WSM

WORKSHOP MANUAL
TRACTOR

L3560,L4060,L4760,
L5060,L5460,L6060

Kubota

KiSC issued 03, 2016 A

TO THE READER

This Workshop Manual tells the servicing personnel about the mechanism, servicing and maintenance of the KUBOTA Tractor L3560, L4060, L4760, L5060, L5460 and L6060. It contains 4 parts: **"Information"**, **"General"**, **"Mechanism"** and **"Servicing"**.

■ **Information**

This section contains information below.

- Safety First
- Safety Decal
- Specification
- Dimension

■ **General**

This section contains information below.

- Engine Identification
- Model Identification
- General Precautions
- Maintenance Check List
- Check and Maintenance
- Special Tools

■ **Mechanism**

This section contains information on the struction and the function of the unit. Before you continue with the subsequent sections, make sure that you read this section.

Refer to the latest version of the Workshop Manual (Code No. 9Y021-01870 / 9Y021-18200) for the diesel engine / tractor mechanism that this workshop manual does not include.

■ **Servicing**

This section contains information below.

- Troubleshooting
- Servicing Specifications
- Tightening Torques
- Checking, Disassembling and Servicing

Regarding the servicing of Common Rail System (CRS), refer to "DIAGNOSIS MANUAL" (9Y120-02420) at the end of this manual.

Regarding the servicing of Diesel Particulate Filter (DPF), refer to "DIESEL PARTICULATE FILTER HANDLING MANUAL" (9Y111-08130).

All illustrations, photographs and specifications contained in this manual are of the newest information available at the time of publication.

KUBOTA reserves the right to change all information at any time without notice.

Since this manual includes many models, information or illustrations and photographs can show more than one model.

May, 2013

Record of Revisions

For pdf, use search function {Search word} to find all the revised locations.

Last digit of the Code No.	Issue month	Main Revised Point and Corrective Measures {Search word}	Reference Page
1	2015.11	Correction of Workshop Manual	
		3. SPECIFICATIONS	I-12, I-14
		4. TRAVELING SPEEDS	I-16, I-17
		Checking DPF Differential Pressure Sensor Pipes and Hoses	G-38
		Flushing Cooling System and Changing Coolant	G-40
		10. IMPLEMENT LIMITATIONS	G-80
		[1] OIL COOLER	1-M3
		[1] THERMOSTAT	1-M4
		[2] BOTTOM BYPASS SYSTEM	1-M5
		[3] RAIL	1-M12
		[3] EGR VALVE	1-M22
		7. AFTER TREATMENT SYSTEM	1-M23 to 1-M29
		Oil Separator	1-M31
		Valve Clearance	1-S13
		Opening-temperature of Thermostat Valve	1-S16
		Filter Comp (DPF) (If necessary)	1-S20
		Judgment of Reuse of Filter Comp (DPF) After Cleaning by Cleaning Contractor	1-S23
		Draining Coolant	1-S24, 1-S37
		Fuel Camshaft	1-S65
		Pistons	1-S67
		Flywheel	1-S70
		Measuring Angular Deviation between Crankshaft TDC and Crank Position Sensor Detected TDC	1-S71
		Confirmation of Crank Position Sensor Top Dead Center Detection Position	1-S72
		Fuel Injection Timing Correction Amount	1-S73
		Main Bearing Case Assembly	1-S75
		Replacement of Valve Guide	1-S78
		(1) Electrical Adjusting [GST Fine-adjustment with Electronic Instrument Panel (Intellipanel)]	3-S21
		(1) Electrical Adjusting [Adjustment with Electronic Instrument Panel (Intellipanel)]	3-S27

Last digit of the Code No.	Issue month	Main Revised Point and Corrective Measures {Search word}	Reference Page
1	2015.11	Overheating Warning	9-M37
		2. SERVICING SPECIFICATIONS	9-S9
		(3) Mode "B" (Traveling Speed Coefficient Input Mode) Input the 4 Digit Tire Code for Correct Travel Speed to the Electronic Instrument Panel Memory Panel	9-S20
		(10) Mode "K" (HST Pedal and Range Shift Lever Fine-adjustment Mode)	9-S27
		(11) Mode "L" (Throttle Sensor Fine-adjustment Mode)	9-S29
		(13) Mode "N" (Tractor Model Select Mode)	9-S30
		(2) SCV (Suction Control Valve)	9-S76
		(7) Crankshaft Position Sensor	9-S81
		(11) Exhaust Temperature Sensor	9-S85
2	2016.03	Maintenance interval was improved.	G-13 to G-49
		CCV heater equipped model was introduced. Assembling and disassembling process in ENGINE was revised and some wiring diagram, electrical circuit and components are added in ELECTRICAL SYSTEM.	1-S1, 1-S17, 1-S29, 1-S46, 1-S47, 2-S9, 9-M2, 9-M4, 9-M6, 9-M8, 9-M10, 9-M12, 9-M14, 9-M16, 9-S34, 9-S35, 9-S89 to 9-S90, 10-S42, 10-S43

I INFORMATION

INFORMATION

CONTENTS

1. SAFETY FIRST

⚠ SAFETY FIRST

- **This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.**
- **It is essential that you read the instructions and safety regulations before you try to repair or use this unit.**

⚠ DANGER
- **Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

⚠ WARNING
- **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

⚠ CAUTION
- **Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.**

■ IMPORTANT
- **Indicates that equipment or property damage could result if instructions are not followed.**

■ NOTE
- **Gives helpful information.**

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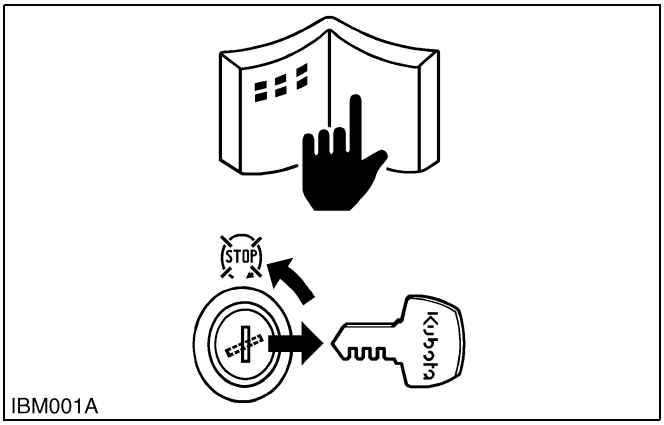

IBM001A


IBM002A

BEFORE YOU START SERVICE

- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a stable and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, then remove the key.
- Disconnect the battery negative cable.
- Hang a **"DO NOT OPERATE"** tag in the operator station.

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START SAFELY

- Do not do the procedures below when you start the engine.
  - short across starter terminals
  - bypass the safety start switch
- Do not change or remove any part of machine safety system.
- Before you start the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Do not start the engine when you stay on the ground. Start the engine only from operator's seat.

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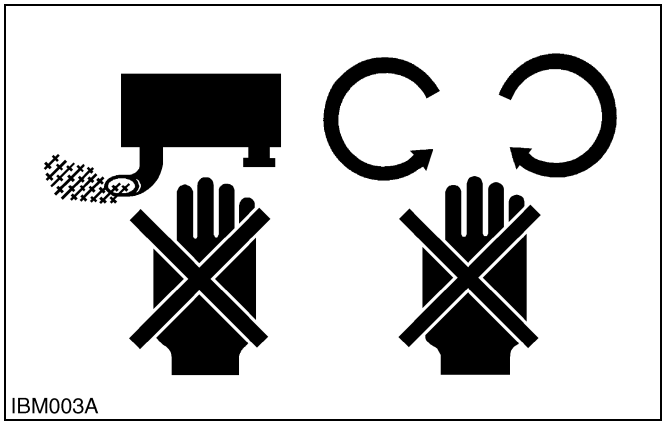
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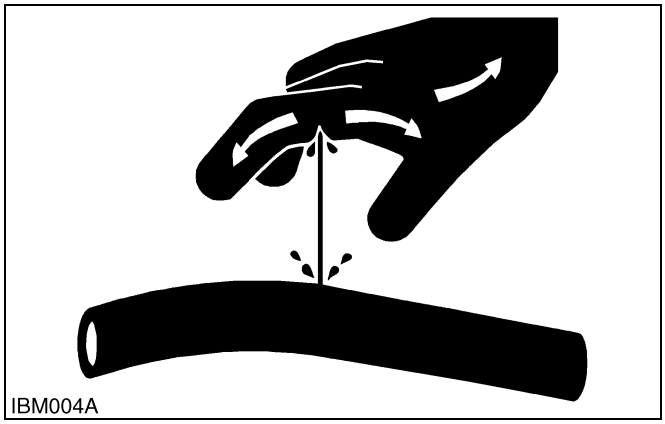
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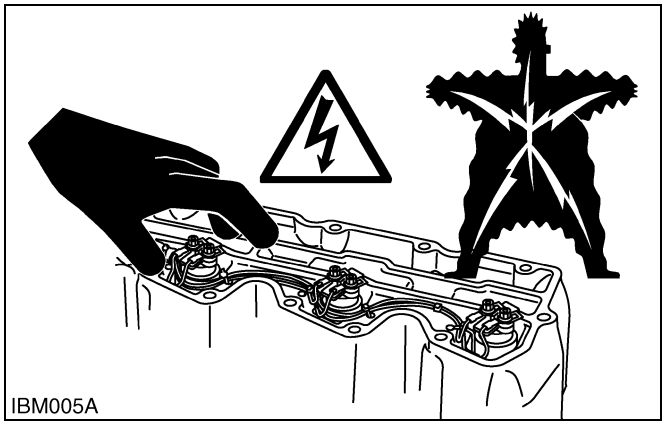
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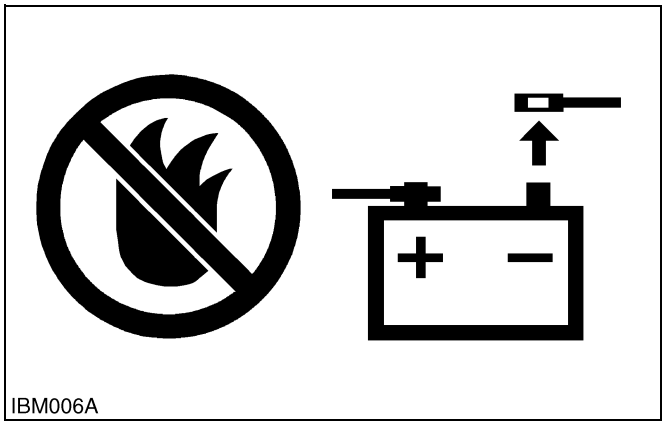
IBM006A

OPERATE SAFELY

- Do not use the machine after you consume alcohol or medication or when you are tired.
- Put on applicable clothing and safety equipment.
- Use applicable tools only. Do not use alternative tools or parts.
- When 2 or more persons do servicing, make sure that you do it safely.
- Do not operate below the machine that only a jack holds. Always use a safety stand to hold the machine.
- Do not touch the hot parts or parts that turn when the engine operates.
- Do not remove the radiator cap when the engine operates, or immediately after it stops. If not, hot water can spout out from the radiator. Only remove the radiator cap when it is at a sufficiently low temperature to touch with bare hands. Slowly loosen the cap to release the pressure before you remove it fully.
- Released fluid (fuel or hydraulic oil) under pressure can cause damage to the skin and cause serious injury. Release the pressure before you disconnect hydraulic or fuel lines. Tighten all connections before you apply the pressure.
- Do not open a fuel system under high pressure. The fluid under high pressure that stays in fuel lines can cause serious injury. Do not disconnect or repair the fuel lines, sensors, or any other components between the fuel pump and injectors on engines with a common rail fuel system under high pressure.
- Put on an applicable ear protective device (earmuffs or earplugs) to prevent injury against loud noises.
- Be careful about electric shock. The engine generates a high voltage of more than DC100 V in the ECU and is applied to the injector.

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PREVENT A FIRE

- Fuel is very flammable and explosive under some conditions. Do not smoke or let flames or sparks in your work area.
- To prevent sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- The battery gas can cause an explosion. Keep the sparks and open flame away from the top of battery, especially when you charge the battery.
- Make sure that you do not spill fuel on the engine.

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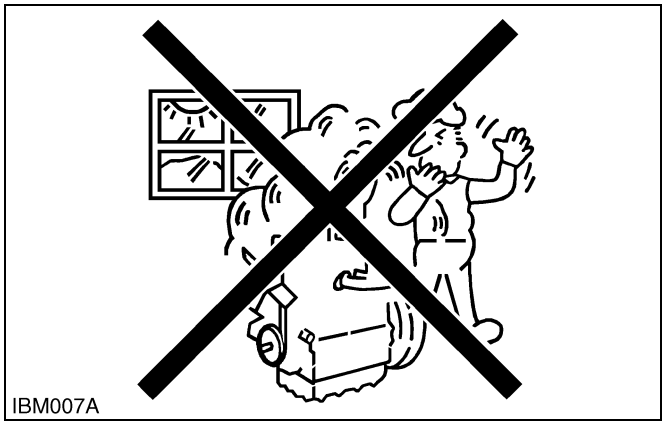
IBM007A

KEEP A GOOD AIRFLOW IN THE WORK AREA

- If the engine is in operation, make sure that the area has good airflow. Do not operate the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.

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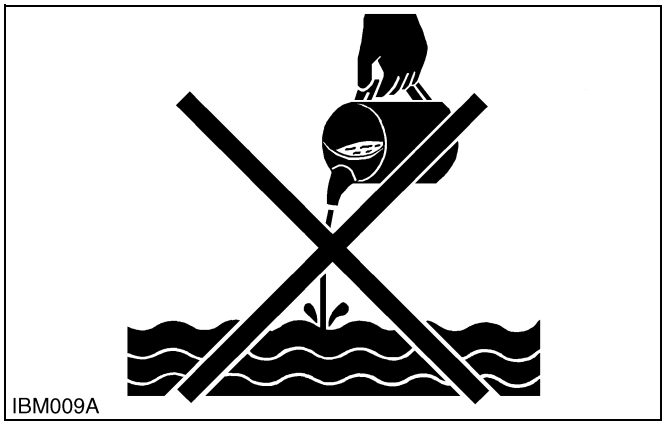
IBM009A

DISCARD FLUIDS CORRECTLY

- Do not discard fluids on the ground, down the drain, into a stream, pond, or lake. Obey related environmental protection regulations when you discard oil, fuel, coolant, electrolyte and other dangerous waste.

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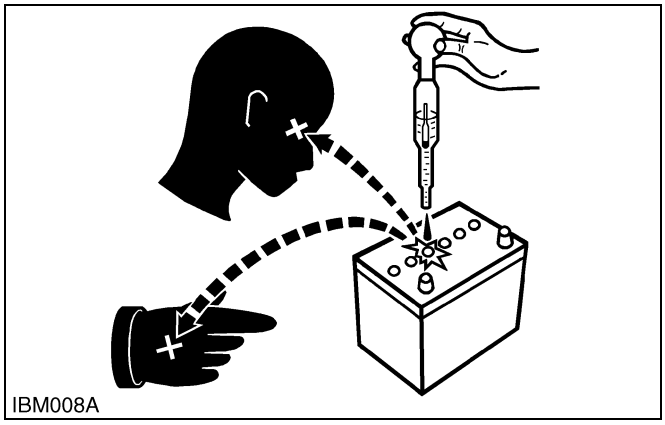
IBM008A

PREVENT ACID BURNS

- Keep electrolyte away from your eyes, hands and clothing. Sulfuric acid in battery electrolyte is poisonous and it can burn your skin and clothing and cause blindness. If you spill electrolyte on yourself, clean yourself with water, and get medical aid immediately.

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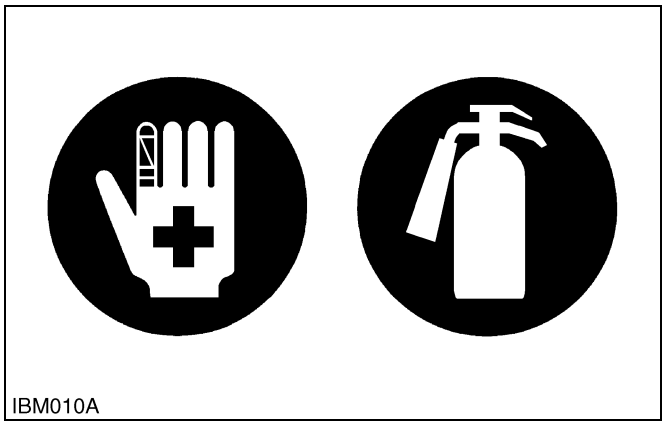

IBM010A

PREPARE FOR EMERGENCIES

- Keep a first aid kit and fire extinguisher ready at all times.
- Keep the emergency contact telephone numbers near your telephone at all times.

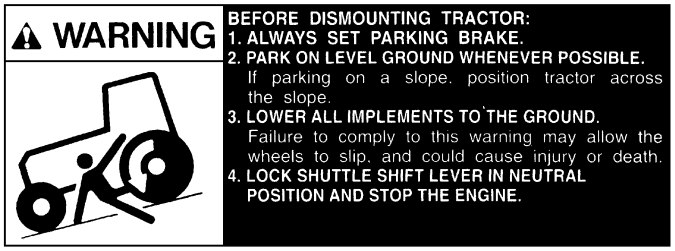
WSM000001INI0009US0

2. SAFETY DECALS

The following safety decals are installed on the machine. If a decal becomes damaged, illegible or is not on the machine, replace it. The decal part number is listed in the parts list.

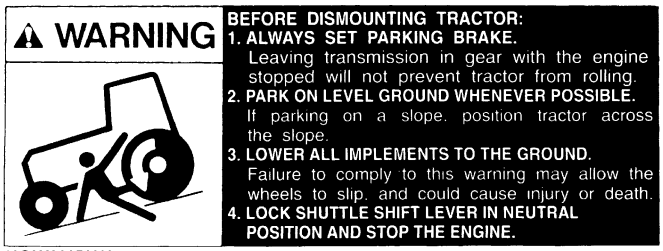
WSM000001INI0013US0

(1) Part No. TD140-4933-1 [Manual Transmission Type]



1AGAMAAAP4000

(1) Part No. TA140-4992-1 [GST Type]

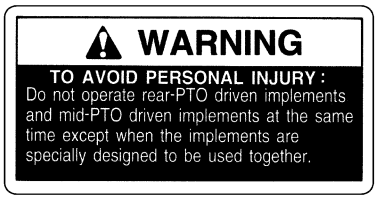


1AGAMAAAP3990

(1) Part No. TD170-4933-1 [HST Type]

1AGAMAAAP3720

(2) Part No. TA040-4934-2
[Mid-PTO type]

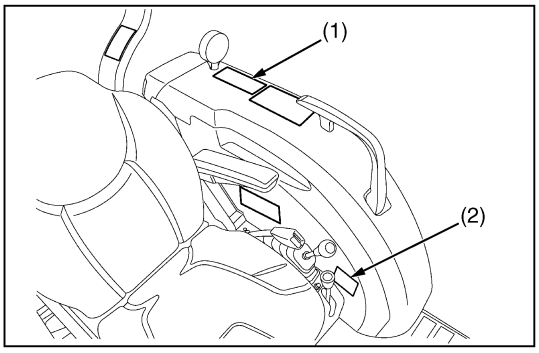


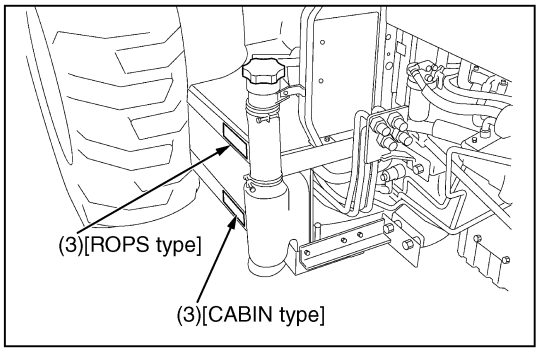
1AGAMAAAP4880

(3) Part No. TC420-4956-1

Diesel fuel only No fire

1AGAIDHAP154E

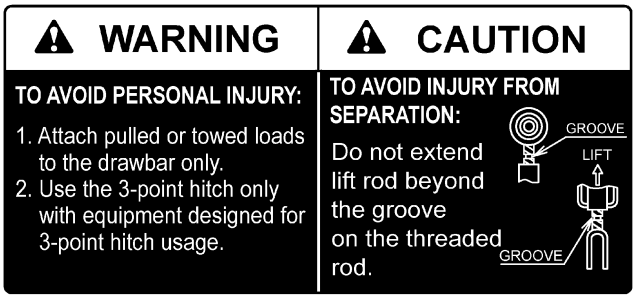




9Y1210824ICI001US

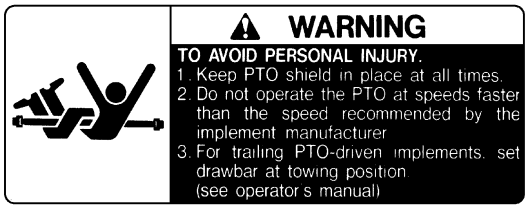
9Y1210824INI0001US0

(1) Part No. TD170-4935-1



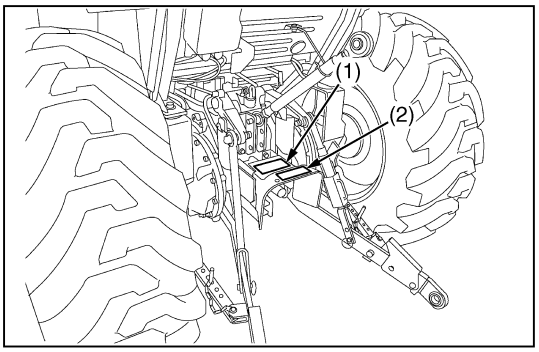
1AGAWAAAP085A

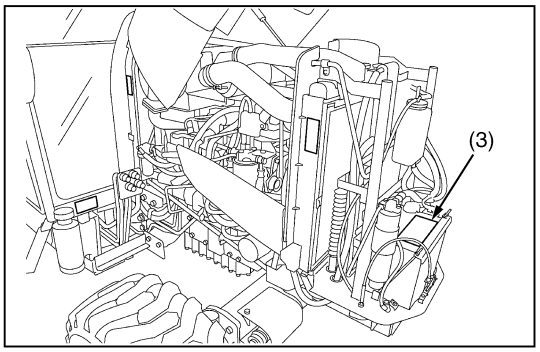
(2) Part No. TA040-4959-3



1AGAMAAAP3830

(3) Part No. TD060-3012-3

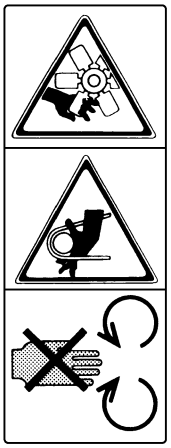




9Y1210824ICI002US

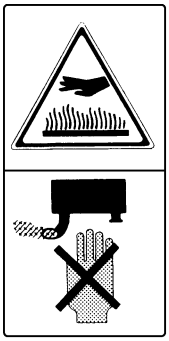
9Y1210824INI0002US0

(1) Part No. 32751-4958-1
Do not get your hands close to engine fan and fan belt.



1AGAMAAAP3980

(2) Part No. TC030-4958-1
Do not touch hot surface like muffler, etc.



1AGAMAAAP3760

(3) Part No. 3C151-9861-1

⚠ CAUTION

TO AVOID PERSONAL INJURY:

When the Diesel Particulate Filter (DPF) is in the regenerating mode, the exhaust gas and the DPF muffler become hot. During regeneration, take into account that the muffler will be very hot and keep the machine away from other people, animals, plants, and flammable material. Also keep the area near the DPF muffler clean and away from flammable material.

1AGAIJHAP084A

(4) Part No. 3C581-9858-1

⚠ DANGER

TO AVOID POSSIBLE INJURY OR DEATH FROM A MACHINE RUNAWAY.

1. Do not start engine by shorting across starter terminals or bypassing the safety start switch. Machine may start in gear and move if normal starting circuitry is bypassed.
2. Start engine only from operator's seat with transmission and PTO OFF. Never start engine while standing on the ground.

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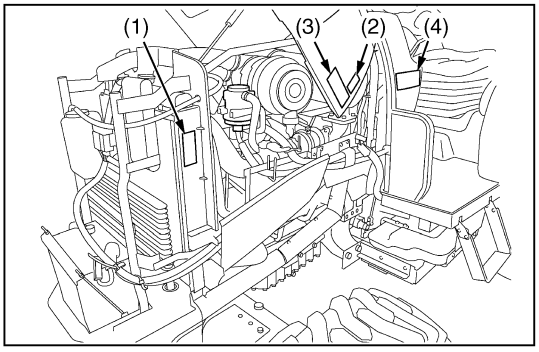
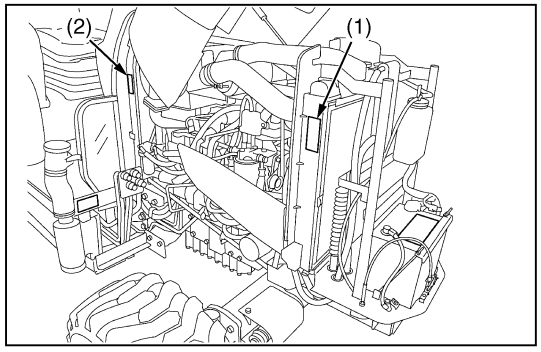




9Y1210824ICI003US

9Y1210824INI0003US0

(1) Part No. 6C140-4746-1
[Foldable ROPS type]

⚠ WARNING

TO AVOID PERSONAL INJURY:

Do not modify or repair a ROPS because welding grinding, drilling or cutting any portion may weaken the structure.

1AGAMAAAP3870

(2) Part No. TD060-4927-1
[Foldable ROPS type]

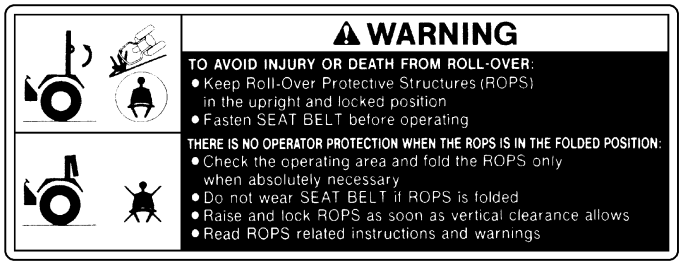
⚠ CAUTION

TO AVOID INJURY WHEN RAISING OR FOLDING ROPS:

- Set parking brake and stop engine.
- Remove any obstruction that may prevent raising or folding of the ROPS.
- Do not allow any bystanders.
- Always perform function from a stable position at the rear of the tractor.
- Hold the top of the ROPS securely when raising or folding.
- Make sure all pins are installed and locked.

1AGAMAAAP4800

(3) Part No. TA240-9848-1
[Foldable ROPS type]



1AGAMAAAP3730

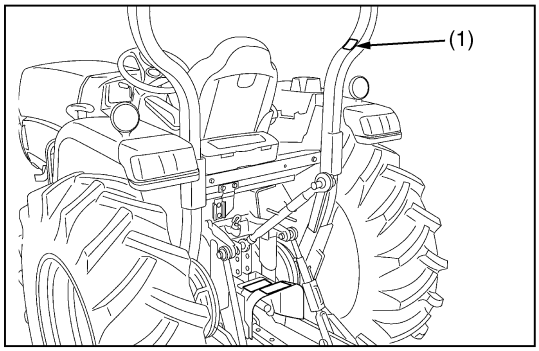
(4) Part No. TD170-4938-1

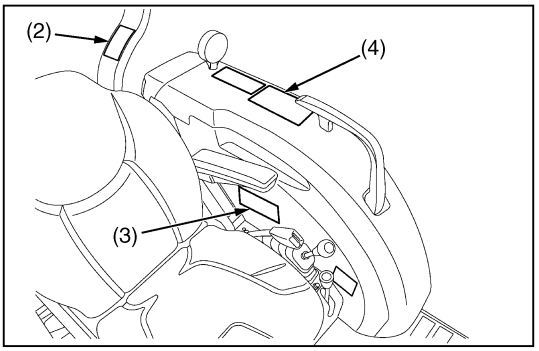
⚠ CAUTION

TO AVOID PERSONAL INJURY:

1. Read and understand the operator's manual before operation.
2. Before starting the engine, make sure that everyone is at a safe distance from the tractor and that the PTO is OFF.
3. Do not allow passengers on the tractor at any time.
4. Before allowing other people to use the tractor, have them read the operator's manual.
5. Check the tightness of all nuts and bolts regularly.
6. Keep all shields in place and stay away from all moving parts.
7. Lock the two brake pedals together before driving on the road.
8. Slow down for turns, or rough roads, or when applying individual brakes.
9. On public roads use SMV emblem and hazard lights, if required by local traffic and safety regulations.
10. Pull only from the drawbar.
11. Before dismounting, lower the implement to the ground, set the parking brake, stop the engine and remove the key.
12. Securely support tractor and implements before working underneath.

1AGAMAOAP0800





9Y1210824ICI004US

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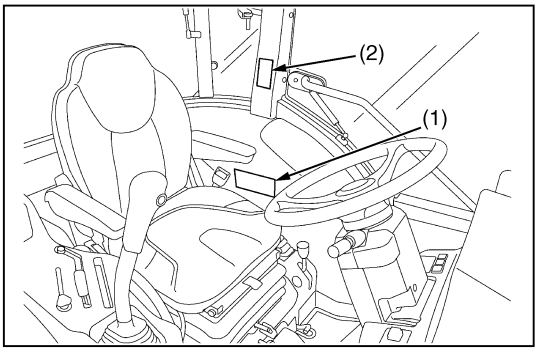
1AGAMAOAP079E

(2) Part No. TA040-4902-1

1AGAMAOAP0780



9Y1210824ICI005US

9Y1210824INI0005US0

(1) Part No. TD170-4938-1

⚠ CAUTION

TO AVOID PERSONAL INJURY:

1. Read and understand the operator's manual before operation.
2. Before starting the engine, make sure that everyone is at a safe distance from the tractor and that the PTO is OFF.
3. Do not allow passengers on the tractor at any time.
4. Before allowing other people to use the tractor, have them read the operator's manual.
5. Check the tightness of all nuts and bolts regularly.
6. Keep all shields in place and stay away from all moving parts.
7. Lock the two brake pedals together before driving on the road.
8. Slow down for turns, or rough roads, or when applying individual brakes.
9. On public roads use SMV emblem and hazard lights, if required by local traffic and safety regulations.
10. Pull only from the drawbar.
11. Before dismounting, lower the implement to the ground, set the parking brake, stop the engine and remove the key.
12. Securely support tractor and implements before working underneath.

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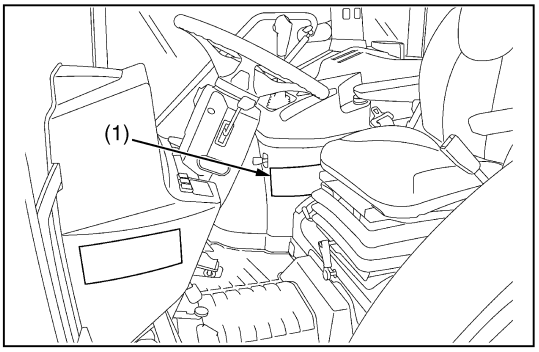


9Y1210824ICI006US

9Y1210824INI0006US0

CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels.
4. If a component with danger, warning and caution label(s) affixed is replace with new part, make sure new label(s) is (are) attached in the same locations(s) as the replace component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressure any bubbles to outside edge.

9Y1210824INI0007US0

3. SPECIFICATIONS

[1] MANUAL TRANSMISSION

Model			L3560	L4060
			4WD	
Engine	Model		D1803-CR-E4	V2403-CR-E4
	Type		Direct injection vertical, water-cooled, 4-cycle diesel	
	Number of cylinders		3	4
	Total displacement		1.826 L (111.4 cu.in.)	2.434 L (148.5 cu.in.)
	Bore and stroke		87 × 102.4 mm (3.4 × 4.0 in.)	
	Rated revolution		2700 min^{-1} (rpm)	
	Low idling revolution		800 min^{-1} (rpm)	
	Net power*		26.1 kW (35.0 HP)	29.8 kW (40.0 HP)
	PTO power* (factory observed)		22.0 kW (29.5 HP) / 2700 min^{-1} (rpm)	25.4 kW (34.0 HP) / 2700 min^{-1} (rpm)
	Maximum torque		114.1 N·m (84.2 lbf·ft)	133.5 N·m (98.5 lbf·ft)
	Battery capacity		12 V, RC: 133 min, CCA: 582 A	
Capacities	Fuel tank		51 L (13.5 U.S.gals, 11.2 Imp.gals)	
	Engine crankcase (with filter)		6.7 L (7.1 U.S.qts, 5.9 Imp.qts)	8.2 L (8.7 U.S.qts, 7.2 Imp.qts)
	Engine coolant		7.5 L (7.9 U.S.qts, 6.6 Imp.qts)	
	Transmission case		42 L (11.1 U.S.gals, 9.24 Imp.gals)	43 L (11.4 U.S.gals, 9.46 Imp.gals)
Dimensions	Overall length (without 3p)		2920 mm (115.0 in.)	3085 mm (121.5 in.)
	Overall width (min. tread)		1520 mm (59.8 in.)	1690 mm (66.5 in.)
	Overall height (with ROPS)		2470 mm (97.2 in.)	2480 mm (97.6 in.)
	Wheel base		1805 mm (71.1 in.)	1895 mm (74.6 in.)
	Min. ground clearance		342 mm (13.5 in.)	360 mm (14.2 in.)
	Tread	Front	1155 mm (45.5 in.)	
		Rear	1200 mm (47.2 in.), 1300 mm (51.2 in.), 1385 mm (54.5 in.), 1480 mm (58.3 in.)	1285 mm (50.6 in.), 1435 mm (56.5 in.), 1530 mm (60.2 in.)
Weight (with ROPS)			1590 kg (3505 lbs)	1635 kg (3605 lbs)
Traveling system	Standard tire size	Front	7-16	8.3-16
		Rear	12.4-24	14.9-24
	Clutch		Dry type single stage	
	Steering		Hydrostatic power steering	
	Transmission		8 forward and 8 reverse fully synchronized main and shuttle transmission	
	Braking system		Wet disk type	
	Min. turning radius (with brake)		2.7 m (8.9 feet)	
Hydraulic unit	Hydraulic control system		Position control	
	Pump capacity		31.5 L (8.3 U.S.gals, 6.9 Imp.gals)	37.0 L (9.8 U.S.gals, 8.1 Imp.gals)
	Three point hitch		SAE category 1	
	Max. lift force	At lift points	1700 kg (3750 lbs)	1750 kg (3860 lbs)
		24 in. behind lift points	1200 kg (2650 lbs)	1250 kg (2760 lbs)
	System pressure		17.7 MPa (180 kgf/cm^2, 2560 psi)	
PTO	Rear PTO		SAE 1-3/8, 6 splines	
	PTO/Engine speed		540 min^{-1} (rpm) / 2550 min^{-1} (rpm)	

■ **NOTE**

- ***Manufacturer's estimate**
  The company reserve the right to change the specifications without notice.

9Y1210824INI0008US0

[2] GST

Model			L3560	L4060	L4760	L5060
			4WD			
Engine	Model		D1803-CR-E4	V2403-CR-E4		V2403-CR-TE4
	Type		Direct injection vertical, water-cooled, 4-cycle diesel			
	Number of cylinders		3	4		
	Total displacement		1.826 L (111.4 cu.in.)	2.434 L (148.5 cu.in.)		
	Bore and stroke		87 × 102.4 mm (3.4 × 4.0 in.)			
	Rated revolution		2700 min^{-1} (rpm)			
	Low idling revolution		800 min^{-1} (rpm)			
	Net power*		26.1 kW (35.0 HP)	29.8 kW (40.0 HP)	35.1 kW (47.0 HP)	37.3 kW (50.0 HP)
	PTO power* (factory observed)		22.0 kW (29.5 HP) / 2700 min^{-1} (rpm)	25.4 kW (34.0 HP) / 2700 min^{-1} (rpm)	30.6 kW (41.0 HP) / 2700 min^{-1} (rpm)	32.8 kW (44.0 HP) / 2700 min^{-1} (rpm)
	Maximum torque		114.1 N·m (84.2 lbf·ft)	133.5 N·m (98.5 lbf·ft)	157.4 N·m (116.1 lbf·ft)	164.2 N·m (121.1 lbf·ft)
	Battery capacity		12 V, RC: 133 min, CCA: 582 A			
Capacities	Fuel tank		51 L (13.5 U.S.gals, 11.2 Imp.gals)			
	Engine crankcase (with filter)		6.7 L (7.1 U.S.qts, 5.9 Imp.qts)	8.2 L (8.7 U.S.qts, 7.2 Imp.qts)		9.4 L (9.9 U.S.qts, 8.3 Imp.qts)
	Engine coolant		7.5 L (7.9 U.S.qts, 6.6 Imp.qts)		8.2 L (8.7 U.S.qts, 7.2 Imp.qts)	
	Transmission case		42 L (11.1 U.S.gals, 9.24 Imp.gals)	43 L (11.4 U.S.gals, 9.46 Imp.gals)		45 L (11.9 U.S.gals, 9.9 Imp.gals)
Dimensions	Overall length (without 3p)		2920 mm (115.0 in.)	3085 mm (121.5 in.)		3210 mm (126.4 in.)
	Overall width (min. tread)		1520 mm (59.8 in.)	1690 mm (66.5 in.)		1710 mm (67.3 in.)
	Overall height (with ROPS)		2470 mm (97.2 in.)	2480 mm (97.6 in.)		2490 mm (98.0 in.)
	Wheel base		1805 mm (71.1 in.)	1895 mm (74.6 in.)		1915 mm (75.4 in.)
	Min. ground clearance		342 mm (13.5 in.)	360 mm (14.2 in.)		392 mm (15.4 in.)
	Tread	Front	1155 mm (45.5 in.)		1300 mm (51.2 in.)	1340 mm (52.8 in.)
		Rear	1200 mm (47.2 in.), 1300 mm (51.2 in.), 1385 mm (54.5 in.), 1480 mm (58.3 in.)	1285 mm (50.6 in.), 1435 mm (56.5 in.), 1530 mm (60.2 in.)		1325 mm (52.2 in.), 1430 mm (56.3 in.)
Weight (with ROPS)			1610 kg (3549 lbs)	1655 kg (3649 lbs)	1675 kg (3693 lbs)	1780 kg (3924 lbs)
Traveling system	Standard tire size	Front	7-16	8.3-16		9.5-16
		Rear	12.4-24	14.9-24		14.9-26
	Clutch		Dry type single stage			
	Steering		Hydrostatic power steering			
	Transmission		Glide shift transmission (12 forward and 8 reverse speeds)			
	Braking system		Wet disk type			
	Min. turning radius (with brake)		2.7 m (8.9 feet)			2.8 m (9.2 feet)
Hydraulic unit	Hydraulic control system		Position control			
	Pump capacity		31.5 L (8.3 U.S.gals, 6.9 Imp.gals)	37.0 L (9.8 U.S.gals, 8.1 Imp.gals)		
	Three point hitch		SAE category 1			SAE category 1, 2
	Max. lift force	At lift points	1700 kg (3750 lbs)	1750 kg (3860 lbs)		
		24 in. behind lift points	1200 kg (2650 lbs)	1250 kg (2760 lbs)		1350 kg (2980 lbs)
	System pressure		17.7 MPa (180 kgf/cm^2, 2560 psi)			
PTO	Rear PTO		SAE 1-3/8, 6 splines			
	PTO/Engine speed		540 min^{-1} (rpm) / 2550 min^{-1} (rpm)			

■ **NOTE**

- ***Manufacturer's estimate**
  The company reserve the right to change the specifications without notice.

9Y1210824INI0009US0

[3] HST

Model			L3560	L4060	L4760	L5460	L6060
			4WD				
Engine	Model		D1803-CR-E4	V2403-CR-E4		V2403-CR-TE4	
	Type		Direct injection vertical, water-cooled, 4-cycle diesel				
	Number of cylinders		3	4			
	Total displacement		1.826 L (111.4 cu.in.)	2.434 L (148.5 cu.in.)			
	Bore and stroke		87 × 102.4 mm (3.4 × 4.0 in.)				
	Rated revolution		2600 min^{-1} (rpm)				
	Low idling revolution		800 min^{-1} (rpm)				
	Net power*		26.1 kW (35.0 HP)	29.8 kW (40.0 HP)	35.1 kW (47.0 HP)	40.3 kW (54.0 HP)	44.8 kW (60.0 HP)
	PTO power* (factory observed)		20.9 kW (28.0 HP) / 2600 min^{-1} (rpm)	24.2 kW (32.5 HP) / 2600 min^{-1} (rpm)	29.5 kW (39.5 HP) / 2600 min^{-1} (rpm)	34.7 kW (46.5 HP) / 2600 min^{-1} (rpm)	39.5 kW (53.0 HP) / 2600 min^{-1} (rpm)
	Maximum torque		114.1 N·m (84.2 lbf·ft)	133.5 N·m (98.5 lbf·ft)	157.4 N·m (116.1 lbf·ft)	182.6 N·m (134.7 lbf·ft)	195.6 N·m (144.3 lbf·ft)
	Battery capacity		12 V, RC: 133 min, CCA: 582 A				
Capacities	Fuel tank		51 L (13.5 U.S.gals, 11.2 Imp.gals)				
	Engine crankcase (with filter)		6.7 L (7.1 U.S.qts, 5.9 Imp.qts)	8.2 L (8.7 U.S.qts, 7.2 Imp.qts)		9.4 L (9.9 U.S.qts, 8.3 Imp.qts)	
	Engine coolant		7.5 L (7.9 U.S.qts, 6.6 Imp.qts)		8.2 L (8.7 U.S.qts, 7.2 Imp.qts)		
	Transmission case		42 L (11.1 U.S.gals, 9.24 Imp.gals)	43 L (11.4 U.S.gals, 9.46 Imp.gals)		45 L (11.9 U.S.gals, 9.9 Imp.gals)	
Dimensions	Overall length (without 3p)		2920 mm (115.0 in.)	3085 mm (121.5 in.)		3210 mm (126.4 in.)	
	Overall width (min. tread)		1520 mm (59.8 in.)	1690 mm (66.5 in.)		1710 mm (67.3 in.)	
	Overall height (with ROPS)		2470 mm (97.2 in.)	2480 mm (97.6 in.)		2490 mm (98.0 in.)	
	Wheel base		1805 mm (71.1 in.)	1895 mm (74.6 in.)		1915 mm (75.4 in.)	
	Min. ground clearance		342 mm (13.5 in.)	360 mm (14.2 in.)		392 mm (15.4 in.)	
	Tread	Front	1155 mm (45.5 in.)		1300 mm (51.2 in.)	1340 mm (52.8 in.)	
		Rear	1200 mm (47.2 in.), 1300 mm (51.2 in.), 1385 mm (54.5 in.), 1480 mm (58.3 in.)	1285 mm (50.6 in.), 1435 mm (56.5 in.), 1530 mm (60.2 in.)		1325 mm (52.2 in.), 1430 mm (56.3 in.)	
Weight (with ROPS)			1655 kg (3649 lbs)	1700 kg (3748 lbs)	1720 kg (3792 lbs)	1825 kg (4023 lbs)	
Traveling system	Standard tire size	Front	7-16	8.3-16		9.5-16	
		Rear	12.4-24	14.9-24		14.9-26	
	Clutch		–				
	Steering		Hydrostatic power steering				
	Transmission		Hydrostatic transmission (3 speeds)				
	Braking system		Wet disk type				
	Min. turning radius (with brake)		2.7 m (8.9 feet)			2.8 m (9.2 feet)	

Model			L3560	L4060	L4760	L5460	L6060
			4WD				
Hydraulic unit	Hydraulic control system		Position control				
	Pump capacity		30.4 L (8.0 U.S.gals, 6.7 Imp.gals)	35.6 L (9.4 U.S.gals, 7.8 Imp.gals)			
	Three point hitch		SAE category 1			SAE category 1, 2	
	Max. lift force	At lift points	1700 kg (3750 lbs)	1750 kg (3860 lbs)			
		24 in. behind lift points	1200 kg (2650 lbs)	1250 kg (2760 lbs)		1350 kg (2980 lbs)	
	System pressure		17.7 MPa (180 kgf/cm^2, 2560 psi)				
PTO	Rear PTO		SAE 1-3/8, 6 splines				
	PTO/Engine speed		540 min^{-1} (rpm) / 2426 min^{-1} (rpm)	540 min^{-1} (rpm) / 2476 min^{-1} (rpm)		540 min^{-1} (rpm) / 2403 min^{-1} (rpm)	

■ **NOTE**

- ***Manufacturer's estimate**
  The company reserve the right to change the specifications without notice.

9Y1210824INI0010US0

[4] HST with CABIN TYPE

Model			L3560	L4060	L4760	L5460	L6060
			4WD				
Engine	Model		D1803-CR-E4	V2403-CR-E4		V2403-CR-TE4	
	Type		Direct injection vertical, water-cooled, 4-cycle diesel				
	Number of cylinders		3	4			
	Total displacement		1.826 L (111.4 cu.in.)	2.434 L (148.5 cu.in.)			
	Bore and stroke		87 × 102.4 mm (3.4 × 4.0 in.)				
	Rated revolution		2600 min^{-1} (rpm)				
	Low idling revolution		800 min^{-1} (rpm)				
	Net power*		26.1 kW (35.0 HP)	29.8 kW (40.0 HP)	35.1 kW (47.0 HP)	40.3 kW (54.0 HP)	44.8 kW (60.0 HP)
	PTO power* (factory observed)		20.9 kW (28.0 HP) / 2600 min^{-1} (rpm)	24.2 kW (32.5 HP) / 2600 min^{-1} (rpm)	29.5 kW (39.5 HP) / 2600 min^{-1} (rpm)	34.7 kW (46.5 HP) / 2600 min^{-1} (rpm)	39.5 kW (53.0 HP) / 2600 min^{-1} (rpm)
	Maximum torque		114.1 N·m (84.2 lbf·ft)	133.5 N·m (98.5 lbf·ft)	157.4 N·m (116.1 lbf·ft)	182.6 N·m (134.7 lbf·ft)	195.6 N·m (144.3 lbf·ft)
	Battery capacity		12 V, RC: 133 min, CCA: 582 A				
Capacities	Fuel tank		51 L (13.5 U.S.gals, 11.2 Imp.gals)				
	Engine crankcase (with filter)		6.7 L (7.1 U.S.qts, 5.9 Imp.qts)	8.2 L (8.7 U.S.qts, 7.2 Imp.qts)		9.4 L (9.9 U.S.qts, 8.3 Imp.qts)	
	Engine coolant		7.5 L (7.9 U.S.qts, 6.6 Imp.qts)		8.2 L (8.7 U.S.qts, 7.2 Imp.qts)		
	Transmission case		42 L (11.1 U.S.gals, 9.24 Imp.gals)	43 L (11.4 U.S.gals, 9.46 Imp.gals)		45 L (11.9 U.S.gals, 9.9 Imp.gals)	
Dimensions	Overall length (without 3p)		2920 mm (115.0 in.)	3085 mm (121.5 in.)		3210 mm (126.4 in.)	
	Overall width (min. tread)		1520 mm (59.8 in.)	1690 mm (66.5 in.)		1710 mm (67.3 in.)	
	Overall height		2300 mm (90.6 in.)	2315 mm (91.1 in.)		2350 mm (92.5 in.)	
	Wheel base		1805 mm (71.1 in.)	1895 mm (74.6 in.)		1915 mm (75.4 in.)	
	Min. ground clearance		342 mm (13.5 in.)	360 mm (14.2 in.)		392 mm (15.4 in.)	
	Tread	Front	1155 mm (45.5 in.)		1300 mm (51.2 in.)	1340 mm (52.8 in.)	
		Rear	1200 mm (47.2 in.), 1300 mm (51.2 in.), 1385 mm (54.5 in.), 1480 mm (58.3 in.)	1285 mm (50.6 in.), 1435 mm (56.5 in.), 1530 mm (60.2 in.)		1325 mm (52.2 in.), 1430 mm (56.3 in.)	
Weight (with CABIN)			1760 kg (3880 lbs)	1875 kg (4134 lbs)	1915 kg (4222 lbs)	1980 kg (4365 lbs)	
Traveling system	Standard tire size	Front	7-16	8.3-16		9.5-16	
		Rear	12.4-24	14.9-24		14.9-26	
	Clutch		–				
	Steering		Hydrostatic power steering				
	Transmission		Hydrostatic transmission (3 speeds)				
	Braking system		Wet disk type				
	Min. turning radius (with brake)		2.7 m (8.9 feet)			2.8 m (9.2 feet)	

Model			L3560	L4060	L4760	L5460	L6060
			4WD				
Hydraulic unit	Hydraulic control system		Position control				
	Pump capacity		30.4 L (8.0 U.S.gals, 6.7 Imp.gals)	35.6 L (9.4 U.S.gals, 7.8 Imp.gals)			
	Three point hitch		SAE category 1			SAE category 1, 2	
	Max. lift force	At lift points	1700 kg (3750 lbs)	1750 kg (3860 lbs)			
		24 in. behind lift points	1200 kg (2650 lbs)	1250 kg (2760 lbs)		1350 kg (2980 lbs)	
	System pressure		17.7 MPa (180 kgf/cm^2, 2560 psi)				
PTO	Rear PTO		SAE 1-3/8, 6 splines				
	PTO/Engine speed		540 min^{-1} (rpm) / 2426 min^{-1} (rpm)	540 min^{-1} (rpm) / 2476 min^{-1} (rpm)		540 min^{-1} (rpm) / 2403 min^{-1} (rpm)	
	Mid-PTO (if equipped)		USA No.5 (KUBOTA 10-tooth) involute spline				
	PTO/Engine speed		2000 min^{-1} (rpm) / 2451 min^{-1} (rpm)	2000 min^{-1} (rpm) / 2502 min^{-1} (rpm)		2000 min^{-1} (rpm) / 2429 min^{-1} (rpm)	

■ **NOTE**

- ***Manufacturer's estimate**
  The company reserve the right to change the specifications without notice.

9Y1210824INI0011US0

4. TRAVELING SPEEDS

[1] MANUAL TRANSMISSION

(At rated engine rpm)

Model				L3560	L4060
Tire size (Rear)				12.4-24	14.9-24
Shuttle shift lever	Creep gear shift lever	Range gear shift lever	Main gear shift lever	km/h (mph)	
Forward	ON	Low	1	0.18 (0.11)	0.17 (0.11)
			2	0.25 (0.16)	0.24 (0.15)
			3	0.41 (0.25)	0.39 (0.24)
			4	0.61 (0.38)	0.57 (0.35)
		High	1	0.88 (0.55)	0.85 (0.53)
			2	1.24 (0.77)	1.20 (0.75)
			3	2.02 (1.26)	1.95 (1.21)
			4	2.98 (1.85)	2.88 (1.79)
	OFF	Low	1	1.6 (1.0)	1.5 (0.9)
			2	2.3 (1.4)	2.1 (1.3)
			3	3.7 (2.3)	3.5 (2.2)
			4	5.4 (3.4)	5.1 (3.2)
		High	1	7.8 (4.8)	7.6 (4.7)
			2	11.1 (6.9)	10.7 (6.6)
			3	18.0 (11.2)	17.4 (10.8)
			4	26.6 (16.5)	25.7 (16.0)
Reverse	ON	Low	1	0.17 (0.11)	0.16 (0.10)
			2	0.24 (0.15)	0.23 (0.14)
			3	0.39 (0.24)	0.37 (0.23)
			4	0.58 (0.36)	0.55 (0.34)
		High	1	0.84 (0.52)	0.81 (0.50)
			2	1.19 (0.74)	1.15 (0.71)
			3	1.93 (1.20)	1.86 (1.16)
			4	2.85 (1.77)	2.75 (1.71)
	OFF	Low	1	1.5 (0.9)	1.4 (0.9)
			2	2.2 (1.4)	2.0 (1.2)
			3	3.5 (2.2)	3.3 (2.1)
			4	5.2 (3.2)	4.9 (3.0)
		High	1	7.5 (4.7)	7.2 (4.5)
			2	10.6 (6.6)	10.2 (6.3)
			3	17.2 (10.7)	16.6 (10.3)
			4	25.4 (15.8)	24.5 (15.2)

The company reserves the right to change the specifications without notice.

9Y1210824INI0012US0

[2] GST

(At rated engine rpm)

Model			L3560	L4060, L4760	L5060
Tire size (Rear)			12.4-24	14.9-24	14.9-26
Shuttle shift lever	Main gear shift lever	Main gear shift lever	km/h (mph)		
Forward	ON	1	0.18 (0.11)	0.17 (0.11)	0.17 (0.11)
		2	0.25 (0.16)	0.24 (0.15)	0.25 (0.16)
		3	0.34 (0.21)	0.32 (0.20)	0.33 (0.21)
		4	0.41 (0.25)	0.39 (0.24)	0.40 (0.25)
		5	0.51 (0.32)	0.47 (0.29)	0.49 (0.30)
		6	0.61 (0.38)	0.57 (0.35)	0.59 (0.37)
		7	0.73 (0.45)	0.71 (0.44)	0.73 (0.45)
		8	0.88 (0.55)	0.85 (0.53)	0.86 (0.55)
		9	1.03 (0.64)	1.00 (0.62)	1.03 (0.64)
		10	1.24 (0.77)	1.20 (0.75)	1.24 (0.77)
		11	2.02 (1.26)	1.95 (1.21)	2.01 (1.25)
		12	2.98 (1.85)	2.88 (1.79)	2.97 (1.85)
	OFF	1	1.6 (1.0)	1.5 (0.9)	1.5 (1.0)
		2	2.3 (1.4)	2.1 (1.3)	2.2 (1.4)
		3	3.1 (1.9)	2.9 (1.8)	3.0 (1.8)
		4	3.7 (2.3)	3.5 (2.2)	3.6 (2.2)
		5	4.5 (2.8)	4.2 (2.6)	4.4 (2.7)
		6	5.4 (3.4)	5.1 (3.2)	5.3 (3.3)
		7	6.5 (4.0)	6.3 (3.9)	6.5 (4.1)
		8	7.8 (4.8)	7.6 (4.7)	7.8 (4.9)
		9	9.2 (5.7)	8.9 (5.5)	9.2 (5.7)
		10	11.1 (6.9)	10.7 (6.6)	11.0 (6.9)
		11	18.0 (11.2)	17.4 (10.8)	17.9 (11.2)
		12	26.6 (16.5)	25.7 (16.0)	26.5 (16.6)

The company reserves the right to change the specifications without notice.

(At rated engine rpm)

Model			L3560	L4060, L4760	L5060
Tire size (Rear)			12.4-24	14.9-24	14.9-26
Shuttle shift lever	Main gear shift lever	Main gear shift lever	km/h (mph)		
Reverse	ON	1	0.17 (0.11)	0.16 (0.10)	0.17 (0.11)
		2	0.24 (0.15)	0.23 (0.14)	0.23 (0.14)
		3	0.39 (0.24)	0.37 (0.23)	0.38 (0.24)
		4	0.58 (0.36)	0.55 (0.34)	0.56 (0.35)
		5	0.84 (0.52)	0.81 (0.50)	0.84 (0.52)
		6	1.19 (0.74)	1.15 (0.71)	1.18 (0.73)
		7	1.93 (1.20)	1.86 (1.16)	1.92 (1.19)
		8	2.85 (1.77)	2.75 (1.71)	2.84 (1.76)
	OFF	1	1.5 (0.9)	1.4 (0.9)	1.5 (0.9)
		2	2.2 (1.4)	2.0 (1.2)	2.1 (1.3)
		3	3.5 (2.2)	3.3 (2.1)	3.4 (2.1)
		4	5.2 (3.2)	4.9 (3.0)	5.0 (3.1)
		5	7.5 (4.7)	7.2 (4.5)	7.5 (4.7)
		6	10.6 (6.6)	10.2 (6.3)	10.5 (6.6)
		7	17.2 (10.7)	16.6 (10.3)	17.1 (10.7)
		8	25.4 (15.8)	24.5 (15.2)	25.3 (15.8)

The company reserves the right to change the specifications without notice.

9Y1210824INI0013US0

[3] HST

(At rated engine rpm)

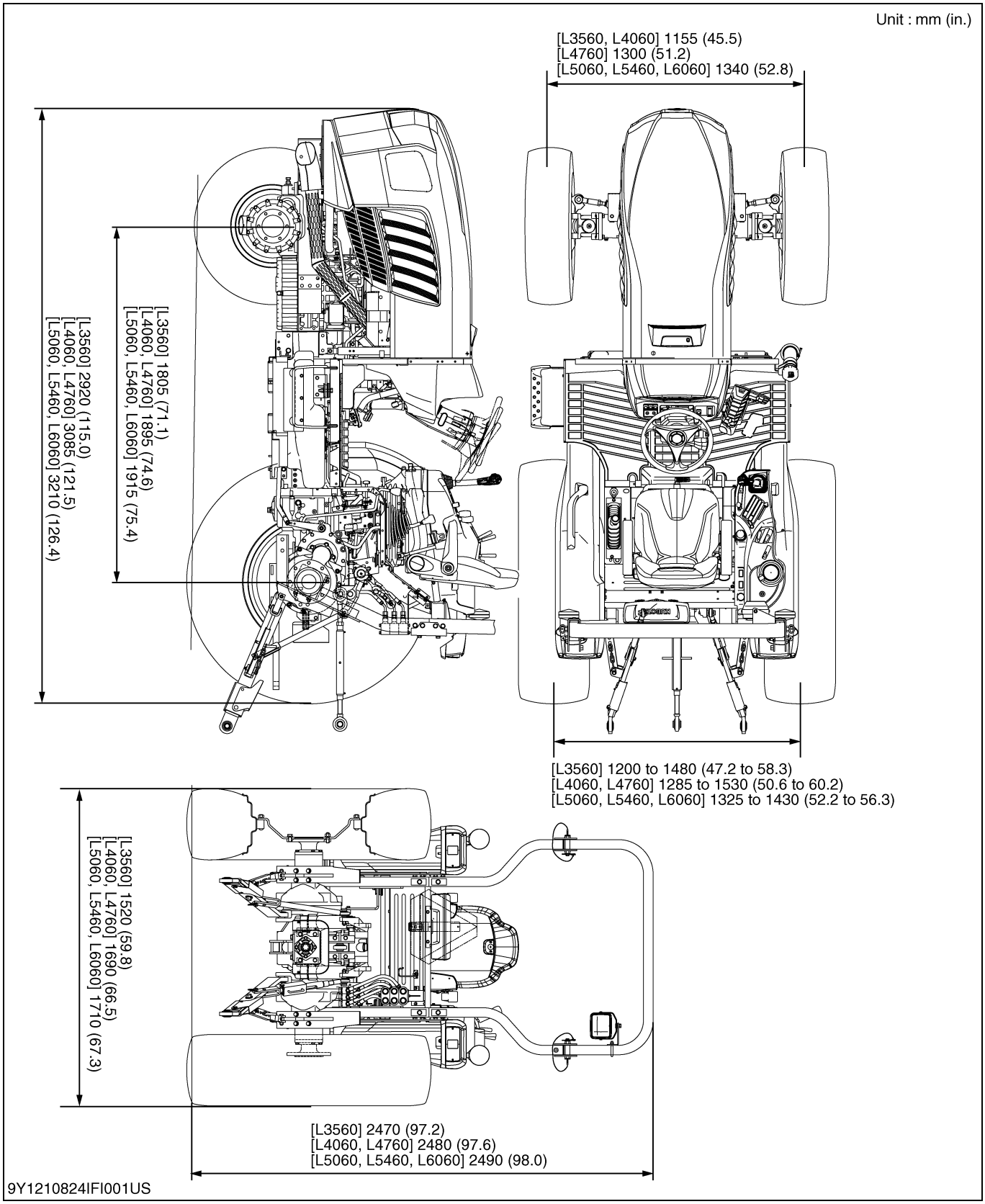
Model			L3560	L4060, L4760	L5460, L6060
Tire size (Rear)			12.4-24	14.9-24	14.9-26
Speed control pedal	H-DS (Hydro Dual Speed) lever	Range gear shift lever	km/h (mph)		
Forward	L	L	3.4 (2.1)	3.4 (2.1)	3.4 (2.1)
		M	6.9 (4.3)	7.0 (4.4)	7.0 (4.4)
		H	15.9 (9.9)	16.2 (10.1)	16.2 (10.1)
	H	L	5.6 (3.5)	5.7 (3.5)	5.8 (3.6)
		M	11.5 (7.1)	11.7 (7.3)	11.8 (7.3)
		H	26.5 (16.4)	27.0 (16.8)	27.1 (16.8)
Reserve	L	L	3.0 (1.9)	3.1 (1.9)	3.1 (1.9)
		M	6.2 (3.9)	6.3 (3.9)	6.3 (3.9)
		H	14.3 (8.9)	14.5 (9.0)	14.6 (9.1)
	H	L	5.1 (3.2)	5.2 (3.2)	5.2 (3.2)
		M	10.3 (6.4)	10.5 (6.5)	10.6 (6.6)
		H	23.9 (14.9)	24.3 (15.1)	24.4 (15.2)

The company reserves the right to change the specifications without notice.

9Y1210824INI0014US0

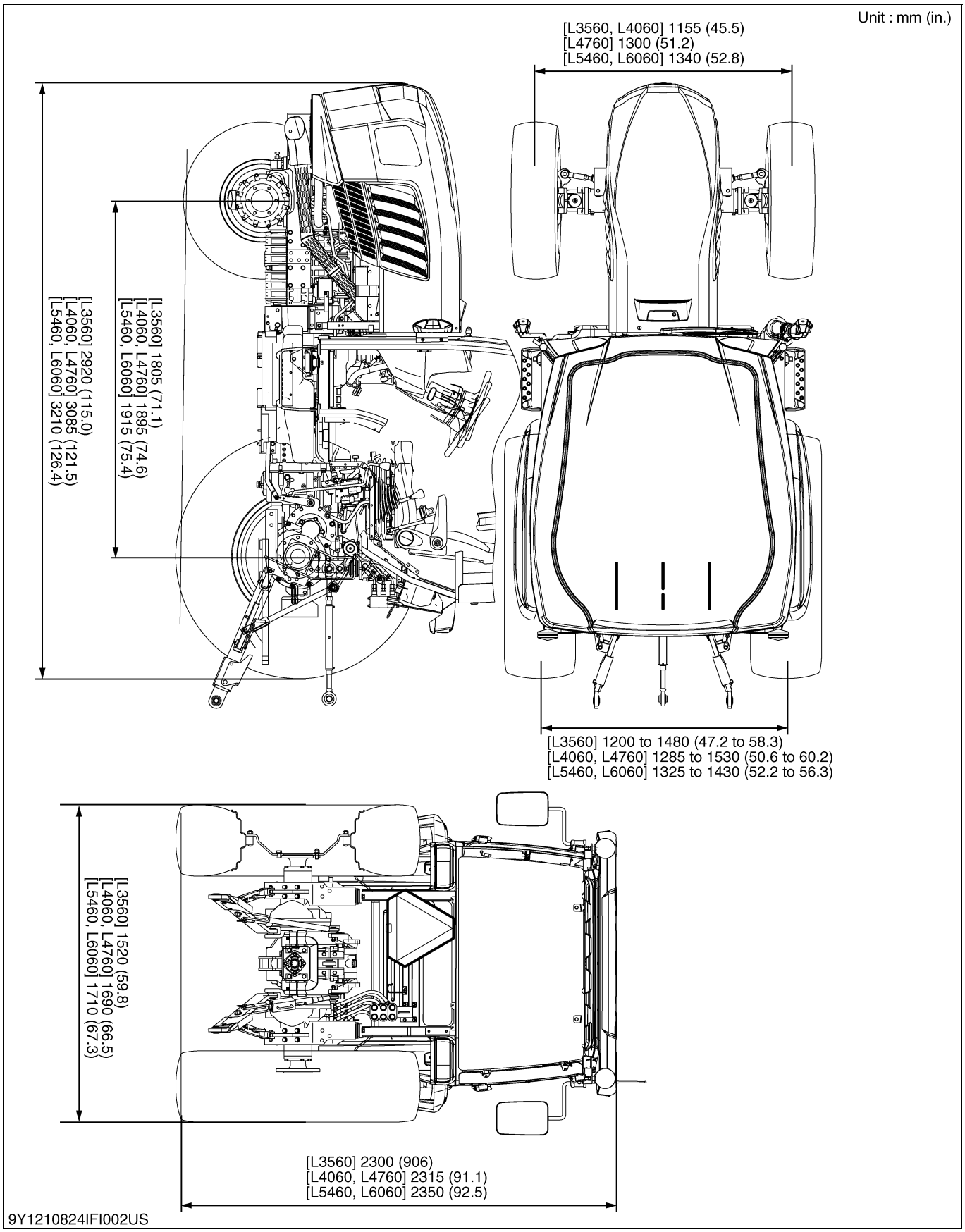
5. DIMENSIONS

ROPS Type



9Y1210824INI0015US0

CABIN Type



9Y1210824INI0016US0

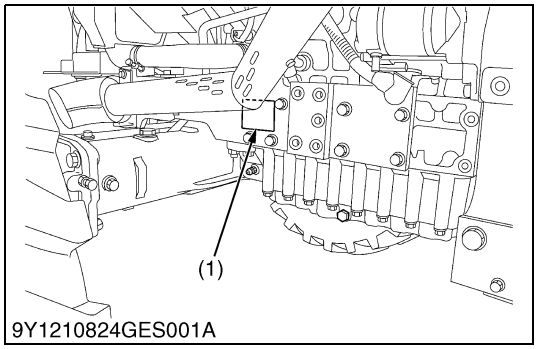
G GENERAL

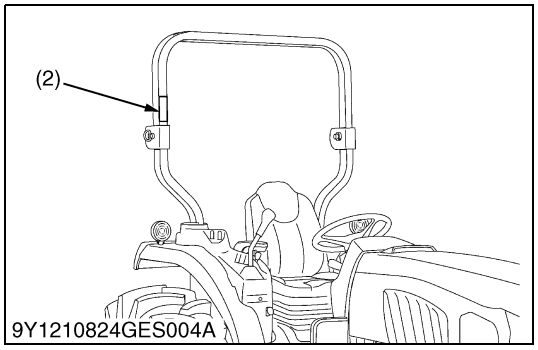
GENERAL

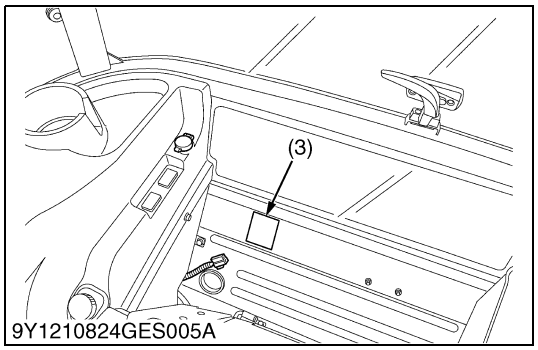
CONTENTS

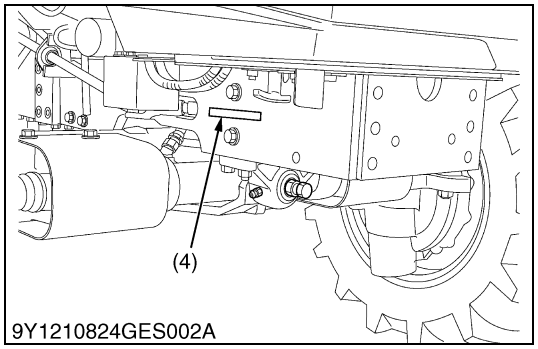
1. TRACTOR IDENTIFICATION

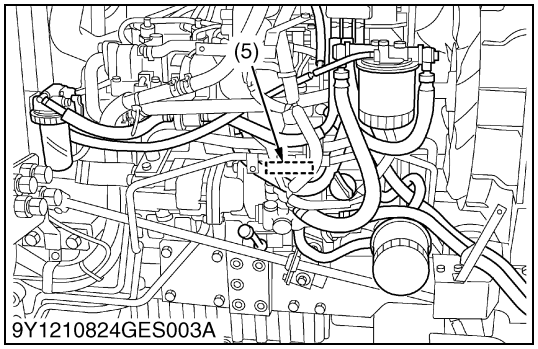
[1] MODEL NAME AND SERIAL NUMBERS



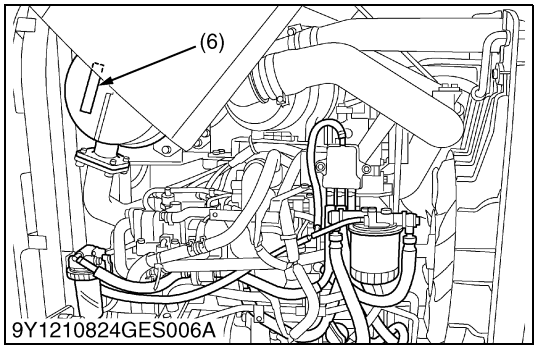








When contacting your local KUBOTA distributor, always specify engine serial number, tractor serial number and hour meter reading.



(1) Tractor Identification Plate
(2) ROPS Identification Plate (ROPS Serial Number)
(3) CABIN Identification Plate (CABIN Serial Number)
(4) Tractor Serial Number
(5) Engine Serial Number
(6) Diesel Particular Filter (DPF) Serial Number

9Y1210824GEG0001US0

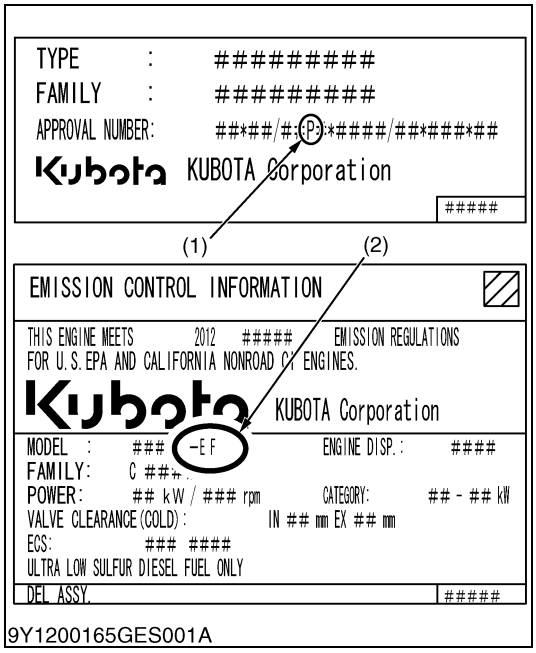
[2] E4B ENGINE

[Example: Engine Model Name V2403-CR-TE4]

The emission controls previously implemented in various countries to prevent air pollution will be stepped up as Nonroad Emission Standards continue to change. The timing or applicable date of the specific Nonroad Emission regulations depends on the engine output classification.

Over the past several years, KUBOTA has been supplying diesel engines that comply with regulations in the respective countries affected by Nonroad Emission regulations. For KUBOTA Engines, E4B will be the designation that identifies engine models affected by the next emission phase (See the table below).

When servicing or repairing ###-E4B series engines, use only replacement parts for that specific E4B engine, designated by the appropriate E4B KUBOTA Parts List and perform all maintenance services listed in the appropriate KUBOTA Operator's Manual or in the appropriate E4B KUBOTA Workshop Manual. Use of incorrect replacement parts or replacement parts from other emission level engines (for example: E3B engines), may result in emission levels out of compliance with the original E4B design and EPA or other applicable regulations.Please refer to the emission label located on the engine head cover to identify Output classification and Emission Control Information. E4B engines are identified with "EF" at the end of the Model designation, on the US EPA label. Please note: E4B is not marked on the engine.



9Y1200165GES001A

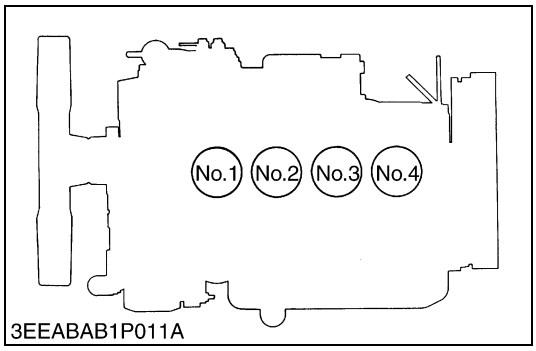
Category (1)	Engine output classification	EU regulation
K	From 19 to 37 kW	STAGE IIIB
P	From 37 to less than 56 kW	STAGE IIIB
N	From 56 to less than 75 kW	STAGE IIIB
M	From 75 to less than 130 kW	STAGE IIIB

Category (2)	Engine output classification	EPA regulation
EF	Less than 19 kW	Tier 4
	From 19 to less than 56 kW	Interim Tier 4
	From 56 to less than 75 kW	Interim Tier 4
	From 75 to less than 130 kW	Interim Tier 4

(1) EU regulation engine output classification category
(2) "E4B" engines are identified with "EF" at the end of the Model designation, on the US EPA label.
"E4B" designates some Interim Tier 4 / Tier 4 models, depending on engine output classification.

9Y1210824GEG0002US0

[3] CYLINDER NUMBER



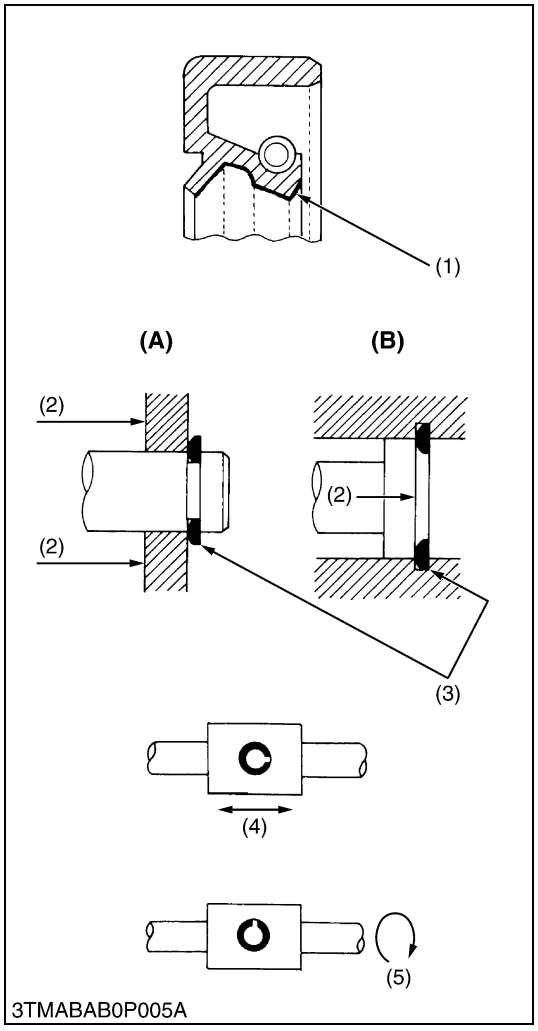
3EEABAB1P011A

The cylinder numbers of KUBOTA diesel engine are designated as shown in the figure.

The sequence of cylinder numbers is given as No.1, No.2, No.3 and No.4 starting from the gear case side.

9Y1210824GEG0003US0

2. GENERAL PRECAUTIONS



3TMABAB0P005A

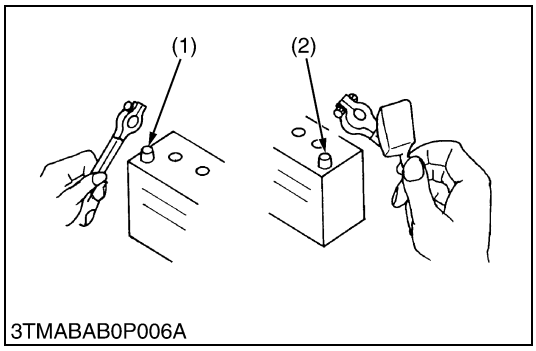
- When you disassemble, carefully put the parts in a clean area to make it easy to find the parts. You must install the screws, bolts and nuts in their initial position to prevent the reassembly errors.
- When it is necessary to use special tools, use KUBOTA special tools. Refer to the drawings when you make special tools that you do not use frequently.
- Before you disassemble or repair machine, make sure that you always disconnect the ground cable from the battery first.
- Remove oil and dirt from parts before you measure.
- Use only KUBOTA genuine parts for replacement to keep the machine performance and to make sure of safety.
- You must replace the gaskets and O-rings when you assemble again. Apply grease **(1)** to new O-rings or oil seals before you assemble.
- When you assemble the external or internal snap rings, make sure that the sharp edge **(3)** faces against the direction from which force **(2)** is applied.
- When inserting spring pins, their splits must face the direction from which a force is applied. See the figure on the left side.
- To prevent damage to the hydraulic system, use only specified fluid or equivalent.
- Clean the parts before you measure them.
- Tighten the fittings to the specified torque. Too much torque can cause damage to the hydraulic units or the fittings. Not sufficient torque can cause oil leakage.
- When you use a new hose or pipe, tighten the nuts to the specified torque. Then loosen (approx. by 45°) and let them be stable before you tighten to the specified torque (This is not applied to the parts with seal tape).
- When you remove the two ends of a pipe, remove the lower end first.
- Use two pliers in removal and installation. One to hold the stable side, and the other to turn the side you remove to prevent twists.
- Make sure that the sleeves of flared connectors and tapers of hoses are free of dust and scratches.
- After you tighten the fittings, clean the joint and apply the maximum operation pressure 2 to 3 times to check oil leakage.

(1) Grease
(2) Force
(3) Sharp Edge
(4) Axial Force
(5) Rotating Movement

(A) External Cir-clip
(B) Internal Cir-clip

WSM000001GEG0106US0

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



3TMABAB0P006A

To ensure safety and prevent damage to the machine and surrounding equipment, obey the following precautions in handling electrical parts and wiring.

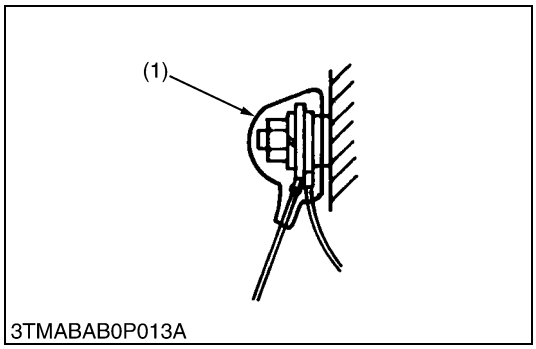
■ **IMPORTANT**

- **Check electrical wiring for damage and loosened connection every year. To this end, educate the customer to do his or her own check and at the same time recommend the dealer to perform periodic check for a fee.**
- **Do not try to modify or remodel any electrical parts and wiring.**
- **When removing the battery cables, disconnect the negative cable first. When installing the battery cables, connect the positive cable first.**

(1) Negative Terminal (2) Positive Terminal

WSM000001GEG0062US0

[1] WIRING

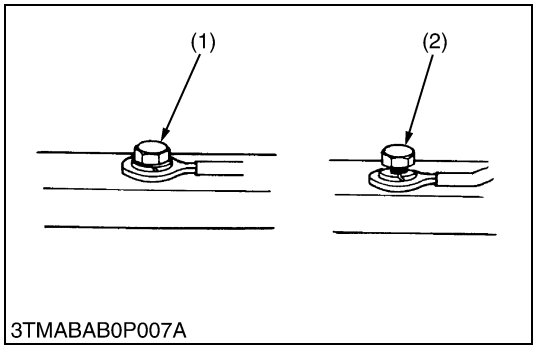


3TMABAB0P013A

- After installing wiring, check protection of terminals and clamped condition of wiring.

(1) Cover
(Securely Install Cover)

WSM000001GEG0070US0



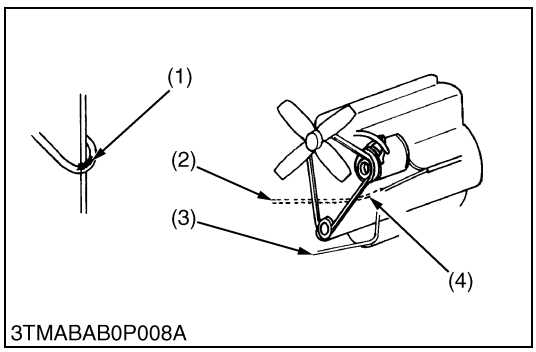
3TMABAB0P007A

- Securely tighten wiring terminals.

(1) Correct
(Securely Tighten)

(2) Incorrect
(Loosening Leads to damaged Contact)

WSM000001GEG0063US0

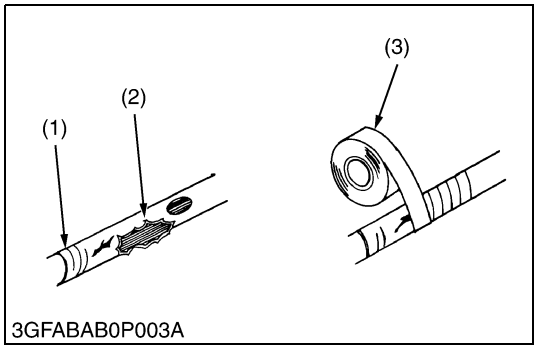


3TMABAB0P008A

- Do not let wiring contact dangerous part.

(1) Dangerous Part (Sharp Edge)
(2) Wiring (Incorrect)
(3) Wiring (Correct)
(4) Dangerous Part

WSM000001GEG0064US0

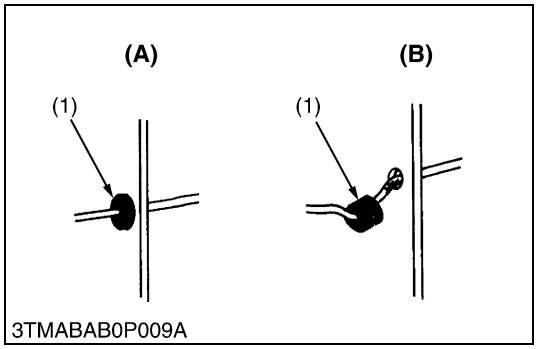


3GFABAB0P003A

- Repair or change torn or aged wiring immediately.

(1) Aged
(2) Torn
(3) Insulating Vinyl Tape

WSM000001GEG0065US0



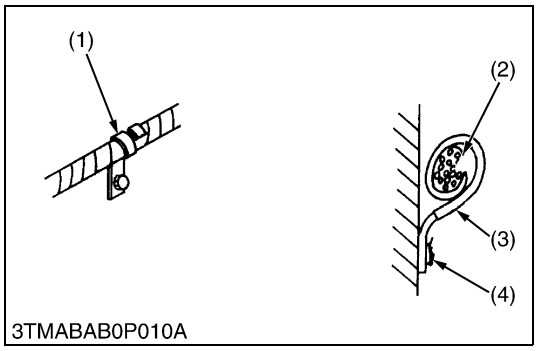
3TMABAB0P009A

- Securely insert grommet.

(1) Grommet

(A) Correct
(B) Incorrect

WSM000001GEG0066US0

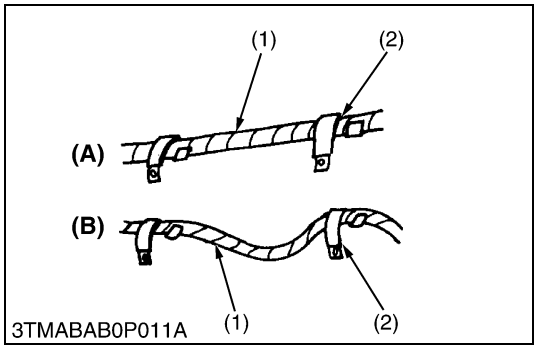


3TMABAB0P010A

- Securely clamp, being careful not to damage wiring.

(1) Clamp (Wind Clamp Spirally)
(2) Wire Harness
(3) Clamp
(4) Welding Dent

WSM000001GEG0067US0



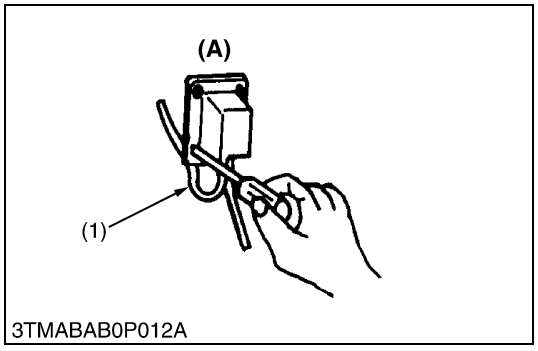
3TMABAB0P011A

- Clamp wiring so that there is no twist, unnecessary sag, or excessive tension, except for movable part, where sag be required.

(1) Wiring
(2) Clamp

(A) Correct
(B) Incorrect

WSM000001GEG0068US0



3TMABAB0P012A

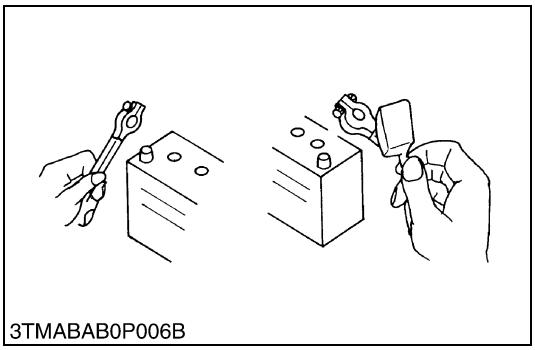
- In installing a part, be careful not to get wiring caught by it.

(1) Wiring

(A) Incorrect

WSM000001GEG0069US0

[2] BATTERY


3TMABAB0P006B

- Be careful not to confuse positive and negative terminal posts.
- When you remove battery cables, disconnect negative cable first. When you install battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After you connect cables to battery terminal posts, apply high temperature grease to them and securely install terminal covers on them.
- Do not allow dirt and dust to collect on battery.

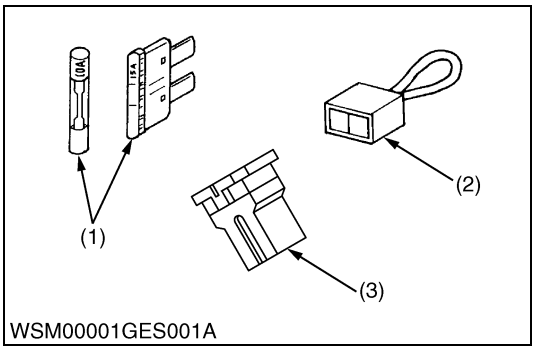
⚠ DANGER

To avoid serious injury or death:

- **Be careful not to let battery liquid spill on your skin and clothes. If contaminated, wash it off with water immediately.**
- **Before you recharge the battery, remove it from the machine.**
- **Before you recharge, remove cell caps.**
- **Recharge in a well-ventilated place where there is no open flame nearby, as hydrogen gas and oxygen are formed.**

WSM000001GEG0071US0

[3] FUSE



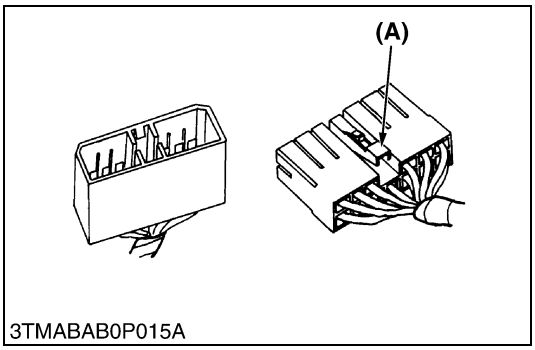
WSM00001GES001A

- Use fuses with specified capacity.
  Neither too large nor small capacity fuse is acceptable.
- Never use steel nor copper wire in place of fuse.
- Do not install working light, radio set, etc. on machine which is not provided with reserve power supply.
- Do not install accessories if fuse capacity of reserve power supply is exceeded.

(1) Fuse
(2) Fusible Link
(3) Slow Blow Fuse

WSM000001GEG0072US0

[4] CONNECTOR

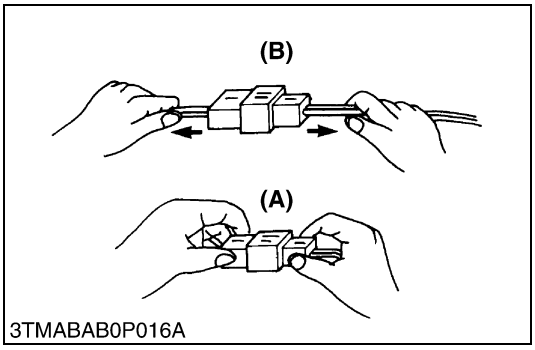


3TMABAB0P015A

- For connector with lock, push lock to separate.

(A) Push

WSM000001GEG0073US0

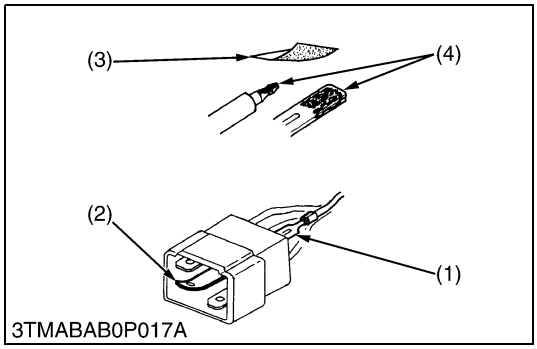


3TMABAB0P016A

- In separating connectors, do not pull wire harnesses.
- Hold connector bodies to separate.

(A) Correct
(B) Incorrect

WSM000001GEG0074US0

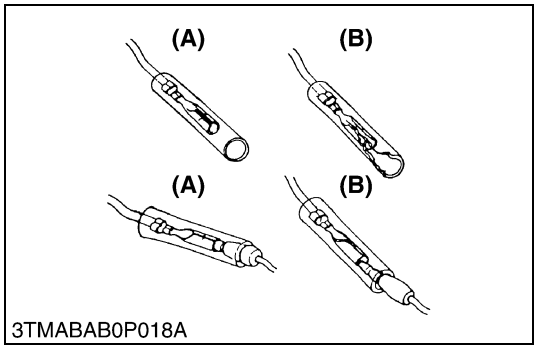


3TMABAB0P017A

- Use sandpaper to remove rust from terminals.
- Repair deformed terminal. Make sure that there is no terminal being exposed or displaced.

(1) Exposed Terminal
(2) Deformed Terminal
(3) Sandpaper
(4) Rust

WSM000001GEG0075US0

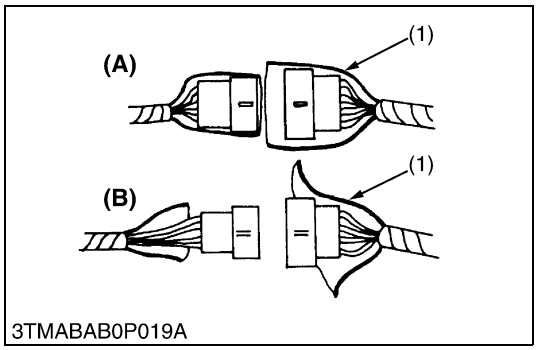


3TMABAB0P018A

- Make sure that there is no female connector being too open.

(A) Correct
(B) Incorrect

WSM000001GEG0076US0



3TMABAB0P019A

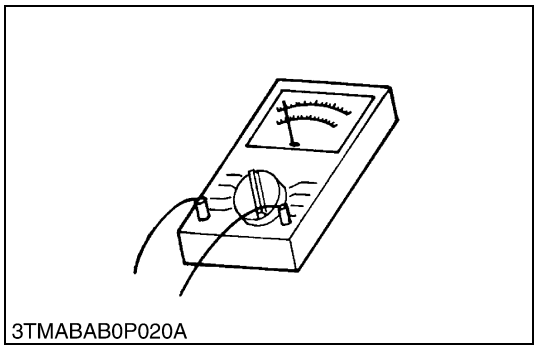
- Make sure that plastic cover is large enough to cover whole connector.

(1) Cover

(A) Correct
(B) Incorrect

WSM000001GEG0077US0

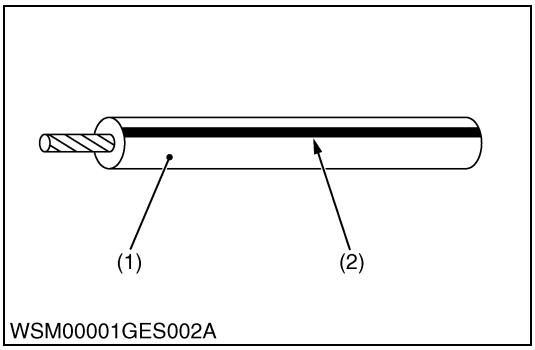
[5] CIRCUIT TESTER


3TMABAB0P020A

- Use tester correctly following manual provided with tester.
- Check for polarity and range.

WSM000001GEG0078US0

[6] COLOR OF WIRING



WSM00001GES002A

- Colors of wire are specified to the color codes.
- This symbol of "/" shows color with stripe (s).

(An example)

Red stripe on white color: W/R

Color of wiring	Color code
Black	B
Brown	Br
Green	G
Gray	Gy or Gr
Blue	L
Light Green	Lg
Orange	Or
Pink	P
Purple	Pu or V
Red	R
Sky Blue	Sb
White	W
Yellow	Y

(1) Wire Color (2) Stripe

WSM000001GEG0079US0

4. LUBRICANTS, FUEL AND COOLANT

No.	Place	Capacity						Lubricants, fuel and coolant
		L3560	L4060	L4760	L5060	L5460	L6060	
1	Fuel tank	51 L 13.5 U.S.gals 11.2 Imp.gals						• No. 2-D S15 diesel fuel • No. 1-D S15 diesel fuel if temperature is below –10 °C (14 °F)
2	Cooling system	7.5 L 7.9 U.S.qts 6.6 Imp.qts		8.2 L 8.7 U.S.qts 7.2 Imp.qts				Fresh clean soft water with anti-freeze
3	Engine crankcase (with filter)	6.7 L 7.1 U.S.qts 5.9 Imp.qts	8.2 L 8.7 U.S.qts 7.2 Imp.qts		9.4 L 9.9 U.S.qts 8.3 Imp.qts			Engine oil : Refer to next page • Above 25 °C (77 °F) SAE30, SAE10W-30 or 15W-40 • −10 to 25 °C (14 to 77 °F) SAE20, SAE10W-30 or 15W-40 • Below −10 °C (14 °F) SAE10W-30
4	Transmission case	42 L 11.1 U.S.gals 9.2 Imp.gals	43 L 11.4 U.S.gals 9.4 Imp.gals		45 L 11.9 U.S.gals 9.9 Imp.gals			KUBOTA SUPER UDT-2 fluid
5	Front axle case	6.5 L 6.9 U.S.qts 5.7 Imp.qts		9.0 L 9.5 U.S.qts 7.9 Imp.qts				KUBOTA SUPER UDT-2 fluid or SAE80, 90 gear oil

■ **NOTE**

- **KUBOTA UDT or SUPER UDT fluid: KUBOTA original transmission hydraulic fluid.**

Greasing				
	Place	No. of greasing point	Capacity	Type of grease
6	Front axle case support	– / 2	Until grease overflows	Multipurpose type grease NLGI-2 or NLGI-1 (GC-LB)
	Front axle support	2		
	Top link	2		
	Top link bracket	2 (with draft control) (if equipped)		
	Lift rod	1		
	Lift cylinder	4		
	Battery terminal	2	Moderate amount	
	Swivel seat	4		

9Y1210824GEG0004US0

■ **NOTE**

Engine Oil:

- **Oil used in the engine should have an American Petroleum Institute (API) service classification and Proper SAE Engine Oil according to the ambient temperatures as shown above.**
- **Refer to the following table for the suitable API classification engine oil according to the engine type (with DPF (Diesel Particulate FIlter) type engines) and the fuel.**

Fuel used	Engine oil classification (API classification)
	Oil class of engines with DPF
Ultra Low Sulfur Fuel [< 0.0015 % (15 ppm)]	CJ-4

Fuel:

- **Use the ultra low sulfur diesel fuel only [below 0.0015 % (15 ppm)] for these engines.**
- **Cetane number of 45 minimum. Cetane number greater than 50 is preferred, especially for temperatures below −20 °C (−4 °F) or elevations above 1500 m (5000 ft).**
- **Diesel fuels specified to EN 590 or ASTM D975 are recommended.**
- **No.2-D is a distillate fuel of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87).**

Transmission Oil:

*KUBOTA Super UDT-2: For an enhanced ownership experience, we highly recommend Super UDT-2 to be used instead of standard hydraulic/transmission fluid.

Super UDT-2 is a proprietary KUBOTA formulation that deliveries superior performance and protection in all operating conditions.

Regular UDT is also permitted for use in this machine.

- Indicated capacities of water and oil are manufacturer's estimate.

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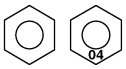
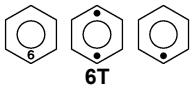
5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Tighten screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual according to the table below.

Indication on top of bolt	 No-grade or 4T			 7T			 9T		
Indication on top of nut	 No-grade or 4T						 6T		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318	–	–	–	491 to 568	50.0 to 58.0	362 to 419

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[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8	12 to 15	1.2 to 1.6	8.7 to 11	8.9 to 11	0.90 to 1.2	6.5 to 8.6
M10	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
M12	30 to 49	3.0 to 5.0	22 to 36	31	3.2	23
M14	62 to 73	6.3 to 7.5	46 to 54	–	–	–
M16	98.1 to 112	10.0 to 11.5	72.4 to 83.1	–	–	–
M18	172 to 201	17.5 to 20.5	127 to 148	–	–	–

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[3] METRIC SCREWS, BOLTS AND NUTS

Grade	8.8 Property class 8.8			10.9 Property class 10.9		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8	24 to 27	2.4 to 2.8	18 to 20	30 to 34	3.0 to 3.5	22 to 25
M10	48 to 55	4.9 to 5.7	36 to 41	61 to 70	6.2 to 7.2	45 to 52
M12	78 to 90	7.9 to 9.2	58 to 66	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	124 to 147	12.6 to 15.0	91.2 to 108	167 to 196	17.0 to 20.0	123 to 144
M16	197 to 225	20.0 to 23.0	145 to 166	260 to 304	26.5 to 31.0	192 to 224

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[4] AMERICAN STANDARD SCREWS, BOLTS AND NUTS WITH UNC OR UNF THREADS

Grade	SAE GR.5			SAE GR.8		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
1/4	11.7 to 15.7	1.20 to 1.60	8.63 to 11.5	16.3 to 19.7	1.67 to 2.00	12.0 to 14.6
5/16	23.1 to 27.7	2.36 to 2.82	17.0 to 20.5	33 to 39	3.4 to 3.9	25 to 28
3/8	48 to 56	4.9 to 5.7	36 to 41	61 to 73	6.3 to 7.4	45 to 53
1/2	110 to 130	11.3 to 13.2	81.2 to 95.8	150 to 178	15.3 to 18.1	111 to 131
9/16	150 to 178	15.3 to 18.1	111 to 131	217 to 260	22.2 to 26.5	160 to 191
5/8	204 to 244	20.8 to 24.8	151 to 179	299 to 357	30.5 to 36.4	221 to 263

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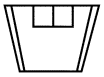
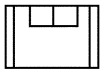
[5] PLUGS

Shape	Size	Material of opponent part					
		Ordinariness			Aluminum		
		N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
Tapered screw 	R1/8	13 to 21	1.3 to 2.2	9.4 to 15	13 to 19	1.3 to 2.0	9.4 to 14
	R1/4	25 to 44	2.5 to 4.5	18 to 32	25 to 34	2.5 to 3.5	18 to 25
	R3/8	49 to 88	5.0 to 9.0	37 to 65	49 to 58	5.0 to 6.0	37 to 43
	R1/2	58.9 to 107	6.00 to 11.0	43.4 to 79.5	59 to 78	6.0 to 8.0	44 to 57
Straight screw 	G1/4	25 to 34	2.5 to 3.5	18 to 25	–	–	–
	G3/8	62 to 82	6.3 to 8.4	46 to 60	–	–	–
	G1/2	49 to 88	5.0 to 9.0	37 to 65	–	–	–

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6. MAINTENANCE

No.	Item		Indication on hour meter														Interval	Reference page	Important	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
1	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-23		
2	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-24		
3	Greasing	–	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-25		
4	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-26	*4	
5	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-28		
6	Brake	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-20		
7	Clutch [GST/MT]	Adjust	★	☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-20	*4	
8	Air cleaner primary element	Clean		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-28	*1	@
		Replace															every 1000 Hr or 1 year	G-35	*2	
	Secondary element	Replace																G-35	*2	
9	Transmission oil filter (HST)	Replace	★			☆				☆				☆			every 200 Hr	G-22		
10	Toe-in	Adjust				☆				☆				☆			every 200 Hr	G-29		
11	Engine oil	Change	★							☆							every 400 Hr	G-21		
12	Engine oil filter	Replace	★							☆							every 400 Hr	G-22		
13	Hydraulic oil filter	Replace								☆							every 400 Hr	G-31		
14	Transmission fluid	Change								☆							every 400 Hr	G-31		
15	Fuel filter	Replace								☆							every 400 Hr	G-32		@
16	Water separator	Replace								☆							every 400 Hr	G-33		
17	Front axle case oil	Change								☆							every 400 Hr	G-32		
18	Front axle pivot	Adjust												☆			every 600 Hr	G-33		
19	Engine valve clearance	Adjust															every 800 Hr	G-33		
20	Exhaust manifold	Check															every 1000 Hr or 1 year	G-35	*2	
21	Fuel injection nozzle tip	Clean															every 1500 Hr	G-34		@
22	Oil separator element	Replace															every 1500 Hr	G-34		@
23	PCV (Positive Crankcase Ventilation) valve (Oil separator)	Check															every 1500 Hr	G-34		@
24	EGR cooler	Check Clean															every 1500 Hr	G-34		@
25	Cooling system	Flush															every 2000 Hr or 2 years	G-40	*3	
26	Coolant	Change															every 2000 Hr or 2 years	G-40	*3	

No.	Item		Indication on hour meter														Interval	Refer-ence page	Impor-tant	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
27	EGR system	Check Clean															every 3000 Hr	G-34		@
28	Supply pump	Check															every 3000 Hr	G-34		
29	DPF muffler	Clean															every 3000 Hr	G-34		@
30	Turbocharger	Check															every 3000 Hr	G-34		@
31	Fuel line	Check															every 1 year	G-35	*5	@
		Replace															every 4 years	G-43	*5	
32	Intake air line	Check															every 1 year	G-36	*5	@
		Replace															every 4 years	G-43	*5	
33	Power steering oil line	Check															every 1 year	G-36	*5	
		Replace															every 4 years	G-43	*5	
34	Radiator hose and clamp	Check															every 1 year	G-37	*5	
		Replace															every 4 years	G-43	*5	
35	Oil cooler line (HST)	Check															every 1 year	G-37	*5	
		Replace															every 4 years	G-43	*5	
36	PCV (Positive Crankcase Ventilation) valve hose (Oil separator hose)	Check															every 1 year	G-43	*5	
		Replace															every 4 years	G-43	*5	
37	Lift cylinder hose	Check															every 1 year	G-43	*5	
		Replace															every 4 years	G-43	*5	
38	DPF differential pressure sensor pipe	Check															every 1 year	G-38		
39	EGR pipe	Check															every 1 year	G-38		
40	Antifrost Heater for Oil Separator (if equipped)	Check															every 1 year	G-39		
41	DPF differential pressure sensor hose	Replace															every 2 years	G-42		
42	Boost sensor hose	Replace															every 2 years	G-42		
43	Fuel system	Bleed															Service as required	G-44		
44	Clutch housing	Drain																G-44		
45	Fuse	Replace																G-45		
46	Light bulb	Replace																G-46		
47	Radiator hose and clamp	Replace																G-48	*5	
48	Fuel line	Replace																G-48	*5	
49	Intake air line	Replace																G-48	*5	
50	Power steering line	Replace																G-48	*5	
51	Oil cooler line	Replace																G-49	*5	
52	Oil separator hose	Replace																G-49	*5	

■ **IMPORTANT**
- **The jobs indicated by ★ must be done after the first 50 hours of operation.**
- ***1: Air cleaner should be cleaned more often in dusty conditions than in normal conditions.**
- ***2: Every 1,000 hours or every 1 year, whichever comes earlier.**
- ***3: Every 2,000 hours or every 2 years, whichever comes earlier.**
- ***4: When the battery is used for less than 100 hours per year, check the battery condition by reading the indicator annually.**
- ***5: Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred. However, must be replaced every 4 years regardless of the condition.**
- **The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in U.S.EPA nonroad emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.**

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(Only the Check Points for Tractor with CABIN)

No.	Item		Indication on hour meter														Interval	Reference page	Important	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
1	Air conditioner condenser screen	Clean															Daily	G-19		
2	Tension of air conditioner drive belt	Adjust				☆				☆				☆			every 200 Hr	G-29		
3	Inner air filter	Clean				☆				☆				☆			every 200 Hr	G-30		
4	Fresh air filter	Clean				☆				☆				☆			every 200 Hr	G-30		
5	Air conditioner condenser	Check				☆				☆				☆			every 200 Hr	G-30		
6	Air conditioner pipes and hoses	Check															every 1 year	G-38		
		Replace															every 2 year	G-42		
7	CABIN isolation cushion	Check															every 1 year	G-39		
8	Washer liquid	Check															Service as required	G-47		
9	Amount of refrigerant (gas)	Check																G-48		

■ **IMPORTANT**
- **The jobs indicated by ★ must be done after the first 50 hours of operation.**
- ***1: Air cleaner should be cleaned more often in dusty conditions than in normal conditions.**
- ***2: Every year or every 6 times of cleaning.**
- ***3: Replace only if necessary.**
- ***4: When the battery is used for less than 100 hours per year, check the battery condition by reading the indicator annually.**
- **The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in U.S.EPA nonroad emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.**

9Y1210824GEG0007US0

7. CHECK AND MAINTENANCE

CAUTION
- **Be sure to check and service the tractor on a flat place with engine shut off and pull the parking brake on and chock the wheels.**

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[1] DAILY CHECK

To prevent trouble from occurring, it is important to know the condition of the tractor. Check the following items before starting.

CAUTION
To avoid personal injury:
Take the following precautions when checking the tractor.
- **Park the machine on firm and level ground.**
- **Set the parking brake.**
- **Lower the implement to the ground.**
- **All residual pressure of the hydraulic system released.**
- **Stop the engine and remove the key.**

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Walk Around Inspection

Look around and under the tractor for such items as loose bolts, trash build-up, oil or coolant leaks, broken or worn parts.

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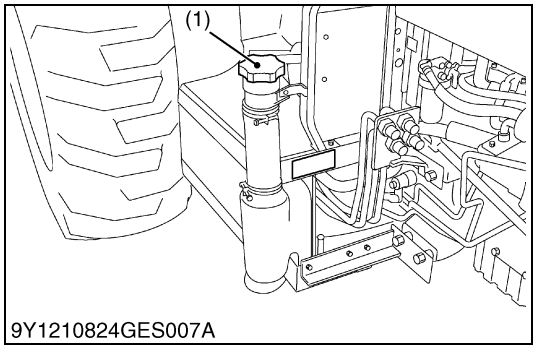

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Checking and Refueling

CAUTION
- **Do not smoke while refueling.**
- **Be sure to stop the engine before refueling.**

1. Turn the key switch to **"ON"**, check the amount of fuel by fuel gauge.
2. Fill fuel tank when fuel gauge shows 1/4 or less fuel in tank.

■ **Refueling alarm**

Suppose that you try to refuel with the key switch at **"ON"**. When you start refueling, the buzzer sounds intermittently.

When the tank gets close to full, the buzzer starts sounding continuously. Stop refueling just when the buzzer sound turns from intermittent to continuous.

Fuel tank capacity	51 L 13.5 U.S.gals 11.2 Imp.gals

■ **IMPORTANT**
- **Do not permit dirt or trash to get into the fuel system.**
- **Be careful not to let the fuel tank become empty, otherwise air will enter the fuel system, necessitating bleeding before next engine start.**
- **Be careful not to spill during refueling. If should spill, wipe it off at once, or it may cause a fire.**
- **To prevent condensation (water) accumulation in the fuel tank, fill the tank before parking overnight.**

(1) Fuel Tank Cap

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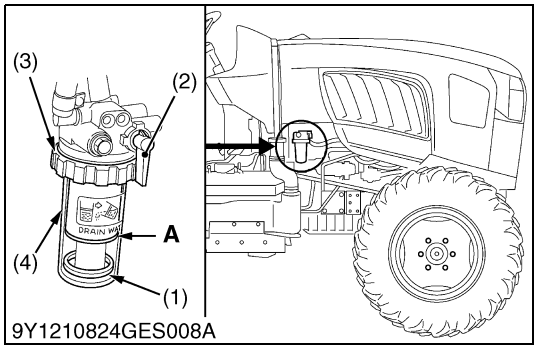

Checking Water Separator

1. As water is collected in the water separator, the red float is raised.
2. When the red float has reached the white line, close the fuel valve, loosen the retainer ring, take out the cup, and clean the cup. Be careful not to break the element.
3. Place the cup back into position. Bleed the fuel system.

■ **IMPORTANT**

- **If water is drawn through to the fuel pump, extensive damage will occur.**

(1) Red Float
(2) Fuel Valve
(3) Retainer Ring
(4) Cup

A : WHITE LINE

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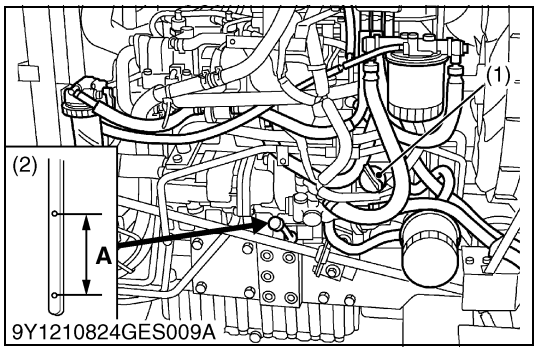

Checking Engine Oil Level

CAUTION

- **Be sure to stop the engine before checking the oil level.**

1. Park the machine on a flat surface.
2. Check engine oil before starting the engine or 5 minutes or more after the engine has stopped.
3. To check the oil level, draw out the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level lies between the two notches.
   If the level is too low, add new oil to the prescribed level at the oil inlet. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)

■ **IMPORTANT**

- **When using an oil of different maker or viscosity from the previous one, remove all of the old oil.**
  Never mix two different types of oil.
- **If oil level is low, do not run engine.**

(1) Oil Inlet
(2) Dipstick

A: Oil level is acceptable within this range.

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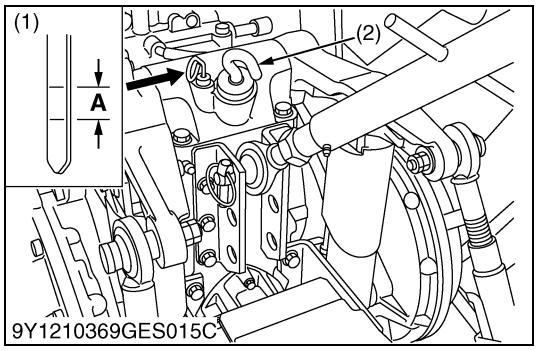

Checking Transmission Fluid Level

1. Park the machine on a flat surface, lower the implement and shut off engine.
2. To check the oil level, draw out the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level lies between the two notches.
   If the level is too low, add new oil to the prescribed level at the oil inlet. (Refer to"4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)

■ **IMPORTANT**

- **If oil level is low, do not run engine.**

(1) Gauge
(2) Oil Inlet

A: Oil level is acceptable within this range.

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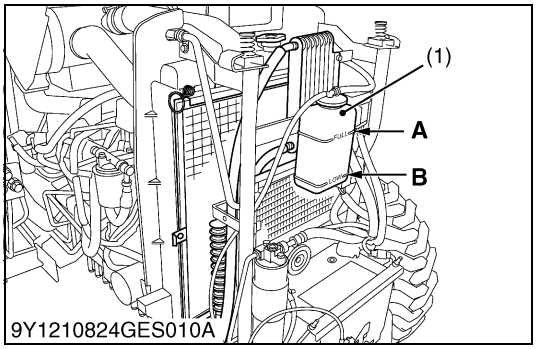

Checking Coolant Level

CAUTION

- **Do not remove radiator cap while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.**

1. Check to see that the coolant level is between the **"FULL"** and **"LOW"** marks of recovery tank.
2. When the coolant level drops due to evaporation, add water only up to the full level.
   In case of leakage, add anti-freeze and water in the specified mixing ratio up to the full level. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)

IMPORTANT

- **If the radiator cap has to be removed, follow the caution above and securely retighten the cap.**
- **Use clean, fresh water and anti-freeze to fill the recovery tank.**

(1) Recovery Tank

A: FULL
B: LOW

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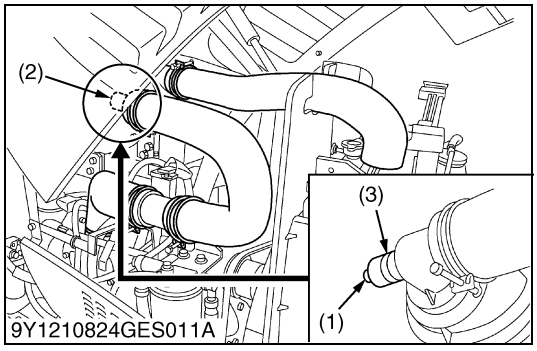

Checking Dust Indicator (L3560)

There is a dust indicator on the air cleaner body. If the red signal on the dust indicator is visible, clean the element immediately (see page G-28). Reset the red signal by pushing a **"RESET"** button after cleaning.

(1) **"RESET"** Button
(2) Dust Indicator
(3) Red Signal

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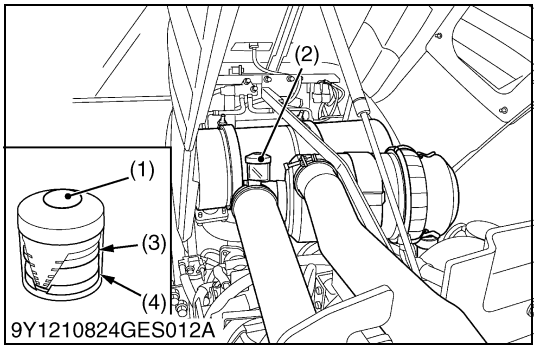

Checking Dust Indicator (L4060, L4760, L5060, L5460, L6060)

There is a dust indicator on the air cleaner body. If the yellow signal on the dust indicator has reached the red zone, clean the element immediately (see page G-28). Reset the yellow signal by pushing a **"RESET"** button after cleaning.

(1) **"RESET"** Button
(2) Dust Indicator
(3) Yellow Signal
(4) Red Zone

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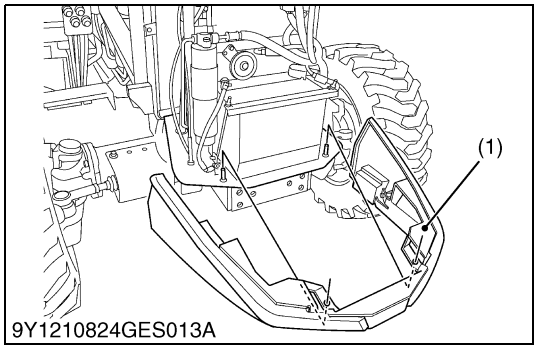
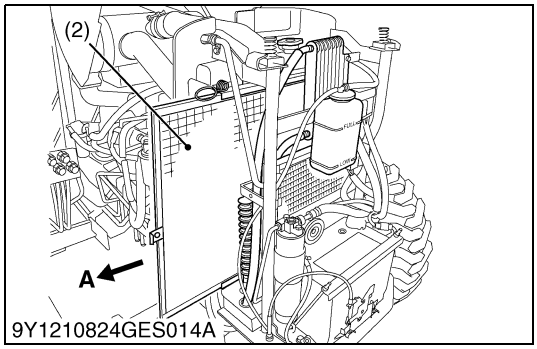
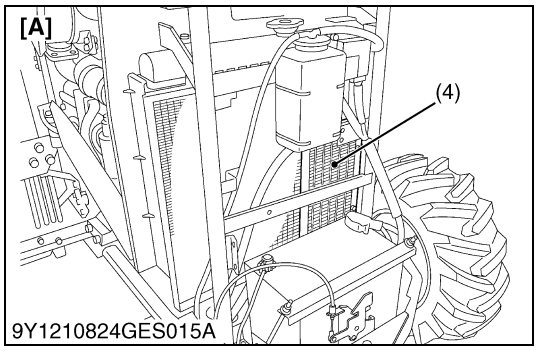
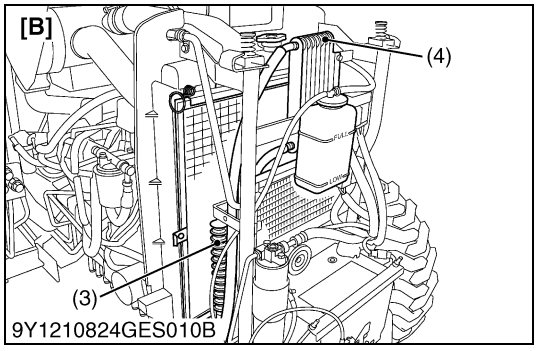
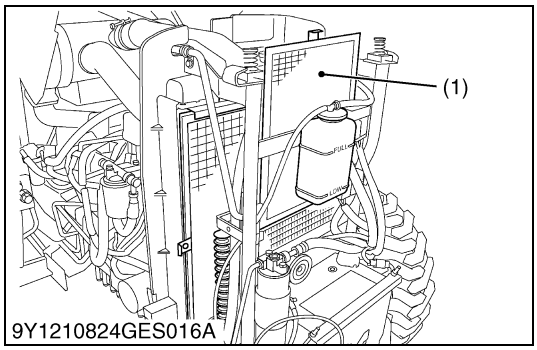










Cleaning Grill, Radiator Screen and Oil Cooler

CAUTION

- **Be sure to stop the engine before removing the screen.**
- **Before checking or cleaning the radiator screen, stop the engine and wait long enough until it is cooled down.**

1. Check front grill and side screens to be sure they are clean of debris.
2. Detach the front skirt.
3. Detach the screen and remove all foreign materials.

IMPORTANT

- **Grill and screen must be clean from debris to prevent engine from overheating and to allow good air intake for the air cleaner.**

(1) Front Skirt
(2) Radiator Screen
(3) Oil Cooler
(4) Fuel Cooler

[A] GST / Manual Transmission
[B] HST
A: DETACH

9Y1210824GEG0018US0

Cleaning Air Conditioner Condenser Screen (Cabin Type)

CAUTION

- **Be sure to stop the engine before removing the screen.**
- **The condenser and receiver become hot while the air conditioner is running. Before checking or cleaning them, wait enough until they cool down.**

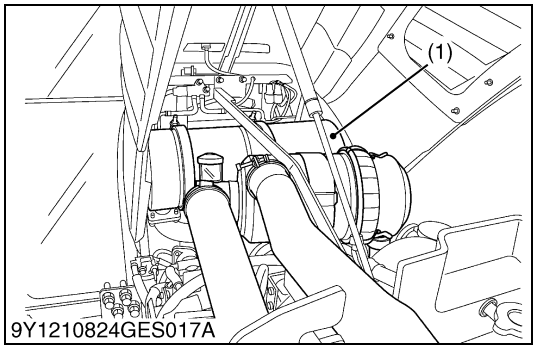
1. Detach the air conditioner condenser screen and remove all foreign materials.

IMPORTANT

- **Grill and screen must be clean from debris to prevent engine from overheating and to allow good air intake for the air cleaner.**

(1) Air Conditioner Condenser Screen

9Y1210824GEG0019US0



Checking DPF Muffler

CAUTION

- **Before checking or cleaning the DPF muffler, stop the engine and wait long enough until it is cooled down.**

1. Check the DPF muffler and its surroundings for build-up of anything flammable. Otherwise a fire may result.

(1) DPF Muffler

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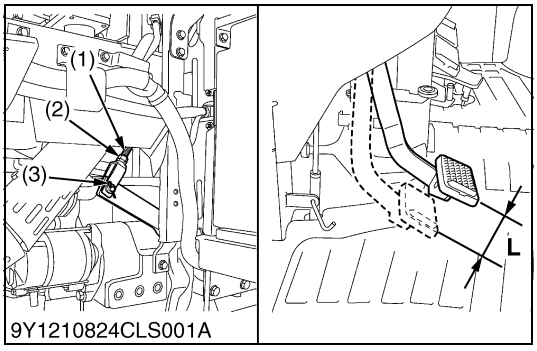

Checking Clutch Pedal Free Travel (GST / Manual Transmission)

CAUTION

- **When checking, park the tractor on flat ground, apply the parking brake, stop the engine and remove the key.**

1. Stop the engine and remove the key.
2. Slightly depress the clutch pedal and measure free travel **"L"** at top of clutch pedal.
3. If the measurement is not within the factory specifications, loosen the lock nut (2), remove the clevis pin (3) adjust the length of rod (1) within acceptable limits.
4. Retighten the lock nut (2) and split the cotter pin.

Clutch pedal free travel **"L"**	Factory specification	20 to 30 mm 0.8 to 1.2 in.

(1) Clutch pedal Rod
(2) Lock Nut
(3) Clevis Pin

L: Free Travel

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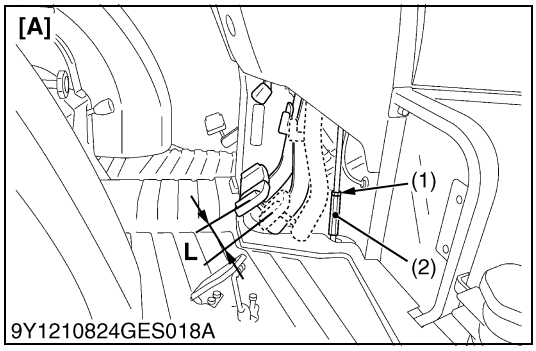
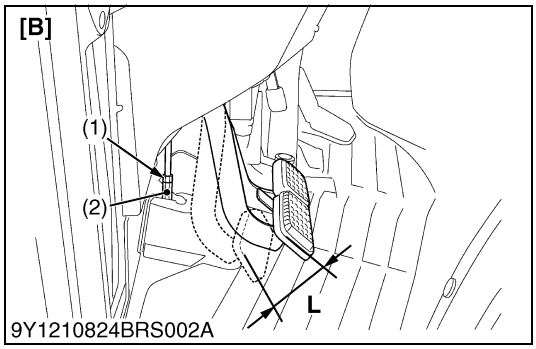




Checking Brake Pedal Free Travel

CAUTION

- **Stop the engine and chock the wheels before checking brake pedal.**

1. Release the parking brake.
2. Slightly depress the brake pedal and measure free travel **"L"** at top of pedal stroke.
3. If the measurement is not within the factory specifications, loosen the lock nut (1) and turn the turnbuckle (2) to adjust the rod length within acceptable limits.
4. Retighten the lock nut (1) securely.
   Keep the free travel in the right and left brake pedals equal.

Brake pedal free travel **"L"**	Factory specification	15 to 20 mm 0.59 to 0.78 in.

(1) Lock Nut
(2) Turnbuckle

[A] GST / Manual Transmission
[B] HST
L: Free Travel

9Y1210824GEG0022US0

Checking Gauges, Meter and Easy Checker™

1. Inspect the instrument panel for broken gauge(s), meter(s) and Easy Checker™.
2. Replace if broken.

9Y1210824GEG0023US0

Checking Head Light / Turn Signal / Hazard Light etc.

1. Inspect the light for broken bulbs and lenses.
2. Replace if broken.

9Y1210824GEG0024US0

Checking Seat Belt and ROPS

1. Always check condition of seat belt and ROPS attaching hardware before operating tractor.
2. Replace if damaged.

9Y1210824GEG0025US0

Checking Movable Parts

1. If any of the movable parts, such as levers and pedals, is not smoothly moved because of rust or anything sticky, do not attempt to force it into motion.
   In the above case, remove the rust or the sticky thing, and apply oil or grease on the relevant spot.
   Otherwise, the machine may get damaged.

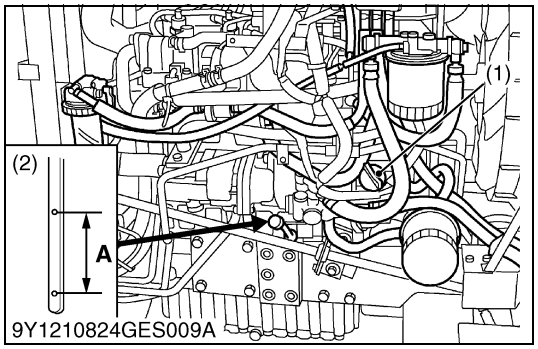
9Y1210824GEG0026US0

[2] CHECK POINTS OF INITIAL 50 HOURS

Checking Clutch Pedal Free Travel (GST / Manual Transmission)

1. See page G-20.

9Y1210824GEG0027US0



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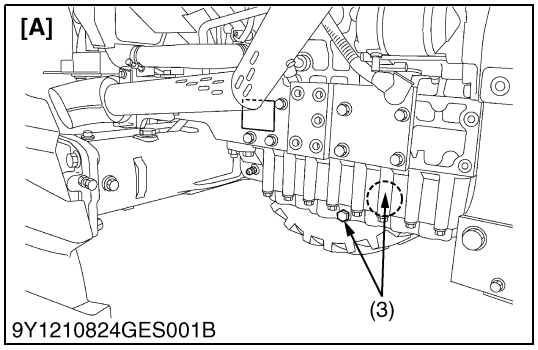

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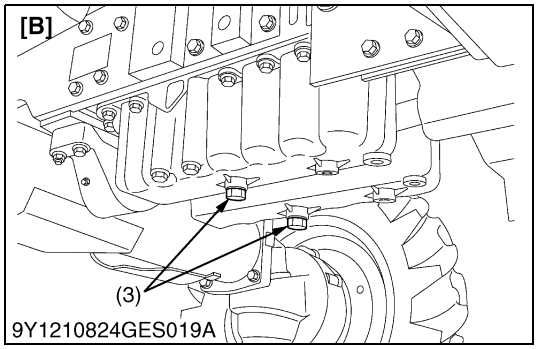

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Changing Engine Oil

CAUTION

- **Be sure to stop the engine before changing the oil.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the engine and drain the oil completely into the oil pan.
   All the used oil can be drained out easily when the engine is still warm.
2. After draining reinstall the drain plug.
3. Fill with the new oil up to the upper notch on the dipstick. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)

IMPORTANT

- **Use DPF-compatible oil (CJ-4) for the engine.**

Engine oil capacity (with filter)	L3560	6.7 L 7.1 U.S.qts 5.9 Imp.qts
	L4060 L4760	8.2 L 8.7 U.S.qts 7.2 Imp.qts
	L5060 L5460 L6060	9.4 L 9.9 U.S.qts 8.3 Imp.qts

(1) Oil Inlet
(2) Dipstick
(3) Drain Plug

[A] L3560
[B] L4060, L4760, L5060, L5460, L6060
A: Oil level is acceptable within this range.

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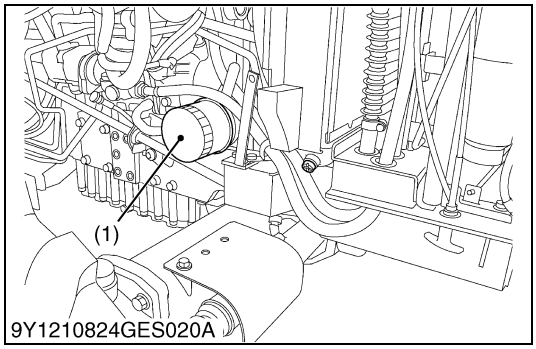


Replacing Engine Oil Filter

CAUTION

- **Be sure to stop the engine before changing the oil filter cartridge.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

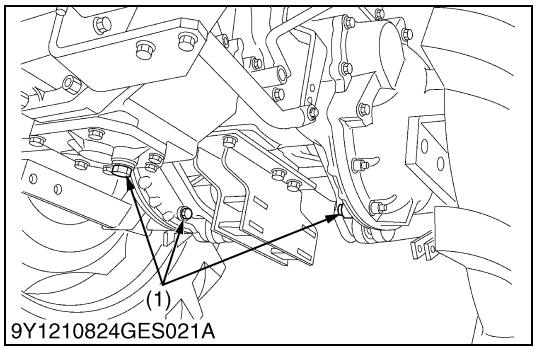
1. Remove the oil filter.
2. Put a film of clean engine oil on the rubber seal of the new filter.
3. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
4. After the new filter has been replaced, the engine oil normally decreases a little. Make sure that the engine oil does not leak through the seal and be sure to check the oil level on the dipstick. Then, replenish the engine oil up to the prescribed level.

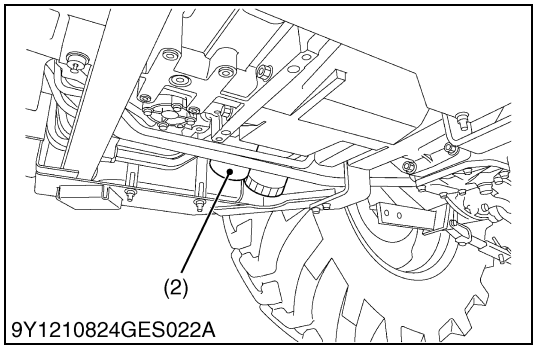
IMPORTANT

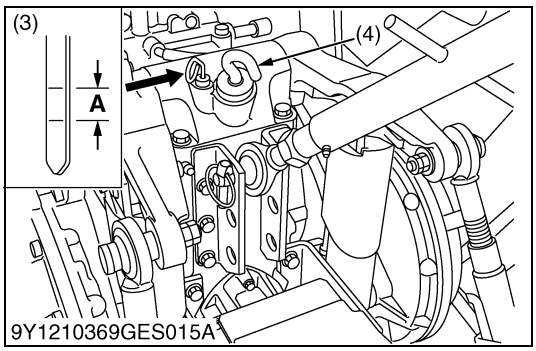
- **To prevent serious damage to the engine, use only a KUBOTA genuine filter.**

(1) Engine Oil Filter

9Y1210824GEG0029US0







Replacing Transmission Oil Filter (HST)

CAUTION

- **Be sure to stop the engine before changing the oil filter cartridge.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. Remove the drain plugs at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.
3. Remove the oil filter.
4. Put a film of clean transmission oil on the rubber seal of the new filter.
5. Quickly tighten the filter until it contacts the mounting surface, then, with a filter wrench, tighten it an additional 1 turn only.
6. After the new filters have been replaced, fill the transmission oil up to the upper notch on the dipstick.
7. After running the engine for a few minutes, stop the engine and check the oil level again, add oil to the prescribed level.
8. Make sure that the transmission fluid does not leak past the seal on the filter.

IMPORTANT

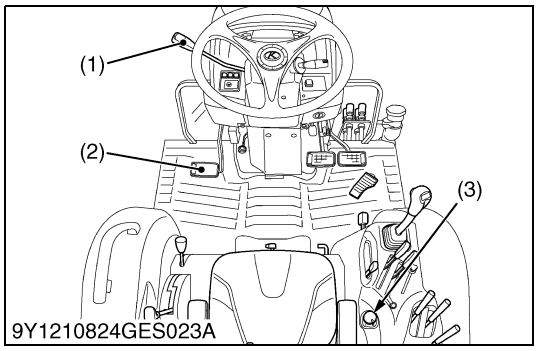
- **To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.**

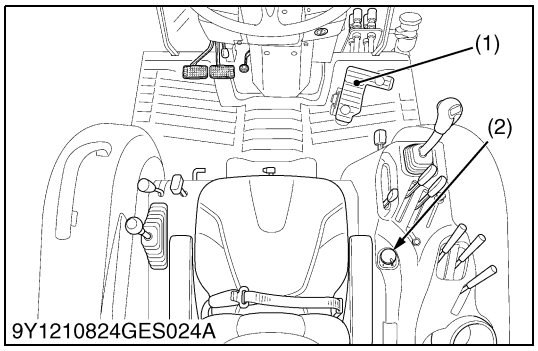
(1) Drain Plug
(2) Transmission Oil FIlter (HST)
(3) Gauge
(4) Oil Inlet

A: Oil level is acceptable within this range.

9Y1210824GEG0030US0

[3] CHECK POINTS OF EVERY 50 HOURS





Checking Engine Start System

CAUTION

To avoid personal injury:

- **Do not allow anyone near the tractor while testing.**
- **If the tractor does not pass the test, do not operate the tractor.**

■ **Preparation before testing.**

1. Place all control levers in the **"NEUTRAL"** position.
2. Set the parking brake and stop the engine.

[GST / Manual Transmission]

■ **Test: Switch for the shuttle shift lever.**

1. Sit on the operator's seat
2. Shift the shuttle shift lever to the forward or reverse position.
3. Depress the clutch pedal fully.
4. Disengage the PTO clutch control switch or lever.
5. Turn the key to **"START"** position.
6. The engine must not crank.

■ **Test: Switch for the PTO clutch control switch or lever.**

1. Sit on the operator's seat.
2. Engage the PTO clutch control switch or lever.
3. Depress the clutch pedal fully.
4. Shift the shuttle shift lever to the neutral position.
5. Turn the key to **"START"** position.
6. The engine must not crank.

[HST]

■ **Test: Switch for the speed control pedal.**

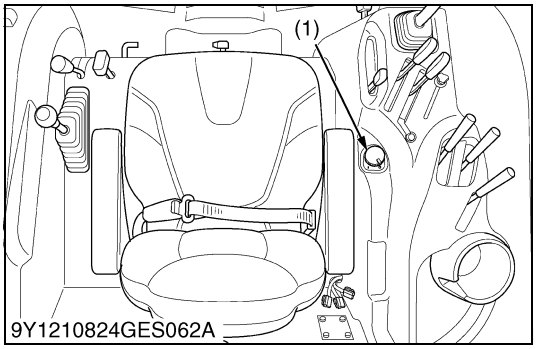
1. Sit on the operator's seat.
2. Depress the speed control pedal to the desired direction.
3. Disengage the PTO clutch control switch or lever.
4. Turn the key to **"START"** position.
5. The engine must not crank.

■ **Test: Switch for the PTO clutch control switch or lever.**

1. Sit on the operator's seat.
2. Engage the PTO clutch control switch or lever.
3. Place the speed control pedal in neutral position.
4. Turn the key to **"START"** position.
5. The engine must not crank.

(1) Shuttle Shift Lever
(2) Clutch Pedal
(3) PTO Clutch Control Switch

9Y1210824GEG0031US0



Checking Operator Presence Control

CAUTION

To avoid personal injury:

- **Do not allow anyone near the tractor while testing.**
- **If the tractor does not pass the test, do not operate the tractor.**

■ **Preparation before testing.**

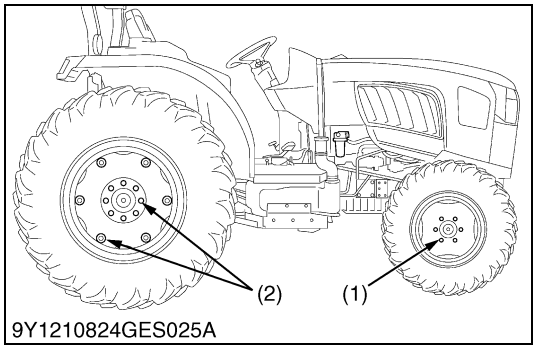
1. Place all control levers in the **"NEUTRAL"** position.
2. Set the parking brake and stop the engine.

■ **Test: Switch for the operator's seat**

1. Sit on the operator's seat.
2. Start the engine.
3. Engage the PTO clutch control switch or lever.
4. Stand up. (Do not get off the machine.)
5. The engine must shut off after approximately 1 second.

(1) PTO Clutch Control Switch

9Y1210824GEG0032US0



Checking Wheel Mounting Screws and Nuts Tightening Torque

CAUTION

- **Never operate tractor with a loose rim, wheel, or axle.**
- **Any time bolts and nuts are loosened, retighten to specified torque.**
- **Check all bolts and nuts frequently and keep them tight.**

1. Check wheel screws and nuts regularly especially when new. If there are loosened, tighten as follows.

Tightening torque	Front wheel mounting nuts	L3560 L4060 L4760	137 N·m 14 kgf·m 100 lbf·ft
	Front wheel mounting nuts	L5060 L5460 L6060	185 N·m 19 kgf·m 136 lbf·ft
	Rear wheel mounting screws and nuts		215 N·m 22 kgf·m 160 lbf·ft

(1) Front Wheel Mounting Nut
(2) Rear Wheel Mounting Screw and Nut

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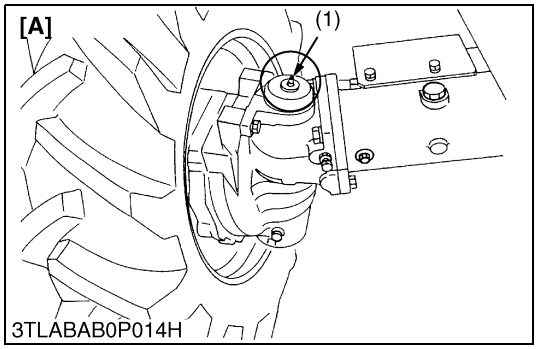
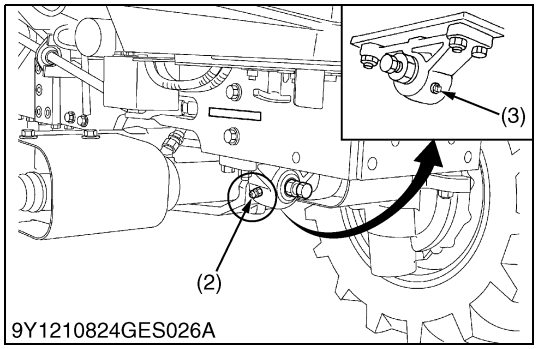
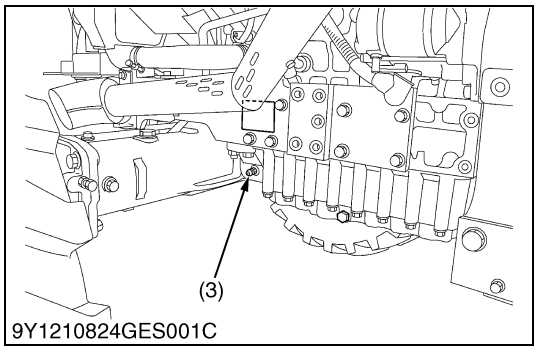
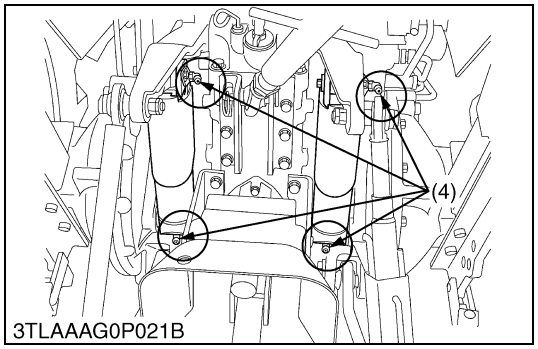
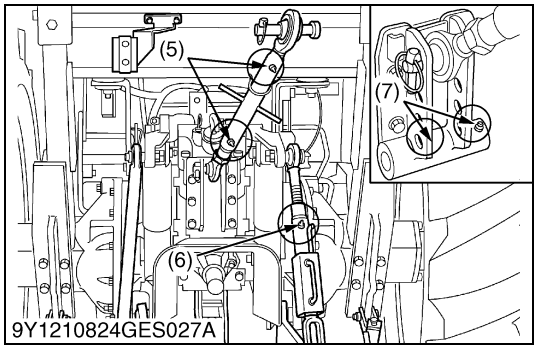




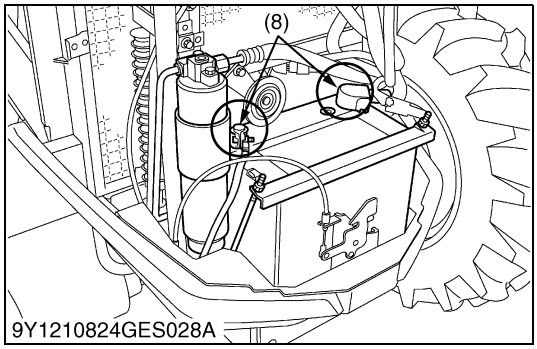


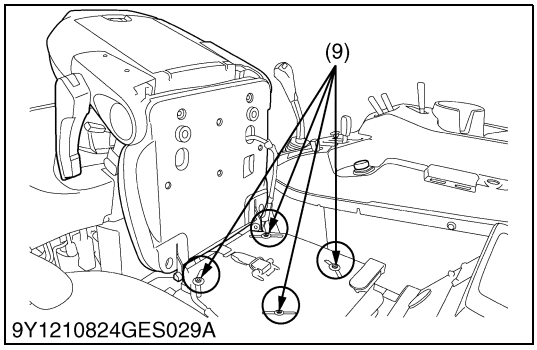




Lubricating Grease Fitting

1. Apply a small amount of multipurpose grease to the following points every 50 hours.
   If you operated the machine in extremely wet and muddy conditions, lubricate grease fittings more often.
2. When apply a grease to forward front axle support, remove the breather plug and apply a grease until grease overflows from breather plug port. After greasing reinstall the breather plug.





(1) Grease Fitting (Front Wheel Case Support RH, LH)
(2) Grease Fitting (Front Axle Support)
(3) Breather Plug
(4) Grease Fitting (Lift Cylinder)
(5) Grease Fitting (Top Link)
(6) Grease Fitting (Lifting Rod RH)
(7) Grease Fitting (Top Link Bracket)
(8) Battery Terminal
(9) Swivel Seat

[A] L4760, L5060, L5460, L6060

9Y1210824GEG0036US0

[4] CHECK POINTS OF EVERY 100 HOURS

Adjusting Clutch Pedal Free Travel (GST / Manual Transmission)

1. See page G-20.

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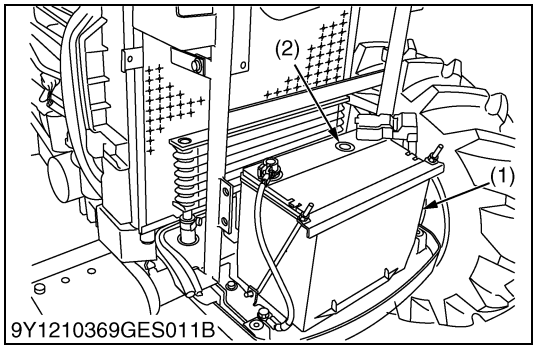
Adjusting Brake Pedal Free Travel

1. See page G-20.

9Y1210824GEG0038US0



Checking Battery Condition

DANGER

To avoid the possibility of battery explosion:
For the refillable type battery, follow the instructions below.

- **Do not use or charge the refillable type battery if the fluid level is below the LOWER (lower limit level) mark.**
  Otherwise, the battery component parts may prematurely deteriorate, which may shorten the battery's service life or cause an explosion. Check the fluid level regularly and add distilled water as required so that the fluid level is between the UPPER and LOWER levels.

CAUTION

- **Never remove the vent plugs while the engine is running.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately and get medical attention.**
- **Keep open sparks and flames away from the battery at all times.**
  Hydrogen gas mixed with oxygen becomes very explosive.
- **Wear eye protection and rubber gloves when working around battery.**

■ **NOTE**

- **The factory-installed battery is of non-refillable type. If the indicator turns white, do not charge the battery but replace it with new one.**

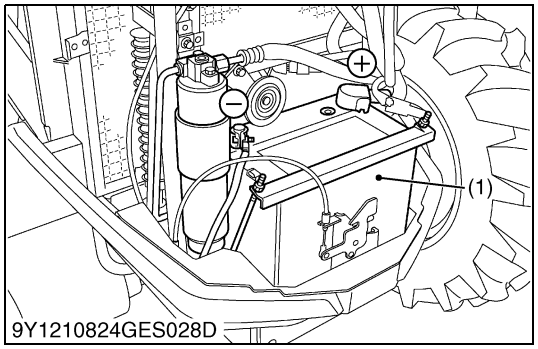
1. Mishandling the battery shortens the service life and adds to maintenance costs.
2. The original battery is maintenance free type battery, but need some servicing.
   If the battery is weak, the engine is difficult to start and the lights be dim. It is important check the battery periodically.

■ **How to read the indicator**
Check the battery condition by reading the indicator.

State of indicator display	
Green	Specific gravity of electrolyte and quality of electrolyte are both in good condition.
Black	Needs charging battery.
White	Needs replacing battery.

(1) Battery (2) Indicator

9Y1210824GEG0039US0



Battery Charging

CAUTION

- **When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.**
- **When charging the battery, ensure the vent caps are securely in place. (if equipped)**
- **When disconnecting the cable from the battery, start with the negative terminal first.**
  When connecting the cable to the battery, start with the positive terminal first.
- **Never check battery charge by placing a metal object across the posts.**
  Use a voltmeter or hydrometer.

1. To slow charge the battery, connect the battery positive terminal to the charger positive terminal and the negative to the negative, then recharge in the standard fashion.
2. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time.
   When using a boost-charged battery, it is necessary to recharge the battery as early as possible.
   Failure to do this will shorten the battery's service life.
3. The battery is charged if the indicator display turns green from black.
4. When exchanging an old battery for a new one, use battery of equal specification shown in table 1.

Table 1

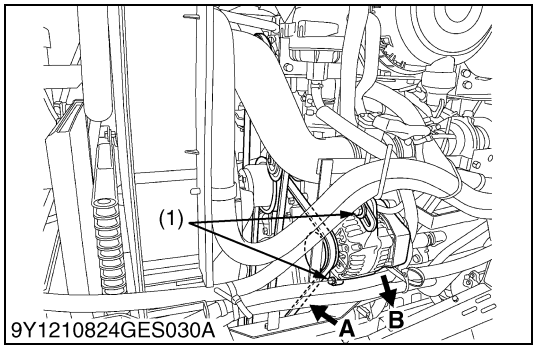
Battery Type	Volt (V)	Capacity at 5 H.R.	Reserve at (min.)	Cold Cranking Amps	Normal Charging Rate (A)
80D26R	12	55	133	582	6.5

■ **Direction for Storage**

1. When storing the tractor for long periods of time, remove the battery from tractor, adjust the electrolyte to the proper level and store in a dry place out of direct sunlight.
2. The battery self-discharges while it is stored.
   Recharge it once every three months in hot seasons and once every six months in cold seasons.

(1) Battery

9Y1210824GEG0040US0



Adjusting Fan Belt Tension

⚠ CAUTION

- **Be sure to stop the engine before checking fan belt tension.**

1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.
4. Replace fan belt if it is damaged.

Fan belt tension	Factory specification	A deflection of between 7 to 9 mm (0.28 to 0.34 in.) when the belt is pressed in the middle of the span.

(1) Alternator Mounting Bolt

A: Check the belt tension
B: To Tighten

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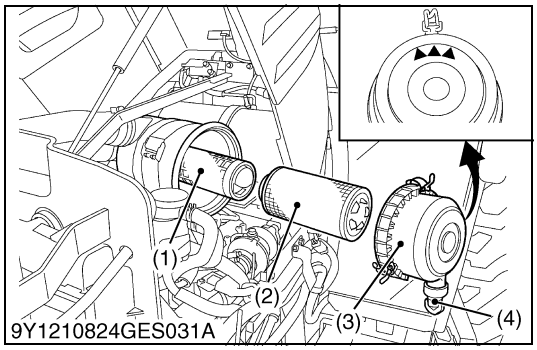


Cleaning Air Cleaner Primary Element

1. Remove the air cleaner cover and primary element.
2. Clean the primary element:
   – When dry dust adheres to the element, blow compressed air from the inside turning the element. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2, 30 psi).
   – When carbon or oil adheres to the element, soak the element in detergent for 15 minutes then wash it several times in water, rinse with clean water and dry it naturally. After element is fully dried, inspect inside of the element with a light and check if it is damaged or not.
3. Replace air cleaner primary element:
   Once yearly or after every six times of cleaning, whichever comes first.

■ **NOTE**

- **Check to see if the evacuator valve is blocked with dust.**

■ **IMPORTANT**

- **The air cleaner uses a dry element, never apply oil.**
- **Do not run the engine with filter element removed.**
- **Be sure to refit the cover with the arrow ↑ (on the rear of cover) upright. If the cover is improperly fitted, evacuator valve will not function and dust will adhere to the element.**
- **Do not touch the secondary element except in cases where replacing is required.**

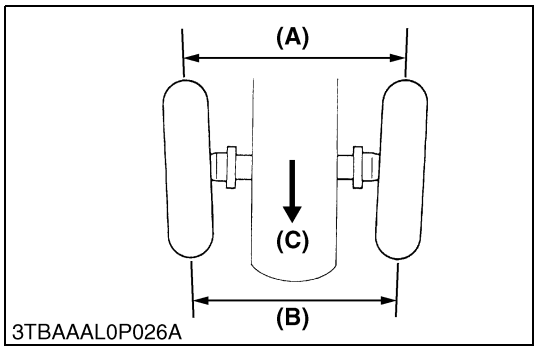
■ **Evacuator Valve**

Open the evacuator valve (4) once a week under ordinary conditions or daily when used in a dusty place to get rid of large particles of dust and dirt.

(1) Secondary (Safety) Element
(2) Primary Element
(3) Cover
(4) Evacuator Valve

9Y1210824GEG0042US0

[5] CHECK POINTS OF EVERY 200 HOURS



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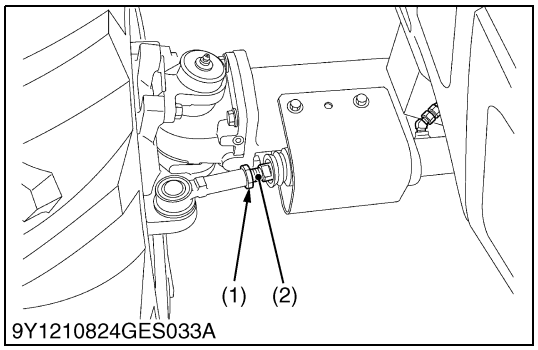

9Y1210824GES033A

Replacing Transmission Oil Filter (HST)

• See page G-22.

9Y1210824GEG0044US0

Adjusting Toe-in

1. Park the tractor on the flat place.
2. Turn steering wheel so front wheels are in the straight ahead position.
3. Lower the implement, lock the parking brake and stop the engine.
4. Measure distance between tire beads at front of tire, hub height.
5. Measure distance between tire beads at rear of tire, hub height.
6. Front distance should be shorter than rear distance. If not, adjust tie rod length.

Toe-in (**A** - **B**)	Factory specification	2 to 8 mm 0.079 to 0.315 in.

■ Adjusting procedures

1. Loosen the tie-rod nut (1).
2. Turn the tie-rod joint (2) to adjust the tie-rod length until the proper toe-in measurement is obtained.
3. Retighten the tie-rod nut (1).

Tightening torque	Tie-rod lock nut	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123 to 145 lbf·ft

■ IMPORTANT

- **A right and left tie-rod joint is adjusted to the same length.**

(1) Tie-rod Nut
(2) Tie-rod Joint

(A) Wheel to Wheel Distance at rear
(B) Wheel to Wheel Distance at front
(C) Front

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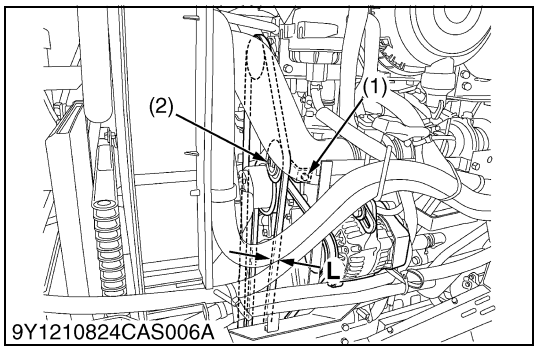

9Y1210824CAS006A

Adjusting Air Conditioner Belt Tension (Cabin Type)

⚠ CAUTION

- **Be sure to stop the engine before checking belt tension.**

1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the tension pulley mounting nut and turn the adjusting bolt to adjust the belt tension within acceptable limits.
4. Replace air-conditioner belt if it is damaged.

Proper air conditioner belt tension	A deflection of between 10 to 12 mm (0.4 to 0.48 in.) when the belt is pressed (98 N [10 kgf, 22.1 lbf]) in the middle of the span.

(1) Adjusting Bolt
(2) Tension Pulley Mounting Nut

A: Check the belt tension

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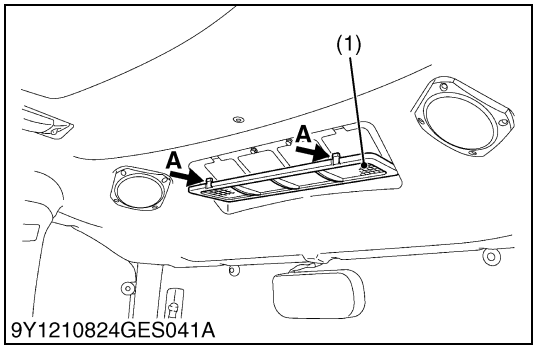

Cleaning Inner Air Filter (Cabin Type)

1. Press the inner air filter in the arrow-marked directions to unlock it and remove the inner filter, and blow air from the direction opposite to the filter's normal air flow.
2. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2, 30 psi).

(1) Inner Air Filter **A: Push**

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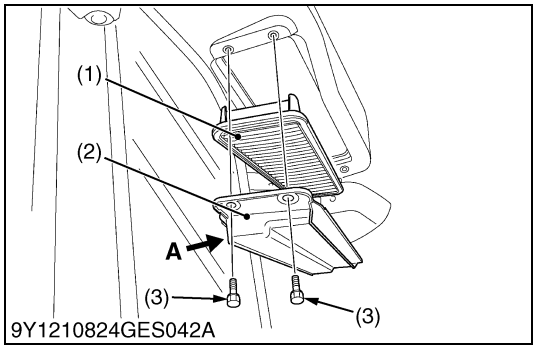


Cleaning Fresh Air Filter (Cabin Type)

Remove the knob bolts and pull out the fresh air filter.

■ **NOTE**
- **Attach the filter and cover as the illustration.**

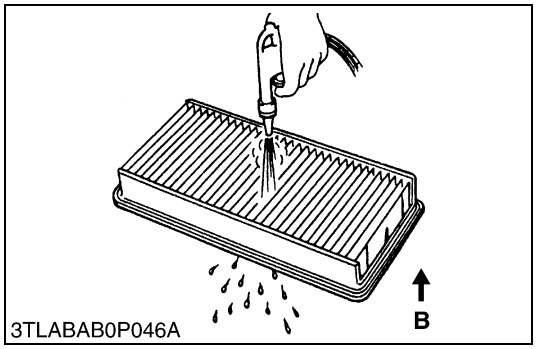
■ **Cleaning the Air Filter**

1. Normal use
   Blow air from the opposite direction to the filter's normal air flow. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2, 30 psi).

■ **IMPORTANT**
- **Do not hit the filter. If the filter becomes deformed, dust may enter into the air-conditioner, which may cause damage and malfunction.**

■ **NOTE**
- **If the filter is very dirty:**
  Dip the filter in lukewarm water with mild dish washing detergent.
  Move it up and down as well as left and right to loosen dirt.
  Rinse the filter with clean water and let it air-dry.

■ **IMPORTANT**
- **Do not use gasoline, thinner or similar chemicals to clean the filter as damage to the filter may occur.**
- **If may also cause an unpleasant odor in the CABIN when the system is used next.**



(1) Fresh Air Filter **A: Air Inlet Port**
(2) Cover **B: Air Conditioner Air Flow**
(3) Knob Bolt

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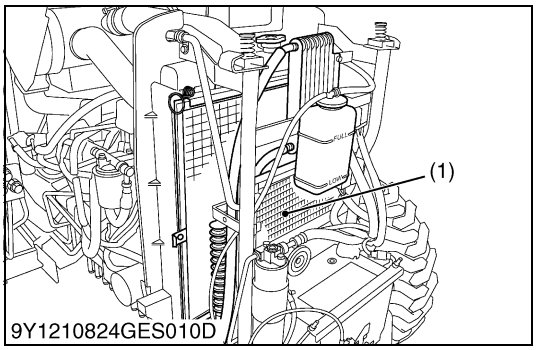


Checking Air Conditioner Condenser (Cabin Type)

1. Check air conditioner condenser to be sure it is clean of debris.

(1) Air Conditioner Condenser

9Y1210824GEG0053US0

[6] CHECK POINTS OF EVERY 400 HOURS

Changing Engine Oil

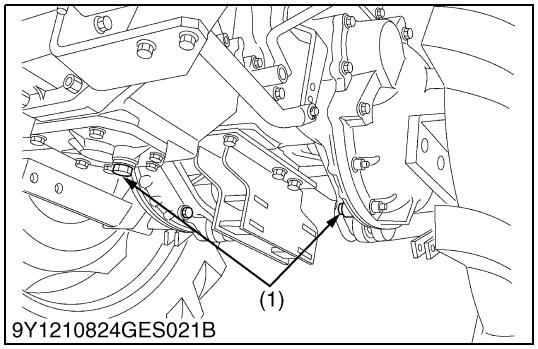
• See page G-21.

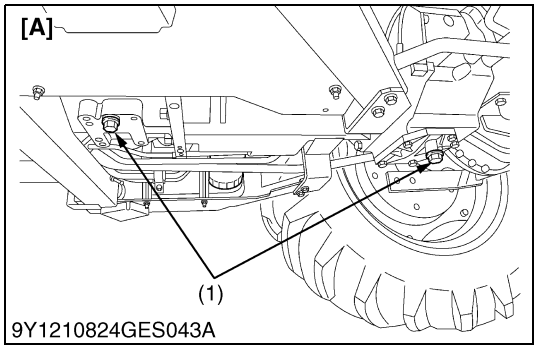
9Y1210824GEG0054US0

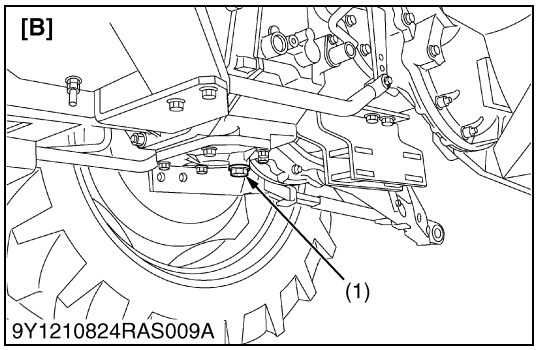
Replacing Engine Oil Filter

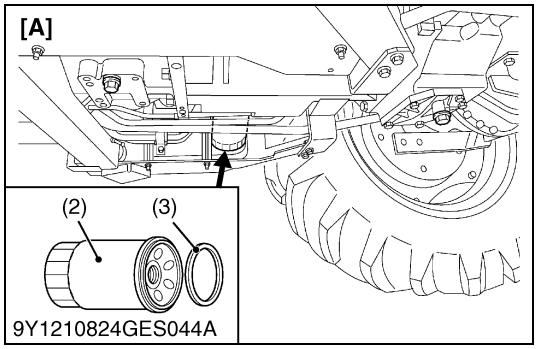
• See page G-22.

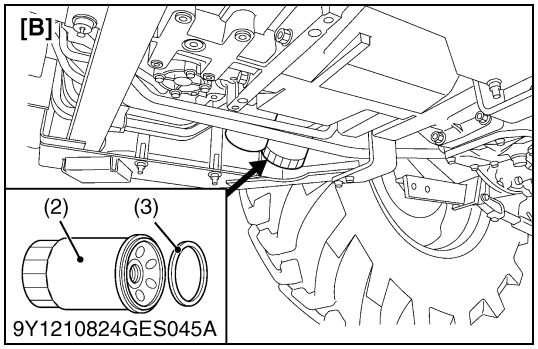
9Y1210824GEG0055US0











Changing Transmission Fluid / Replacing Hydraulic Oil Filter

■ Cleaning Magnetic Filter

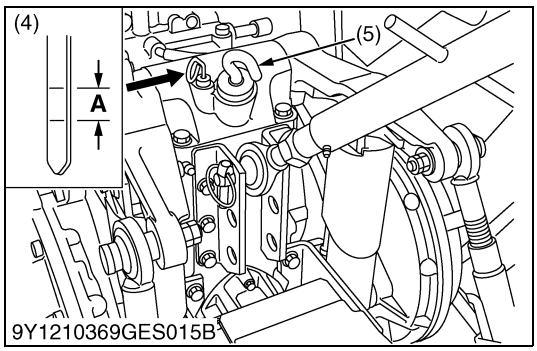
⚠ CAUTION

- **Be sure to stop the engine before changing the oil filter cartridge.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. Remove the drain plugs at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.
3. Remove the oil filter.
4. Wipe off metal filings from the magnetic filter with a clean rag.
5. Put a film of clean transmission oil on the rubber seal of the new filter.
6. Quickly tighten the filter until it contacts the mounting surface, then tighten it by hand an additional 1/2 turn only.
7. Fill with the new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)
8. After running the engine for a few minutes, stop the engine and check the oil level again, add oil to the prescribed level.
9. Make sure that the transmission fluid doesn't leak past the seal on the filter.

■ IMPORTANT

- **To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.**
- **Do not operate the tractor immediately after changing the transmission fluid.**
  Run the engine at medium speed for a few minutes to prevent damage to the transmission.



Transmission oil capacity	L3560	42 L 11.1 U.S.gals 9.2 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5060 L5460 L6060	45 L 11.9 U.S.gals 9.9 Imp.gals

(1) Drain Plug
(2) Hydraulic Oil Filter
(3) Magnetic Filter (Wipe Off Metal Filings)
(4) Gauge
(5) Oil Inlet

[A] GST / Manual Transmission
[B] HST
A: Oil level is acceptable within this range.

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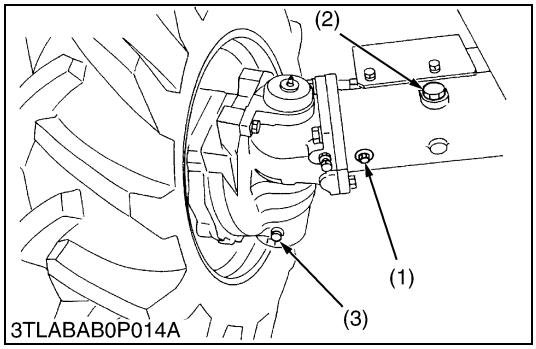


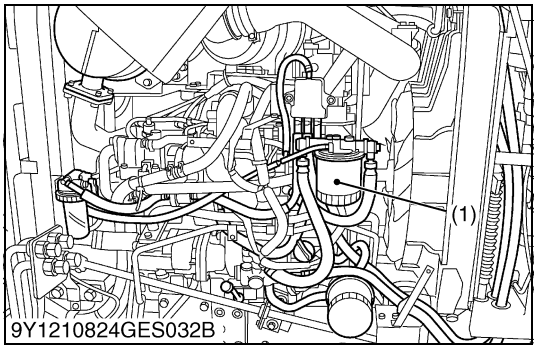
Changing Front Axle Case Oil

1. To drain the used oil, remove the right and left drain plugs and filling plug at the front axle case and let out the oil completely into the oil pan.
2. After draining, reinstall the drain plugs.
3. Gently pour new oil through the filling port. Required oil quantities are written in the table below. Make sure to pour the specified amounts. If oil overflows before pouring any of the specified amounts, wait a couple of minutes and try again. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)
4. After filling, reinstall the filling plug.
5. Run the vehicle a few minutes in order for the oil to flow through the font axle case.
6. Remove the oil level check plug and check to see if the oil flows out of its port. If not, add the oil through the filling port until it flows out of the oil level check port.
7. Reinstall and tighten the oil level check plug and filling plug.

Front axle case oil capacity	L3560 L4060	6.5 L 6.9 U.S.qts 5.7 Imp.qts
	L4760 L5060 L5460 L6060	8.5 L 9.0 U.S.qts 7.5 Imp.qts

(1) Check Plug
(2) Filling Plug
(3) Drain Plug

9Y1210824GEG0057US0

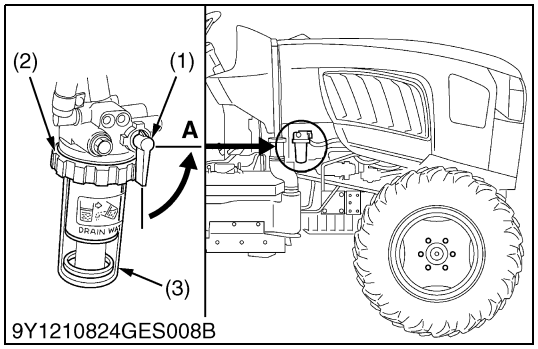


Replacing Fuel Filter

1. Remove the fuel filter.
2. Put a film of clean fuel on rubber seal of new filter.
3. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
4. Bleed the fuel system. (See page G-44.)

(1) Fuel Filter

9Y1210824GEG0058US0



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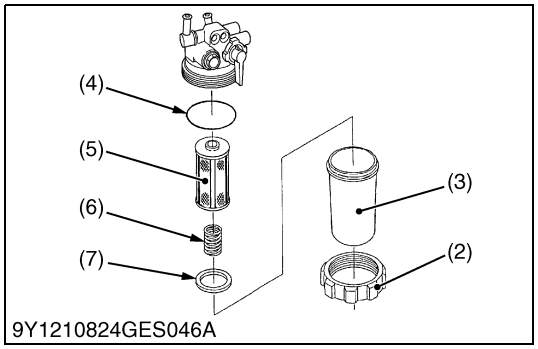


9Y1210824GES046A

Cleaning Water Separator

This job should not be done in the field, but in a clean place.

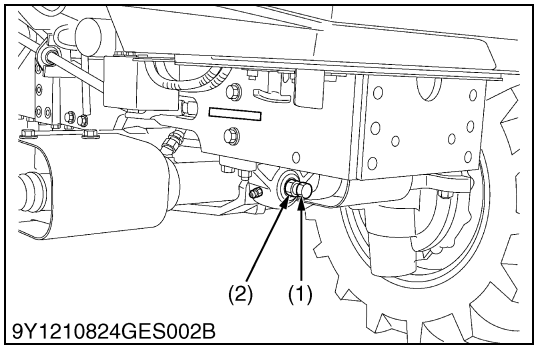
1. Close the fuel valve.
2. Unscrew the retainer ring and remove the cup, and rinse the inside with kerosene.
3. Take out the element and dip it in the kerosene to rinse.
4. After cleaning, reassemble the water separator, keeping out dust and dirt.
5. Bleed the fuel system. (See page G-44.)

(1) Fuel Valve
(2) Retainer Ring
(3) Cup
(4) O-ring
(5) Element
(6) Spring
(7) Red Float

A : Close

9Y1210824GEG0059US0

[7] CHECK POINT OF EVERY 600 HOURS



9Y1210824GES002B

Adjust Front Axle Pivot

If the front axle pivot pin adjustment is not correct, front wheel vibration can occur causing vibration in the steering wheel.

■ **Adjusting procedure**

1. Loosen the lock nut, screw-in the adjusting screw until seated, then tighten the screw with an additional 1/6 turn. Re-tighten the lock nut.

(1) Adjusting Screw (2) Lock Nut

9Y1210824GEG0060US0

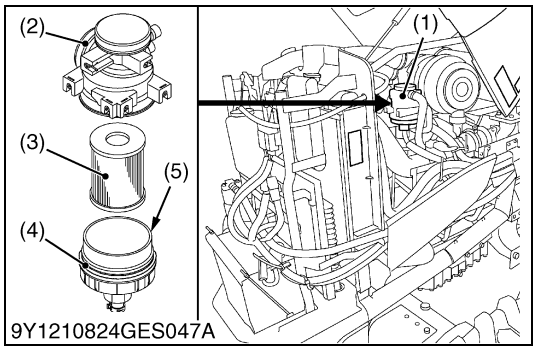
[8] CHECK POINT OF EVERY 800 HOURS

Checking Valve Clearance

- See page 1-S13.

9Y1210824GEG0061US0

[9] CHECK POINTS OF EVERY 1500 HOURS



Cleaning Fuel Injector Nozzle Tip

- See page 1-S57.

9Y1210824GEG0062US0

Replacing Oil Separator Element

CAUTION

To avoid personal injury:

- **Be sure to stop the engine before replacing the oil separator element.**

1. Remove the cover and take out the element. Wipe off oil and the carbon in the case with a clean rag.
2. Fit a new oil separator element.
3. Tighten the cover.

(1) Oil Separator
(2) Body
(3) Oil Separator Element
(4) Gasket
(5) Cover

9Y1210824GEG0063US0

Checking PCV (Positive Crankcase Ventilation) Valve (Oil Separator)

- See page 1-S17.

9Y1210824GEG0064US0

Checking and Cleaning EGR Cooler

- See page 1-S17.

9Y1210824GEG0065US0

[10] CHECK POINTS OF EVERY 3000 HOURS

Checking and Cleaning EGR System

1. Perform an EGR actuation test.
2. Based on test results, check that the EGR valve gas passage and coolant passage are not clogged.
3. Clean any soot from the gas passage so that it does not damage the EGR valve.
4. Clean the coolant passage by running it with water.

9Y1210824GEG0066US0

Checking Supply Pump

- Refer to "6. DIAGNOSIS", DIAGNOSIS MANUAL "COMMON RAIL SYSTEM" (Code No. 9Y120-02420).

9Y1210824GEG0067US0

Cleaning DPF Muffler

- Refer to the Diesel particulate filter handling manual (9Y121-08130).

9Y1210824GEG0068US0

Checking Turbocharger [L5060, L5460, L6060]

- See page 1-S16.

9Y1210824GEG0069US0

[11] CHECK POINTS OF EVERY 1000 HOURS OR 1 YEAR

Replacing Air Cleaner Primary Element and Secondary Element

1. See page G-28.

9Y1210824GEG0070US0

Checking Exhaust Manifold

1. Examine the exhaust manifold for crack, exhaust gas leakage and loose mounting screw.
2. If you find a crack, change the exhaust manifold.
3. If you find a gas leakage, tighten the mounting screw again or replace the gasket with a new one.
4. If you find a loose mounting screw, tighten the mounting screw again.

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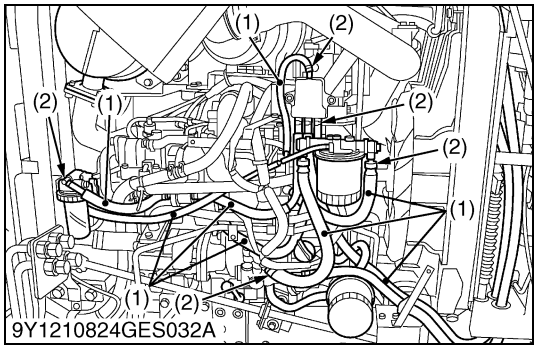
[12] CHECK POINTS OF EVERY 1 YEAR



9Y1210824GES032A

Checking Fuel Line

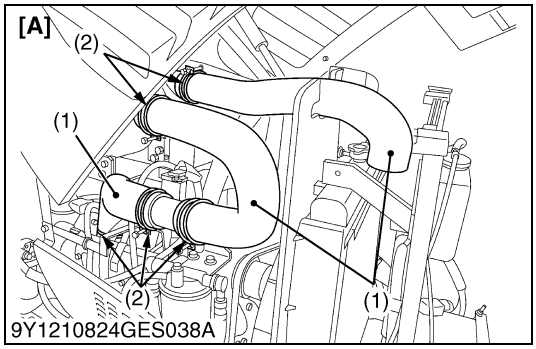
1. Check to see that all line and hose clamp are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace or repair them at once.

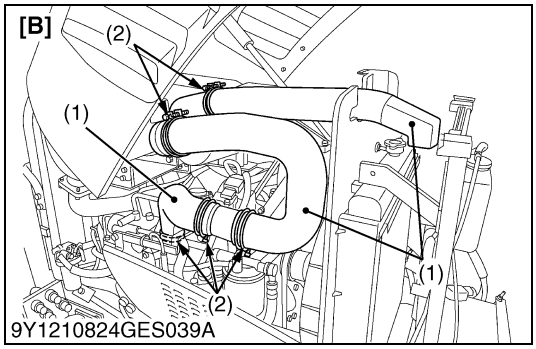
■ **NOTE**

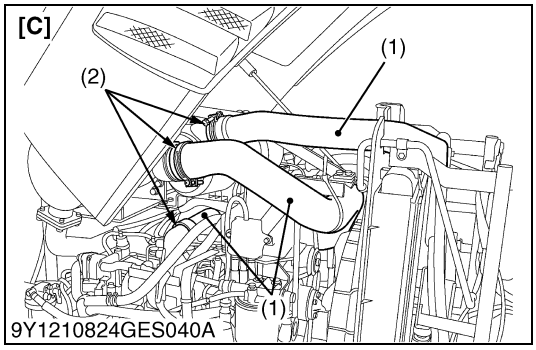
- **If the fuel line is removed, be sure to properly bleed the fuel system. (See page G-44.)**

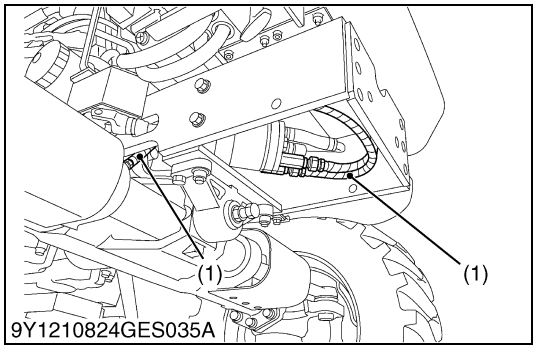
(1) Fuel Hose (2) Clamp Band

9Y1210824GEG0043US0









Checking Intake Air Line

1. Check to see that hose and hose clamps are tight and not damaged.
2. If hose and clamps are found worn or damaged, replace or repair them at once.

(1) Hose
(2) Hose Clamp

[A] L3560
[B] L4060, L4760
[C] L5060, L5460, L6060

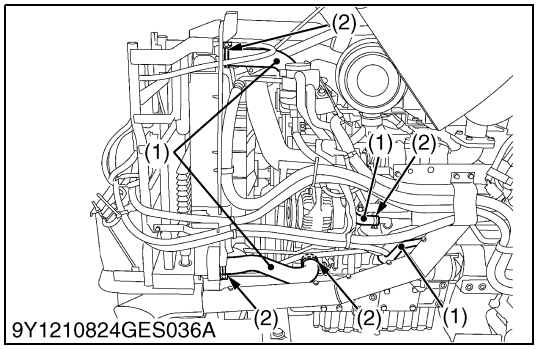
9Y1210824GEG0049US0

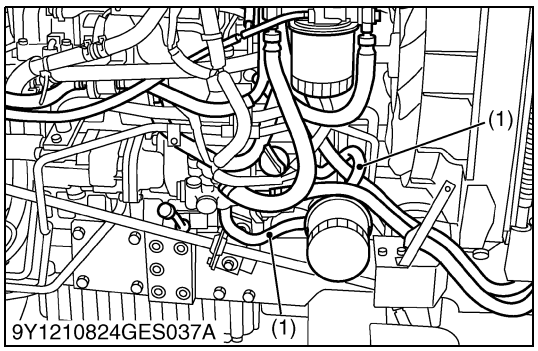
Checking Power Steering Oil Line

1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace repair them at once.

(1) Power Steering Pressure Hoses

9Y1210824GEG0047US0





Checking Radiator Hose and Hose Clamp

Check to see if radiator hoses are properly fixed every 200 hours of operation or six months, whichever comes first.

1. If hose clamps are loose or water leaks, tighten bands securely.
2. Replace hoses and tighten hose clamps securely, if radiator hoses are swollen, hardened or cracked.
   Replace hoses and hose clamps every 2 years or earlier if checked and found that hoses are swollen, hardened or cracked.

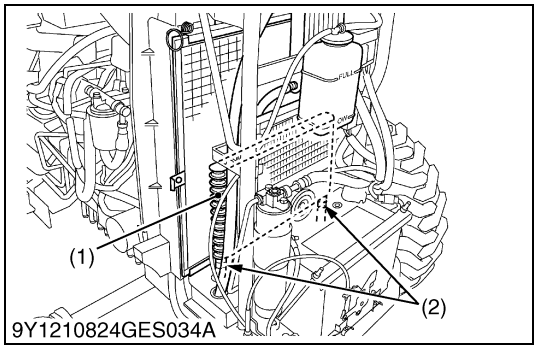
■ **Precaution at Overheating**

Take the following actions in the event the coolant temperature be nearly or more than the boiling point, what is called **"Overheating"**.

1. Stop the machine operation in a safe place and keep the engine unloaded idling.
2. Don't stop the engine suddenly, but stop it after about 5 minutes of unloaded idling.
3. Keep yourself well away from the machine for further 10 minutes or while the steam blown out.
4. Checking that there gets no danger such as burn, get rid of the causes of overheating according to the manual, see "Troubleshooting" section, and then, start again the engine.

(1) Radiator Hose (2) Clamp

9Y1210824GEG0048US0



Checking Oil Cooler Line (HST)

1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace repair them at once.

(1) Oil Cooler (2) HST Oil Line

9Y1210824GEG0046US0

Checking PCV (Positive Crankcase Ventilation) Valve Hose (Oil Separator Hose)

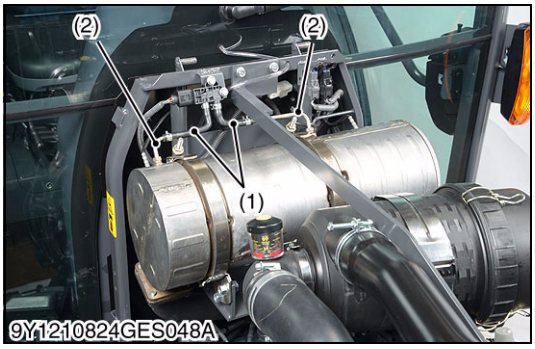
- Check the hoses. (See page 1-S17.)

9Y1210824GEG0135US0

Checking Lift Cylinder Hose

1. Check the lift cylinder hose. (See page 8-S21.)

9Y1210824GEG0136US0



Checking DPF Differential Pressure Sensor Pipes and Hoses

■ **IMPORTANT**

- **Be sure to loosen the differential pressure pipe tightening nut with crowfoot wrench to prevent the damage of the sensor or pipe.**
  If it is still hard to loosen, apply the lubricant spray to threaded portion and soak it with lubricant.
- **Tighten bolts and nuts to their specified torque.**
  Also tighten the differential pressure pipe tightening nut to the specified torque with crowfoot wrench.

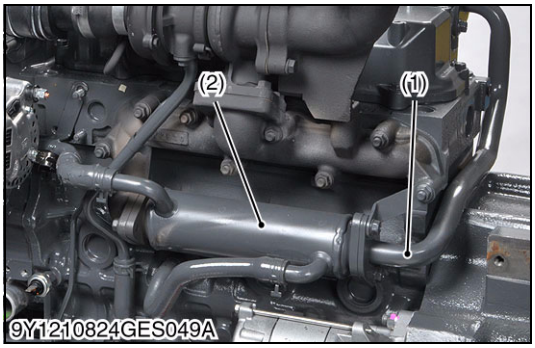
1. Check the DPF differential pressure sensor pipe (2) for crack, gas leakage and loose mounting nut.
2. If you find a crack, change the DPF differential pressure sensor pipe (2).
3. If you find a gas leakage, remove the DPF differential pressure sensor pipe (2) and wipe off the anti-seize & lubricating compound.
4. Apply the anti-seize & lubricating compound again, then tighten the DPF differential pressure sensor pipe (2) to the specified torque.
5. Check the DPF differential pressure sensor hose (1) for crack, gas leakage.
6. If you find a crack or gas leakage, change the DPF differential pressure sensor hose (1).

■ **NOTE**

- **When you change the DPF differential pressure pipe, apply the anti-seize & lubricating compound (Bostik, NEVER-SEEZ, Pure nickel special grade) to the DPF differential pressure pipe.**

(1) DPF Differential Pressure Sensor Hose
(2) DPF Differential Pressure Sensor Pipe

9Y1210824GEG0072US0

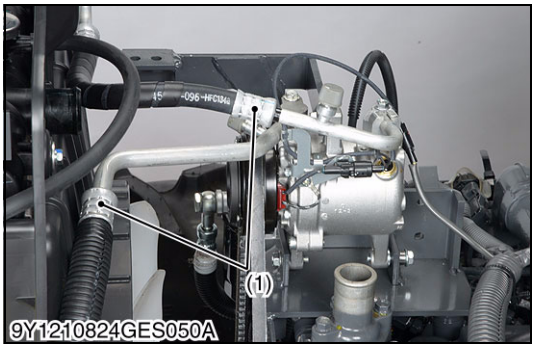


Checking EGR Piping

1. Examine the EGR cooler (2) and the EGR pipe (1) for crack, gas leakage and loose mounting screw.
2. If you find a crack, change the cracked EGR cooler (2) or the cracked EGR pipe (1).
3. If you find a gas leakage, tighten the mounting screw again or replace the gasket with a new one.
4. If you find a loose mounting screw, tighten the mounting screw again.

(1) EGR Pipe
(2) EGR Cooler

9Y1210824GEG0073US0

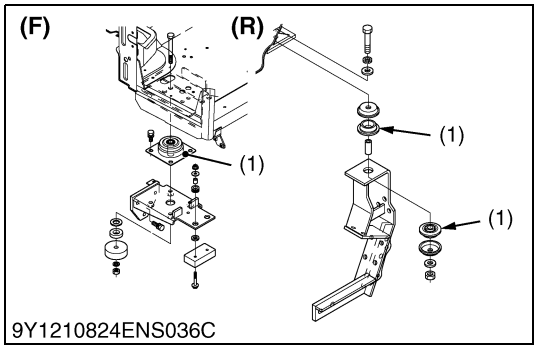


Checking Air-Conditioner Pipe and Hose

1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses (1) and clamps are found worn or damaged, replace or repair them at once.

(1) Hose

9Y1210824GEG0074US0



9Y1210824ENS036C

Checking Cabin Isolation Cushion

1. Check the isolation cushion (1) for any breakage or fatigue.
2. Replace them if they have deteriorated.

(1) Isolation Cushion
(F) Front Side
(R) Rear Side

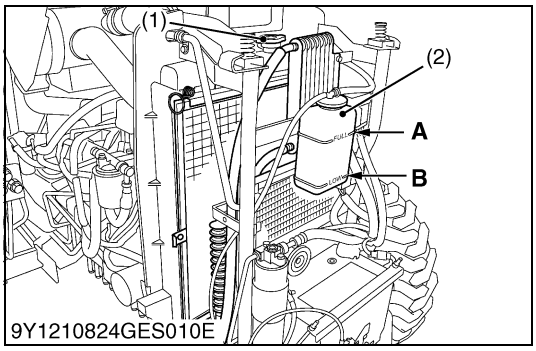
9Y1210824GEG0075US0

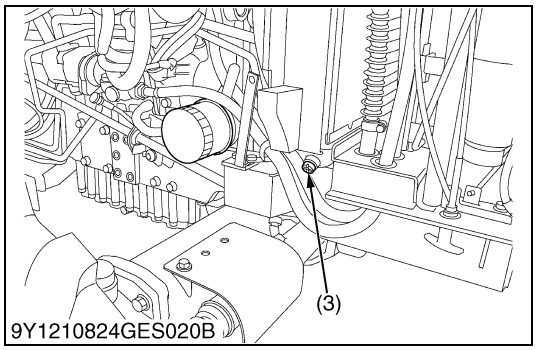
Checking Antifrost Heater for Oil Separator (If Equipped)

1. See page 9-S90.

9Y1210824GEG0134US0

[13] CHECK POINTS OF EVERY 2000 HOURS OR 2 YEARS





Flushing Cooling System and Changing Coolant

CAUTION

To avoid personal injury:

- **Do not remove radiator cap while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.**

1. Stop the engine, remove the key and let it cool down.
2. To drain the coolant, open the radiator drain plug and remove radiator cap. The radiator cap must be removed to completely drain the coolant.
3. After all coolant is drained, reinstall the drain plug.
4. Fill with clean soft water and cooling system cleaner.
5. Follow directions of the cleaner instruction.
6. After flushing, fill with clean soft water and anti-freeze until the coolant level is just below the radiator cap.
   Install the radiator cap securely.
7. Fill with coolant up to the **"FULL"** mark of recovery tank.
8. Start and operate the engine for few minutes.
9. Stop the engine, remove the key and let cool.
10. Check coolant level of recovery tank and add coolant if necessary.
11. Properly dispose of used coolant.

■ **IMPORTANT**

- **Do not start engine without coolant.**
- **Use clean, coolant and anti-freeze to fill the radiator and recovery tank.**
- **When the anti-freeze is mixed with water, the anti-freeze mixing ratio must be less than 50 %.**
- **Securely tighten radiator cap. If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**

■ **NOTE**

- **On cabin type machines, coolant circulates through the heater. This means that one more liter or so of coolant is required.**
  In changing coolant, pour coolant up to the filter port of the recovery tank. Turn ON the heater (shift the temperature control lever toward WARM), and run the engine for a while in order to warm coolant. Then stop the engine.
  When coolant has cooled down, some of the coolant in the recovery tank is sucked. Now the recovery tank is appropriately filled with coolant.

Coolant capacity (without recovery tank)	L3560 L4060	7.5 L 7.9 U.S.qts 6.6 Imp.qts
	L4760 L5060 L5460 L6060	8.2 L 8.7 U.S.qts 7.2 Imp.qts

(1) Radiator Cap
(2) Recovery Tank
(3) Drain Plug

A: FULL
B: LOW

9Y1210824GEG0076US0

Anti-Freeze

CAUTION

To avoid personal injury:

- **When using antifreeze, put on some protection such as rubber gloves. (Antifreeze contains poison.)**
- **If it is swallowed, seek immediate medical help. Do NOT make a person throw up unless told to do so by poison control or a health care professional. Use standard first aid and CPR for signs of shock or cardiac arrest. Call your local Poison Control Center or your local emergency number for further assistance.**
- **When antifreeze comes in contact with the skin or clothing, wash it off immediately.**
- **Do not mix different types of antifreeze.**
  The mixture can produce chemical reaction causing harmful substances.
- **Antifreeze is extremely flammable and explosive under certain conditions. Keep fire and children away from antifreeze.**
- **When draining fluids from the engine, place some container underneath the engine body.**
- **Do not pour waste onto the grounds, down a drain, or into any water source.**
- **Also, observe the relevant environmental protection regulations when disposing of antifreeze.**

Always use a 50/50 mix of long-life coolant and clean soft water in KUBOTA engines.

1. Long-life coolant (hereafter LLC) comes in several types. Use ethylene glycol (EG) type for this engine.
2. Before employing LLC-mixed cooling water, fill the radiator with fresh water and empty it again.
   Repeat this procedure 2 or 3 times to clean up the inside.
3. Mixing the LLC
   Premix 50 % LLC with 50 % clean soft water. When mixing, stir it up well, and then fill into the radiator.
4. The procedure for the mixing of water and antifreeze differs according to the make of the antifreeze and the ambient temperature. Refer to SAE J1034 standard, more specifically also to SEA J814c.

Vol % Anti-freeze	Freezing Point		Boiling Point*	
	°C	°F	°C	°F
50	−37	−34	108	226

*At 1.013 × 10^5 Pa (760 mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within cooling system.

(To be continued)

(Continued)

5. Adding the LLC
   a) Add only water if the mixture reduces in amount by evaporation
   b) If there is a mixture leak, add the LLC of the same manufacturer and type in the same mixture percentage.
      *Never add any long-life coolant of different manufacturer. (Different brands may have different additive components, and the engine may fail to perform as specified.)
6. When the LLC is mixed, do not employ any radiator cleaning agent. The LLC contains anticorrosive agent. If mixed with the cleaning agent, sludge may build up, adversely affecting the engine parts.
7. Kubota's genuine long-life coolant has a service life of 2 years. Be sure to change the coolant every 2 years.

■ **NOTE**

- **The above data represent industry standards that necessitate a minimum glycol content in the concentrated antifreeze.**

9Y1210824GEG0077US0

[14] CHECK POINTS OF EVERY 2 YEARS

Replacing DPF Differential Pressure Sensor Hose

- Refer to "Replacing DPF Differential Pressure Sensor Hose". (See page G-38.)

9Y1210824GEG0084US0

Replacing Boost Sensor Hose

1. Replace the boost sensor hose.
2. If clamps are found damaged, replace them.

9Y1210824GEG0085US0

Replacing Air Conditioner Pipes and Hoses

1. Replace the air conditioner pipes and hoses. (See page 10-S50, 10-S51.)

9Y1210824GEG0087US0

[15] CHECK POINTS OF EVERY 4 YEARS

Replacing Fuel Hose

1. Replace the fuel hoses and clamps.
   Refer to "Checking Fuel Line". (See page G-35.)

9Y1210824GEG0081US0

Replacing Intake Air Line

1. Replace the intake hoses and clamps.
   Refer to "Checking Intake Air Line". (See page G-36.)

9Y1210824GEG0082US0

Replacing Power Steering Hose

1. Replace the hoses and clamps.
   Refer to "Checking HST Oil Line and Power Steering Oil Line". (See page G-36.)

9Y1210824GEG0079US0

Replacing Radiator Hose (Water Pipes)

1. Replace the hoses and clamps.
   Refer to "Checking Radiator Hose and Hose Clamp". (See page G-37.)

9Y1210824GEG0078US0

Replacing Oil Cooler Line (HST)

1. Replace the hoses and clamps.
   Refer to "Checking HST Oil Line and Power Steering Line". (See page G-37.)

9Y1210824GEG0080US0

Replacing PCV (Positive Crankcase Ventilation) Valve Hose (Oil Separator Hose)

- Replace the hoses. (See page 1-S17.)

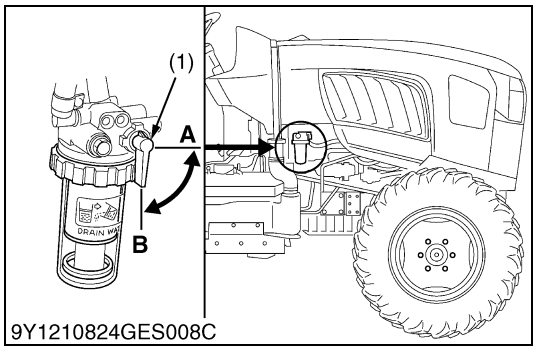
9Y1210824GEG0083US0

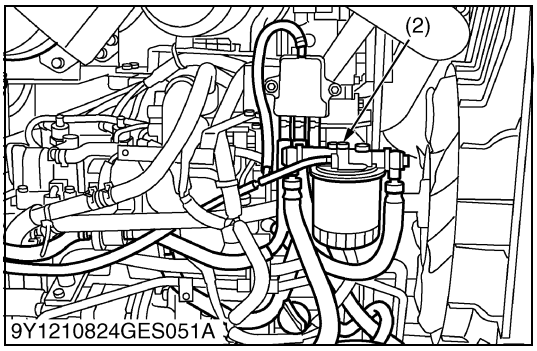
Replacing Lift Cylinder Hose

1. Replace the lift cylinder hose. (See page 8-S21.)

9Y1210824GEG0086US0

[16] OTHERS





Bleeding Fuel System

Air must be removed:

1. When the fuel filter or lines are removed.
2. When water is drained from water separator.
3. When tank is completely empty.
4. After the tractor has not been used for a long period of time.

■ **Bleeding procedure is as follows:**

1. Fill the fuel tank with fuel, and open the fuel valve (1).
2. Loosen the air vent plug on the fuel filter 2 turns or so.
3. Turn on the key switch and wait for about 1 minute. Then tighten up the air vent plug.
4. Set the hand throttle lever at the minimum speed position and turn the key to **"START"** position.
   If the engine does not start, try it several times at 30 second intervals.

■ **IMPORTANT**

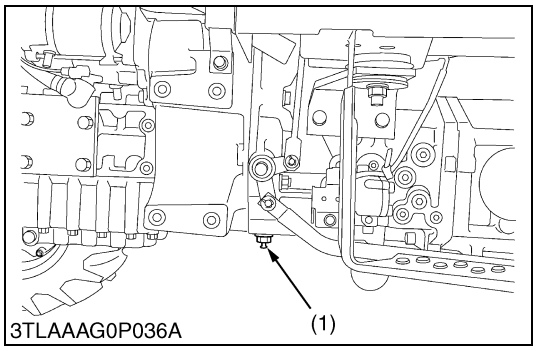
- **Do not hold key switch at engine start position for more than 10 seconds continuously. If more engine cranking is needed, try again after 30 seconds.**

5. Accelerate the engine to remove the small portion of air left in the fuel system.
6. If air still remains and the engine stops, repeat the above steps.

(1) Fuel Valve
(2) Air Vent Valve

A: Close
B: Open

9Y1210824GEG0088US0



Draining Clutch Housing Water

1. The tractor is equipped with split pin plug (1) under the clutch housing.
2. After operating in rain, snow or tractor has been washed, water may get into the clutch housing.
3. Check it by pushing in the split pin (1).
4. If water has entered into the clutch housing, remove the plug (1) and drain the water, then reinstall the plug again.

(1) Split Pin Plug

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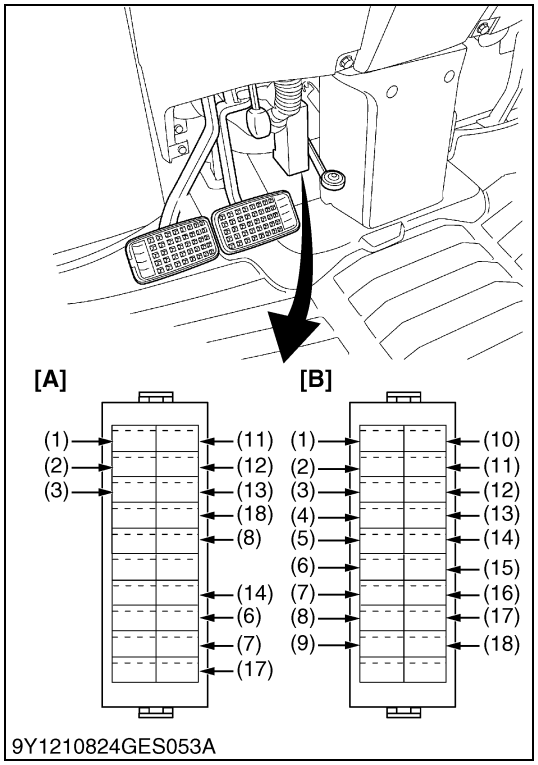

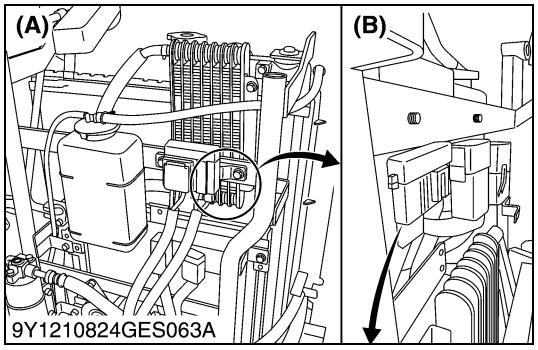

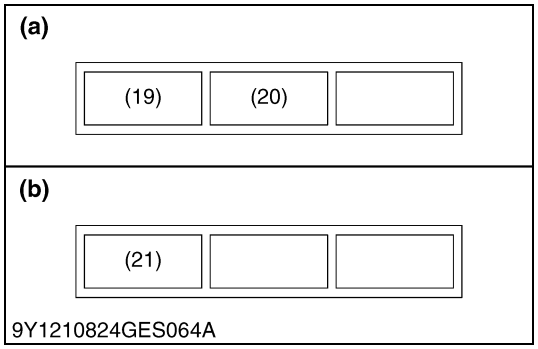

Replacing Fuse

1. The tractor electrical system is protected from potential damage by fuses.
   A blown fuse indicates that there is an overload or short somewhere in the electrical system.
2. If any of the fuses should blow, replace with a new one of the same capacity.

■ **IMPORTANT**

- **Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system. Refer to "1. TROUBLESHOOTING" on page 9-S1.**
  If any of them should blow, replace with a new one of the same capacity.

■ **Protected Circuit**

Fuse No.	Capacity (A)	Protected circuit	ROPS	CABIN
1	5	Meter (Battery)	☆	☆
2	15	Hazard	☆	–
	20	Hazard	–	☆
3	5	Transmission controller (Battery)	☆	☆
4	10	Radio (Battery)	–	☆
5	20	Air conditioner blower	–	☆
6	20	Engine ECU (Battery)	☆	☆
7	30	Starter relay	☆	☆
8	5	Engine ECU (IG)	☆	☆
9	20	Cigar lighter	–	☆
10	5	Radio (ACC)	–	☆
11	15	Transmission controller (IG)	☆	☆
12	10	Meter (IG)	☆	☆
13	5	Meter switch	☆	☆
14	30	Head lights	☆	☆
15	7.5	Air conditioner compressor	–	☆
16	30	Wiper	–	☆
17	15	Flasher	–	☆
18	10	Work light	☆	–
	15	Work light	–	☆

[CCV Heater Fuse] (If Equipped)

Fuse No.	Capacity (A)	Protected circuit
19	20	Heater (Oil Separator, IN 1) Heater (Oil Separator, IN 2)
20	20	Heater (Oil Separator, OUT 1) Heater (Oil Separator, OUT 2)
21	20	Heater (Oil Separator, IN) Heater (Oil Separator, OUT)

[A] ROPS Type
[B] CABIN Type

(A) Front Side
(B) Rear Side
(a) L3560, L4060, L4760
(b) L5060, L5460, L6060

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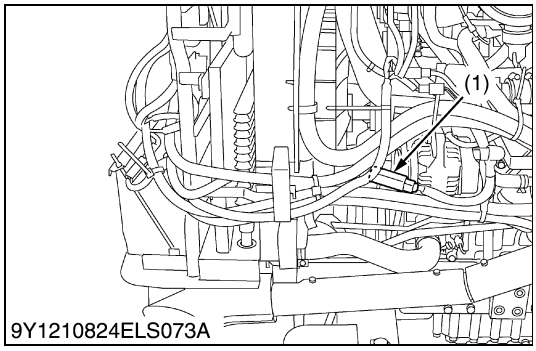

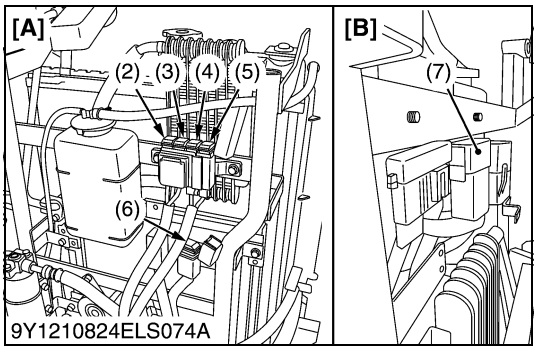

Replacing Slow-Blow Fuses

1. The slow-blow fuses are intended to protect the electrical cabling. If any of them has blown out, be sure to pinpoint the cause. Never use any substitute, use only a KUBOTA genuine part.

No.	Capacity (A)	Protected circuit
1	150	Alternator
2	100, 80	Main
3	60	Battery (CABIN Model)
4	60	Key Switch
5	50	Glow
6	40	Defogger (CABIN Model)
7	40	Oil Separator

[A] Front Side **[B] Rear Side**

9Y1210824GEG0091US0

Replacing Light Bulb

Light	Capacity	
	ROPS	CABIN
Head lights	60 W / 55 W	
Tail light	5 W	
Hazard and turn signal light (rear)	21 W	
Hazard and turn signal light (front)	–	21 W
Side marker light	21 W	
Room light	–	5 W
Work light	–	35 W

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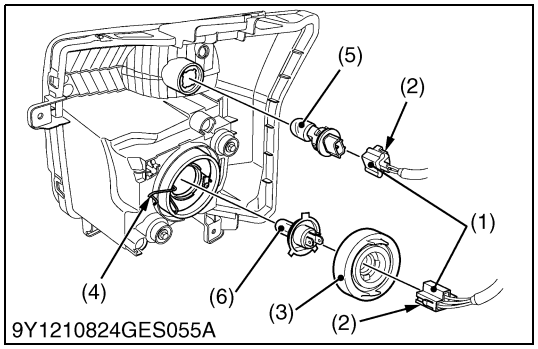


Replacing Head Lamp

■ **NOTE**

To avoid personal injury:

- **Be careful not to drop the bulb, hit anything against the lamp, apply excess force, and get the lamp scratched. If broken, glass may cause injury. Pay more attention to halogen lamps in particular, which have high pressure inside.**
- **Before replacing the lamp, be sure to turn off the light and wait until the bulb cools down, otherwise, you may get burned.**

■ **Side work light**

1. While pushing the lock button, pull and remove the electrical connector.
2. Turn the bulb counter-clockwise slightly and take out the bulb.
3. Replace with a new bulb and reinstall the side work light assembly in the reverse order.

■ **Head lamp**

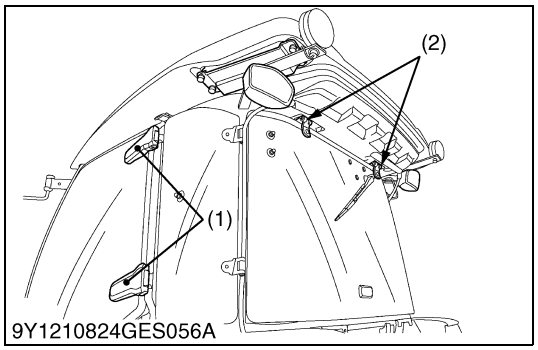
1. While pushing the right and left lock buttons, pull and remove the electrical connector.
2. Remove the rubber boot.
3. Remove the clamping fixture and take out the bulb.
4. Replace with a new bulb and reinstall the head lamp assembly in the reverse order.

■ **IMPORTANT**

- **Be sure to use a new bulb of the specified wattage.**
- **Never touch the bulb surface (glass) with bare hands. Fingerprints, for example, may break the bulb.**

(1) Electrical Connector
(2) Lock Button
(3) Rubber Boot
(4) Clamping Fixture
(5) Bulb (Side Work Light)
(6) Bulb (Head Lamp)

9Y1210824GEG0093US0



Lubricating Points

(1) Door Hinge
(2) Rear Window Hinge

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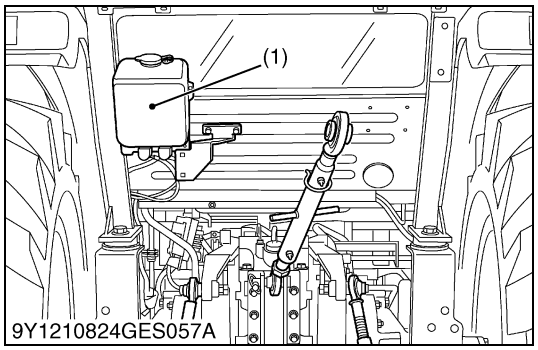

Adding Washer Liquid

1. Add a proper amount of automobile washer liquid.

Tank capacity	2.0 L 2.1 U.S.qts 1.8 Imp.qts

(1) Washer Liquid Tank

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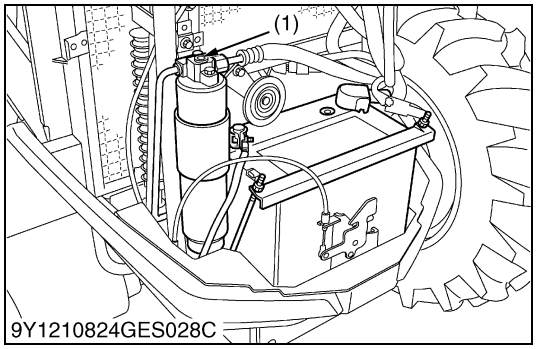
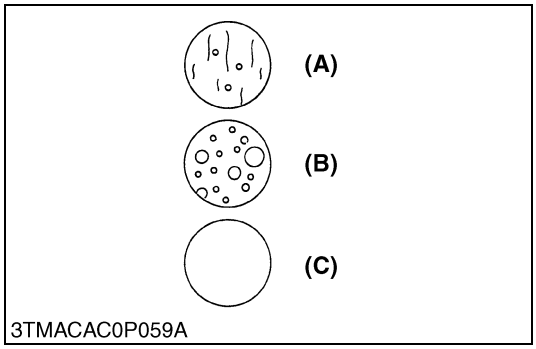




Checking Refrigerant (Gas)

WARNING

- **Liquid contact with eyes or skin may cause frostbite.**
- **In the event of a leakage, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes.**
- **In contact with a flame, R134a refrigerant gives a toxic gas.**
- **Do not disconnect any part of the refrigeration circuit of the air conditioning system.**

A shortage of refrigerant impairs the air-conditioner performance. Check the following points. If it is indicated that the amount of refrigerant is extremely low, inspect and charge. (See page 10-S19.)

■ **Checking Procedure**

1. Run the air-conditioner in the following conditions.
   - Engine speed:
     About 1500 min^{-1} (rpm)
   - Temperature control lever:
     Maximum cooling position (leftmost)
   - Fan switch:
     Highest blow (**HI**)
   - Air-conditioner switch: **ON**
2. Look into the sight glass (1) to see if the refrigerant is flowing through its circuit.

■ **IMPORTANT**

- **Charge only with R134a not R12 refrigerant (gas).**

(1) Sight Glass

(A) Proper: Little or no air bubbles in the refrigerant flow.
(B) Low: Lots of air bubbles in the refrigerant flow (air bubbles or foam passing continuously).
(C) Overfull or no refrigerant: Colorless and transparent.

9Y1210824GEG0096US0

Replacing Radiator Hose (Water Pipes)

1. Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.
   Refer to "Checking Radiator Hose and Hose Clamp". (See page G-37.)

9Y1210824GEG0137US0

Replacing Fuel Hose

1. Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.
   Refer to "Checking Fuel Line". (See page G-35.)

9Y1210824GEG0138US0

Replacing Intake Air Line

1. Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.
   Refer to "Checking Intake Air Line". (See page G-36.)

9Y1210824GEG0139US0

Replacing Power Steering Hose

1. Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.
   Refer to "Checking HST Oil Line and Power Steering Oil Line". (See page G-36.)

9Y1210824GEG0140US0

Replacing Oil Cooler Line [HST Type]

1. Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.
   Refer to "Checking HST Oil Line and Power Steering Line". (See page G-37.)

9Y1210824GEG0141US0

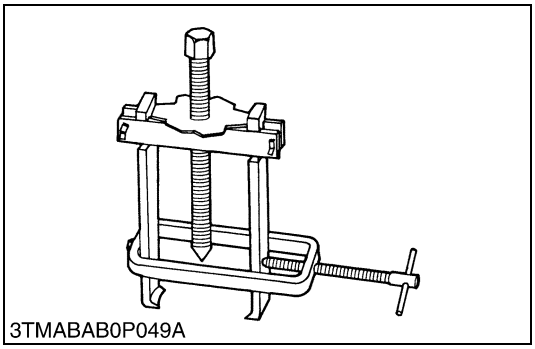
Replacing Oil Separator Hose

1. Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred. (See page 1-S17.)

9Y1210824GEG0142US0

8. SPECIAL TOOLS

[1] SPECIAL TOOLS FOR ENGINE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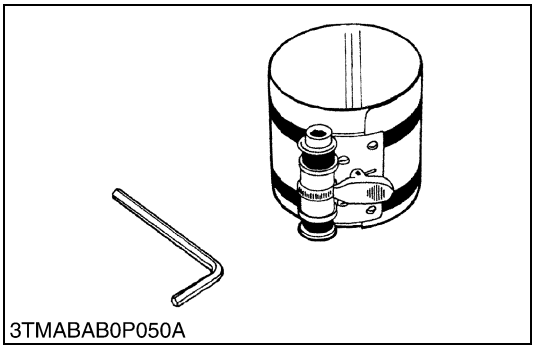
Special Use Puller Set

Code No.
- 07916-09032

Application
- Use exclusively to pull out bearing, gears and other parts with ease.

WSM000001GEG0011US0

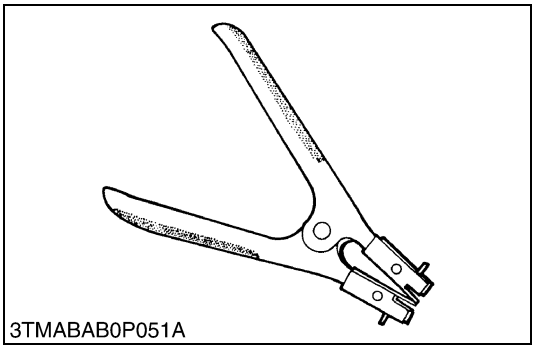

3TMABAB0P050A

Piston Ring Compressor

Code No.
- 07909-32111

Application
- Use exclusively to push in the piston with piston rings into the cylinder.

WSM000001GEG0012US0

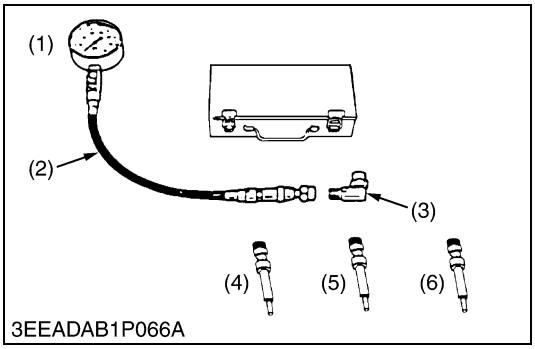

3TMABAB0P051A

Piston Ring Tool

Code No.
- 07909-32121

Application
- Use exclusively to remove or install the piston ring with ease.

WSM000001GEG0013US0



3EEADAB1P066A

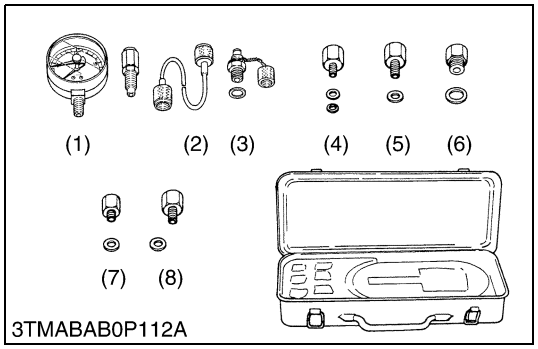
Diesel Engine Compression Tester (for Glow Plug)

Code No.
- 07909-39081 (Assembly)
- 07909-31291 (**K**)
- 07909-31301 (**L**)
- 07909-31311 (**M**)

Application
- Use to measure diesel engine compression and diagnosis of need for major overhaul.

(1) Gauge
(2) Hose Assembly
(3) **L** Joint
(4) Adaptor **K**
(5) Adaptor **L**
(6) Adaptor **M**

WSM000001GEG0096US0



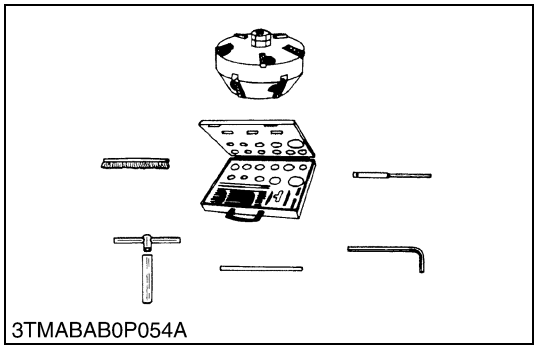
Oil Pressure Tester

Code No.
- 07916-32032

Application
- Use to measure lubricating oil pressure.

(1) Gauge
(2) Cable
(3) Threaded Joint
(4) Adaptor **1**
(5) Adaptor **2**
(6) Adaptor **3**
(7) Adaptor **4**
(8) Adaptor **5**

WSM000001GEG0015US0



Valve Seat Cutter

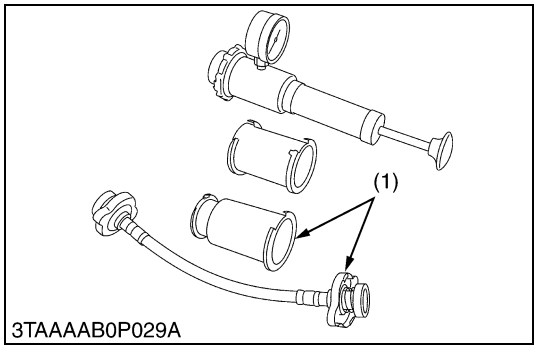
Code No.
- 07909-33102

Application
- Use to reseat valves.

Angle
- 0.79 rad (45°)
- 0.26 rad (15°)

Diameter
- 28.6 mm (1.13 in.)
- 31.6 mm (1.24 in.)
- 35.0 mm (1.38 in.)
- 38.0 mm (1.50 in.)
- 41.3 mm (1.63 in.)
- 50.8 mm (2.00 in.)

WSM000001GEG0016US0



Radiator Tester

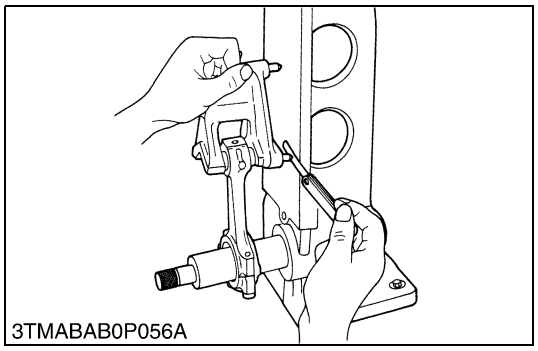
Code No.
- 07909-31551

Application
- Use to check of radiator cap pressure, and leaks from cooling system.

Remarks
- Adaptor (1) BANZAI Code No. RCT-2A-30S.

(1) Adaptor

WSM000001GEG0017US0



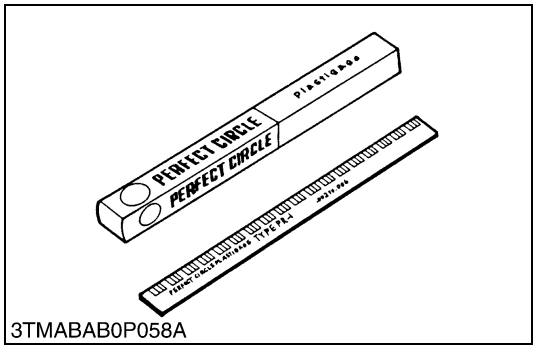
Connecting Rod Alignment Tool

Code No.
- 07909-31661

Application
- Use to check the connecting rod alignment.

Applicable range
- Connecting rod big end I.D.
  30 to 75 mm dia. (1.2 to 2.9 in. dia.)
- Connecting rod length
  65.0 to 300 mm (2.56 to 11.8 in.)

WSM000001GEG0020US0



3TMABAB0P058A

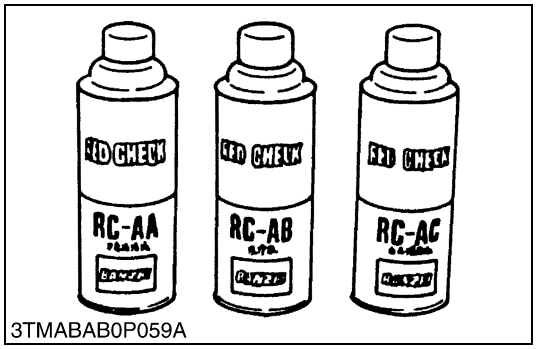
Plastigauge

Code No.
- 07909-30241

Application
- Use to check the oil clearance between crankshaft and bearing, etc..

Measuring range
- Green: 0.03 to 0.07 mm (0.001 to 0.003 in.)
- Red: 0.05 to 0.1 mm (0.002 to 0.006 in.)
- Blue: 0.1 to 0.2 mm (0.004 to 0.009 in.)

WSM000001GEG0022US0



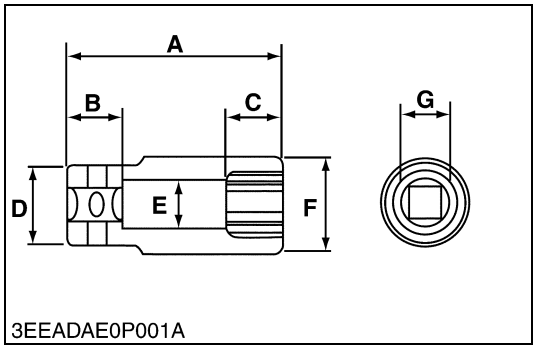
3TMABAB0P059A

Red Check

Code No.
- 07909-31371

Application
- Use to check cracks on cylinder head, cylinder block, etc..

WSM000001GEG0023US0



3EEADAE0P001A

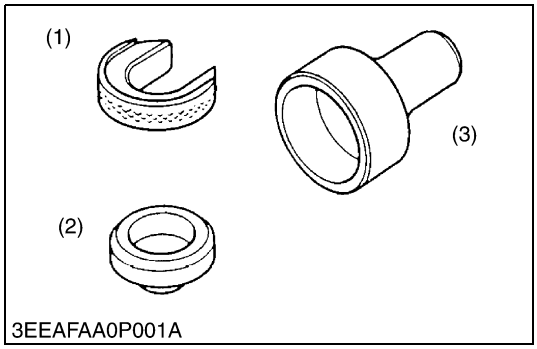
Socket Wrench for Crank Pulley Nut (46 mm Deep Socket Wrench)

Application
- Use to loosen and tighten the fan drive pulley mounting nut.

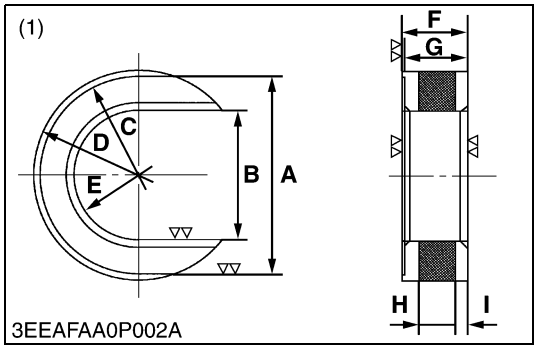
■ **NOTE**
- **The special tool is not available, so make it. Refer to the figure.**

A	100 mm (3.94 in.)
B	25.0 mm (0.98 in.)
C	27.0 mm (1.06 in.)
D	45.0 mm dia. (1.77 in. dia.)
E	35.0 mm dia. (1.38 in. dia.)
F	62.5 mm dia. (2.46 in. dia.)
G	46.0 mm (1.81 in.)

9Y1210824GEG0097US0



3EEAFAA0P001A



3EEAFAA0P002A

Auxiliary Socket for Fixing Crankshaft Sleeve

Application

- To fix the crankshaft sleeve of the diesel engine.

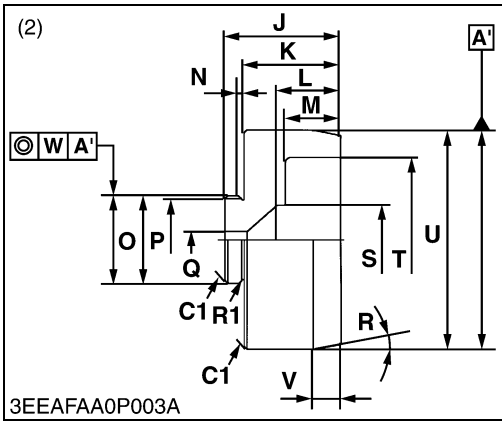
A	80.0 mm (3.15 in.)
B	60.10 to 60.30 mm (2.367 to 2.374 in.)
C	80.0 mm dia. (3.15 in. dia.)
D	85.0 mm dia. (3.35 in. dia.)
E	60.10 to 60.30 mm dia. (2.367 to 2.374 in. dia.)
F	26.30 to 26.40 mm (1.036 to 1.039 in.)
G	25.85 to 25.90 mm (1.018 to 1.019 in.)
H	15.0 mm (0.591 in.)
I	5.0 mm (0.20 in.)

(1) Stopper
(2) Sleeve Guide
(3) Auxiliary Socket for Pushing

(To be continued)

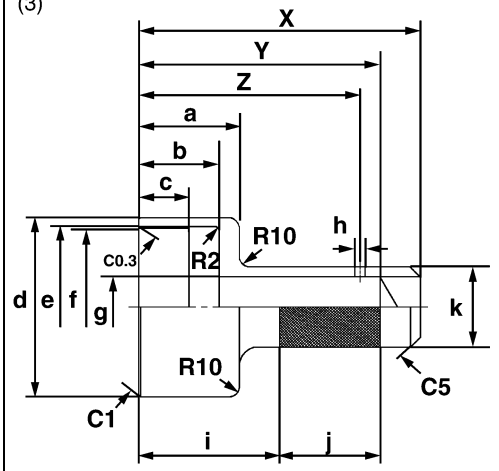
(Continued)

(2)



3EEAFAA0P003A

(3)



3EEAFAA0P004A

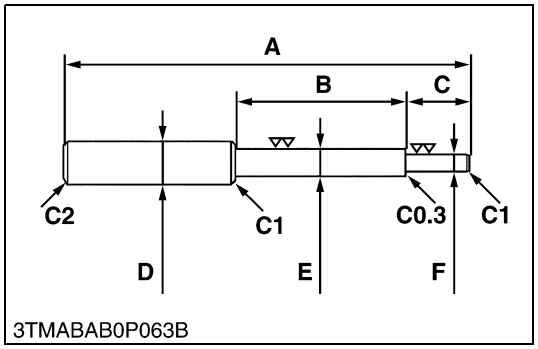
Application

- To fix the crankshaft sleeve of the diesel engine.

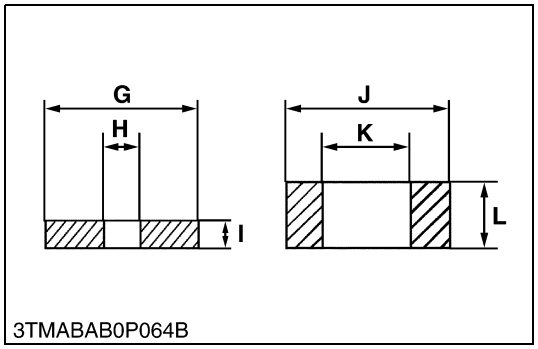
J	42.0 mm (1.65 in.)
K	30.50 to 30.60 mm (1.201 to 1.204 in.)
L	23.0 mm (0.906 in.)
M	20.0 mm (0.787 in.)
N	2.0 mm (0.079 in.)
O	31.911 to 31.950 mm dia. (1.2564 to 1.2578 in. dia.)
P	30.0 mm dia. (1.18 in. dia.)
Q	5.0 mm dia. (0.20 in. dia.)
R	0.09 rad (5 °)
S	25.0 mm dia. (0.984 in. dia.)
T	60.0 mm dia. (2.36 in. dia.)
U	79.80 to 79.85 mm dia. (3.142 to 3.143 in. dia.)
V	10.0 mm (0.394 in.)
W	0.04 mm dia. (0.002 in. dia.)
X	140 mm (5.51 in.)
Y	120 mm (4.72 in.)
Z	110 mm (4.33 in.)
a	50.0 mm (1.97 in.)
b	39.90 to 40.00 mm (1.571 to 1.574 in.)
c	25.0 mm (0.984 in.)
d	90.0 mm dia. (3.54 in. dia.)
e	81.0 mm dia. (3.19 in. dia.)
f	80.10 to 80.15 mm dia. (3.154 to 3.155 in. dia.)
g	30.0 mm dia. (1.18 in. dia.)
h	5.0 mm dia. (0.20 in. dia.)
i	70.0 mm (2.76 in.)
j	50.0 mm (1.97 in.)
k	40.0 mm dia. (1.57 in. dia.)
C1	Chamfer 1.0 mm (0.039 in.)
C5	Chamfer 5.0 mm (0.20 in.)
C0.3	Chamfer 0.3 mm (0.01 in.)
R1	1.0 mm radius (0.039 in. radius)
R2	2.0 mm radius (0.079 in. radius)
R10	10.0 mm radius (0.394 in. radius)

(2) Sleeve Guide (3) Auxiliary Socket for Pushing

9Y1210824GEG0098US0



3TMABAB0P063B



3TMABAB0P064B

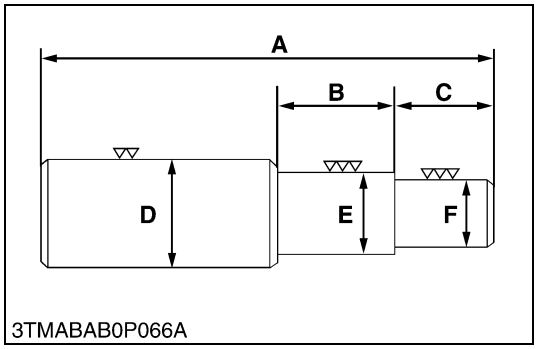
Valve Guide Replacing Tool

Application

- To press out and press fit the valve guide.

A	225 mm (8.86 in.)
B	70 mm (2.8 in.)
C	45 mm (1.8 in.)
D	20 mm dia. (0.79 in. dia.)
E	12.7 to 12.9 mm dia. (0.500 to 0.507 in. dia.)
F	7.50 to 7.60 mm dia. (0.296 to 0.299 in. dia.)
G	25 mm dia. (0.98 in. dia.)
H	7.70 to 8.00 mm dia. (0.304 to 0.314 in. dia.)
I	5 mm (0.2 in.)
J	20 mm dia. (0.79 in. dia.)
K	13.5 to 13.8 mm dia. (0.532 to 0.543 in. dia.)
L	8.90 to 9.10 mm (0.351 to 0.358 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.01 in.)

9Y1210824GEG0099US0



3TMABAB0P066A

Bushing Replacing Tools

Application

- To press out and press fit the bushing.

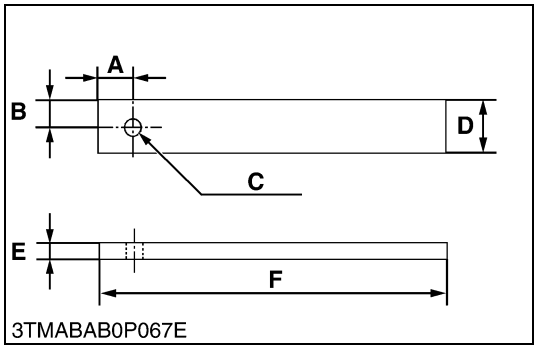
1) For small end bushing

A	162 mm (6.38 in.)
B	35 mm (1.4 in.)
C	27 mm (1.1 in.)
D	35 mm dia. (1.4 in. dia.)
E	27.90 to 27.95 mm dia. (1.099 to 1.100 in. dia.)
F	25.00 to 25.01 mm dia. (0.9843 to 0.9846 in. dia.)

2) For idle gear bushing

A	175 mm (6.89 in.)
B	40 mm (1.6 in.)
C	38 mm (1.5 in.)
D	45 mm dia. (1.8 in. dia.)
E	41.90 to 41.95 mm dia. (1.650 to 1.651 in. dia.)
F	37.950 to 37.970 mm dia. (1.4941 to 1.4948 in. dia.)

9Y1210824GEG0101US0



3TMABAB0P067E

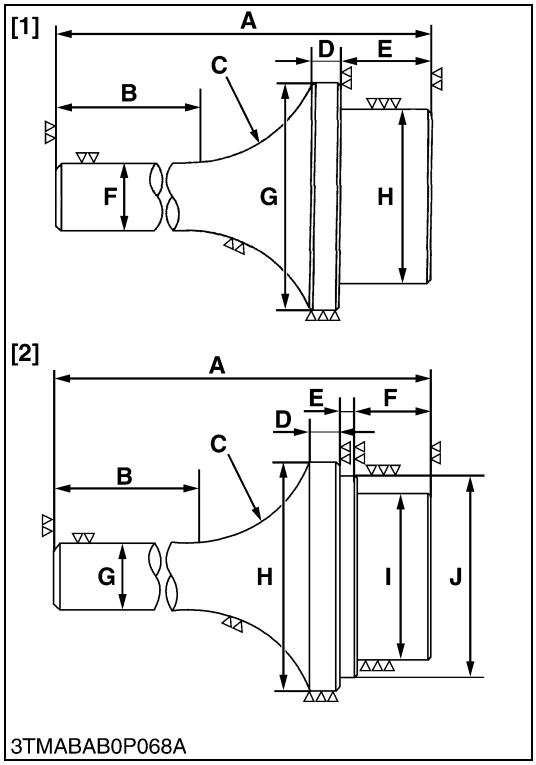
Flywheel Stopper

Application

- To loosen and tighten the flywheel screw.

A	20 mm (0.79 in.)
B	15 mm (0.59 in.)
C	10 mm dia. (0.39 in. dia.)
D	30 mm (1.2 in.)
E	8 mm (0.3 in.)
F	200 mm (7.87 in.)

9Y1210824GEG0102US0



3TMABAB0P068A

Crankshaft Bearing 1 Replacing Tool

Application

- To press out and press fit the crankshaft bearing 1.

[1] Extracting tool

A	135 mm (5.31 in.)
B	72 mm (2.8 in.)
C	40 mm radius (1.6 in. radius)
D	10 mm (0.39 in.)
E	20 mm (0.79 in.)
F	20 mm dia. (0.79 in. dia.)
G	64.80 to 64.90 mm dia. (2.552 to 2.555 in. dia.)
H	59.80 to 59.90 mm dia. (2.355 to 2.358 in. dia.)

[2] Inserting tool

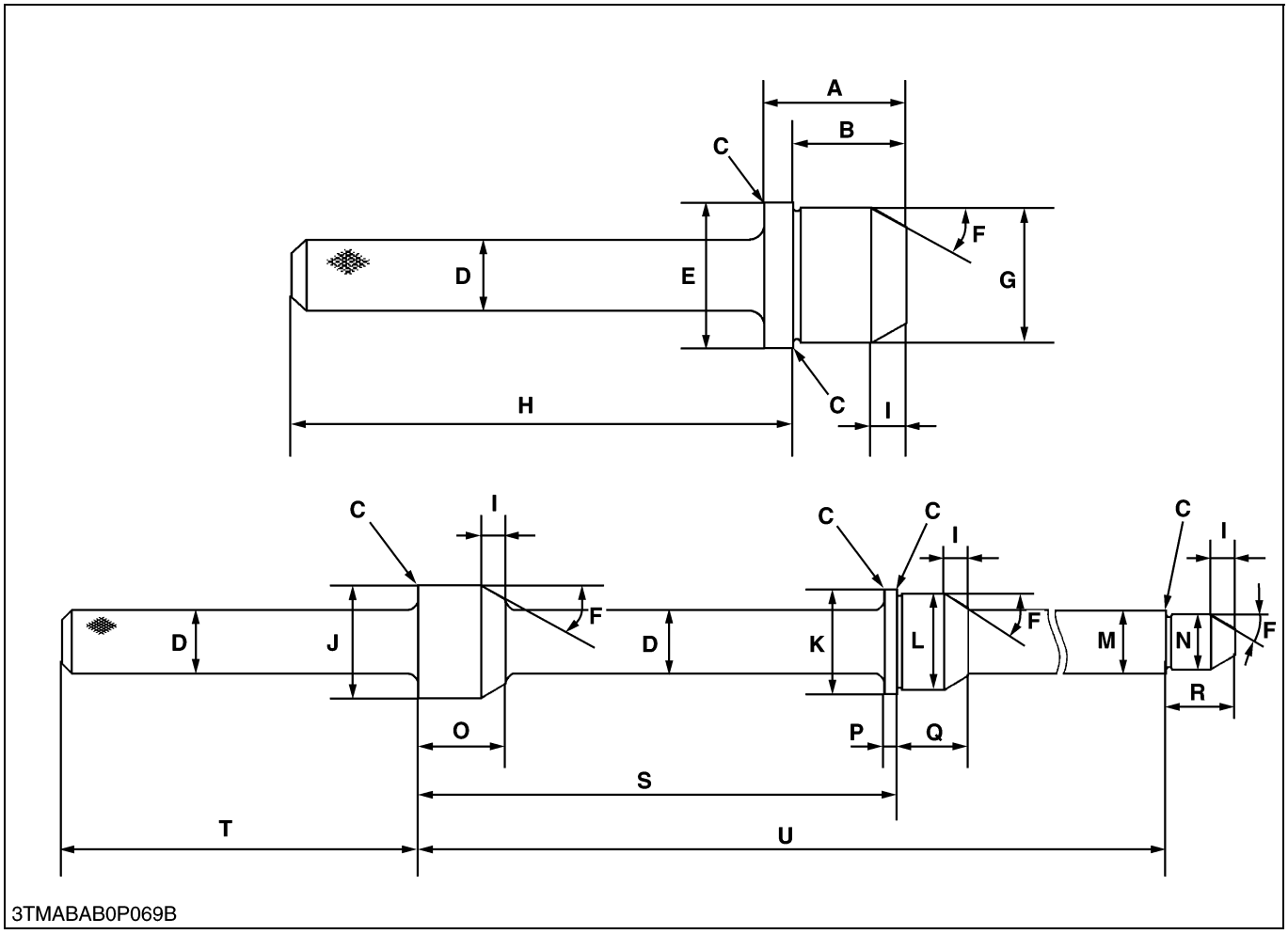
A	130 mm (5.12 in.)
B	72 mm (2.8 in.)
C	40 mm radius (1.6 in. radius)
D	9 mm (0.4 in.)
E	4 mm (0.2 in.)
F	20 mm (0.79 in.)
G	20 mm dia. (0.79 in. dia.)
H	68 mm dia. (2.7 in. dia.)
I	59.80 to 59.90 mm dia. (2.355 to 2.358 in. dia.)
J	64.80 to 64.90 mm dia. (2.552 to 2.555 in. dia.)

9Y1210824GEG0103US0

Balancer Metal Replacing Tool (for Removing)

Application

- To remove the metal bearing.



3TMABAB0P069B

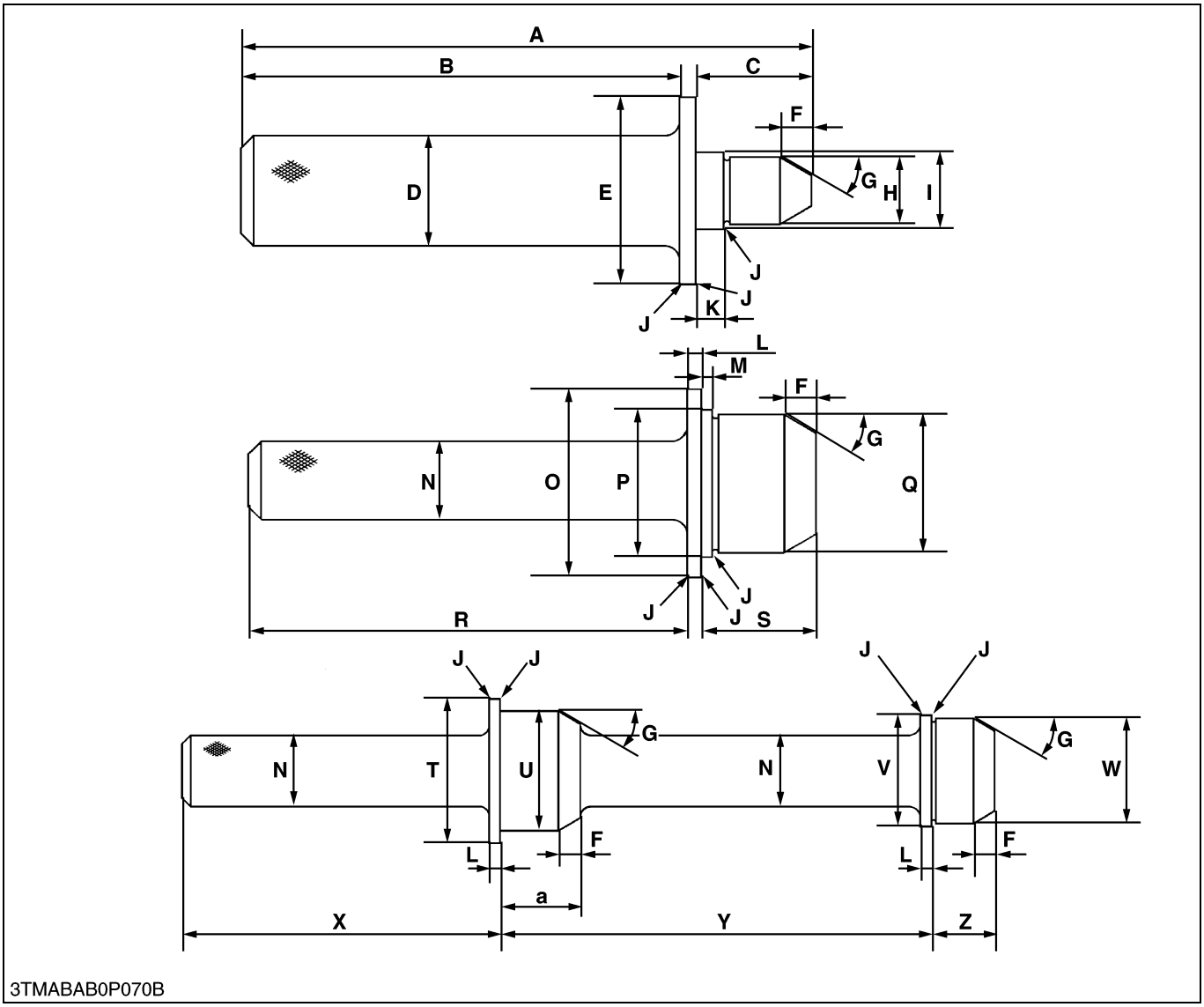
A	41 mm (1.6 in.)	**L**	41.934 to 41.950 mm dia. (1.6510 to 1.6515 in. dia.)
B	32.5 mm (1.28 in.)	**M**	24.959 to 24.980 mm dia. (0.98264 to 0.98346 in. dia.)
C	Chamfer 0.3 mm (0.01 in.)	**N**	21.947 to 21.960 mm dia. (0.86406 to 0.86456 in. dia.)
D	25 mm dia. (0.98 in. dia.)	**O**	36 mm (1.4 in.)
E	46.950 to 46.975 mm dia. (1.8485 to 1.8494 in. dia.)	**P**	5 mm (0.2 in.)
F	0.52 rad (30 °)	**Q**	29.0 mm (1.14 in.)
G	43.934 to 43.950 mm dia. (1.7297 to 1.7303 in. dia.)	**R**	28.0 mm (1.10 in.)
H	148.5 mm (5.846 in.)	**S**	195.25 to 195.75 mm (7.6870 to 7.7066 in.)
I	10 mm (0.39 in.)	**T**	145 mm (5.71 in.)
J	46.50 to 46.75 mm dia. (1.831 to 1.840 in. dia.)	**U**	384.75 to 385.25 mm (15.148 to 15.167 in.)
K	44.950 to 44.975 mm dia. (1.7697 to 1.7706 in. dia.)		

9Y1210824GEG0104US0

Balancer Metal Replacing Tool (for Fitting)

Application

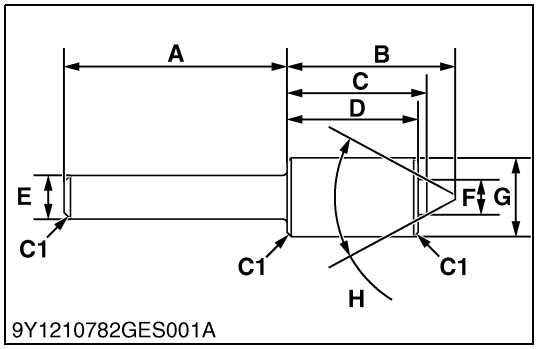
- To press fit the metal bearing.



3TMABAB0P070B

A	182 mm (7.17 in.)	**O**	60 mm dia. (2.4 in. dia.)
B	140 mm (5.51 in.)	**P**	46.950 to 46.975 mm dia. (1.8485 to 1.8494 in. dia.)
C	37 mm (1.5 in.)	**Q**	43.934 to 43.950 mm dia. (1.7297 to 1.7303 in. dia.)
D	35 mm dia. (1.4 in. dia.)	**R**	140 mm (5.51 in.)
E	60 mm dia. (2.4 in. dia.)	**S**	36 mm (1.4 in.)
F	10 mm (0.39 in.)	**T**	60 mm dia. (2.4 in. dia.)
G	0.52 rad (30 °)	**U**	46.950 to 46.975 mm dia. (1.8485 to 1.8494 in. dia.)
H	21.947 to 21.960 mm dia. (0.86406 to 0.86456 in. dia.)	**V**	44.950 to 44.975 mm dia. (1.7697 to 1.7706 in. dia.)
I	24.959 to 24.980 mm dia. (0.98264 to 0.98346 in. dia.)	**W**	41.934 to 41.950 mm dia. (1.6510 to 1.6515 in. dia.)
J	Chamfer 0.3 mm (0.01 in.)	**X**	145 mm (5.71 in.)
K	8.8 to 9.2 mm (0.35 to 0.36 in.)	**Y**	195.25 to 195.75 mm (7.6870 to 7.7066 in.)
L	5 mm (0.2 in.)	**Z**	29 mm (1.1 in.)
M	3.3 to 3.7 mm (0.13 to 0.14 in.)	**a**	36 mm (1.4 in.)
N	25 mm dia. (0.98 in. dia.)		

9Y1210824GEG0105US0



9Y1210782GES001A

Injection Top Correction Jig

Application

- To detects and position the sensor in top-dead center position.

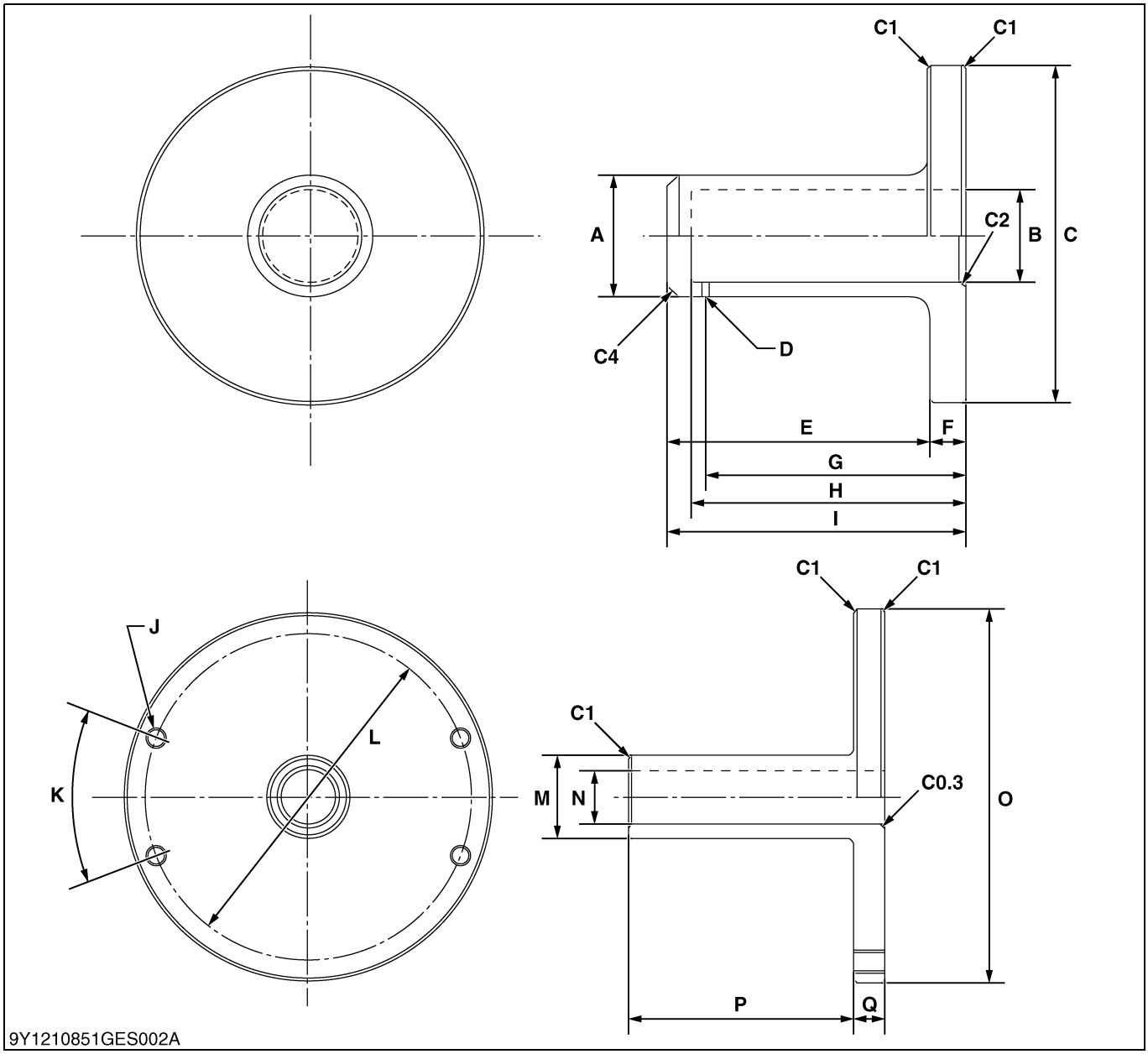
A	60 mm (2.4 in.)
B	45 mm (1.8 in.)
C	37.3 mm (1.47 in.)
D	3.5 mm (1.4 in.)
E	12 mm dia. (0.47 in. dia.)
F	10 mm dia. (0.39 in. dia.)
G	20.34 to 20.50 mm dia. (0.8008 to 0.8070 in. dia.)
H	1.0 rad (60 °)
C1	Chamfer 1.0 mm (0.079 in.)

9Y1210824GEG0132US0

Bearing Case Cover Oil Seal Replacing Tool

Application

- To install bearing case cover oil seal.



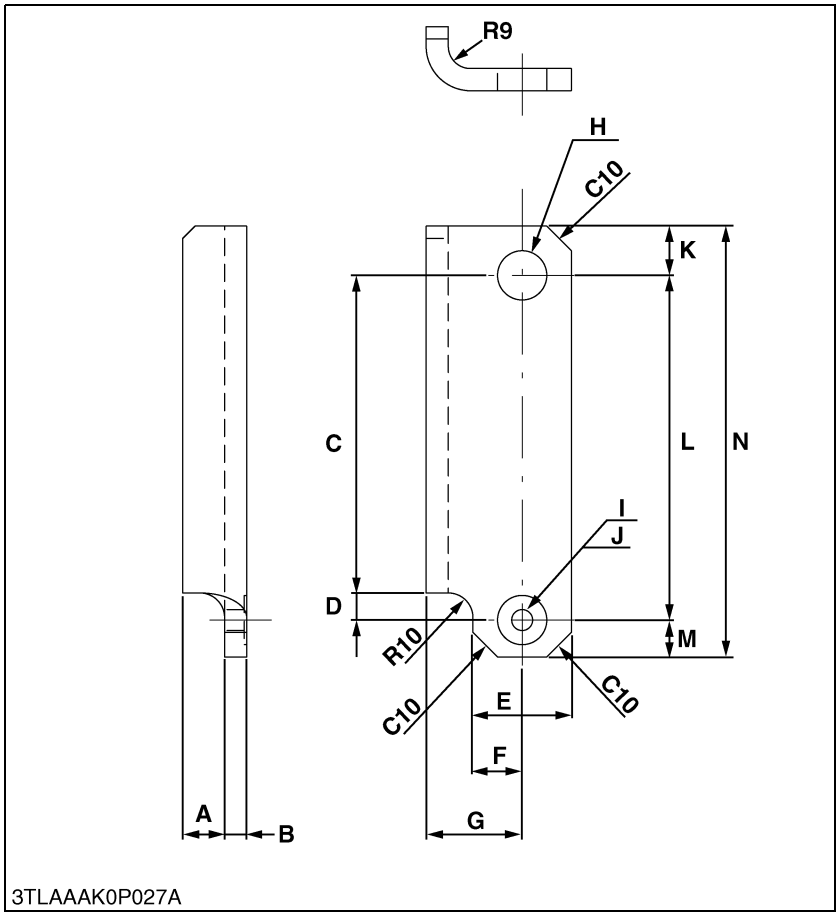
A	42 mm dia. (1.7 in. dia.)	**L**	129 mm dia. (5.08 in. dia.)
B	32 to 32.025 mm dia. (1.260 to 1.261 in. dia.)	**M**	31.950 to 31.975 mm dia. (1.2579 to 1.2588 in. dia.)
C	116 mm dia. (4.57 in. dia.)	**N**	22 mm dia. (0.87 in. dia.)
D	3 mm dia. (0.1 in. dia.)	**O**	145 mm dia. (5.71 in. dia.)
E	88 mm (3.5 in.)	**P**	90 mm (3.5 in.)
F	12 mm (0.47 in.)	**Q**	12 mm (0.47 in.)
G	88 mm (3.5 in.)	**C0.3**	Chamfer 0.3 mm (0.01 in.)
H	92 mm (3.6 in.)	**C1**	Chamfer 1.0 mm (0.039 in.)
I	100 mm (3.94 in.)	**C2**	Chamfer 2.0 mm (0.079 in.)
J	M8 × Pitch	**C4**	Chamfer 4.0 mm (0.2 in.)
K	0.70 rad (40 °)		

9Y1210824GEG0106US0

Engine Hook 1

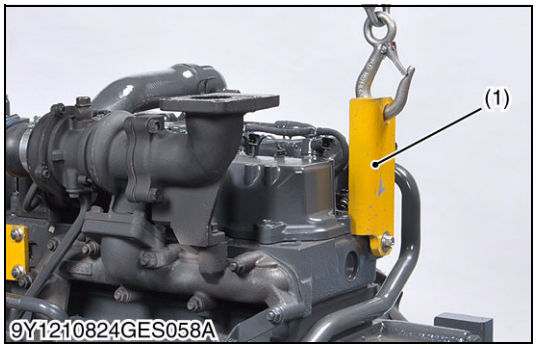
Application

- Use for hooking the V2403 engine. Use this engine hook 1 with the engine hook 2.



3TLAAAK0P027A

A	17 mm (0.67 in.)
B	9 mm (0.35 in.)
C	129 mm (5.08 in.)
D	10.8 to 11.2 mm (0.426 to 0.440 in.)
E	40 mm (1.6 in.)
F	20 mm (0.79 in.)
G	39 mm (1.5 in.)
H	20 mm Hole (0.79 in. Hole)
I	8.50 to 8.80 mm Drilled hole (0.335 to 0.346 in. Drilled hole)
J	20 mm Spot-faced hole 1 mm deep (0.79 in. Spot-faced hole 0.04 in. deep)
K	20 mm (0.79 in.)
L	140 mm (5.51 in.)
M	15 mm (0.59 in.)
N	175 mm (6.89 in.)
C10	Chamfer 10 mm (0.39 in.)
R9	Radius 9.0 mm (0.35 in.)
R10	Radius 10 mm (0.39 in.)



9Y1210824GES058A

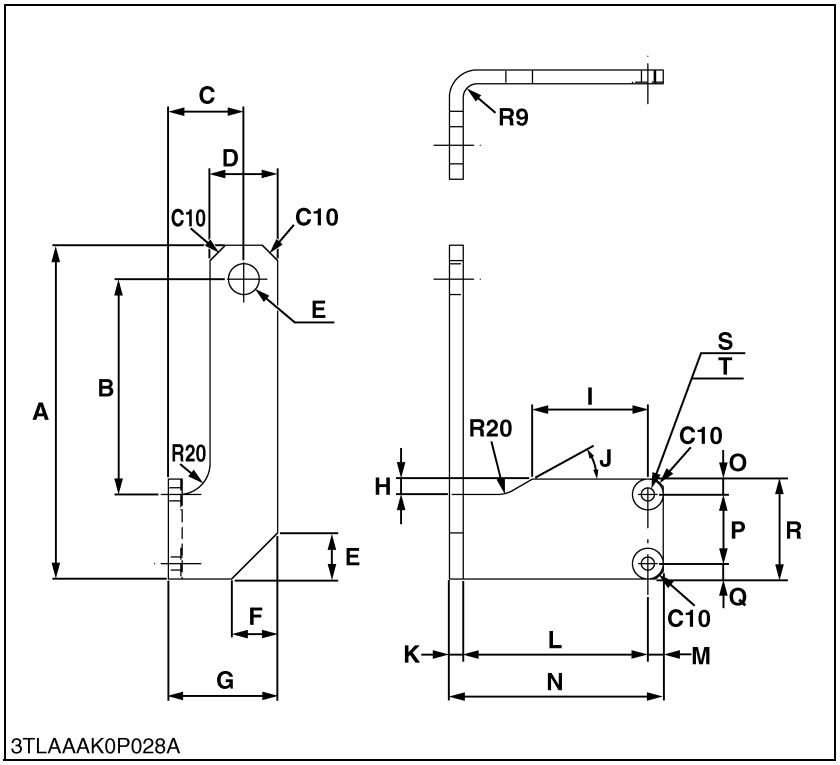
(1) Engine Hook 1

9Y1210824GEG0107US0

Engine Hook 2

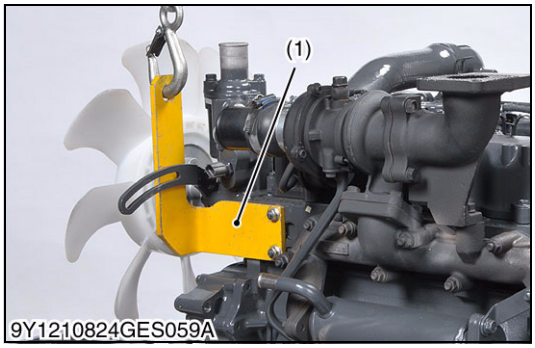
Application

- Use for hooking the V2403 engine. Use this engine hook 2 with the engine hook 1.



3TLAAAK0P028A

A	217 mm (8.54 in.)
B	140 mm (5.51 in.)
C	49 mm (1.9 in.)
D	44 mm (1.7 in.)
E	20 mm Hole (0.79 in. Hole)
F	30 mm (1.2 in.)
G	71 mm (2.8 in.)
H	10 mm (0.39 in.)
I	85 mm (3.3 in.)
J	0.52 rad (30 °)
K	9.0 mm (0.35 in.)
L	120 mm (4.72 in.)
M	10 mm (0.39 in.)
N	139 mm (5.12 in.)
O	10 mm (0.39 in.)
P	44.7 to 45.3 mm (1.76 to 1.78 in.)
Q	10 mm (0.39 in.)
R	65 mm (2.6 in.)
S	2 × 8.50 to 8.80 mm Drilled hole (2 × 0.335 to 0.346 in. Drilled hole)
T	20 mm Spot-faced hole 1 mm deep (0.79 in. Spot-faced hole 0.04 in. deep)
C10	Chamfer 10 mm (0.39 in.)
R9	Radius 9.0 mm (0.35 in.)
R10	Radius 10 mm (0.39 in.)
R20	Radius 20 mm (0.79 in.)

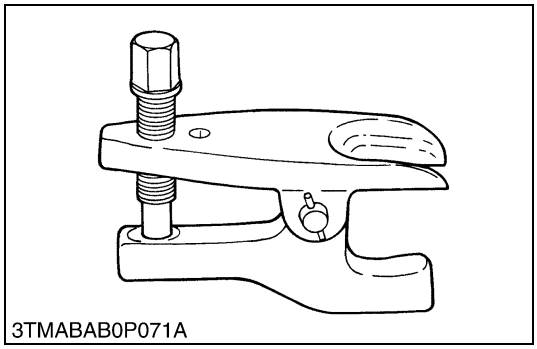


9Y1210824GES059A

(1) Engine Hook 2

9Y1210824GEG0108US0

[2] SPECIAL TOOLS FOR TRACTOR

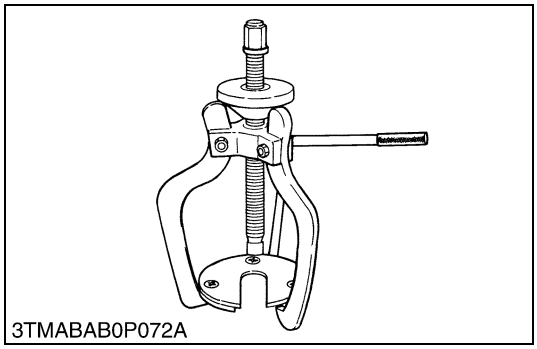

3TMABAB0P071A

Tie-rod End Lifter

Code No.
- 07909-39051

Application
- Use to remove the tie-rod end with ease.

WSM000001GEG0029US0

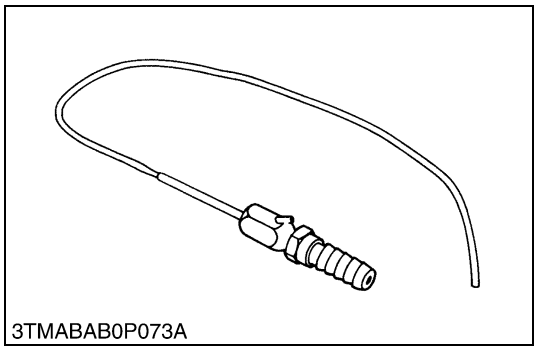

3TMABAB0P072A

Steering Wheel Puller

Code No.
- 07916-51090

Application
- Use to remove the steering wheel without damage to the steering shaft.

WSM000001GEG0030US0

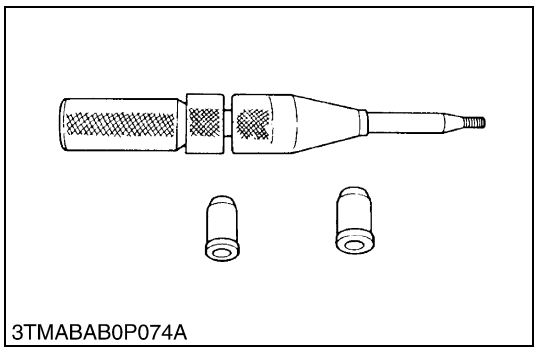

3TMABAB0P073A

Injector CH3

Code No.
- 07916-52501

Application
- Use to put calcium chloride solution into a rear wheel and to remove it.

WSM000001GEG0031US0

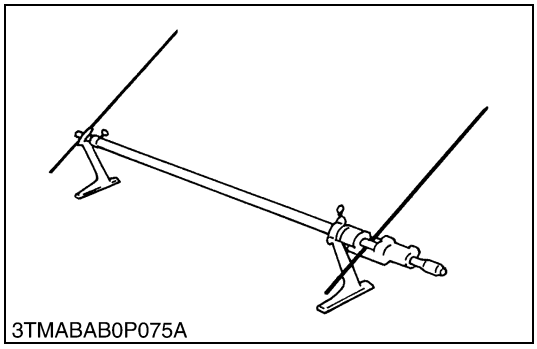

3TMABAB0P074A

Clutch Center Tool (For B and L Series Tractors)

Code No.
- 07916-80410

Application
- The clutch center tool is for all B and L series tractors with a diaphragm clutch by changing tip guides. Center piece diameter is 20 mm (0.79 in.).

WSM000001GEG0032US0

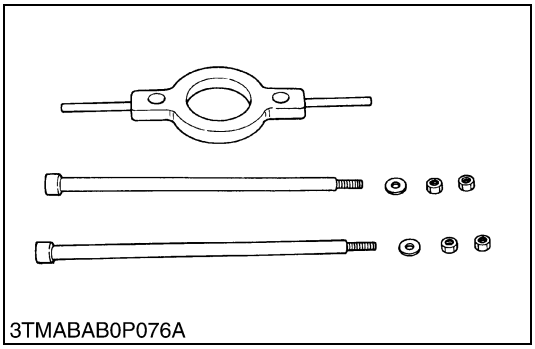

3TMABAB0P075A

Toe-in Gauge

Code No.
- 07909-31681

Application
- This allows easy measurement of toe-in for all machine models.

WSM000001GEG0034US0

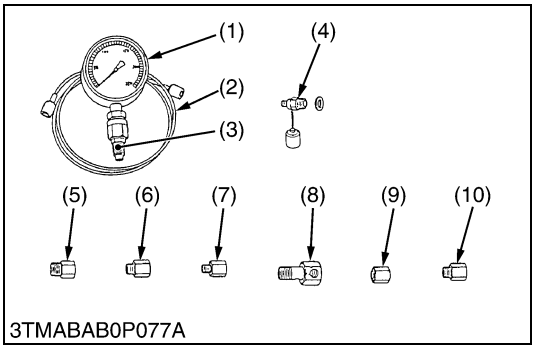

3TMABAB0P076A

Rear Axle Cover Puller

Code No.
- 07916-51041

Application
- Use to remove a rear axle cover from rear axle.

WSM000001GEG0035US0



3TMABAB0P077A

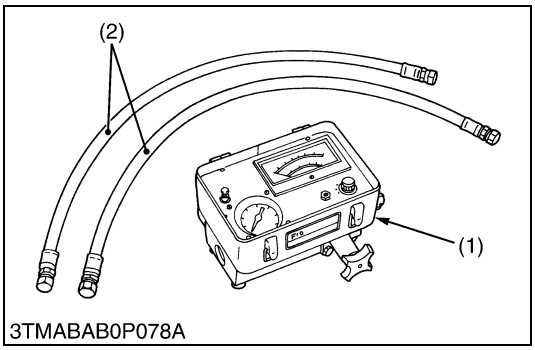
Relief Valve Pressure Tester

Code No.
- 07916-50045

Application
- This allows easy measurement of relief set pressure.

(1) Gauge (07916-50322)
(2) Cable (07916-50331)
(3) Threaded Joint (07916-50401)
(4) Threaded Joint (07916-50341)
(5) Adaptor **B** (M18 × P1.5) (07916-50361)
(6) Adaptor **C** (PS3/8) (07916-50371)
(7) Adaptor **D** (PT1/8) (07916-50381)
(8) Adaptor **E** (PS3/8) (07916-50392)
(9) Adaptor **F** (PF1/2) (07916-62601)
(10) Adaptor **58** (PT1/4) (07916-52391)

WSM000001GEG0027US0



3TMABAB0P078A

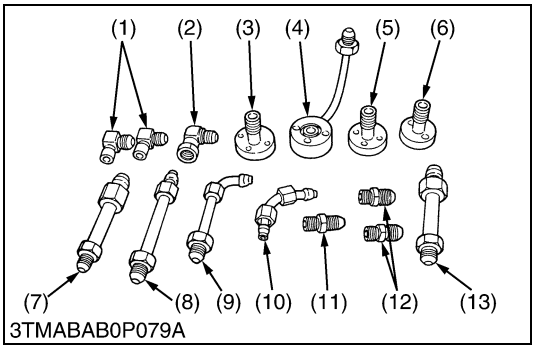
Flow Meter

Code No.
- 07916-52791 (Flow Meter)
- 07916-52651 (Hydraulic Test Hose)

Application
- This allows easy testing of hydraulic system.

(1) Flow Meter
(2) Hydraulic Test Hose

WSM000001GEG0036US0



3TMABAB0P079A

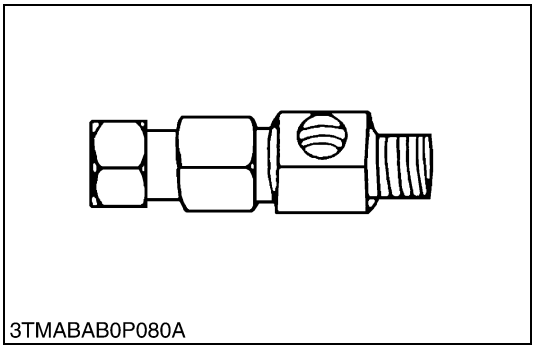
Adaptor Set for Flow Meter

Code No.
- 07916-54031

Application
- Use for test of the hydraulic system.

(1) Adaptor **52**
(2) Adaptor **53**
(3) Adaptor **54**
(4) Adaptor **61**
(5) Adaptor **62**
(6) Adaptor **63**
(7) Adaptor **64**
(8) Adaptor **65**
(9) Adaptor **66**
(10) Adaptor **67**
(11) Adaptor **68**
(12) Adaptor **69**
(13) Hydraulic Adaptor **1**

WSM000001GEG0037US0

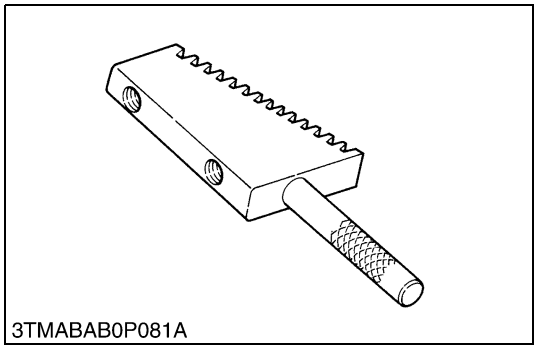

3TMABAB0P080A

Power Steering Adaptor

Code No.
- 07916-54021

Application
- Use to measure the relief valve setting pressure for power steering.

WSM000001GEG0038US0

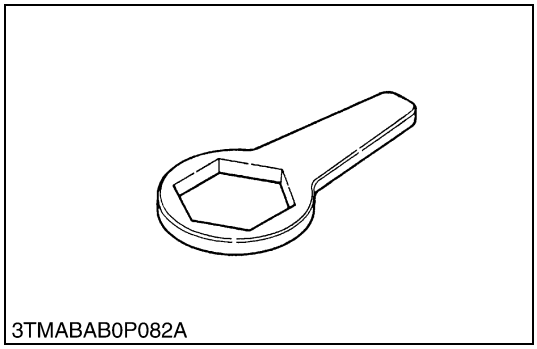

3TMABAB0P081A

Pinion Locking Tool

Code No.
- 07916-55311

Application
- Use to prevent the shaft from turning when you remove or tighten a staking nut of a bevel pinion shaft.

WSM000001GEG0039US0

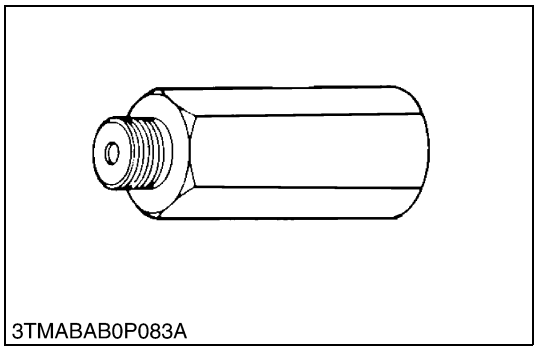

3TMABAB0P082A

Rear Axle Nut Wrench 71

Code No.
- 07916-52531

Application
- Use to remove and tighten a rear axle nut.

WSM000001GEG0040US0

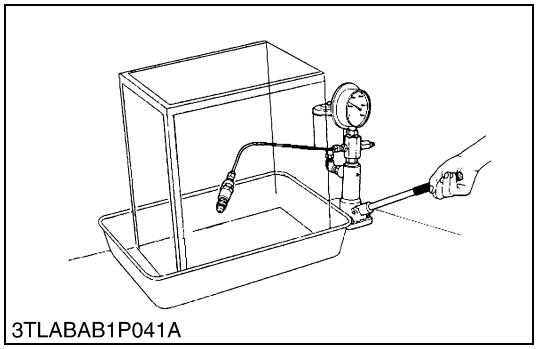

3TMABAB0P083A

Relief Valve Setting Pressure Adaptor G

Code No.
- 07916-52751

Application
- This allows easy measurement of relief valve setting pressure from the hydraulic coupler. This is available with the relief valve setting pressure tester.

WSM000001GEG0041US0


3TLABAB1P041A

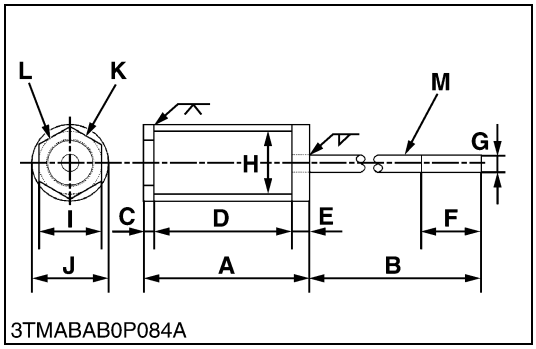
Safety Valve Tester

Code No.
- 07909-31361

Application
- Use to check the safety valve setting pressure.

Measuring range
- 0 to 50 MPa (0 to 500 kgf/cm^2, 0 to 7200 psi)

9Y1210447GEG0092US0



3TMABAB0P084A

Pinion Shaft Remover

Application

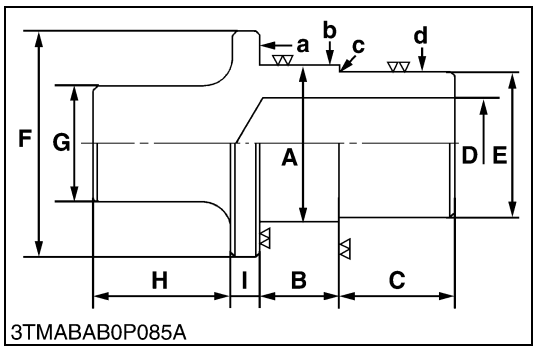
- Use for removing a pinion shaft.

■ **NOTE**

- **The special tool is not available, so make it. Refer to the figure.**

A	106 mm (4.17 in.)
B	350 mm (13.78 in.)
C	6 mm (0.24 in.)
D	90 mm (3.54 in.)
E	10 mm (0.39 in.)
F	40 mm (1.57 in.)
G	10 mm (0.39 in.)
H	35.6 mm (1.40 in.)
I	36 mm (1.42 in.)
J	41.6 mm (1.64 in.)
K	Part code No. 3A201-4130 nut
L	M27 × P1.5
M	M10 × P1.25

9Y1210824GEG0109US0



3TMABAB0P085A

Hydraulic Arm Shaft Bushing Press-Fitting Tool

Application

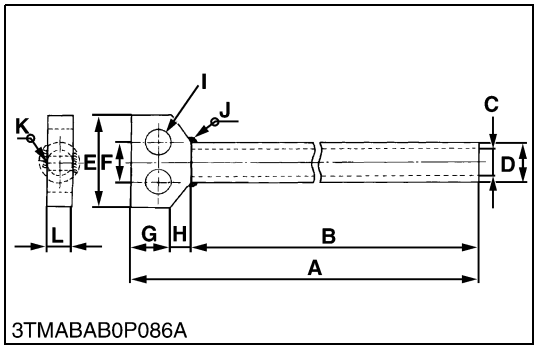
- Use for replacing the hydraulic arm shaft bushings in the hydraulic cylinder body.

■ **NOTE**

- **The special tools are not available, so make them. Refer to the figure.**

	Right	Left
A	54.7 to 54.9 mm (2.1535 to 2.1614 in.)	49.7 to 49.9 mm (1.9567 to 1.9646 in.)
B	24.5 to 25.5 mm (0.9646 to 1.0039 in.)	21.5 to 22.5 mm (0.8465 to 0.8858 in.)
C	40 mm (1.57 in.)	40 mm (1.57 in.)
D	32 mm (1.26 in.)	30 mm (1.18 in.)
E	49.7 to 49.9 mm (1.9567 to 1.9646 in.)	44.7 to 44.9 mm (1.7598 to 1.7677 in.)
F	70 mm dia. (2.76 in. dia.)	
G	40 mm dia. (1.57 in. dia.)	
H	50 mm (1.97 in.)	
I	10 mm (0.39 in.)	
a	6.3 µm (250 µin.)	
b	6.3 µm (250 µin.)	
c	6.3 µm (250 µin.)	
d	6.3 µm (250 µin.)	

9Y1210824GEG0110US0



3TMABAB0P086A

Draft Control Test Bar

Application

- Use for checking the lift range and floating range of hydraulic draft control.

■ **NOTE**

- **The special tool is not available, so make it. Refer to the figure.**

A	1045 mm (41.14 in.)
B	1000 mm (29.37 in.)
C	20 mm dia. (0.79 in. dia.)
D	30 mm dia. (1.18 in. dia.)
E	90 mm (3.54 in.)
F	30 mm (1.18 in.)
G	30 mm (1.18 in.)
H	15 mm (0.59 in.)
I	20 mm dia. (0.79 in. dia.)
J	Weld all around
K	Weld all around
L	20 mm (0.79 in.)

9Y1210824GEG0111US0

Pump Adaptor

Application

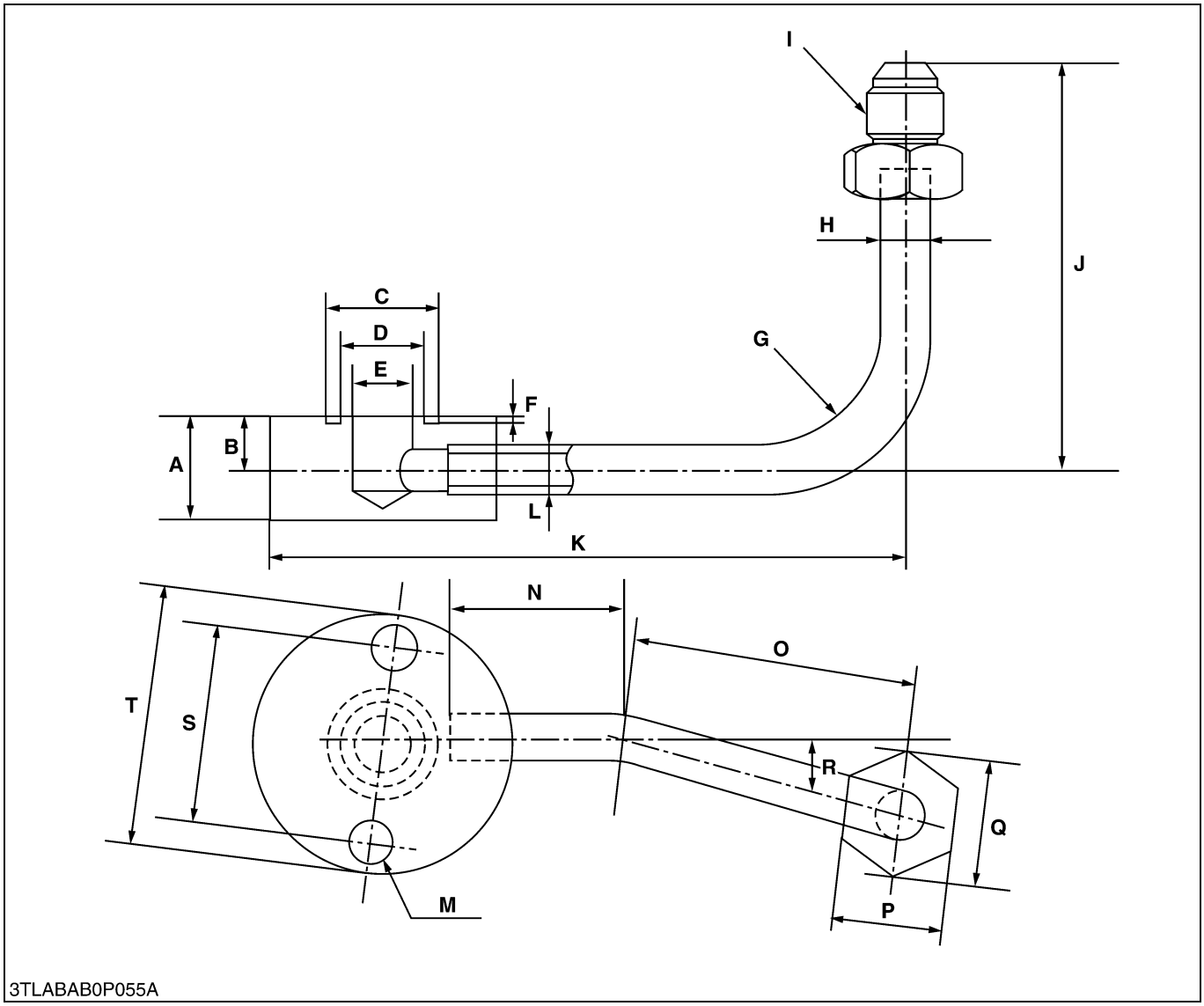
- Use for examining the main hydraulic pump.

■ **NOTE**

- **When you use, attach with following parts.**
  O-ring: 04811-00180
- **This adaptor is changed from Adaptor 61 of flowmeter adaptor set (see page G-64).**
- **This special tool is not available, so make it. Refer to the figure.**

(Reference)

- From size **"A"** to size **"R"** are same size as adaptor **61**.



3TLABAB0P055A

A	22 mm (0.872 in.)	**K**	135 mm (5.31 in.)
B	11 mm (0.437 in.)	**L**	7 mm dia. (0.28 in. dia.)
C	24 mm dia. (0.94 in. dia.)	**M**	8.5 mm dia. (0.33 in. dia.)
D	18 mm dia. (0.71 in. dia.)	**N**	37 mm (1.46 in.)
E	12 mm dia. (0.47 in. dia.)	**O**	61.5 mm (2.42 in.)
F	1.7 to 1.9 mm (0.067 to 0.075 in.)	**P**	24 mm (0.94 in.)
G	30 mm Round (1.18 in. Round)	**Q**	27.7 mm (1.09 in.)
H	10 mm dia. (0.39 in. dia.)	**R**	0.244 rad (14 °)
I	G 3/8	**S**	40 mm (1.57 in.)
J	89 mm (3.50 in.)	**T**	60 mm dia. (2.36 in. dia.)

9Y1210824GEG0116US0

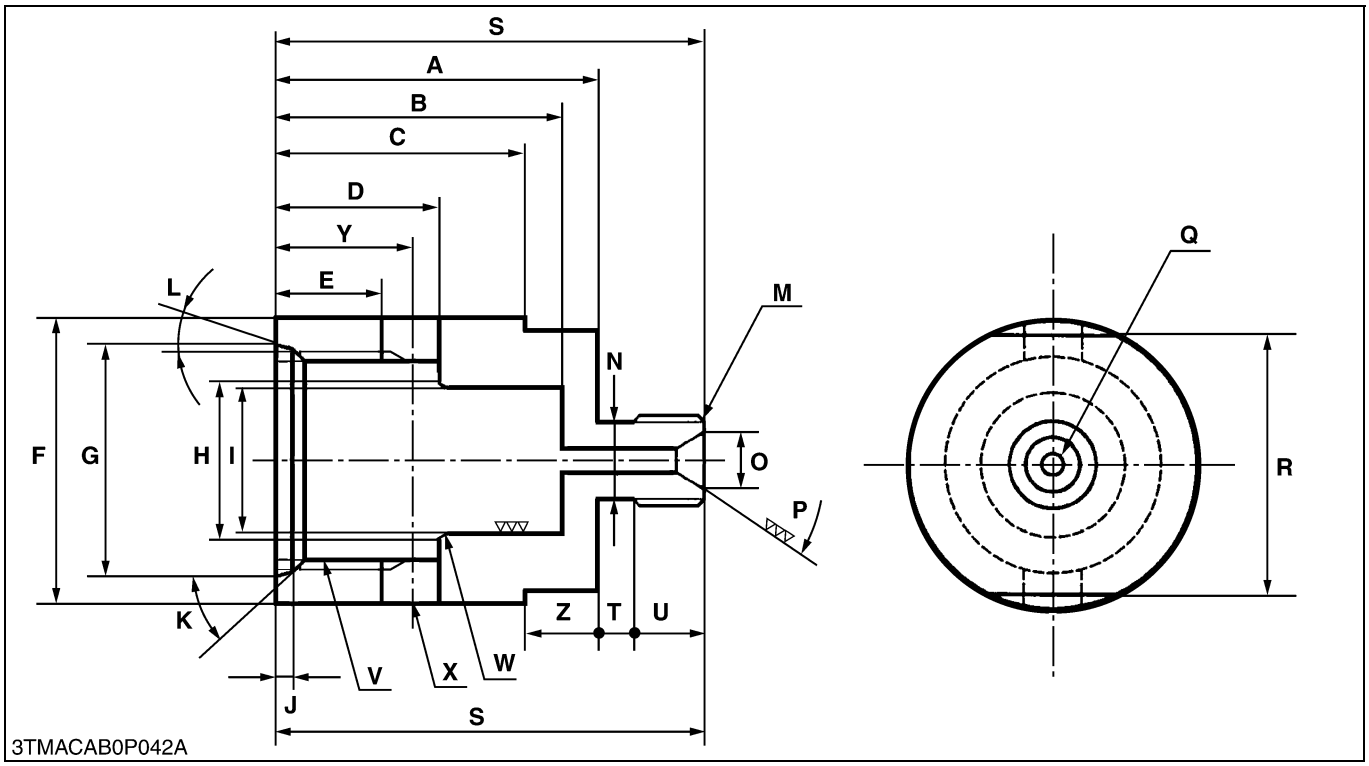
Cylinder Safety Valve Setting Pressure Adaptor

Application

- Use for setting the safety valve to the nozzle tester to measure cracking pressure and check oil tightness of the safety valves.

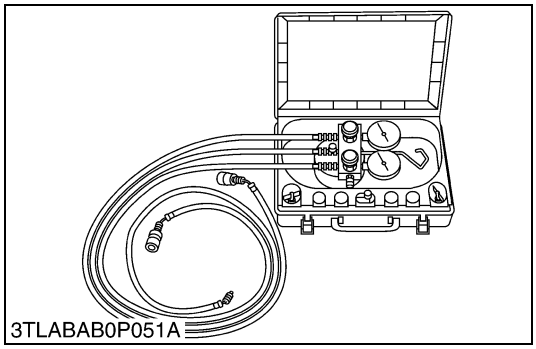
■ **NOTE**

- **This special tool is not provided, so make it referring to the figure.**



A	45 mm (1.77 in.)	**N**	10 mm dia. (0.39 in. dia.)
B	40 mm (1.58 in.)	**O**	7.5 mm dia. (0.3 in. dia.)
C	35 mm (13.8 in.)	**P**	1.05 rad (60 °)
D	23.0 to 23.3 mm (0.9055 to 0.9713 in.)	**Q**	3 mm dia. (1.18 in. dia.)
E	16 mm (0.63 in.)	**R**	36 mm (1.18 in.)
F	40 mm dia. (1.58 in. dia.)	**S**	60 mm (2.36 in.)
G	32.4 to 32.7 mm dia. (1.2756 to 1.2874 in. dia.)	**T**	5 mm (0.20 in.)
H	21 mm dia. (0.83 in. dia.)	**U**	10 mm (0.39 in.)
I	20.00 to 20.05 mm dia. (0.7874 to 0.7894 in. dia.)	**V**	M30 × P1.5
J	2.50 to 2.59 mm (0.0984 to 0.1097 in.)	**W**	0.52 rad (30 °)
K	0.79 rad (45 °)	**X**	8 mm dia. (0.32 in. dia.)
L	0.26 rad (15 °)	**Y**	19 mm (0.75 in.)
M	M12 × P1.5	**Z**	10 mm (0.39 in.)

9Y1210824GEG0133US0


3TLABAB0P051A

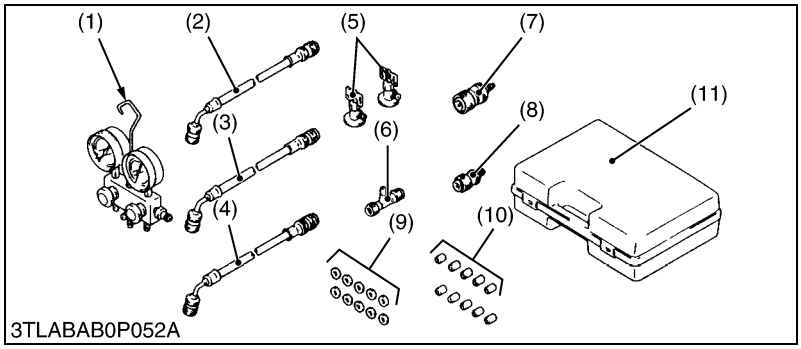
Air-Conditioner Service Tool

Code No.

- DENSO 95048-00063

Application

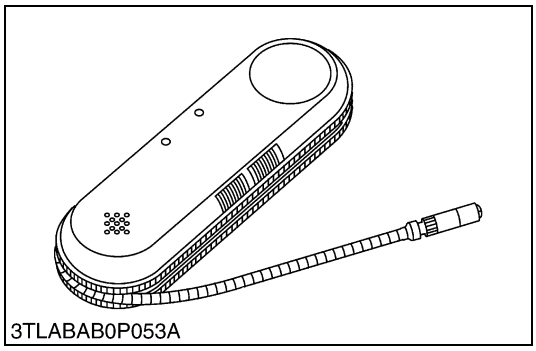
- Use for charge, test or discharge of the air conditioning system.



3TLABAB0P052A

(1) Manifold Gauge Assembly (95048-10090)
(2) Charging Hose (Red: HI) (95948-10270)
(3) Charging Hose (Blue: LO) (95948-10280)
(4) Charging Hose (Green) (95948-10260)
(5) Can Tap Valve (95048-10150)
(6) T Joint (95048-10160)
(7) Quick Coupler (HI) (95048-10130)
(8) Quick Coupler (LO) (95048-10140)
(9) Service Valve Packing (95906-10310)
(10) Charging Hose Packing (95906-10300)
(11) Tool Case (95949-10610)

WSM000001GEG0042US0


3TLABAB0P053A

Electric Gas Leak Tester

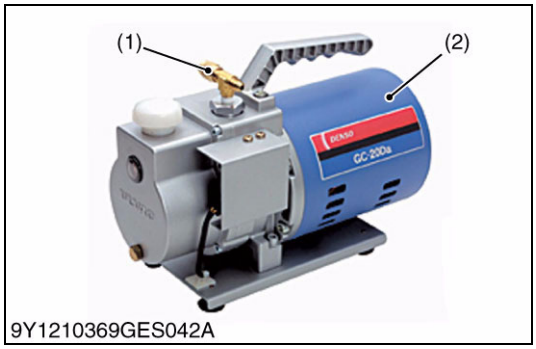
Code No.

- DENSO 95146-00060

Application

- Use for gas leak test of the air conditioning system.

WSM000001GEG0043US0



9Y1210369GES042A

Vacuum Pump

Code No.

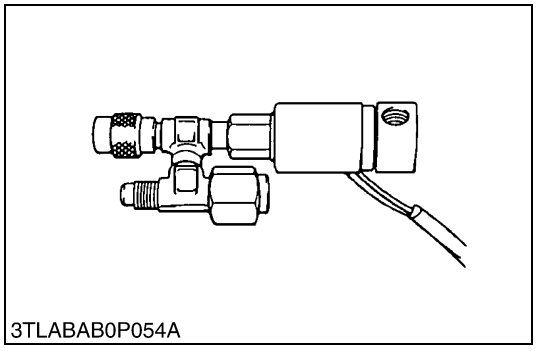
- DENSO 95046-00130 (AC220V)
- DENSO 95046-00140 (AC240V)

Application

- Use to evacuate the air conditioning system.

(1) Adaptor (For 134a) (2) Vacuum Pump

WSM000001GEG0044US0


3TLABAB0P054A

Adaptor (For R134a)

Code No.

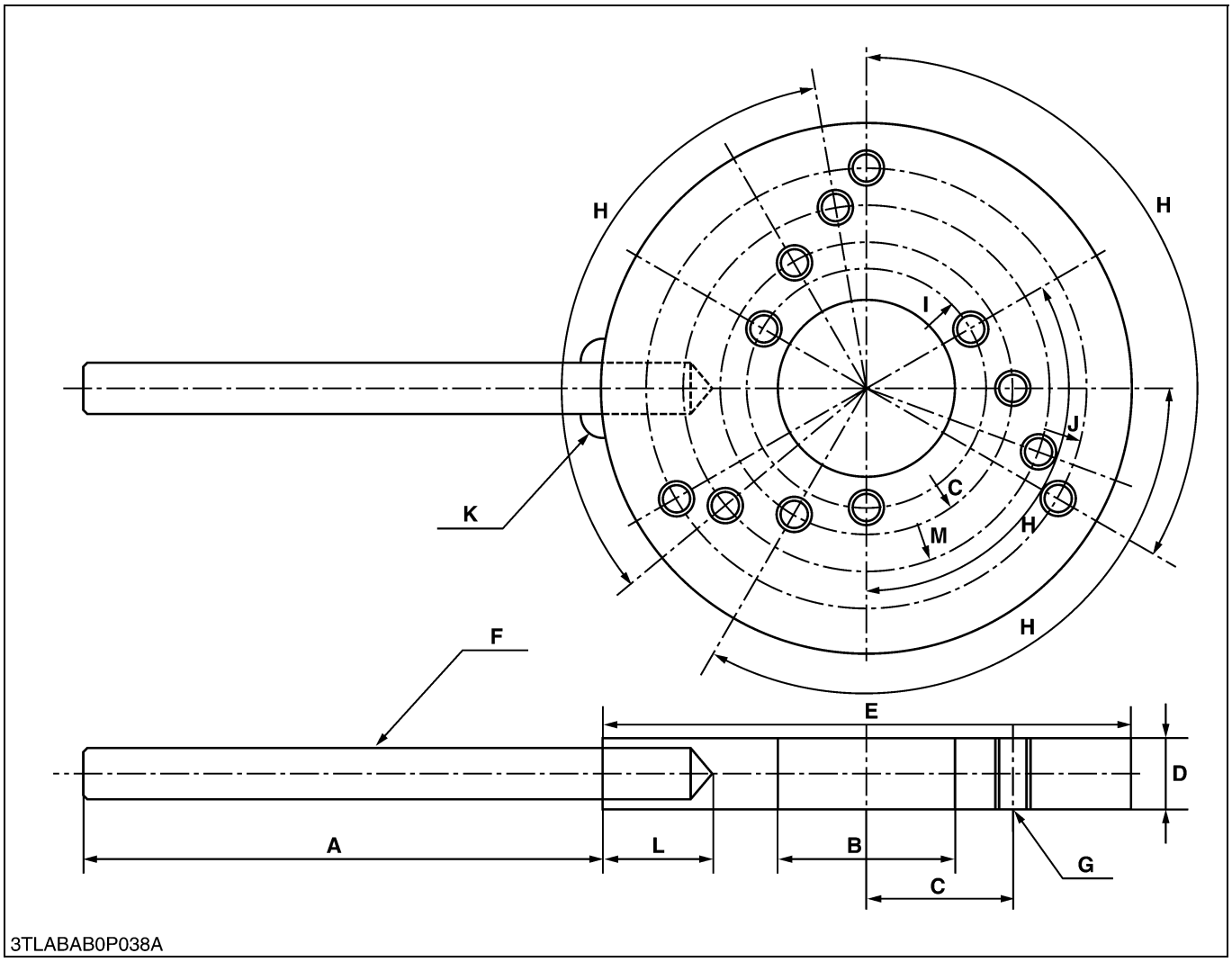
- DENSO 95048-10190 (AC220V)
- DENSO 95048-10200 (AC240V)

Application

- Use to evacuate the air conditioning system.

WSM000001GEG0045US0

Stopper Magnet Clutch (For A/C Compressor)



3TLABAB0P038A

Application

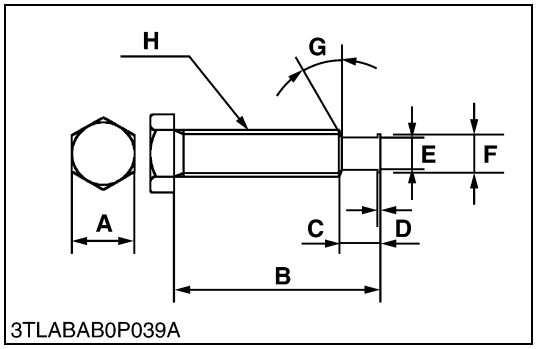
- Use for loosen and tighten the magnet clutch mounting nut. (Use radius **C**).

■ **NOTE**

- **This special tool is not available, so make it. Refer to the figure.**

A	125 mm (4.92 in.)	**H**	4.52 rad (120 °)
B	40 mm dia. (1.57 in. dia.)	**I**	Radius 27 mm (Radius 1.06 in.)
C	Radius 33 mm (Radius 1.30 in.)	**J**	Radius 50 mm (Radius 1.97 in.)
D	16 mm (0.63 in.)	**K**	Weld all around
E	120 mm dia. (4.72 in. dia.)	**L**	20 mm (0.78 in.)
F	12 mm dia. (0.47 in. dia.)	**M**	Radius 41 mm (Radius 1.61 in.)
G	3 × M8 × 1.25 All screws		

9Y1210824GEG0112US0



3TLABAB0P039A

Stopper Bolt (for A/C Compressor)

Application

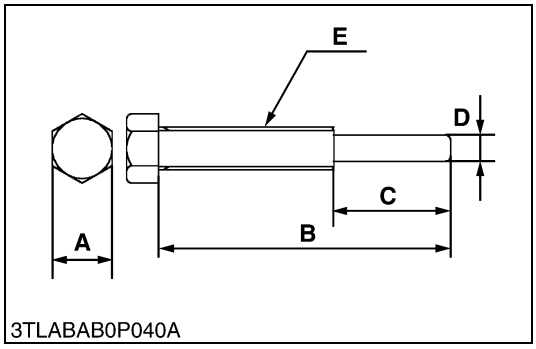
- Use with the stopper magnet clutch.

■ **NOTE**

- **This special tool is not available, so make it. Refer to the figure.**

A	12 mm (0.47 in.)	**E**	5.5 mm dia. (0.22 in. dia.)
B	35 mm (1.38 in.)	**F**	6.5 mm dia. (0.26 in. dia.)
C	7 mm (0.28 in.)	**G**	0.52 rad (30 °)
D	0.4 mm (0.016 in.)	**H**	M8 × P1.25

9Y1210824GEG0113US0



3TLABAB0P040A

Remover Magnet Clutch (for A/C Compressor)

Application

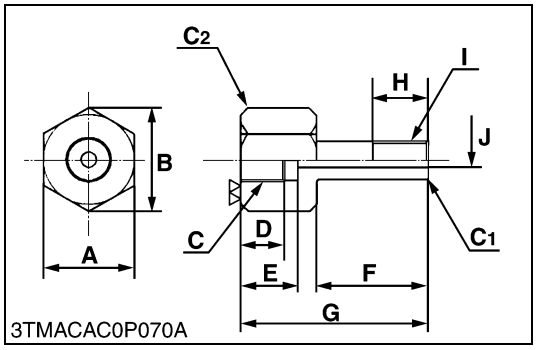
- Use to remove the hub plate or center piece.

■ **NOTE**

- **This special tool is not available, so make it. Refer to the figure.**

A	12 mm (0.47 in.)
B	55 mm (2.16 in.)
C	20 mm (0.79 in.)
D	5 mm dia. (0.20 in. dia.)
E	M8 × P1.25

9Y1210824GEG0114US0



3TMACAC0P070A

Valve Adaptor

Application

- Use for measuring the system pressure of shuttle valve.

■ **NOTE**

- **The special tool is not available, so make it. Refer to the figure.**

A	24 mm (0.94 in.)
B	27.7 mm (1.09 in.)
C	PS1/4
D	11 mm (0.43 in.)
E	15 mm (0.59 in.)
F	40 mm (1.57 in.)
G	60 mm (2.36 in.)
H	15 mm (0.59 in.)
I	PT1/8
J	4 mm dia. (0.15 in. dia.)
C1	Chamfer 1 mm (0.039 in.)
C2	Chamfer 2 mm (0.079 in.)

9Y1210824GEG0115US0

9. TIRES

[1] TIRES

CAUTION

To avoid personal injury:

- **Do not attempt to mount a tire on a rim. This should be done by a qualified person with the proper equipment.**
- **Always maintain the correct tire pressure.**
  Do not inflate tires above the recommended pressure shown in the operator's manual.

IMPORTANT

- **Do not use tires other than those approved by KUBOTA.**

9Y1210824GEG0117US0

Inflation Pressure

Though the tire pressure is factory-set to the prescribed level, it naturally drops slowly in the course of time. Thus, check it everyday and inflate as necessary.

NOTE

- **Maintain the maximum pressure in front tires, if using a front loader or when equipped with a full load of front weights.**

	Tire sizes	Inflation pressure
Rear	12.4-24, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)
	14.9-24, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)
	14.9-26, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)
	355/80-D20, 4PR	100 kPa (1.0 kgf/cm^2, 14 psi)
	44 × 18-20, 6PR	170 kPa (1.7 kgf/cm^2, 24 psi)
Front	7.2-16, 4PR	150 kPa (1.5 kgf/cm^2, 22 psi)
	8.3-16, 4PR	150 kPa (1.5 kgf/cm^2, 22 psi)
	9.5-16, 4PR	205 kPa (2.1 kgf/cm^2, 30 psi)
	27 × 8.50-15, 4PR	85 kPa (8.5 kgf/cm^2, 12 psi)
	29 × 12.50-15, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)

9Y1210824GEG0118US0

[2] WHEEL ADJUSTMENT

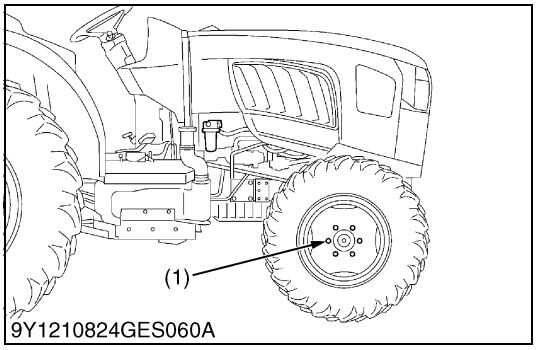
CAUTION

To avoid personal injury:

- **When working on slopes or when working with trailer, set the wheel tread as wide as practical for maximum stability.**
- **Support tractor securely on stands before removing a wheel.**
- **Do not work under any hydraulically supported devices. They can settle, suddenly leak down, or be accidentally lowered. If necessary to work under tractor or any machine elements for servicing or adjustment, securely support them with stands or suitable blocking beforehand.**
- **Never operate tractor with a loose rim, wheel, or axle.**

9Y1210824GEG0119US0

(1) Front Wheel



9Y1210824GES060A

Front Wheels (with Four Wheel Drive)

Front tread can not be adjusted.

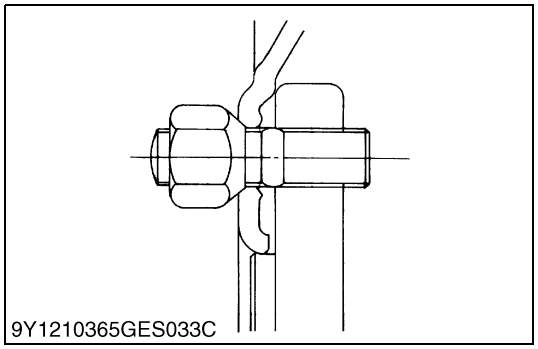
■ **IMPORTANT**

- **Do not turn front discs to obtain wider tread.**
- **When re-fitting or adjusting a wheel, tighten the bolts to the following torques then recheck after driving the tractor 200 m (200 yards) and 10 times of shuttle movement by 5 m (5 yards), and thereafter according to service interval. (See page G-24.)**

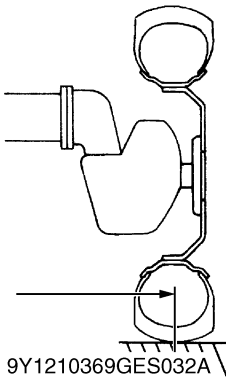
Tightening torque	Front wheel mounting nut (L3560, L4060, L4760)	137 N·m 14 kgf·m 100 lbf·ft
	Front wheel mounting nut (L5060, L5460, L6060)	185 N·m 19 kgf·m 136 lbf·ft

(1) Front Wheel Mounting Nut

9Y1210824GEG0120US0


9Y1210365GES033C

■ **NOTE**
- **Wheels with beveled or tapered holes: Use the tapered side of lug nut.**

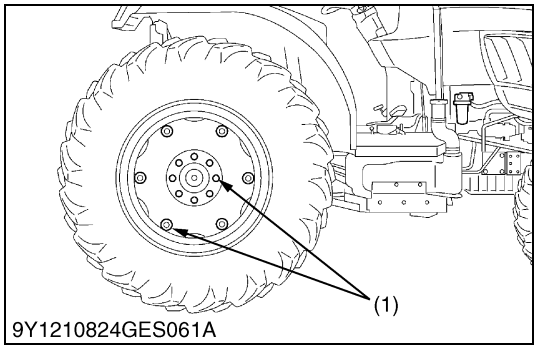

9Y1210369GES032A

Models	L3560				
Tire	7-16, 7.2-16 Farm	27 × 8.50-15 Turf	27 × 10.50-15 Turf	29 × 12.50-15 Turf	10-16.5 IND
Tread	1115 mm (45.5 in.)	1200 mm (47.2 in.)	1230 mm (48.4 in.)	1170 mm (46.1 in.)	1195 mm (47.0 in.)
Models	L4060				
Tire	8-16, 8.3-16 Farm	27 × 8.50-15 Turf	27 × 10.50-15 Turf	29 × 12.50-15 Turf	10-16.5 IND
Tread	1155 mm (45.5 in.)	1200 mm (47.2 in.)	1230 mm (48.4 in.)	1170 mm (46.1 in.)	1195 mm (47.0 in.)
Models	L4760				
Tire	8-16, 8.3-16 Farm	27 × 10.50-15 Turf	29 × 12.50-15 Turf	305R343 Turf	10-16.5 IND
Tread	1300 mm (51.2 in.)	1375 mm (54.1 in.)	1425 mm (56.1 in.)	1455 mm (57.3 in.)	1340 mm (52.8 in.)
Models	L5060, L5460, L6060				
Tire	9.5-16 Farm	27 × 10.50-15 Turf	29 × 12.50-15 Turf	305R343 Turf	10-16.5 IND
Tread	1340 mm (52.8 in.)	1375 mm (54.1 in.)	1425 mm (56.1 in.)	1455 mm (57.3 in.)	1340 mm (52.8 in.)

■ **NOTE**
- **IND: for industrial**

9Y1210824GEG0121US0

(2) Rear Wheel



9Y1210824GES061A

Rear Wheels

Rear tread width can be adjusted as shown with the standard equipped tires.

To change the tread width

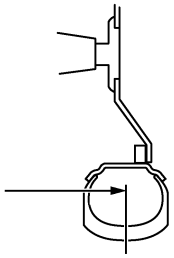
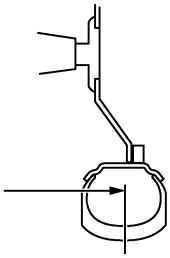
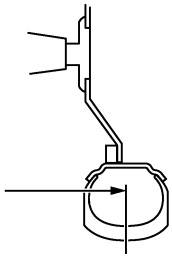
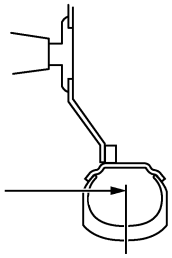
1. Remove the wheel rim and / or disk mounting bolts.
2. Change the position of the rim and / or disk (right and left) to the desired position, and tighten the bolts.

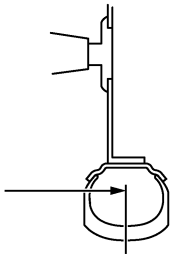
■ **IMPORTANT**
- **Always attach wheels as shown in the drawings.**
- **If not attached as illustrated, transmission parts may be damaged.**
- **When re-fitting or adjusting a wheel, tighten the bolts to the following torques then recheck after driving the tractor 200 m (200 yards) and 10 times of shuttle movement by 5 m (5 yards), and thereafter according to service interval. (See page G-24.)**

Tightening torque	Rear wheel mounting screws and nut	215 N·m 22 kgf·m 160 lbf·ft

(1) Rear Wheel Mounting Screws and Nut

9Y1210824GEG0122US0

Models	 9Y1210369GES033A	 9Y1210369GES034A	 9Y1210369GES035A	 9Y1210369GES036A
L3560 12.4-24 Farm	1200 mm (47.2 in.)	1300 mm (51.2 in.)	1385 mm (54.5 in.)	1480 mm (58.3 in.)
L4060, L4760 14.9-24 Farm	–	1285 mm (50.6 in.)	1435 mm (56.5 in.)	1530 mm (60.2 in.)
L3560 420/70-24 IND	–	1325 mm (52.2 in.)	1360 mm (53.5 in.)	1465 mm (57.7 in.)
L4060, L4760 17.5L-24 IND	–	1340 mm (52.8 in.)	1380 mm (54.3 in.)	1490 mm (58.7 in.)
L5060, L5460, L6060 13.6-28 Farm	1220 mm (48.0 in.)	1330 mm (52.4 in.)	1425 mm (56.1 in.)	1530 mm (60.2 in.)
L5060, L5460, L6060 14.9-26 Farm	–	–	1325 mm (52.2 in.)	1430 mm (56.3 in.)
L5060, L5460, L6060 17.5L-24 IND	–	1360 mm (53.5 in.)	1395 mm (54.9 in.)	1500 mm (59.1 in.)

Models	 9Y1210369GES037A
L4060, L4760, L5060, L5460, L6060 610R470 Turf	1515 mm (59.6 in.)
L3560 355/80-D20 Turf	1270 mm (50.0 in.)
L4060 355/80-D20 Turf	1290 mm (50.8 in.)
L3560 41/18LL × 16.1 Turf	1420 mm (55.9 in.)
L4060, L4760, L5060, L5460, L6060 41/18LL × 16.1 Turf	1440 mm (56.7 in.)
L3560 44 × 18-20 Turf	1400 mm (55.1 in.)
L3560, L4060, L4760, L5060, L5460, L6060 44 × 18-20 Turf	1415 mm (55.7 in.)

9Y1210824GEG0123US0

[3] TIRE LIQUID INJECTION

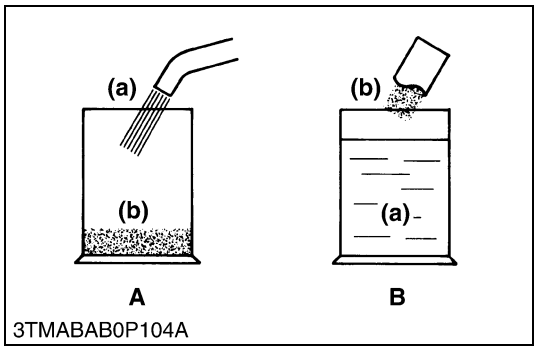
Auxiliary weights can be used to increase traction force for plowing in fields or clayey ground.

Another way is to inject water or another liquid, such as a calcium chloride solution in the tires. Water must not be used in winter since it freezes at 0 °C (32 °F). The calcium chloride solution will not freeze and moreover, affords higher effect than water since its specific gravity is higher than that of water by about 20 %. Below is an explanation of calcium chloride solution injection.

■ **IMPORTANT**

- **Do not fill the front tires with liquid.**

9Y1210824GEG0124US0



3TMABAB0P104A

Preparation of Calcium Chloride Solution

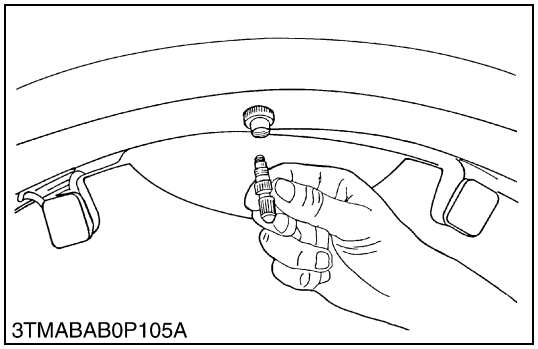
CAUTION

- **When making a calcium chloride solution, do not pour water over calcium chloride since this results in chemical reaction which will cause high temperature. Instead add a small amount of calcium chloride to the water at a time until the desired solution is achieved.**

Freezing temp.	Weight of $CaCl_2$ to be dissolved in 100 L (26.5 U.S.gals, 22.0 Imp.gals) of water
−5 °C (23 °F)	12 kg (26.4 lbs)
−10 °C (14 °F)	21 kg (46.3 lbs)
−15 °C (5 °F)	28 kg (61.7 lbs)
−20 °C (−4 °F)	34 kg (75.0 lbs)
−25 °C (−13 °F)	40 kg (88.2 lbs)
−30 °C (−22 °F)	44 kg (97.0 lbs)
−35 °C (−31 °F)	49 kg (108 lbs)
−40 °C (−40 °F)	52 kg (114.6 lbs)
−45 °C (−49 °F)	56 kg (123.5 lbs)
−50 °C (−58 °F)	61 kg (134.5 lbs)

(a) Water
(b) $CaCl_2$ (Calcium Chloride)
A: Bad
B: Good

9Y1210824GEG0125US0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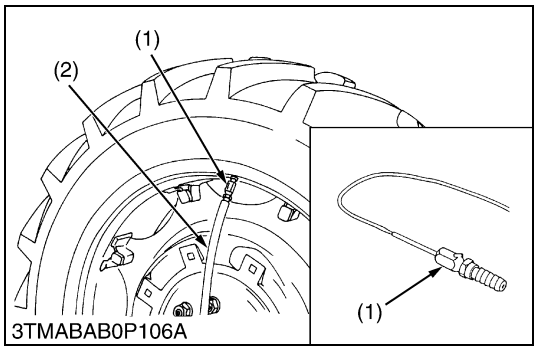
Attaching Injector

1. Lift the rear tires off the ground.
2. Turn the tire so that the air valve is at the top.
3. Remove the air valve, and attach the injector. (Code No. 07916-52501)

(1) Injector
(2) Hose

9Y1210824GEG0126US0



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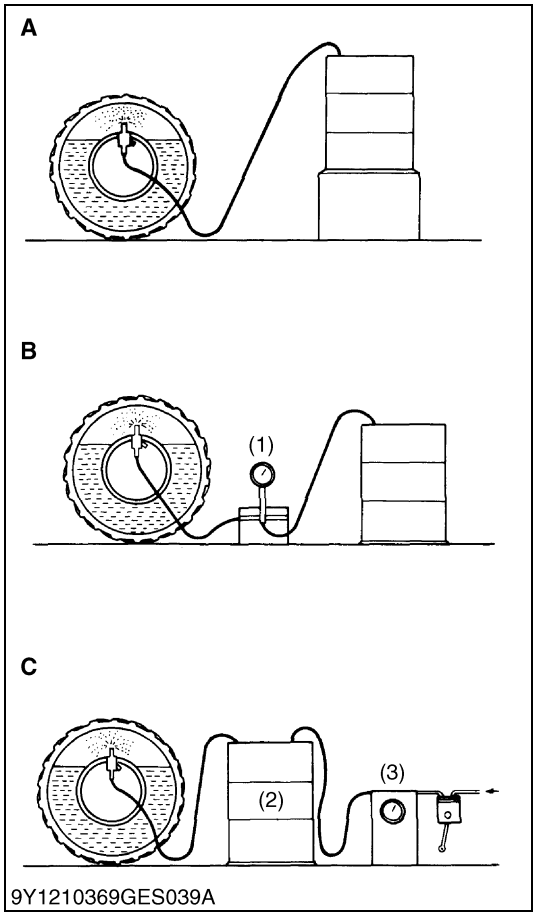

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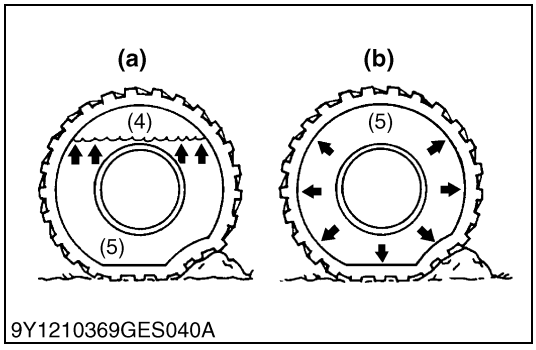

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Injection

CAUTION

- **When a calcium chloride solution is used, cool it before pouring it into the tire.**
- **Do not fill tires with water or solution more than 75 % of full capacity (to the valve stem level).**

The following four ways can be used to inject water or a calcium chloride solution into tires.

1. Gravity injection **"A"**
2. Pump injection **"B"**
3. Pressure tank injection **"C"**
4. Injection directly from tap (only when water is being used).

NOTE

- **Once injection is completed, reset the air valve, and pump air into the tire to the specified pressure.**

Weight of Calcium Chloride Solution Filling 75 % of Full Capacity of a Tire.

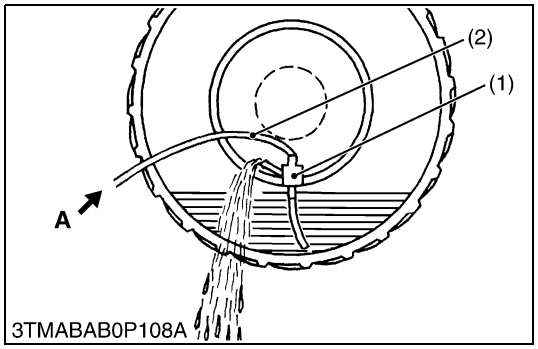
Tire sizes	12.4-24	420/70-24	14.9-24
Slush free at −10 °C (14 °F) Solid at −30 °C (−22 °F) [Approx. 1 kg (2 lbs) $CaCl_2$ per 4 L (1 gal) of water]	130 kg (285 lbs)	195 kg (430 lbs)	205 kg (450 lbs)
Slush free at −24 °C (−11 °F) Solid at −47 °C (−53 °F) [Approx. 1.5 kg (3.5 lbs) $CaCl_2$ per 4 L (1 gal) of water]	135 kg (295 lbs)	205 kg (450 lbs)	215 kg (475 lbs)
Slush free at −47 °C (−53 °F) Solid at −52 °C (−62 °F) [Approx. 2.25 kg (5 lbs) $CaCl_2$ per 4 L (1 gal) of water]	145 kg (320 lbs)	220 kg (485 lbs)	225 kg (495 lbs)

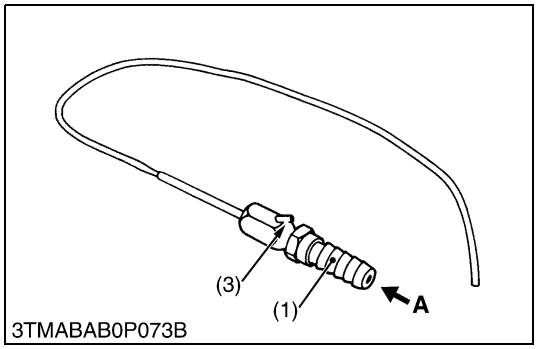
Tire sizes	17.5L-24	14.9-26	13.6-28
Slush free at −10 °C (14 °F) Solid at −30 °C (−22 °F) [Approx. 1 kg (2 lbs) $CaCl_2$ per 4 L (1 gal) of water]	235 kg (515 lbs)	215 kg (475 lbs)	185 kg (405 lbs)
Slush free at −24 °C (−11 °F) Solid at −47 °C (−53 °F) [Approx. 1.5 kg (3.5 lbs) $CaCl_2$ per 4 L (1 gal) of water]	250 kg (550 lbs)	225 kg (495 lbs)	200 kg (441 lbs)
Slush free at −47 °C (−53 °F) Solid at −52 °C (−62 °F) [Approx. 2.25 kg (5 lbs) $CaCl_2$ per 4 L (1 gal) of water]	265 kg (585 lbs)	235 kg (515 lbs)	215 kg (475 lbs)

(1) Pump
(2) Pressure Tank
(3) Compressor
(4) Air
(5) Water

A: Gravity Injection
B: Pump Injection
C: Pressure Tank Injection
(a) Correct: 75 %
Air Compresses Like A Cushion
(b) Incorrect: 100 % Full
Water Can Not Be Compressed

9Y1210824GEG0127US0





Draining Water or Solution

1. Lift the rear tires off the ground.
2. Turn the tire so that the air valve is at the bottom.
3. Remove the air valve, and drain liquid (liquid can only be drained to the level of the valve and liquid under that level remains inside).
4. To drain liquid completely, use the injector, and direct compressed air into the tire to force out the liquid through the injector's vent.

(1) Injector
(2) Hose
(3) Vent

A: Compressed Air

9Y1210824GEG0128US0

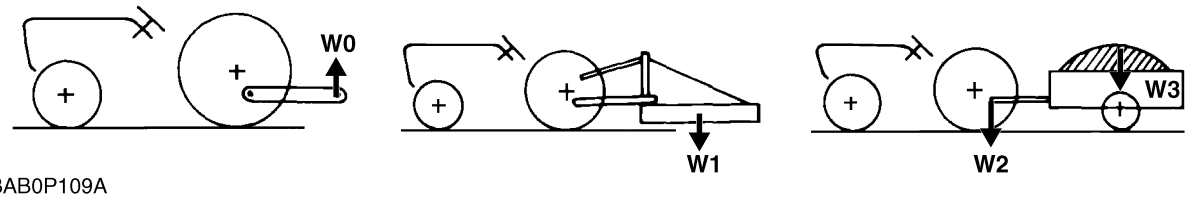
10. IMPLEMENT LIMITATIONS

The KUBOTA Tractor has been thoroughly tested for proper performance with implements sold or approved by KUBOTA. Use with implements which exceed the maximum specifications listed below, or which are otherwise unfit for use with the KUBOTA Tractor may result in malfunctions or failures of the tractor, damage to other property and injury to the operator or others. [Any malfunctions or failures of the tractor resulting from use with improper implements are not covered by the warranty.]

	Tread (max. width)		Lower link end max. loading weight W0
	Front	Rear	
L3560	1155 mm (45.5 in.)	1480 mm (58.3 in.)	1700 kg (3750 lbs)
L4060		1530 mm (60.2 in.)	1750 kg (3860 lbs)
L4760	1300 mm (51.2 in.)		
L5060, L5460, L6060	1340 mm (52.8 in.)	1430 mm (56.3 in.)	

	Actual figures		
	Implement weight W1 and / or size	Max. Drawbar Load W2	Trailer loading weight W3 Max. capacity
L3560	As in the following list (Shown on the next pate)	650 kg (1430 lbs)	2000 kg (4400 lbs)
L4060			2500 kg (5500 lbs)
L4760, L5060 L5460, L6060			3000 kg (6600 lbs)

Lower link end max. hydraulic lift capacity: **W0**
Implement weight: The implement weight which you can put on the link: **W1**
Max. drawbar load: **W2**
Trailer loading weight: The max loading weight for trailer (without trailer weight): **W3**



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■ **NOTE**
- **Implement size may vary depending on soil operating conditions.**

9Y1210824GEG0129US0

No.	Implement		Remarks	L3560	L4060
1	Trailer		Max. Load Capacity	2000 kg (4400 lbs)	2500 kg (5500 lbs)
			Max. Drawbar Load	650 kg (1430 lbs)	
2	Mower	Rotary-cutter	Max. Cutting Width	1829 mm (72 in.)	
			Max. Weight	350 kg (770 lbs)	420 kg (926 lbs)
		Flail Mower (Heavy)	Max. Cutting Width	1524 mm (60 in.)	
			Max. Weight	400 kg (8800 lbs)	
		Sickle Bar	Max. Cutting Width	2134 mm (84 in.)	
			Max. Weight	500 kg (1100 lbs)	
3	Sprayer	Rear Mount	Max. Tank-capacity	300 L (80 U.S.gals, 66 Imp.gals)	400 L (106 U.S.gals, 88 Imp.gals)
		Pull Type	Max. Tank-capacity	1000 L (264 U.S.gals, 220 Imp.gals)	1200 L (317 U.S.gals, 264 Imp.gals)
4	Rotary Tiller		Max. Tilling Width	1524 mm (60 in.)	
5	Bottom Plow		Max. Size	12 in. × 2, 16 in. × 1	14 in. × 2
6	Disc-harrow Pull Type		Max. Harrowing Width	1829 mm (72 in.)	1981 mm (78 in.)
			Max. Weight	350 kg (770 lbs)	400 kg (880 lbs)
7	Chisel Plow		Max. Width	1829 mm (72 in.)	
			Max. Weight	350 kg (770 lbs)	
8	Broad Caster		Max. Tank-capacity	250 L (66 U.S.gals, 55 Imp.gals)	300 L (80 U.S.gals, 66 Imp.gals)
			Max. Weight	100 kg (220 lbs)	
9	Manure Spreader		Max. Capacity	1500 kg (3300 lbs)	2000 kg (4400 lbs)
10	Cultivator		Max. Width	1829 mm (72 in.)	2134 mm (84 in.)
			Number of Rows	1	2
			Max. Weight	350 kg (770 lbs)	400 kg (880 lbs)
11	Front Blade		Max. Cutting Width	1829 mm (72 in.)	
			Max. Oil Pressure	17.2 MPa (175 kgf/cm^2, 2490 psi)	
			Sub Frame	Necessary	
12	Rear Blade		Max. Cutting Width	1829 mm (72 in.)	
			Max. Oil Pressure	17.2 MPa (175 kgf/cm^2, 2490 psi)	
13	Front Loader		Max. Lifting Capacity	720 kg (1590 lbs)	
			Max. Oil Pressure	17.7 MPa (180 kgf/cm^2, 2560 psi)	
			Sub Frame	Necessary	
14	Box Blade		Max. Cutting Width	1651 mm (65 in.)	
			Max. Weight	400 kg (880 lbs)	
15	Back Hoe		Max. Digging Depth	2286 mm (90 in.)	
			Max. Weight	450 kg (990 lbs)	
			Sub Frame	Necessary	
16	Snow Blade		Max. Width	1829 mm (72 in.)	
			Max. Weight	350 kg (770 lbs)	
17	Snow Blower		Max. Working Width	1702 mm (67 in.)	
			Max. Weight	280 kg (620 lbs)	

■ **NOTE**

- **Implement size may vary depending on soil operating conditions.**

9Y1210824GEG0130US0

No.	Implement		Remarks	L4760	L5060, L5460, L6060
1	Trailer		Max. Load Capacity	3000 kg (6600 lbs)	
			Max. Drawbar Load	650 kg (1430 lbs)	
2	Mower	Rotary-cutter	Max. Cutting Width	1829 mm (72 in.)	2134 mm (84 in.)
			Max. Weight	420 kg (926 lbs)	480 kg (1058 lbs)
		Flail Mower (Heavy)	Max. Cutting Width	1524 mm (60 in.)	1829 mm (72 in.)
			Max. Weight	400 kg (880 lbs)	500 kg (1100 lbs)
		Sickle Bar	Max. Cutting Width	2134 mm (84 in.)	
			Max. Weight	500 kg (1100 lbs)	
3	Sprayer	Rear Mount	Max. Tank-capacity	400 L (106 U.S.gals, 88 Imp.gals)	500 L (132 U.S.gals, 110 Imp.gals)
		Pull Type	Max. Tank-capacity	1200 L (317 U.S.gals, 264 Imp.gals)	2000 L (528 U.S.gals, 440 Imp.gals)
4	Rotary Tiller		Max. Tilling Width	1524 mm (60 in.)	1829 mm (72 in.)
5	Bottom Plow		Max. Size	14 in. × 2	16 in. × 2
6	Disc-harrow Pull Type		Max. Harrowing Width	1981 mm (78 in.)	2134 mm (84 in.)
			Max. Weight	400 kg (880 lbs)	
7	Chisel Plow		Max. Width	1829 mm (72 in.)	
			Max. Weight	350 kg (770 lbs)	
8	Broad Caster		Max. Tank-capacity	300 L (80 U.S.gals, 66 Imp.gals)	
			Max. Weight	100 kg (220 lbs)	
9	Manure Spreader		Max. Capacity	2000 kg (4400 lbs)	
10	Cultivator		Max. Width	2134 mm (84 in.)	2438 mm (96 in.)
			Number of Rows	2	4
			Max. Weight	400 kg (880 lbs)	
11	Front Blade		Max. Cutting Width	2134 mm (84 in.)	
			Max. Oil Pressure	17.2 MPa (175 kgf/cm^2, 2490 psi)	
			Sub Frame	Necessary	
12	Rear Blade		Max. Cutting Width	1829 mm (72 in.)	
			Max. Oil Pressure	17.2 MPa (175 kgf/cm^2, 2490 psi)	
13	Front Loader		Max. Lifting Capacity	850 kg (1880 lbs)	
			Max. Oil Pressure	17.7 MPa (180 kgf/cm^2, 2560 psi)	
			Sub Frame	Necessary	
14	Box Blade		Max. Cutting Width	1829 mm (72 in.)	
			Max. Weight	470 kg (1040 lbs)	
15	Back Hoe		Max. Digging Depth	2286 mm (90 in.)	
			Max. Weight	450 kg (990 lbs)	
			Sub Frame	Necessary	
16	Snow Blade		Max. Width	2134 mm (84 in.)	
			Max. Weight	400 kg (880 lbs)	
17	Snow Blower		Max. Working Width	1829 mm (72 in.)	
			Max. Weight	330 kg (730 lbs)	

■ **NOTE**

- **Implement size may vary depending on soil operating conditions.**

9Y1210824GEG0131US0

1 ENGINE

MECHANISM

CONTENTS

1. FEATURES


9Y1210824ENM006A

The engine models shown in the table below are adopted in the L60 series tractor.

Tractor Model	Engine Model
L3560	D1803-CR-E4
L4060	V2403-CR-E4
L4760	V2403-CR-E4
L5060	V2403-CR-TE4
L5460	V2403-CR-TE4
L6060	V2403-CR-TE4

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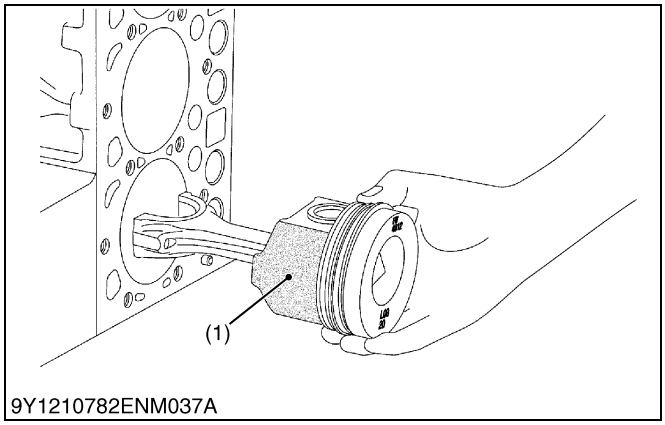
2. ENGINE BODY

[1] PISTON



9Y1210782ENM037A

The piston skirt has a layer of **molybdenum disulfide** ★, which decreases the piston slap noise and thus the all the engine noise.

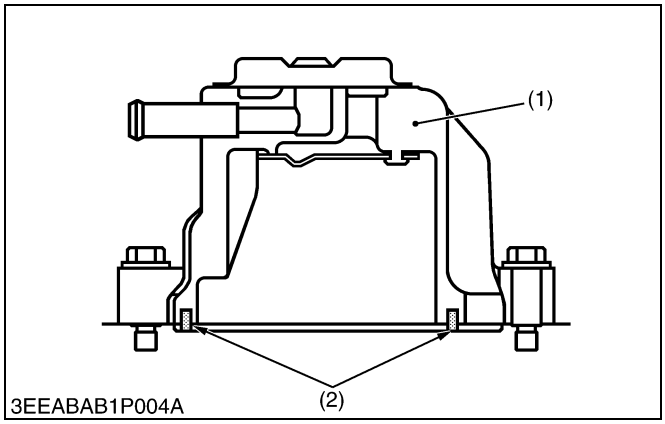
★ Molybdenum disulfide (MoS_2)

The molybdenum disulfide (1) is a solid lubricant, like Graphite or Teflon. This material helps not to wear the metal even with little lube oil.

(1) Molybdenum Disulfide

9Y1210824ENM0002US0

[2] HALF-FLOATING HEAD COVER



3EEABAB1P004A

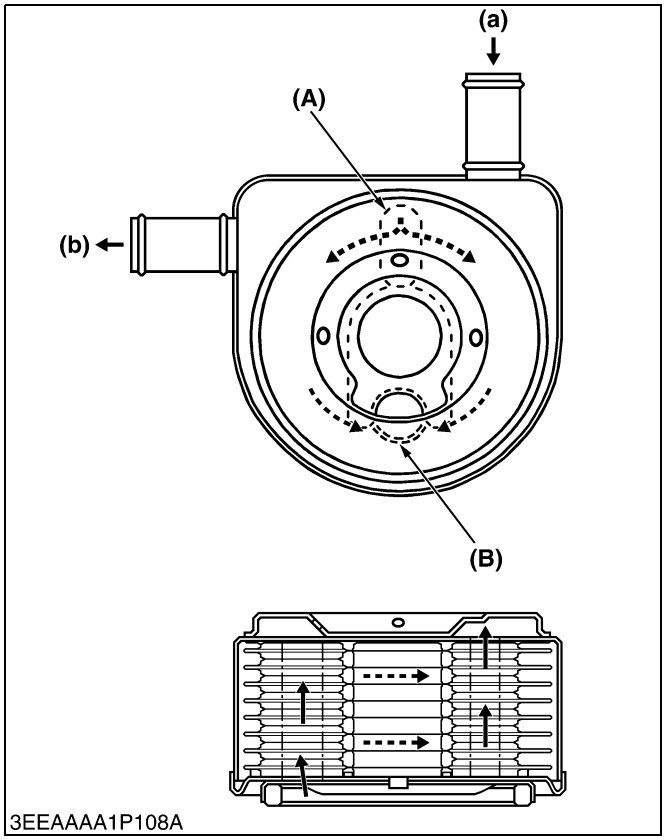
The rubber packing is attached to keep the cylinder head cover approximately 0.5 mm (0.02 in.) off the cylinder head. This decreases the noise from the cylinder head.

(1) Cylinder Head Cover (2) Rubber Packing

9Y1210824ENM0003US0

3. LUBRICATING SYSTEM

[1] OIL COOLER



3EEAAAA1P108A

The engine is equipped with a water-cooled oil cooler to keep the temperature of the oil from rising while the engine is operating and provide it with proper lubrication.

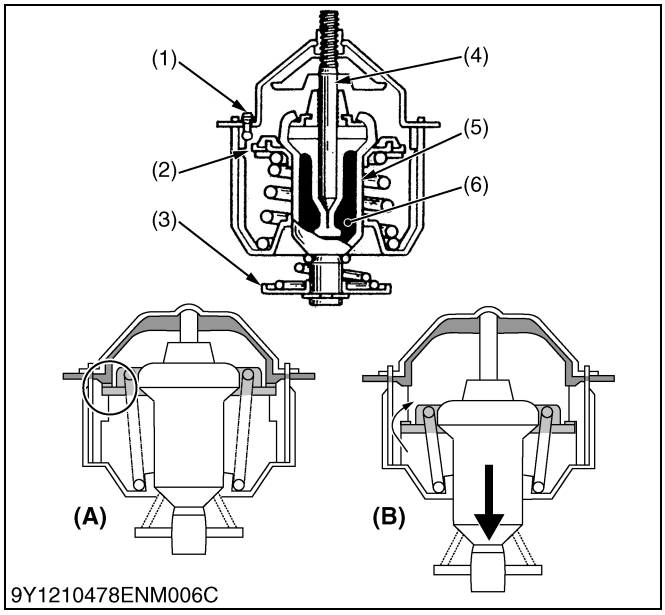
The oil flows on the inside of the cooler plate and is cooled by the coolant flowing on the outside of the plate.

(A) Oil Inlet
(B) Oil Outlet
(a) Coolant Inlet
(b) Coolant Outlet

9Y1210824ENM0050US0

4. COOLING SYSTEM

[1] THERMOSTAT



This thermostat uses a wax-pellet type. When temperature goes up, wax (6) in metal container (pellet (5)) changes to a liquid from a solid.

The volume of the wax (6) starts to expand in this process. As spindle (4) is fixed, pellet (5) goes down and valve (2) goes down.

There is a jiggle valve (1) on the top depending on the specification.

When you put coolant and thermostat is closed, coolant can not go in easily because air at the engine side can not go out.

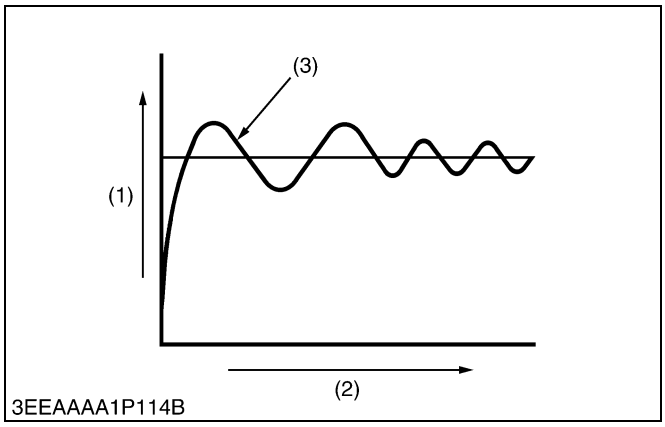
The jiggle valve helps to remove air from this hole, and then coolant can go in easily.

(1) Jiggle Valve
(2) Valve
(3) Bypass Valve
(4) Spindle
(5) Pellet
(6) Wax

(A) When The Valve is Closed
(B) When The Valve is Opened

9Y1210824ENM0051US0

[2] BOTTOM BYPASS SYSTEM



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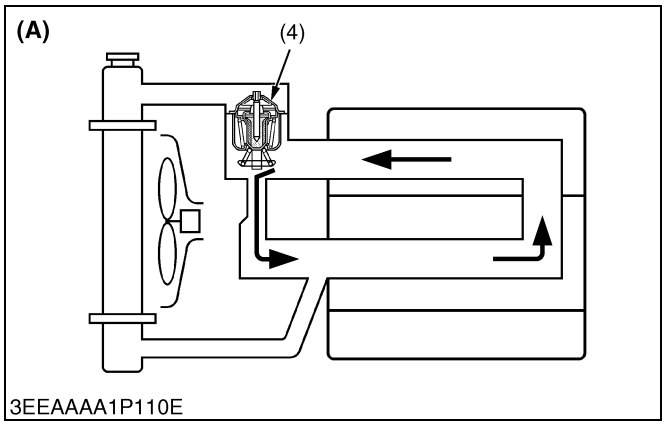

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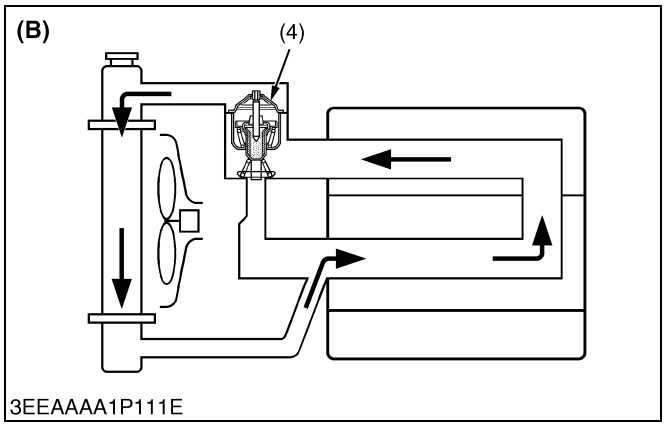

3EEAAAA1P111E

In addition to improving the cooling performance of the radiator by utilizing a bottom bypass system, the mechanism uses a 3-stage thermostat valve that reduces thermal shock considerably compared to previous radiators.

When the coolant inside the engine is cool, the thermostat (4) stays closed and coolant circulates inside the engine via the bypass pipe.

When the temperature of the coolant exceeds the opening temperature of the thermostat (4), the thermostat opens in three stages, sending the now hot coolant to the radiator. Further, when the thermostat is fully open, it is structured so the hot coolant does not flow into the engine via the bypass circuit, thus increasing the cooling performance of the system.

(1) Coolant Temperature
(2) Time
(3) Overshoot
(4) Thermostat

(A) Bypass Opened
(B) Bypass Closed

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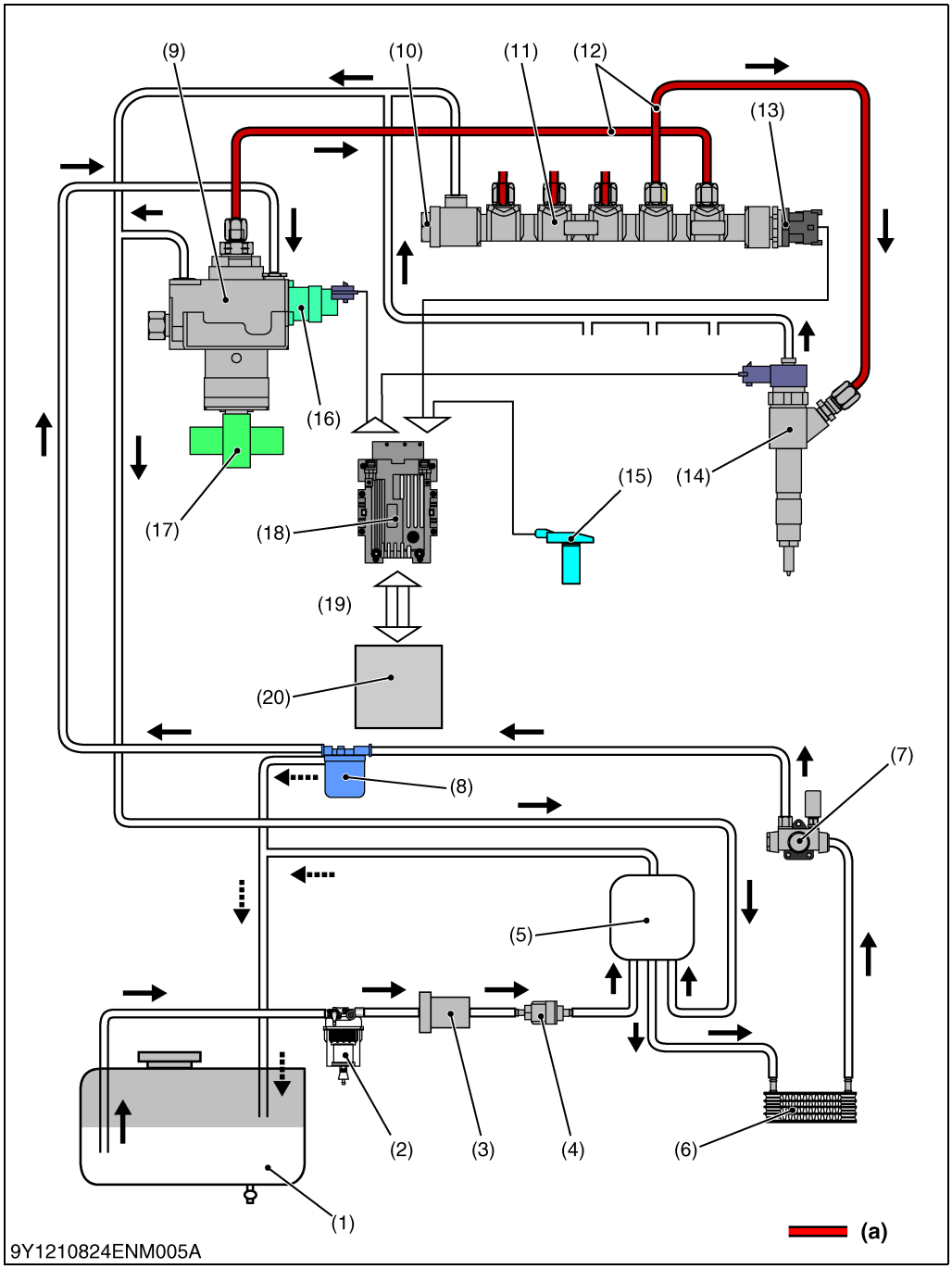
5. FUEL SYSTEM

[1] OVERVIEW OF COMMON RAIL SYSTEM



(1) Fuel Tank
(2) Water Separator
(3) Electromagnetic Pump
(4) Check Valve
(5) Fuel Sub Tank
(6) Fuel Cooler
(7) Feed Pump
(8) Fuel Filter
(9) Supply Pump
(10) Pressure Limiter
(11) Rail
(12) Injection Pipe
(13) Rail Pressure Sensor
(14) Injector
(15) Sensor
(16) SCV (Suction Control Valve)
(17) Fuel Cam Shaft
(18) Engine ECU
(19) CAN Communication
(20) Main ECU

(a) High Pressure Circuit

The common rail system is an electronically controlled fuel injection device, with a supply pump (9) that pressurizes the fuel, a rail (11) that stores the high-pressure fuel, injectors (14) that inject the fuel under high-pressure based on solenoid operation into each cylinder and an engine ECU that controls all of these components.

The injection amount and injection timing by the injectors (14) and pressure of fuel stored in the rail are controlled by the engine ECU (18) based on signals from each sensor (15) and instructions sent by CAN communication (19) from the main ECU (20) on the tractor.

Therefore, fuel is injected under optimal conditions at all times enabling suppressing of that which is a characteristic of diesel engines, generation of black smoke on start up and under acceleration achieving reduction in exhaust gas and higher output power.

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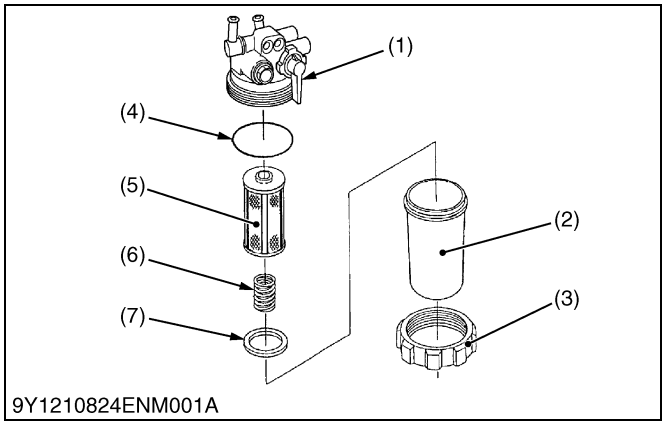

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Separator

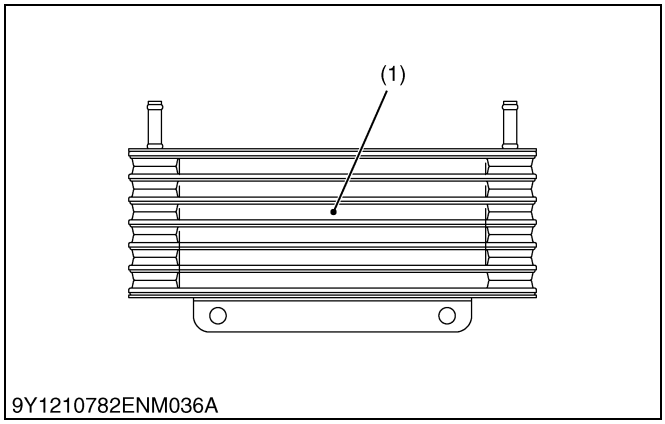
The separator has a function of separating fuel and water through difference in specific gravity. There is a read float (7) with a specific weight of 0.9 made of a polypropylene material inside that has properties in that it is heavier than diesel and lighter than water.

When fuel containing water enters the separator, water with a high specific weight pools in the bottom of a cup (2) and causes the float to float. The state of mixing in of water can be recognized by the state of the float and can be visually inspected externally.

Fuel with a low specific weight flows over the top of the cup but passes through the element (5) provided inside enabling filth to be removed from the fuel.

(1) Fuel Valve
(2) Cup
(3) Retainer Ring
(4) O-ring
(5) Element
(6) Spring
(7) Red Float

9Y1210824ENM0009US0



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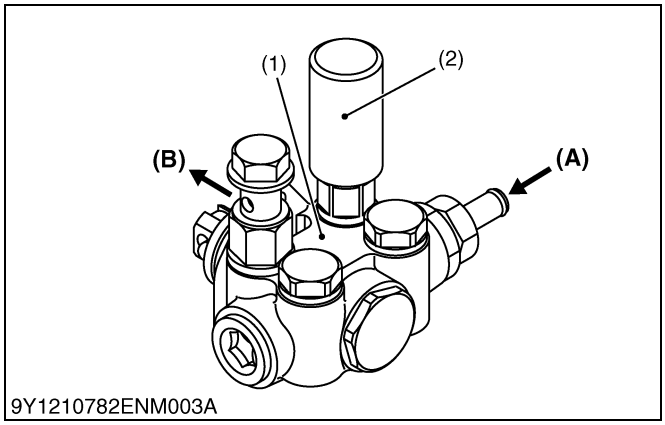
Fuel Cooler

The fuel cooler (1) is set downstream of the separator and is used to cool the fuel.

When the pressure of fuel is increased, the temperature also rises. The fuel in the common rail system is raised to high pressure so the fuel temperature also rises. If the fuel temperature rises too much, output and durability are reduced. A fuel cooler that suppresses fuel temperature rise is provided to prevent this.

(1) Fuel Cooler

9Y1210824ENM0010US0



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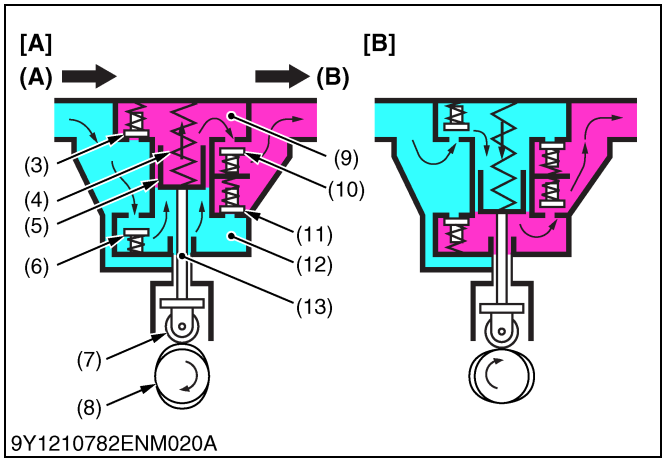


9Y1210782ENM020A

Feed Pump

The feed pump (1) is installed after the fuel cooler and has a function of suctioning fuel from the fuel tank and pressure feeding it through a filter and to the supply pump.

Also, the feed pump is provided with a priming pump (2). This is for air removal through the supply pump through manual operation of the priming pump.

■ Operating

During the up stroke, the piston (5) is pushed up by the fuel cam (8) via the tappet (7) and push rod (13). As a result, the pressure in the inner chamber (9) rises, the suction side check valve (3) closes and the discharge side check valve (10) opens. On the other hand, the pressure in the outer chamber (12) is lowered so the suction side check valve (6) opens and discharge side check valve (11) closes.

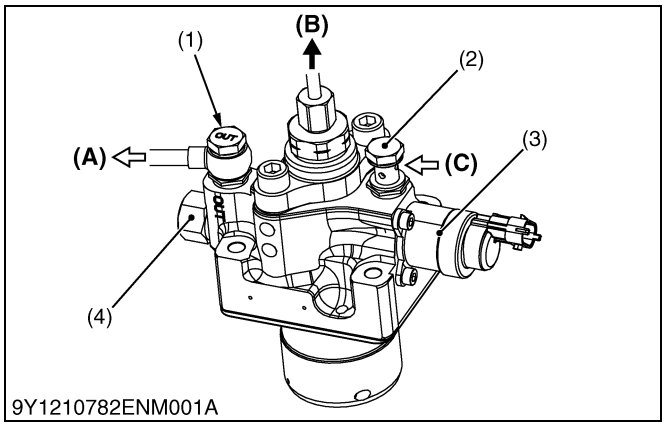
During the down stroke the piston is lowered by a piston spring (4) and the pressure in the inner chamber is lowered so the suction side check valve opens and discharge side check valve closes. On the other hand, the pressure in the outer chamber rises so the suction side check valve closes and discharge side check valve opens.

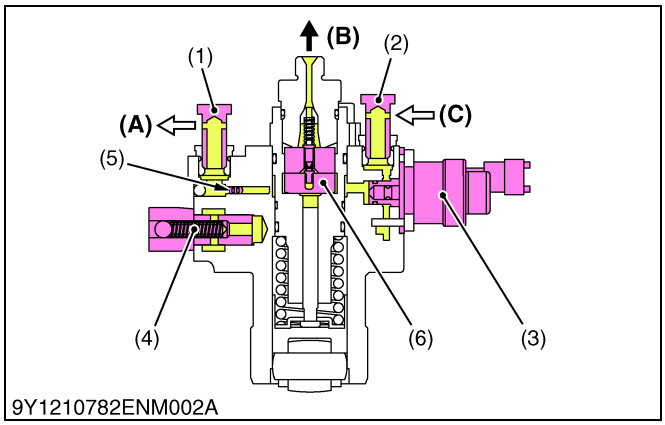
(1) Feed Pump
(2) Supply Pump
(3) Suction Side Check Valve
(4) Piston Spring
(5) Piston
(6) Suction Side Check Valve
(7) Tappet
(8) Fuel Cam
(9) Inner Chamber
(10) Discharge Side Check Valve
(11) Discharge Side Check Valve
(12) Outer Chamber
(13) Push Rod

(A) Suction Side
(B) Discharge Side
[A] Up Stroke
[B] Down Stroke

9Y1210824ENM0011US0

[2] SUPPLY PUMP





The supply pump corresponds to conventional injection pumps but pressurizes the fuel to more than 2 times that of conventional pumps for delivery to the rail.

The supply pump is made up of an intake adjustment valve (SCV) (3), pressurizing part, overflow valve (4), IO valve (6), and zero delivery drain (5).

■ **NOTE**

- **Rail pressure changes based on engine model and engine conditions.**

[D1803-CR-E4]

Supply Pump Type	Rail pressure reference values MPa (kgf/cm^2)	
	At Idling	At Rated Speed
PF49	25 to 30 MPa 260 to 300 kgf/cm^2 3700 to 4300 psi	65 to 70 MPa 663 to 713 kgf/cm^2 9500 to 10000 psi

[V2403-CR-E4]

Supply Pump Type	Rail pressure reference values MPa (kgf/cm^2)	
	At Idling	At Rated Speed
PF49	25 to 30 MPa 260 to 300 kgf/cm^2 3700 to 4300 psi	65 to 70 MPa 663 to 713 kgf/cm^2 9500 to 10000 psi

[V2403-CR-TE4]

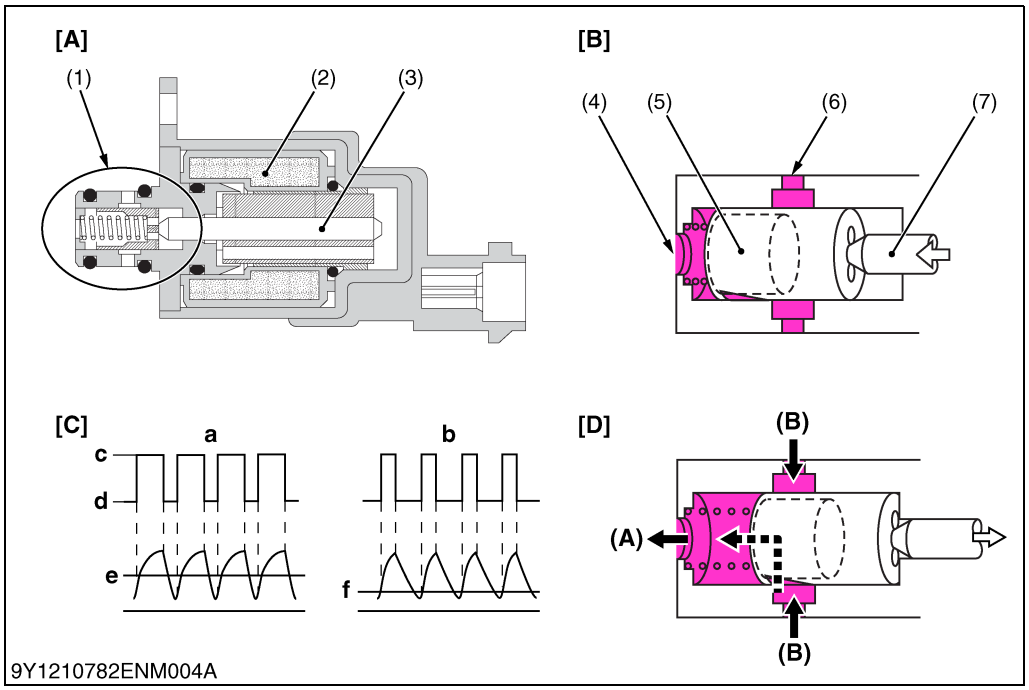
Supply Pump Type	Rail pressure reference values MPa (kgf/cm^2)	
	At Idling	At Rated Speed
PF49	25 to 30 MPa 260 to 300 kgf/cm^2 3700 to 4300 psi	65 to 70 MPa 663 to 713 kgf/cm^2 9500 to 10000 psi

(1) Eye Bolt (out)
(2) Eye Bolt (in)
(3) Suction Control Valve (SCV)
(4) Overflow Valve
(5) Zero Delivery Drain
(6) IO Valve

(A) To fuel tank
(B) To rail
(C) From fuel filter

9Y1210824ENM0012US0

Suction Control Valve (SCV)



9Y1210782ENM004A

(1) Cylinder Part
(2) Solenoid
(3) Armature
(4) Discharge Port
(5) Piston
(6) Cylinder
(7) Suction Port

a: High Suction Volume
b: Low Suction Volume
c: ON
d: OFF
e: Large
f: Small

(A) To pressurizing section
(B) From fuel pump

[A] Suction Control Valve
[B] No delivery (current ON)
[C] When Solenoid is Electrified
[D] Maximum delivery volume (current OFF)

The suction control valve (SCV) is a proportional control valve that adjusts the amount of fuel delivered from the fuel pump to achieve the fuel pressure requested by the engine, has a function of delivering to the pressurizing part, and is made up of a piston (5), cylinder (6), armature (3), and solenoid (2) etc.

The SCV is a linear solenoid type electromagnetic valve and the engine ECU controls the time the solenoid is electrified (duty ratio control). When current flows through the solenoid, the armature moves based on the duty ratio and pushes on the cylinder and fuel flow changes based on position of the cylinder enabling suitable fuel flow.

■ **NOTE**

- **Since the suction control valve (SCV) has not been adopted as a part, replace the supply pump when SCV is needed to replace.**
- **Linear solenoid type: when voltage is applied to the coil, the moveable core moves linearly in proportion to the voltage based on the magnetic force**

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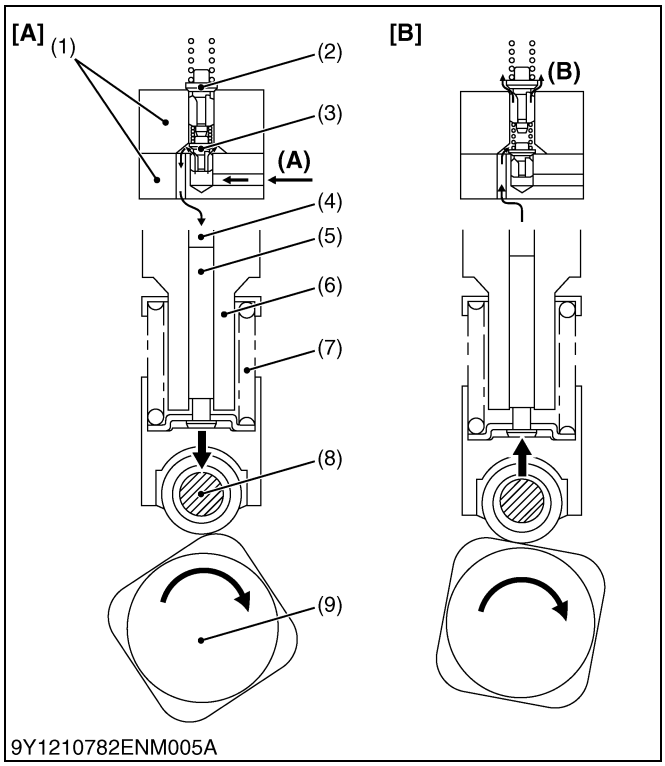

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Pressurizing Part (Pump Body)

The pressurizing part (pump body) applies pressure to the fuel supplied from the suction control valve, has a function of supplying fuel to the rail, and is made up of an IO valve (1), plunger (5), plunger barrel (6), spring (7), tappet (8), and pump housing etc.

The engine side fuel camshaft (9) rotates and during the lowering stroke, the spring cause the plunger to lower. An optimal amount of fuel adjusted by the suction control valve is suctioned through the IO valve and into the plunger chamber (4).

Rotation continues and during the lift stroke of the cam the plunger rises, pressurizes the fuel, and supplies it through the IO valve to the rail.

(1) IO Valve
(2) Outlet Valve
(3) Inlet Valve
(4) Plunger Chamber
(5) Plunger
(6) Plunger Barrel
(7) Spring
(8) Tappet
(9) Fuel Camshaft

(A) From suction control valve
(B) To rail
[A] Suction Stroke
[B] Compression Stroke

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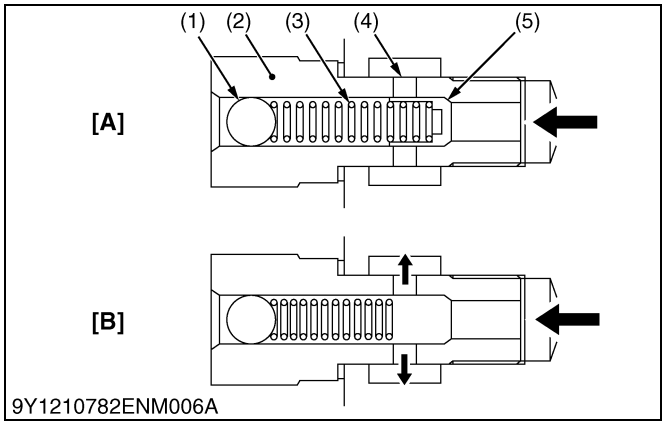

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Overflow Valve

When the pressure of fuel delivered from the feed pump rises above a prescribed amount, the overflow valve has a function of returning fuel to the tank and is made up of a valve body (2), valve piston (5), spring (3), and ball (1).

When fuel pressure increases and exceeds the force of the spring, the valve piston is pushed. Here, the fuel passes through the port (4) provided in the valve body and returns to the fuel tank.

Therefore, the pressure in the suction control valve is stabilized and fuel flow is accurately adjusted.

(1) Ball
(2) Valve Body
(3) Spring
(4) Port
(5) Valve Piston

[A] While Open
[B] While Closed

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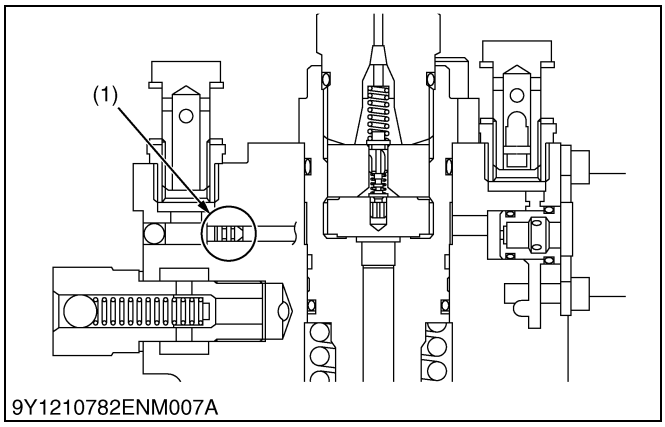

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Zero Delivery Drain

The zero delivery drain (1) has a function of preventing fuel flow to the pressurizing part when no fuel is being delivered.

Though the suction control valve is set to no flow, a small amount of fuel flows to the pressurizing part. The zero delivery drain is provided to prevent this and this small amount of fuel is returned through the zero delivery drain and returned to the fuel tank.

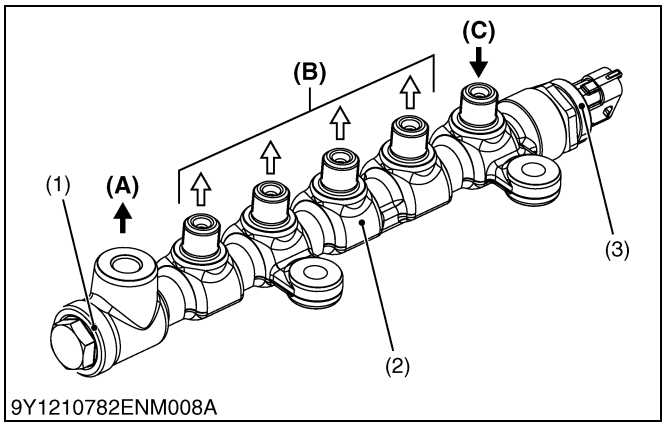
■ **NOTE**

- **Other than no delivery, fuel is delivered to the pressurizing part based on the amount of throttle and very little flows to the zero delivery drain.**

(1) Zero Delivery Drain

9Y1210824ENM0016US0

[3] RAIL



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The rail (2) stores fuel at the high pressure applied by the supply pump and the injectors of each cylinder. The rail incorporates control parts-a rail pressure sensor (3) and a pressure limiter (1).

The pressure of the fuel in the rail is detected by the rail pressure sensor, and optimal feedback control is provided for the engine RPM and load. This greatly improves the ability to raise the pressure at low RPMs and enables high-pressure injection from low speed ranges.

Pressure Limiter

The pressure limiter operates when the pressure inside the rail becomes excessively high (valve opens), and then once the pressure drops to a certain pressure, it acts to keep the pressure (valve closes).

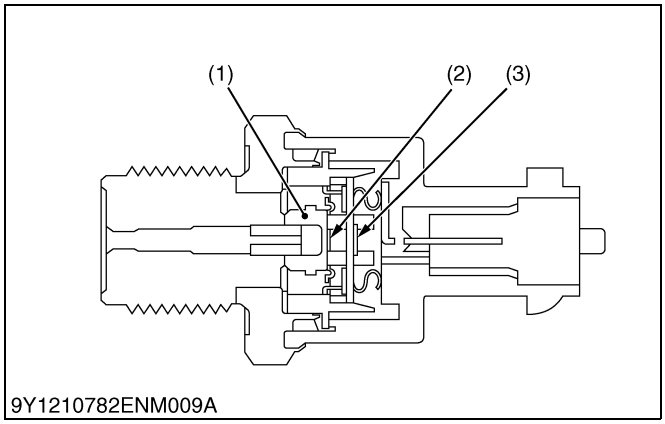
Fuel discharged by the pressure limiter returns to the fuel tank.

Please note that the pressure limiter is not treated as a part, so replacement requires replacing the rail assembly.

Valve opening pressure	Reference value	Approx. 200 MPa (2039 kgf/cm^2, 29000 psi)
Valve closing pressure		Approx. 50 MPa (510 kgf/cm^2, 7260 psi)

(1) Pressure Limiter
(2) Rail
(3) Rail Pressure Sensor
(A) To Fuel Tank
(B) To Injector
(C) From Supply Pump

9Y1210824ENM0053US0



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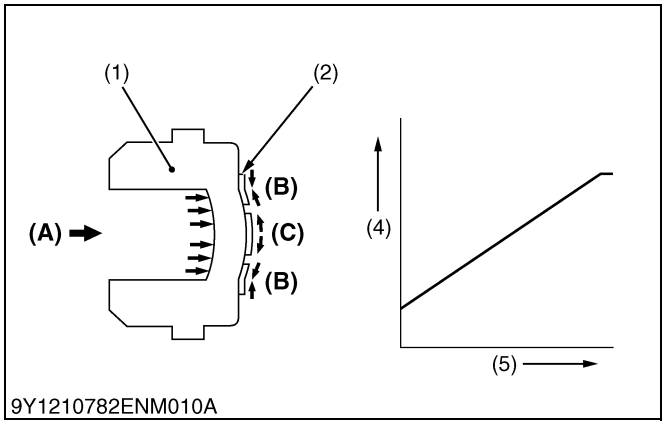
Rail Pressure Sensor

The rail pressure sensor is mounted on the rail, detects the fuel pressure inside the rail, converts this to an electronic signal and sends it to the ECU.

The rail pressure sensor is made up of a metal diaphragm (1), distortion detection part (metal gauge) (2), signal processing circuit (3), and housing etc.

When the fuel pressure **(A)** in the rail is applied to the metal diaphragm, the diaphragm is distorted. Metal gauges are positioned in the center and at the edge of the metal diaphragm and tensile **(C)** or compression **(B)** force is applied. A difference in resistance values is generated based on the force that is applied.

Please note that the rail pressure sensor is not available separately as a part, so replacement requires replacing the rail assembly.



9Y1210782ENM010A

(1) Metal Diaphragm
(2) Distortion Sensor Part (Metal Gauge)
(3) Signal Processing Circuit
(4) Voltage
(5) Pressure
(A) Fuel pressure
(B) Pressurization
(C) Tensile

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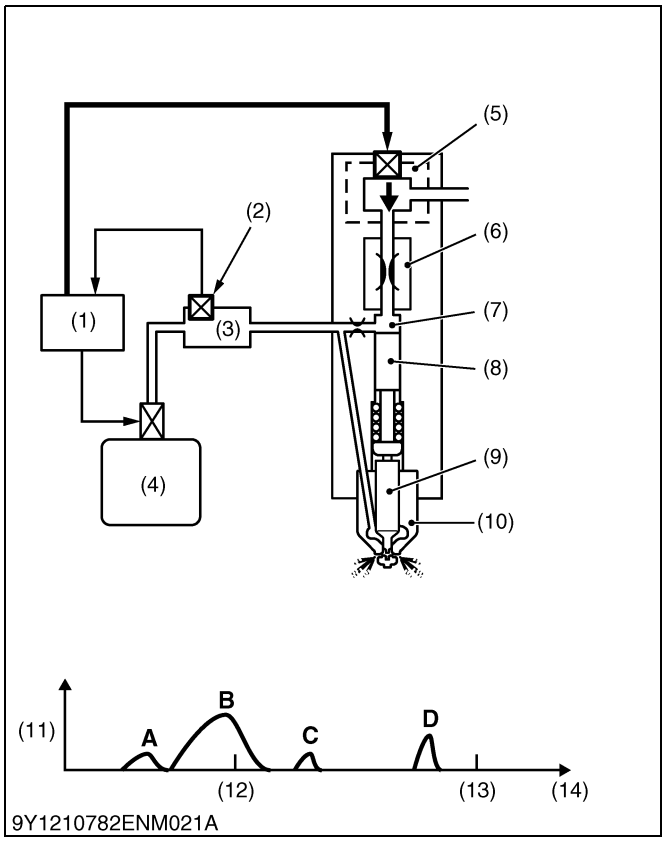
[4] INJECTOR



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General

The injectors inject high-pressure fuel sent from the rail into the combustion chamber of the engine.

The injections are controlled by the signal of engine's ECU to produce the ideal timing, amount of fuel, mixture and spray.

The injector injects a finely turned spray in three pulses during the combustion stage. First a small amount is injected, mitigating the effect of the initial burn and reducing NOx (oxides of nitrogen) and noise. The main injection follows with the real burn, and in the last stage, a diffuse combustion is induced, thus reducing particulate matter (PM) generated by the main injection.

(1) Engine ECU
(2) Rail Pressure Sensor
(3) Rail
(4) Supply Pump
(5) TWV (Two-way Valve)
(6) Discharge Orifice
(7) Control Chamber
(8) Command Piston
(9) Needle Valve
(10) Nozzle
(11) Injection Amount
(12) T.D.C (Top Dead Center)
(13) B.D.C (Bottom Dead Center)
(14) Crank Angle

A: Pre-injection
B: Main Injection
C: After Injection
D: Post Injection

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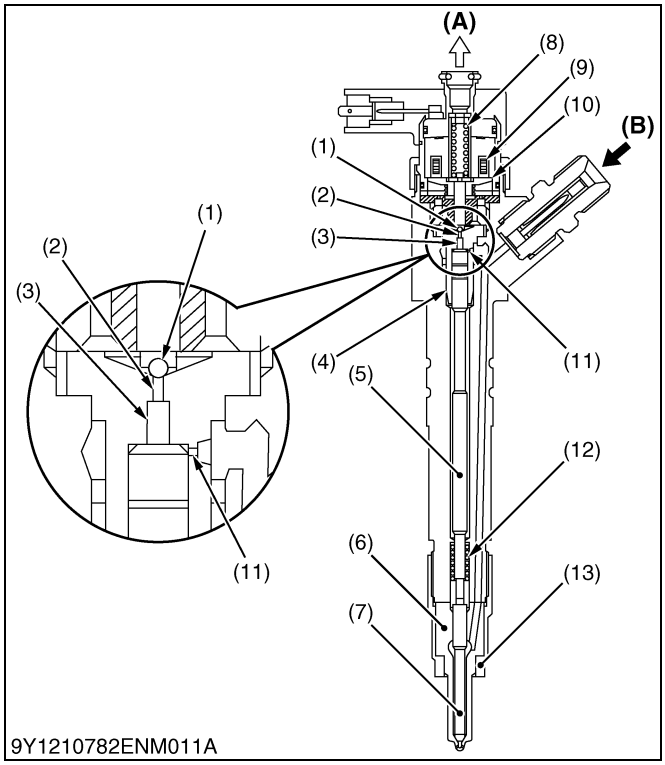

Injector Structure

Injectors consist of nozzle components (nozzle body (6), needle valve (7), nozzle spring (12), nozzle nut (13)) and control components (control chamber (3), solenoid (9), valve spring (8), TWV (Two Way Valve) (10), valve ball (1), valve body (4), command piston (5), suction orifice (11), discharge orifice (2).

(1) Valve Ball
(2) Discharge Orifice
(3) Valve Spring
(4) Valve Body
(5) Command Piston
(6) Nozzle Body
(7) Needle Valve
(8) Valve Spring
(9) Solenoid
(10) TWV (Two Way Valve)
(11) Suction Orifice
(12) Nozzle Spring
(13) Nozzle Nut

(A) To Fuel Tank
(B) From Rail

Part	Function
Two way electromagnetic valve	Electromagnetic valve that is operated through turning current to a solenoid ON and OFF controlling flowing in and flowing out of fuel from the rail to the control chamber.
Suction, discharge orifice	This sets the raise and lower speed of the needle valve through constricting discharge and suctioning of fuel into the control chamber. Also, sets a slight delay between operation of the two way electromagnetic valve and operation of the needle valve enabling reliable injection of very low amounts.
Valve piston	Raises and lowers a nozzle needle through changing pressure in the control chamber provided on top of the piston.
Nozzle spring	Along with control chamber pressure causes the needle valve to be in close contact with the nozzle body preventing leaking of high pressure fuel from the rail.
Nozzle	Part that performs fuel injection. The needle valve is raised and lowered based on change to pressure in the control chamber, opens and closes the fuel injection port, and while the valve is open, atomizes and injects fuel from the rail.

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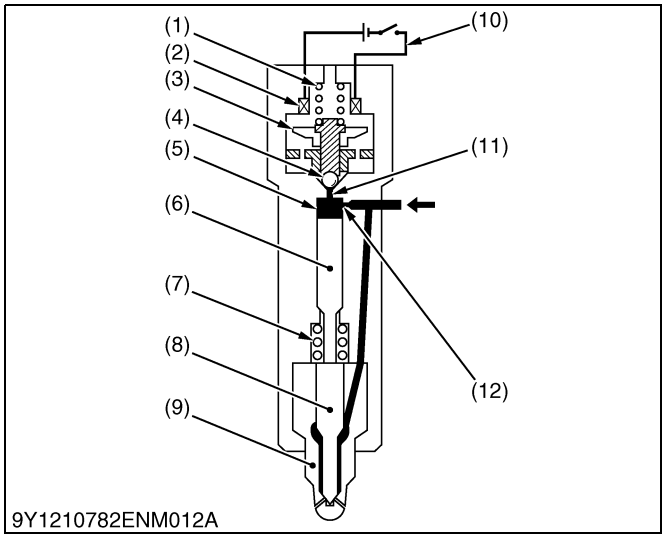

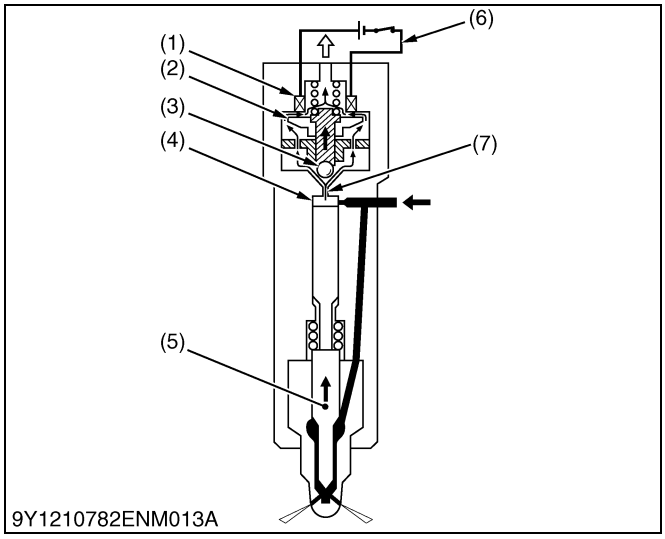

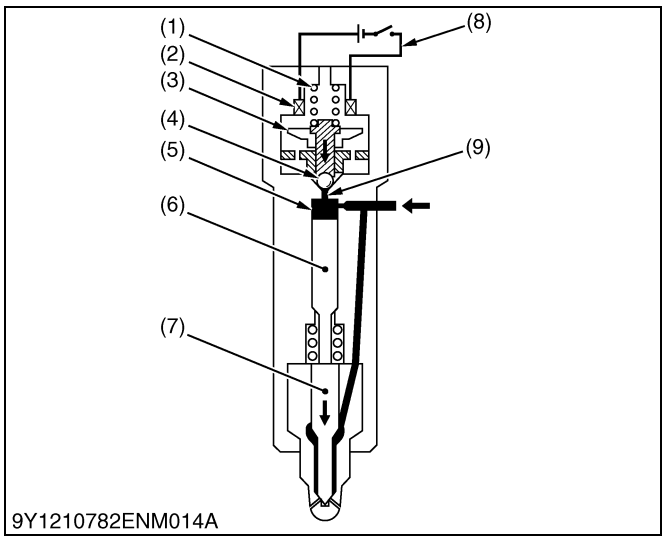

Injector Operation

■ No Injection

While the solenoid (2) is not electrified, the two way electromagnetic valve (3) is pushed down by the valve spring (1) and the discharge orifice (11) path is closed by the valve ball (4). Here, fuel pressure is applied in the control chamber (5) and to the bottom of the needle valve (8) but based on the difference in projected net area and the force of the nozzle spring (7), the needle valve is pushed into the nozzle body (9) so fuel injection is not performed.

(1) Valve Spring
(2) Solenoid
(3) Two Way Electromagnetic Valve
(4) Valve Ball
(5) Control Chamber
(6) Valve Piston
(7) Nozzle Spring
(8) Needle Valve
(9) Nozzle Body
(10) Drive Circuit
(11) Discharge Orifice
(12) Suction Orifice

9Y1210824ENM0021US0

■ Injection Start

When the solenoid (1) is electrified by the drive circuit (6) the two way electromagnetic valve (2) is lifted by an electromagnetic force and the valve ball (3) is lifted by fuel pressure opening the discharge orifice (7). Here, fuel inside the control chamber (4) passes through the discharge orifice and flows to the fuel tank. As a result, the needle valve (5) is pushed up based on fuel pressure and fuel injection starts.

■ NOTE

- **Longer electrification time of the solenoid leads to increased amount of fuel injected.**

(1) Solenoid
(2) Two Way Electromagnetic Valve
(3) Valve Ball
(4) Control Chamber
(5) Needle Valve
(6) Drive Circuit
(7) Discharge Orifice

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■ Injection Complete

When electrification of the solenoid (2) by the drive circuit (9) stops, the two way electromagnetic valve (3) is pushed closed by the force of the valve spring (1) and the discharge orifice (9) is closed by the valve ball (4). As a result, fuel pressure in the control chamber (5) rises and the needle valve (7) is pushed by the valve piston (6).

(1) Valve Spring
(2) Solenoid
(3) Two Way Electromagnetic Valve
(4) Valve Ball
(5) Control Chamber
(6) Valve Piston
(7) Needle Valve
(8) Drive Circuit
(9) Discharge Orifice

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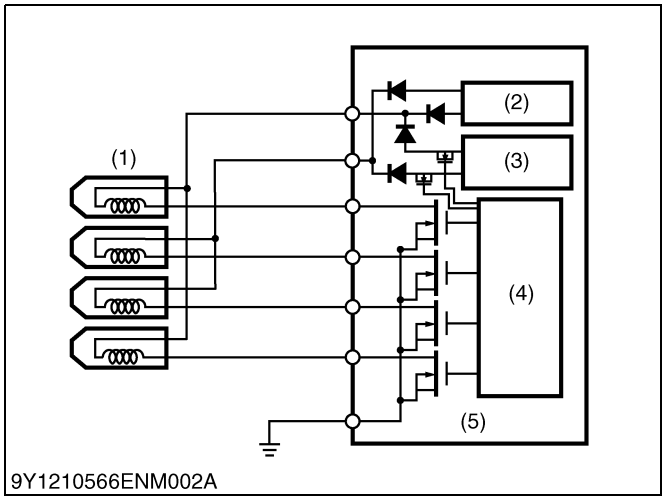

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Injector Drive Circuit

To increase the responsiveness of the injector, the voltage that drives the injector is raised to a high voltage, accelerating the magnetization of the solenoid and increasing the responsiveness of the TWV.

The battery voltage is raised to about 110 V by a high-voltage generating circuit inside the ECU and that voltage is supplied to the injector to actuate it.

(1) Injector
(2) Rated Amperage Circuit
(3) High-voltage Generating Circuit
(4) Control Circuit
(5) Engine ECU

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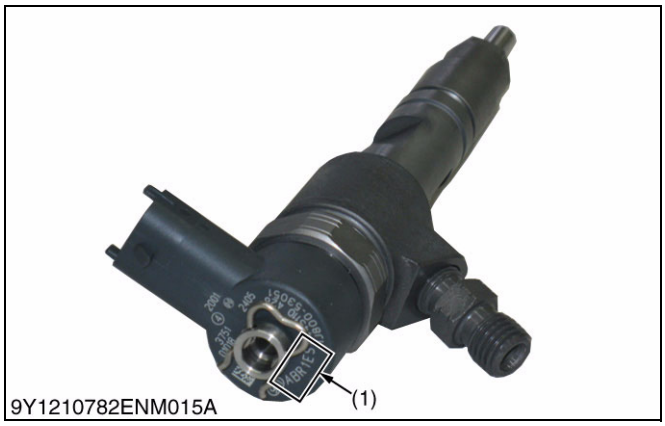

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Injector QR/ID Codes

Injectors are processed to exacting tolerances, but there are minute variations in the amount they inject, so to correct for these variations, a correction volume is recorded on the QR/ID codes of the injectors.

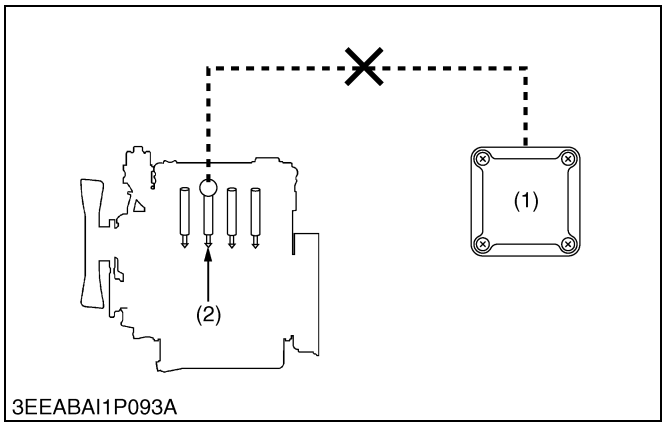
During manufacture, the QR code is read by a scanner and the correction value is registered in the ECU.

■ **IMPORTANT**

- **In order for the engine ECU to recognize and calibrate injectors, if an injector or the engine ECU is replaced, perform "Injector calibration" using a diagnostics tool.**

(1) ID Code

9Y1210824ENM0025US0



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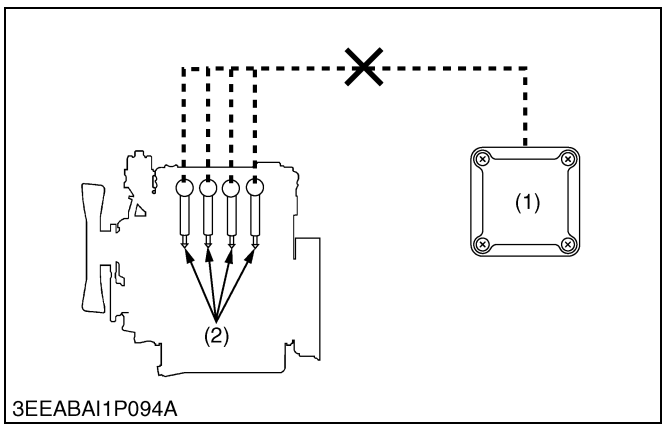
When Replacing an Injector

Register the ID code of the replacement injector into the ECU.

(1) Engine ECU
(2) Replacement Injector

9Y1210824ENM0026US0



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When Replacing the Engine ECU

Register the ID codes of all of the injectors into the replacement engine ECU.

When replacing an ECU, as it is necessary to write all of the data, including the injector corrections, only KUBOTA can write the data to the ECU.

(1) Replacement ECU
(2) Injector

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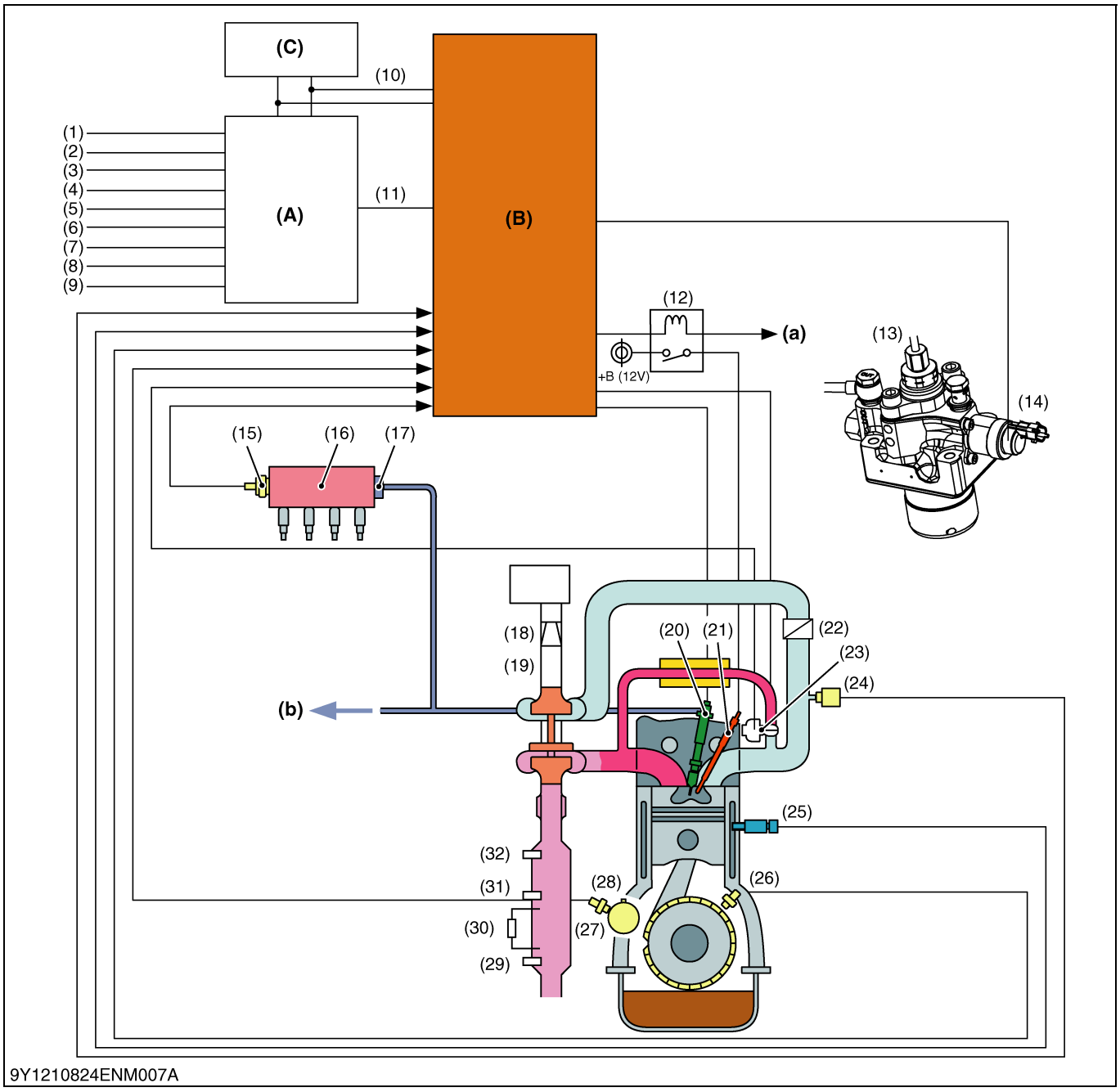
[5] ENGINE CONTROL SYSTEM



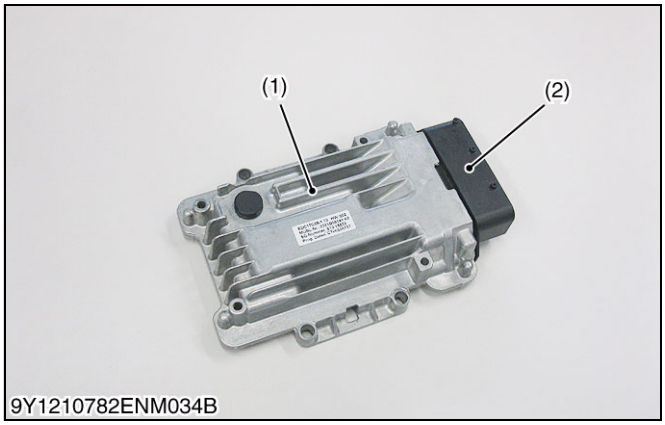
9Y1210824ENM007A

(1) Main Switch ON Signal
(2) Starter Switch Signal
(3) Hand Throttle Sensor
(4) Foot Throttle Sensor
(5) Oil Pressure Switch
(6) Traveling Speed Sensor
(7) Auto Regeneration Switch
(8) Parked Regeneration Switch
(9) Starter Relay
(10) CAN Communication
(11) OPC Switch Signal
(12) Glow Relay
(13) Supply Pump
(14) SCV (Suction Control Valve)
(15) Rail Pressure Sensor
(16) Rail
(17) Rail Pressure Limiter
(18) Air Flow Sensor
(19) Turbocharger
(20) Injector
(21) Glow Plug
(22) Intake Throttle Valve
(23) EGR Valve (Motor, Lift Sensor)
(24) Intake Air Pressure Sensor
(25) Coolant Temperature Sensor
(26) Crankshaft Position Sensor
(27) Diesel Particulate Filter (Hereinafter Referred To As The "DPF") Muffler
(28) Camshaft Position Sensor
(29) Temperature Sensor (DPF Outlet Exhaust Temperature) (T_2)
(30) Differential Pressure Sensor (DPF Differential Pressure) (ΔP)
(31) Temperature Sensor (DPF Inlet Exhaust Temperature) (T_1)
(32) Temperature Sensor (DOC Inlet Exhaust Temperature) (T_0)

(A) Main ECU
(B) Engine ECU
(C) Instrument Panel
(a) From Main Switch
(b) To Fuel Tank

9Y1210824ENM0028US0

(1) Engine ECU



The engine ECU (1) controls the amount, timing, mixture and pressure of fuel that is injected. The engine ECU (1) operates each kind of control based on the signals from each type of sensor.

The actuator for controlling the amount, timing and mixture of fuel injection is the injector, while the actuator for controlling fuel pressure is the supply pump.

■ **Fuel Quantity Control**

The amount of fuel to be injected is determined using a basic injection amount, which is calculated based on the state of the engine and driving conditions, with corrections added for parameters such as water temperature, intake air temperature, intake pressure, etc.

■ **Injection Timing Control**

The ECU controls the timing for starting to energize the injectors, first determining the timing for the main injection and then setting the timing of other injections, such as pilot injections.

■ **Fuel Mixture Control**

By conducting a pilot injection, the initial fuel mixture is kept to a minimum, mitigating the explosive initial combustion and reducing NOx and noise.

■ **Fuel Pressure Control**

The ECU calculates the set fuel injection pressure based on the engine load (last injection amount and engine RPM) and controls the amount the supply pump supplies and the fuel pressure inside the rail.

(1) Engine ECU (2) ECU Connector

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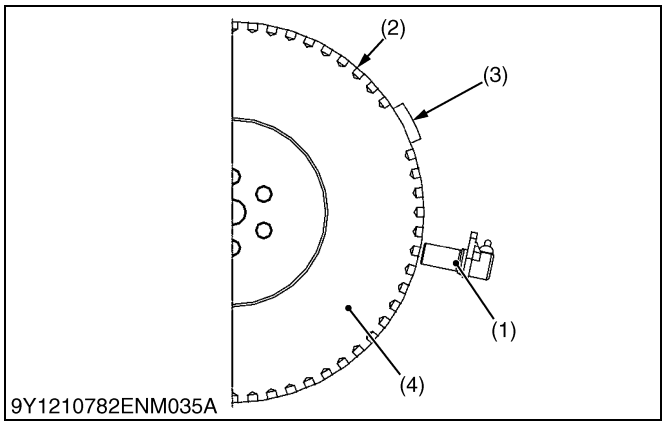
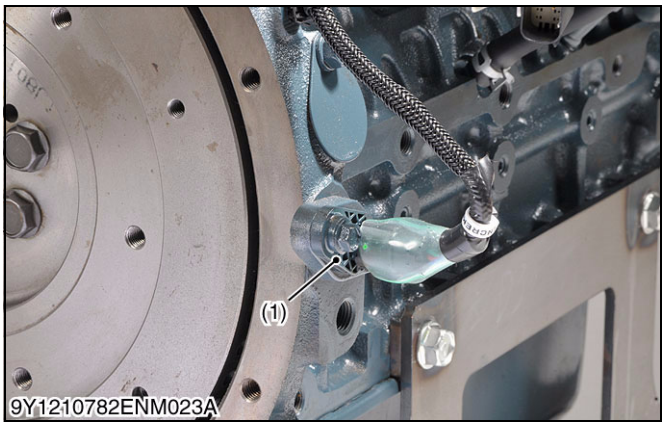
(2) Sensor





Crankshaft Position Sensor

The crank position sensor (1) is mounted on the flywheel housing and the sensor body uses a hall element type.

When pulse holes (2) provided on the outer edge of the flywheel (4) pass through the sensor, the internal magnetic field changes and this is output to the engine ECU.

Also, a no hole part (3) is provided in a part and this detects the crank position each rotation and outputs this to the engine ECU.

The engine ECU uses the signals to calculate the crank angle and engine speed.

(1) Crankshaft Position Sensor (3) Part without a Hole
(2) Pulse Hole (4) Flywheel

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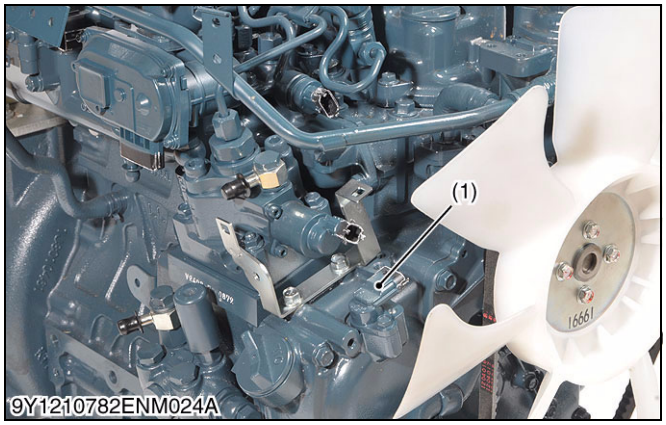

Camshaft Position Sensor

The cam position sensor (1) is mounted near the supply pump gear of the gear case and the sensor functions in the same way as the crank position sensor.

This sensor detects the teeth of the pulsar gear (2) and the engine ECU uses this signal to calculate the cam angle.

(1) Cam Position Sensor (2) Pulsar Gear

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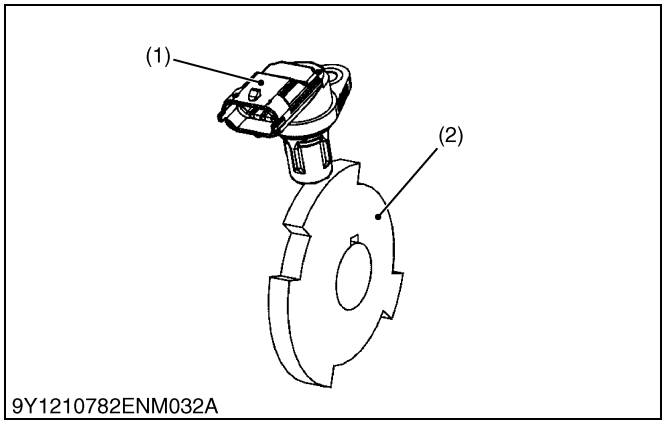

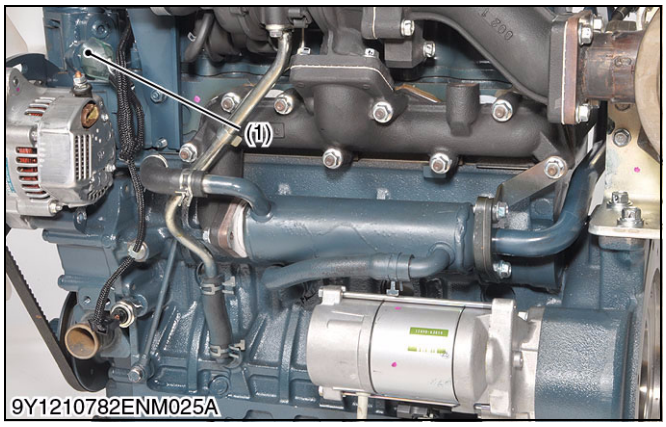

Coolant Sensor

The temperature sensor is mounted to the water flange and uses a thermistor in the sensor part to detect temperature.

A characteristic of thermistors is that their electrical resistance varies with temperature, and this characteristic is used by the different sensors to detect temperature via voltage.

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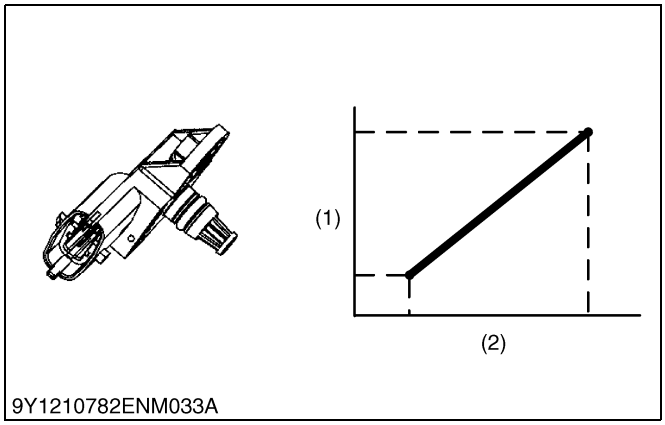

Boost Sensor [V2403-CR-TE4]

The boost sensor is a semiconductor pressure sensor and when there are changes in the pressure on the silicon element inside the sensor, its electrical resistance changes and this piezo resistance effect is used to detect pressure using voltage.

The boost sensor measures the intake air pressure after it passes through the turbocharger.

(1) Output Voltage (2) Intake Air Pressure

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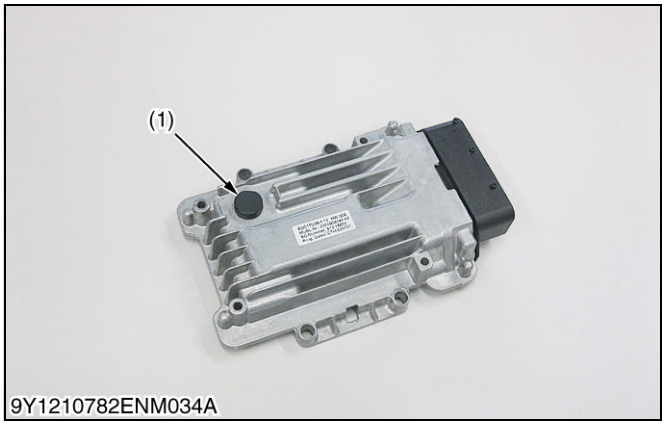

Atmosphere Pressure Sensor

An atmosphere pressure sensor is installed in the body of the ECU and detects atmospheric pressure close to the ECU.

This is provided to prevent changes to combustion status due to changes in atmospheric pressure. (At high altitudes, air pressure is low and air volume is low making complete combustion difficult etc.)

■ **NOTE**

- **Since the atmospheric pressure sensor has not been adopted as a part, replace the ECU assembly when the atmospheric pressure is needed to replace.**

(1) Atmosphere Pressure Sensor

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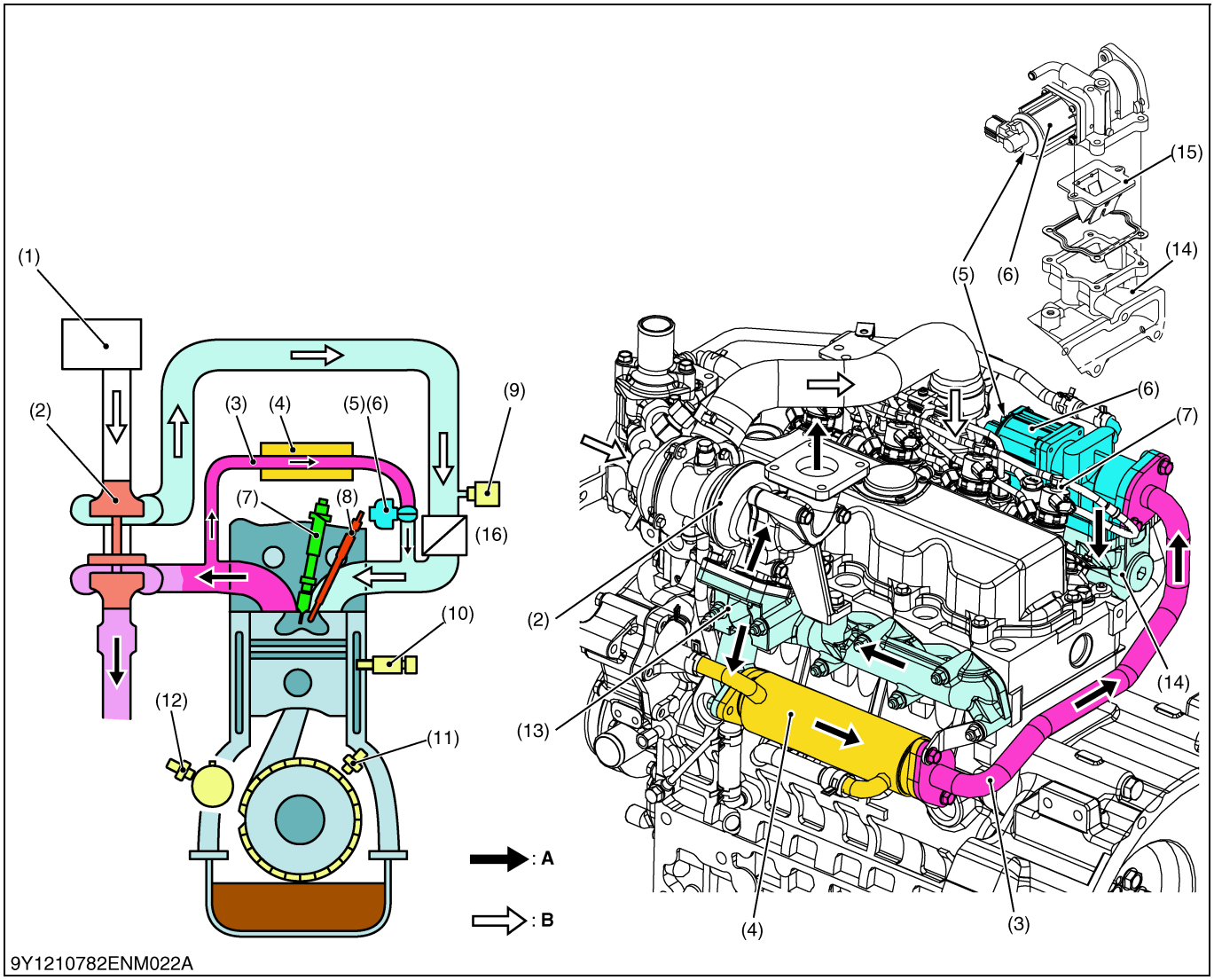
6. EGR SYSTEM

[1] OVERVIEW



(1) Air Cleaner
(2) Turbocharger
(3) EGR Pipe
(4) EGR Cooler
(5) EGR Lift Sensor
(6) EGR Valve Motor
(7) Injector
(8) Glow Plug
(9) Boost Sensor
(10) Coolant Temperature Sensor
(11) Crankshaft Position Sensor
(12) Camshaft Position Sensor
(13) Exhaust-manifold
(14) Intake-manifold
(15) Reed Valve
(16) Intake Throttle Valve

A: Exhaust Gas Flow
B: Intake Air Flow

The EGR (Exhaust Gas Recirculation) system is a device that captures a part of the exhaust gas and returns it to the intake side reducing the amount of oxygen entering the engine and lowers combustion temperature suppressing generation of nitrogen oxides (NOx).

The EGR being used on this engine is electronic and is made up of an EGR cooler (4), EGR lift sensor (5), EGR valve motor (6), and reed valve (15).

The exhaust gas that is returned to the intake side (hereafter EGR gas) is cooled in the EGR cooler (4), adjusted to a suitable flow by an EGR valve motor that is controlled by the engine ECU, and is sent to the intake manifold (14).

The reed valve prevents reverse flow of air from the air cleaner (1) to the EGR valve motor (6).

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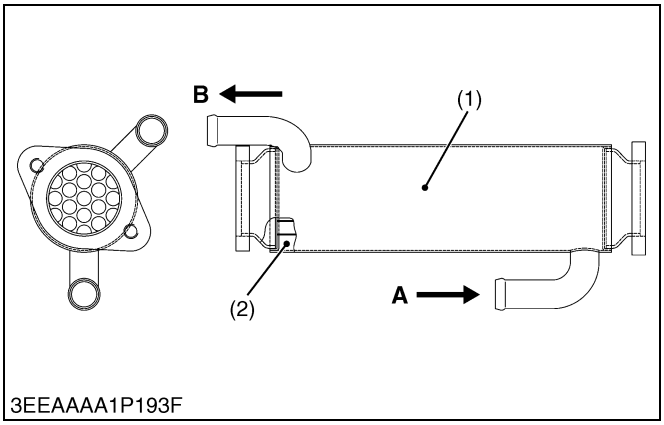
[2] EGR COOLER



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The EGR (Exhaust Gas Recirculation) cooler (1) is used to lower combustion temperature and efficiently cool EGR gas, with the aim of reducing the NOx that is in the exhaust gas of diesel engine.

The EGR cooler (1) is set between the cylinder head and the EGR valve and returns the cooled exhaust gases to the engine suction side.

The EGR cooler (1) has resistant to clogging up, compact and efficient tubes (2) internally.

(1) EGR Cooler
(2) Tube
A: Coolant Inlet Port
B: Coolant Outlet Port

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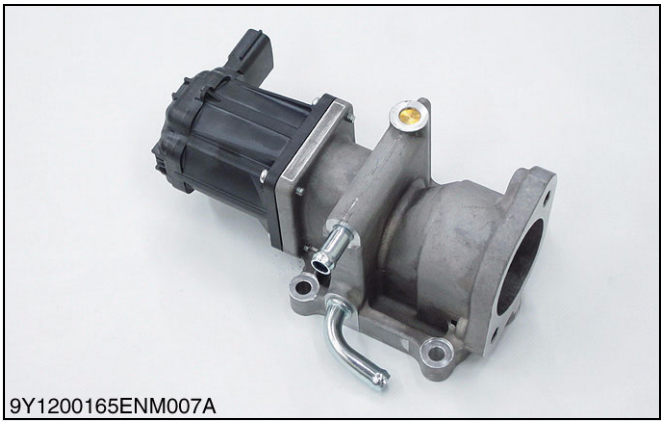
[3] EGR VALVE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Water Cooled EGR Valve

This is a device that regulates EGR gas flow. The degree the valve is open is detected using a lift sensor and a motor is used to set this to the degree of open calculated using signals including the engine speed.

Also, passing engine coolant through the housing enables controlling temperature rise of the EGR valve.

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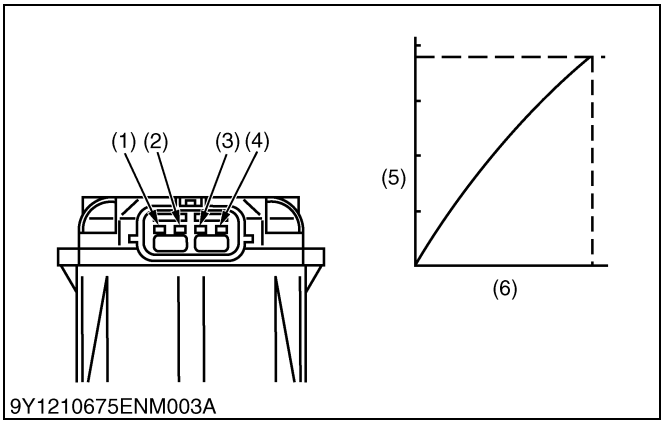

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EGR Valve Lift Sensor

How far the EGR valve is open is detected by a contact type of position sensor that detects the movement of the motor's shaft. The motor's shaft opens and closes the valve by changing the rotation of the motor into linear motion via a screw deceleration mechanism.

(1) CAN H
(2) CAN L
(3) GND (–)
(4) Power (+)
(5) Exhaust Gas Flow
(6) CAN Communication Data

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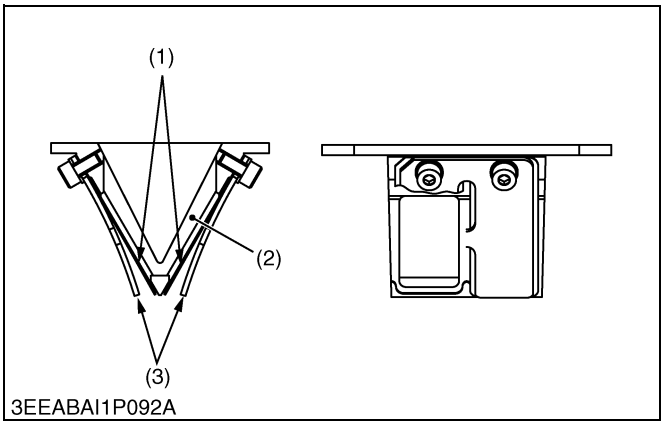
[4] REED VALVE



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The reed valves are set at the point where exhaust gases that have passed through the EGR valve mix with intake air and they prevent air on the air cleaner side from flowing to the EGR cooler side.

These thin plate springs (reed valves) mounted at the bottom of the EGR valve motor open and close the EGR gas passage (during intake: reed valve is closed; during exhaust: open) and prevent the intake air from backflowing to the exhaust side.

(1) Valve
(2) Case
(3) Stopper

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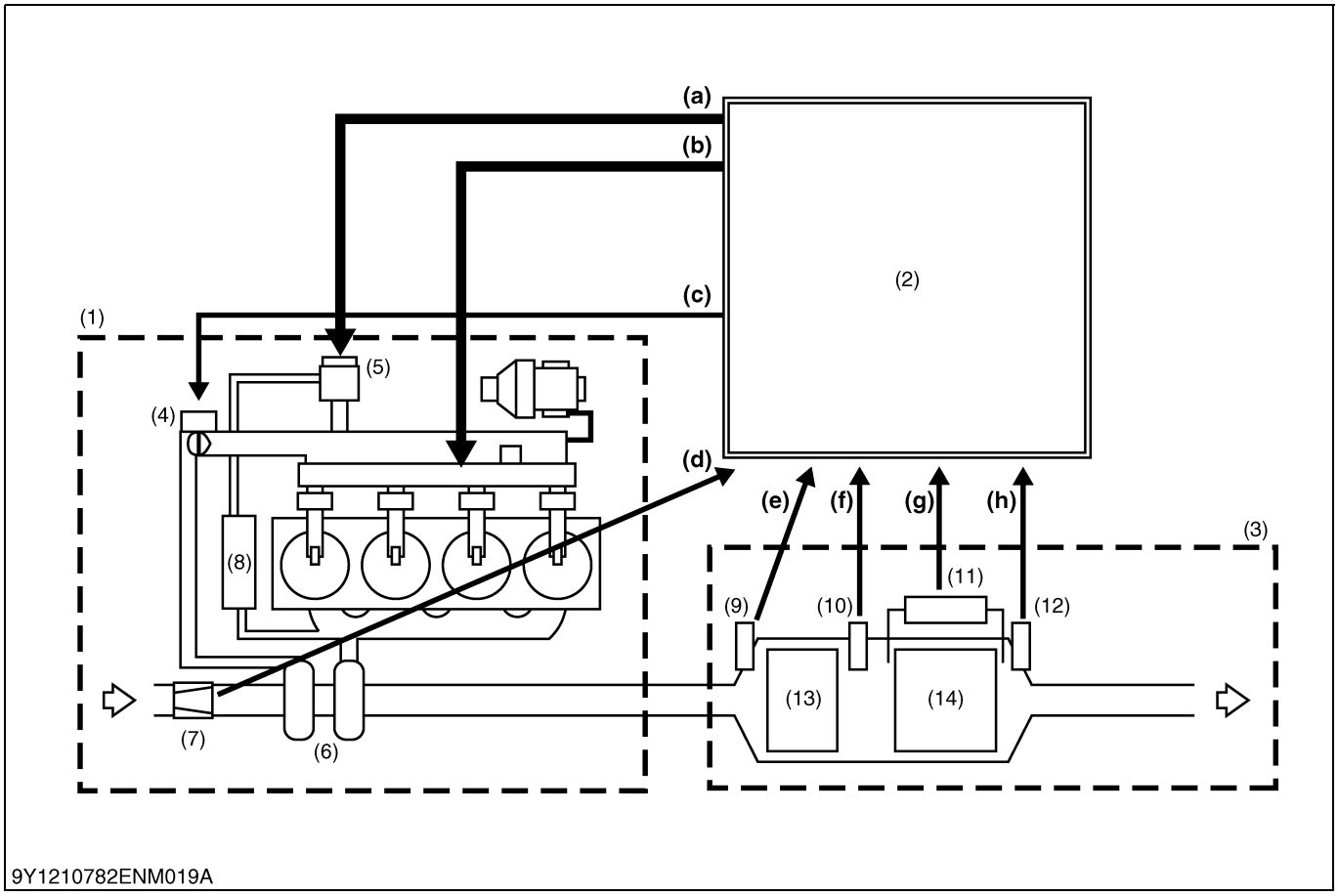
7. AFTER TREATMENT SYSTEM

[1] AFTER TREATMENT DEVICES



(1) Common Rail System
(2) ECU
(3) After Treatment Devices
(4) Intake Throttle Valve
(5) EGR Valve
(6) Turbo Charger
(7) Air Flow Sensor
(8) EGR Cooler
(9) Temperature Sensor (DOC Inlet Exhaust Temperature) (T_0)
(10) Temperature Sensor (DPF Inlet Exhaust Temperature) (T_1)
(11) Differential Pressure Sensor (DPF Differential Pressure) (ΔP)
(12) Temperature Sensor (DPF Outlet Exhaust Temperature) (T_2)
(13) Diesel Oxidation Catalyst (DOC)
(14) Diesel Particulate Filter (DPF)

(a) EGR Valve Opening
(b) Injection Pattern
(c) Inlet Throttle Valve Angle
(d) Air Flow Sensor
(e) T_0 (DOC Inlet Exhaust Temperature)
(f) T_1 (DPF Inlet Exhaust Temperature)
(g) ΔP (DPF Differential Pressure)
(h) T_2 (DPF Outlet Exhaust Temperature)

9Y1210824ENM0056US0

[2] DPF REGENERATION SYSTEM (INHIBIT VERSION)

(1) Regeneration Mode (Inhibit Version)

This system has "Auto Regeneration Mode" in which the DPF can regenerate automatically while working, "Inhibit Mode" in which the auto regeneration is inhibited and "Parked Regeneration Mode" in which the DPF regenerates while the tractor is parked.

■ Auto Regeneration Mode

Press the auto regeneration switch, and the Auto Mode is activated. The tractor has been set to Inhibit Mode by default. When the main key switch is turned ON, the tractor will be in the Inhibit Mode. By pressing the auto regeneration switch, the mode can be switched to the Auto Regeneration Mode.

When an amount of PM more than specified has built up in the DPF muffler, the DPF is automatically regenerated under the specified condition through the heat generated by the chemical reaction of between DOC (Diesel Oxidation Catalyst) and post injection fuel whether the tractor is in motion or parked.

For jobs not affected by hot gases emitted out of the DPF muffler during regeneration, the Auto Regeneration Mode is advisable.

■ Inhibit Mode

The tractor has been set to Inhibit Mode by default.

Even if an amount of PM more than specified has built up in the DPF muffler, the DPF does not regenerate. When the regeneration is needed, the indicator starts flashing to notify the operator to active Auto Regeneration Mode or conduct a Parked Regeneration Mode, at once in a safe area.

For jobs that are done in poorly ventilated area or in area that may affect plants and animals because of hot gases that will be emitted, the Inhibit Mode is recommended.

■ Parked Regeneration Mode

When an amount of PM more than specified has built up in the DPF, the indicator starts flashing to notify the operator that Regeneration is required and it is possible to carry out the parked regeneration under the specified condition. Therefore, park the tractor in a safe place and carry out the regeneration. In the Parked Regeneration Mode, the DPF regeneration is conducted under the condition controlled by the ECU in which the accumulated PM is burned off slowly and steadily for the safety.

9Y1210824ENM0058US0

(2) PM Warning Level (Inhibit Version)

PM warning level 0 to 5 as shown below is set according to the amount of accumulated PM to prompt the operator to perform the required procedure in each level.

- Level 0: Normal operation. Regeneration is not required.
- Level 1: Auto Regeneration is possible in the Auto Regeneration Mode.
- Level 2: Auto Regeneration is possible in the Auto Regeneration Mode. Parked Regeneration is possible in both of the Auto Regeneration Mode and Inhibit Mode.
- Level 3: Auto Regeneration is not possible in above level 3. Parked Regeneration is required as soon as possible.
- Level 4: Only by using diagmaster, Parked Regeneration is possible. Parked Regeneration is required as soon as possible.
- Level 5: Cleaning or replacement is required. Regeneration is not possible.

9Y1210824ENM0059US0

Auto Regeneration Mode

Warning level	Buzzer	Engine output limitation	AUTO		n/min		P		Remark
Level 0	No	No limitation	●						Normal operation, Regeneration is not required.
Level 1	No	No limitation	●	★	★				Condition for Auto Regeneration is not satisfied and engine speed is low.
			●	★					Condition for Auto Regeneration is not satisfied. Engine speed is OK.
			●	●					Under the Auto Regeneration.
			●	●	★				Under the Auto Regeneration. Engine speed is low. (Auto Regeneration may be interrupted after a while.)
Level 2-1: Every 5 seconds Level 2-2: Every 3 seconds.		No limitation	Same with level 1				★		Auto Regeneration is same with level 1. Condition for Parked Regeneration is not satisfied.
			●	★	★	★	★		Condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
			●	●		●			Under the Parked Regeneration.
Level 3	Every second	50 %					★	★	Condition for Parked Regeneration is not satisfied.
						★	★	★	Condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
				●		●		★	Under the Parked Regeneration.
Level 4	Every second	50 %						●	Without diagmaster.
			Same with level 3					●	When using diagmaster and selecting the Parked Regeneration command.
Level 5	Every second	50 %						●	Even when using diagmaster, it is not possible to carry out Parked Regeneration.

★ : Blink, ● : ON

9Y1210824ENM0060US0

Inhibit Mode

Warning level	Buzzer	Engine output limitation	AUTO		n/min		P		Remark
Level 0	No	No limitation							Normal operation, Regeneration is not required.
Level 1	No	No limitation		★					Regeneration is required, but Auto Regeneration is not possible.
Level 2-1: Every 5 seconds Level 2-2: Every 3 seconds.		No limitation		★			★		Regeneration is required, but Auto Regeneration is not possible. Condition for Parked Regeneration is not satisfied.
				★		★	★		Condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
				●		●			Under the Parked Regeneration.
Level 3	Every second	50 %					★	★	Condition for Parked Regeneration is not satisfied.
						★	★	★	Condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
				●		●		★	Under the Parked Regeneration.
Level 4	Every second	50 %						●	Without diagmaster.
			Same with level 3					●	When using diagmaster and selecting the Parked Regeneration command.
Level 5	Every second	50 %						●	Even when using diagmaster, it is not possible to carry out Parked Regeneration.

★ : Blink, ● : ON

9Y1210824ENM0061US0

[3] DPF REGENERATION SYSTEM (Default Version)

(1) Regeneration Mode (Default Version)

DPF regeneration process can be performed by choosing from "Auto Regeneration" or "Regeneration inhibit" mode according to your job conditions. For jobs not affected by hot gases emitted during regeneration, the "Auto Regeneration" is advisable.

■ **Auto Regeneration Mode**

When starting the engine (switch operation is unnecessary), the "Auto Regeneration" mode is automatically activated.

With the auto regeneration mode on, when a specific amount of PM has accumulated, and the regeneration conditions are satisfied (See the "Tips on Diesel Particulate Filter [DPF] Regeneration"), the DPF will be automatically regenerated whether the tractor is in motion or parked.

By this way, work efficiency is improved. For details of auto regeneration, refer to "Operating Procedure for Auto Regeneration Mode" section.

■ **Inhibit Mode**

After starting the engine, if the "DPF INHIBIT switch" is pressed to turn on the switch lamp, the "Regeneration inhibit" mode will be activated.

With "Regeneration Inhibit" mode on, the PM which has accumulated inside the DPF will not be burnt, unless the operator performs the regeneration work manually.

The "Regeneration Inhibit" mode is effective for work in poorly ventilated work spaces.

For details of regeneration prohibition, refer to "Operating Procedure for Regeneration Inhibit Mode" section.

■ **NOTE**

- **If stop the engine once, the "Auto Regeneration" mode will be activated.**

9Y1210824ENM0063US0

(2) PM Warning Level (Default Version)

PM warning level 0 to 5 as shown below is set according to the amount of accumulated PM to prompt the operator to perform the required procedure in each level.

- Level 0: Normal operation. Regeneration is not required.
- Level 1: Auto Regeneration is possible in the Auto Regeneration Mode.
- Level 2: Auto Regeneration is possible in the Auto Regeneration Mode. Parked Regeneration is possible in both of the Auto Regeneration Mode and Inhibit Mode.
- Level 3: Auto Regeneration is not possible in above level 3. Parked Regeneration is required as soon as possible.
- Level 4: Only by using diagmaster, Parked Regeneration is possible. Parked Regeneration is required as soon as possible.
- Level 5: Cleaning or replacement is required. Regeneration is not possible.

9Y1210824ENM0064US0

Auto Regeneration Mode

Warning level	Buzzer	Engine output limitation							Remark
0	No	No limitation							Normal operation, Regeneration is not required.
1	No	No limitation		★	★				Condition for Auto Regeneration is not satisfied and engine speed is low.
				★					DPF temperature for Auto Regeneration is not satisfied. Engine speed is OK.
				●					Under the Auto Regeneration.
Level 2-1: Every 5 second Level 2-2: Every 3 second		No limitation		★	★		★		Condition for Auto Regeneration is not satisfied and engine speed is low.
				★			★		DPF temperature for Auto Regeneration is not satisfied. Engine speed is OK.
				●			★		Under the Parked Regeneration.
3	Every second	50 %					★	★	Condition for Parked Regeneration is not satisfied.
						★	★	★	Condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
						●	★	★	Under the preparation for Parked Regeneration.
				●		●		★	Under the Parked Regeneration.
4	Every second	50 %						●	Without diagmaster.
							★	★	When using diagmaster and condition for Parked Regeneration is not satisfied. This indication switch to the following if cancel the DPF INHIBIT switch in the state of condition for Parked Regeneration is satisfied.
						★	★	★	When using diagmaster and condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
						●	★	★	Under the preparation for Parked Regeneration when using diagmaster.
				●		●		★	Under the Parked Regeneration when using diagmaster.
5	Every seconds	50 %						●	Even when using diagmaster, it is not possible to carry out Parked Regeneration.

★ : Blink, ● : ON

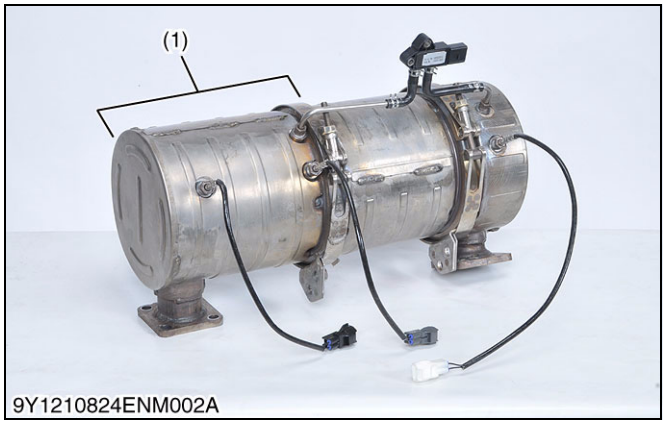
9Y1210824ENM0065US0

Inhibit Mode

Warning level	Buzzer	Engine output limitation			n/min		P		Remark
0	No	No limitation	●						Normal operation, Regeneration is not required.
1	No	No limitation	●	★					Regeneration is required, but Auto Regeneration is not permitted. Parking Regeneration is not possible.
Level 2-1: Every 5 second Level 2-2: Every 3 second		No limitation	●	★			★		Auto Regeneration is prohibited. Condition for Parked Regeneration is not satisfied. This indication switch to the following if cancel the DPF INHIBIT switch in the state of condition for Parked Regeneration is satisfied. Shift to the Auto Regeneration if cancel the DPF INHIBIT switch in the state of condition for Parked Regeneration is not satisfied.
				★	★	★	★		Condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
				★	★	●	★		Under the preparation for Parked Regeneration.
				●		●			Under the Parked Regeneration.
3	Every seconds	50 %	●				★	★	This indication switch to the following if cancel the DPF INHIBIT switch in the state of condition for Parked Regeneration is satisfied.
						★	★	★	Condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
						●	★	★	Under the preparation for Parked Regeneration.
				●		●		★	Under the Parked Regeneration.
4	Every seconds	50 %	●					●	Without diagmaster.
			●				★	★	When using diagmaster and condition for Parked Regeneration is not satisfied. This indication switch to the following if cancel the DPF INHIBIT switch in the state of condition for Parked Regeneration is satisfied.
						★	★	★	When using diagmaster and condition for Parked Regeneration is satisfied. When pressing the parked regeneration switch, Parked Regeneration will start.
						●	★	★	Under the preparation for Parked Regeneration when using diagmaster.
				●		●		★	Under the Parked Regeneration when using diagmaster.
5	Every seconds	50 %	●					●	Even when using diagmaster, it is not possible to do Parked Regeneration.

★ : Blink, ● : ON

9Y1210824ENM0066US0

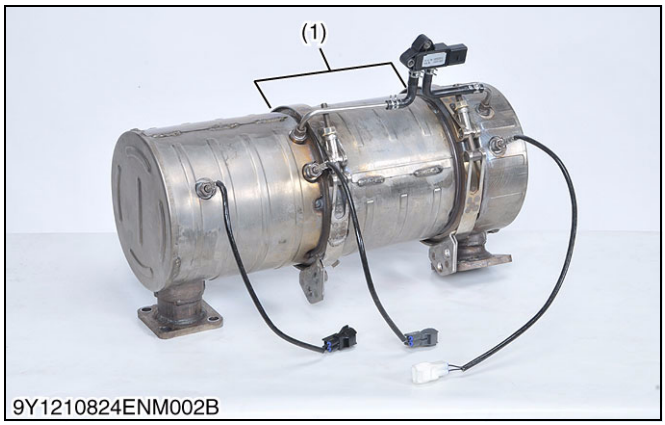


Diesel Oxidation Catalyst (DOC)

An oxidizing catalyst set in front of the Diesel Particulate Filter (DPF) step that uses post injection unburned fuel to actively regenerate the DPF.

(1) Diesel Oxidation Catalyst (DOC)

9Y1210824ENM0043US0



Diesel Particulate Filter (DPF)

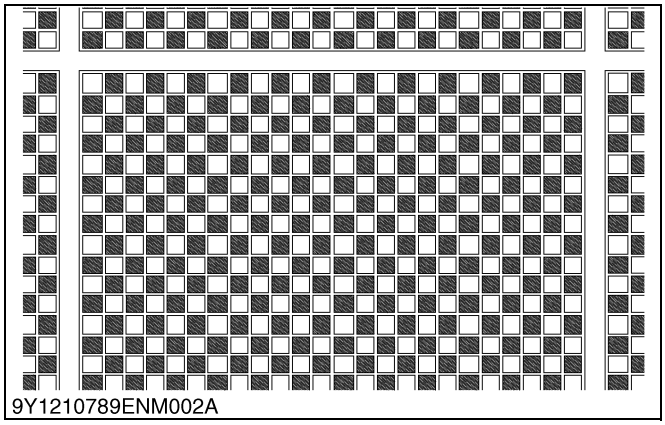
The Diesel Particulate Filter (DPF) is a device that captures and combusts PM in the exhaust gas.

Physically captures the PM using a filter which spontaneously combusts when exhaust gas temperature is high.

However, while exhaust gas temperature is low PM does not spontaneously combust the pressure differential between the inlet and outlet of the DPF is detected and the PM is combusted using a heat source generated using DOC to regenerate the filter.

(1) Diesel Particulate Filter (DPF))

9Y1210824ENM0044US0



Function of Diesel Particulate Filter (DPF)

The Diesel Particulate Filter (DPF) is a filter to capture fine particles (soot and ash) contained in the exhaust gas of a diesel engine.

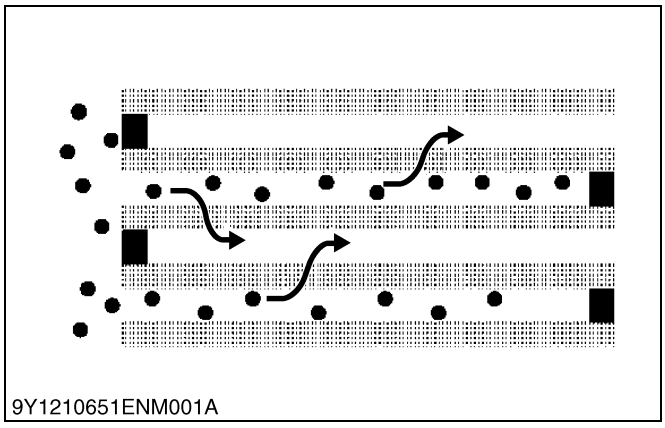
The ash content is mainly metallic additives contained in burnt lubricating oil.

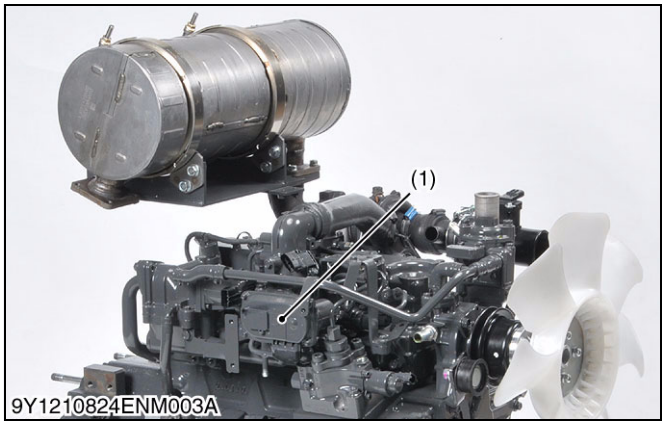
The filter has a honeycomb structure with adjacent cell holes alternately closed.

In addition, by alternately closing the inlet side and the outlet side of the exhaust gas, the thin ceramics wall is used as a filter.

As shown in the figure, fine particles in the exhaust gas are captured when they pass through this thin wall, and the exhaust gas is discharged as clean gas.

9Y1210824ENM0074US0





Intake Throttle Valve

The amount of air intake is regulated by the angle of the throttle valve and the exhaust temperature is controlled when regenerating the DPF muffler.

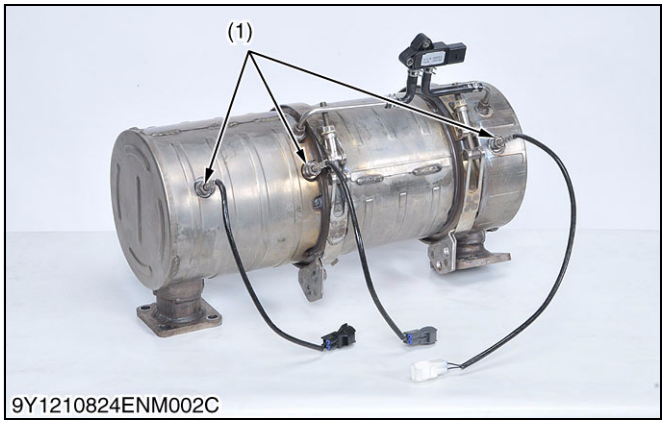
(1) Intake Throttle Valve

9Y1210824ENM0045US0

Air Flow Sensor

The amount of air intake required for control of the EGR valve used to reduce NOx is measured.

9Y1210824ENM0046US0

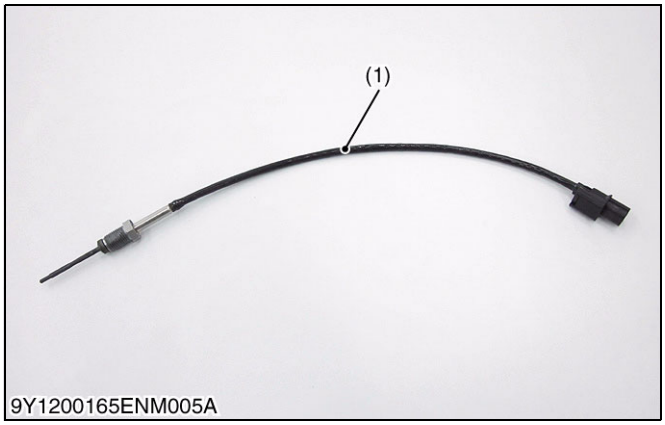


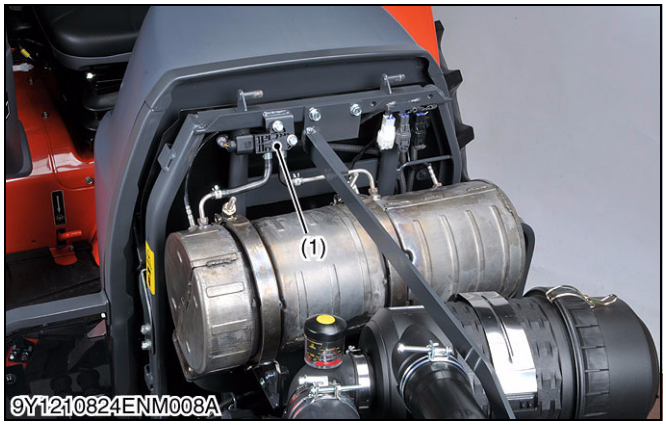
Temperature Sensor

This is mounted on the DPF muffler and the DPF muffler DOC intake, DPF intake, and DPF discharge exhaust temperature, needed for the post processing system, are measured.

(1) Temperature Sensor

9Y1210824ENM0047US0





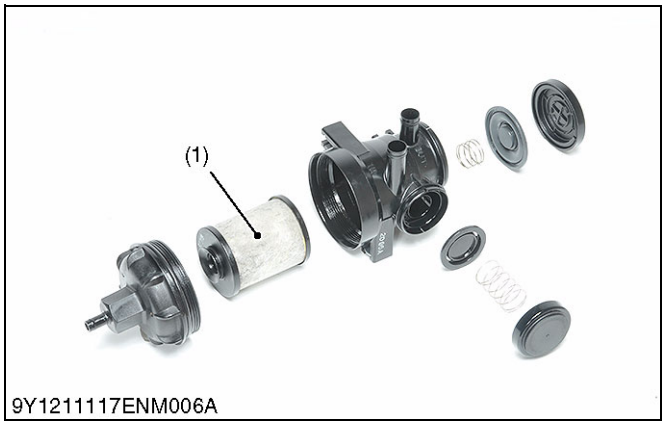
Differential Pressure Sensor

The differential pressure sensor is a sensor that detects the pressure differential between the inlet and the outlet of the DPF.

The engine ECU calculates the amount of accumulated PM in the DPF using this signal.

(1) Differential Pressure Sensor

9Y1210824ENM0048US0



Oil Separator

Removes oil in the blowby gases that pass through the element (1) and the oil is returned to the oil pan.

Blowby gases that pass through the element (1) are mixed into the intake upstream from the turbocharger.

(1) Element

9Y1210824ENM0049US0

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Fill fuel	G-9
	Air in the fuel system	Bleed	G-44
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel pipe or hose clogged	Clean	–
	Fuel filter clogged	Replace	G-32
	Excessively high viscosity of fuel at low temperature	Use the specified fuel or engine oil	G-9
	Fuel with low cetane number	Use the specified fuel	G-9
	Fuel leak due to loose injection pipe retaining nut	Tighten nut	1-S54
	Injector stuck or clogged	Replace	1-S57
	Fuel supply pump malfunctioning	Replace	1-S62
	Seizure of crankshaft, camshaft, piston or bearing	Repair or replace	1-S65, 1-S67, 1-S74
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S56, 1-S57, 1-S59
	Improper valve timing	Correct or replace timing gear	1-S64
	Piston ring and cylinder worn out	Replace	1-S86, 1-S92
	Incorrect valve clearance	Adjust	1-S13
Starter Does Not Run	Battery discharged	Charge	G-27
	Starter malfunctioning	Repair or replace	9-S94
	Main switch malfunctioning	Repair or replace	9-S60, 9-S61
	Safety switches improperly adjusted or damaged	Adjust or replace	9-S62
	Starter relay damaged	Replace	9-S66
	Wiring disconnected	Connect	–
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Change	G-32
	Air cleaner clogged	Clean or change	G-28
	Fuel leak due to loose injection pipe retaining nut	Tighten nut	1-S54
	Fuel supply pump malfunctioning	Replace	1-S62
	Injector stuck or clogged	Replace	1-S57
	Turbocharger bearing worn out	Replace turbocharger assembly	1-S53
	Turbocharger shaft bent	Replace turbocharger assembly	1-S53
	Turbocharger fin or component parts damaged	Replace turbocharger assembly	1-S53

Symptom	Probable Cause	Solution	Reference Page
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to the specified level	G-9
	Piston ring and cylinder worn or stuck	Repair or replace	1-S86, 1-S92
Oil Leaks Into Exhaust Pipe or Suction Pipe	Oil pipe clogged or damaged	Replace or clean oil pipe	1-S53
	Piston ring seal of turbocharger damaged	Replace turbocharger assembly	1-S53
Either Black or Dark Gray Exhaust Gas Is Observed	Filter comp (DPF) clogged	Replace	1-S20
	Overload	Decrease the load	–
	Low grade fuel used	Use the specified fuel	G-9
	Fuel filter clogged	Change	G-32
	Air cleaner clogged	Clean or change	G-28
	Injector damaged	Replace	1-S57
Deficient Output	Engine's moving parts stuck	Repair or replace	–
	Supply pump damaged	Replace	1-S62
	Injector damaged	Replace	1-S57
	Compression leak	Examine compression pressure and repair	1-S12
	Air cleaner clogged	Clean or replace element	G-28
	Air leakage from compressor discharge side	Replace turbocharger assembly	1-S53
	Breather hose or CCV clogged due to ice	Melt the ice in breather hose or CCV, or Replace	1-S17, 1-S47
Excessive Lubricant Oil Consumption	Piston ring's gap points in the same direction	Shift ring gap direction	1-S67
	Oil ring worn or stuck	Replace	1-S69
	Piston ring groove worn out	Replace piston and piston ring	1-S67, 1-S69, 1-S87
	Valve stem and guide worn out	Replace	1-S77
	Crankshaft bearing and crankpin bearing are worn out	Replace	–
Fuel Mixed Into Lubricant Oil	Injector damaged	Replace	1-S57
	Oil dilution due to regeneration	Change engine oil	–
Water Mixed Into Lubricant Oil	Head gasket damaged	Replace	1-S59
	Cylinder block or cylinder head flawed	Replace	1-S59, 1-S92

Symptom	Probable Cause	Solution	Reference Page
Low Oil Pressure	Engine oil insufficient	Fill	G-9
	Oil strainer clogged	Clean	1-S66
	Relief valve stuck with dirt	Repair or replace	–
	Excessive oil clearance of the bearings	Replace the metal, bushing or shaft	1-S88, 1-S89, 1-S90
	Oil passage clogged	Clean	–
	Different type of oil	Use the specified type of oil	G-9
	Oil Pump damaged	Replace	1-S66
High Oil Pressure	Difference type oil	Use the specified type of oil	G-9
	Relief valve damaged	Repair or replace	–
	Breather hose or CCV clogged due to ice	Melt the ice in breather hose or CCV, or Replace	1-S17, 1-S47
Engine Overheated	Engine oil insufficient	Fill oil prescribed level	G-9
	Fan belt broken or elongated	Change or adjust	G-28
	Coolant insufficient	Fill oil prescribed level	G-9
	Radiator net and radiator fin clogged with dust	Clean	G-19
	Inside of radiator corroded	Clean or replace	–
	Coolant flow route corroded	Clean or replace	–
	Radiator or radiator cap damaged	Replace	1-S15
	Overload running	Reduce the load	–
	Head gasket damaged	Replace	1-S59
	Unsuitable fuel used	Use the specified fuel	G-9

9Y1210824ENS0001US0

2. SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Valve Clearance (When Cold)		0.18 to 0.22 mm 0.0071 to 0.0086 in.	–
Compression Pressure (When You Crank the Engine with the Starter)		2.95 to 3.23 MPa / 290 min^{-1} (rpm) 30.0 to 33.0 kgf/cm^2 / 290 min^{-1} (rpm) 427 to 469 psi / 290 min^{-1} (rpm)	2.35 MPa / 290 min^{-1} (rpm) 24.0 kgf/cm^2 / 290 min^{-1} (rpm) 341 psi / 290 min^{-1} (rpm)
Difference among Cylinders		–	10 % or less
Top Clearance		0.60 to 0.70 mm 0.024 to 0.027 in.	–
Cylinder Head Surface	Flatness	–	0.05 mm / 500 mm 0.002 in. / 19.7 in.
Valve Recessing	Recessing	0.65 to 0.85 mm 0.026 to 0.033 in.	1.20 mm 0.0472 in.
Valve Stem to Valve Guide	Clearance	0.040 to 0.070 mm 0.0016 to 0.0027 in.	0.10 mm 0.0039 in.
• Valve Stem	O.D.	7.960 to 7.975 mm 0.3134 to 0.3139 in.	–
• Valve Guide	I.D.	8.015 to 8.030 mm 0.3156 to 0.3161 in.	–
Valve Face	Angle (Intake)	0.79 rad 45 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
Valve Seat	Width (Intake)	2.12 mm 0.0835 in.	–
	Width (Exhaust)	2.12 mm 0.0835 in.	–
Valve Seat	Angle (Intake)	0.79 rad 45 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
Valve Timing (Intake Valve)	Open	0.2 rad (9 °) before T.D.C.	–
	Close	0.68 rad (39 °) after B.D.C.	–
Valve Timing (Exhaust Valve)	Open	0.72 rad (41 °) before B.D.C.	–
	Close	0.2 rad (9 °) after T.D.C.	–

Item		Factory Specification	Allowable Limit
Valve Spring	Free Length	41.7 to 42.2 mm 1.65 to 1.66 in.	41.2 mm 1.62 in.
	Setting Load / Setting Length	118 N / 35.0 mm 12.0 kgf / 35.0 mm 26.5 lbf / 1.38 in.	100 N / 35.0 mm 10.2 kgf / 35.0 mm 22.5 lbf /1.38 in.
	Tilt	–	1.0 mm 0.039 in.
Rocker Arm Shaft to Rocker Arm	Oil Clearance	0.016 to 0.045 mm 0.00063 to 0.0017 in.	0.10 mm 0.0039 in.
• Rocker Arm Shaft	O.D.	13.973 to 13.984 mm 0.55012 to 0.55055 in.	–
• Rocker Arm	I.D.	14.000 to 14.018 mm 0.55119 to 0.55188 in.	–
Push Rod	Bend	–	0.25 mm 0.0098 in.
Tappet to Tappet Guide	Oil Clearance	0.020 to 0.062 mm 0.00079 to 0.0024 in.	0.07 mm 0.003 in.
• Tappet	O.D.	23.959 to 23.980 mm 0.94327 to 0.94409 in.	–
• Tappet Guide	I.D.	24.000 to 24.021 mm 0.94489 to 0.94570 in.	–
Timing Gear			
• Crank Gear to Idle Gear	Backlash	0.04150 to 0.1122 mm 0.001634 to 0.004417 in.	0.15 mm 0.0059 in.
• Idle Gear to Cam Gear	Backlash	0.04150 to 0.1154 mm 0.001634 to 0.004543 in.	0.15 mm 0.0059 in.
• Idle Gear to Fuel Supply Pump Gear	Backlash	0.04150 to 0.1154 mm 0.001634 to 0.004543 in.	0.15 mm 0.0059 in.
• Crank Gear to Oil Pump Gear	Backlash	0.04150 to 0.1090 mm 0.001634 to 0.004291 in.	0.15 mm 0.0059 in.
• Idle Gear to Balancer Gear (V2403 Only)	Backlash (Intake side)	0.0350 to 0.116 mm 0.00138 to 0.00456 in.	0.15 mm 0.0059 in.
	Backlash (Exhaust side)	0.0350 to 0.116 mm 0.00138 to 0.00456 in.	0.15 mm 0.0059 in.
Idle Gear	Side Clearance	0.15 to 0.25 mm 0.0059 to 0.0098 in.	0.9 mm 0.04 in.
Idle Gear Shaft to Idle Gear Bushing	Oil Clearance	0.025 to 0.066 mm 0.00099 to 0.0025 in.	0.10 mm 0.0039 in.
• Idle Gear Shaft	O.D.	37.959 to 37.975 mm 1.4945 to 1.4950 in.	–
• Idle Gear Bushing	I.D.	38.000 to 38.025 mm 1.4961 to 1.4970 in.	–

Item		Factory Specification	Allowable Limit
Camshaft	Side Clearance	0.070 to 0.22 mm 0.0028 to 0.0086 in.	0.30 mm 0.012 in.
Camshaft	Bend	–	0.01 mm 0.0004 in.
Cam **[D1803-CR-E4, V2403-CR-E4]**	Height (Intake / Exhaust)	33.90 mm 1.335 in.	33.85 mm 1.333 in.
Cam **[V2403-CR-TE4]**	Height (Intake) Height (Exhaust)	33.47 mm 1.318 in. 33.00 mm 1.299 in.	33.42 mm 1.316 in. 32.95 mm 1.297 in.
Camshaft Journal to Cylinder Block Bore	Oil Clearance	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
• Camshaft Journal	O.D.	39.934 to 39.950 mm 1.5722 to 1.5728 in.	–
• Cylinder Block Bore	I.D.	40.000 to 40.025 mm 1.5748 to 1.5757 in.	–
Balancer Shaft (V2403 Only)	Side Clearance	0.070 to 0.22 mm 0.0028 to 0.0086 in.	0.30 mm 0.012 in.
Balancer Shaft Journal 1 to Balancer Shaft Bearing 1 (V2403 Only)	Clearance	0.030 to 0.111 mm 0.00119 to 0.00437 in.	0.20 mm 0.0079 in.
• Balancer Shaft Journal 1	O.D.	43.934 to 43.950 mm 1.7297 to 1.7303 in.	–
• Balancer Shaft Bearing 1	I.D.	43.980 to 44.045 mm 1.7315 to 1.7340 in.	–
Balancer Shaft Journal 2 to Balancer Shaft Bearing 2 (V2403 Only)	Clearance	0.030 to 0.111 mm 0.00119 to 0.00437 in.	0.20 mm 0.0079 in.
• Balancer Shaft Journal 2	O.D.	41.934 to 41.950 mm 1.6510 to 1.6515 in.	–
• Balancer Shaft Bearing 2	I.D.	41.980 to 42.045 mm 1.6528 to 1.6553 in.	–
Balancer Shaft Journal 3 to Balancer Shaft Bearing 3 (V2403 Only)	Clearance	0.020 to 0.094 mm 0.00079 to 0.0037 in.	0.20 mm 0.0079 in.
• Balancer Shaft Journal 3	O.D.	21.947 to 21.960 mm 0.86406 to 0.86456 in.	–
• Balancer Shaft Bearing 3	I.D.	21.980 to 22.041 mm 0.86536 to 0.86775 in.	–
Piston Pin Bore	I.D.	25.000 to 25.013 mm 0.98426 to 0.98476 in.	25.05 mm 0.9862 in.
Top Ring to Ring Groove **[D1803-CR-E4, V2403-CR-E4]** **[V2403-CR-TE4]**	Clearance Clearance	0.050 to 0.090 mm 0.0020 to 0.0035 in. –	0.20 mm 0.0079 in. –

Item		Factory Specification	Allowable Limit
Second Ring to Ring Groove **[D1803-CR-E4, V2403-CR-E4]** **[V2403-CR-TE4]**	Clearance Clearance	0.0780 to 0.110 mm 0.00307 to 0.00433 in. 0.0930 to 0.128 mm 0.00367 to 0.00503 in.	0.20 mm 0.0079 in. 0.20 mm 0.0079 in.
Oil Ring to Ring Groove **[D1803-CR-E4, V2403-CR-E4]** **[V2403-CR-TE4]**	Clearance Clearance	0.030 to 0.070 mm 0.0012 to 0.0027 in. 0.020 to 0.060 mm 0.00079 to 0.0023 in.	0.15 mm 0.0059 in. 0.15 mm 0.0059 in.
Top Ring	Ring Gap	0.20 to 0.35 mm 0.0079 to 0.013 in.	1.25 mm 0.0492 in.
Second Ring **[D1803-CR-E4, V2403-CR-E4]** **[V2403-CR-TE4]**	Ring Gap Ring Gap	0.30 to 0.45 mm 0.012 to 0.017 in. 0.40 to 0.55 mm 0.016 to 0.021 in.	1.25 mm 0.0492 in. 1.25 mm 0.0492 in.
Oil Ring **[D1803-CR-E4, V2403-CR-E4]** **[V2403-CR-TE4]**	Ring Gap Ring Gap	0.20 to 0.40 mm 0.0079 to 0.015 in. 0.25 to 0.45 mm 0.0099 to 0.017 in.	1.25 mm 0.0492 in. 1.25 mm 0.0492 in.
Connecting Rod	Alignment	–	0.05 mm 0.002 in.
Piston Pin to Small End Bushing • Piston Pin • Small End Bushing	Oil Clearance O.D. I.D.	0.014 to 0.036 mm 0.00056 to 0.0014 in. 25.004 to 25.011 mm 0.98441 to 0.98468 in. 25.025 to 25.040 mm 0.98524 to 0.98582 in.	0.15 mm 0.0059 in. – –
Crankshaft	Bend	–	0.03 mm 0.0001 in.
Crankshaft Journal to Crankshaft Bearing 1 • Crankshaft Journal • Crankshaft Bearing 1	Oil Clearance O.D. I.D.	0.0400 to 0.118 mm 0.00158 to 0.00464 in. 59.921 to 59.940 mm 2.3591 to 2.3598 in. 59.980 to 60.039 mm 2.3615 to 2.3637 in.	0.20 mm 0.0079 in. – –
Crankshaft Journal to Crankshaft Bearing 2 • Crankshaft Journal • Crankshaft Bearing 2	Oil Clearance O.D. I.D.	0.0400 to 0.104 mm 0.00158 to 0.00409 in. 59.921 to 59.940 mm 2.3591 to 2.3598 in. 59.980 to 60.025 mm 2.3615 to 2.3631 in.	0.20 mm 0.0079 in. – –

Item		Factory Specification	Allowable Limit
Crankpin to Crankpin Bearing	Oil Clearance	0.025 to 0.087 mm 0.00099 to 0.0034 in.	0.20 mm 0.0079 in.
• Crankpin	O.D.	46.959 to 46.975 mm 1.8488 to 1.8494 in.	–
• Crankpin Bearing	I.D.	47.000 to 47.046 mm 1.8504 to 1.8522 in.	–
Crankshaft	Side Clearance	0.15 to 0.31 mm 0.0059 to 0.012 in.	0.5 mm 0.02 in.
Cylinder Bore (Oversize)	I.D.	87.250 to 87.272 mm 3.4351 to 3.4359 in.	87.420 mm 3.4417 in.
Cylinder Maximum I.D. to Cylinder Minimum I.D.	Difference	–	0.15 mm 0.0059 in.

LUBRICATING SYSTEM

Item		Factory Specification	Allowable Limit
Engine Oil Pressure	At Idle Speed	More than 98 kPa 1.0 kgf/cm^2 14 psi	50 kPa 0.5 kgf/cm^2 7 psi
	At Rated Speed	300 to 440 kPa 3.0 to 4.5 kgf/cm^2 43 to 64 psi	250 kPa 2.5 kgf/cm^2 36 psi
Engine Oil Pressure Switch	Working Pressure	50 kPa 0.5 kgf/cm^2 7 psi	–
Inner Rotor to Outer Rotor	Clearance	0.030 to 0.14 mm 0.0012 to 0.0055 in.	0.2 mm 0.008 in.
Outer Rotor to Pump Body	Clearance	0.11 to 0.19 mm 0.0044 to 0.0074 in.	0.25 mm 0.0098 in.
Inner Rotor to Cover	Clearance	0.105 to 0.150 mm 0.00414 to 0.00590 in.	0.20 mm 0.008 in.

COOLING SYSTEM

Item		Factory Specification	Allowable Limit
Fan Belt	Tension	7.0 to 9.0 mm (0.28 to 0.35 in.) deflection at 98 N (10 kgf, 22 lbf) of force	–
Thermostat Valve	Opening-Temperature (When the valve starts to open)	80.5 to 83.5 °C 176.9 to 182.3 °F	–
	Opening-Temperature (When the valve opened completely)	95 °C 203 °F	–
Radiator	Water Tightness	No leak at specified pressure	–
Radiator Cap	Pressure Decreasing Time	More than 10 seconds for pressure decrease from 90 to 60 kPa from 0.9 to 0.6 kgf/cm^2 from 10 to 9 psi	–

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

Tractor

Item	N·m	kgf·m	lbf·ft
Filter comp (DPF) mounting clamp band	16 to 20	1.7 to 2.0	12 to 14
Temperature sensor	25 to 34	2.5 to 3.5	18 to 25
Differential pressure pipe	16 to 22	1.6 to 2.3	12 to 16
Joint bolt for PTO delivery pipe	35 to 39	3.5 to 4.0	26 to 28
Engine and clutch housing mounting screw	78 to 90	7.9 to 9.2	58 to 66
Engine and clutch housing mounting nut	103 to 117	10.5 to 12.0	76.0 to 86.7
Joint bolt for power steering delivery pipe	40 to 49	4.0 to 5.0	29 to 36
Retaining nut of power steering delivery pipe	49 to 58	5.0 to 6.0	37 to 43
Joint bolt for HST return pipe (HST type)	88 to 98	9.0 to 9.9	65 to 72
Front axle frame mounting screw (7T)	78 to 90	7.9 to 9.2	58 to 66
Front axle frame mounting screw (9T)	103 to 117	10.5 to 12.0	76.0 to 86.7
Muffler pipe mounting screw	31 to 37	3.2 to 3.7	23 to 27
Exhaust flange mounting screw	31 to 37	3.2 to 3.7	23 to 27
Front loader pipe retaining nut	90 to 108	9.18 to 11.0	66.4 to 79.6
Clutch mounting screw	24 to 27	2.4 to 2.8	18 to 20
Outer roof mounting screw (CABIN type only)	3.5 to 4.0	0.36 to 0.40	2.6 to 2.9
Cabin mounting bolt and nut (CABIN type only)	12.4 to 14.7	12.6 to 15.0	91.2 to 108

ENGINE

Item	Dimension × Pitch	N·m	kgf·m	lbf·ft
Injector clamp screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Cylinder head cover screw	M6 × 1.0	6.86 to 11.3	0.700 to 1.15	5.06 to 8.33
Injection pipe retaining nut	M12 × 1.5	24.5 to 29.4	2.50 to 2.99	18.1 to 21.6
Oil pressure switch screw	R 1/8	15 to 19	1.5 to 2.0	11 to 14
Supply pump mounting nut	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Common rail mounting screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Coolant temperature sensor taper screw	–	16 to 23	1.6 to 2.4	12 to 17
Camshaft position sensor mounting screw	–	4 to 5	0.4 to 0.6	3 to 4
Crankshaft position sensor mounting screw	–	4 to 6	0.4 to 0.6	3 to 4
Rocker arm bracket screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
*Cylinder head mounting screw	M11 × 1.25	93.2 to 98.0	9.50 to 10.0	68.8 to 72.3
Oil cooler joint screw	M20 × 1.5	40 to 44	4.0 to 4.5	29 to 32
Fan drive pulley mounting nut	M30 × 1.5	138 to 156	14.0 to 16.0	102 to 115
Camshaft set screw	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Balancer shaft set bolt	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
*Connecting rod screw	M8 × 1.25	40 to 45	4.1 to 4.5	30 to 33
*Flywheel screw	M12 × 1.25	98.1 to 107	10.0 to 11.0	72.4 to 79.5
Screw 1 of main bearing case	M9 × 1.25	46 to 50	4.7 to 5.2	34 to 37
Screw 2 of main bearing case	M10 × 1.25	69 to 73	7.0 to 7.5	51 to 54
B terminal nut of starter	M8 × 1.25	5.9 to 11	0.60 to 1.2	4.4 to 8.6
Pulley nut of alternator	–	58.4 to 78.9	5.95 to 8.05	43.1 to 58.2
Diesel Particulate Filter (hereinafter referred to as the "DPF") stay 1	M10 × 1.25	49 to 55	5.0 to 5.7	37 to 41
Boost sensor mounting screw	M4 × 0.7	0.98 to 1.7	0.10 to 0.18	0.73 to 1.3
Glow lead mounting nut	M4 × 0.7	0.98 to 1.7	0.10 to 0.18	0.73 to 1.3
Glow plug	M10 × 1.25	15 to 19	1.5 to 2.0	11 to 14
Injector clamp bolt	M8 × 1.25	23.5 to 27.5	2.40 to 2.80	17.4 to 20.2
Injection pipe cap nut	M12 × 1.5	24.5 to 29.4	2.5 to 3.0	18.1 to 21.6
Mounting screw of bearing case cover	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20

■ **NOTE**

- **For the screws, bolts and nuts with the mark "*", apply engine oil to their threads and seats before you tighten.**
- **The alphabet "M" in Dimension × Pitch shows that the screw, bolt or nut dimensions are in the metric system. The dimension is the nominal external diameter in mm of the threads. The pitch is the nominal distance in mm between 2 threads.**

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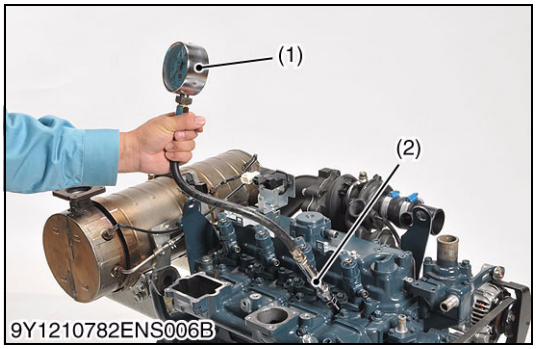
4. CHECKING AND ADJUSTING

[1] ENGINE BODY



Compression Pressure

1. After warming-up the engine, remove the air cleaner, muffler, glow lead, and glow plugs.
2. Set a compression tester (1) (Code No.: 07909-39081) with the adaptor (2) to the glow plug hole.
3. Crank the engine with the starter to operate the engine approx. 200 to 300 min^{-1} (rpm).
4. Measure a maximum value of the compression pressure. Do the same steps twice for each cylinder.

■ **NOTE**

- **Examine the compression pressure with the specified valve clearance.**
- **Always use a fully charged battery for you do this test.**
- **Variances in cylinder compression values must be less than 10 %.**

Compression pressure	Factory specification	2.95 to 3.23 MPa 30.0 to 33.0 kgf/cm^2 427 to 469 psi
	Allowable limit	2.35 MPa 24.0 kgf/cm^2 341 psi

Tightening torque	Injector clamp screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Cylinder head cover screw	6.86 to 11.3 N·m 0.700 to 1.15 kgf·m 5.06 to 8.33 lbf·ft
	Injection pipe retaining nut	24.5 to 29.4 N·m 2.50 to 2.99 kgf·m 18.1 to 21.6 lbf·ft

(1) Compression Tester (2) Glow Plug Adaptor

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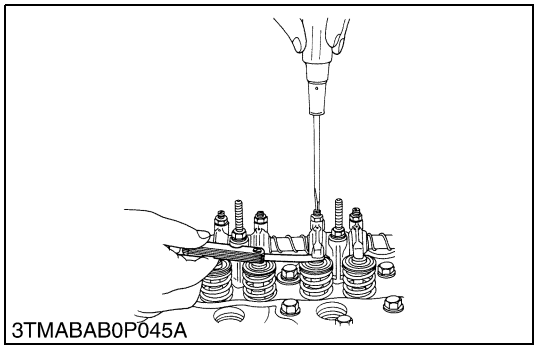
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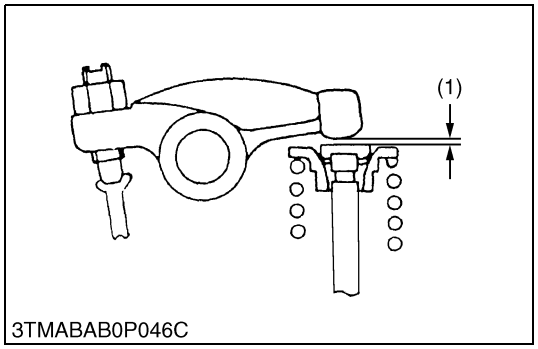

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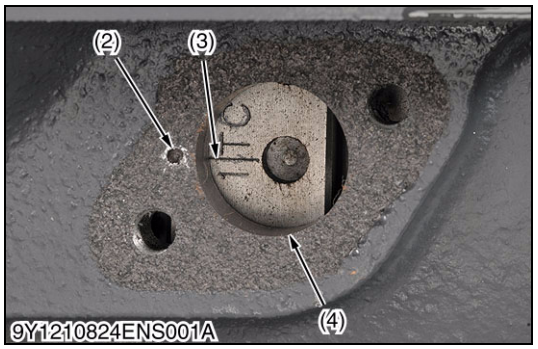

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Valve Clearance

■ **IMPORTANT**

- **You must examine and adjust the valve clearance when the engine is cold.**

1. Remove the head cover.
2. Align the **"1TC"** mark line (3) on the flywheel and timing mark (2) on the housing. Make sure that the No.1 piston comes to the compression or overlap top dead center.
3. Examine the subsequent valve clearance (1) at the mark "☆" with a feeler gauge.
4. If the clearance is out of the factory specifications, adjust with the adjusting screw.

Valve clearance	Factory specification	0.18 to 0.22 mm 0.0071 to 0.0086 in.

■ **NOTE**

- **The "1TC" mark line on the flywheel is only for the No. 1 cylinder. There is no "TC" mark for the other cylinders.**
- **Align the "TC" mark with the center of timing mark (2) on the flywheel-housing. No. 1 piston is on the top dead center position at this time. Turn the flywheel 0.26 rad (15 °) to see if the piston is at the compression top dead center or the overlap position. Refer to the table below to adjust the valve clearance (1) again. (The piston is at the compression top dead center when both the IN. and EX. valves do not move. The piston is at the overlap position when both the valves move.)**
- **Turn the flywheel 6.28 rad (360 °) and align the "1TC" mark line (3) with the timing mark (2) correctly. Adjust all the other valve clearance if necessary.**
- **After you turn the flywheel counterclockwise 2 or 3 times, examine the valve clearance (1) again.**
- **After you adjust the valve clearance (1), tighten the lock nut of the adjusting screw.**

Adjustable Cylinder Location of Piston		Valve Arrangement			
		3 Cylinder		4 Cylinder	
		IN.	EX.	IN.	EX.
When No. 1 piston is at compression top dead center	No. 1	☆	☆	☆	☆
	No. 2		☆	☆	
	No. 3	☆			☆
	No. 4	–	–		
When No. 1 piston is at overlap position	No. 1				
	No. 2	☆			☆
	No. 3		☆	☆	
	No. 4	–	–	☆	☆

Tightening torque	Injector clamp screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Cylinder head cover screw	6.86 to 11.3 N·m 0.700 to 1.15 kgf·m 5.06 to 8.33 lbf·ft
	Injection pipe retaining nut	24.5 to 29.4 N·m 2.50 to 2.99 kgf·m 18.1 to 21.6 lbf·ft

(1) Valve Clearance
(2) Timing Mark
(3) 1TC Mark Line
(4) Timing Window

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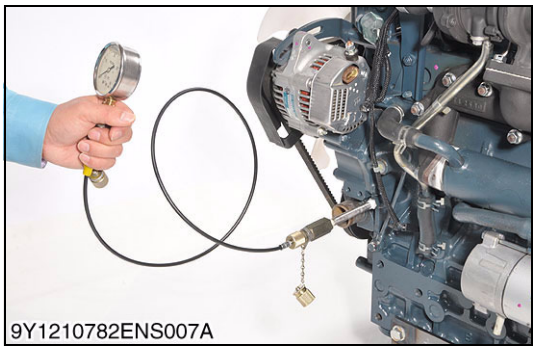
[2] LUBRICATING SYSTEM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Engine Oil Pressure

1. Remove the engine oil pressure switch, and set the oil pressure tester (Code No. : 07916-32032). (Adaptor screw : PT 1/8)
2. Operate the engine for warming-up.
3. Measure the oil pressure at the idle speed and rated speed.
4. If the oil pressure is less than the allowable limit, do a check below.
   - Engine oil level
   - Oil pump
   - Oil strainer
   - Oil filter cartridge
   - Oil passage
   - Oil clearance
   - Relief valve

Engine oil pressure	At idle speed	Factory specification	More than 98 kPa 1.0 kgf/cm^2 14 psi
		Allowable limit	50 kPa 0.5 kgf/cm^2 7 psi
	At rated speed	Factory specification	300 to 440 kPa 3.0 to 4.5 kgf/cm^2 43 to 64 psi
		Allowable limit	250 kPa 2.5 kgf/cm^2 36 psi

(When reassembling)

- After you examine the oil pressure of the engine, tighten its oil pressure switch to the specified torque.

Tightening torque	Oil pressure switch	15 to 19 N·m 1.5 to 2.0 kgf·m 11 to 14 lbf·ft

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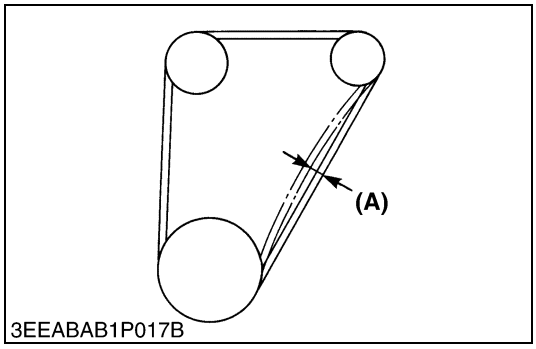
[3] COOLING SYSTEM



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Fan Belt Tension

1. Push the belt halfway between the fan drive pulley and alternator pulley at a specified force 98 N (10 kgf, 22 lbf) to measure the deflection **(A)**.
2. If the measurement is out of the factory specifications, loosen the alternator mounting screws and adjust its position.

Deflection **(A)**	Factory specification	7.0 to 9.0 mm 0.28 to 0.35 in.

(A) Deflection

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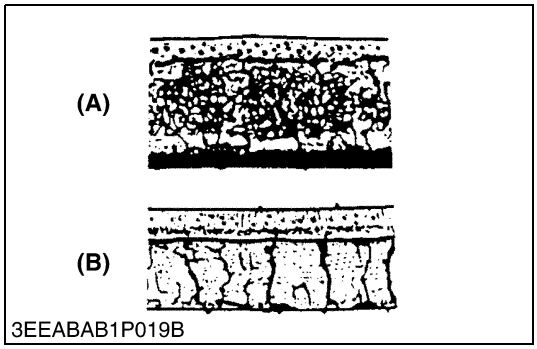

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Fan Belt Damage and Wear

1. Examine the fan belt for damage.
2. If the fan belt has a damage, replace it.
3. Examine if the fan belt is worn out and sunk in the pulley groove.
4. If it is, replace it.

(A) Good **(B) Bad**

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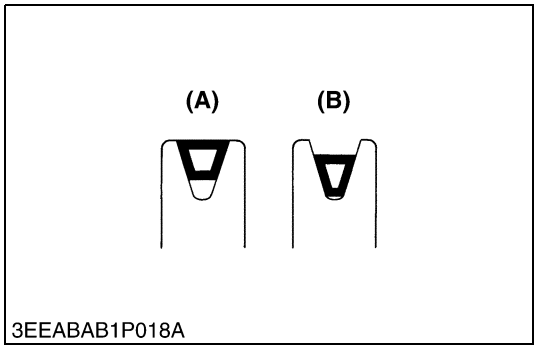

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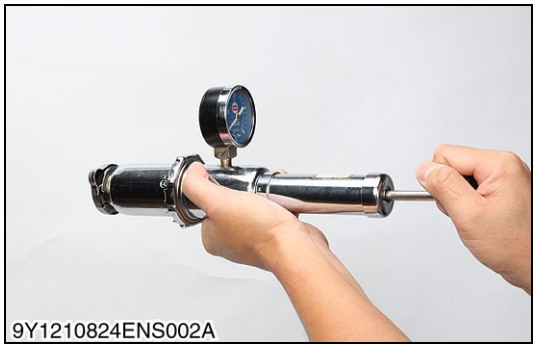
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Radiator Cap Air Leakage

CAUTION

- **Remove the radiator cap only after you stop the engine for a minimum of 10 minutes to decrease its temperature. If not, hot water can gush out and cause injury.**

1. Set a radiator tester and an adaptor on the radiator cap.
2. Apply the specified pressure 90 kPa (0.9 kgf/cm^2, 10 psi).
3. Measure the time for the pressure to decrease to 60 kPa (0.6 kgf/cm^2, 9 psi).
4. If the measurement is less than the factory specification, replace the radiator cap.

Pressure decreasing time	Factory specification	More than 10 seconds for pressure decrease from 90 to 60 kPa (from 0.9 to 0.6 kgf/cm^2, from 10 to 9 psi)

9Y1210824ENS0009US0


9Y1210824ENS003A

Radiator Water Leakage

1. Fill a specified quantity of water into the radiator.
2. Set a radiator tester and an adaptor on the radiator. Increase the water pressure to the specified pressure with the radiator tester and adaptor.
3. Examine the radiator for water leakage.
4. For water leakages from the pinhole, replace the radiator or repair with the radiator cement. When water leak is too much, replace the radiator.

Radiator water leakage test	Factory specification	No leak at 137 kPa 1.4 kgf/cm^2 20 psi

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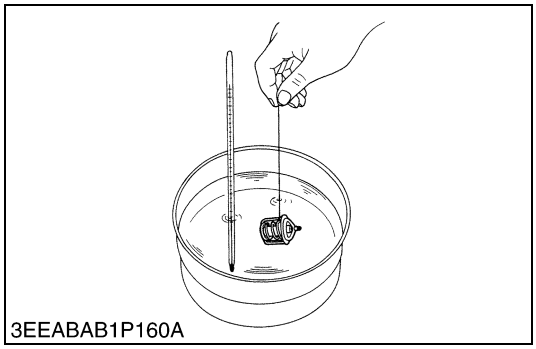
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Opening-temperature of Thermostat Valve

1. Push down the thermostat valve and put the thread between the valve and the valve seat.
2. Put the thermostat and the thermometer in the container and increase the temperature of the water gradually.
3. Take the thread, and float the thermostat in the water. As the water temperature rises, the valve will open, and the thermostat will separate from the thread. Measure the temperature at this moment.
4. Continue to increase the temperature and read the temperature when the valve opens approximately 8 mm (0.3 in.).
5. If the measurement is out of the factory specifications, replace the thermostat.

Thermostat valve opening temperature	Factory specification	80.5 to 83.5 °C 176.9 to 182.3 °F
Full opening temperature	Factory specification	95 °C 203 °F

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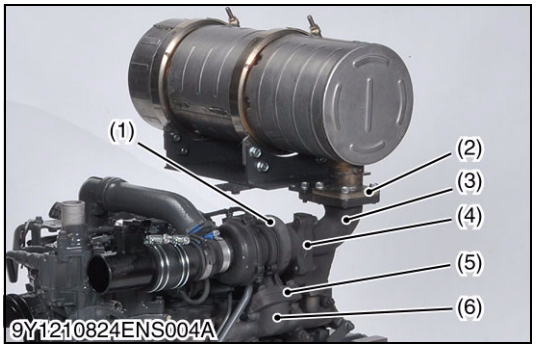
[4] TURBOCHARGER



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Exhaust Gas Leakage of Turbine Side

1. Examine the exhaust port (3) and the inlet port (6) side of the turbine housing (1) for exhaust gas leakage.
2. If you find a gas leakage, tighten the screws and nuts again or replace the gasket (2) / (4) / (5) with a new one.

(1) Turbine Housing
(2) Gasket
(3) Exhaust Port
(4) Gasket
(5) Gasket
(6) Inlet Port

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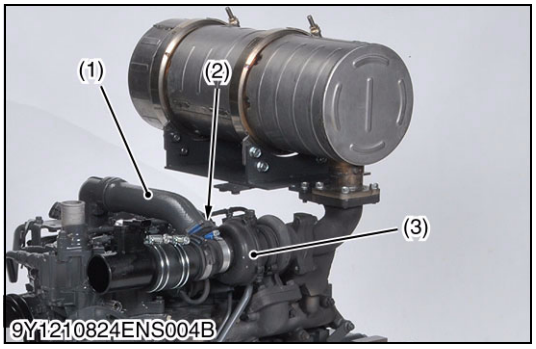

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Air Leakage of Compressor Side

1. Examine the inlet hose (1) of the compressor cover (3) for air leakage.
2. Examine the suction side of the inlet hose for loose connections or cracks.
3. If you find an air leakage, change the clamps (2) and / or the inlet hose.

(1) Inlet Hose
(2) Clamp
(3) Compressor Cover

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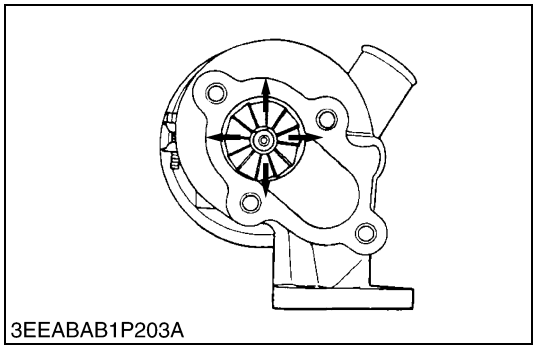
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Radial Clearance

1. If the wheel touches the housing, replace the turbocharger assembly with a new one.

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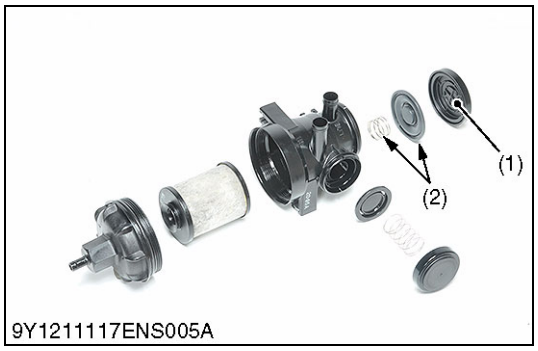
[5] PCV VALVE



PCV (Positive Crankcase Ventilation) Valve (Oil Separator)

1. Remove the cover (1) and PCV valve (spring and diaphragm) (2).
2. Check whether there is no damage of the spring and/or no breaking or damage of the diaphragm.
   If there are any damage or breaking, replace the oil separator kit with a new one.

■ **NOTE**

- **If you find ice inside of PCV or breather hose, there is an option to install "Antifrost Heater Kit".**
  Contact sales company to confirm the kit number.

(1) Cover (2) PCV Valve

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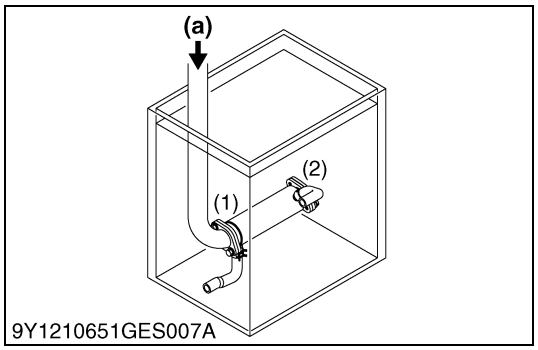
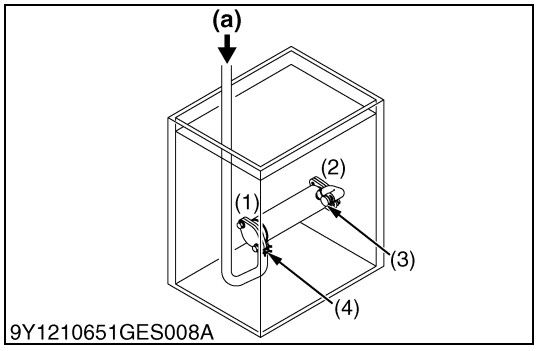
[6] EGR COOLER





EGR Cooler

(Exhaust gas passage)

1. Block the EGR cooler exhaust gas outlet (2).
2. Attach an air hose to the EGR cooler exhaust gas inlet (1) and then submerge it in a water tank.
3. Check that the coolant passage is full of water.
4. Apply the specified amount of air pressure **(a)** (290 kPa, 3.0 kgf/cm^2, 43 psi) to the air hose side, and check that there are no air leaks in any of the EGR cooler parts.
5. If there are air leaks, replace the EGR cooler.

(Coolant passage)

1. Block the EGR cooler exhaust gas inlet (1), EGR cooler exhaust gas outlet (2), and the coolant outlet (3).
2. Attach an air hose to the EGR cooler coolant inlet (4), and then submerge it in a water tank.
3. Apply the specified amount of air pressure **(a)** (250 kPa, 2.5 kgf/cm^2, 36 psi) to the air hose side, and check that there are no air leaks in any of the EGR cooler parts.
4. If there are air leaks, replace the EGR cooler.

EGR cooler leakage test pressure	Factory specification	Exhaust gas passage	290 kPa 3.0 kgf/cm^2 43 psi
		Coolant passage	250 kPa 2.5 kgf/cm^2 36 psi

(1) Exhaust Gas Inlet
(2) Exhaust Gas Outlet
(3) Coolant Outlet
(4) Coolant Inlet

(a) Air Pressure

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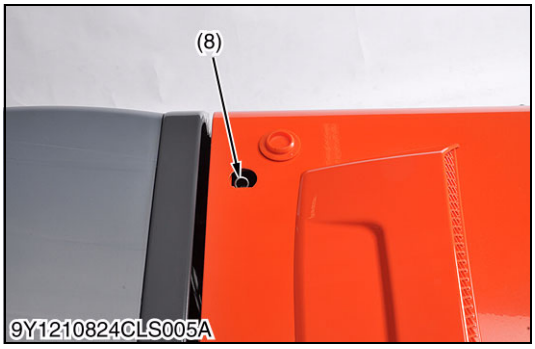
5. PREPARATION

[1] SEPARATING DPF MUFFLER FROM TRACTOR



Front Grill, Skirts and Bonnet

1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Disconnect the head light connector (6).
5. Remove the damper (7).
6. Remove the β pin (8), then the bonnet.

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Head Light Connector
(7) Damper
(8) β Pin

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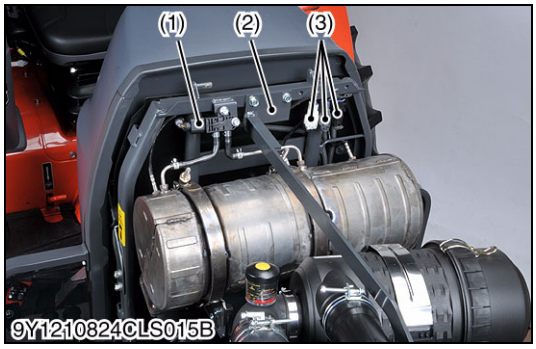

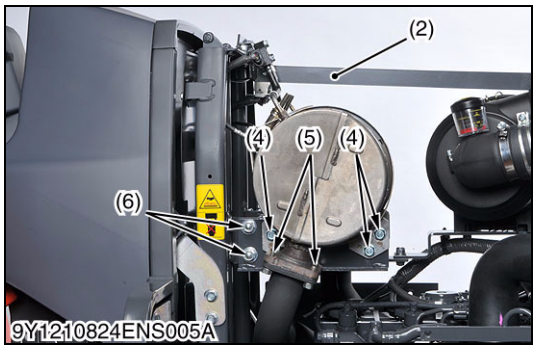

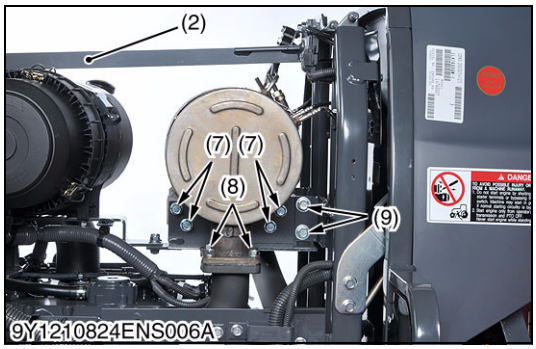

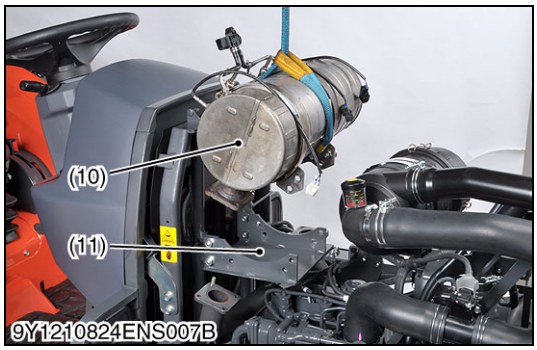

DPF Muffler

1. Remove the damper support (2).
2. Disconnect the differential pressure connector (1) and DPF temperature sensor connectors (3).
3. Remove the muffler pipe mounting screws (5).
4. Remove the DPF mounting screws R.H. (4).
5. Remove the exhaust flange mounting screws (8).
6. Remove the DPF mounting screws L.H. (7).
7. Remove the DPF muffler (10) using hoist.

(When reassembling)

■ **IMPORTANT**

- **When mounting the DPF muffler (10) to the bracket (11), make sure to follow the procedures below.**

1. **Loosen the bracket mounting screws between the bracket (11) and the exhaust flange.**
2. **Loosen the bracket mounting screws (6) and (9) until the bracket (11) can move.**
3. **Mount the DPF muffler to the bracket (11) and temporarily tighten the screws (4), (5), (7) and (8).**
4. **Tighten evenly and properly the exhaust flange mounting screws (8).**
5. **Tighten evenly and properly the bracket mounting screws between the bracket (11) and the exhaust flange.**
6. **Tighten evenly and properly the bracket mounting screws (6) and (9).**
7. **Tighten evenly and properly the DPF muffler mounting screws R.H. (4) and then the DPF muffler mounting screws L.H. (7).**
8. **Tighten evenly and properly the muffler pipe mounting screws (5).**

■ **NOTE**

- **Record the tractor serial number and the engine serial number.**
- **Record the DPF muffler serial number.**

Tightening torque	Muffler pipe mounting screw	31 to 37 N·m 3.2 to 3.7 kgf·m 23 to 27 lbf·ft
	Exhaust flange mounting screw	31 to 37 N·m 3.2 to 3.7 kgf·m 23 to 27 lbf·ft

(1) Differential Pressure Connector
(2) Damper Support
(3) DPF Temperature Sensor Connector
(4) DPF Mounting Screw R.H.
(5) Muffler Pipe Mounting Screw
(6) Bracket Mounting Screw R.H.
(7) DPF Mounting Screw L.H.
(8) Exhaust Flange Mounting Screw
(9) Bracket Mounting Screw L.H.
(10) DPF Muffler
(11) Bracket

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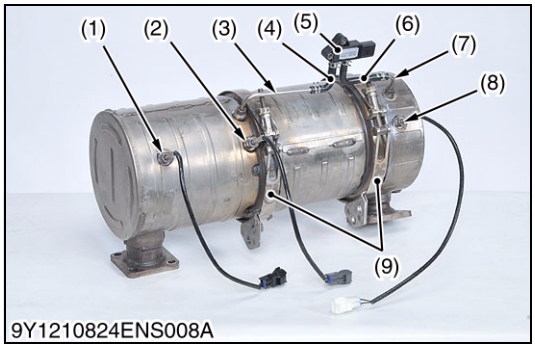
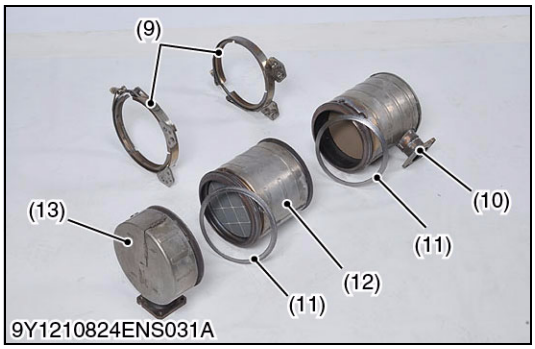




Filter Comp (DPF) (If necessary)

■ **NOTE**

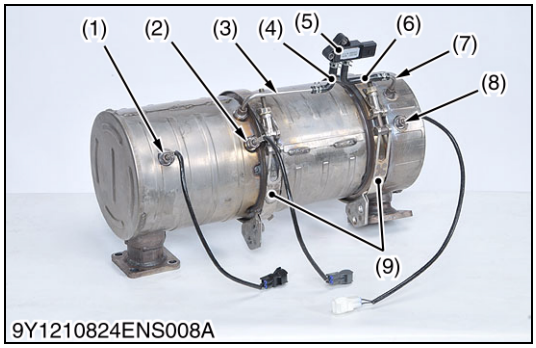
- **Always work in the workshop equipped with a electric hoist (including mobile hoist).**
- **Put a tractor on a stable ground, and set the parking brake.**
- **As the DPF muffler is hot just after the engine shutdown, make sure to start operation after it gets cool.**
- **Make sure not to let any foreign substances enter the opening section during the operation.**
- **Make sure not to damage the DPF muffler full assembly by falling or impact as it contains a ceramic filter.**
- **Before removing the DPF for cleaning, keep the records of the engine serial number, DPF muffler full assembly part number, DPF muffler full assembly serial number, and engine operating time, which are required in preparing the DPF cleaning order from.**
  Since the engine operating time is recorded in the ECU, check the operating time by connecting the service tool (Diagmaster).
- **When installing and removing the muffler full assembly (DPF), make sure that the temperature sensor, differential pressure sensor, and differential pressure pipe do not make contact with surrounding parts.**

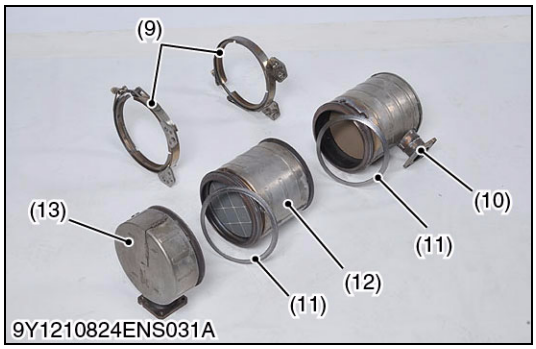
1. Remove the hoses (4), (6) from the differential pressure pipes (3), (7).
2. Remove the differential pressure sensor (5).
3. Remove the DPF mounting clamp band (9).
4. Separate the Diesel Oxidation Catalyst (DOC) (10), Diesel Particulate Filter (DPF) (12), DPF outlet body (13) respectively.

(1) Temperature Sensor (T_0)
(2) Temperature Sensor (T_1)
(3) Differential Pressure Pipe
(4) Hose
(5) Differential Pressure Sensor
(6) Hose
(7) Differential Pressure Pipe
(8) Temperature Sensor (T_2)
(9) Filter Comp (DPF) Mounting Clamp Band
(10) Diesel Oxidation Catalyst (DOC)
(11) Gasket
(12) Diesel Particulate Filter (DPF)
(13) DPF Outlet Body

(To be continued)

(Continued)





(When reassembling)

■ **NOTE**

- **Assemble DOC, DPF, DPF outlet body and DPF stay 1 according to the each alignment mark put on before disassembling.**
- **Temporary tighten stay 1, stay 2 and muffler flange first, and then tighten and adjust them to the specified torque value to avoid stress to the DPF muffler.**
- Replace the gaskets (11) with new ones.
- If the differential pressure hoses (4), (6) are damaged or cracked, replace it.
- When the differential pressure pipes (3), (7) and temperature sensors (1), (2), (8) are removed, wipe off the anti-seize & lubricating compound, apply a anti-seize & lubricating compound (Bostik, NEVER SEEZ, Pure Nickel Special Grade), and then attach them to their correct position.
- When replacing the differential pressure pipes (3), (7) apply a anti-seize & lubricating compound (Bostik, NEVER SEEZ, Pure Nickel Special Grade), and then attach it to its correct position.
- When replacing the temperature sensor, check that it is coated with anti-seize & lubricating compound, and then attach it to its correct position.
- Tighten bolts and nuts to their specified torque. Also tighten the temperature sensor tightening nut or the differential pressure pipe tightening nut to the specified torque with crowfoot wrench.
- After attaching the assembly, start the engine and make sure that there are no gas leaks.
- Reassemble the Diesel Particulate Filter (DPF) (12) in the correct direction.

Tightening torque	Filter comp (DPF) mounting clamp band	16 to 20 N·m 1.7 to 2.0 kgf·m 12 to 14 lbf·ft
	Temperature sensor	25 to 34 N·m 2.5 to 3.5 kgf·m 18 to 25 lbf·ft
	Differential pressure pipe	16 to 22 N·m 1.6 to 2.3 kgf·m 12 to 16 lbf·ft

(1) Temperature Sensor (T_0)
(2) Temperature Sensor (T_1)
(3) Differential Pressure Pipe
(4) Tube
(5) Differential Pressure Sensor
(6) Tube
(7) Differential Pressure Pipe
(8) Temperature Sensor (T_2)
(9) Filter Comp (DPF) Mounting Clamp Band
(10) Diesel Oxidation Catalyst (DOC)
(11) Gasket
(12) Diesel Particulate Filter (DPF)
(13) DPF Outlet Body

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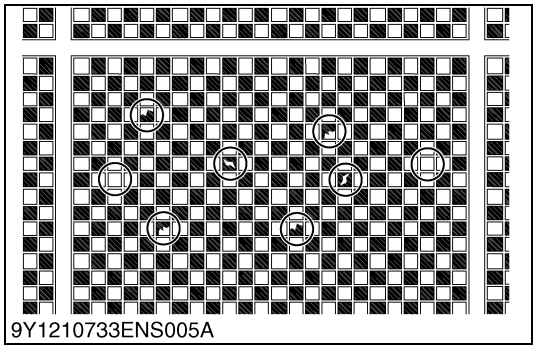
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Judgment of Reuse of Filter Comp (DPF) Before Cleaning (Service Dealer)

■ **IMPORTANT**

- **Before ordering to a cleaning contractor, follow the procedure below to make a judgment on whether the DPF is reusable.**

1. Check to see that the exhaust gas outlet side on the removed DPF is not darkened.
2. Check whether there is no crack or failure of the sealing wall on both ends of the cell (inlet side and outlet side) of DPF.
   If the number of cells with failure sealing wall exceeds the allowable limit, the DPF cannot be reused even after cleaning.

Judgment of non-reusability of DPF	Allowable limit	Number of cells with failure sealing wall 10 or more

3. Check whether there is no crack and loss of the ceramic element.
   If there are any crack or losses of the ceramic element, the DPF cannot be reused even if it is cleaned.
4. If it is judged that the DPF is not reusable, report the result of the evaluation to the customer that requested the DPF cleaning, and replace the DPF with a new one.

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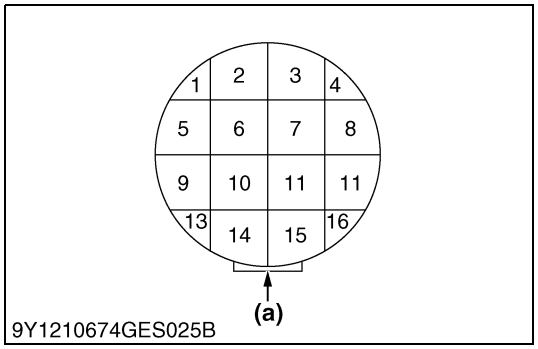

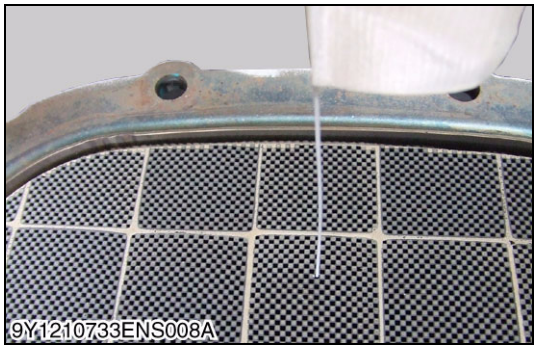

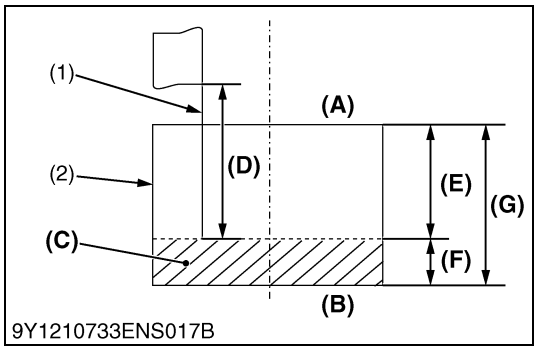

Judgment of Reuse of Filter Comp (DPF) After Cleaning by Cleaning Contractor

■ **IMPORTANT**

- **After the cleaning contractor has cleaned the filter comp DPF (2), they should measure the quantity of remaining ash in the following procedure, and evaluate the reusability.**

1. After having cleaned the filter comp (DPF) (2), measure the actual cell depth **(E)** with a pin gauge (1) in the each block shown in the figure. One cell (The measurement point is not specified) is measured in each block.

Model	Measurement total
All model	16 blocks

2. If the actual cell depth **(E)** is less than the allowable limit, the DPF (2) cannot be reused.
   If the DPF (2) is judged as non-reusable, report the result of the judgment to the customer that requested the filter cleaning via the service dealer, and replace the DPF (2) with a new one.

(Reference)

Actual Cell Depth **(E)** = Cell Depth **(G)** − Accumulated Ash Depth **(F)**

■ **NOTE**

- **Select a metal pin gauge (1) having a wire size slightly thinner than the cell width (0.60 to 0.80 mm dia., 0.024 to 0.031 in. dia.).**
- **When the pin gauge (1) is inserted into the cell hole, insert it by lightly tapping on the gage end with a finger tip.**
- **If the pin gauge is forcibly pushed in, the pin pierces through the accumulated ash and it cannot be measured accurately. So be careful not to push the pin forcibly.**

Actual Cell Depth (Average of all measurement blocks)	Allowable limit	D1803-CR-E4	85 mm 3.3 in.
		V2403-CR-E4	102 mm 4.02 in.
		V2403-CR-TE4	119 mm 4.68 in.

(1) Pin Gauge (0.60 to 0.80 mm dia., 0.024 to 0.031 in. dia.)
(2) DPF

(a) Serial Number

(A) Exhaust Inlet Side
(B) Exhaust Outlet Side
(C) Accumulated Ash
(D) 150 mm (5.91 in.)
(E) Actual Cell Depth
(F) Accumulated Ash Depth
(G) Cell Depth

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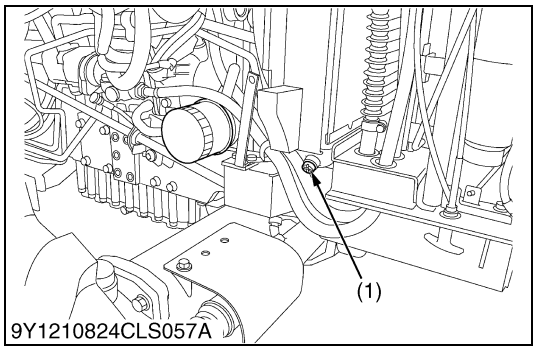
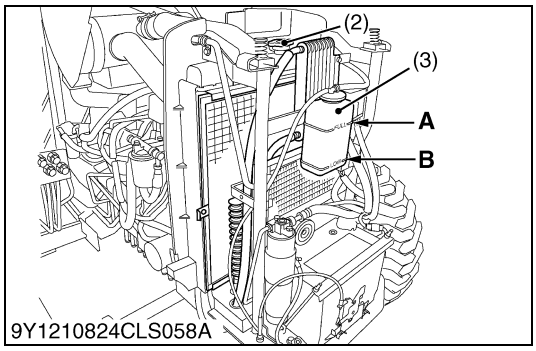
[2] SEPARATING CLUTCH HOUSING AND ENGINE (ROPS TYPE)





Draining Coolant

WARNING

- **Do not remove the radiator cap when the engine is hot. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.**

1. Stop the engine, remove the key and let it cool down.
2. To drain the coolant, open the radiator drain plug and remove radiator cap. The radiator cap must be removed to completely drain the coolant.
3. After all coolant is drained, reinstall the drain plug.

(When refilling)

- Fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap securely.
- Fill with coolant up to **"FULL"** mark on the recovery tank.
- Start and operate the engine for few minutes.
- Stop the engine and let cool. Check coolant level of recovery tank and add coolant if necessary.

IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh soft water and anti-freeze to fill the radiator and recovery tank.**
- **When mixing the anti-freeze with water, the anti-freeze mixing ratio is 50 %.**
- **Securely tighten radiator cap. If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**
- **Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.**

Coolant capacity (without recovery tank)	L3560 L4060	7.5 L 7.9 U.S.qts 6.6 Imp.qts
	L4760 L5060 L5460 L6060	8.2 L 8.7 U.S.qts 7.2 Imp.qts

(1) Drain Plug
(2) Radiator Cap
(3) Recovery Tank

A: FULL
B: LOW

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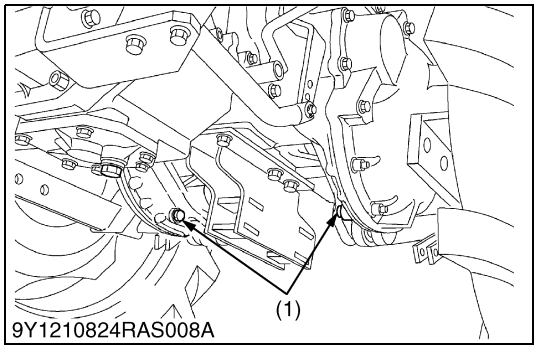

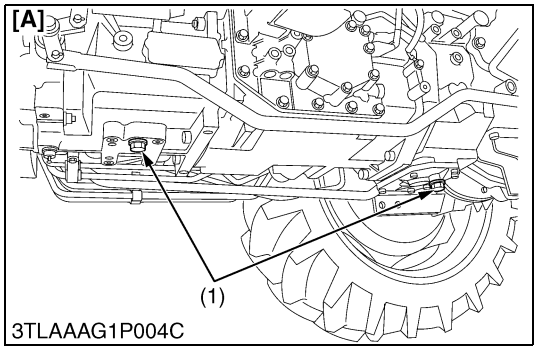

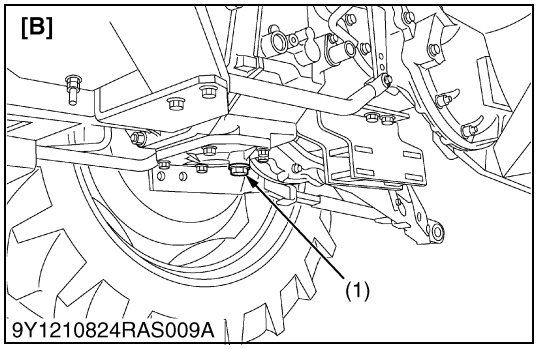

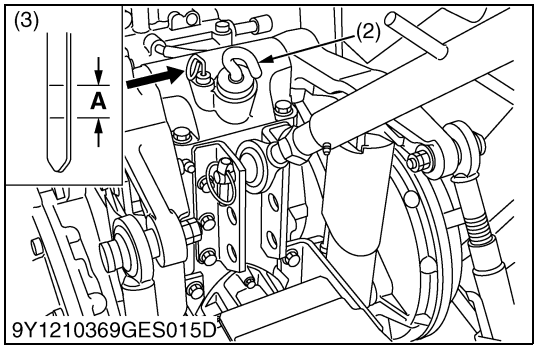

Draining the Transmission Fluid

⚠ CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5060 L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

■ IMPORTANT

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

[A] Manual Transmission / GST
[B] HST
A: Oil level is acceptable within this range.

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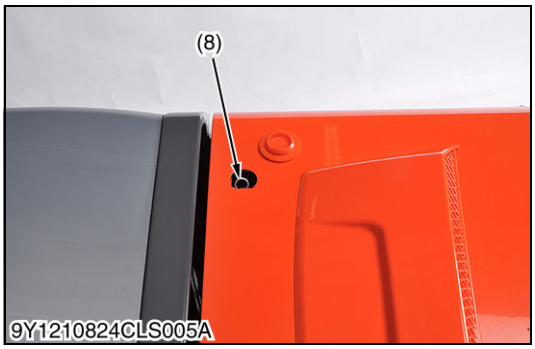

Front Grill, Skirts and Bonnet

1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Disconnect the head light connector (6).
5. Remove the damper (7).
6. Remove the β pin (8), then the bonnet.

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Head Light Connector
(7) Damper
(8) β Pin

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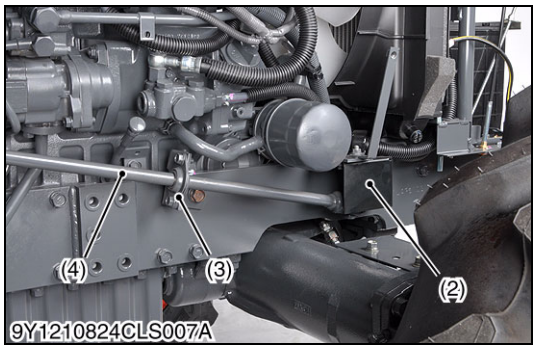

Steering Joint Shaft

1. Remove the steering joint screw (1).
2. Remove the steering joint cover (2) and the steering joint support (3).
3. Remove the steering joint shaft (4).

(1) Steering Joint Screw
(2) Steering Joint Cover
(3) Steering Joint Support
(4) Steering Joint Shaft

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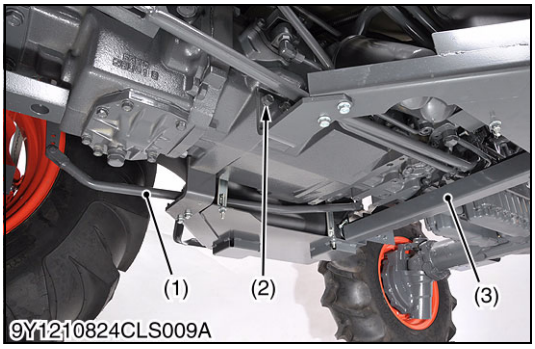

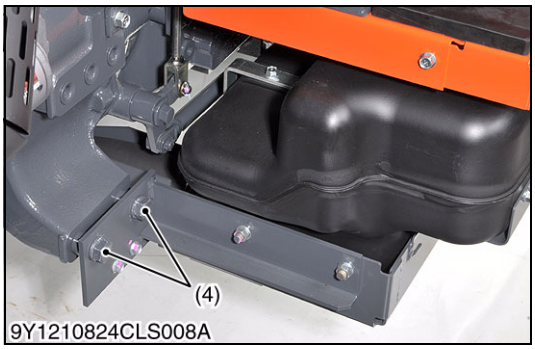

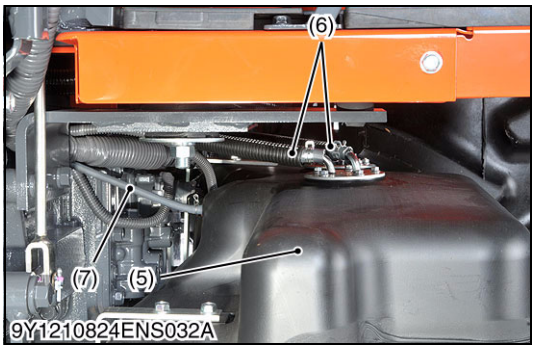

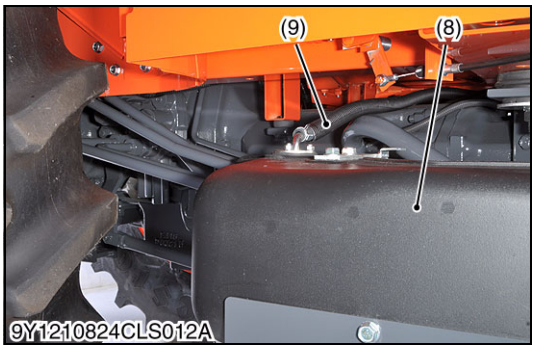

Fuel Tanks

1. Remove the left step.
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (1).
4. Place the disassembling stands under the right and left fuel tanks (5), (8).
5. Remove the front (4) and rear support mounting screws (2) of the right and left fuel tanks (5), (8).
6. Lower the fuel tanks (5), (8) together with the disassembling stands.
7. Disconnect the fuel hoses (6), overflow hose (7) and fuel level sensor connector from the fuel tank L.H. (5).
8. Disconnect the fuel hose (9) from the fuel tank R.H. (8).

(1) Brake Rod L.H.
(2) Rear Support Mounting Screw
(3) Fuel Hose Cover
(4) Front Support Mounting Screw
(5) Fuel Tank L.H.
(6) Fuel Hose
(7) Overflow Hose
(8) Fuel Tank R.H.
(9) Fuel Hose

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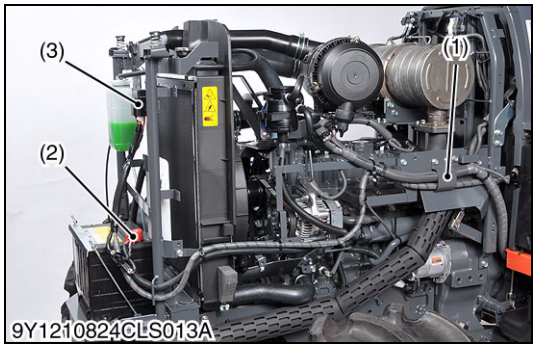

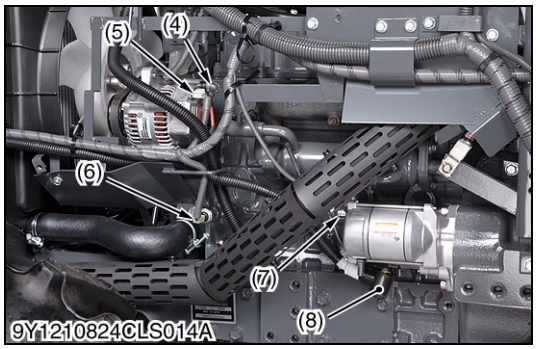

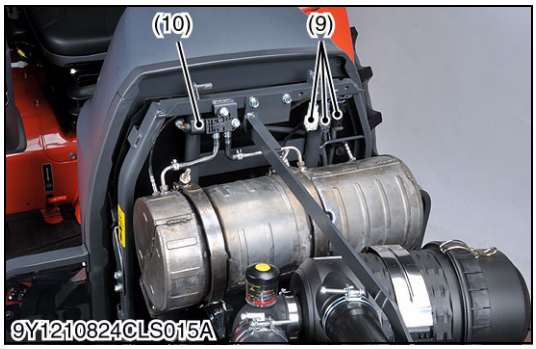

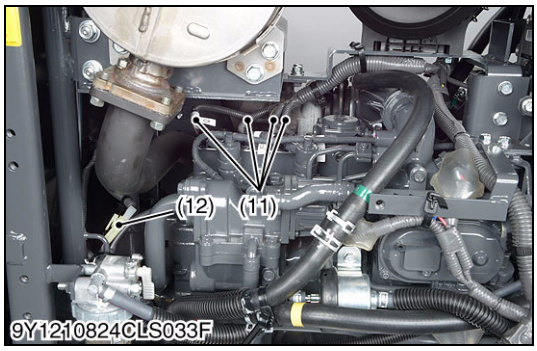

Wiring Harness

1. Remove the harness clamps and harness cover (1).
2. Disconnect the battery positive cable (2) and battery.
3. Remove the slow blow fuse box (3).
4. Disconnect the alternator terminal **B** (4) and terminal **IG** (5).
5. Disconnect the oil pressure switch connector (6), starter terminal **B** (8) and terminal **ST** (7).
6. Disconnect the DPF temperature sensor connectors (9) and differential pressure connector (10).
7. Disconnect the injector connectors (11) and glow plug connector (12).
8. Disconnect CCV GND wiring harness (13), CCV relay (14), CCV heater fuse (15), CCV SB fuse (16) and CCV heater (17) (18). (If equipped)

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Harness Cover
(2) Battery Positive Cable
(3) Slow Blow Fuse Box
(4) Alternator Terminal **B**
(5) Alternator Terminal **ST**
(6) Oil Pressure Switch Connector
(7) Starter Terminal **ST**
(8) Starter Terminal **B**
(9) DPF Temperature Sensor Connector
(10) DPF Differential Pressure Connector
(11) Injector Connector
(12) Glow Plug Connector

(To be continued)

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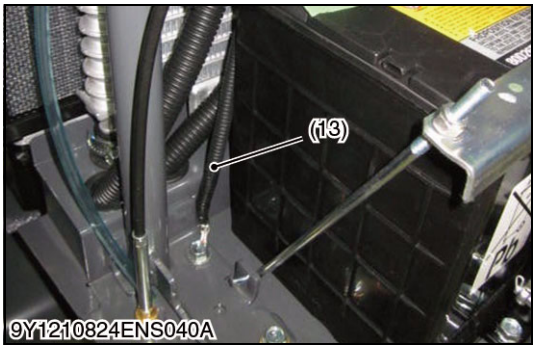

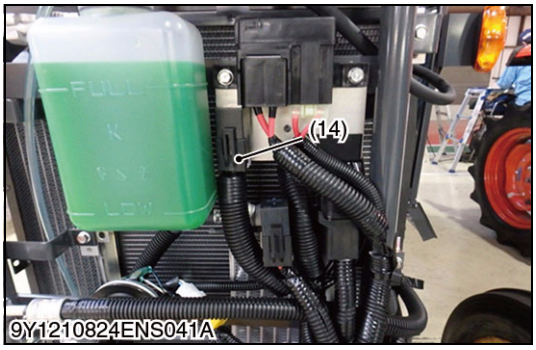

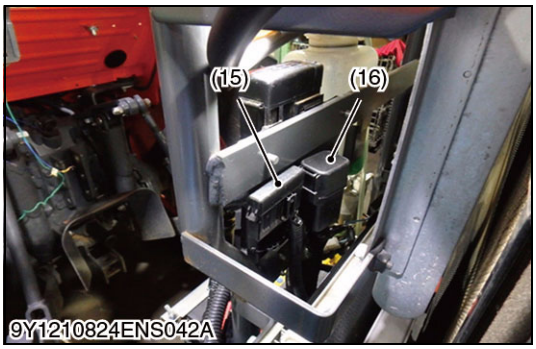

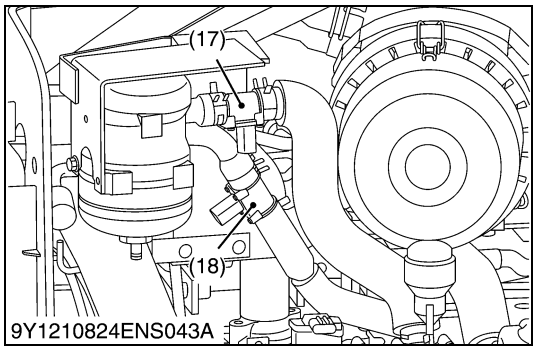

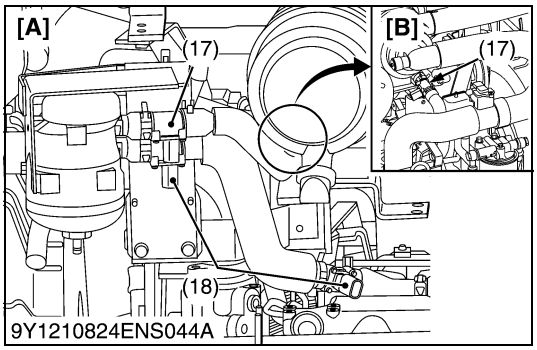

(13) CCV GND Wiring Harness
(14) CCV Relay
(15) CCV Heater Fuse
(16) CCV SB Fuse
(17) CCV Heater (OUT)
(18) CCV Heater (IN)

[A] Left Side
[B] Right Side

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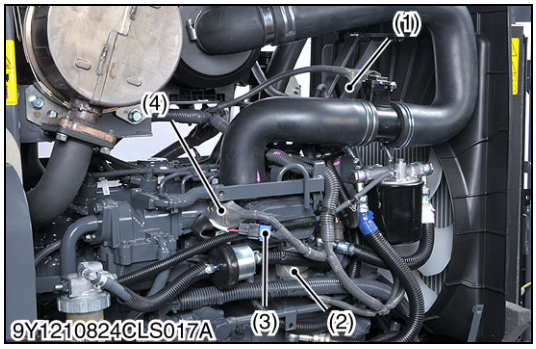

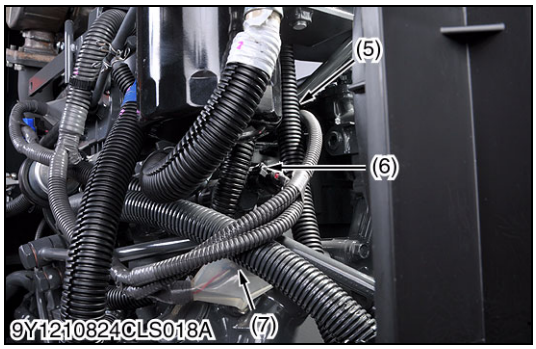

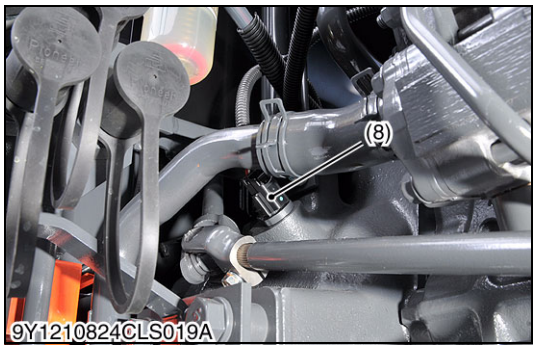

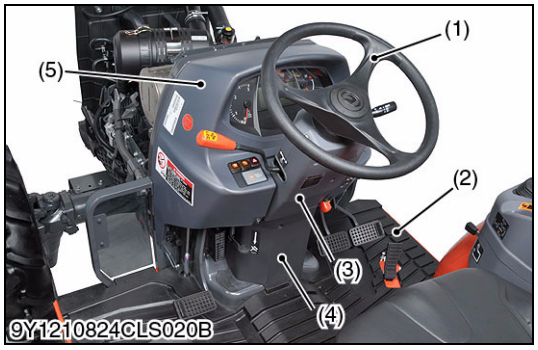

Sensor Connectors

1. Disconnect the air flow sensor connector (1), intake throttle sensor connector (2), electromagnetic pump connector (3) and EGR valve connector (4).
2. Disconnect the common rail sensor connector (5), suction control valve connector (6) and camshaft position sensor connector (7).
3. Disconnect the crankshaft position sensor connector (8).
4. Set aside the main harness to the rear.

(1) Air Flow Sensor Connector
(2) Intake Throttle Sensor Connector
(3) Electromagnetic Pump Connector
(4) EGR Valve Connector
(5) Common Rail Sensor Connector
(6) Suction Control Valve Connector
(7) Camshaft Position Sensor Connector
(8) Crankshaft Position Sensor Connector

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Steering and Panel Cover

1. Remove the steering wheel (1).
2. Remove the mat (2).
3. Remove the steering post cover 2 (4) and steering post cover 1 (3).
4. Remove the meter panel cover (5).

(1) Steering Wheel
(2) Mat
(3) Steering Post Cover 1
(4) Steering Post Cover 2
(5) Meter Panel Cover

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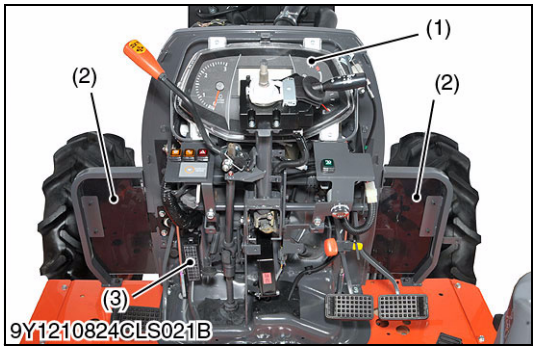

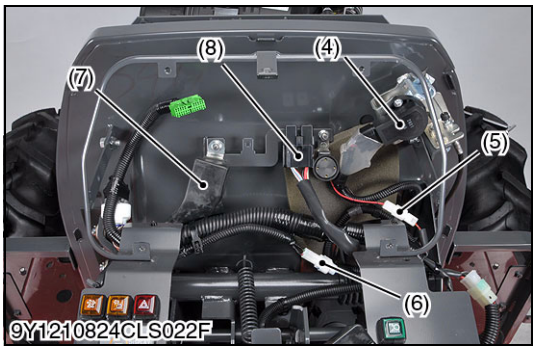

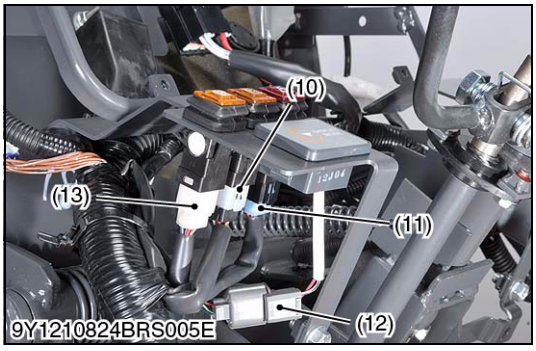

Meter Panel and Wiring Harness

1. Remove the meter panel (1).
2. Remove the right and left mud shields (2).
3. Remove the fuse box (3) and relay box (8).
4. Disconnect the flasher relay connector (7), buzzer connector (5) and parking brake switch connector (6).
5. Disconnect the foot throttle sensor connector (4). (Manual Transmission and GST only)
6. Disconnect the cruise control switch connector (9). (HST only)
7. Disconnect the DPF auto switch connector (13), DPF switch connector (10), hazard switch connector (11) and display mode switch connector (12).

(1) Meter Panel
(2) Mud Shield
(3) Fuse Box
(4) Foot Throttle Sensor Connector
(5) Buzzer Connector
(6) Parking Brake Switch Connector
(7) Flasher Unit
(8) Relay Box
(9) Cruise Control Switch
(10) DPF Switch Connector
(11) Hazard Switch Connector
(12) Display Mode Switch Connector
(13) DPF Auto Switch Connector

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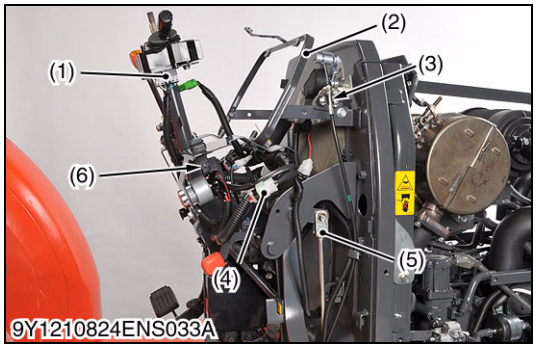

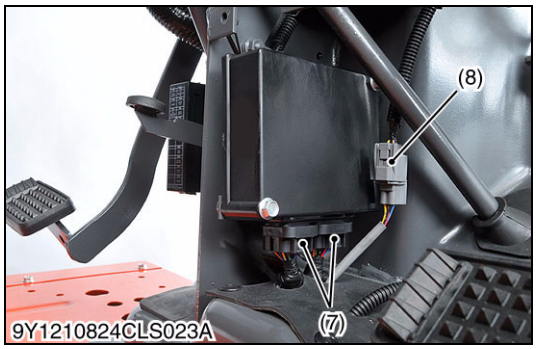

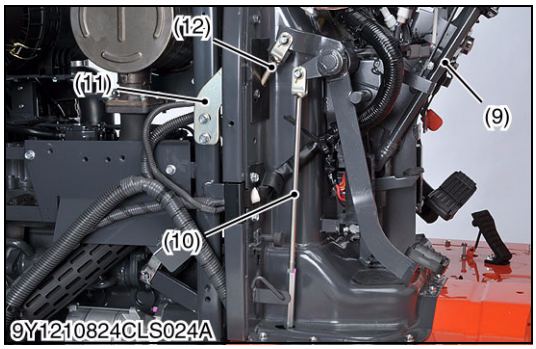

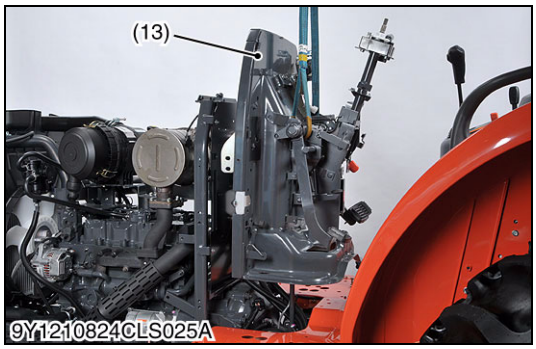

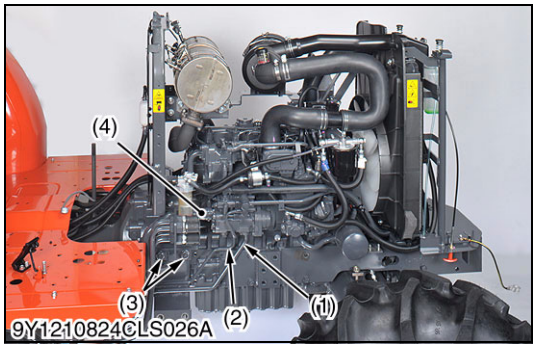

Panel Frame

1. Disconnect the multi function combination switch connector (1), side working light connector (6) and main switch connector (4).
2. Disconnect the foot throttle wire (3) and shuttle switch connector (8) (Manual Transmission and GST only)
3. Remove the meter panel support (2) and brake pedal rod R.H. (5).
4. Remove the main ECU connectors (7).
5. Remove the shuttle link (9) and clutch pedal rod (12). (Manual transmission and GST only)
6. Remove the shuttle link (9), brake pedal rod L.H. (10), clutch pedal rod (12) and both sides of support plate (11).
7. Remove the panel frame (13) using the hoist.

(1) Multi Function Combination Switch
(2) Meter Panel Support
(3) Foot Throttle Wire
(4) Main Switch Connector
(5) Brake Pedal Rod R.H.
(6) Front Working Light Connector
(7) Main ECU Connector
(8) Shuttle Switch Connector
(9) Shuttle Link
(10) Brake Pedal Rod L.H.
(11) Rear Support Plate
(12) Clutch Pedal Rod
(13) Panel Frame

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Hydraulic Pipes

1. Disconnect the delivery pipe (1), PTO delivery pipe (2) and suction hose (4) from the hydraulic pump.
2. Remove the front loader pipe bracket mounting bolts (3).

(When reassembling)

Tightening torque	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

(1) Delivery Pipe
(2) PTO Delivery Pipe
(3) Bolt
(4) Suction Hose

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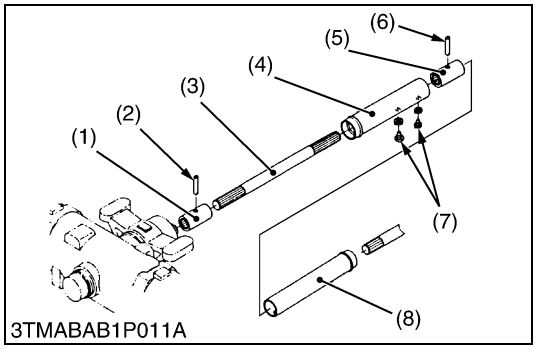

Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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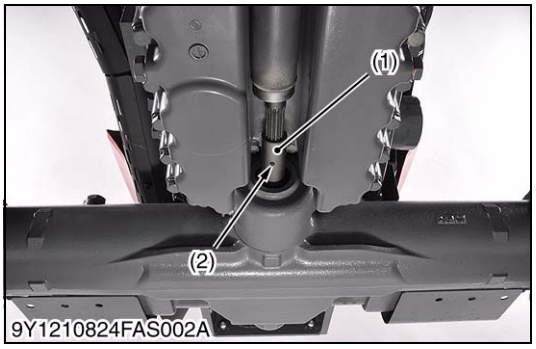

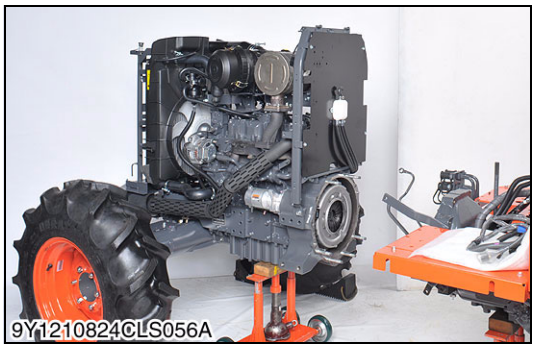

Separating Engine from Clutch Housing

1. Place the disassembling stands under the engine and clutch housing.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine and clutch housing.

(When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1211 or equivalent) to joint face of the flywheel housing and clutch housing.

Tightening torque	Engine and clutch housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Engine and clutch housing mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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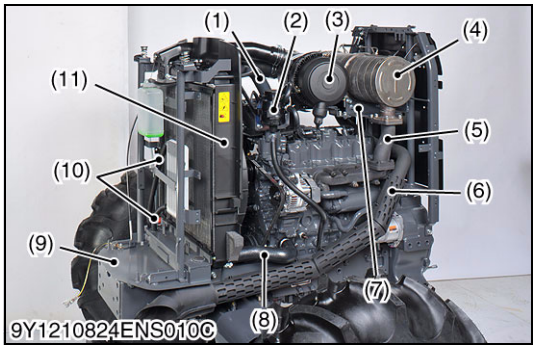

Radiator Assembly and DPF Muffler

1. Remove the air cleaner (3) together with air cleaner hoses and bracket.
2. Remove the muffler pipe (6), muffler flange (5) mounting screws and DPF muffler (4) together with DPF muffler bracket (7).
3. Remove the oil separator (2).
4. Disconnect the radiator hoses (1), (8).
5. Disconnect the fuel cooler hoses (10).
6. Remove the radiator (11) together with front support (9).

(When reassembling)

- See page 1-S19.

(1) Radiator Hose
(2) Oil Separator
(3) Air Cleaner
(4) DPF Muffler
(5) Exhaust Flange
(6) Muffler Pipe
(7) DPF Bracket
(8) Radiator Hose
(9) Front Support
(10) Fuel Cooler Hose
(11) Radiator

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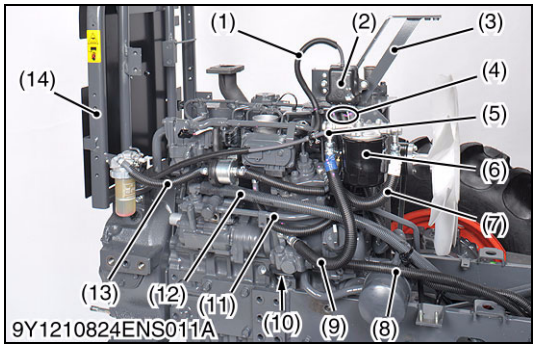

Fuel Hoses and Pillar

1. Disconnect the overflow hose (1) and fuel hoses (4), then remove the bracket (3) together with fuel sub tank (2).
2. Disconnect the overflow hose (5), fuel hose (7), (9), (13), then remove the fuel filter (6).
3. Disconnect the power steering return hose (12) and fuel hose (8).
4. Remove the power steering delivery pipe (11).
5. Remove the dipstick stay (10).
6. Remove the pillar (14).

(When reassembling)

Tightening torque	Joint bolt for power steering delivery pipe	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Retaining nut of power steering delivery pipe	49 to 58 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft

(1) Overflow Hose
(2) Fuel Sub Tank
(3) Bracket
(4) Fuel Hose
(5) Overflow Hose
(6) Fuel Filter
(7) Fuel Hose
(8) Fuel Hose
(9) Fuel Hose
(10) Dipstick Stay
(11) Power Steering Delivery Pipe
(12) Power Steering Return Hose
(13) Fuel Hose
(14) Pillar

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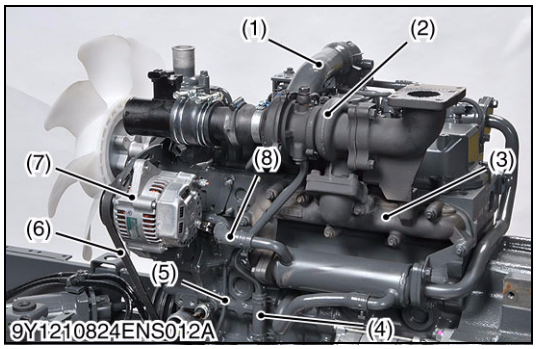

Turbocharger (If Equipped)

1. Disconnect the air intake hose (1).
2. Remove the fan belt (6) and alternator (7)
3. Remove the EGR cooler hose (8) and cooler pipe.
4. Disconnect the oil pipe (5) and return hose (4).
5. Remove the exhaust manifold (3) together with turbocharger (2).

(When reassembling)

- Be sure to adjust the fan belt tension. (See page 1-S14.)

Tightening torque	Alternator mounting screw (M10)	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
	Tension adjusting Screw (M8)	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Intake Hose
(2) Turbocharger
(3) Exhaust Manifold
(4) Return Hose
(5) Oil Pipe
(6) Fan Belt
(7) Alternator
(8) EGR Cooler Hose

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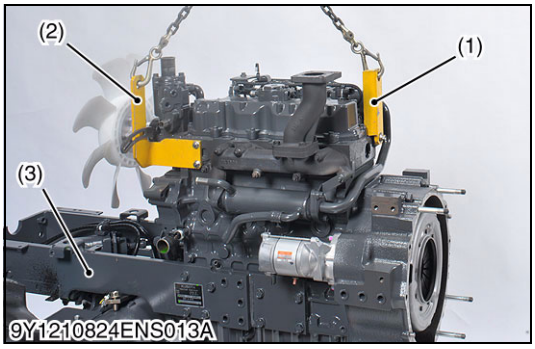

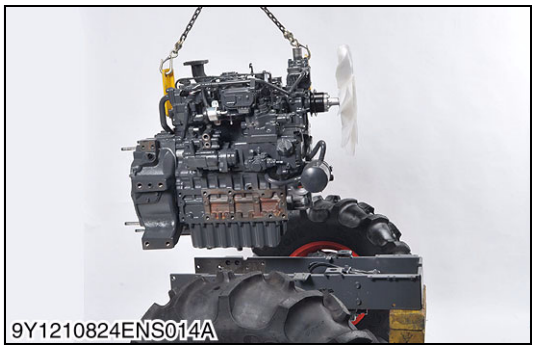

Front Axle Frame

1. [L3560]
   Remove one of the two engine hooks attached on the left side of the engine and install it on the right rear side of the engine.
   [except L3560]
   Install the engine hooks (1), (2).
   (See page G-61, G-62.)
2. Hold the engine by the hoist chain hooked on the engine hooks (1) and (2).
3. Remove the engine mounting screws.
4. Separate the engine from the front axle frame (3).

Tightening torque	Front axle frame mounting screw (7T)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Front axle frame mounting screw (9T)	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

(1) Engine Hook
(2) Engine Hook
(3) Front Axle Frame

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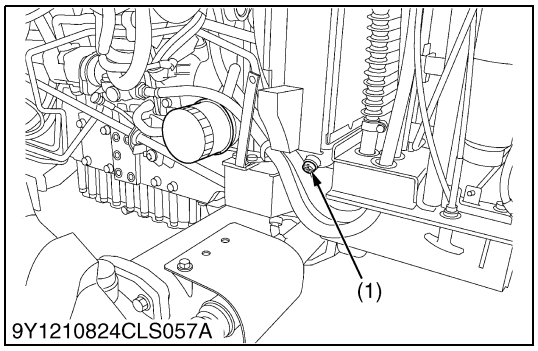
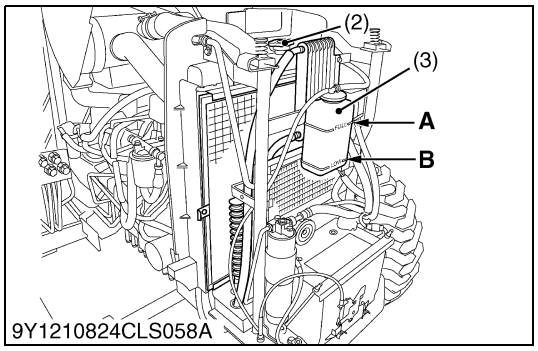
[3] SEPARATING CLUTCH HOUSING AND ENGINE (CABIN TYPE)





Draining Coolant

WARNING

To avoid personal injury or death:

- **Do not remove radiator cap while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.**

1. Stop the engine, remove the key and let it cool down.
2. To drain the coolant, open the radiator drain plug and remove radiator cap. The radiator cap must be removed to completely drain the coolant.
3. After all coolant is drained, reinstall the drain plug.

(When refilling)

- Fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap securely.
- Fill with coolant up to **"FULL"** mark on the recovery tank.
- Start and operate the engine for few minutes.
- Stop the engine and let cool. Check coolant level of recovery tank and add coolant if necessary.

IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh soft water and anti-freeze to fill the radiator and recovery tank.**
- **When mixing the anti-freeze with water, the anti-freeze mixing ratio is 50 %.**
- **Securely tighten radiator cap. If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**
- **Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.**

NOTE

- **On cab type machines, coolant circulates through the heater. This means that one more liter or so of coolant is required.**
  In changing coolant, pour coolant up to the filler port of the recovery tank. Turn ON the heater (shift the temperature control lever toward WARM), and run the engine for a while in order to warm coolant. Then stop the engine.
  When coolant has cooled down, some of the coolant in the recovery tank is sucked. Now the recovery tank is appropriately filled with coolant.

Coolant capacity (without recovery tank)	L3560 L4060	7.5 L 7.9 U.S.qts 6.6 Imp.qts
	L4760 L5060 L5460 L6060	8.2 L 8.7 U.S.qts 7.2 Imp.qts

(1) Drain Plug
(2) Radiator Cap
(3) Recovery Tank

A: FULL
B: LOW

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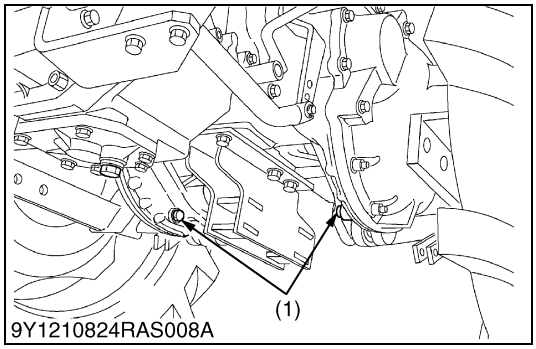

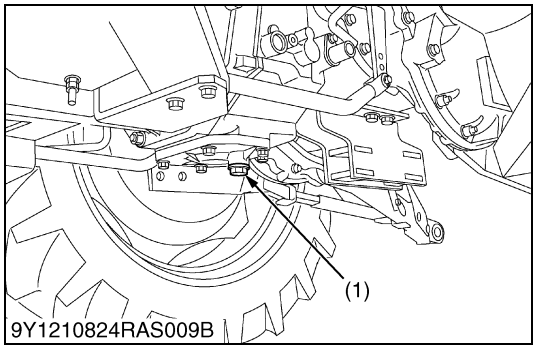

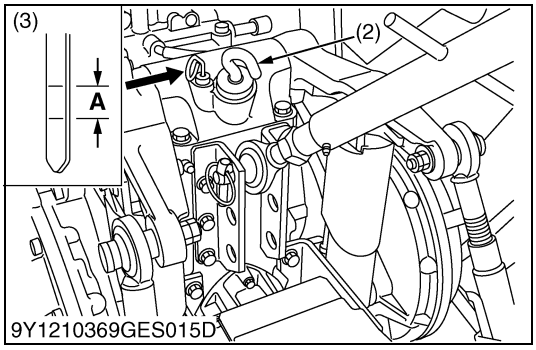

Draining the Transmission Fluid

CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

HST

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

■ **IMPORTANT**

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

A: Oil level is acceptable within this range.

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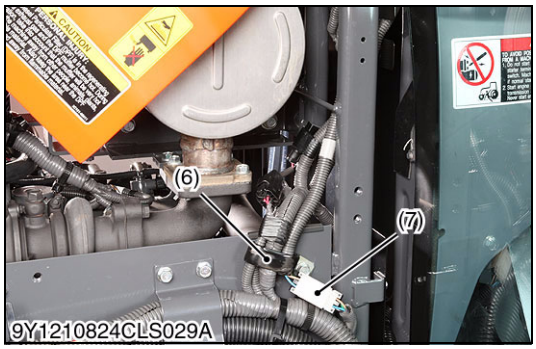

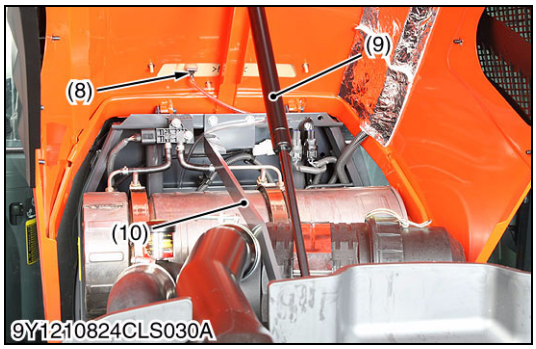

Front Grill, Skirts and Bonnet

1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Remove the clamp (6) and disconnect the head light connector (7).
5. Disconnect the window washer hose (8) and remove the damper (9).
6. Remove the plug (11) and the ß pin inside, then the bonnet.
7. Remove the damper support (10).

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Clamp
(7) Head Light Connector
(8) Window Washer Hose
(9) Damper
(10) Damper Support
(11) Plug

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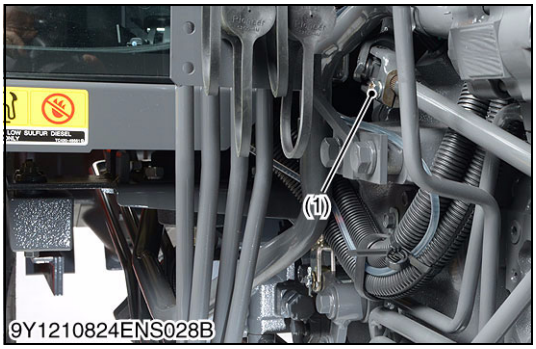

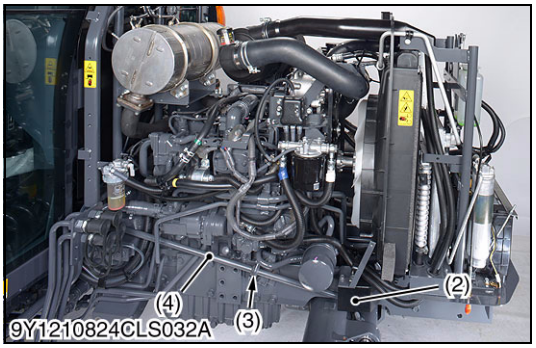

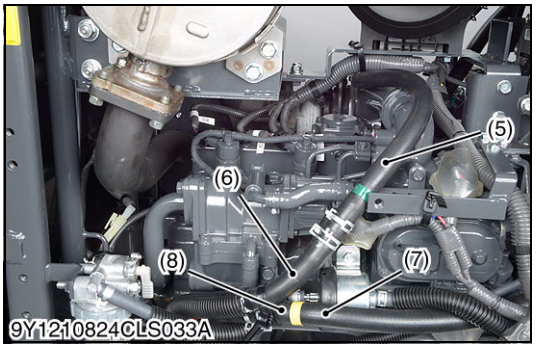

Steering Joint Shaft

1. Remove the steering joint screw (1).
2. Remove the steering joint cover (2) and the steering joint support (3).
3. Remove the steering joint shaft (4).
4. Disconnect the heater hose (5) from the heater hose (6) and the heater hose (7) from the heater hose (8) inside, then reconnect the heater hose (5), (7) and heater hose (6), (8) to make the loop.

■ **NOTE**

- **Put a mark to each heater hose before disconnecting.**

(1) Steering Joint Screw
(2) Steering Joint Cover
(3) Steering Joint Support
(4) Steering Joint Shaft
(5) Heater Hose
(6) Heater Hose
(7) Heater Hose
(8) Heater Hose

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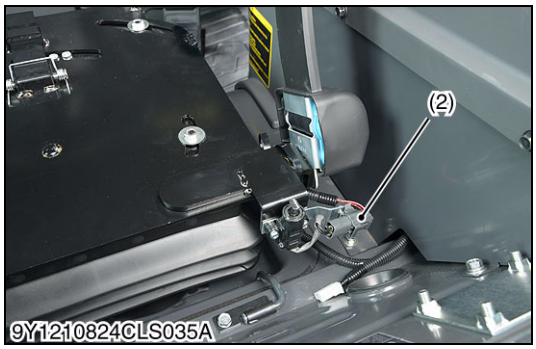

Seat and Seat Bracket

1. Disconnect the seat switch connector (1) and seat tilt switch connector (2).
2. Remove the seat (3).
3. Remove the seat suspension (4) together with seat bracket (5).

(1) Seat Switch Connector
(2) Seat Tilt Switch Connector
(3) Seat
(4) Seat Suspension
(5) Seat Bracket

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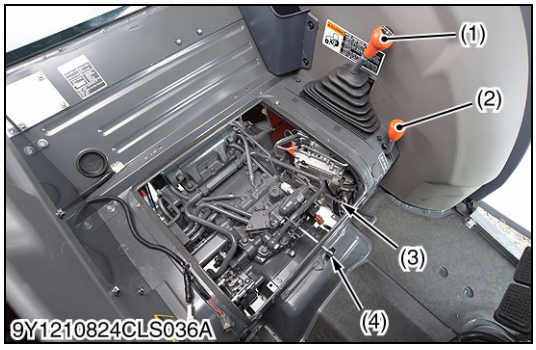

Lever Grips, Differential Lock Rod and Lowering Speed Adjusting Knob

1. Remove the range gear shift lever grip (1) and front wheel drive lever grip (2).
2. Remove the differential lock rod (3) and the lowering speed adjusting knob (4).
3. Remove the range gear shift rod (5).

(1) Range Gear Shift Lever Grip
(2) Front Wheel Drive Lever Grip
(3) Differential Lock Rod
(4) Lowering Speed Adjusting Knob
(5) Range Gear Shift Rod

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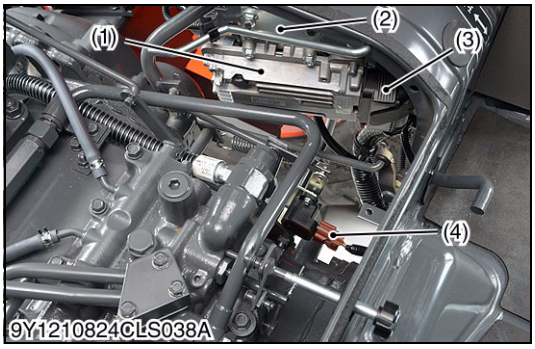

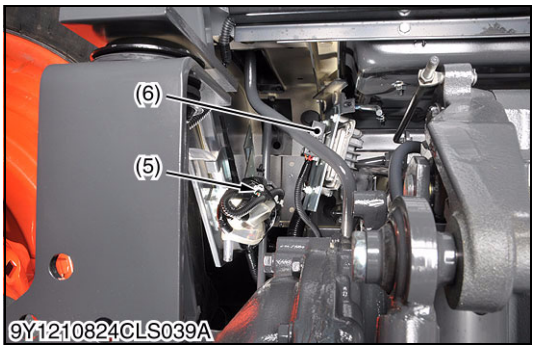

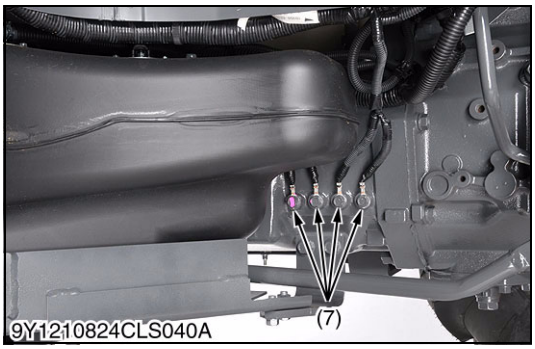

Rear Wiring Harness

1. Remove the engine ECU support (2).
2. Disconnect the engine ECU connector (3).
3. Disconnect the range gear sensor connector (4).
4. Disconnect the joint connectors (5).
5. Remove the engine ECU power relay and glow relay (6) from the engine ECU support (2).
6. Disconnect the earth cables (7).

(1) Engine ECU
(2) Engine ECU Support
(3) Engine ECU Connector
(4) Range Gear Sensor Connector
(5) Joint Connector
(6) Glow Relay
(7) Earth Cable

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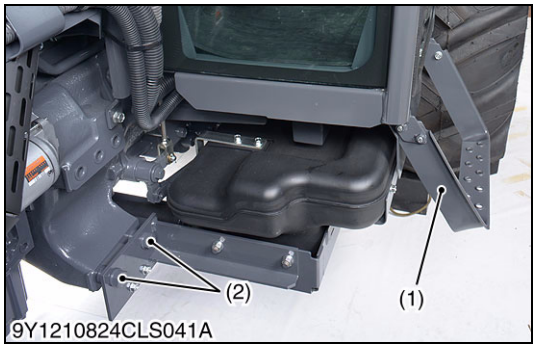

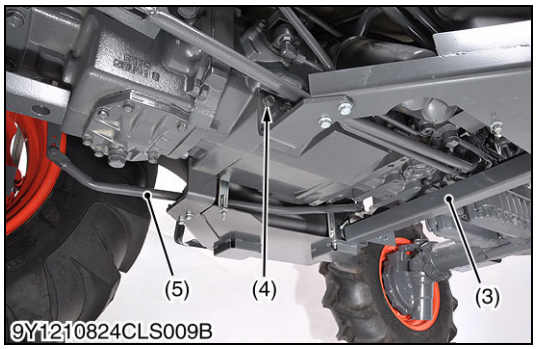

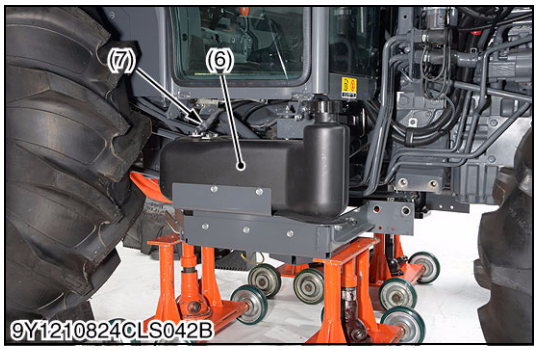

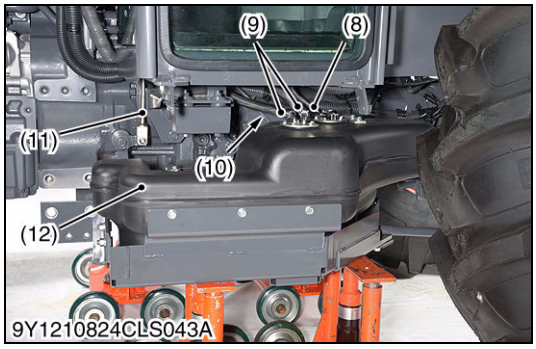

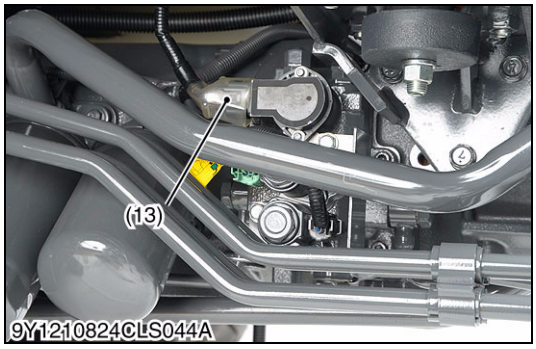

Fuel Tanks

1. Remove the right and left steps (1).
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (5).
4. Place the disassembling stands under the right and left fuel tanks (6), (12).
5. Remove the front (2) and rear support mounting screws (4) of the right and left fuel tanks (6), (12).
6. Lower the fuel tanks (6), (12) together with the disassembling stands.
7. Disconnect the fuel hoses (9), overflow hose (10) and fuel level sensor connector (8) from the fuel tank L.H. (12).
8. Disconnect the fuel hose (7) from the fuel tank R.H. (6).
9. Remove the right and left brake pedal rod (11).
10. Disconnect the swashplate position sensor connector (10).

(1) Step
(2) Front Support Mounting Screw
(3) Fuel Hose Cover
(4) Rear Support Mounting Screw
(5) Brake Rod L.H.
(6) Fuel Tank R.H.
(7) Fuel Hose
(8) Fuel Level Sensor Connector
(9) Fuel Hose
(10) Overflow Hose
(11) Brake Pedal Rod L.H.
(12) Fuel Tank L.H.
(13) Swashplate Position Sensor Connector

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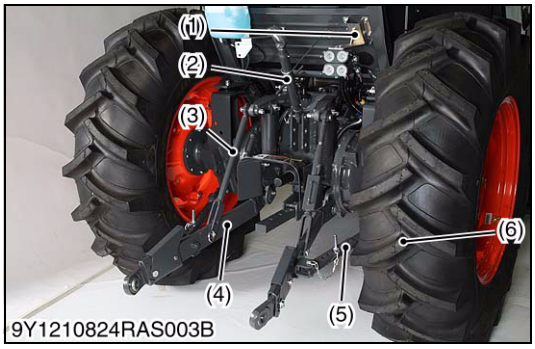

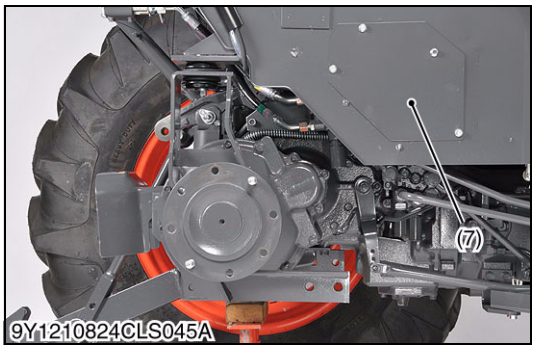

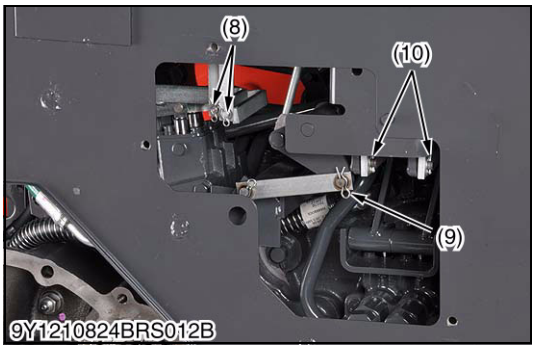

Linkage and Remote Control Valve

1. Remove the remote control valve support (1) together with the couplers. (If equipped.)
2. Remove the top link (2), right and left lift rods (3), lower links (4) and stabilizers (5).
3. Remove the rear tire R.H. (6) and fender plate (7).
4. Disconnect the remote control valve linkage ß pins (8) to release the links. (If equipped.)
5. Disconnect the position lever linkage ß pin (9) to release the link.
6. Disconnect the front loader control linkage ß pins (10) to release the links.

(1) Remote Control Valve
(2) Top Link
(3) Lift Rod
(4) Lower Link
(5) Stabilizer
(6) Rear Tire R.H.
(7) Fender Plate
(8) ß Pin
(9) ß Pin
(10) ß Pin

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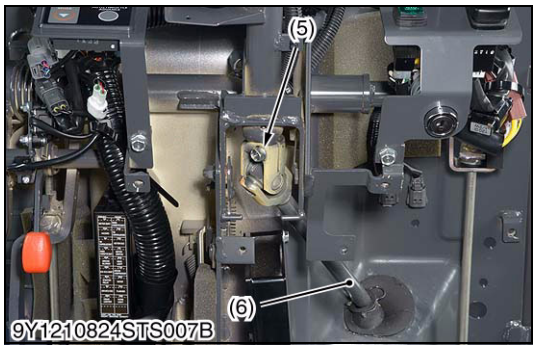

Mat, Panel Cover and Linkage

1. Remove the step mat (1) and sound absorber (2).
2. Remove the steering post cover 1 and 2 (4).
3. Remove the panel cover (3).
4. Remove the universal joint screw (5) and disconnect the steering joint shaft (6).

(1) Step Mat
(2) Sound Absorber
(3) Panel Cover
(4) Steering Post Cover
(5) Universal Joint Screw
(6) Steering Joint Shaft

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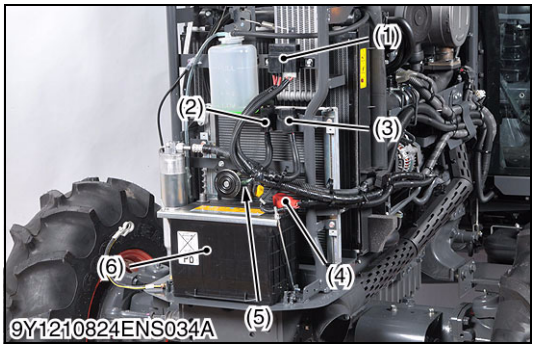
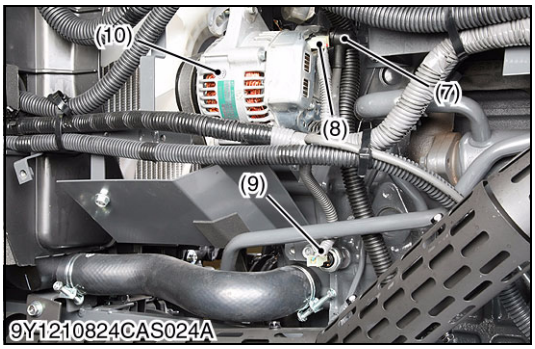
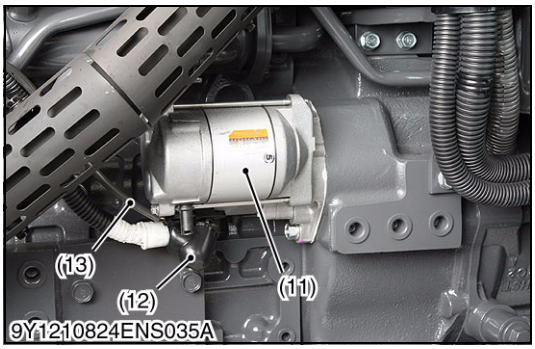
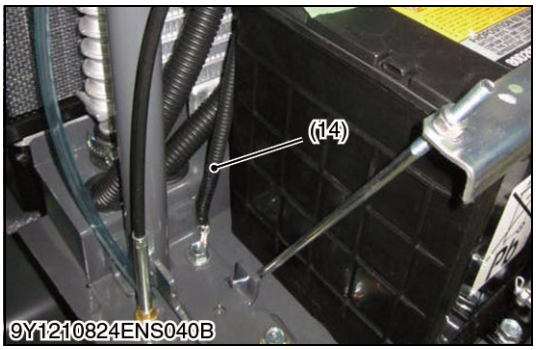
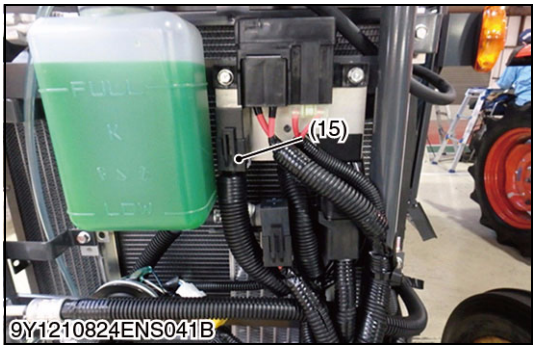








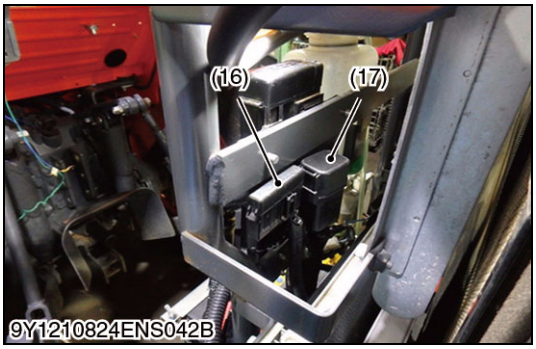


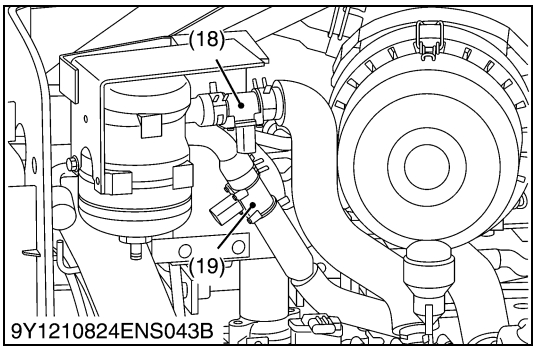
Electric Wiring

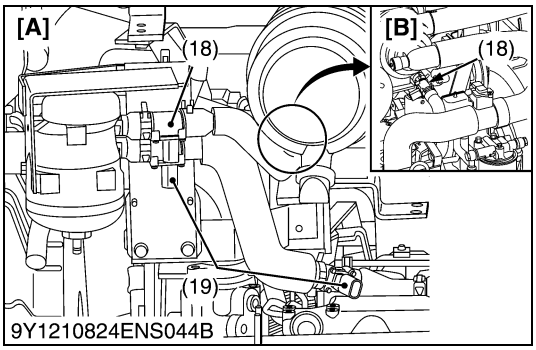
1. Remove the slow blow fuse box (1).
2. Remove the defogger relay (2) and defogger slow blow fuse (3). (If equipped)
3. Disconnect the battery positive cable (4) and battery (6).
4. Disconnect the horn connectors (5).
5. Disconnect the **B** terminal (7), **IG** terminal (8) from the alternator (10) and the oil pressure switch (9).
6. Disconnect the **ST** terminal (13) and the **B** terminal (12) from the starter motor (11).
7. Disconnect CCV GND wiring harness (14), CCV relay (15), CCV heater fuse (16), CCV SB fuse (17) and CCV heater (18) (19). (If equipped)

■ **NOTE**

- **When disconnecting the battery cords, disconnect the negative cord first, when connecting, positive cord first.**







(1) Slow Blow Fuse Box
(2) Defogger Relay
(3) Defogger Slow Blow Fuse
(4) Positive Cable
(5) Horn Connector
(6) Battery
(7) **B** Terminal
(8) **IG** Terminal
(9) Oil Pressure Switch
(10) Alternator
(11) Starter Motor
(12) **B** Terminal
(13) **ST** Terminal
(14) CCV GND Wiring Harness
(15) CCV Relay
(16) CCV Heater Fuse
(17) CCV SB Fuse
(18) CCV Heater (OUT)
(19) CCV Heater (IN)

[A] Left Side
[B] Right Side

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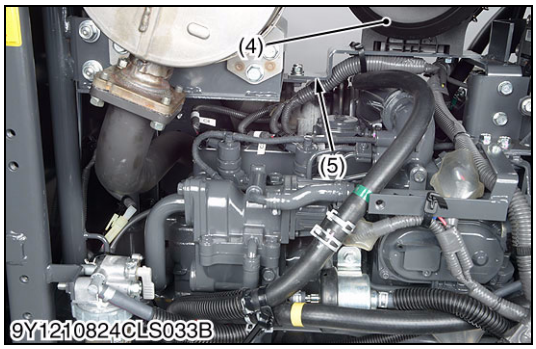
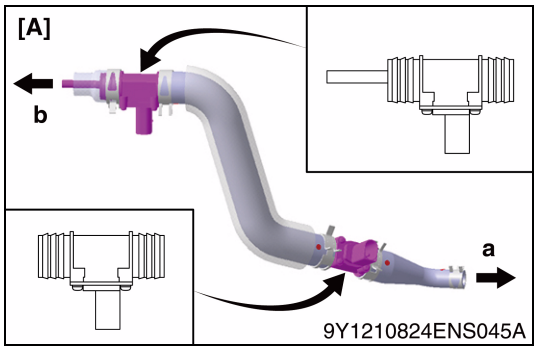
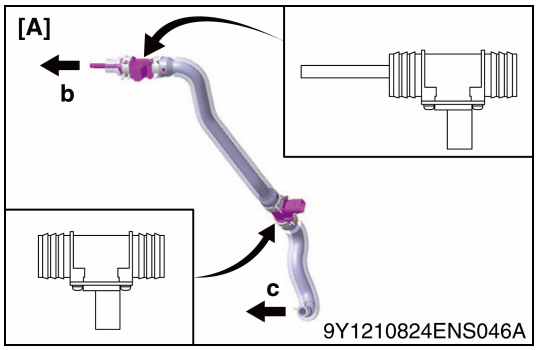




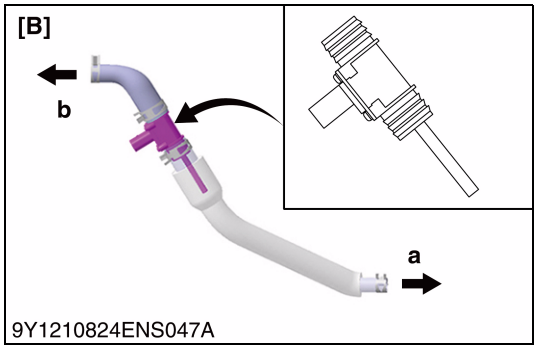


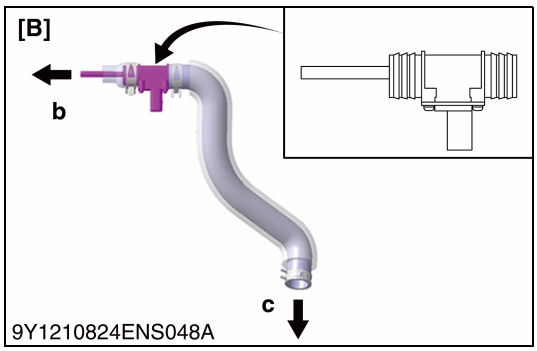
Air Cleaner and Radiator Hose

1. Remove the cramps and hoses of oil separator (3), then remove the oil separator (3).
2. Remove the intake hose (1).
3. Remove the air cleaner bracket (5) together with air cleaner (4).
4. Remove the radiator upper hose (2) and lower hose.

(When reassembling)

- If CCV Heater is equipped, Be careful not to assemble in the wrong direction. Refer the images shown here.





(1) Intake Hose
(2) Radiator Upper Hose
(3) Oil Separator
(4) Air Cleaner
(5) Air Cleaner Bracket

a: To Engine Breather
b: To CCV Inlet
c: To Engine Inlet

[A] L3560, L4060, L4760
[B] L5060, L5460, L6060

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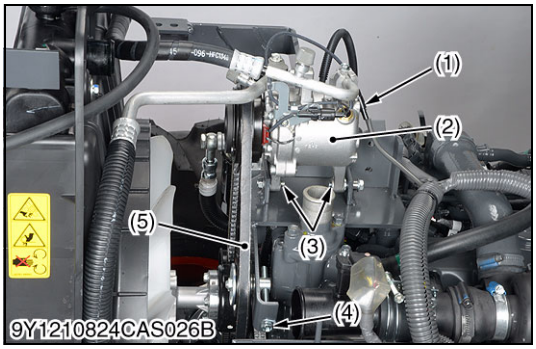

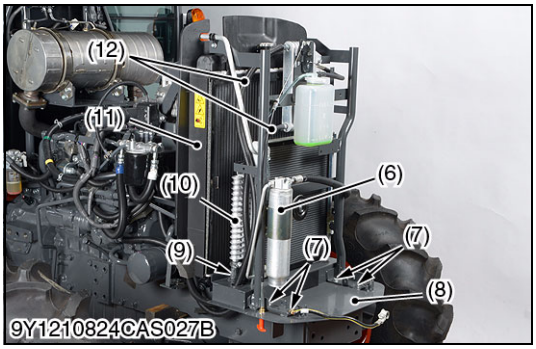

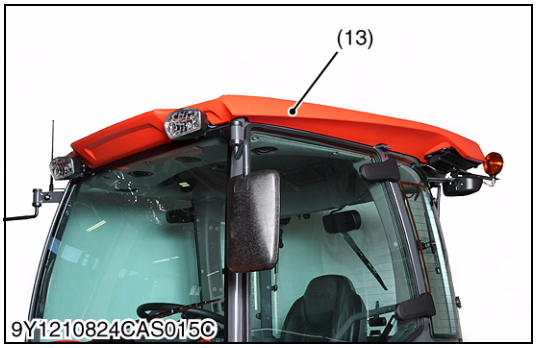

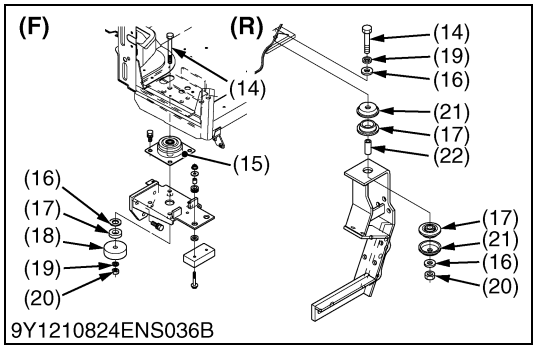

Air Conditioner Parts and Cabin Assembly

1. Disconnect the **1P** connector (1) from compressor (2).
2. Loosen the tension pulley mounting nut, the adjusting bolt (4) and remove the air conditioner belt (5).
3. Remove the compressor mounting bolts (3).
4. Remove the front support mounting bolts (7).
5. Disconnect the oil cooler hoses (9) and fuel cooler hoses (12).
6. Remove the compressor (2), radiator (11), oil cooler (10), and receiver (5), together with front support (8) as a unit.
7. Remove the outer roof (13) of cabin.
8. Support the cabin with nylon straps and hoists.
9. Remove the cabin mounting bolts and nuts.
10. Dismounting the cabin from tractor body.

■ **NOTE**

- **Lift the cabin while making sure it does not catch on anything.**

(When reassembling)

- Be sure to install the washers and mount rubbers, etc. in their original positions as shown in figure.

Tightening torque	Outer roof mounting screw	3.5 to 4.0 N·m 0.36 to 0.40 kgf·m 2.6 to 2.9 lbf·ft
	Cabin mounting bolt and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft

(1) **1P** Connector
(2) Compressor
(3) Compressor Mounting Bolt
(4) Adjusting Bolt
(5) Air Conditioner Belt
(6) Receiver
(7) Front Support Mounting Bolt
(8) Front Support
(9) Oil Cooler Hoses
(10) Oil Cooler
(11) Radiator
(12) Fuel Cooler Hose
(13) Outer Roof
(14) Bolt
(15) Cabin Rubber
(16) Washer
(17) Rubber
(18) Damper
(19) Spring Washer
(20) Nut
(21) Cup
(22) Collar

(F) Front Side
(R) Rear Side

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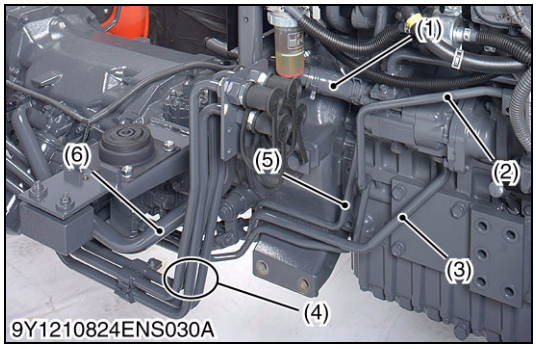

Hydraulic Pipe

1. Remove the front loader pipes (4).
2. Disconnect the suction hose (1) and suction pipe (6).
3. Remove the main delivery pipe (3), power steering delivery pipe (2) and delivery pipe (5).

(When reassembling)

Tightening torque	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft
	Joint bolt for main delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft
	Joint bolt for delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft

(1) Suction Hose
(2) Power Steering Delivery Pipe
(3) Main Delivery Pipe
(4) Front Loader Pipe
(5) Delivery Pipe
(6) Suction Pipe

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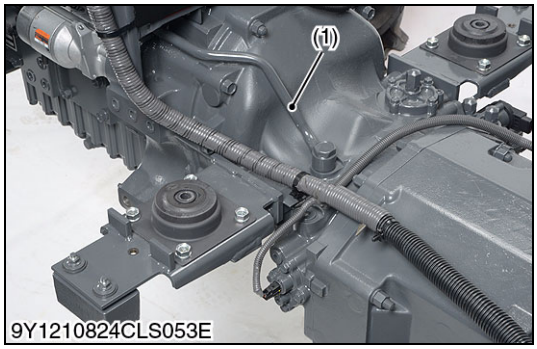

HST Return Pipe

1. Remove the HST return pipe (1).

Tightening torque	Joint bolt for HST return pipe	88 to 98 N·m 9.0 to 9.9 kgf·m 65 to 72 lbf·ft

(1) HST Return Pipe

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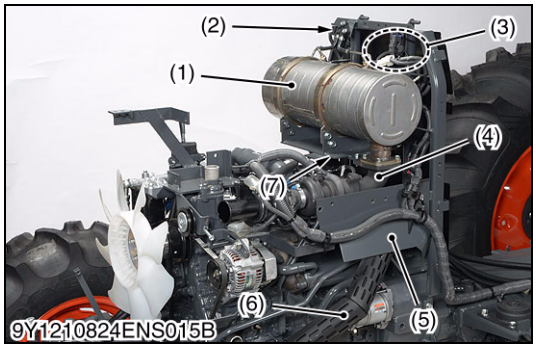

DPF Muffler

1. Remove the plate (5).
2. Disconnect the differential pressure sensor connector (2) and DPF temperature sensor connectors (3).
3. Remove the muffler pipe (6), exhaust flange (4) mounting screws and DPF muffler (1) together with bracket (7).

(When reassembling)

- See page 1-S19.

(1) DPF Muffler
(2) Differential Pressure Sensor Connector
(3) DPF Temperature Sensor Connector
(4) Exhaust Flange
(5) Plate
(6) Muffler Pipe
(7) Bracket

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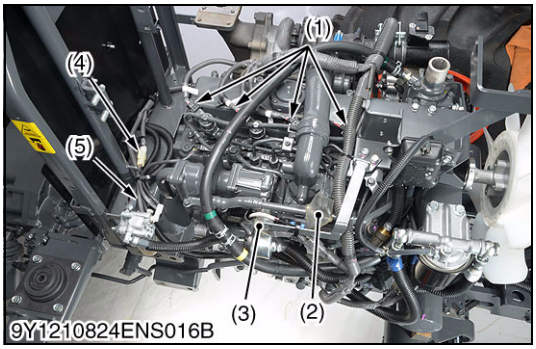

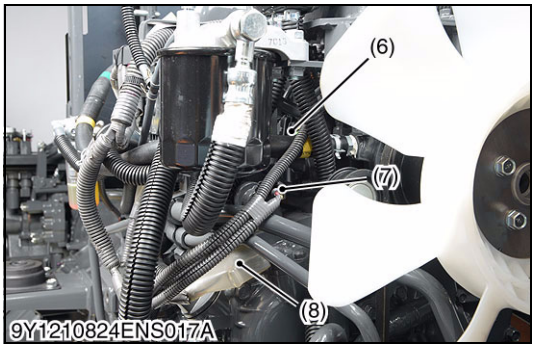

Wiring Harness Connector

1. Disconnect the injector connectors (1).
2. Disconnect the glow plug connector (4).
3. Disconnect the boost sensor connector (2), EGR valve connector (3) and intake throttle sensor connector.
4. Disconnect the rail sensor connector (6), suction control valve connector (7) and camshaft position sensor connector (8).
5. Set aside the main harness to the rear.

(1) Injector Connector
(2) Boost Sensor Connector
(3) EGR Valve Connector
(4) Glow Plug Connector
(5) Crankshaft Position Sensor Connector
(6) Rail Sensor Connector
(7) Suction Control Valve Connector
(8) Camshaft Position Sensor

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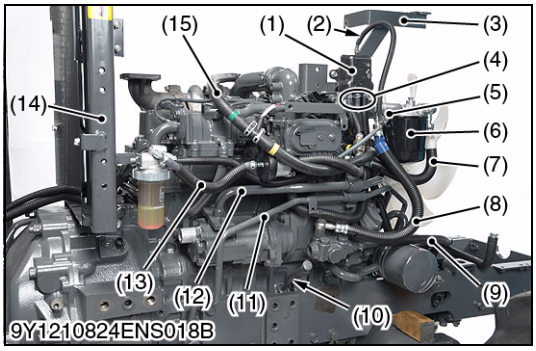

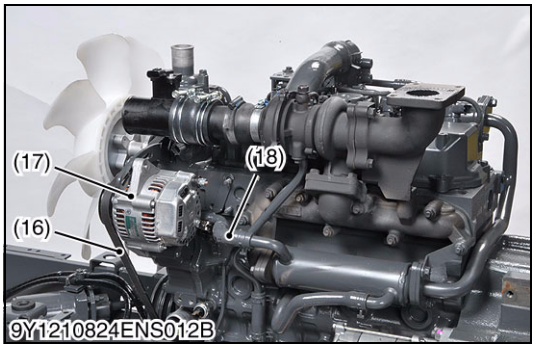

Fuel Hoses and Pillar

1. Disconnect the overflow hose (2), fuel hoses (4), then remove the support (3) together with fuel sub tank (1).
2. Disconnect the overflow hose (5) and fuel hose (7), (8), (9), (13).
3. Disconnect the power steering delivery pipe (11).
4. Remove the power steering return pipe (12).
5. Remove the dipstick stay (10).
6. Remove the heater hose (15).
7. Remove the pillar (14).
8. Remove the fan belt (16) and alternator (17).
9. Remove the EGR cooler hose (18) and cooler pipe.

(When reassembling)

- Be sure to adjust the fan belt tension. (See page 1-S14.)

Tightening torque	Joint bolt for power steering delivery pipe	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Retaining nut of power steering delivery pipe	49 to 58 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
	Alternator mounting screw (M10)	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
	Tension adjusting Screw (M8)	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Fuel Sub Tank
(2) Overflow Hose
(3) Support
(4) Fuel Hose
(5) Overflow Hose
(6) Fuel Filter
(7) Fuel Hose
(8) Fuel Hose
(9) Fuel Hose
(10) Dipstick Stay
(11) Power Steering Delivery Pipe
(12) Power Steering Return Pipe
(13) Fuel Hose
(14) Pillar
(15) Heater Hose
(16) Fan Belt
(17) Alternator
(18) EGR Cooler Hose

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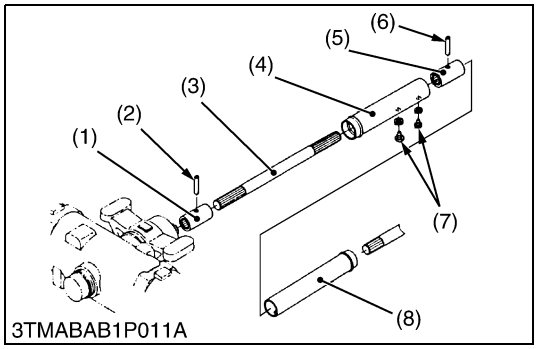

Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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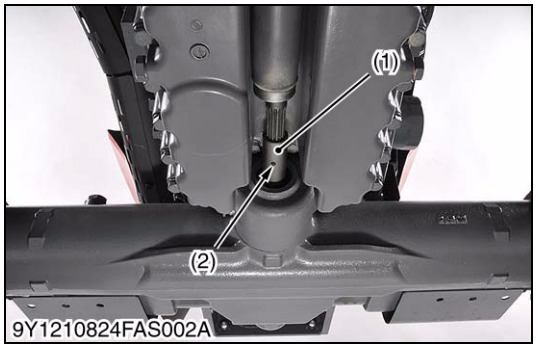
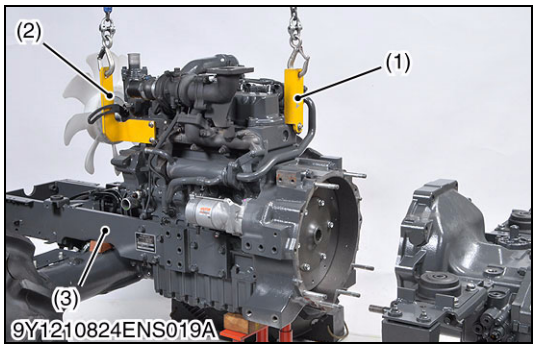


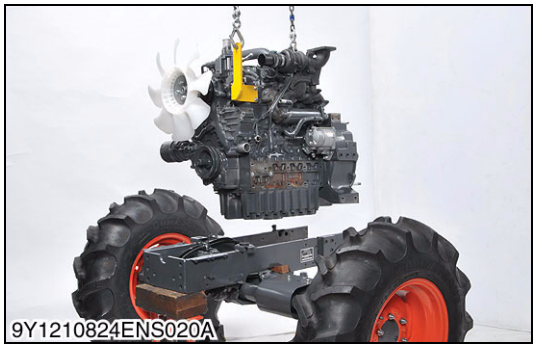
Separating Engine from Clutch Housing and Front Axle Frame

1. Place the disassembling stands under the engine and clutch housing.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine and clutch housing.
4. [L3560]
   Remove one of the two engine hooks attached on the left side of the engine and install it on the right rear side of the engine.
   [except L3560]
   Install the engine hooks (1), (2). (See page G-61, G-62.)
5. Hold the engine by the hoist chain hooked on the engine hooks (1) and (2).
6. Remove the engine mounting screws.
7. Lift up the engine to separate from the front axle frame (3).

(When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1211 or equivalent) to joint face of the flywheel housing and clutch housing.





Tightening torque	Engine and clutch housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Engine and clutch housing mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Front axle frame mounting screw (7T)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Front axle frame mounting screw (9T)	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

(1) Engine Hook
(2) Engine Hook
(3) Front Axle Frame

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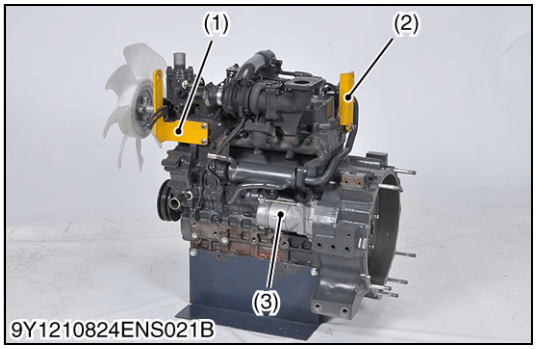
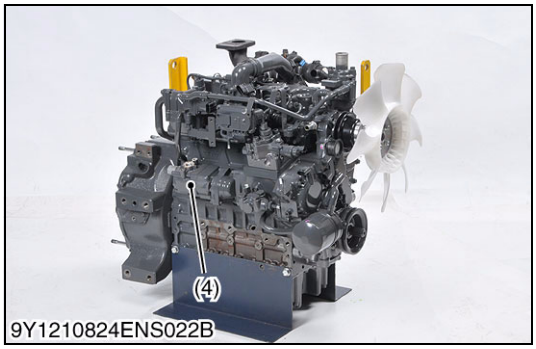
6. DISASSEMBLING AND ASSEMBLING

[1] OUTER PARTS





Outer Parts of Engine

1. Remove the engine hooks (1) and (2).
2. Remove the starter motor (3).
3. Remove the hydraulic pump (4) with pump holder and regulating valve. [Manual Transmission and GST]
   Remove the hydraulic pump (4) with pump holder. [HST]

(1) Engine Hock
(2) Engine Hook
(3) Starter Motor
(4) Hydraulic Pump

9Y1210824ENS0028US0

[2] CLUTCH ASSEMBLY

Clutch Assembly (Manual Transmission and GST)

1. Remove the clutch from the flywheel.

(When reassembling)

- Direct the shorter end of the clutch disc boss toward the flywheel.
- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Install the pressure plate, noting the position of straight pins.

■ **IMPORTANT**

- **Align the center of disc and flywheel by inserting the clutch center tool. (See page G-63.)**

■ **NOTE**

- **Do not allow grease and oil on the clutch disc facing.**

9Y1210824CLS0026US0

[3] TURBOCHARGER AND EGR

■ **NOTE**
- **When you remove or install the turbocharger assembly, do not let dust, dirt and other unwanted materials in the oil pipes.**
- **After you replace the turbocharger assembly, fill clean engine oil through the oil filter port of the turbocharger.**
- **Before you start the engine, make sure that the air cleaner is in the correct position.**

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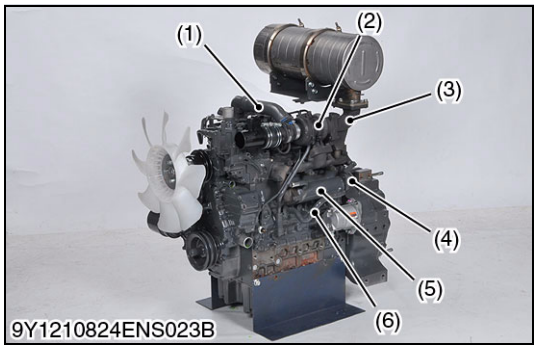

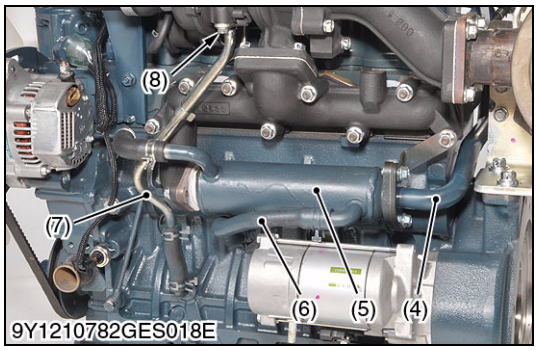

EGR Pipe, Turbocharger and EGR Cooler

1. Remove the intake hose (1).
2. Remove the muffler flange (3).
3. Remove the screw (8) for the oil return pipe (7).
4. Remove the oil return pipe (4).
5. Remove the turbocharger assembly (2).
6. Remove the EGR pipe (4).
7. Remove the EGR cooler hose (6).
8. Remove the EGR cooler (5).

(When reassembling)
- Fill clean engine oil through the oil filter port of the turbocharger.
- Replace the gaskets with new ones.
- Do not to let dust, dirt and other unwanted materials in the oil pipes.

■ **NOTE**
- **Put tape or cover on all openings to prevent damage in the oil holes in the turbocharger by unwanted materials.**

(1) Intake Hose
(2) Turbocharger Assembly
(3) Muffler Flange
(4) EGR Pipe
(5) EGR Cooler
(6) EGR Hose
(7) Oil Return Pipe
(8) Screw

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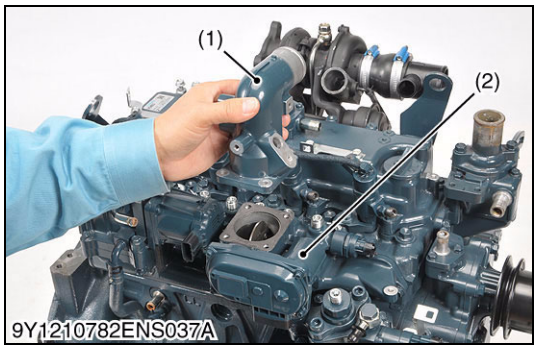

Intake Throttle Valve

1. Remove the air cleaner flange (1).
2. Remove the intake throttle valve (2).

■ **NOTE**
- **Do not disassemble the intake throttle valve.**

(When reassembling)
- Replace the gaskets with new ones.

(1) Air Cleaner Flange
(2) Intake Throttle Valve

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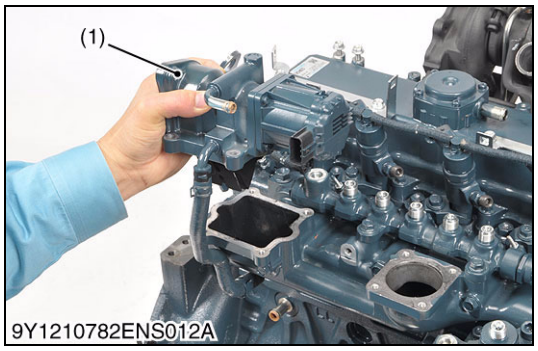

EGR Valve

1. Disconnect the cooler pipe of EGR valve.
2. Remove the EGR valve (1).

■ **NOTE**
- **Do not disassemble the EGR valve assembly.**

(When reassembling)
- Replace the gaskets with new ones.

(1) EGR Valve

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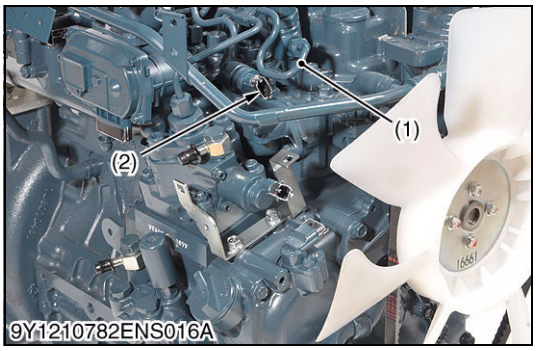
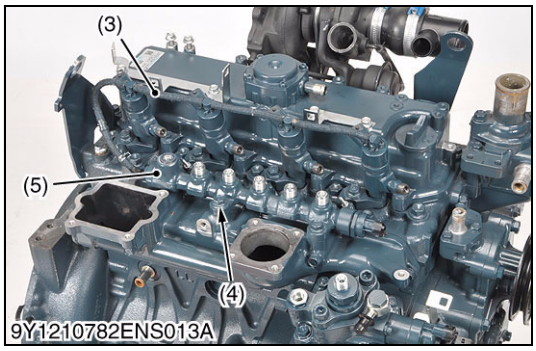
[4] COMMON RAIL





Common Rail and Injection Pipes

CAUTION

- **Do not loosen the injection pipe when the fuel is under high pressure (within five minutes of stopping the engine).**

NOTE

- **Do not remove the pressure limiter (5) and rail pressure sensor (2) from the common rail (4).**
- **When removing the common rail (4), do not hold it by the pressure limiter (5) and rail pressure sensor (2).**

1. Remove the injection pipes (1).
2. Remove the overflow pipe (3).
3. Remove the common rail (4).

IMPORTANT

- **Store the injection pipes (1) so it does not get any dust in it.**
- **Store the common rail (4) so it does not get any dust in it.**

(When reassembling)

NOTE

- **Tighten the injection pipes securely to their specified torques.**

Tightening torque	Common rail mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Injection pipe retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.6 lbf·ft

(1) Injection Pipe
(2) Rail Pressure Sensor
(3) Overflow Pipe
(4) Common Rail
(5) Pressure Limiter

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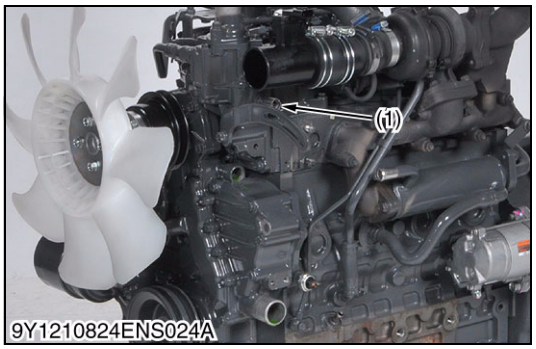

Coolant Temperature Sensor

1. Remove the coolant temperature sensor (1).

(When reassembling)

- Replace the O-ring with new ones.

Tightening torque	Coolant Temperature Sensor taper screw	16 to 23 N·m 1.6 to 2.4 kgf·m 12 to 17 lbf·ft

(1) Coolant Temperature Sensor

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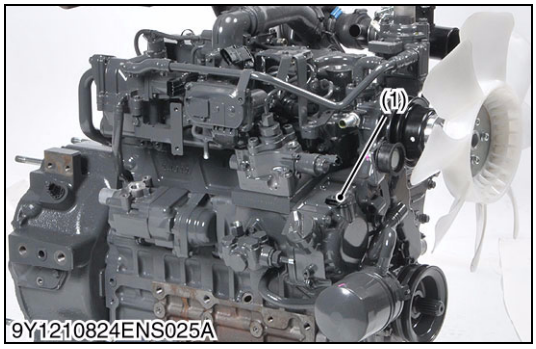


Camshaft Position Sensor

1. Remove the camshaft position sensor mounting screw.
2. Remove the camshaft position sensor (1).

(When reassembling)

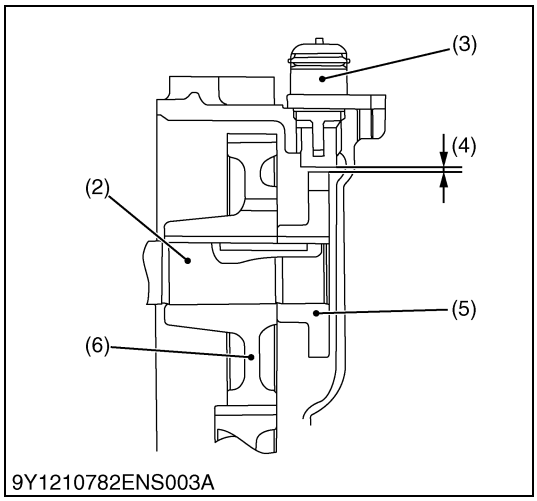
- Replace the O-ring with a new one.

Air Gap	Factory specification	0.2 to 1.3 mm 0.008 to 0.059 in.

Tightening torque	Camshaft position sensor mounting screw	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

■ **IMPORTANT**

- **If you drop the sensor, do not reuse it.**



(1) Camshaft Position Sensor
(2) Fuel Camshaft
(3) Sensor
(4) Air Gap
(5) Pulsa Cam
(6) Supply Pump Gear

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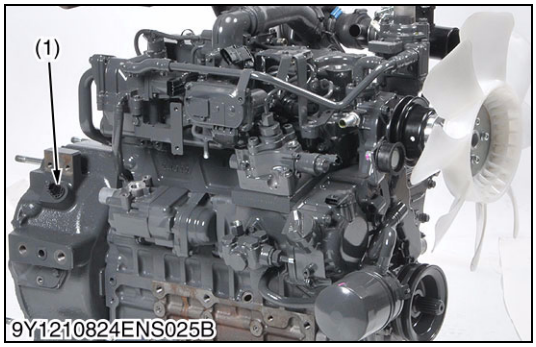


Crankshaft Position Sensor

1. Remove the crankshaft position sensor mounting screw.
2. Remove the crankshaft position sensor (1).

(When reassembling)

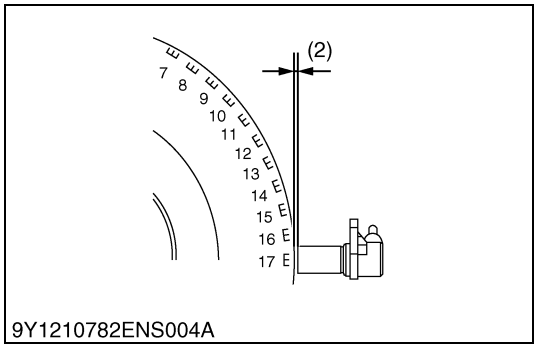
- Replace the O-ring with a new one.

■ **IMPORTANT**

- **If you drop the sensor, do not reuse it.**

Air Gap	Factory specification	0.3 to 1.5 mm 0.002 to 0.059 in.

Tightening torque	Crankshaft position sensor mounting screw	4 to 6 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft



(1) Crankshaft Position Sensor
(2) Air Gap

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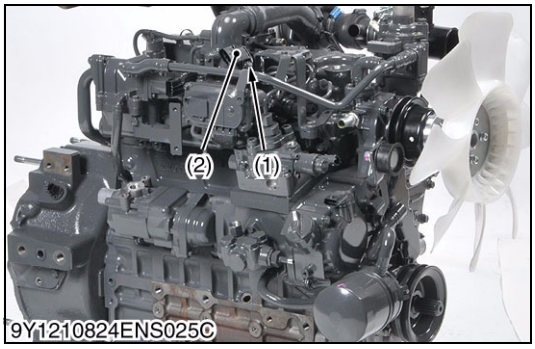

Boost Sensor

■ **IMPORTANT**
- **Be careful not to damage the sensor when removing the boost sensor.**

1. Remove the boost sensor mounting screw (1).
2. Remove the boost sensor (2).

(When reassembling)
- Replace the O-ring with new ones.

Tightening torque	Boost sensor mounting screw	0.98 to 1.7 N·m 0.10 to 0.18 kgf·m 0.73 to 1.3 lbf·ft

(1) Boost Sensor Mounting Screw (2) Boost Sensor

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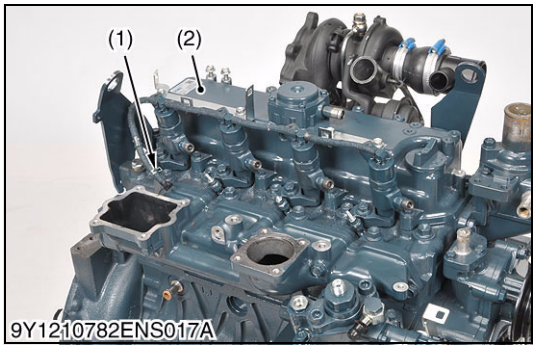
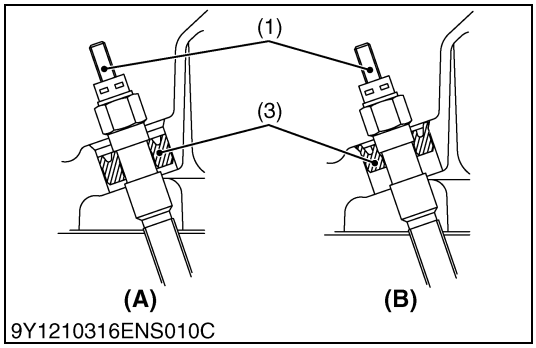
[5] CYLINDER HEAD AND VALVES





Cylinder Head Cover and Glow Plug

1. Remove the glow lead and the glow plugs (1).
2. Remove the cylinder head cover (2).

(When reassembling)
- Check to see that the cylinder head cover gasket is not detective.
- Tighten the head cover mounting screws to specified torque.
- Replace the gasket of cylinder head cover with a new one.
- Adjust the direction of the ditch to the terminal side when the seal (3) is installed in the glow plug (1).
- After installing the glow plug (1), make sure that the seal (3) was set to the specified position.

Tightening torque	Cylinder head cover screw	6.86 to 11.3 N·m 0.700 to 1.15 kgf·m 5.06 to 8.33 lbf·ft
	Glow lead mounting nut	0.98 to 1.7 N·m 0.10 to 0.18 kgf·m 0.73 to 1.3 lbf·ft
	Glow plug	15 to 19 N·m 1.5 to 2.0 kgf·m 11 to 14 lbf·ft

(1) Glow Plug
(2) Cylinder Head Cover
(3) Seal
(A) Good
(B) Bad

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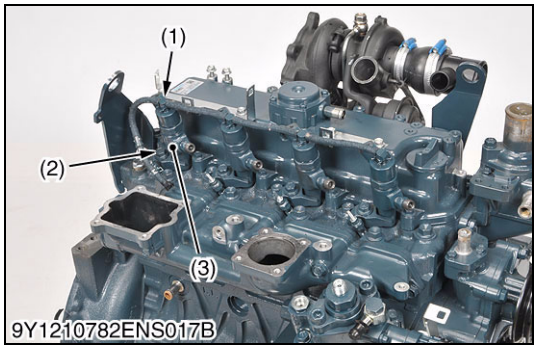

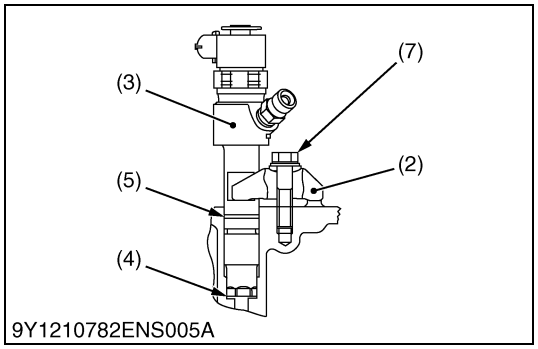

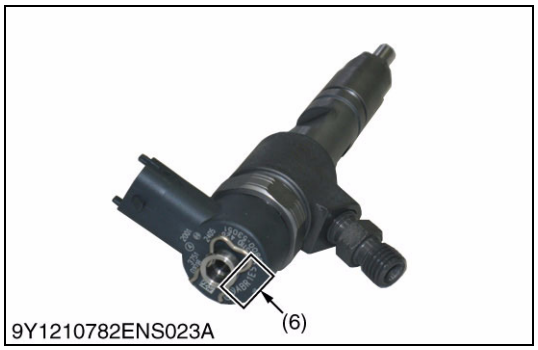

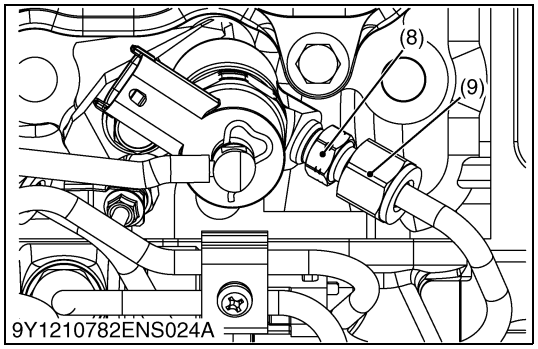

Overflow Pipe and Injectors

1. Remove the overflow pipe (1).
2. Remove the injector clamp (2).
3. Remove the injector (3) and its gasket (4).

■ **IMPORTANT**

- **Do not disassemble the injector (3).**
- **Do not remove the injector QR code tag (6).**
- **Do not damage the injector QR code tag (6).**
- **Do not get the injectors out of order. If the injectors get out of order, it is necessary to perform injector correction (writing the injector ID codes (6) to the engine ECU).**
- **Store the injectors so they do not get any dust in them.**

(When reassembling)

1. Attach the O-ring (5) to the correct position on the injector (3).
2. After attaching gasket (4) to the injector (3), attach the injector (3) to the cylinder head.
3. Correctly set the clamp (2) as shown in the drawing.
4. Attach the injector with screws (7) as shown in the drawing.
5. Check that the injector (3) is attached securely.

■ **NOTE**

- **Do not remove the injector dust protection cap until immediately before you attach the injection pipe.**
- **To prevent the injector inlet connector from turning when removing the injection pipe cap nut (9), use a counter wrench.**
  When the inlet connector (8) becomes loose, replace the injector.

■ **NOTE**

- **If you replace the injectors, it is necessary to perform injector correction (writing the injector ID codes (6) to the engine ECU).**

Tightening torque	Injector clamp screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Injection pipe cap nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.6 lbf·ft

(1) Overflow Pipe
(2) Injector Clamp
(3) Injector
(4) Gasket
(5) O-ring
(6) Injector ID Code
(7) Injector Clamp Screw
(8) Inlet Connector
(9) Injection Pipe Cap Nut

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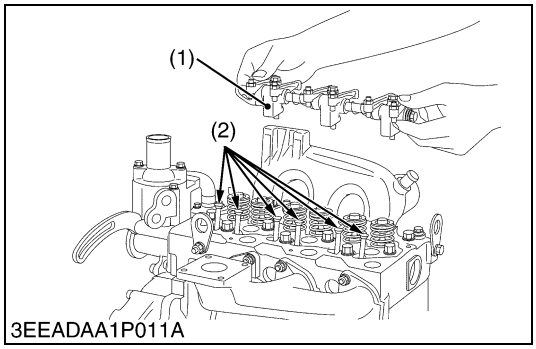

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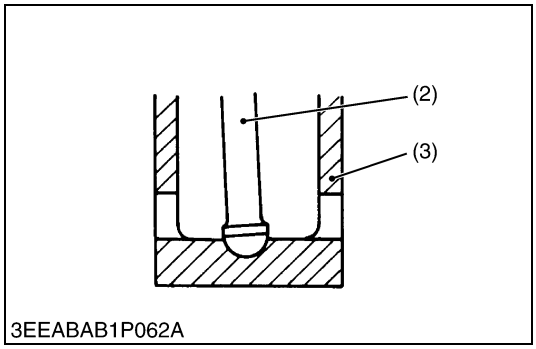

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Rocker Arm and Push Rods

1. Remove the screws of the rocker arm bracket.
2. Remove the rocker arm assembly (1).
3. Remove the push rods (2).

(When reassembling)

- When you put the push rods (2) on the tappets (3), make sure that their ends are correctly engaged with the grooves.

■ **IMPORTANT**

- **After you install the rocker arm, adjust the valve clearance.**

Tightening torque	Rocker arm bracket screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Rocker Arm Assembly
(2) Push Rod
(3) Tappet

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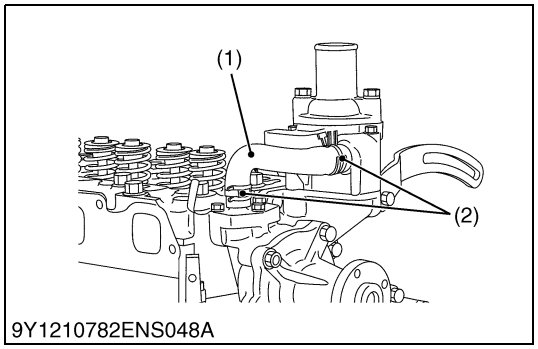

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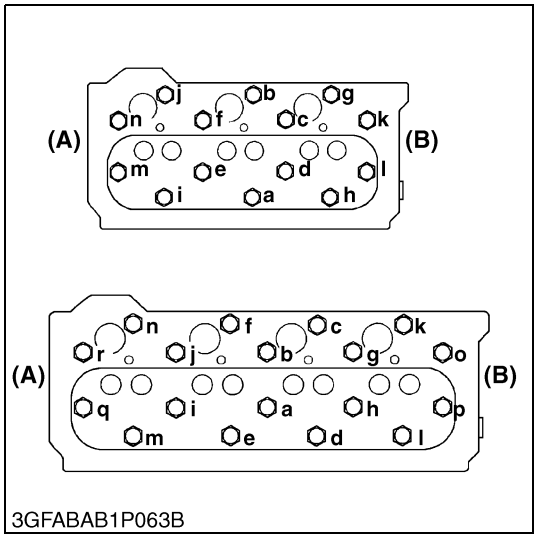

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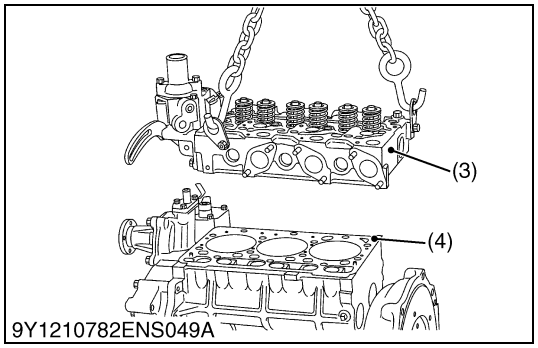

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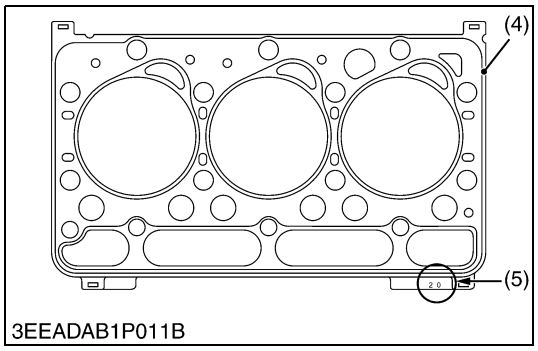

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Cylinder Head

1. Remove the cylinder head screw in the sequence of **(n or r)** to **(a)**.
2. Lift up the cylinder head (3) to remove.
3. Remove the cylinder head gasket (4).

(When reassembling)

- Replace the cylinder head gasket (4) with a new one.
- Apply sufficient oil and tighten the cylinder head screws.
- Tighten the cylinder head screws in a diagonal sequence. Start from the center in the sequence of **(a)** to **(n or r)**.
- Tighten them equally, or the shape of the head changes after some time.

Tightening torque	Cylinder head screw	93.2 to 98.1 N·m 9.50 to 10.0 kgf·m 68.8 to 72.3 lbf·ft

■ **IMPORTANT**

- **Before you replace the cylinder head gasket (4), record the mark (5) on the cylinder head gasket of the engine. Then replace a cylinder head gasket with same mark.**

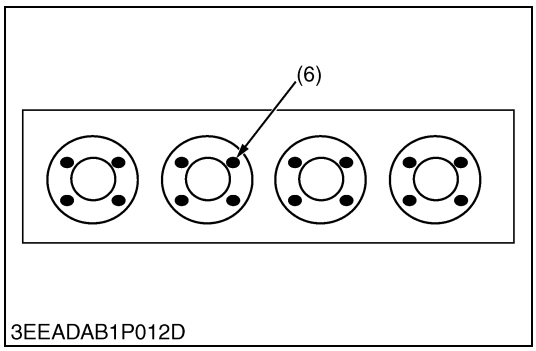
Gasket Mark and Code Number	Model	
	D1803-CR-E4	V2403-CR-E4, V2403-CR-TE4
15	1G750-03600	1G790-03600
20	1G750-03310	1G790-03310
25	1G750-03610	1G790-03610
30	1G750-03620	1G790-03620
35	1G750-03630	1G790-03630

(1) Water Return Pipe
(2) Pipe Clamp
(3) Cylinder Head
(4) Cylinder Head Gasket
(5) Mark

(n or r) to (a) : To Loosen
(a) to (n or r) : To Tighten
(A) Gear Case Side
(B) Flywheel Side

(To be continued)

(Continued)



■ **IMPORTANT**

- **After you replace an item below, you have to select a cylinder head gasket.**
  - **Piston**
  - **Piston pin**
  - **Small end bushing**
  - **Connecting rod**
  - **Crankpin bearings**

To select the cylinder head gasket

1. Measure the protrusion or recess of the piston head from the level of crankcase cylinder face at 4 points per each piston with a dial gauge.
2. Get the average of the measurements.
3. Use the table below to select an applicable cylinder head gasket.

Gasket Dimension (Number)	Piston Protrusion
15	0.475 to 0.525 mm 0.0187 to 0.0206 in.
20	0.525 to 0.575 mm 0.0206 to 0.0227 in.
25	0.575 to 0.625 mm 0.0227 to 0.0246 in.
30	0.625 to 0.675 mm 0.0246 to 0.0266 in.
35	0.675 to 0.725 mm 0.0266 to 0.0285 in.

(6) Points of Measurement

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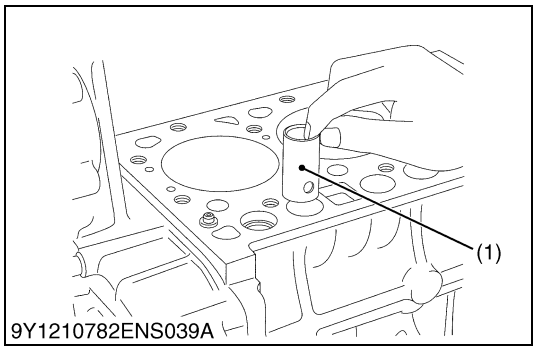

Tappets

1. Remove the tappets (1) from the crankcase.

(When reassembling)

- Before you install the tappets, apply a thin layer of engine oil around them.
- Examine the contact between tappets and cams that it turns correctly. If it is damaged, replace the tappets.

■ **IMPORTANT**

- **Do not change the combination of tappet and tappet guide.**

(1) Tappet

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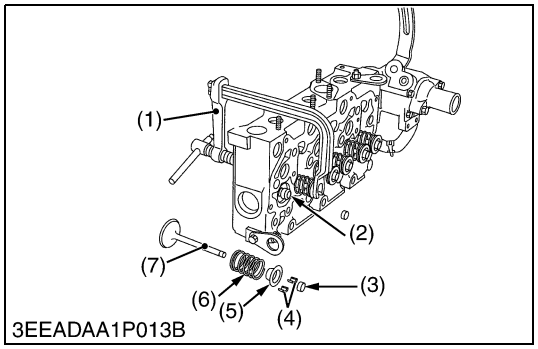

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Valves

1. Remove the valve caps (3).
2. Push the valve spring retainer with the valve spring replacer (1) and remove the valve spring collets (4).
3. Remove the valve spring retainer (5) and valve spring (6).
4. Remove the valve (7).

(When reassembling)

- Clean the valve stem and the valve guide hole, and apply engine oil sufficiently.
- After you install the valve spring collets (4), lightly tap the stem tip to attach it correctly with the plastic hammer.

■ **IMPORTANT**

- **Do not change the combination of valve and valve guide.**

(1) Valve Spring Replacer
(2) Valve Stem Seal
(3) Valve Cap
(4) Valve Spring Collet
(5) Valve Spring Retainer
(6) Valve Spring
(7) Valve

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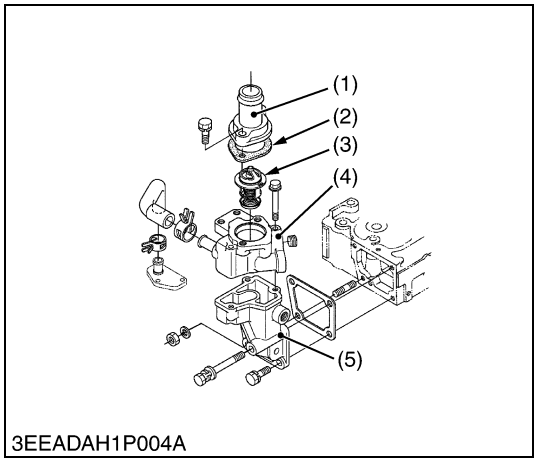
[6] THERMOSTAT



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Thermostat Assembly

1. Remove the thermostat cover mounting screws, and remove the thermostat cover (1).
2. Remove the thermostat assembly (3).

(When reassembling)

- Replace the thermostat cover gasket (2) with a new one.
- Apply a liquid gasket (Three Bond 1215 or equivalent) to the water flange 1 (4) and flange 2 (5).

(1) Thermostat Cover
(2) Thermostat Cover Gasket
(3) Thermostat Assembly
(4) Water Flange 1
(5) Water Flange 2

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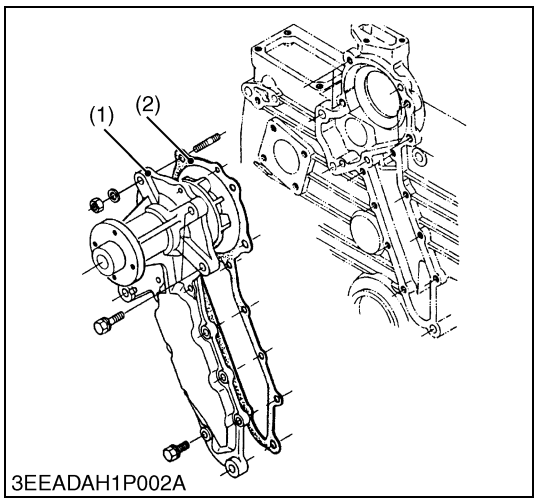

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Water Pump Assembly (If Necessary)

1. Remove the water pump assembly (1) from the gear case.

(When reassembling)

- Replace the gasket (2) with a new one.

(1) Water Pump Assembly
(2) Gasket

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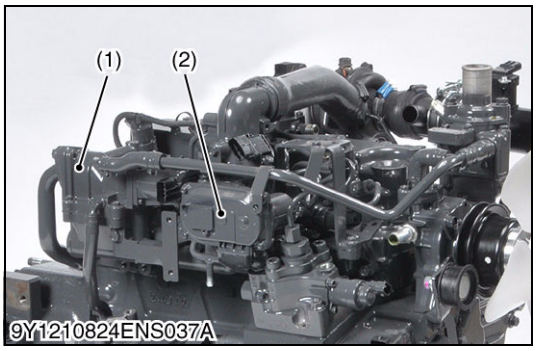
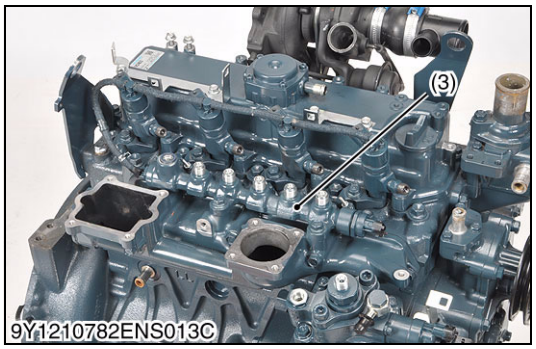
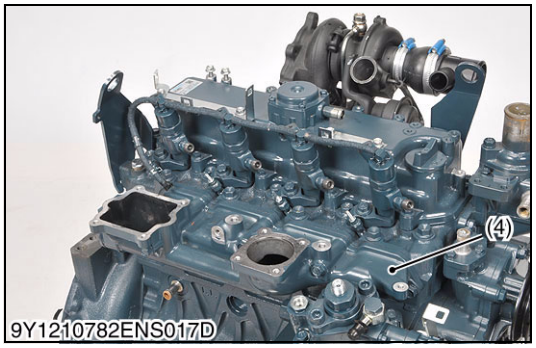
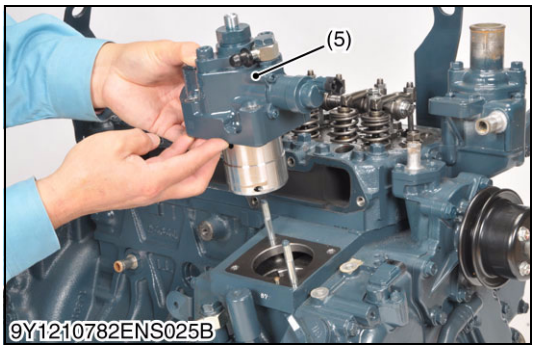
[7] SUPPLY PUMP









Supply Pump

CAUTION

- **Do not loosen the injection pipe when the fuel is under high pressure (Within five minutes of stopping the engine).**

1. Remove the intake throttle valve assembly (2).
2. Remove the EGR valve assembly (1).
3. Remove the rail (3).
4. Remove the intake manifold (4).
5. Remove the supply pump (5).

NOTE

- **Do not disassemble the supply pump.**
- **Store the supply pump so it does not get any dust in it.**

(When reassembling)

NOTE

- **When attaching the supply crank case, do not put force on the MPRP and overflow sections of the part.**
- **Do not remove the dust protection cap until immediately before you attach the part.**

Tightening torque	Supply pump mounting nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Injection pipe retaining nut	24.5 to 29.0 N·m 2.5 to 3.0 kgf·m 18.1 to 21.3 lbf·ft

(1) EGR Valve Assembly
(2) Intake Throttle Valve Assembly
(3) Rail
(4) Intake Manifold
(5) Supply Pump

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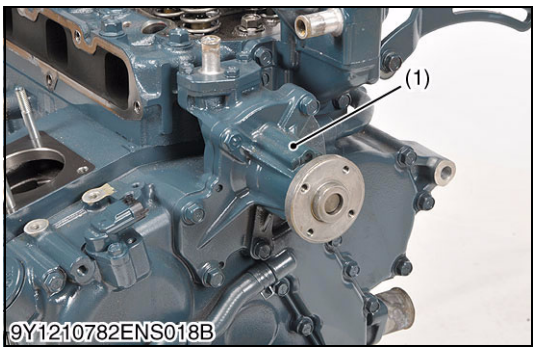
[8] WATER PUMP AND OIL COOLER



Water Pump

1. Remove the pipe band and the water pipe (water pump side).
2. Remove the water pump (1).

(When reassembling)

- When mounting the water pump, be careful not to forget mounting the O-ring and not to let it out of position.

(1) Water Pump

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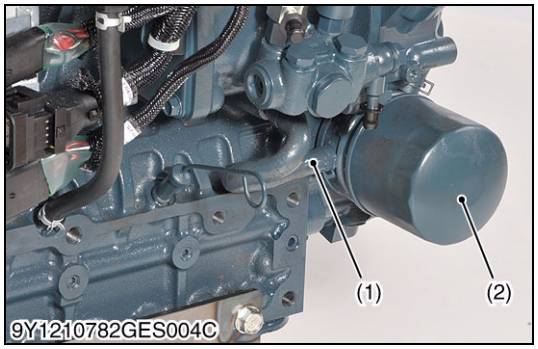

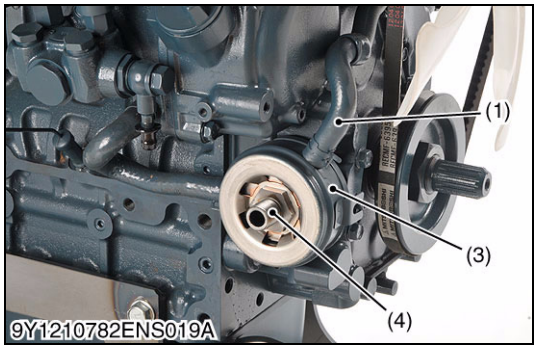

Oil Cooler

1. Remove the water pipe (1).
2. Remove the oil filter cartridge (2).
3. Remove the oil cooler joint screw (4).
4. Remove the oil cooler (3).

Tightening torque	Oil cooler joint screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Water Pipe
(2) Oil Filter Cartridge
(3) Oil Cooler
(4) Oil Cooler Joint Screw

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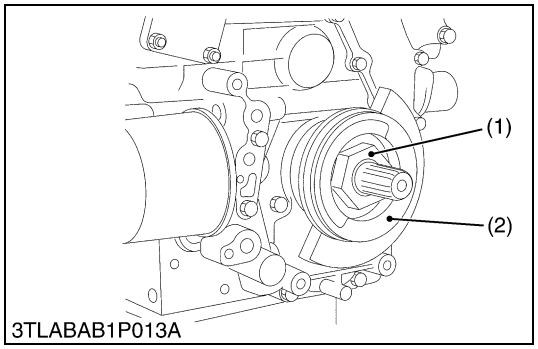
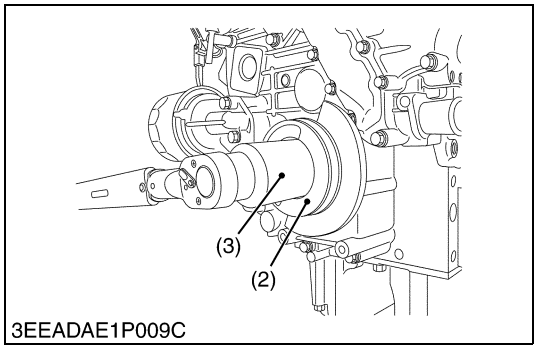
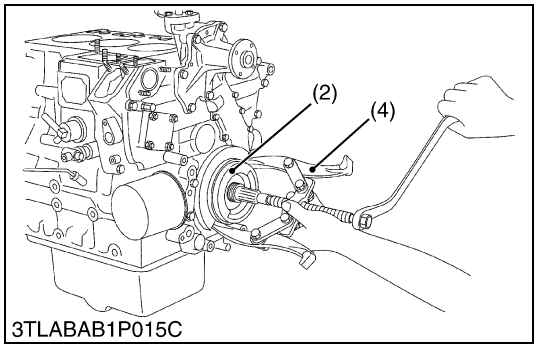
[9] GEAR CASE AND TIMING GEAR







Fan Drive Pulley

1. Lock the flywheel with the flywheel stopper.
2. Remove the mounting nut (1) of the fan drive pulley with a 46 mm (1.8 in.) deep socket wrench (3).
3. Remove the fan drive pulley (2) with a gear puller (4).
4. Remove the feather key.

(When reassembling)

- Apply grease to the splines of coupling.

Tightening torque	Mounting nut of fan drive pulley	138 to 156 N·m 14.0 to 16.0 kgf·m 102 to 115 lbf·ft

(1) Nut
(2) Fan Drive Pulley
(3) 46 mm (1.8 in.) Deep Socket Wrench
(4) Gear Puller

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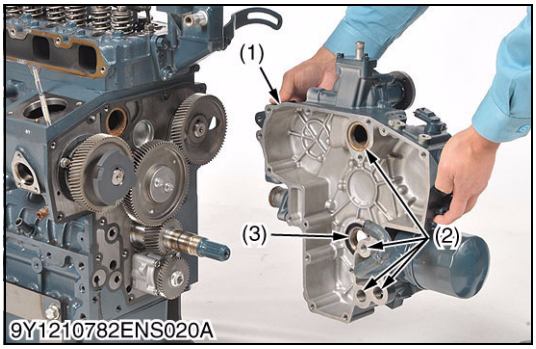

Gear Case

1. Remove the hour meter gear case (if attached).
2. Remove the gear case (1).
3. Remove the O-rings (2).

(When reassembling)

- Replace the gear case gasket and O-rings (2).
- Replace the hour meter gear case gasket with a new one.
- Make sure that there are 4 O-rings (2) in the gear case (1).
- Apply a thin layer of engine oil to the oil seal. Then install the oil seal not to come off the lip.
- Before you install the gear case gasket, apply an adhesive that does not become dry.

(1) Gear Case
(2) O-ring
(3) Oil Seal

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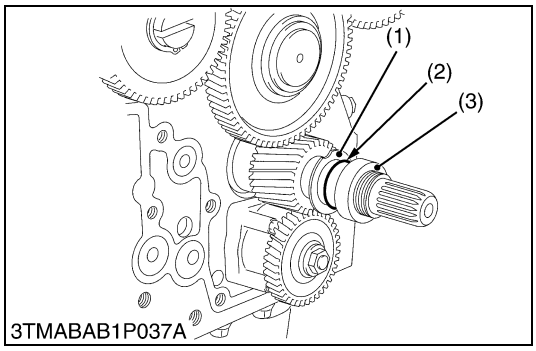

Crankshaft Oil Slinger

1. Remove the crankshaft collar (3).
2. Remove the O-ring (2).
3. Remove the crankshaft oil slinger (1).

(When reassembling)

- Attach the crankshaft collar (3) after you install the gear case to the cylinder body.

(1) Crankshaft Oil Slinger
(2) O-ring
(3) Crankshaft Collar

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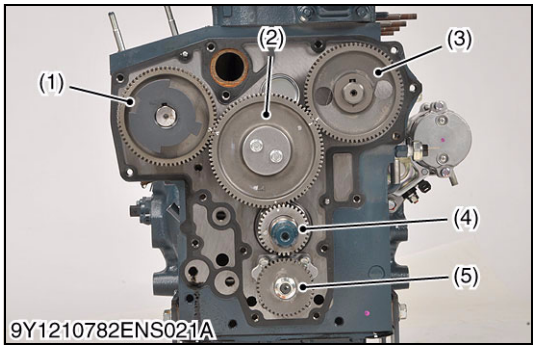

Idle Gear (D1803-CR-E4)

1. Remove the external snap ring.
2. Remove the idle gear collar.
3. Remove the idle gear (2).

(When reassembling)

- Align each gear with its mark.
  - Idle gear (2) and crank gear (4)
  - Idle gear (2) and cam gear (3)
  - Idle gear (2) and fuel supply pump gear (1)

(1) Fuel Supply Pump Gear
(2) Idle Gear
(3) Cam Gear
(4) Crank Gear
(5) Oil Pump Drive Gear

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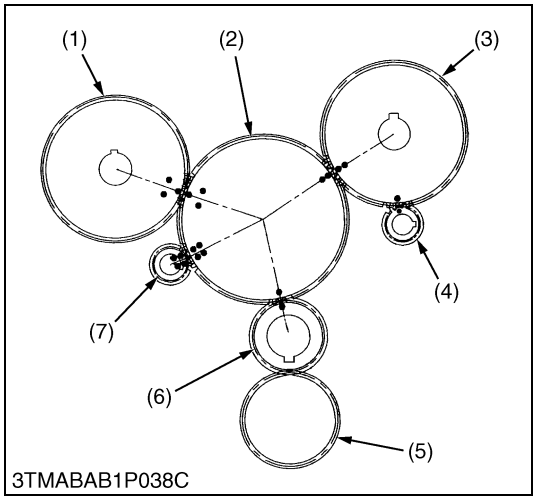

Idle Gear (V2403-CR-E4 and V2403-CR-TE4)

1. Remove the external snap ring.
2. Remove the idle gear collar.
3. Remove the idle gear (2).

(When reassembling)

- Check to see each gear is aligned with its aligning mark:
  - Idle gear (2) and crank gear (6), cam gear (3) and balancer gear (4)
  - Cam gear (3) and idle gear (2)
  - Idle gear (2) and fuel supply pump gear (1)
  - Idle gear (2) and balancer gear (7)

(1) Fuel Supply Pump Gear
(2) Idle Gear
(3) Cam Gear
(4) Balancer Gear
(5) Oil Pump Drive Gear
(6) Crank Gear
(7) Balancer Gear

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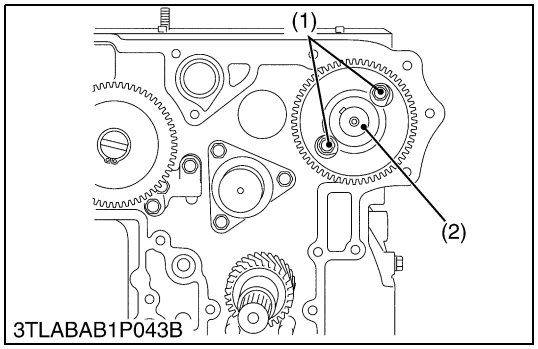

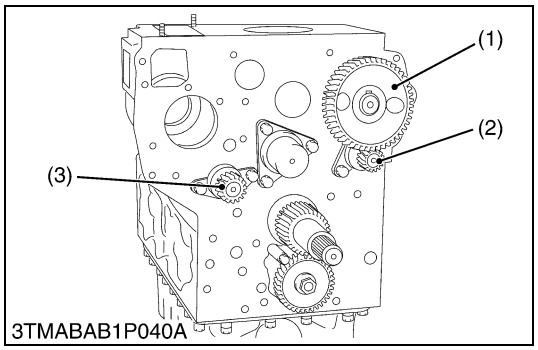

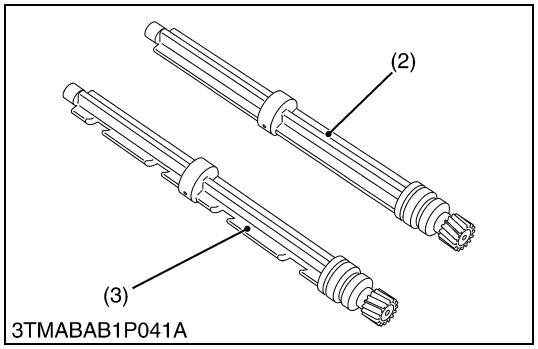

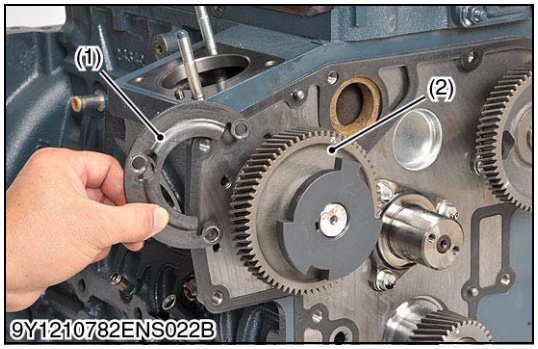

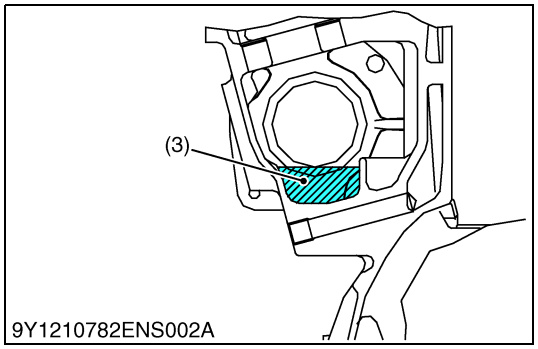

Camshaft (D1803-CR-E4)

1. Remove the camshaft set screws (1) and pull out the camshaft (2).

(When reassembling)

- When you install the idle gear, align the marks on the gears.

Tightening torque	Camshaft set screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Camshaft Set Screw (2) Camshaft

9Y1210824ENS0053US0

Camshaft and Balancer Shaft (V2403-CR-E4 and V2403-CR-TE4)

1. Remove the camshaft set bolts and draw out the camshaft (1).
2. Remove the balancer shaft 1 (2) set bolts and draw out the balancer shaft 1 (2).
3. Remove the balancer shaft 2 (3) set bolts and draw out the balancer shaft 2 (3).

(When reassembling)

- When install the balancer shaft 1 and 2, be sure to place the 4th cylinders piston at the top dead center in compression then, align all mating marks on each gear to assemble the timing gears, set the idle gear last.

Tightening torque	Camshaft set bolt	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Balancer shaft set bolt	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Camshaft (3) Balancer Shaft 2
(2) Balancer Shaft 1

9Y1210824ENS0124US0

Fuel Camshaft

1. Remove the fuel feed pump.
2. Remove the fuel camshaft stopper (1).
3. Pull out the fuel camshaft assembly (2).

(When reassembling)

- After attaching the fuel camshaft, store oil in the pump room as shown in drawing on the left.
- Recommended oil amount about 110 cc.

(1) Fuel Camshaft Stopper (3) Oil
(2) Fuel Camshaft

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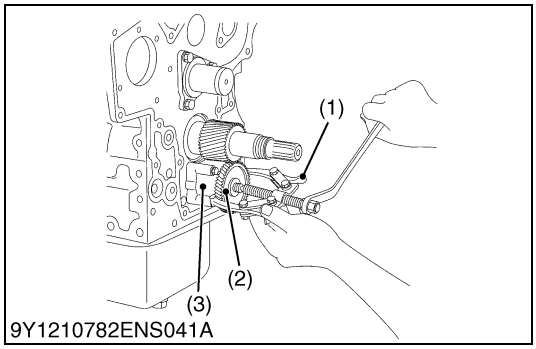

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Oil Pump

1. Remove the nut.
2. Pull out the oil pump drive gear (2) with a gear puller (1).
3. Remove the 4 mounting screws of the oil pump. Remove the oil pump (3).

(1) Gear Puller
(2) Oil Pump Drive Gear
(3) Oil Pump

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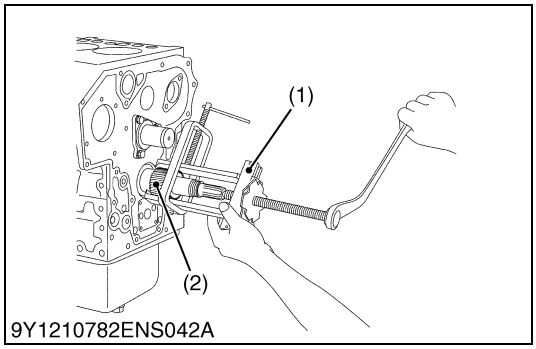

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Crank Gear

1. Pull out the crank gear (2) with a puller (1).
2. Remove the feather key.

(1) Puller
(2) Crank Gear

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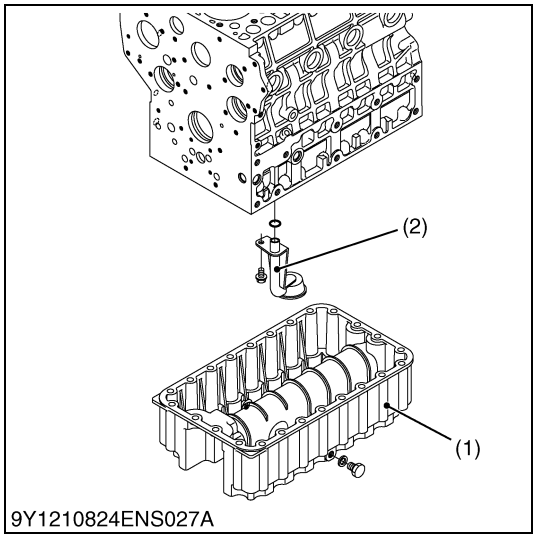
[10] PISTON AND CONNECTING ROD



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Oil Pan and Oil Strainer

1. Remove the oil pan mounting screws and remove the oil pan (1).
2. Remove the oil strainer mounting screw, and remove the oil strainer (2).

(When reassembling)

- When installing the oil strainer, be careful not to damage the O-ring.
- Apply liquid gasket (3) (Three Bond 1217H) to the oil pan as shown in the figure.
- Make sure that the liquid gasket coating surface is free of water, dust and oil in order to keep sealing effect.
- Carefully apply the adhesive evenly.

■ **NOTE**

- **Make sure the surfaces align when mounting parts with a liquid gasket applied to them.**
- **Mount parts with a liquid gasket within 10 minutes of application.**
- **Tighten the mounting screws of the oil pan in diagonal sequence from the center to tighten equally.**
- **After cleaning the oil strainer, install it.**
- **Attach the oil pan with its central drain plug facing toward the air suction side.**

(1) Oil Pan
(2) Oil Strainer
(3) Liquid Gasket

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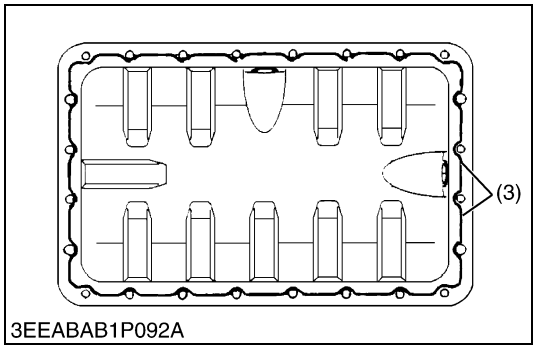

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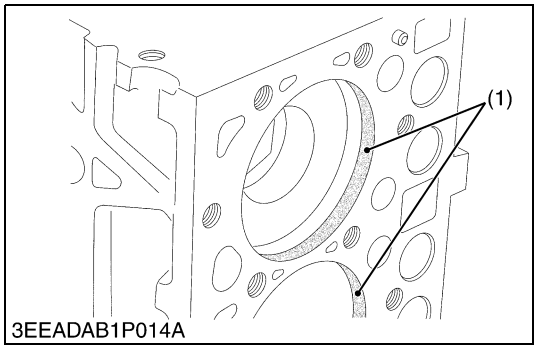

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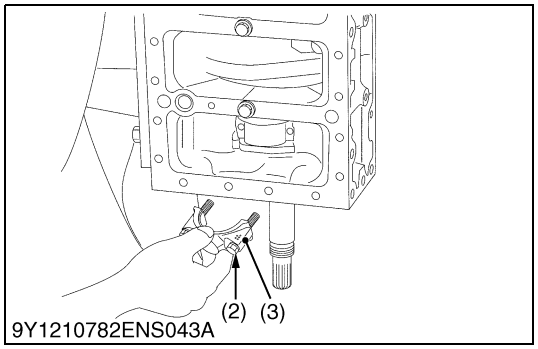

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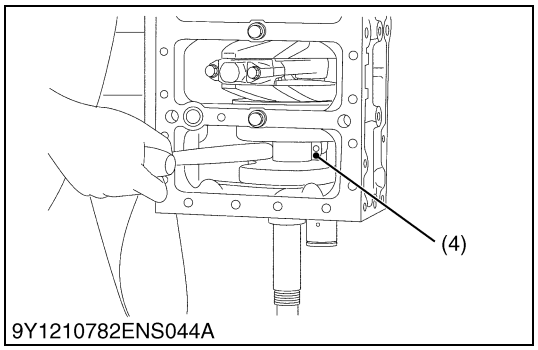

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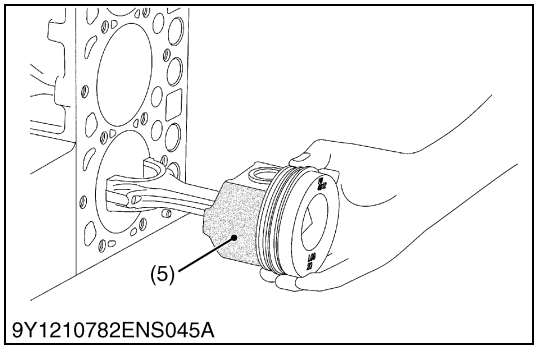

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Pistons

1. Fully clean the carbon (1) in the cylinders.
2. Remove the connecting rod cap (3).
3. Turn the flywheel and move the piston to top dead center.
4. Lightly tap the piston from the bottom of the crankcase with the grip of a hammer to pull the piston out.
5. Pull out the other piston in the same procedure as above.

(When reassembling)

- Before you install the piston into the cylinder, apply sufficient engine oil to the piston.
- When you install the piston into the cylinder, point the mark on the connecting rod to the fuel supply pump side.

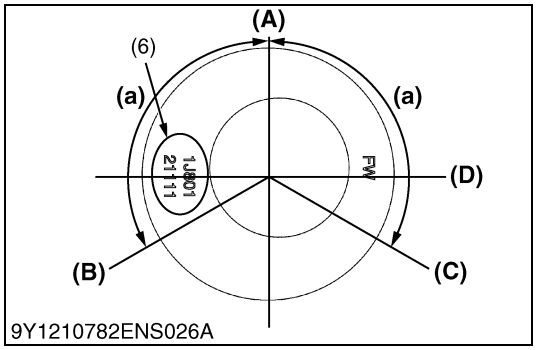
■ **IMPORTANT**

- **Do not change the combination of cylinder and piston. Align the position of each piston by its mark. For example, mark "1" on the No. 1 piston.**
- **Set the top ring with its gap (A) at 1.6 rad (90 °) from the direction of the piston pin.**
  Then set the second ring and the oil ring with their gaps (B), (C) at 2.09 rad (120 °) from the top ring gap (A). (See the figure.)
- **Install the pistons with a piston ring compressor (7) carefully.**
- **When you install the piston in position, do not give a damage to the layer of molybdenum disulfide on the piston skirt. This layer can decrease the clearance with the cylinder liner. Immediately after you press-fit the piston pin, the piston is hot and the layer comes off easily. Only put in the piston after its temperature decreases.**
- **When you replace the piston, look at the code number (6) on top of the piston. Use a replacement piston with the same code number.**

(1) Carbon
(2) Connecting Rod Screw
(3) Connecting Rod Cap
(4) Connecting Rod
(5) Layer of Molybdenum Disulfide

(To be continued)

(Continued)



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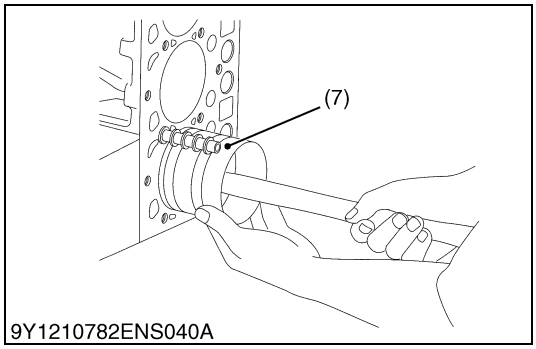

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Tightening torque	Connecting rod screw	40 to 45 N·m 4.1 to 4.5 kgf·m 30 to 33 lbf·ft

■ **NOTE**

- **Apply engine oil to the connecting rod screws and lightly screw it in by hand, then tighten it to the specified torque.**

(6) Code Number
(7) Piston Ring Compressor

(A) Top Ring Gap
(B) Second Ring Gap
(C) Oil Ring Gap
(D) Piston Pin Hole

(a) 2.09 rad (120 °)

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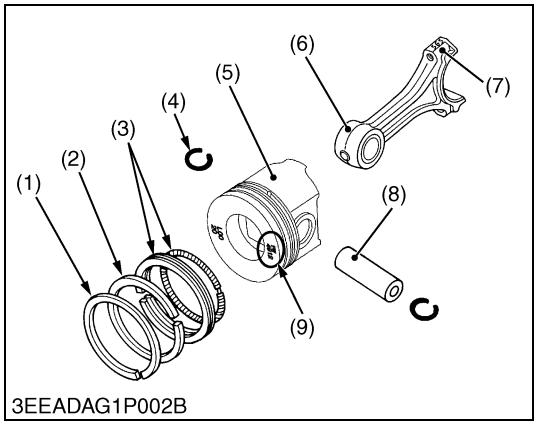

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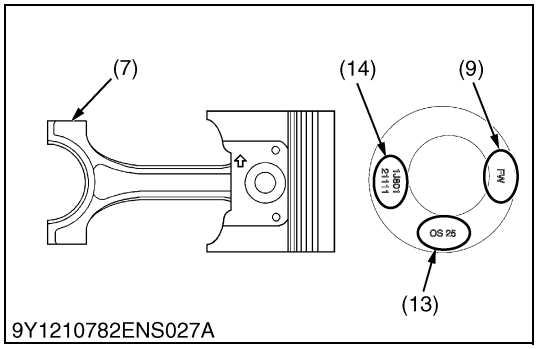

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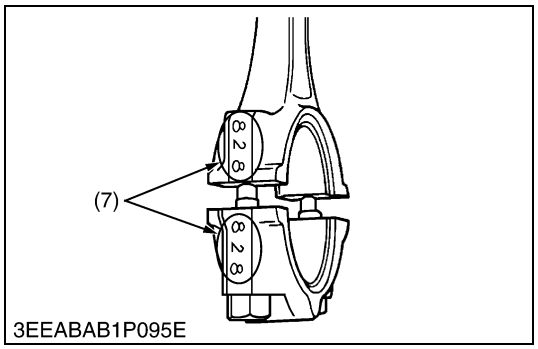

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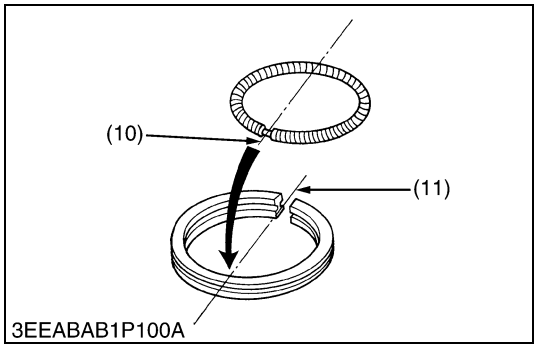

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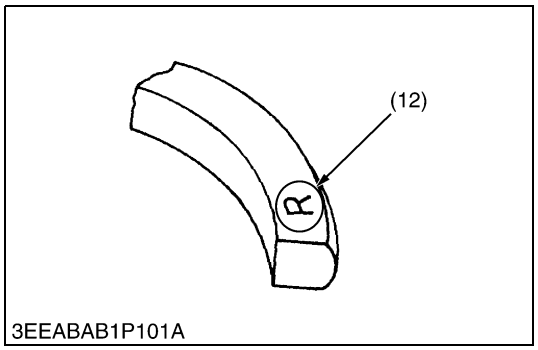

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Piston Ring and Connecting Rod

1. Remove the piston rings (1), (2) and (3) with a piston ring tool.
2. Remove the piston pin (8) to disconnect the connecting rod (6) from the piston (5).

(When reassembling)

- When you install the rings to the piston (5), set the manufacturer mark (12) upward.
- When you install the oil ring (3) on the piston (5), set the expander joint (10) on the opposite side of the oil ring gap (11).
- When you install the piston pin, put the piston fully in 80 °C (176 °F) oil for 10 to 15 minutes.
- Apply engine oil to the piston pin (8).
- When you connect the piston and connecting rod, set the FW mark (9) on the piston head to the flywheel side. When you install the piston into the cylinder, point the mark on the connecting rod to the fuel supply pump.

■ **NOTE**

- **Put a mark on the connecting rod (6) and the piston (5) with the same number to keep the same combination.**

(1) Top Ring
(2) Second Ring
(3) Oil Ring
(4) Piston Pin Snap Ring
(5) Piston
(6) Connecting Rod
(7) Mark
(8) Piston Pin
(9) FW Mark
(10) Expander Joint
(11) Oil Ring Gap
(12) Manufacturer Mark
(13) Over Size Mark
(14) Part Number

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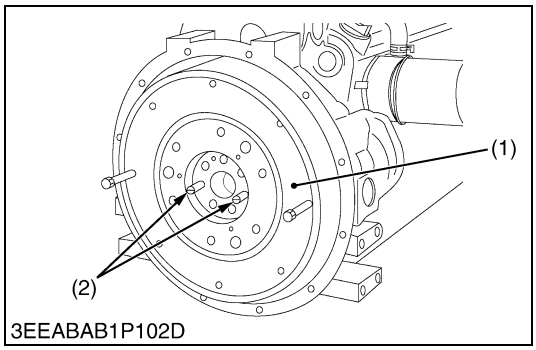
[11] FLYWHEEL AND CRANKSHAFT



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Flywheel

1. Attach the stopper to the flywheel (1).
2. Remove 2 flywheel screws.
3. Put the 2 flywheel guide screws (2) in the holes.
4. Remove all the flywheel screws.
5. Remove the flywheel (1) slowly along the flywheel guide screws (2).

■ **NOTE**
- **Do not use an impact wrench. Serious damage will occur.**

■ **IMPORTANT**
- **The flywheel is very heavy, so securely hold the flywheel when removing.**

(When reassembling)
- Put in 2 flywheel guide screws.
- Check that there are no metal particles that remain on the flywheel mounting surfaces.
- Apply engine oil to the threads and the flange seat face of the flywheel screw. Then attach the screw.

Tightening torque	Flywheel screw	98.1 to 107.9 N·m 10.0 to 11.0 kgf·m 72.4 to 79.58 lbf·ft

(1) Flywheel (2) Flywheel Guide Screw

9Y1210824ENS0060US0

Measuring Angular Deviation between Crankshaft TDC and Crank Position Sensor Detected TDC

■ **IMPORTANT**

- **Perform this correction every time the crank shaft or flywheel is replaced.**

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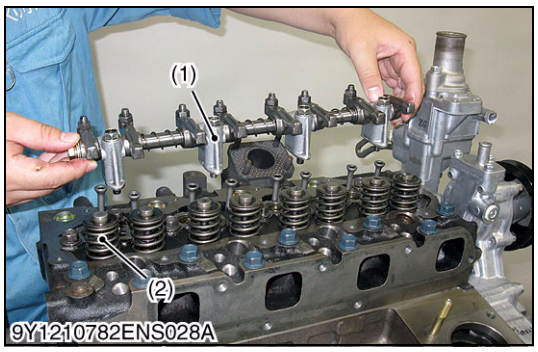

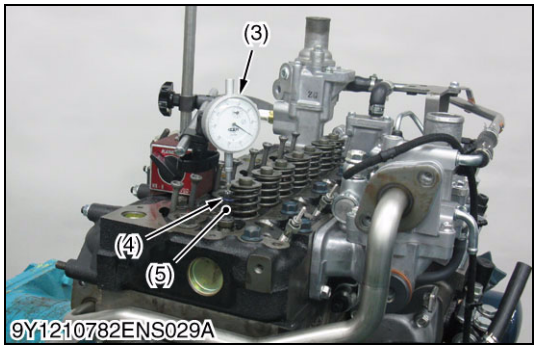

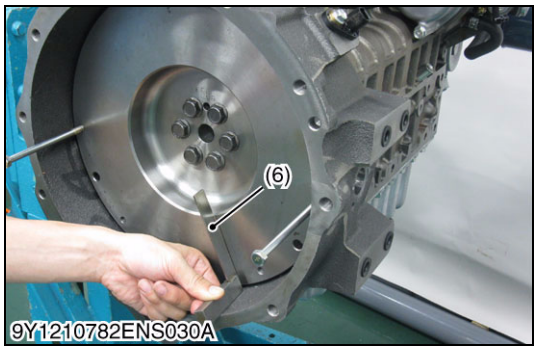

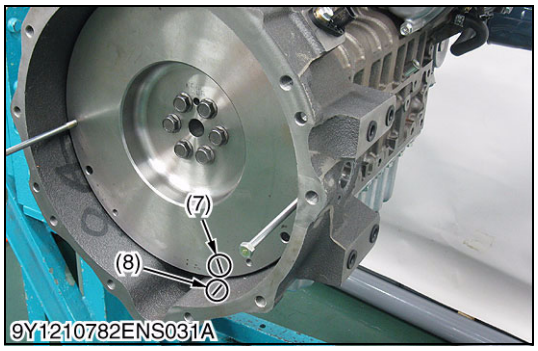

Confirmation of Top Dead Center

1. Remove the rocker arm (1). (See disassembling and assembling)
2. Align the #4 piston with top dead center and remove the valve spring (2) of the #4 cylinder
3. Insert an O-ring (4) to prevent the exhaust valve (5) from falling into the cylinder and position the dial gauge (3) at the tip of the valve.
4. While turning the flywheel to the left, the largest deflection of the needle on the gauge indicates top dead center so stop the flywheel in this position and set a tri-square (6) as indicated in the diagram and place a top dead center mark (7) on the reference line (8) and flywheel on the engine body side. Note, in the case the flywheel is turned too far, return it by turning to the right and start over.

(1) Rocker Arm
(2) Valve Spring
(3) Dial Gauge
(4) O-Ring
(5) Exhaust Valve
(6) Tri-square
(7) Mark for Top Dead Center
(8) Reference Line

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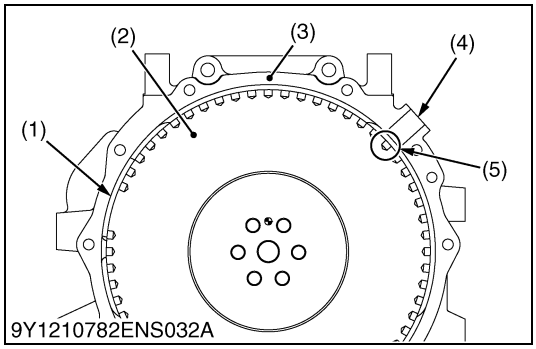

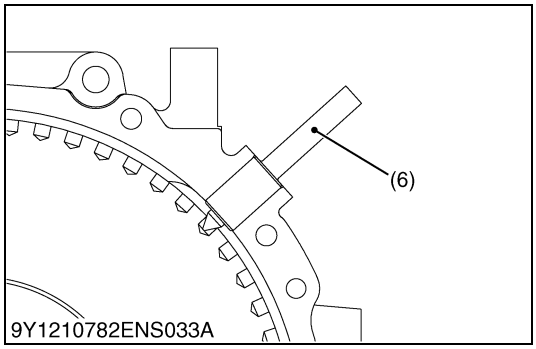

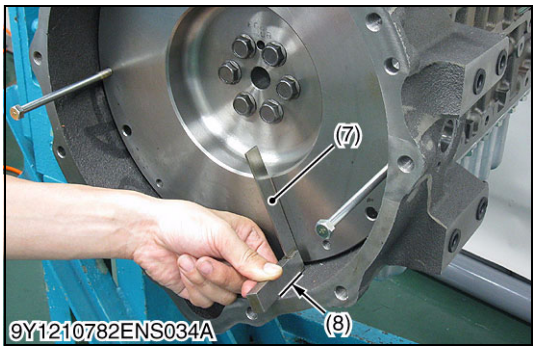

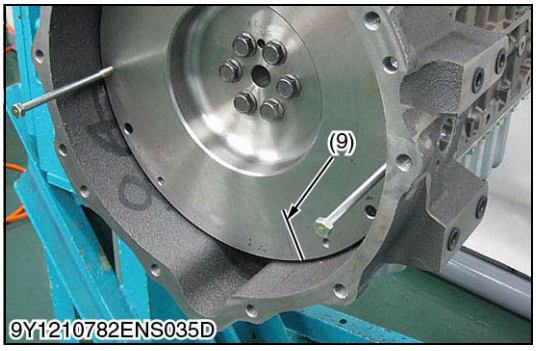

Confirmation of Crank Position Sensor Top Dead Center Detection Position

1. Align the reference (17th for 3 cylinder models or 20th for 4 cylinder models) pulser hole (5) from the area where there is no pulser hole (1) on the outer circumference of the flywheel (2) with the crank position sensor mounting hole (4) on the flywheel housing (3).
2. Insert a special tooling injection top correction jig (6) into the crank position sensor mounting hole and align the center of handle and pulser.
3. This position is the crank position sensor top dead center detection position so position the tri-square (7) on the reference line (8) set in the previous item and make a crank position sensor top dead center detection position mark (9) on the flywheel.

(1) Area where there is no pulser hole
(2) Flywheel
(3) Flywheel Housing
(4) Crank Position Sensor Mounting Hole
(5) Reference Pulser Hole
(17th: 3 Cylinder Models)
(20th: 4 Cylinder Models)
(6) Injection Top Correction Jig
(7) Tri-square
(8) Reference Line
(9) Mark of Crank Position Sensor Top Dead Center Detection Position

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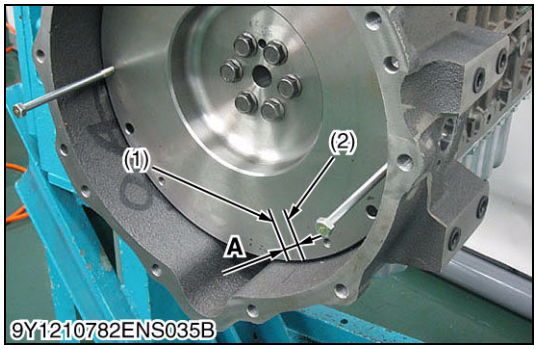

Fuel Injection Timing Correction Amount

The difference A between the top dead center mark (1) and the crank position sensor top dead center detection position mark (2) is the correction amount for fuel injection timing.

Calculate the correction value referencing the following and using a diagnostics tool, overwrite the injection timing correction amount in the "data overwrite/confirmation".

(Remarks)

- 1 mm = 360 ° / (Flywheel Diameter × π)
  (For example)
  FD = 300 mm → 1 mm = 0.38 °
  Correction amount (CA) = 0.38 × A (mm)
- If the crank position sensor top dead center detection position is in front of top dead center, enter a negative value.
- If the crank position sensor top dead center detection position is in back of top dead center, enter a positive value.

(1) Mark for Top Dead Center
(2) Mark of Crank Position Sensor Top Dead Center Detection Position

A: Correction amount (mm)

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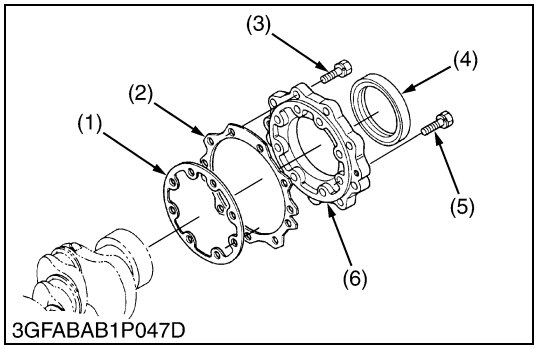


Bearing Case Cover

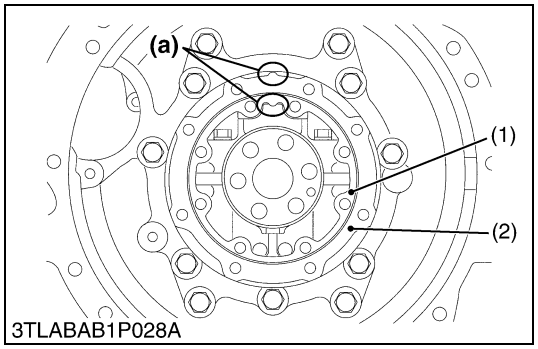
1. Remove the mounting screws of the bearing case cover. First, remove inner screws (5) and then external screws (3).
2. Remove the bearing case cover (6).

■ **IMPORTANT**

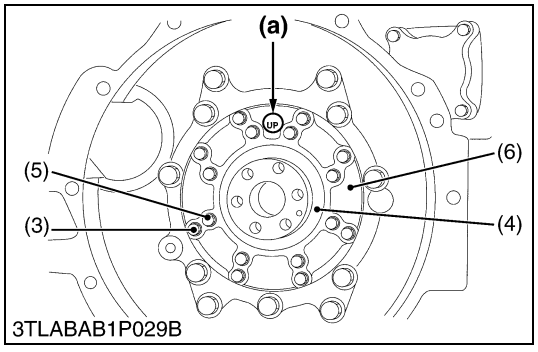
- **The length of inner screws (5) and external screws (3) are different. Make sure that you use the correct one at the correct position.**

(When reassembling)

- Attach the bearing case gasket (1) and the bearing case cover gasket (2) in the correct directions.
- Put the casting mark **"UP"** of the bearing case cover (6) upward, then install the bearing case cover.
- Apply a thin layer of engine oil to the oil seal.
  Then install the oil seal not to come off the lip.
- Tighten the mounting screws of the bearing case cover with an equal force on the diagonal line.



Tightening torque	Mounting screw of bearing case cover	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft



(1) Bearing Case Gasket
(2) Bearing Case Cover Gasket
(3) Mounting Screw of Bearing Case Cover
(4) Oil Seal
(5) Mounting Screw 1 of Bearing Case Cover
(6) Bearing Case Cover

(a) Upside

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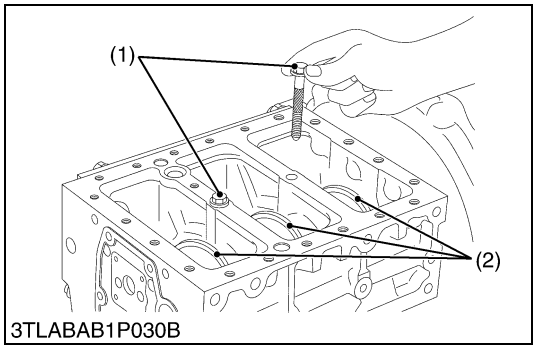

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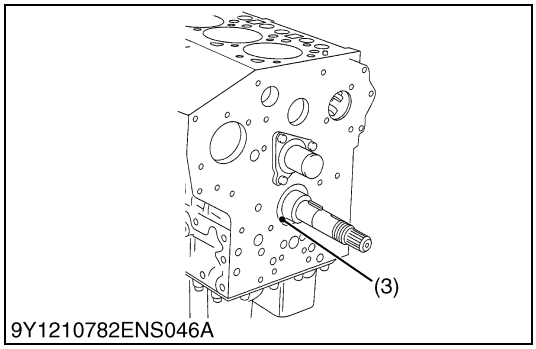

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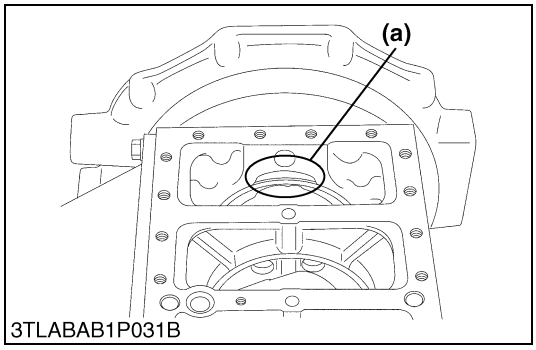

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Crankshaft

■ **NOTE**

- **Before you disassemble, measure the side clearance of crankshaft. Measure it when you assemble again.**

[D1803-CR-E4]

1. Remove the screw 2 (1) of the main bearing case.
2. Turn the crankshaft to set the crankpin of the third cylinder to the bottom dead center.
3. Pull out the crankshaft until the crankpin of the second cylinder comes to the center of the third cylinder.
4. Turn the crankshaft by 2.09 rad (120 °) counterclockwise to set the crankpin of the second cylinder to the bottom dead center.
5. Pull out the crankshaft until the crankpin of the first cylinder comes to the center of the third cylinder.
6. Do the above steps again to pull out the crankshaft completely.

[V2403-CR-E4, V2403-CR-TE4]

1. Remove the screw 2 (1) of the main bearing case.
2. Turn the crankshaft to set the crankpin of the fourth cylinder to the horizontal directions (right or left).
3. Hold the crankpins to the horizontal directions (right or left) and pull out the crankshaft completely.

(When reassembling)

■ **IMPORTANT**

- **When you install the crankshaft assembly, align the screw hole of the main bearing case 2 (2) with the screw hole of the cylinder block.**
- **Apply oil to the screw 2 (1) of the main bearing case and tighten the screw by hand.**
  If you cannot turn the screw 2 smoothly, align the screw holes between the cylinder block and the main bearing case correctly.
  Then tighten the screw 2 to the specified tightening torque with a torque wrench.

Tightening torque	Screw 2 of main bearing case	69 to 73 N·m 7.0 to 7.5 kgf·m 51 to 54 lbf·ft

(1) Screw 2 of Main Bearing Case
(2) Main Bearing Case 2
(3) Crankshaft Bearing 1
(a) Cut place to remove and install the crankshaft

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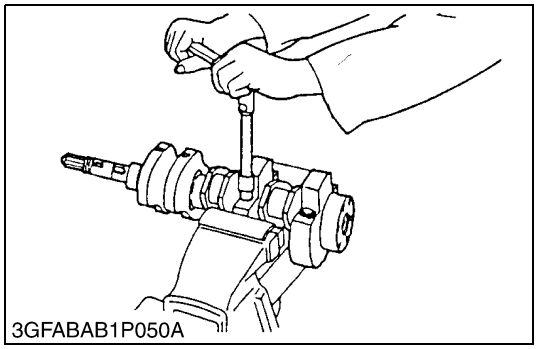
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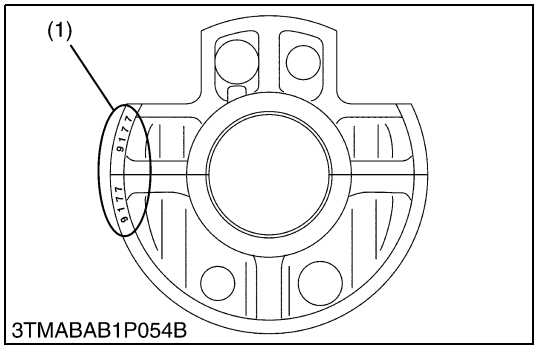

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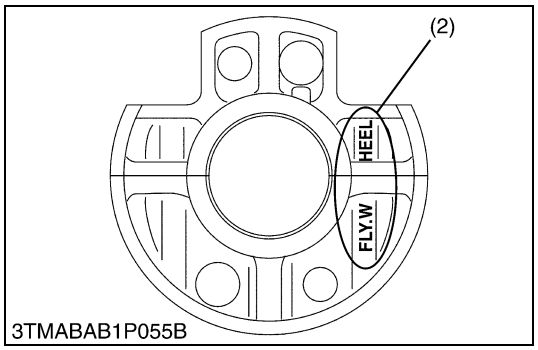

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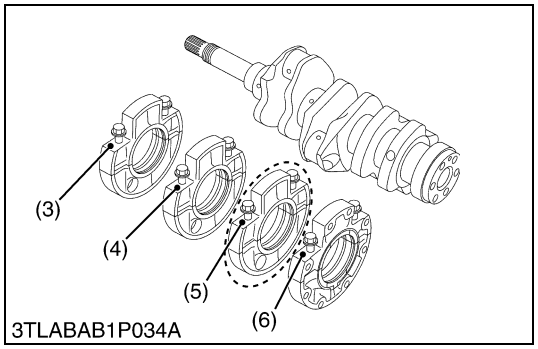

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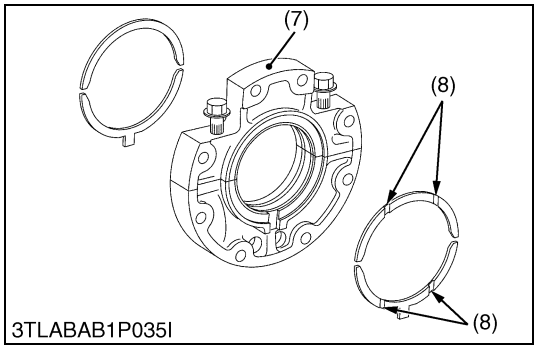

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Main Bearing Case Assembly

1. Remove the screws 1 of the main bearing case. Then remove the main bearing case (7).
2. Remove other main bearing cases as above.

(When reassembling)

- Clean the oil channel in the main bearing case.
- Apply clean engine oil on the bearings.
- Align the numbers (1) on the main bearing case.
- When you install the main bearing case, point the mark (2) **"FLYWHEEL"** to the flywheel.
- When you install the thrust bearing, point the oil groove (8) externally.
- Install the main bearing case assemblies in the initial positions. Since the diameters of the main bearing cases are different, install them in the sequence of their marks (A, B for 3 cylinders and A, B, C for 4 cylinders) from the gear case side.
- After you tighten the screw 1 of the main bearing case to the specified torque, make sure that the main bearing case moves smoothly.

Tightening torque	Screw 1 of main bearing case	46 to 50 N·m 4.7 to 5.2 kgf·m 34 to 37 lbf·ft

(1) Number
(2) Mark
(3) A
(4) B
(5) C
(6) No Mark
(7) Main Bearing Case
(8) Oil Groove

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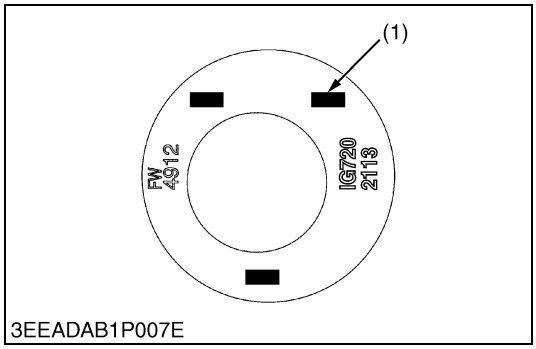
7. SERVICING

[1] CYLINDER HEAD AND VALVES



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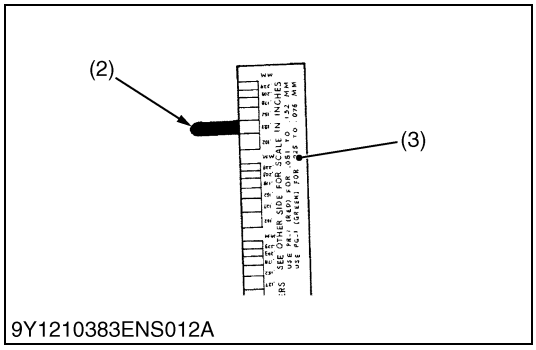

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Top Clearance

1. Remove the cylinder head.
2. With the piston at TDC, use grease to affix three or four plastigauges (1) of a diameter 1.5 mm (0.059 in.) × 5.0 to 7.0 mm (0.20 to 0.27 in.) long to the crown of the piston; keep the gauges away from the intake valve and combustion chamber fittings.
3. Take the piston to an intermediate position, install the cylinder head and tighten the head screws to the specified torque.
4. Turn the crankshaft so the piston goes through TDC.
5. Remove the cylinder head and compare the width of the crushed plastigauges (2) with the scale (3).
6. If they are out of spec, check the oil clearance of the crank pin, journals and piston pin.

■ **NOTE**

- **Top clearance = Width of the crushed plastigauge (2).**

Top clearance	Factory specification	0.60 to 0.70 mm 0.024 to 0.027 in.

Tightening torque	Cylinder head screws	93.2 to 98.0 N·m 9.50 to 10.0 kgf·m 68.8 to 72.3 lbf·ft

(1) Plastigauge
(2) Crushed Plastigauge
(3) Scale

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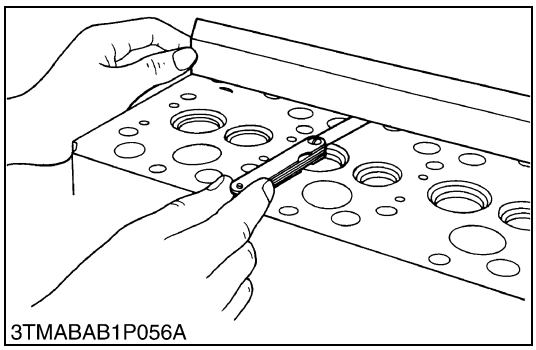
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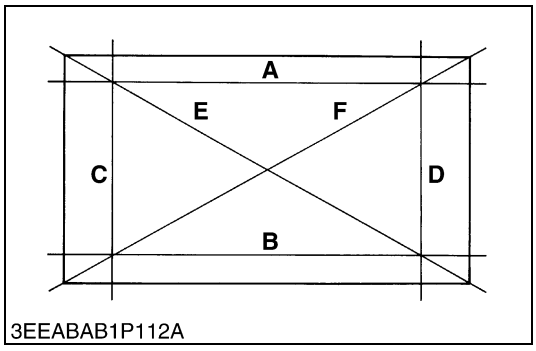
Cylinder Head Surface Flatness

1. Clean the cylinder head surface.
2. Put a straightedge on the cylinder head.
3. Measure the clearance with a feeler gauge at the 6 places (see the figure).
4. If the measurement is more than the allowable limit, make it straight with a surface grinder.

■ **IMPORTANT**

- **Do not put a straightedge on the combustion chamber.**
- **Examine the valve recessing after you correct.**



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Cylinder head surface flatness	Allowable limit	0.05 mm 0.002 in.

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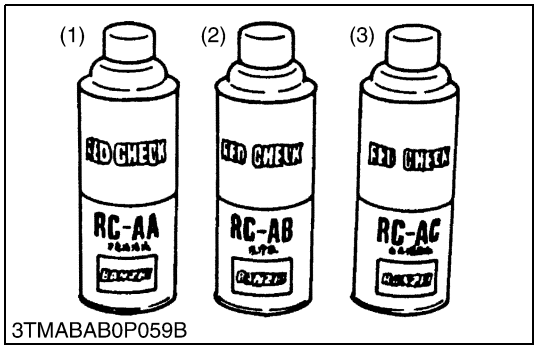

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Cylinder Head Flaw

1. Prepare an air spray red check.
2. Clean the surface of the cylinder head with detergent (2).
3. Apply some red permeative liquid (1) on the cylinder head surface. After you apply, do not touch it for 5 to 10 minutes.
4. Clean away the red permeative liquid on the cylinder head surface with detergent (2).
5. Apply the white developer (3) on the cylinder head surface.
6. If you found a red flaw, replace the cylinder head.

(1) Red Permeative Liquid
(2) Detergent
(3) White Developer

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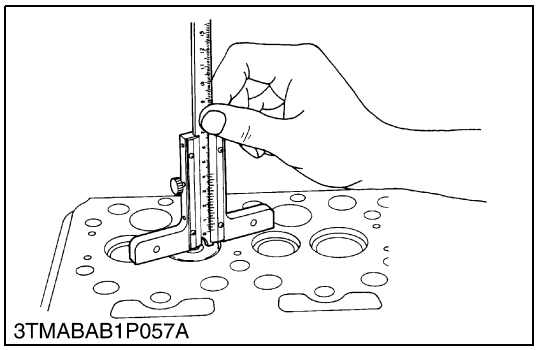
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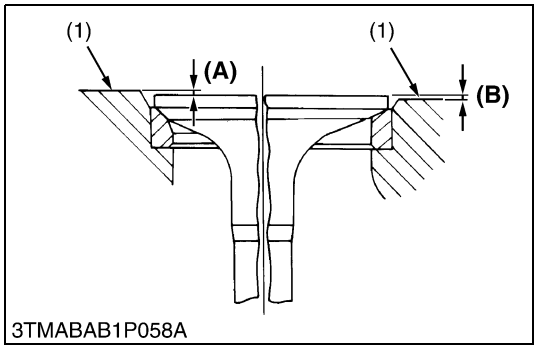
Valve Recessing

1. Clean the cylinder head surface, valve face and valve seat.
2. Set the valve into the valve guide.
3. Measure the valve recessing with a depth gauge.
4. If the measurement is more than the allowable limit, replace the valve.
5. If it stays more than the allowable limit after you replace the valve, replace the cylinder head.

Valve recessing	Factory specification	0.65 to 0.85 mm 0.026 to 0.033 in.
	Allowable limit	1.20 mm 0.0472 in.



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(1) Cylinder Head Surface

(A) Recessing
(B) Protrusion

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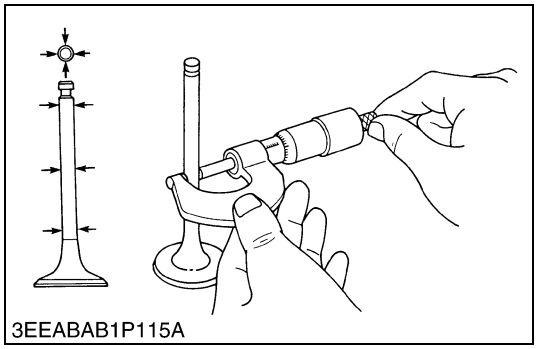
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Clearance between Valve Stem and Valve Guide

1. Remove carbon from the valve guide section.
2. Measure the valve stem O.D. with an external micrometer.
3. Measure the valve guide I.D. with a small hole gauge, and calculate the clearance.
4. If the clearance is more than the allowable limit, replace the valves.
5. If the clearance stays more than the allowable limit, replace the valve guide also.

Clearance between valve stem and valve guide	Factory specification	0.040 to 0.070 mm 0.0016 to 0.0027 in.
	Allowable limit	0.10 mm 0.0039 in.

Valve stem O.D.	Factory specification	7.960 to 7.975 mm 0.3134 to 0.3139 in.
Valve guide I.D.	Factory specification	8.015 to 8.030 mm 0.3156 to 0.3161 in.

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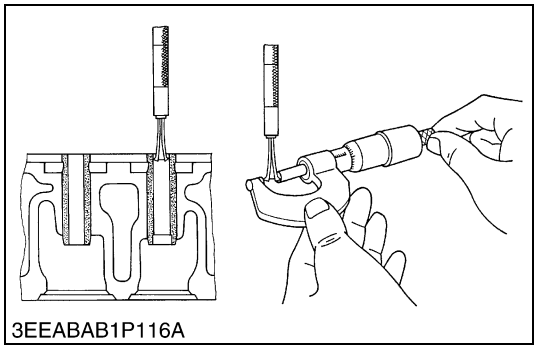
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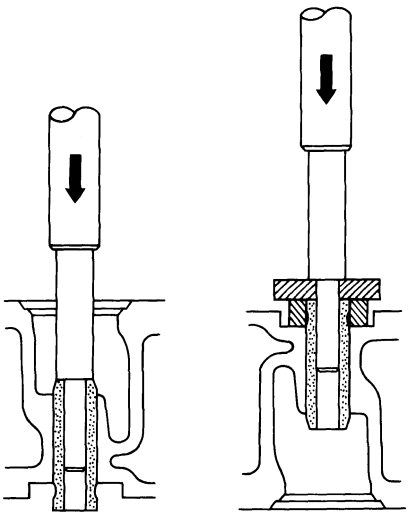

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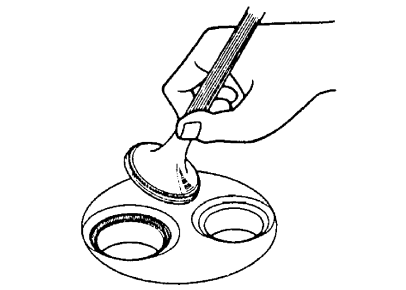
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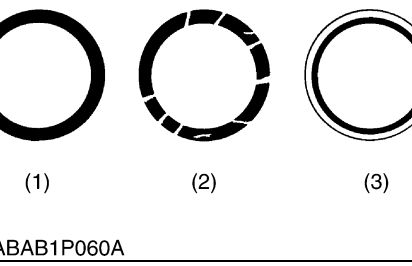

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Replacement of Valve Guide

(When removing)

1. Press out the used valve guide with the valve guide replacing tool. (See page **"SPECIAL TOOLS"**.)

(When installing)

1. Clean the new valve guide and valve guide bore, and apply engine oil to them.
2. Press fit the new valve guide with the valve guide replacing tool.
3. Ream accurately the I.D. of the valve guide to the specified dimension.

Valve guide I.D. (Intake and exhaust)	Factory specification	8.015 to 8.030 mm 0.3156 to 0.3161 in.

■ **IMPORTANT**

- **Do not hit the valve guide with a hammer during replacement.**

(A) When Removing **(B) When Installing**

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Valve Seating

1. Apply a thin layer of Prussian Blue on the valve face. Then put the valve on its seat to examine the contact.
2. If the valve is not fully around the seat or the contact is less than 70 % of the factory specification, correct the valve seat. See the next section.
3. If the valve contact width cannot get the factory specification, replace the valve or correct the contact of the valve seat.

Valve contact width	Factory specification	2.12 mm 0.0835 in.

(1) Correct
(2) Incorrect
(3) Incorrect

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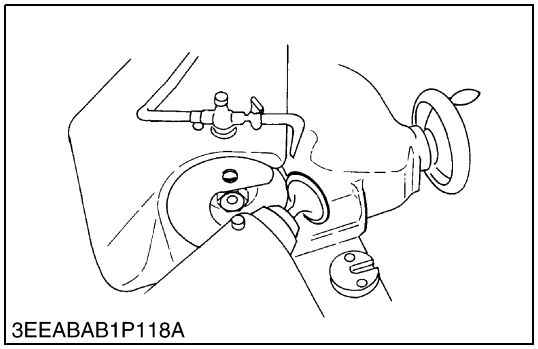
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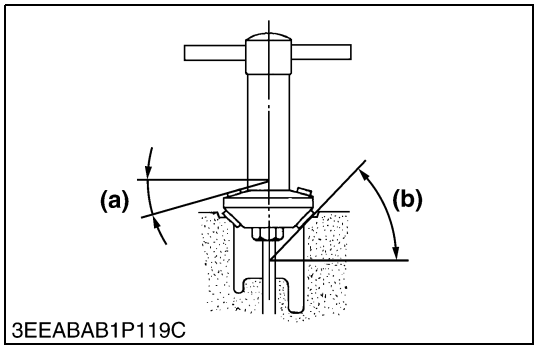

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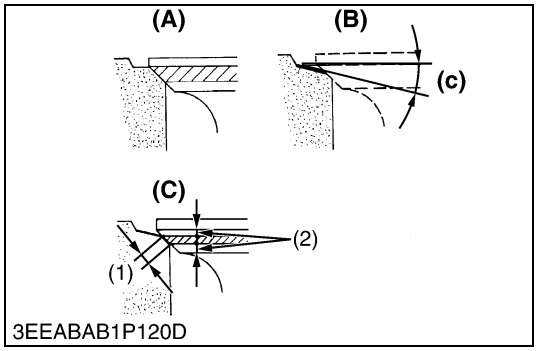

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Correction of Valve and Valve Seat

■ **NOTE**
- **Before you correct the valve and seat, examine the valve stem and measure the I.D. of the valve guide section. Repair them if necessary.**
- **After you correct the valve seat, be sure to examine the valve recessing.**

1) Correction of valve

1. Correct the valve with a valve refacer.

Valve face angle	Factory specification	Intake	0.79 rad 45 °
		Exhaust	0.79 rad 45 °

2) Correction of valve seat

1. Slightly correct the seat surface with a 1.0 rad (60 °) or 0.79 rad (45 °) valve seat cutter.
2. Correct the seat surface with a 0.52 rad (30 °) or 0.26 rad (15 °) valve seat cutter. The width must be near the specified valve seat width (2.12 mm, 0.0835 in.).
3. After you correct the seat, examine that the valve seating is flat. Apply a thin layer of compound between the valve face and valve seat, and lap them with a valve lapping tool.
4. Examine the valve seating with Prussian Blue. The valve seating surface must show good contact on all sides.

Valve seat angle	Factory specification	Intake	0.79 rad 45 °
		Exhaust	0.79 rad 45 °

(1) Valve Seat Width
(2) Identical Dimensions

(A) Examine the Contact
(B) Correct Seat Width
(C) Examine the Contact
(a) 0.26 rad (15 °) or 0.52 rad (30 °)
(b) 0.79 rad (45 °) or 1.0 rad (60 °)
(c) 0.52 rad (30 °) or 0.26 rad (15 °)

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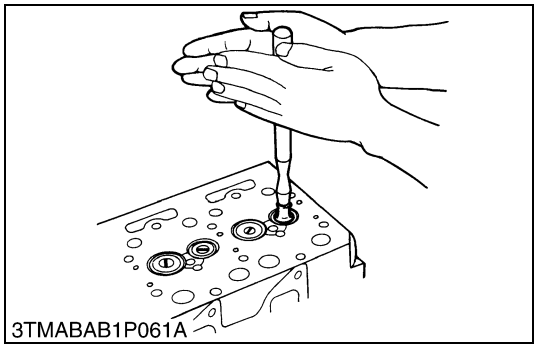
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Valve Lapping

1. Apply the compound equally to the valve lapping surface.
2. Put the valve into the valve guide. Lap the valve on its seat with a valve lapping tool.
3. After you lap the valve, clean away the compound and apply oil, then lap the valve again with oil.
4. Apply Prussian Blue to the contact surface to measure the seated rate.
5. If the seated rate is less than 70 %, lap the valve again.

■ **IMPORTANT**
- **After you complete the valve lapping and assemble the valve, examine the valve recessing and adjust the valve clearance.**

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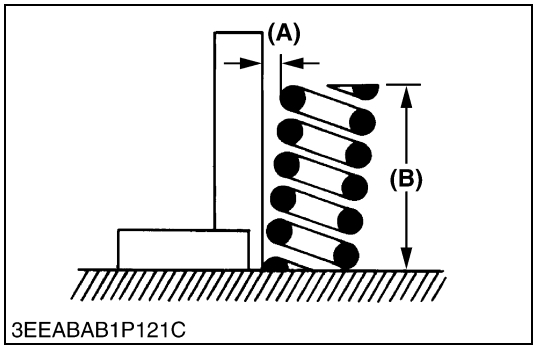

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Free Length and Tilt of Valve Spring

1. Measure the free length **(B)** of valve spring with a vernier calipers.
2. If the measurement is less than the allowable limit, replace it.
3. Put the valve spring on a surface plate, and put a square on the side of the valve spring.
4. Make sure that the full side is in contact with the square.
5. Turn the valve spring to measure the maximum tilt **(A)**.
6. If the measurement is more than the allowable limit, replace it.
7. Examine the full surface of the valve spring for scratches.
8. If there is a problem, replace it.

Tilt **(A)**	Allowable limit	1.0 mm 0.039 in.

Free length **(B)**	Factory specification	41.7 to 42.2 mm 1.65 to 1.66 in.
	Allowable limit	41.2 mm 1.62 in.

(A) Tilt **(B) Free Length**

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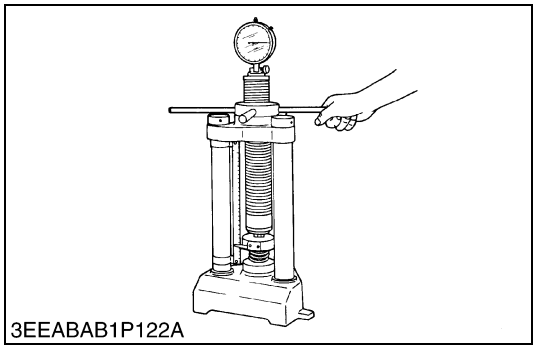
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Setting Load of Valve Spring

1. Put the valve spring on a tester.
2. Compress the valve spring to the specified setting length.
3. Read the compression load on the gauge.
4. If the measurement is less than the allowable limit, replace the valve spring.

Setting load / Setting length	Factory specification	118 N / 35.0 mm 12.0 kgf / 35.0 mm 26.5 lbf / 1.38 in.
	Allowable limit	100 N / 35.0 mm 10.2 kgf / 35.0 mm 22.5 lbf / 1.38 in.

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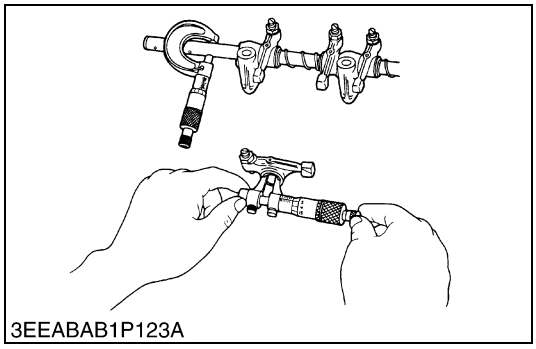
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Oil Clearance between Rocker Arm and Rocker Arm Shaft

1. Measure the rocker arm shaft O.D. with an external micrometer.
2. Measure the rocker arm I.D. with an internal micrometer.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit, replace the rocker arm and measure the oil clearance again.
5. If the oil clearance stays more than the allowable limit, replace the rocker arm shaft also.

Oil clearance between rocker arm and rocker arm shaft	Factory specification	0.016 to 0.045 mm 0.00063 to 0.0017 in.
	Allowable limit	0.10 mm 0.0039 in.

Rocker arm shaft O.D.	Factory specification	13.973 to 13.984 mm 0.55012 to 0.55055 in.
Rocker arm I.D.	Factory specification	14.000 to 14.018 mm 0.55119 to 0.55188 in.

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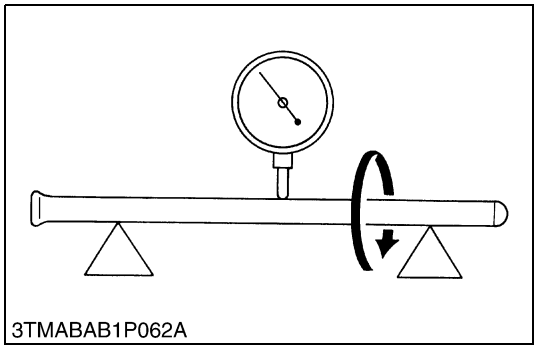
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Push Rod Bend

1. Put the push rod on V blocks.
2. Set a dial indicator with its point on the middle of the push rod.
3. Turn the push rod slowly and read the variation on the indicator.
4. If the measurement is more than the allowable limit, replace the push rod.

Push rod bend	Allowable limit	0.25 mm 0.0098 in.

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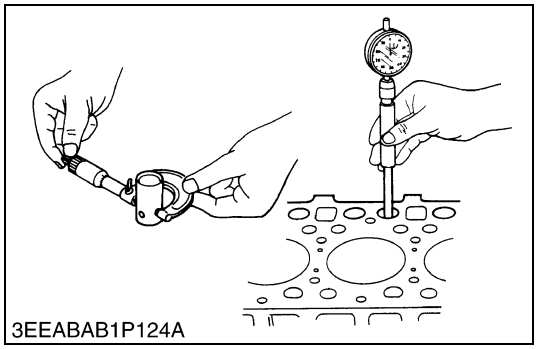
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Oil Clearance between Tappet and Tappet Guide Bore

1. Measure the tappet O.D. with an external micrometer.
2. Measure the tappet guide bore I.D. with a cylinder gauge.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit or the tappet has a damage, replace the tappet.

Oil Clearance between tappet and tappet guide bore	Factory specification	0.020 to 0.062 mm 0.00079 to 0.0024 in.
	Allowable limit	0.07 mm 0.003 in.

Tappet O.D.	Factory specification	23.959 to 23.980 mm 0.94327 to 0.94409 in.
Tappet guide bore I.D.	Factory specification	24.000 to 24.021 mm 0.94489 to 0.94570 in.

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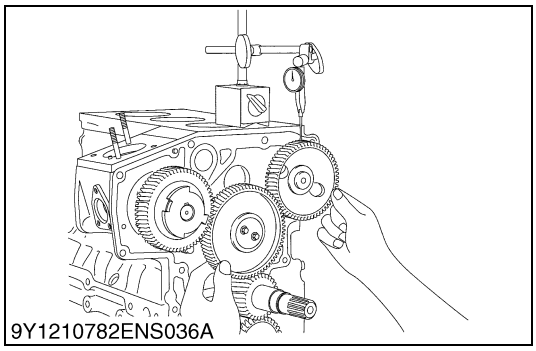
[2] TIMING GEARS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Timing Gear Backlash

1. Set a dial indicator (lever type) with its point on the gear tooth.
2. Hold the mating gear and move the gear to measure the backlash.
3. If the backlash is more than the allowable limit, measure the oil clearance in the journal part of each shaft.
4. If the oil clearance is correct, replace the gear.

Backlash between idle gear and crank gear	Factory specification	0.04150 to 0.1122 mm 0.001634 to 0.004417 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear and cam gear	Factory specification	0.04150 to 0.1154 mm 0.001634 to 0.004543 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear and fuel supply pump gear	Factory specification	0.04150 to 0.1154 mm 0.001634 to 0.004543 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between crank gear and oil pump gear	Factory specification	0.04150 to 0.1090 mm 0.001634 to 0.004291 in.
	Allowable limit	0.15 mm 0.0059 in.

[V2403-CR-E4 and V2403-CR-TE4 only]

Backlash between idle gear and balancer gear (IN. side)	Factory specification	0.0350 to 0.116 mm 0.00138 to 0.00456 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between cam gear and balancer gear (EX. gear)	Factory specification	0.0350 to 0.116 mm 0.00138 to 0.00456 in.
	Allowable limit	0.15 mm 0.0059 in.

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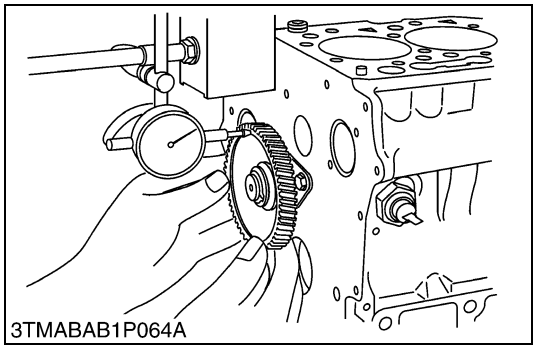
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Side Clearance of Idle Gear

1. Set a dial indicator with its point on the idle gear.
2. Move the idle gear to the front and rear to measure the side clearance.
3. If the measurement is more than the allowable limit, replace the idle gear collar.

Side clearance of idle gear	Factory specification	0.15 to 0.25 mm 0.0059 to 0.0098 in.
	Allowable limit	0.9 mm 0.04 in.

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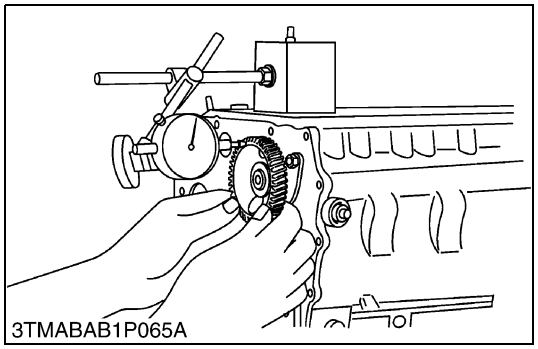
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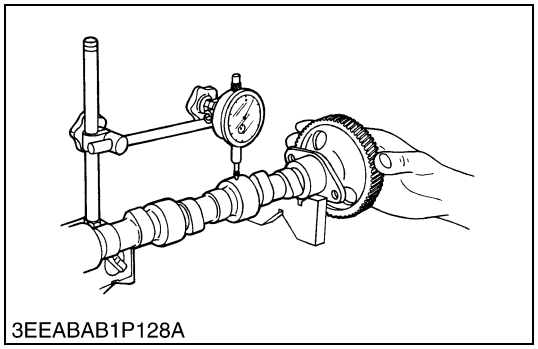
Side Clearance of Camshaft

1. Set a dial indicator with its point on the camshaft.
2. Move the cam gear to the front and rear to measure the side clearance.
3. If the measurement is more than the allowable limit, replace the camshaft stopper.

Side clearance of camshaft	Factory specification	0.070 to 0.22 mm 0.0028 to 0.0086 in.
	Allowable limit	0.30 mm 0.012 in.

9Y1210824ENS0084US0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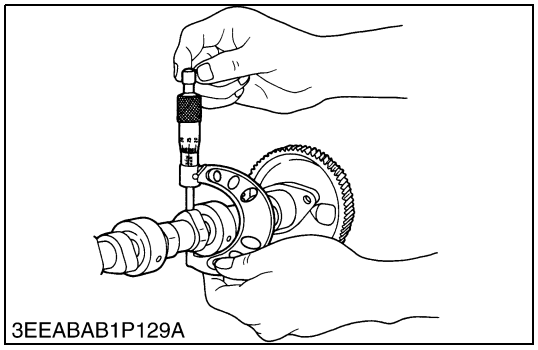
Camshaft Bend

1. Hold the 2 end journals of camshaft with V blocks on the surface plate.
2. Set a dial indicator with its point on the middle journal.
3. Turn the camshaft slowly and read the variation on the indicator.
4. If the measurement is more than the allowable limit, replace the camshaft.

Camshaft bend	Allowable limit	0.01 mm 0.0004 in.

9Y1210824ENS0085US0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Cam Height

1. Measure the height of the cam at its highest point with an external micrometer.
2. If the measurement is less than the allowable limit, replace the camshaft.

Cam height of intake	Factory specification	33.90 mm 1.335 in.
	Allowable limit	33.85 mm 1.333 in.

Cam height of exhaust	Factory specification	33.90 mm 1.335 in.
	Allowable limit	33.85 mm 1.333 in.

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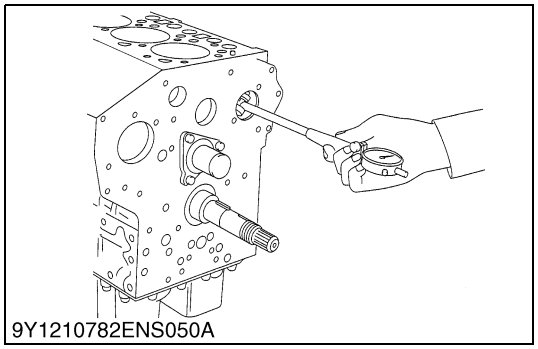
9Y1210782ENS050A

Oil Clearance of Camshaft Journal

1. Measure the camshaft journal O.D. with an external micrometer.
2. Measure the cylinder block bore I.D. for the camshaft with a cylinder gauge.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit, replace the camshaft.

Oil clearance of camshaft journal	Factory specification	0.050 to 0.091 mm 0.0020 to 0.0035 in.
	Allowable limit	0.15 mm 0.0059 in.

Camshaft journal O.D.	Factory specification	39.934 to 39.950 mm 1.5722 to 1.5728 in.
Cylinder block bore I.D.	Factory specification	40.000 to 40.025 mm 1.5748 to 1.5757 in.

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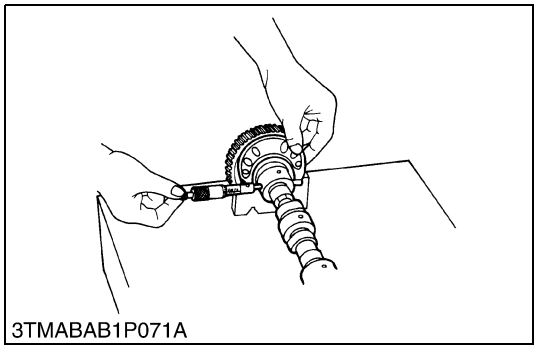
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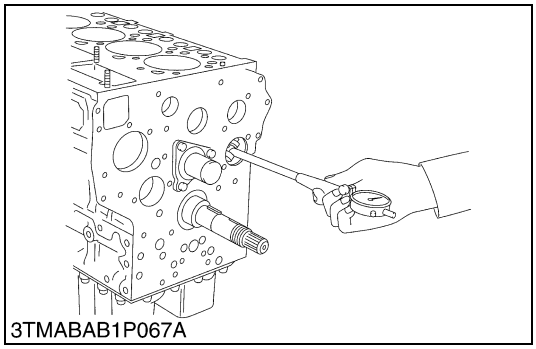
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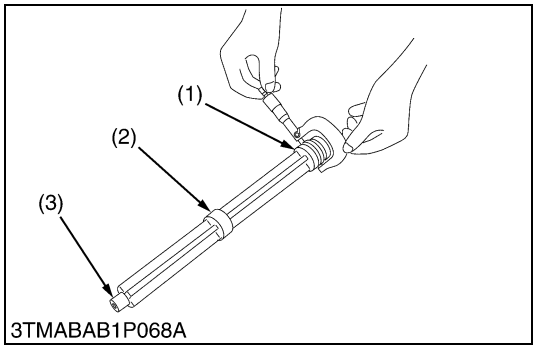

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Oil Clearance of Balancer Shaft Journal (V2403-CR-E4 and V2403-CR-TE4)

1. Measure the balancer shaft journal O.D. with an outside micrometer.
2. Measure the cylinder block bore I.D. for balancer shaft with an inside micrometer or cylinder gauge.
3. If the clearance exceeds the allowable limit, replace the balancer shaft.

Oil clearance of balancer shaft journal 1	Factory specification	0.030 to 0.111 mm 0.00119 to 0.00437 in.
	Allowable limit	0.20 mm 0.0079 in.

Balancer shaft journal 1 O.D.	Factory specification	43.934 to 43.950 mm 1.7297 to 1.7303 in.
Balancer shaft bearing 1 I.D.	Factory specification	43.980 to 44.045 mm 1.7315 to 1.7340 in.

Oil clearance of balancer shaft journal 2	Factory specification	0.030 to 0.111 mm 0.00119 to 0.00437 in.
	Allowable limit	0.20 mm 0.0079 in.

Balancer shaft journal 2 O.D.	Factory specification	41.934 to 41.950 mm 1.6510 to 1.6515 in.
Balancer shaft bearing 2 I.D.	Factory specification	41.980 to 42.045 mm 1.6528 to 1.6553 in.

Oil clearance of balancer shaft journal 3	Factory specification	0.020 to 0.094 mm 0.00079 to 0.0037 in.
	Allowable limit	0.20 mm 0.0079 in.

Balancer shaft journal 3 O.D.	Factory specification	21.947 to 21.960 mm 0.86406 to 0.86456 in.
Balancer shaft bearing 3 I.D.	Factory specification	21.980 to 22.041 mm 0.86536 to 0.86775 in.

(1) Balancer Shaft Journal 1
(2) Balancer Shaft Journal 2
(3) Balancer Shaft Journal 3

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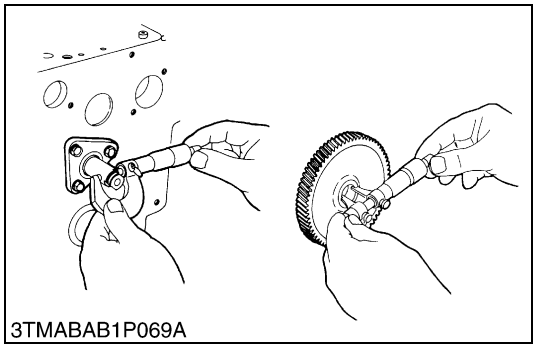
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Oil Clearance between Idle Gear Shaft and Idle Gear Bushing

1. Measure the idle gear shaft O.D. with an external micrometer.
2. Measure the idle gear bushing I.D. with an internal micrometer.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit, replace the bushing.
5. If the oil clearance stays more than the allowable limit, replace the idle gear shaft also.

Oil clearance between idle gear shaft and idle gear bushing	Factory specification	0.025 to 0.066 mm 0.00099 to 0.0025 in.
	Allowable limit	0.10 mm 0.0039 in.

Idle gear shaft O.D.	Factory specification	37.959 to 37.975 mm 1.4945 to 1.4950 in.
Idle gear bushing I.D.	Factory specification	38.000 to 38.025 mm 1.4961 to 1.4970 in.

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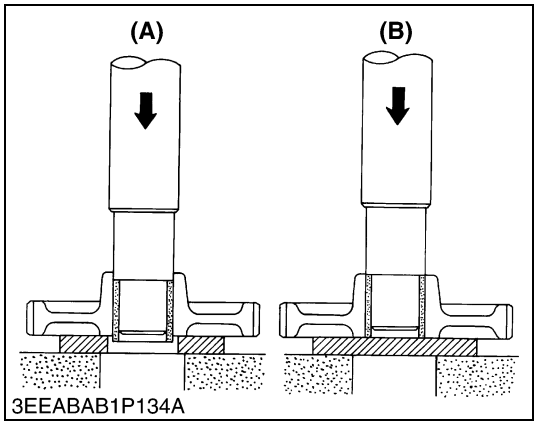

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Replacement of Idle Gear Bushing

(When removing)

1. Press out the used idle gear bushing with the replacing tool. (See page G-55.)

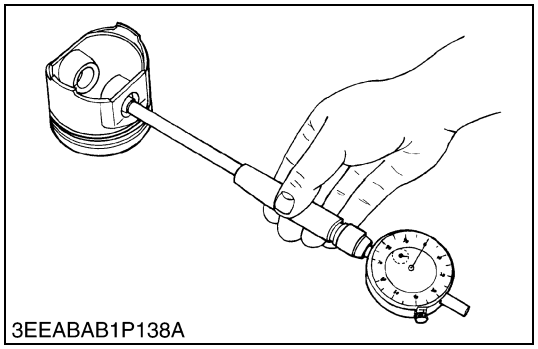
(When installing)

1. Clean a new idle gear bushing and idle gear bore, and apply engine oil to them.
2. Press fit the new bushing with the replacing tool.
   Make sure that the bushing end aligns the end of the idle gear.

(A) When Removing **(B) When Installing**

9Y1210824ENS0089US0

[3] PISTON AND CONNECTING ROD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Piston Pin Bore I.D.

1. Measure the piston pin bore I.D. in the horizontal and vertical directions with a cylinder gauge.
2. If the measurement is more than the allowable limit, replace the piston.

Piston pin bore I.D.	Factory specification	25.000 to 25.013 mm 0.98426 to 0.98476 in.
	Allowable limit	25.05 mm 0.9862 in.

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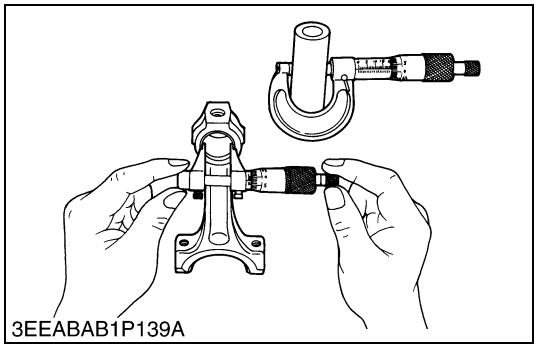
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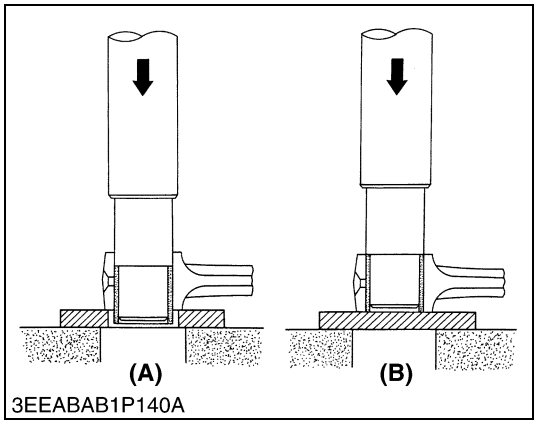
Oil Clearance between Piston Pin and Small End Bushing

1. Measure the piston pin O.D. where it touches the bushing with an external micrometer.
2. Measure the small end bushing I.D. with an internal micrometer.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit, replace the bushing.
5. If the oil clearance stays more than the allowable limit, replace the piston pin also.

Oil clearance between piston pin and small end bushing	Factory specification	0.014 to 0.036 mm 0.00056 to 0.0014 in.
	Allowable limit	0.15 mm 0.0059 in.

Piston pin O.D.	Factory specification	25.004 to 25.011 mm 0.98441 to 0.98468 in.
Small end bushing I.D.	Factory specification	25.025 to 25.040 mm 0.98524 to 0.98582 in.

9Y1210824ENS0091US0



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Replacement of Small End Bushing

(When removing)

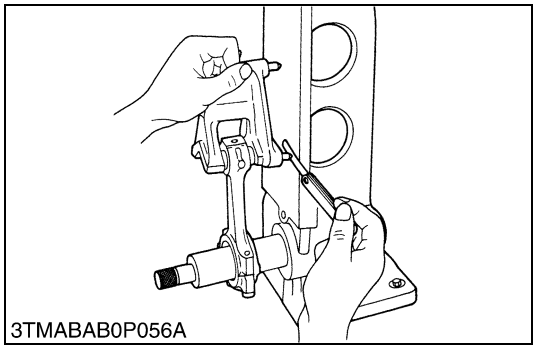
1. Press out the used small end bushing with the replacing tool. (See page G-55.)

(When installing)

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Make sure that the oil hole of the connecting rod aligns the bushing hole. Then press fit the new bushing with the replacing tool.

(A) When Removing **(B) When Installing**

9Y1210824ENS0092US0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Connecting Rod Alignment

■ **NOTE**
- **Make sure that the oil clearance of the small end bushing is less than the allowable limit.**

1. Install the piston pin into the connecting rod.
2. Install the connecting rod on the alignment tool of the connecting rod.
3. Put a gauge on the piston pin, and move it against the face plate.
4. If the gauge does not touch fully against the face plate, measure the space between the gauge pin and face plate.
5. If the measurement is more than the allowable limit, replace the connecting rod.

Connecting rod alignment	Allowable limit	0.05 mm 0.002 in.

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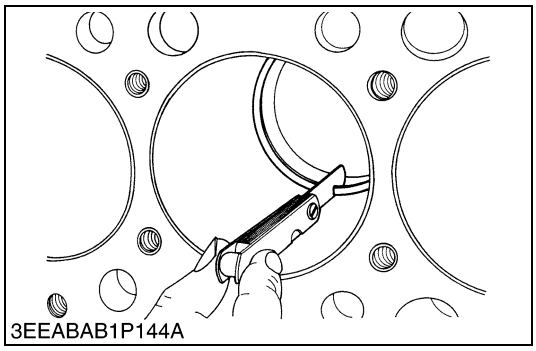
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Piston Ring Gap

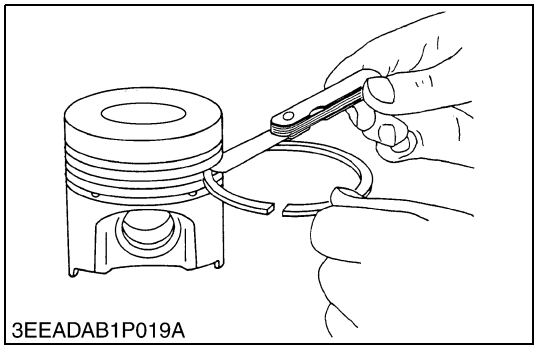
1. Put the piston ring into the lower part of the liner (the least worn out part) with the piston.
2. Measure the ring gap with a feeler gauge.
3. If the ring gap is more than the allowable limit, replace the ring.

Top ring	Factory specification	0.20 to 0.35 mm 0.0079 to 0.013 in.
	Allowable limit	1.25 mm 0.0492 in.

Second ring	Factory specification	D1803-CR-E4 V2403-CR-E4	0.30 to 0.45 mm 0.012 to 0.017 in.
		V2403-CR-TE4	0.40 to 0.55 mm 0.016 to 0.021 in.
	Allowable limit		1.25 mm 0.0492 in.

Oil ring	Factory specification	V2403-CR-TE4	0.25 to 0.45 mm 0.0099 to 0.017 in.
		D1803-CR-E4 V2403-CR-E4	0.20 to 0.40 mm 0.0079 to 0.015 in.
	Allowable limit		1.25 mm 0.0492 in.

9Y1210824ENS0094US0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Clearance between Piston Ring and Groove

1. Clean the rings and the ring grooves, and install each ring in its groove.
2. Measure the clearance between the ring and the groove with a feeler gauge or depth gauge.
3. If the clearance is more than the allowable limit, replace the piston ring.
4. If the clearance stays more than the allowable limit with new ring, replace the piston also.

Top ring	Factory specification	D1803-CR-E4, V2403-CR-E4	0.050 to 0.090 mm 0.0020 to 0.0035 in.
	Allowable limit	D1803-CR-E4, V2403-CR-E4	0.20 mm 0.0079 in.

* D1803-CR-TE4 and V2403-CR-TE4 are key stone type.

Second ring	Factory specification	V2403-CR-TE4	0.0930 to 0.128 mm 0.00367 to 0.00503 in.
		D1803-CR-E4 V2403-CR-E4	0.0780 to 0.110 mm 0.00307 to 0.00433 in.
	Allowable limit		0.20 mm 0.0079 in.

Oil ring	Factory specification	V2403-CR-TE4	0.020 to 0.060 mm 0.00079 to 0.0023 in.
		D1803-CR-E4 V2403-CR-E4	0.030 to 0.070 mm 0.0012 to 0.0027 in.
	Allowable limit		0.15 mm 0.0059 in.

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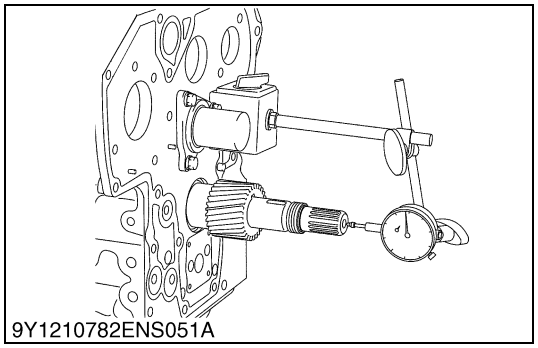
[4] CRANKSHAFT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Side Clearance of Crankshaft

1. Set a dial indicator with its point on the end of the crankshaft.
2. Move the crankshaft to the front and rear to measure the side clearance.
3. If the measurement is more than the allowable limit, replace the thrust bearings.
4. If the same dimension bearing is not applicable because of the crankshaft journal wear, replace it with an oversize one. Refer to the table and figure.

Side clearance of crankshaft	Factory specification	0.15 to 0.31 mm 0.0059 to 0.012 in.
	Allowable limit	0.5 mm 0.02 in.

(Reference)

- Oversize dimensions of crankshaft journal

Oversize	0.2 mm 0.008 in.	0.4 mm 0.02 in.
Dimension **A**	54.50 to 54.70 mm 2.146 to 2.153 in.	54.60 to 54.80 mm 2.150 to 2.157 in.
Dimension **B**	26.20 to 26.25 mm 1.032 to 1.033 in.	26.40 to 26.45 mm 1.040 to 1.041 in.
Dimension **C**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
The crankshaft journal must be fine-finished to higher than Rmax = 0.4S		

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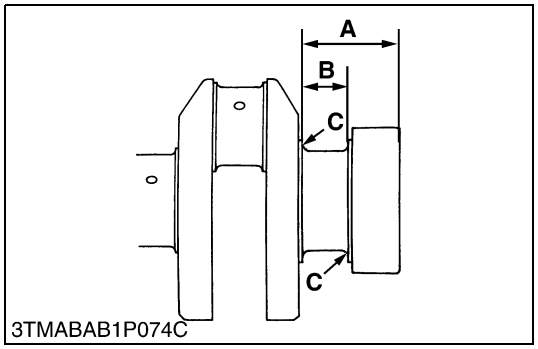

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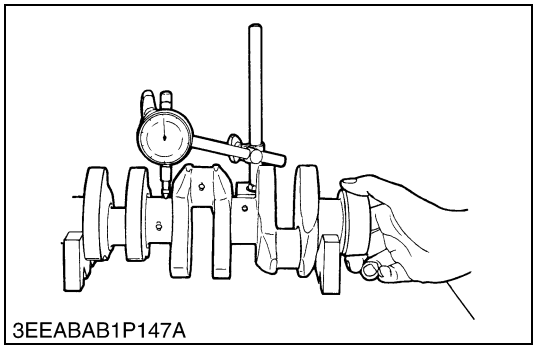
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Crankshaft Bend

1. Hold the 2 end journals of crankshaft with V blocks on the surface plate.
2. Set a dial indicator with its point on the middle journal.
3. Turn the crankshaft slowly and read the variation on the indicator.
4. If the measurement is more than the allowable limit, replace the crankshaft.

Crankshaft bend	Allowable limit	0.03 mm 0.001 in.

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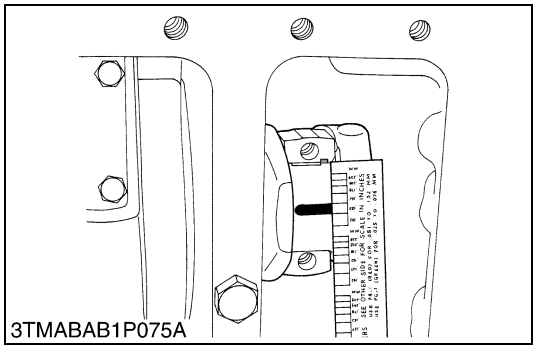
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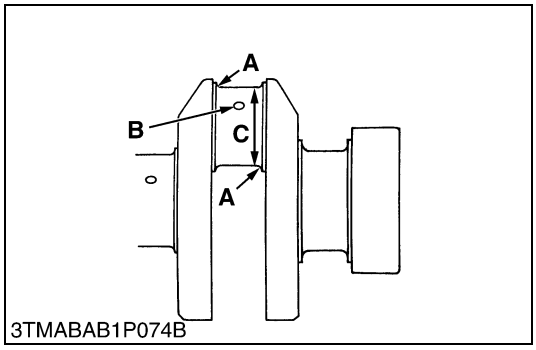
Oil Clearance between Crankpin and Crankpin Bearing

1. Clean the crankpin and crankpin bearing.
2. Put a strip of plastigauge on the center of the crankpin.
3. Install the connecting rod cap and tighten the connecting rod screws to the specified torque, and remove the cap again.
4. Measure the width that it becomes flat with the scale to get the oil clearance.
5. If the oil clearance is more than the allowable limit, replace the crankpin bearing.
6. If the same dimension bearing is not applicable because of the crankpin wear, replace it with an undersize one. Refer to the table and figure.



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■ **NOTE**
- **Do not put the plastigauge into the crankpin oil hole.**
- **When you tighten the connecting rod screws, do not move the crankshaft.**

Oil clearance between crankpin and crankpin bearing	Factory specification	0.025 to 0.087 mm 0.00099 to 0.0034 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankpin O.D.	Factory specification	46.959 to 46.975 mm 1.8488 to 1.8494 in.
Crankpin bearing I.D.	Factory specification	47.000 to 47.046 mm 1.8504 to 1.8522 in.

(Reference)
- Undersize dimensions of crankpin

Undersize	**0.2 mm 0.008 in.**	**0.4 mm 0.02 in.**
Dimension **A**	3.3 to 3.7 mm radius 0.13 to 0.14 in. radius	3.3 to 3.7 mm radius 0.13 to 0.14 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	46.759 to 46.775 mm dia. 1.8409 to 1.8415 in. dia.	46.559 to 46.575 mm dia. 1.8331 to 1.8336 in. dia.
The crankpin must be fine-finished to higher than Rmax = 0.4S *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

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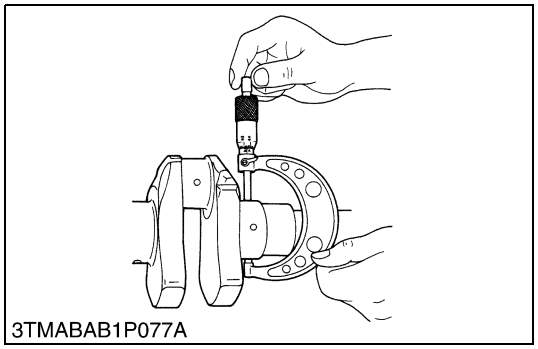
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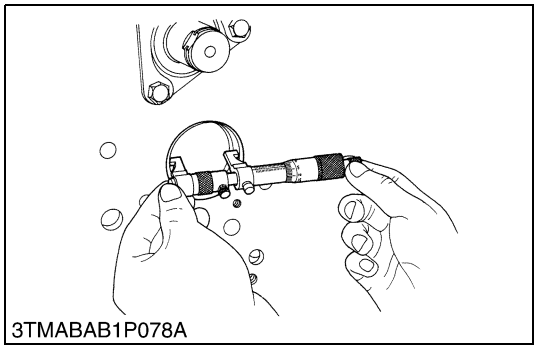
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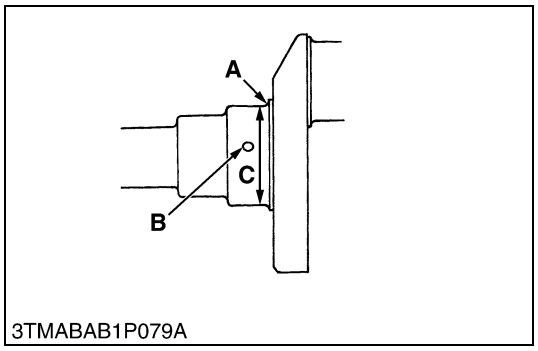

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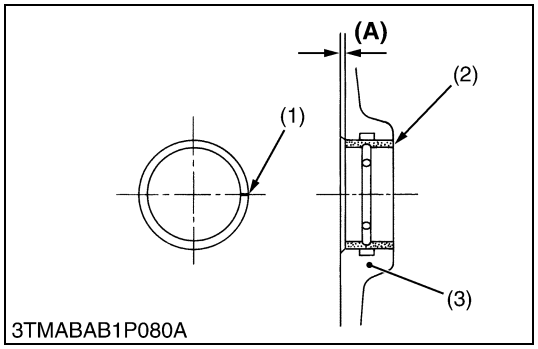

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 1

1. Measure the O.D. of the crankshaft journal with an external micrometer.
2. Measure the I.D. of the crankshaft bearing 1 with an internal micrometer.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit, replace the crankshaft bearing 1.
5. If the same dimension bearing is not applicable because of the crankshaft journal wear, replace it with an undersize one. Refer to the table and figure.

Oil clearance between crankshaft journal and crankshaft bearing 1	Factory specification	0.0400 to 0.118 mm 0.00158 to 0.00464 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory specification	59.921 to 59.940 mm 2.3591 to 2.3598 in.
Crankshaft bearing 1 I.D.	Factory specification	59.980 to 60.039 mm 2.3615 to 2.3637 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	**0.2 mm 0.008 in.**	**0.4 mm 0.02 in.**
Dimension **A**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	59.721 to 59.740 mm dia. 2.3513 to 2.3519 in. dia.	59.521 to 59.540 mm dia. 2.3434 to 2.3440 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax = 0.4S *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

9Y1210824ENS0099US0

Replacement of Crankshaft Bearing 1

(When removing)

1. Press out the used crankshaft bearing 1 with the replacing tool. (See page G-56.)

(When installing)

1. Clean a new crankshaft bearing 1 and crankshaft journal bore, and apply engine oil to them.
2. Make sure that the seam (1) of the new bearing 1 (2) points to the exhaust manifold side (see the figure). Then press fit the new bearing 1 (2) with the replacing tool.

Dimension **(A)**	Factory specification	3.90 to 4.10 mm 0.154 to 0.161 in.

(1) Seam
(2) Crankshaft Bearing 1
(3) Cylinder Block

(A) Dimension

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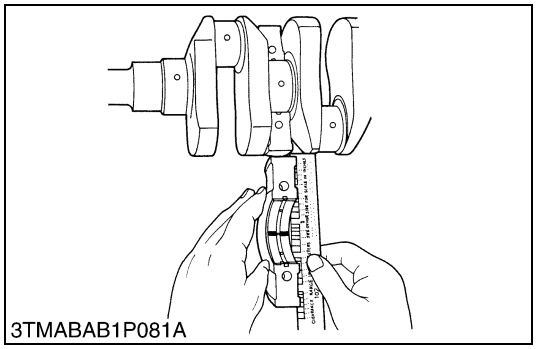
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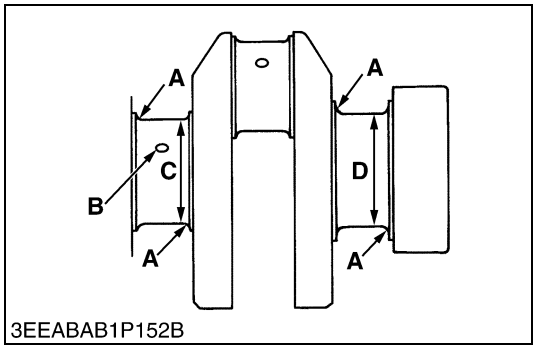

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2

1. Put a strip of plastigauge on the center of the journal.
2. Install the bearing case and tighten the baring case screws 1 to the specified torque, and remove the bearing case again.
3. Measure the width that it becomes flat with the scale to get the oil clearance.
4. If the oil clearance is more than the allowable limit, replace the crankshaft bearing 2.
5. If the same dimension bearing is not applicable because of the crankshaft journal wear, replace it with an undersize one. Refer to the table and figure.

■ **NOTE**

- **When you tighten the bearing case screws, do not move the crankshaft.**

Oil clearance between crankshaft and crankshaft bearing 2	Factory specification	0.0400 to 0.104 mm 0.00158 to 0.00409 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory specification	59.921 to 59.940 mm 2.3591 to 2.3598 in.
Crankshaft bearing 2 I.D.	Factory specification	59.980 to 60.025 mm 2.3615 to 2.3631 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	**0.2 mm 0.008 in.**	**0.4 mm 0.02 in.**
Dimension **A**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C, D**	59.721 to 59.740 mm dia. 2.3513 to 2.3519 in. dia.	59.521 to 59.540 mm dia. 2.3434 to 2.3440 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax = 0.4S *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

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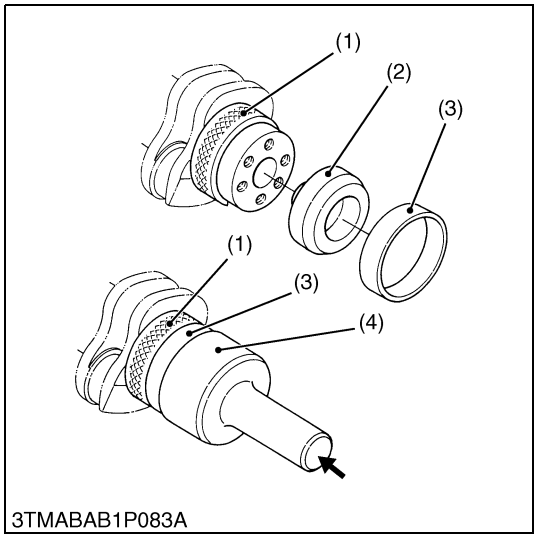

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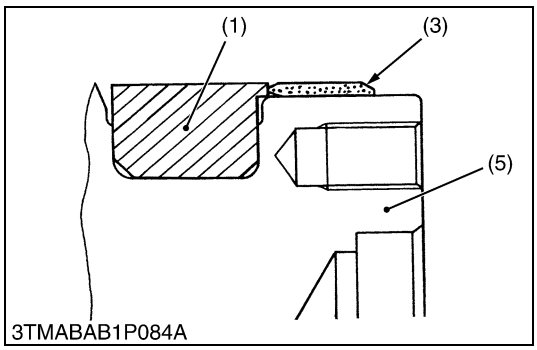

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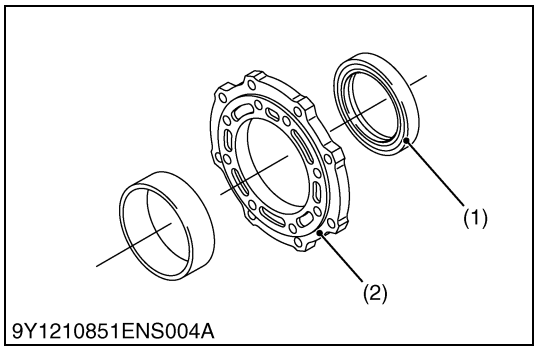

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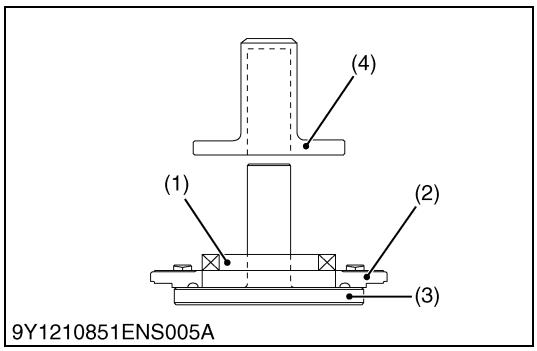

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Replacement of Crankshaft Sleeve

1. Remove the used crankshaft sleeve (3).
2. Set the sleeve guide (2) to the crankshaft (5).
3. Set the stopper (1) to the crankshaft (5) (see the figure).
4. Increase the temperature of a new sleeve to between 150 and 200 °C (302 and 392 °F).
5. Install the sleeve to the crankshaft with the auxiliary socket for pushing (4) (see the figure). (See page G-53.)

■ **NOTE**

- **Make sure that the large chamfer of the sleeve points to outward.**
- **If the temperature of the sleeve is not enough to install, the sleeve can get a damage when you install.**

(1) Stopper
(2) Sleeve Guide
(3) Crankshaft Sleeve
(4) Auxiliary Socket for Pushing
(5) Crankshaft

9Y1210824ENS0102US0

Replacement of Bearing Case Cover Oil Seal

(When removing)

1. Remove the used oil seal by using appropriate tool and be careful not to scratch the bearing case cover.

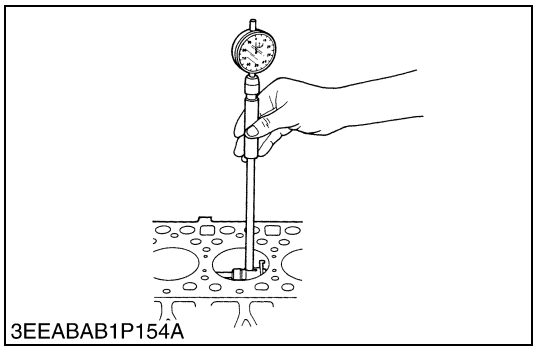
(When installing)

1. Clean a new oil seal (1) and bearing case cover (2).
2. Set the bearing case cover on the replacing tool 1 (3) and fix it with bolts.
3. Apply a layer of engine oil to the seal outer periphery.
4. Install the oil seal into the bearing case cover by using the replacing tool 2 (4) as shown in the figure, until it is flash with the bearing case cover.

(1) Oil Seal
(2) Bearing Case Cover
(3) Replacing Tool 1
(4) Replacing Tool 2

9Y1210824ENS0103US0

[5] CYLINDER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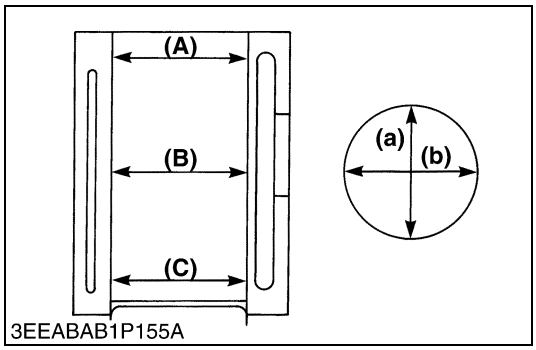

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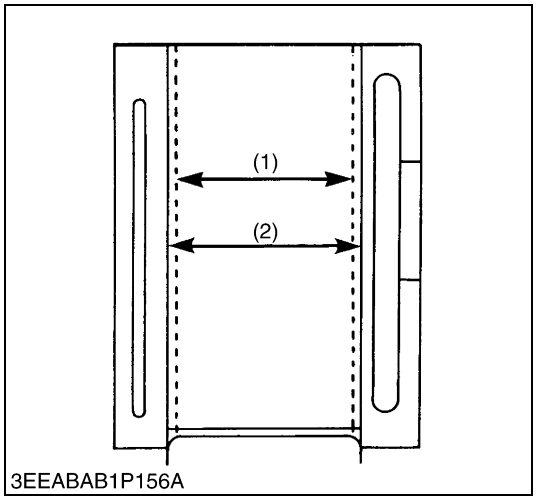

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Cylinder Wear

1. Measure the I.D. of the cylinder at the 6 positions (see figure) with a cylinder gauge.
2. Find the maximum and minimum inner diameters.
3. Find the difference between the maximum and the minimum inner diameters.
4. If the maximum I.D. or the difference is more than the allowable limit, bore and hone it to the oversize dimension. (Refer to **"Cylinder Correction (Oversize)"**.).
5. Examine the cylinder wall for scratches. If you find deep scratches, bore the cylinder. (Refer to **"Cylinder Correction (Oversize)"**.)

Cylinder I.D.	Factory specification	87.000 to 87.022 mm 3.4252 to 3.4260 in.
	Allowable limit	87.170 mm 3.4319 in.
Difference between maximum I.D. and minimum I.D.	Allowable limit	0.15 mm 0.0059 in.

(A) Top
(B) Middle
(C) Bottom (Skirt)
(a) Right-angled to Piston Pin
(b) Piston Pin Direction

9Y1210824ENS0104US0

Cylinder Correction (Oversize)

1. If the cylinder wear is more than the allowable limit, bore and hone it to the specified dimension.

Oversize cylinder I.D.	Factory specification	87.250 to 87.272 mm 3.4351 to 3.4359 in.
	Allowable limit	87.420 mm 3.4417 in.
Difference between maximum I.D. and minimum I.D.	Allowable limit	0.15 mm 0.0059 in.
Finishing	Hone to 2.2 to 3.0 μmRz (0.000087 to 0.000118 in.Rz)	

2. Replace the piston and piston rings with oversize ones.
   Oversize : 0.25 mm (0.0098 in.)

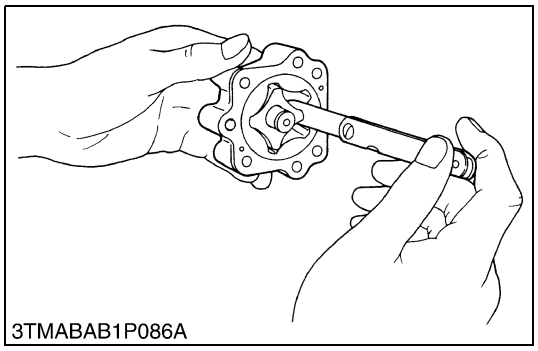
■ **NOTE**

- **If the maximum I.D. or the difference for the oversize cylinder is more than the allowable limit, replace the cylinder block with a new one.**

(1) Cylinder I.D. (Before Correction) (2) Cylinder I.D. (Oversize)

9Y1210824ENS0105US0

[6] OIL PUMP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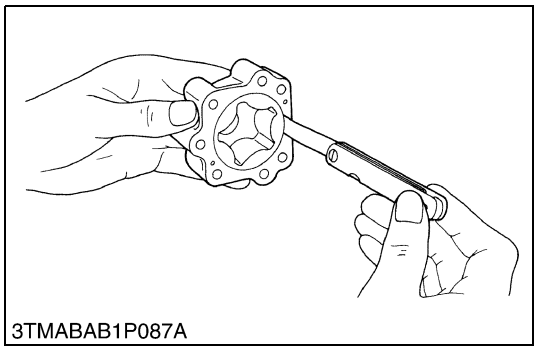
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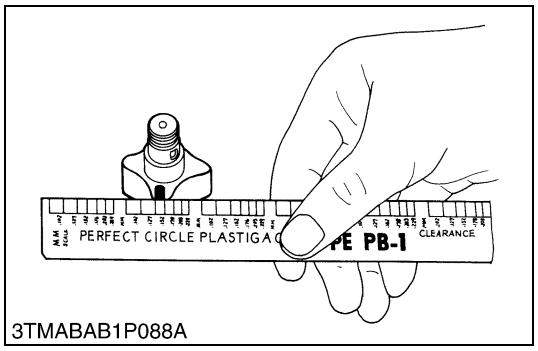

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Rotor Lobe Clearance

1. Measure the clearance between the lobes of the inner rotor and the outer rotor with a feeler gauge.
2. Measure the clearance between the outer rotor and the pump body with a feeler gauge.
3. If the clearance is more than the allowable limit, replace the rotor assembly of the oil pump.

Clearance between inner rotor and outer rotor	Factory specification	0.030 to 0.14 mm 0.0012 to 0.0055 in.
	Allowable limit	0.2 mm 0.008 in.

Clearance between outer rotor and pump body	Factory specification	0.11 to 0.19 mm 0.0044 to 0.0074 in.
	Allowable limit	0.25 mm 0.0098 in.

9Y1210824ENS0106US0

Clearance between Rotor and Cover

1. Put a strip of plastigauge on the rotor face with grease.
2. Install the cover and tighten the screws.
3. Remove the cover carefully.
4. Measure the width that plastigauge becomes flat with the scale to get the oil clearance.
5. If the clearance is more than the allowable limit, replace the rotor assembly of the oil pump.

Clearance between inner rotor and cover	Factory specification	0.105 to 0.150 mm 0.00414 to 0.00590 in.
	Allowable limit	0.20 mm 0.008 in.

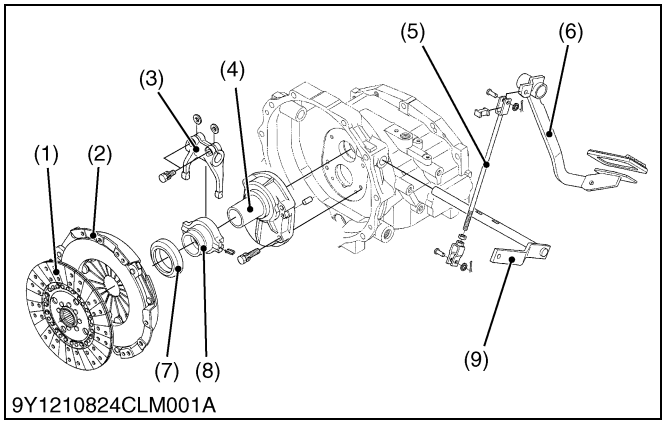
9Y1210824ENS0107US0

2 CLUTCH

MECHANISM

CONTENTS

1. FEATURE



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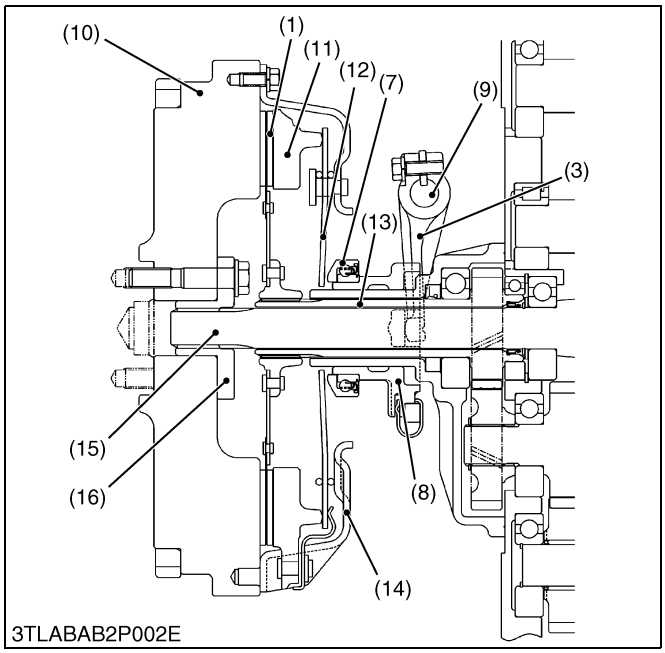

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Manual Transmission / GST

The dry single plate with diaphragm spring type clutch is adapted for manual transmission and GST.

(1) Clutch Disc
(2) Pressure Plate Assembly
(3) Release Fork
(4) Shaft Case
(5) Clutch Pedal Rod
(6) Clutch Pedal
(7) Release Bearing
(8) Release Hub
(9) Clutch Lever Shaft
(10) Flywheel
(11) Pressure Plate
(12) Diaphragm Spring
(13) Main Shaft
(14) Clutch Cover
(15) PTO Shaft
(16) Spring Hub

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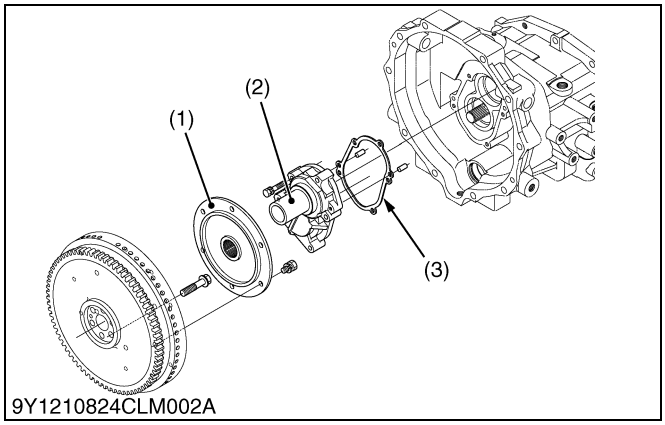

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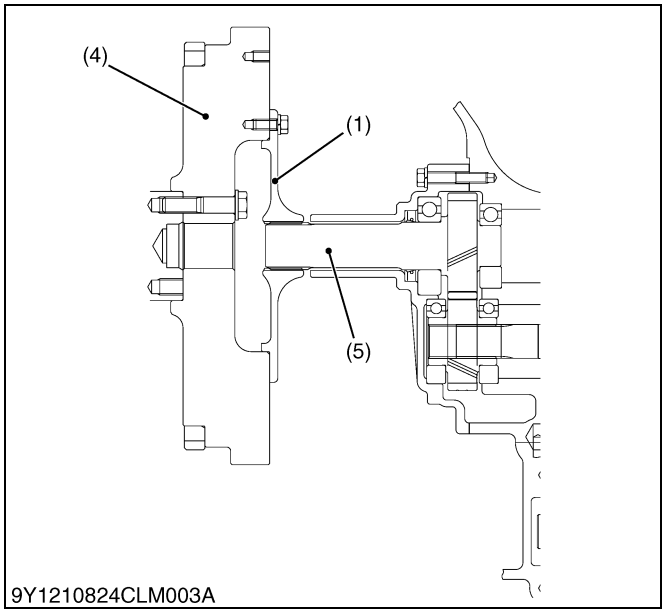

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HST

Unlike the manual transmission / GST, the HST is not equipped with a clutch. Only a clutch coupling is adapted.

(1) Clutch Coupling
(2) Shaft Case
(3) Gasket
(4) Flywheel
(5) Main Shaft

9Y1210824CLM0002US0

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Clutch Drags	Clutch pedal free travel excessive	Adjust	2-S4
	Dust on clutch disc generated from clutch disc facing	Remove rust	–
	Release fork broken	Replace	2-S27
	Clutch disc or pressure plate warped	Replace	2-S27
	Wire ring of the pressure plate worn or broken	Replace (Pressure Plate assembly)	2-S27
Clutch Slips	Clutch pedal free travel too small	Adjust	2-S4
	Clutch disc excessively worn	Replace	2-S27
	Grease or oil on clutch disc facing	Replace	2-S27
	Clutch disc or pressure plate warped	Replace	2-S27
	Diaphragm spring weaken or broken	Replace	2-S27
	Wiring of the pressure plate worn or broken	Replace (Pressure Plate assembly)	2-S27
Chattering	Grease or oil on clutch disc facing	Replace	2-S27
	Clutch disc or pressure plate warped	Replace	2-S27
	Clutch disc boss spline worn or rusted	Replace or remove rust	2-S28
	Gear shaft bent	Replace	3-S75, 3-S94
	Pressure plate or flywheel face cracked or scored	Replace	2-S28
	Clutch disc boss spline and gear shaft spline worn	Replace	2-S28
	Diaphragm spring strength uneven or diaphragm spring broken	Replace	2-S28
Rattle During Running	Clutch disc boss spline worn or rusted	Replace	2-S28
	Thrust ball bearing worn or sticking	Replace	2-S28
Clutch Squeaks	Thrust ball bearing sticking or dry	Replace or lubricate	2-S28
	Clutch disc excessively worn	Replace	2-S28
Vibration	Gear shaft bent	Replace	3-S75, 3-S94
	Clutch disc rivet worn or broken	Replace	2-S28
	Clutch parts broken	Replace	2-S27

9Y1210824CLS0001US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Clutch Pedal	Free travel	20 to 30 mm 0.78 to 1.18 in.	–
Clutch Disc Boss and Gear Shaft (Manual Transmission and GST)	Backlash (Displacement Around Disc Edge)	–	2.0 mm 0.079 in.
Clutch Coupling Boss and Input Shaft (HST)	Backlash (Displacement Around Clutch Coupling)	–	1.5 to 2.0 mm 0.059 to 0.078 in.
Clutch Disc	Disc Surface to Rivet Top (Depth)	–	0.3 mm 0.01 in.
Diaphragm Spring	Mutual Difference	–	0.5 mm 0.02 in.
Pressure Plate	Flatness	–	0.2 mm 0.008 in.

9Y1210824CLS0002US0

3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

[ROPS Model]

Item	N·m	kgf·m	lbf·ft
Joint bolt for PTO delivery pipe	35 to 39	3.5 to 4.0	26 to 28
Release fork setting screws (except HST)	24 to 27	2.4 to 2.8	18 to 20

[CABIN Model]

Item	N·m	kgf·m	lbf·ft
Outer roof mounting screw	3.5 to 4.0	0.36 to 0.40	2.6 to 2.9
Cabin mounting bolt and nut	124 to 147	12.6 to 15.0	91.2 to 108
Joint bolt for delivery pipe	40 to 49	4.0 to 5.0	29 to 36

[All Models]

Item	N·m	kgf·m	lbf·ft
Front loader pipe retaining nut	90.0 to 108	9.18 to 11.0	66.4 to 79.6
Joint bolt for HST return pipe	88 to 98	9.0 to 9.9	65 to 72
Clutch mounting screws	24 to 27	2.4 to 2.8	18 to 20
Engine and clutch housing mounting screw	78 to 90	7.9 to 9.2	58 to 66
Engine and clutch housing mounting nut	103 to 117	10.5 to 12.0	76.0 to 86.7
Joint bolt for main delivery pipe	40 to 49	4.0 to 4.9	29 to 36
Joint bolt for PTO delivery pipe	35 to 39	3.5 to 4.0	26 to 28

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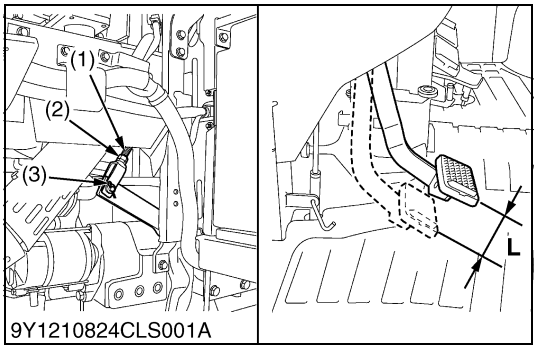
4. CHECKING AND ADJUSTING



9Y1210824CLS001A

Clutch Pedal Free Travel (Manual Transmission and GST Only)

CAUTION

- **When checking, park the tractor on flat ground, apply the parking brake, stop the engine and remove the key.**

1. Slightly depress the clutch pedal and measure free travel **"L"** at top of clutch pedal.
2. If the measurement is not within the factory specifications, loosen the lock nut (2), remove the clevis pin (3) adjust the length of rod (1) within acceptable limits.
3. Retighten the lock nut (2) and split the cotter pin.

Clutch pedal free travel **"L"**	Factory specification	20 to 30 mm 0.78 to 1.18 in.

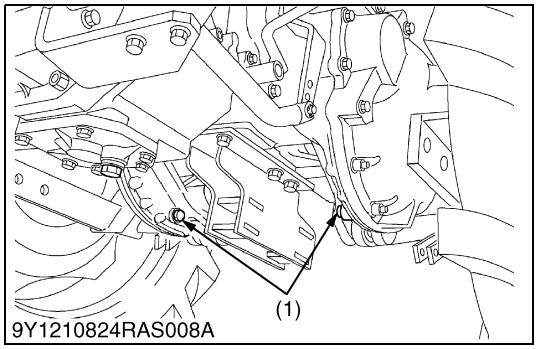
(1) Clutch Pedal Rod
(2) Lock Nut
(3) Clevis Pin

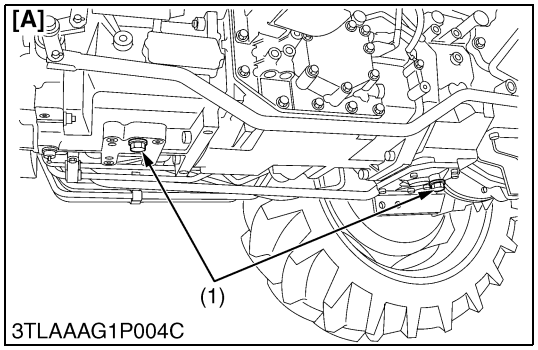
L: Free Travel

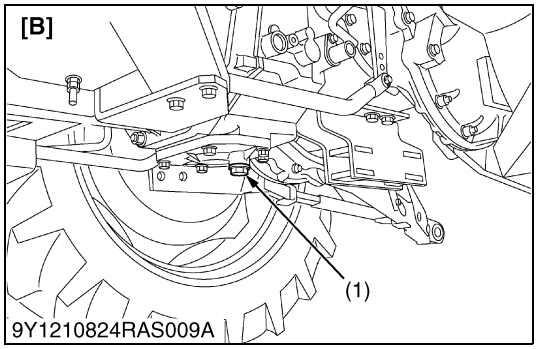
9Y1210824CLS0004US0

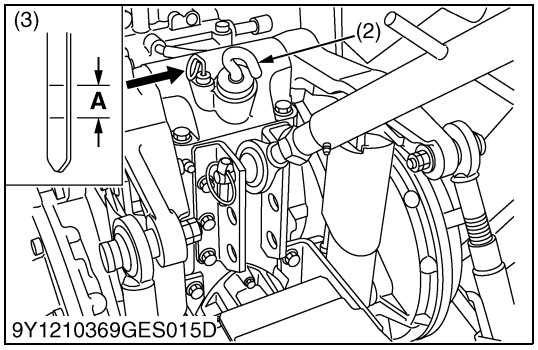
5. PREPARATION

[1] SEPARATING CLUTCH HOUSING FROM ENGINE (ROPS TYPE)









Draining the Transmission Fluid

CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5060 L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

IMPORTANT

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

[A] Manual Transmission / GST
[B] HST
A: Oil level is acceptable within this range.

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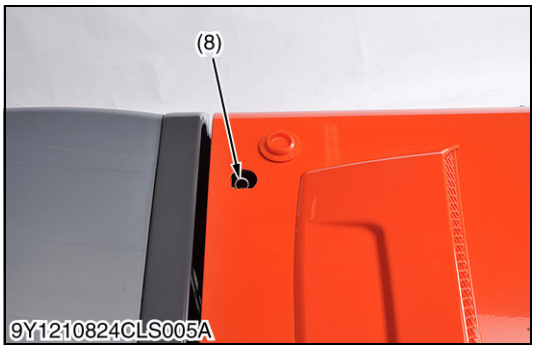

Front Grill, Skirts and Bonnet

1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Disconnect the head light connector (6).
5. Remove the damper (7).
6. Remove the β pin (8), then the bonnet.

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Head Light Connector
(7) Damper
(8) β Pin

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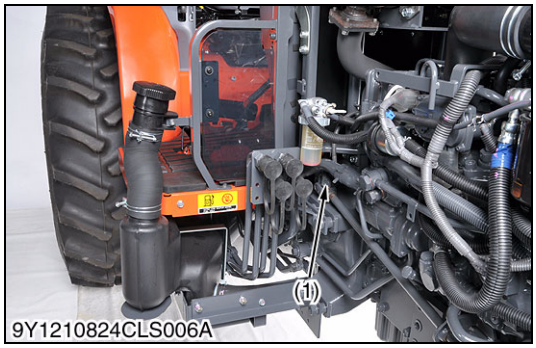

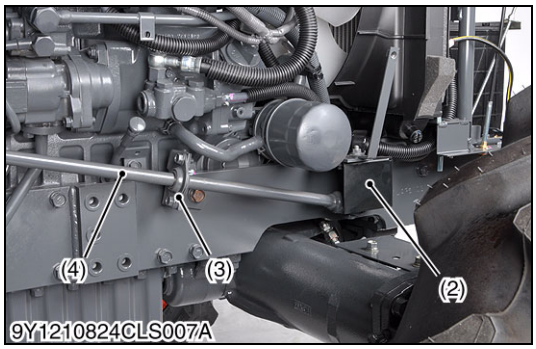

Steering Joint Shaft

1. Remove the steering joint screw (1).
2. Remove the steering joint cover (2) and the steering joint support (3).
3. Remove the steering joint shaft (4).

(1) Steering Joint Screw
(2) Steering Joint Cover
(3) Steering Joint Support
(4) Steering Joint Shaft

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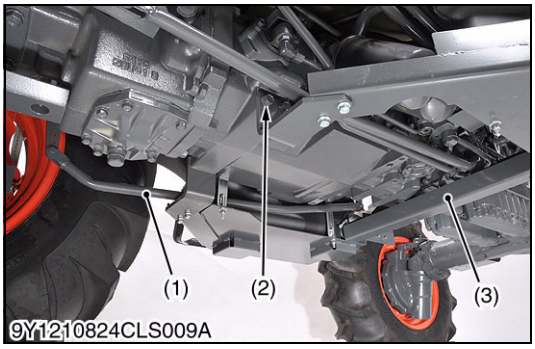

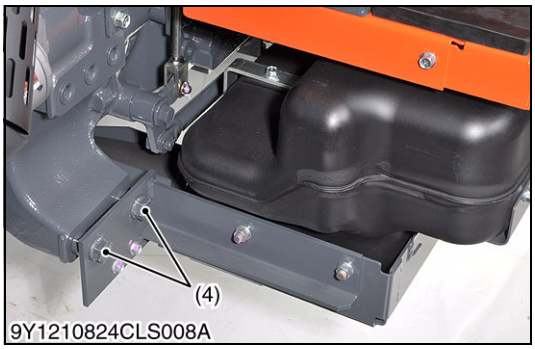

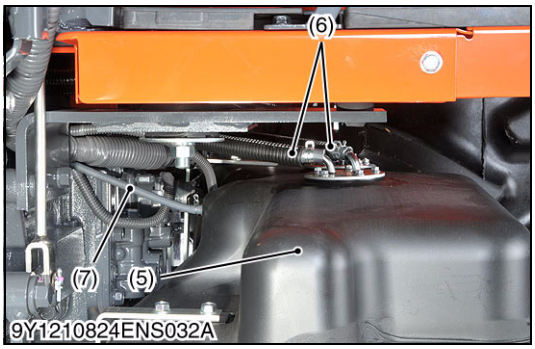

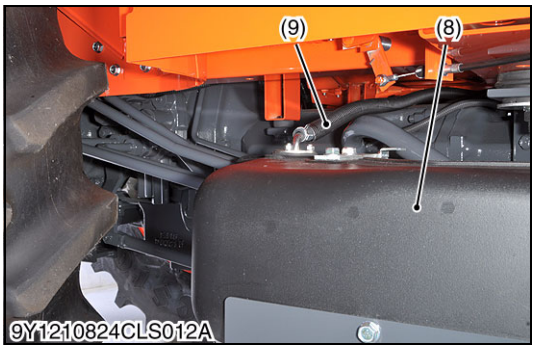

Fuel Tanks

1. Remove the left step.
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (1).
4. Place the disassembling stands under the right and left fuel tanks (5), (8).
5. Remove the front (4) and rear support mounting screws (2) of the right and left fuel tanks (5), (8).
6. Lower the fuel tanks (5), (8) together with the disassembling stands.
7. Disconnect the fuel hoses (6), overflow hose (7) and fuel level sensor connector from the fuel tank L.H. (5).
8. Disconnect the fuel hose (9) from the fuel tank R.H. (8).

(1) Brake Rod L.H.
(2) Rear Support Mounting Screw
(3) Fuel Hose Cover
(4) Front Support Mounting Screw
(5) Fuel Tank L.H.
(6) Fuel Hose
(7) Overflow Hose
(8) Fuel Tank R.H.
(9) Fuel Hose

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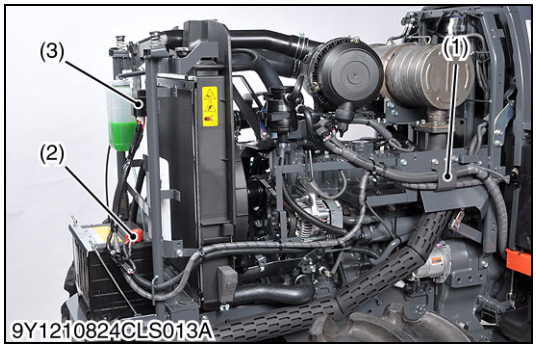

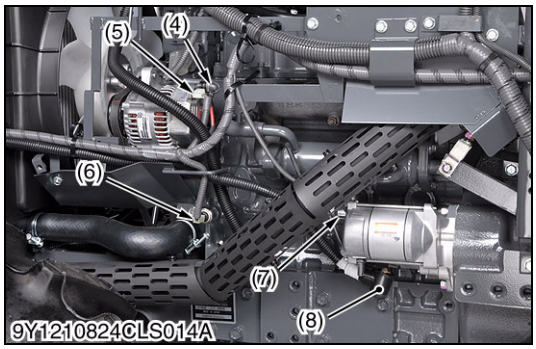

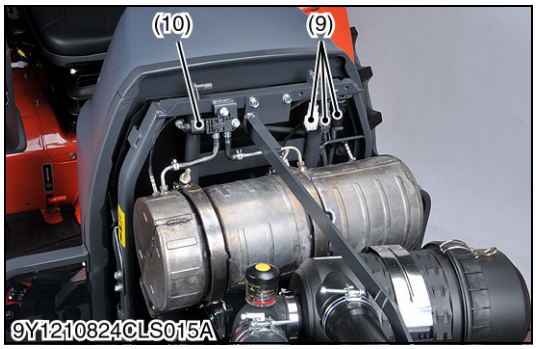

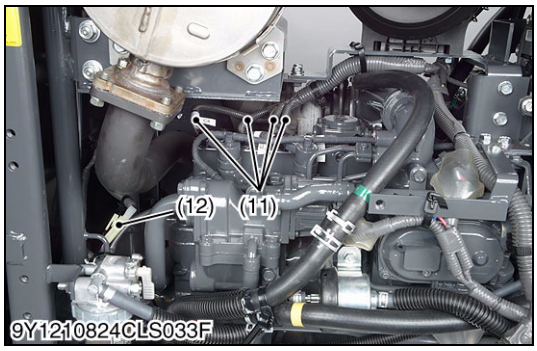

Wiring Harness

1. Remove the harness clamps and harness cover (1).
2. Disconnect the battery positive cable (2) and battery.
3. Remove the slow blow fuse box (3).
4. Disconnect the alternator terminal **B** (4) and terminal **IG** (5).
5. Disconnect the oil pressure switch connector (6), starter terminal **B** (8) and terminal **ST** (7).
6. Disconnect the DPF temperature sensor connectors (9) and differential pressure connector (10).
7. Disconnect the injector connectors (11) and glow plug connector (12).
8. Disconnect CCV GND wiring harness (13), CCV relay (14), CCV heater fuse (15), CCV SB fuse (16) and CCV heater (17) (18). (If equipped)

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Harness Cover
(2) Battery Positive Cable
(3) Slow Blow Fuse Box
(4) Alternator Terminal **B**
(5) Alternator Terminal **ST**
(6) Oil Pressure Switch Connector
(7) Starter Terminal **ST**
(8) Starter Terminal **B**
(9) DPF Temperature Sensor Connector
(10) DPF Differential Pressure Connector
(11) Injector Connector
(12) Glow Plug Connector

(To be continued)

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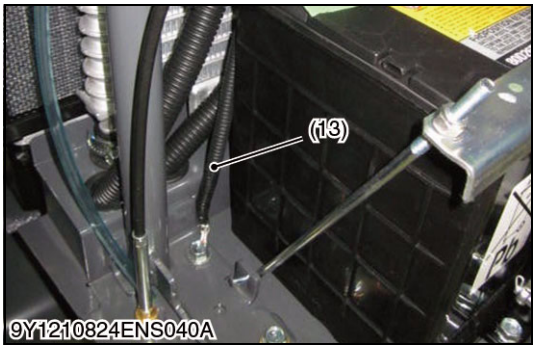

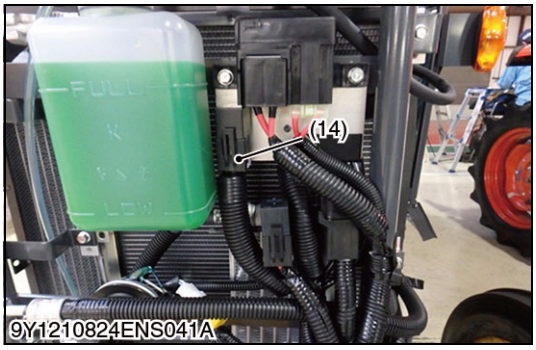

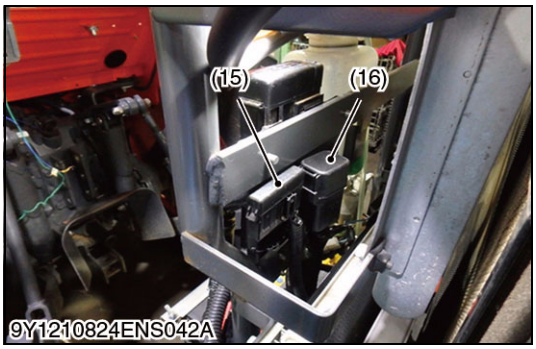

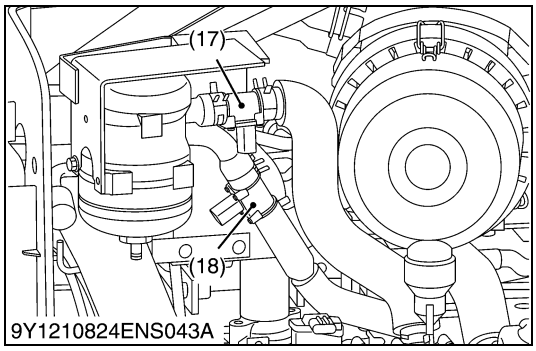

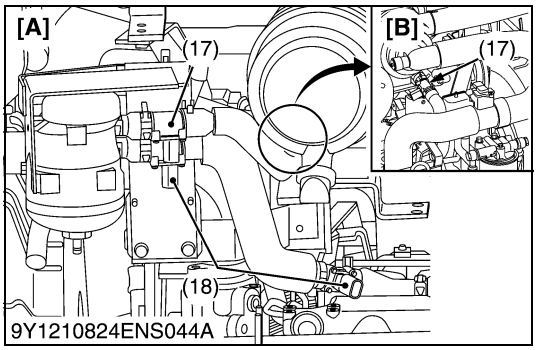

(13) CCV GND Wiring Harness
(14) CCV Relay
(15) CCV Heater Fuse
(16) CCV SB Fuse
(17) CCV Heater (OUT)
(18) CCV Heater (IN)

[A] Left Side
[B] Right Side

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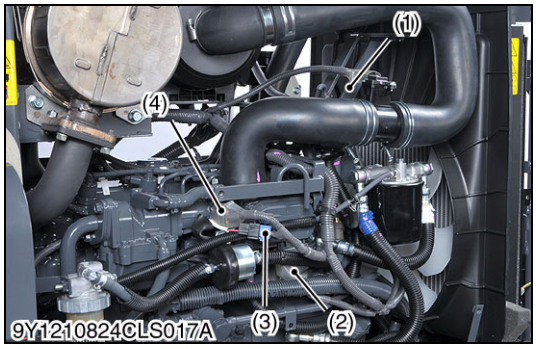

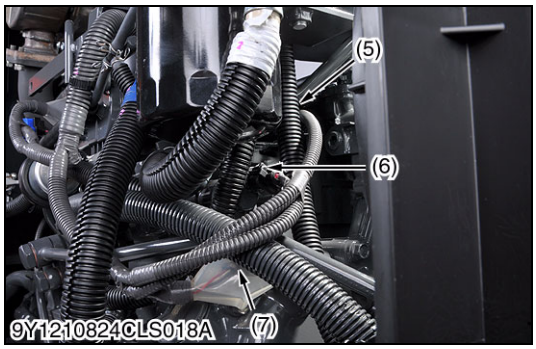

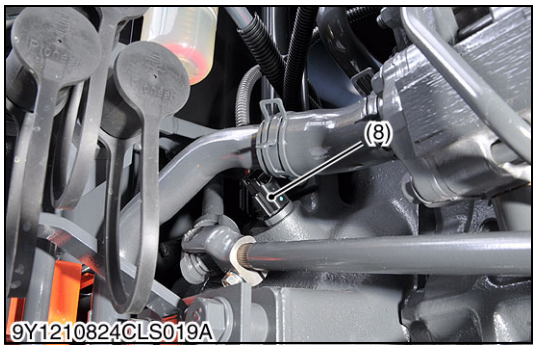

Sensor Connectors

1. Disconnect the air flow sensor connector (1), intake throttle sensor connector (2), electromagnetic pump connector (3) and EGR valve connector (4).
2. Disconnect the common rail sensor connector (5), suction control valve connector (6) and camshaft position sensor connector (7).
3. Disconnect the crankshaft position sensor connector (8).
4. Set aside the main harness to the rear.

(1) Air Flow Sensor Connector
(2) Intake Throttle Sensor Connector
(3) Electromagnetic Pump Connector
(4) EGR Valve Connector
(5) Common Rail Sensor Connector
(6) Suction Control Valve Connector
(7) Camshaft Position Sensor Connector
(8) Crankshaft Position Sensor Connector

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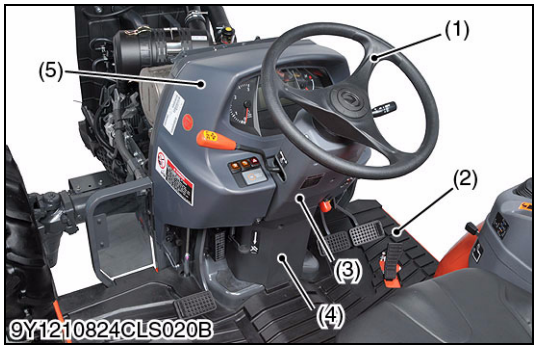

Steering and Panel Cover

1. Remove the steering wheel (1).
2. Remove the mat (2).
3. Remove the steering post cover 2 (4) and steering post cover 1 (3).
4. Remove the meter panel cover (5).

(1) Steering Wheel
(2) Mat
(3) Steering Post Cover 1
(4) Steering Post Cover 2
(5) Meter Panel Cover

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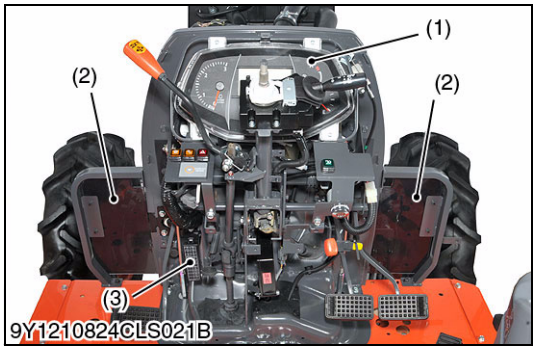

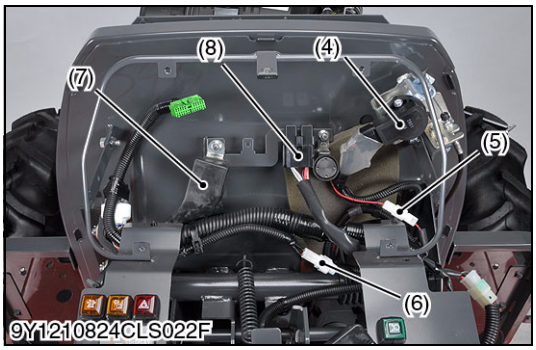

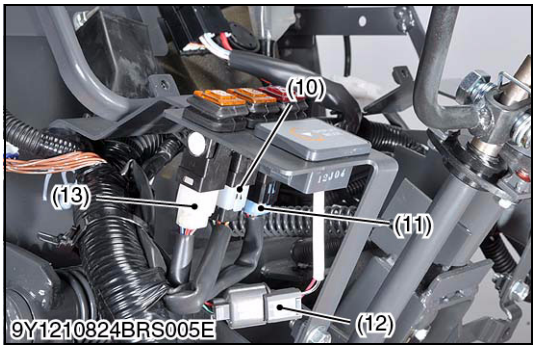

Meter Panel and Wiring Harness

1. Remove the meter panel (1).
2. Remove the right and left mud shields (2).
3. Remove the fuse box (3) and relay box (8).
4. Disconnect the flasher relay connector (7), buzzer connector (5) and parking brake switch connector (6).
5. Disconnect the foot throttle sensor connector (4). (Manual Transmission and GST only)
6. Disconnect the cruise control switch connector (9). (HST only)
7. Disconnect the DPF auto switch connector (13), DPF switch connector (10), hazard switch connector (11) and display mode switch connector (12).

(1) Meter Panel
(2) Mud Shield
(3) Fuse Box
(4) Foot Throttle Sensor Connector
(5) Buzzer Connector
(6) Parking Brake Switch Connector
(7) Flasher Unit
(8) Relay Box
(9) Cruise Control Switch
(10) DPF Switch Connector
(11) Hazard Switch Connector
(12) Display Mode Switch Connector
(13) DPF Auto Switch Connector

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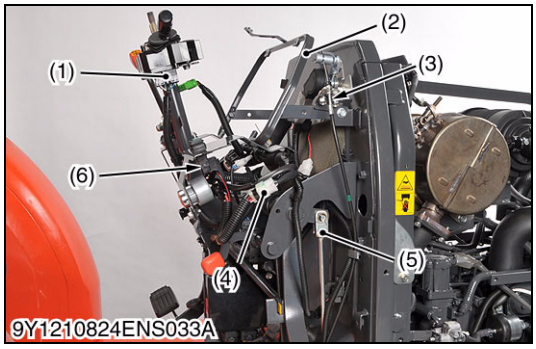

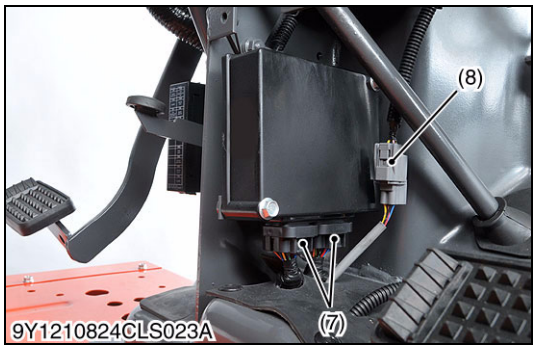

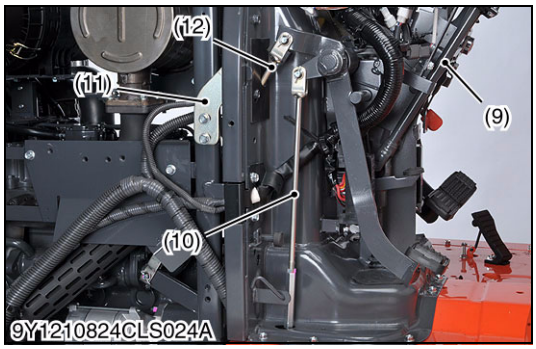

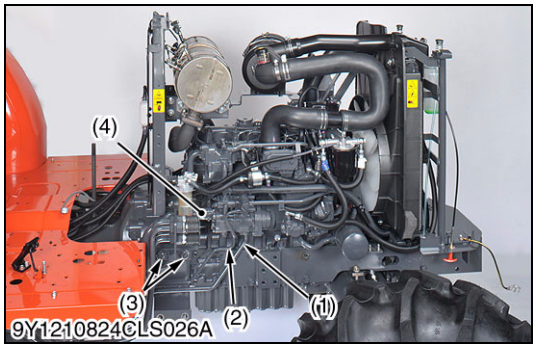

Panel Frame

1. Disconnect the multi function combination switch connector (1), side working light connector (6) and main switch connector (4).
2. Disconnect the foot throttle wire (3) and shuttle switch connector (8) (Manual Transmission and GST only)
3. Remove the meter panel support (2) and brake pedal rod R.H. (5).
4. Remove the main ECU connectors (7).
5. Remove the shuttle link (9) and clutch pedal rod (12). (Manual transmission and GST only)
6. Remove the shuttle link (9), brake pedal rod L.H. (10), clutch pedal rod (12) and both sides of support plate (11).

(1) Multi Function Combination Switch
(2) Meter Panel Support
(3) Foot Throttle Wire
(4) Main Switch Connector
(5) Brake Pedal Rod R.H.
(6) Front Working Light Connector
(7) Main ECU Connector
(8) Shuttle Switch Connector
(9) Shuttle Link
(10) Brake Pedal Rod L.H.
(11) Rear Support Plate
(12) Clutch Pedal Rod

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Hydraulic Pipes

1. Disconnect the delivery pipe (1), PTO delivery pipe (2) and suction hose (4) from the hydraulic pump.
2. Remove the front loader pipe bracket mounting bolts (3).

(When reassembling)

Tightening torque	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

(1) Delivery Pipe
(2) PTO Delivery Pipe
(3) Bolt
(4) Suction Hose

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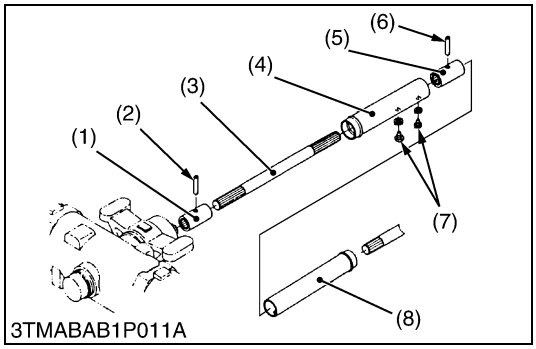

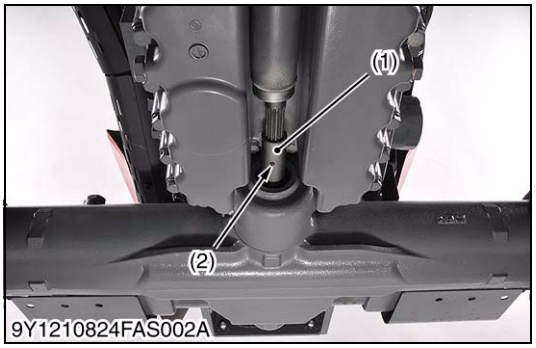

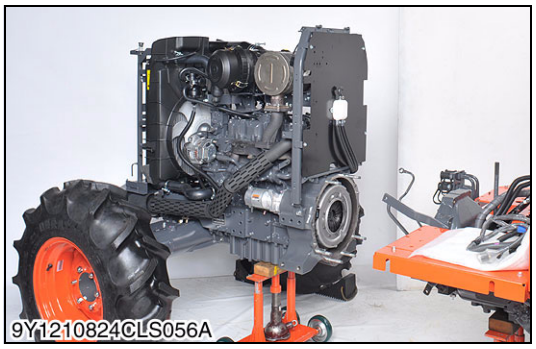

Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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Separating Engine from Clutch Housing

1. Place the disassembling stands under the engine and clutch housing.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine and clutch housing.

(When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1211 or equivalent) to joint face of the flywheel housing and clutch housing.

Tightening torque	Engine and clutch housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Engine and clutch housing mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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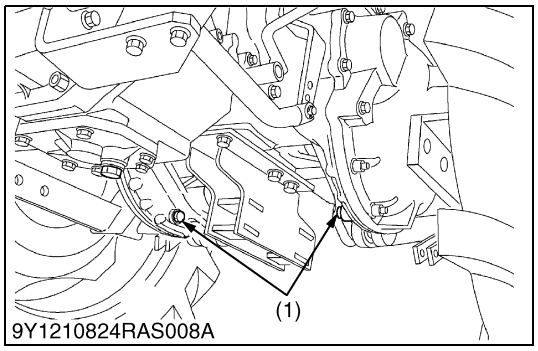
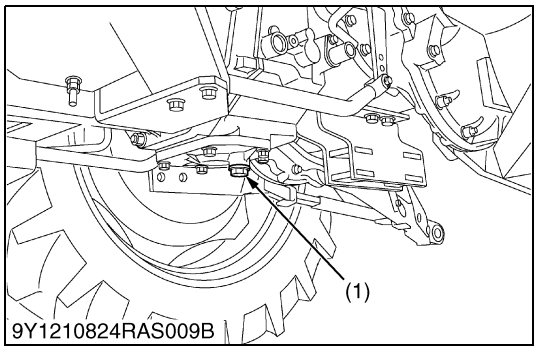
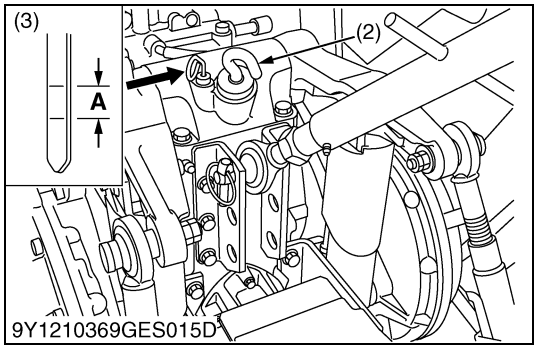
[2] SEPARATING CLUTCH HOUSING AND ENGINE (CABIN TYPE)







Draining the Transmission Fluid

CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

HST

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

IMPORTANT

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

A: Oil level is acceptable within this range.

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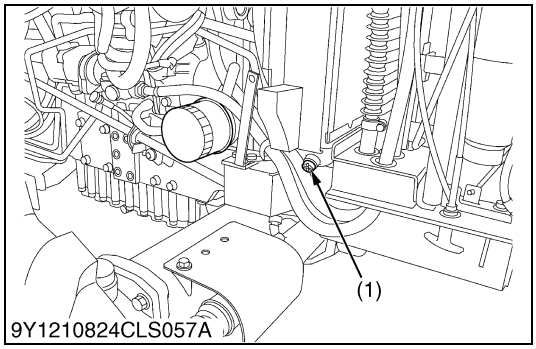

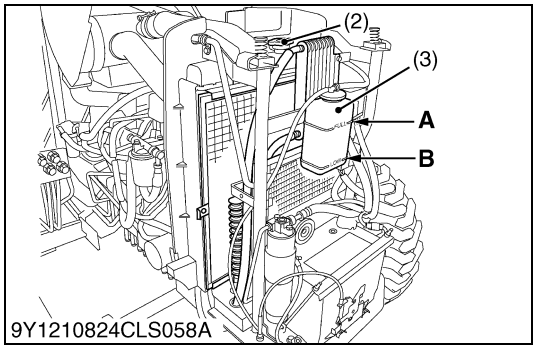

Draining Coolant

WARNING

To avoid personal injury or death:

- **Do not remove radiator cap while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.**

1. Stop the engine, remove the key and let it cool down.
2. To drain the coolant, open the radiator drain plug and remove radiator cap. The radiator cap must be removed to completely drain the coolant.
3. After all coolant is drained, reinstall the drain plug.

(When refilling)

- Fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap securely.
- Fill with coolant up to **"FULL"** mark on the recovery tank.
- Start and operate the engine for few minutes.
- Stop the engine and let cool. Check coolant level of recovery tank and add coolant if necessary.

IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh soft water and anti-freeze to fill the radiator and recovery tank.**
- **When mixing the anti-freeze with water, the anti-freeze mixing ratio is 50 %.**
- **Securely tighten radiator cap. If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**
- **Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.**

NOTE

- **On cab type machines, coolant circulates through the heater. This means that one more liter or so of coolant is required.**
  In changing coolant, pour coolant up to the filler port of the recovery tank. Turn ON the heater (shift the temperature control lever toward WARM), and run the engine for a while in order to warm coolant. Then stop the engine.
  When coolant has cooled down, some of the coolant in the recovery tank is sucked. Now the recovery tank is appropriately filled with coolant.

Coolant capacity (without recovery tank)	L3560 L4060	7.5 L 7.9 U.S.qts 6.6 Imp.qts
	L4760 L5060 L5460 L6060	8.2 L 8.7 U.S.qts 7.2 Imp.qts

(1) Drain Plug
(2) Radiator Cap
(3) Recovery Tank

A: FULL
B: LOW

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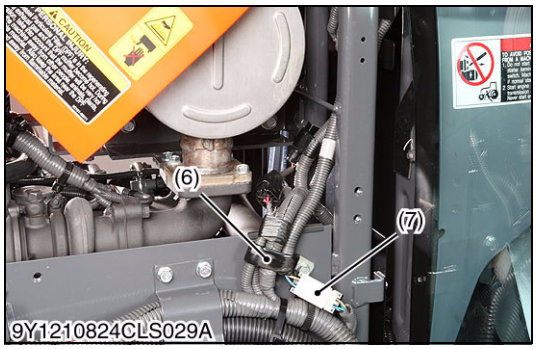

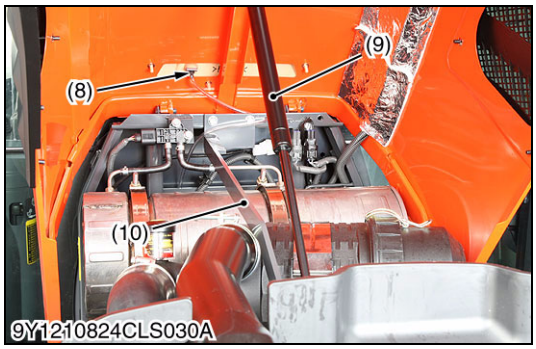

Front Grill, Skirts and Bonnet

1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Remove the clamp (6) and disconnect the head light connector (7).
5. Disconnect the window washer hose (8) and remove the damper (9).
6. Remove the plug (11) and the ß pin inside, then the bonnet.
7. Remove the damper support (10).

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Clamp
(7) Head Light Connector
(8) Window Washer Hose
(9) Damper
(10) Damper Support
(11) Plug

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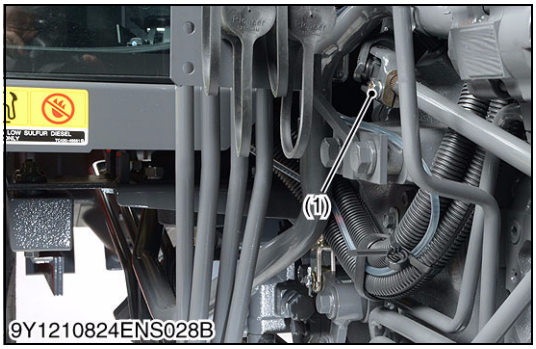

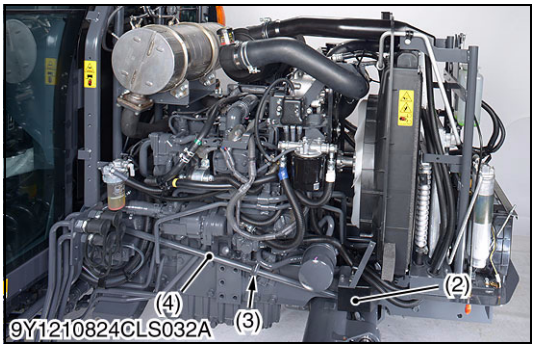

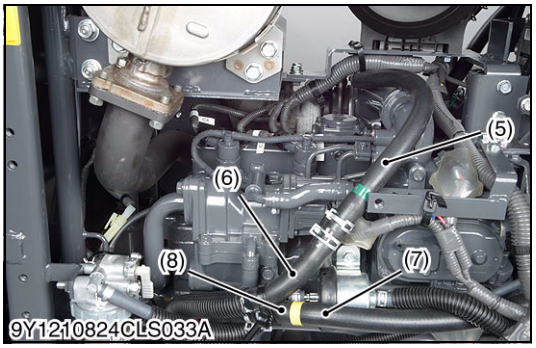

Steering Joint Shaft

1. Remove the steering joint screw (1).
2. Remove the steering joint cover (2) and the steering joint support (3).
3. Remove the steering joint shaft (4).
4. Disconnect the heater hose (5) from the heater hose (6) and the heater hose (7) from the heater hose (8) inside, then reconnect the heater hose (5), (7) and heater hose (6), (8) to make the loop.

■ **NOTE**

- **Put a mark to each heater hose before disconnecting.**

(1) Steering Joint Screw
(2) Steering Joint Cover
(3) Steering Joint Support
(4) Steering Joint Shaft
(5) Heater Hose
(6) Heater Hose
(7) Heater Hose
(8) Heater Hose

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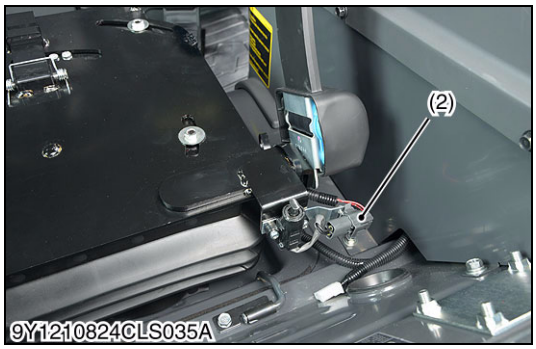

Seat and Seat Bracket

1. Disconnect the seat switch connector (1) and seat tilt switch connector (2).
2. Remove the seat (3).
3. Remove the seat suspension (4) together with seat bracket (5).

(1) Seat Switch Connector
(2) Seat Tilt Switch Connector
(3) Seat
(4) Seat Suspension
(5) Seat Bracket

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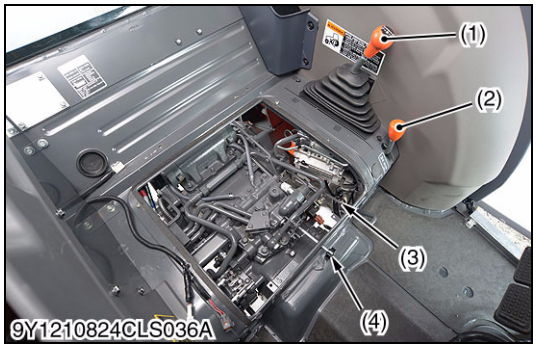

Lever Grips, Differential Lock Rod and Lowering Speed Adjusting Knob

1. Remove the range gear shift lever grip (1) and front wheel drive lever grip (2).
2. Remove the differential lock rod (3) and the lowering speed adjusting knob (4).
3. Remove the range gear shift rod (5).

(1) Range Gear Shift Lever Grip
(2) Front Wheel Drive Lever Grip
(3) Differential Lock Rod
(4) Lowering Speed Adjusting Knob
(5) Range Gear Shift Rod

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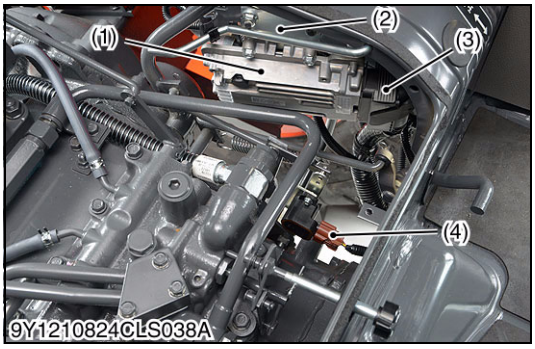

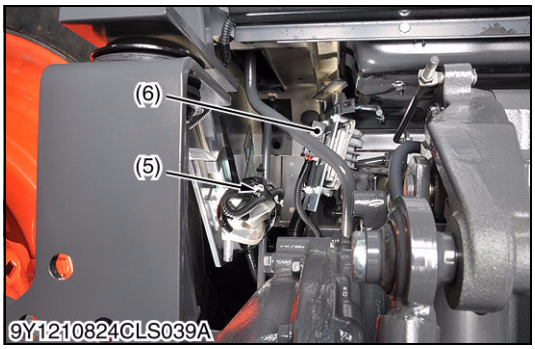

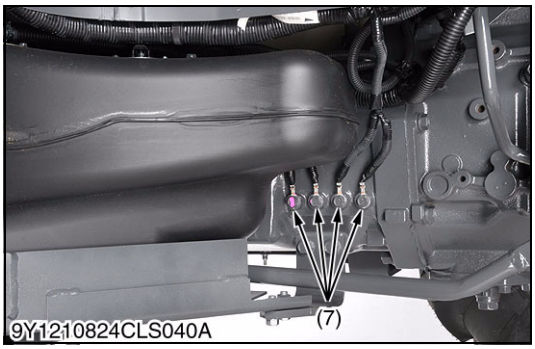

Rear Wiring Harness

1. Remove the engine ECU support (2).
2. Disconnect the engine ECU connector (3).
3. Disconnect the range gear sensor connector (4).
4. Disconnect the joint connectors (5).
5. Remove the engine ECU power relay and glow relay (6) from the engine ECU support (2).
6. Disconnect the earth cables (7).

(1) Engine ECU
(2) Engine ECU Support
(3) Engine ECU Connector
(4) Range Gear Sensor Connector
(5) Joint Connector
(6) Glow Relay
(7) Earth Cable

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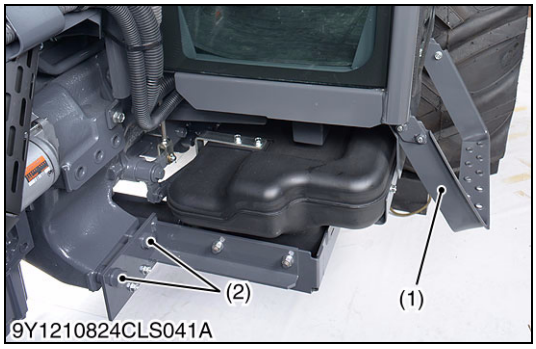

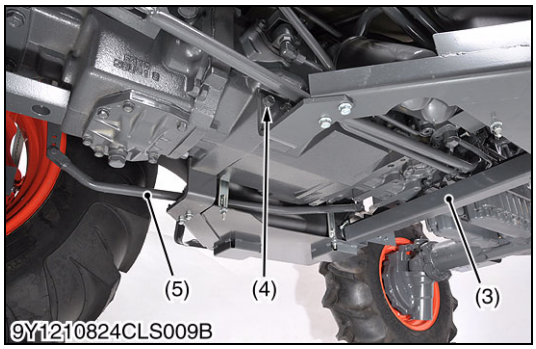

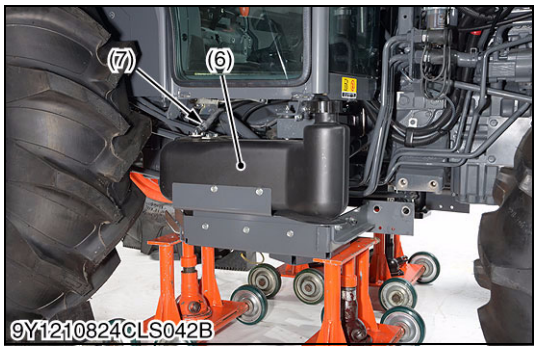

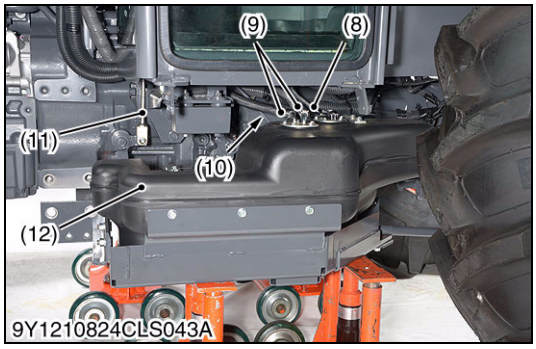

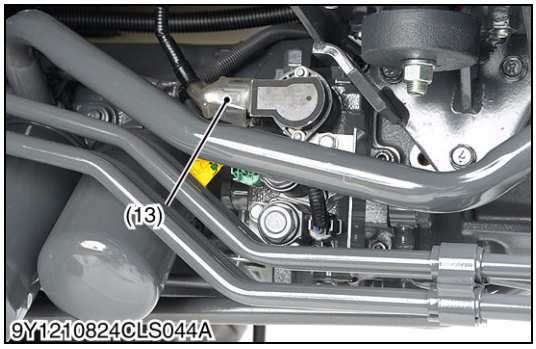

Fuel Tanks

1. Remove the right and left steps (1).
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (5).
4. Place the disassembling stands under the right and left fuel tanks (6), (12).
5. Remove the front (2) and rear support mounting screws (4) of the right and left fuel tanks (6), (12).
6. Lower the fuel tanks (6), (12) together with the disassembling stands.
7. Disconnect the fuel hoses (9), overflow hose (10) and fuel level sensor connector (8) from the fuel tank L.H. (12).
8. Disconnect the fuel hose (7) from the fuel tank R.H. (6).
9. Remove the right and left brake pedal rod (11).
10. Disconnect the swashplate position sensor connector (10).

(1) Step
(2) Front Support Mounting Screw
(3) Fuel Hose Cover
(4) Rear Support Mounting Screw
(5) Brake Rod L.H.
(6) Fuel Tank R.H.
(7) Fuel Hose
(8) Fuel Level Sensor Connector
(9) Fuel Hose
(10) Overflow Hose
(11) Brake Pedal Rod L.H.
(12) Fuel Tank L.H.
(13) Swashplate Position Sensor Connector

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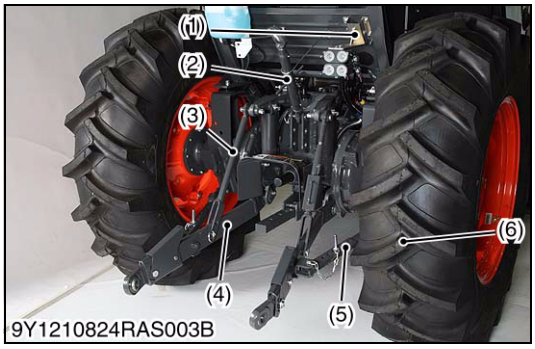

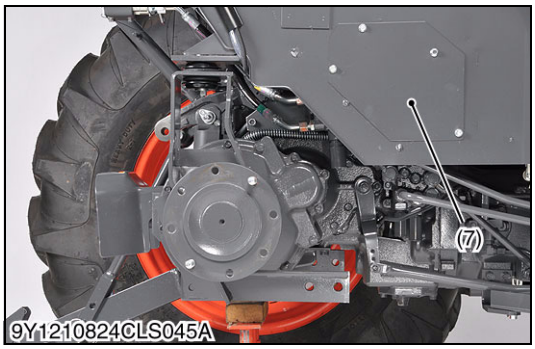

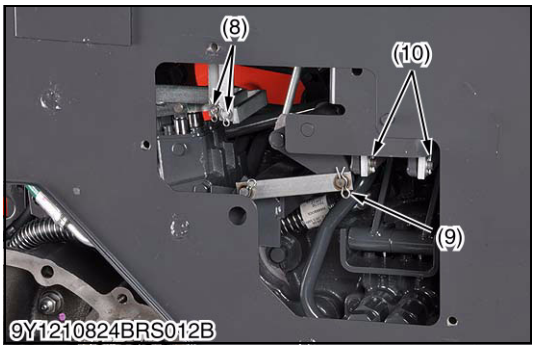

Linkage and Remote Control Valve

1. Remove the remote control valve support (1) together with the couplers. (If equipped.)
2. Remove the top link (2), right and left lift rods (3), lower links (4) and stabilizers (5).
3. Remove the rear tire R.H. (6) and fender plate (7).
4. Disconnect the remote control valve linkage ß pins (8) to release the links. (If equipped.)
5. Disconnect the position lever linkage ß pin (9) to release the link.
6. Disconnect the front loader control linkage ß pins (10) to release the links.

(1) Remote Control Valve
(2) Top Link
(3) Lift Rod
(4) Lower Link
(5) Stabilizer
(6) Rear Tire R.H.
(7) Fender Plate
(8) ß Pin
(9) ß Pin
(10) ß Pin

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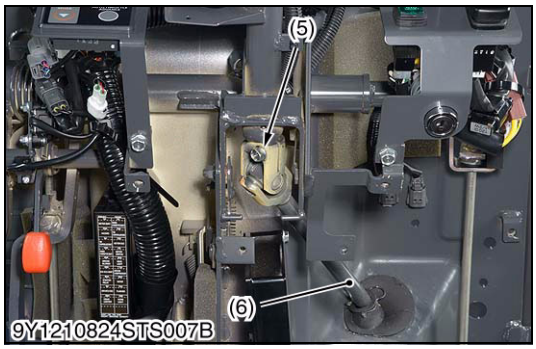

Mat, Panel Cover and Linkage

1. Remove the step mat (1) and sound absorber (2).
2. Remove the steering post cover 1 and 2 (4).
3. Remove the panel cover (3).
4. Remove the universal joint screw (5) and disconnect the steering joint shaft (6).

(1) Step Mat
(2) Sound Absorber
(3) Panel Cover
(4) Steering Post Cover
(5) Universal Joint Screw
(6) Steering Joint Shaft

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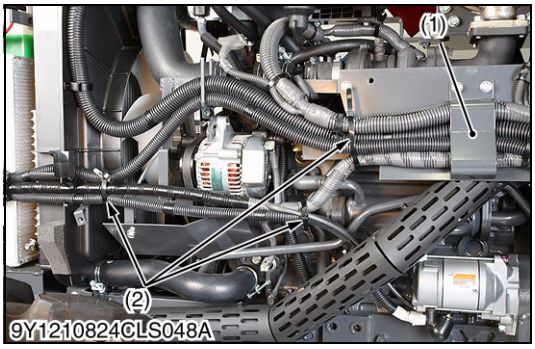

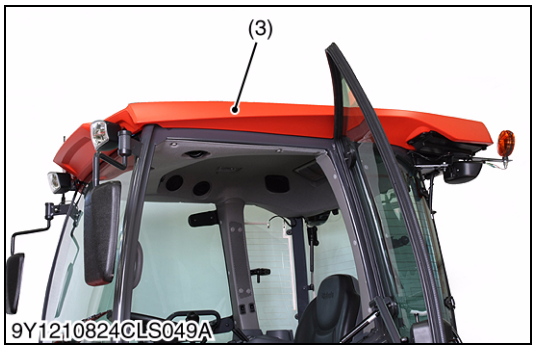

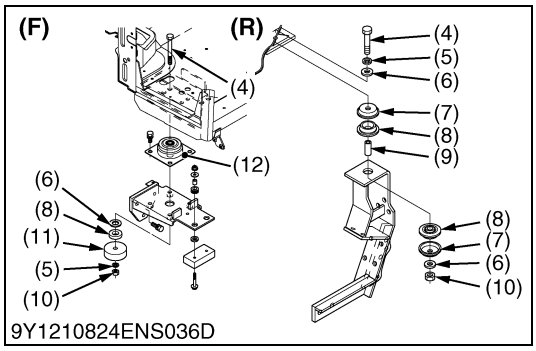

Dismounting Cabin

1. Remove the wiring harness cover (1) and wiring harness tighteners (2).
2. Remove the cabin outer roof (3).
3. Secure the cabin with nylon straps and hoist.
4. Remove the cabin mounting bolts and nuts.
5. Dismount the cabin from the tractor body with careful attention to the hoses connecting to the air conditioner, then set the cabin to the left side of the tractor body.

■ **NOTE**

- **Lift the cabin while making sure it does not catch on anything.**

(When reassembling)

- Be sure to install the washers and mount rubbers, etc. in their original positions as shown in figure.

Tightening torque	Outer roof mounting screw	3.5 to 4.0 N·m 0.36 to 0.40 kgf·m 2.6 to 2.9 lbf·ft
	Cabin mounting bolt and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft

(1) Wiring Harness Cover
(2) Wiring Harness Tightener
(3) Outer Roof
(4) Bolt
(5) Spring Washer
(6) Washer
(7) Cup
(8) Rubber
(9) Collar
(10) Nut
(11) Damper
(12) Cabin Rubber

(F) Front Side
(R) Rear Side

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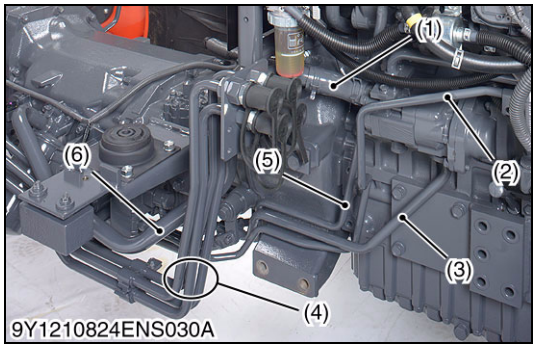

Hydraulic Pipe

1. Remove the front loader pipes (4).
2. Disconnect the suction hose (1) and suction pipe (6).
3. Remove the main delivery pipe (3), power steering delivery pipe (2) and delivery pipe (5).

(When reassembling)

Tightening torque	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft
	Joint bolt for main delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft
	Joint bolt for delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft

(1) Suction Hose
(2) Power Steering Delivery Pipe
(3) Main Delivery Pipe
(4) Front Loader Pipe
(5) Delivery Pipe
(6) Suction Pipe

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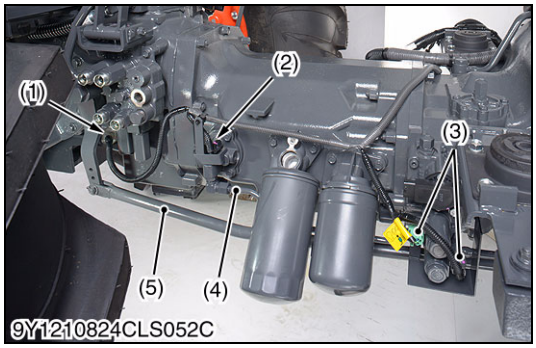

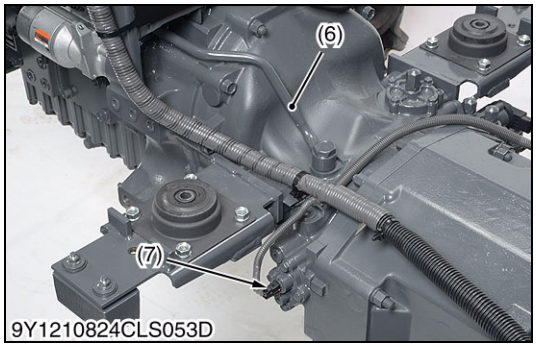

Hydraulic Pipe and Wiring Harness

1. Disconnect the travling speed sensor connector (1).
2. Disconnect the PTO clutch valve connector (2).
3. Disconnect the proportional valve connectors (3).
4. Remove the brake rod R.H. (5).
5. Remove the PTO delivery pipe (4).
6. Disconnect the solenoid valve connector (7).
7. Set aside the main wiring harness to the front.
8. Remove the HST return pipe (6).

(When reassembling)

■ **IMPORTANT**

- **In installing the connector of the proportional valve, pay attention to the color of the connector to ensure correct installation.**

Tightening torque	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Joint bolt for HST return pipe	88 to 98 N·m 9.0 to 9.9 kgf·m 65 to 72 lbf·ft

(1) Traveling Speed Sensor Connector
(2) PTO Clutch Valve Connector
(3) Proportional Valve Connector
(4) PTO Delivery Pipe
(5) Brake Rod R.H.
(6) HST Return Pipe
(7) Solenoid Valve Connector

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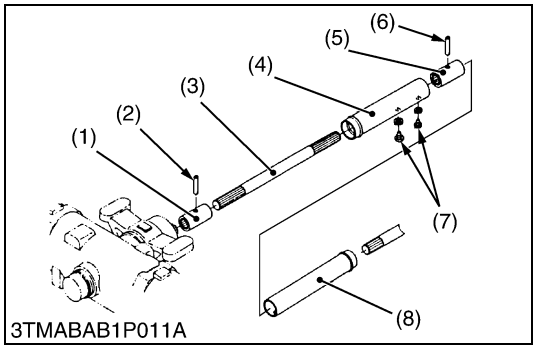

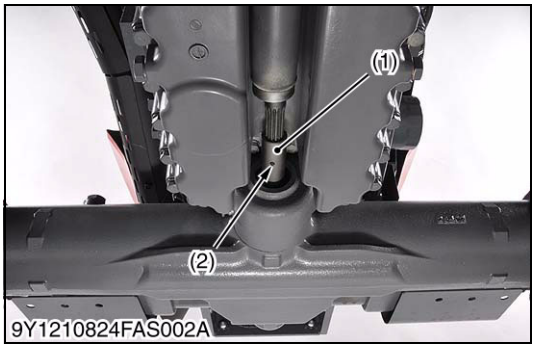

Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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Separating Engine from Clutch Housing

1. Place the disassembling stands under the engine and clutch housing.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine from clutch housing.

(When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1211 or equivalent) to joint face of the flywheel housing and clutch housing.

Tightening torque	Engine and clutch housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Engine and clutch housing mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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6. DISASSEMBLING AND ASSEMBLING

Clutch Assembly (Manual Transmission and GST)

1. Remove the clutch from the flywheel.

(When reassembling)

- Direct the shorter end of the clutch disc boss toward the flywheel.
- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Install the pressure plate, noting the position of straight pins.

■ **IMPORTANT**

- **Align the center of disc and flywheel by inserting the clutch center tool. (See page G-63.)**

■ **NOTE**

- **Do not allow grease and oil on the clutch disc facing.**

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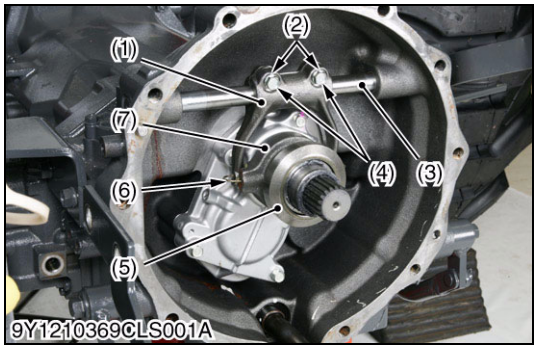

Release Hub and Clutch Lever (Manual Transmission and GST)

1. Draw out the clutch release hub (7) and the release bearing (5) as a unit.
2. Remove the release fork setting screws (4) and fork keys (2).
3. Draw out the clutch lever (3) to remove the release fork (1).

(When reassembling)

- Make sure the direction of the release fork (1) is correct.
- Inject grease to the release hub (7).
- Be sure to set the snap pins (6).

Tightening torque	Release fork setting screws	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Release Fork
(2) Fork Key
(3) Clutch Lever
(4) Setting Screw
(5) Release Bearing
(6) Snap Pin
(7) Release Hub

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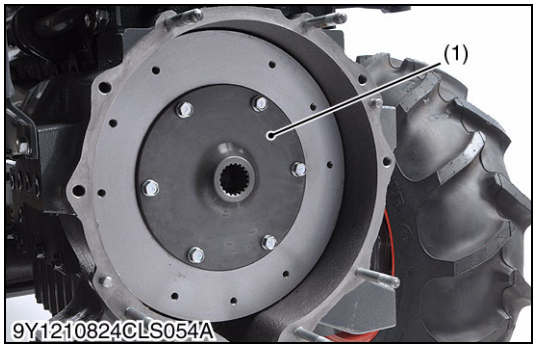

Clutch Coupling (HST)

1. Remove the clutch coupling mounting screws.

(When reassembling)

- Mount the clutch coupling so that the short boss side faces to the flywheel.
- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch coupling boss.

■ **IMPORTANT**

- **Align the center of disc and flywheel by inserting the clutch center tool.**

(1) Clutch Housing

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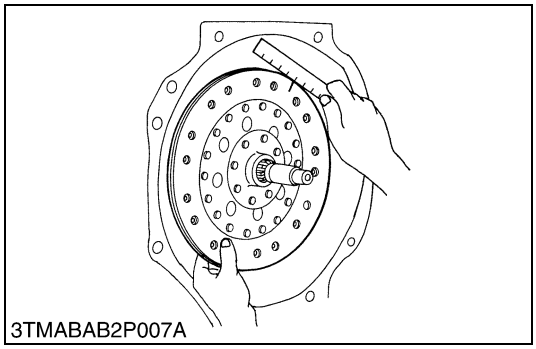
7. SERVICING
[1] MANUAL TRANSMISSION AND GST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Backlash between Clutch Disc Boss and Gear Shaft

1. Mount the clutch disc to the gear shaft.
2. Hold the gear shaft so that it may not turn.
3. Rotate disc lightly and measure the displacement around the disc edge.
4. If the measurement exceeds the allowable limit, replace the disc.

Displacement around disc edge	Allowable limit	2.0 mm 0.079 in.

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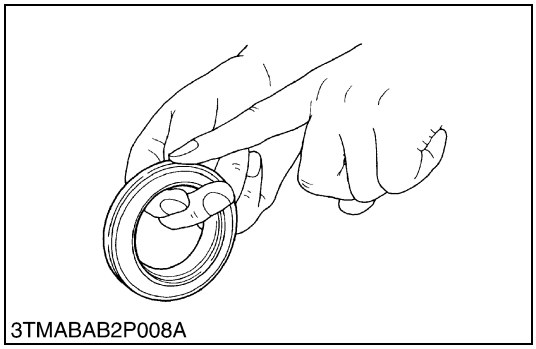
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Thrust Ball Bearing

1. Remove the thrust ball bearing from release hub with a puller.
2. Check for abnormal wear on contact surface.
3. Hold bearing inner race and rotate outer race, while applying pressure to it.
4. If the bearing rotation is rough or noisy, replace the bearing.

■ **NOTE**
- **Do not depress outer race, while installing thrust ball bearing.**

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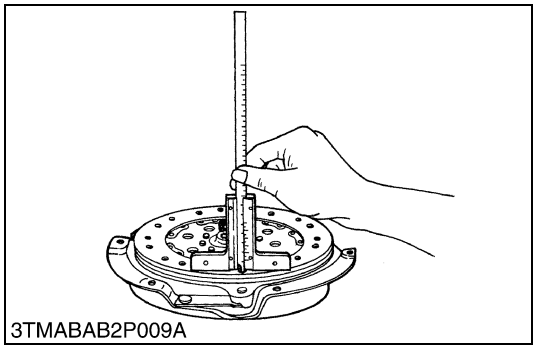
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Clutch Disc Wear

1. Measure the depth from clutch disc surface to the top of rivet at least 10 points with a depth gauge.
2. If the depth is less than the allowable limit, replace the disc.
3. If oil is sticking to clutch disc, or disc surface is carbonized, replace the disc.
   In this case, inspect transmission gear shaft oil seal, engine rear oil seal and other points for oil leakage.

Disc surface to rivet top (Depth)	Allowable limit	0.3 mm 0.01 in.

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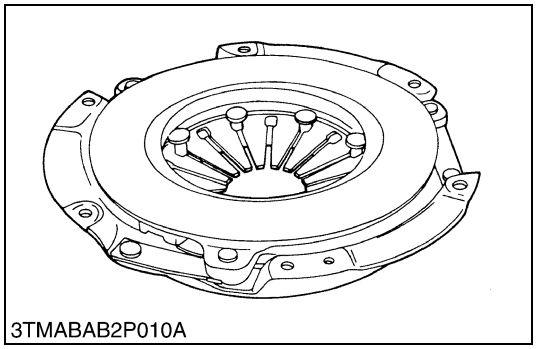
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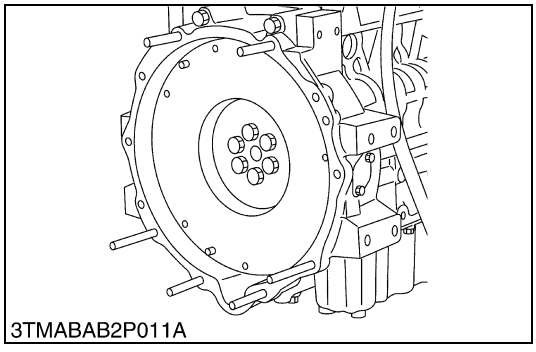
Checking Pressure Plate Assembly and Flywheel

1. Wash the disassembling parts except clutch disc with a suitable cleaning solvent to remove dirt and grease before making inspection and adjustment.
2. Check friction surface of pressure plate and flywheel for scoring or roughness.
   - Slight roughness may be smoothed by using fine emery cloth.
   - If these parts have deep scores or grooves on their surface, they should be replaced.
3. Check the surface of the diaphragm spring for wear.
   If excessive wear is found, replace clutch cover assembly.
4. Inspect thrust rings (wire ring) for wear or damage. As these parts are invisible from outside, shake pressure plate assembly up and down to listen for chattering noise, or lightly hammer on rivets for a slightly cracked noise. Any of these noises indicates need of replace as a complete assembly.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Diaphragm spring mutual difference	Allowable limit	0.5 mm 0.02 in.

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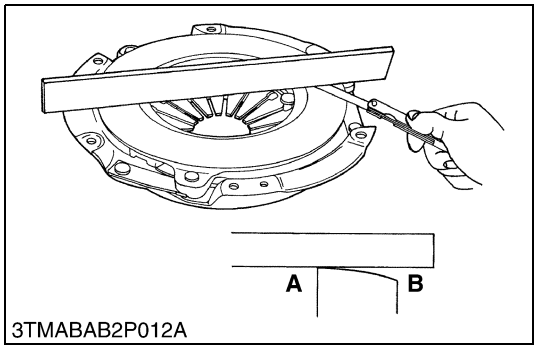

Pressure Plate Flatness

1. Place a straight edge on the pressure plate and measure clearance with a feeler gauge at several points.
2. If the clearance exceeds the allowable limit, replace it.
3. When the pressure plate is worn around its outside and its inside surface only is in contact with the straight edge, replace even if the clearance is within the allowable limit.

Clearance between pressure plate and straight edge	Allowable limit	0.2 mm 0.008 in.

A: inside **B: Outside**

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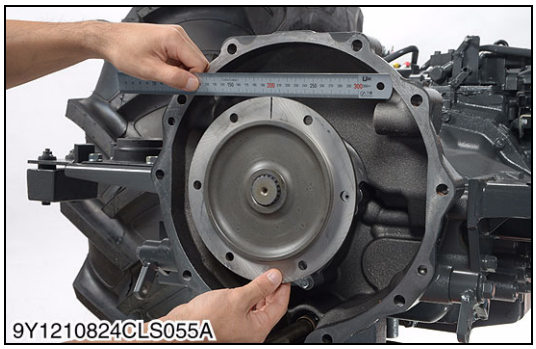
[2] HST



Backlash between Clutch Coupling Boss and Input Shaft

1. Put a mark on the rim of the clutch coupling (see the picture on the left) and mount the clutch coupling to the input shaft.
2. Hold the input shaft and move the clutch coupling to measure the displacement of the mark.
3. If the displacement exceeds the allowable limit, replace the clutch coupling.

Displacement	Allowable limit	1.5 to 2.0 mm 0.059 to 0.078 in.

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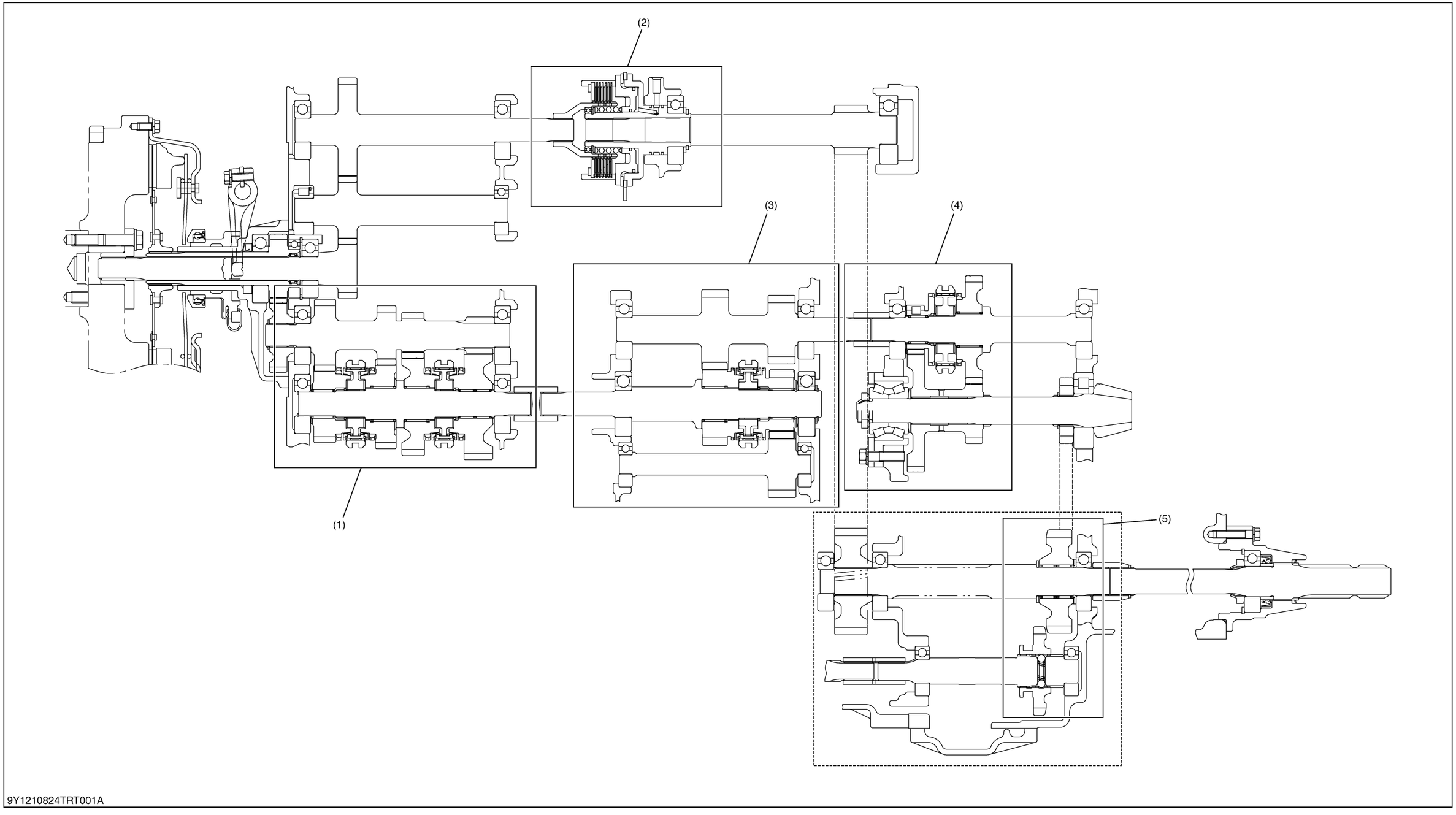
3 TRANSMISSION

MECHANISM

CONTENTS

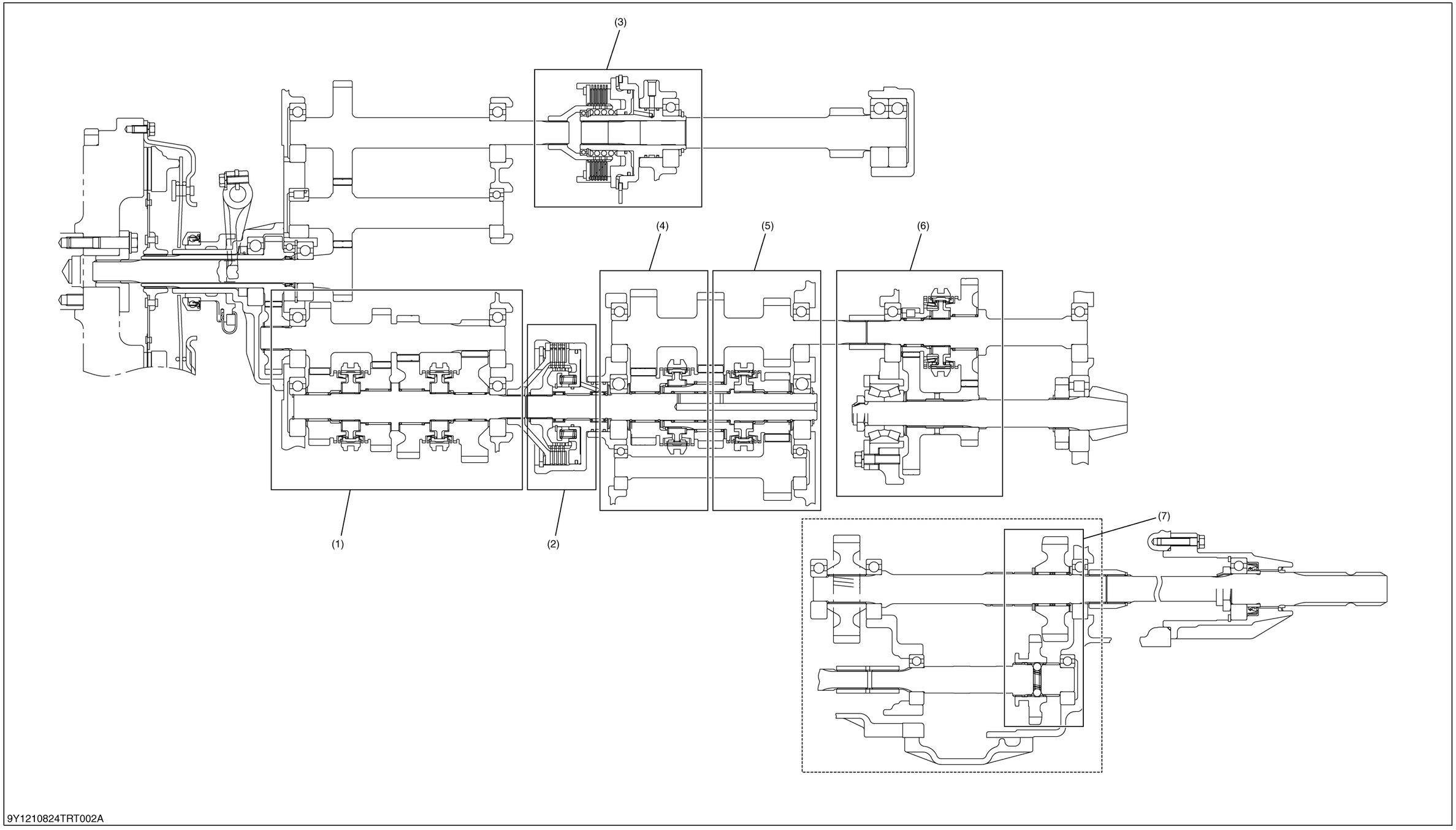
1. STRUCTURE

[1] MANUAL TRANSMISSION



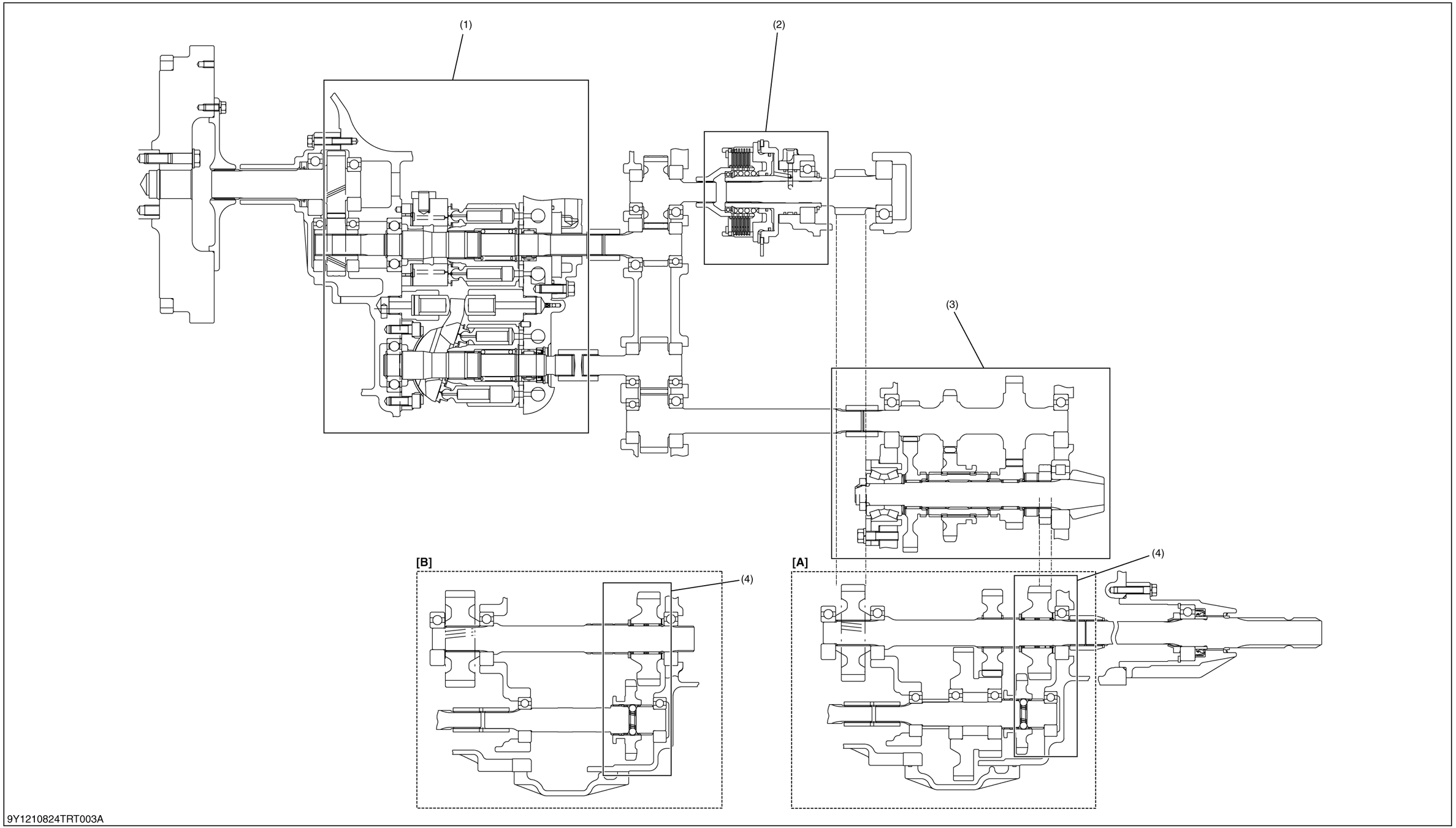
(1) Main Gear Shift Section
(2) PTO Clutch Section
(3) Shuttle Shift Section
(4) Range Gear Shift Section
(5) Front Wheel Drive Shift Section

[2] GLIDE SHIFT TRANSMISSION (GST)



(1) Main Gear Shift Section
(2) Clutch Pack for GST
(3) PTO Clutch Section
(4) Sub-range Gear Shift Section
(5) Shuttle Shift Section
(6) Range Gear Shift Section
(7) Front Wheel Drive Shift Section

[3] HYDROSTATIC TRANSMISSION (HST)



(1) Hydrostatic Transmission Section
(2) PTO Clutch Section
(3) Range Gear Shift Section
(4) Front Wheel Drive Section
[A] All CABIN Model
[B] All ROPS Model

2. MANUAL TRANSMISSION

[1] POWER TRAIN FOR TRAVELING GEAR

The transmission consists of a series of gears and shafts as shown in previous page.

The traveling system consists of main gear shift section, shuttle shift section, range gear shift section and front wheel drive section.

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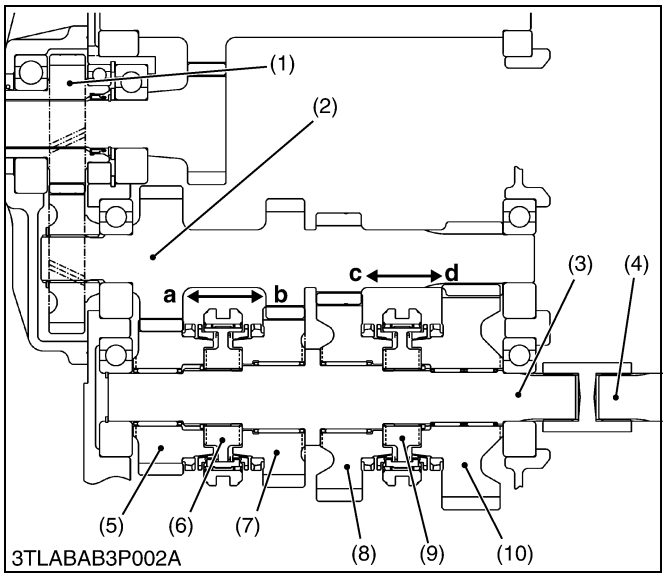
(1) Main Gear Shift Section



The main gear shift section is located in the clutch housing, and it uses a synchromesh.

The power is transmitted from the engine to the gear shaft (1) via the clutch is changed in four ways by operating the main shift lever to shift the shifters, and transmits to the counter shaft (3).

(1) Gear Shaft (Input)
(2) Main Shaft
(3) Counter Shaft
(4) Shuttle Shaft
(5) Gear for 4th
(6) Synchromesh Gears (3rd and 4th)
(7) Gear for 3rd
(8) Gear for 2nd
(9) Synchromesh Gears (1st and 2nd)
(10) Gear for 1st

a: 4th Speed
b: 3rd Speed
c: 2nd Speed
d: 1st Speed

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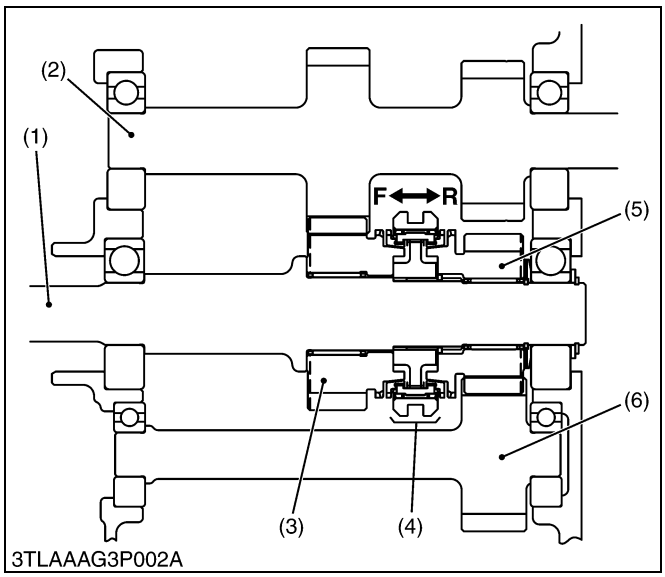
(2) Shuttle Shift Section



The shuttle shift section is located in the mid case, and it uses a single cone type synchromesh. It allows the operator to change forward and reverse for each speed from the first to eight with single shift lever.

(1) Shuttle Shaft (Connected to Counter Shaft)
(2) Shuttle Gear Shaft (Connected to Range Gear Shaft)
(3) Gear for Forward
(4) Single Cone Type Synchromesh
(5) Gear for Reverse
(6) Reverse Gear Shaft

F: Forward
R: Reverse

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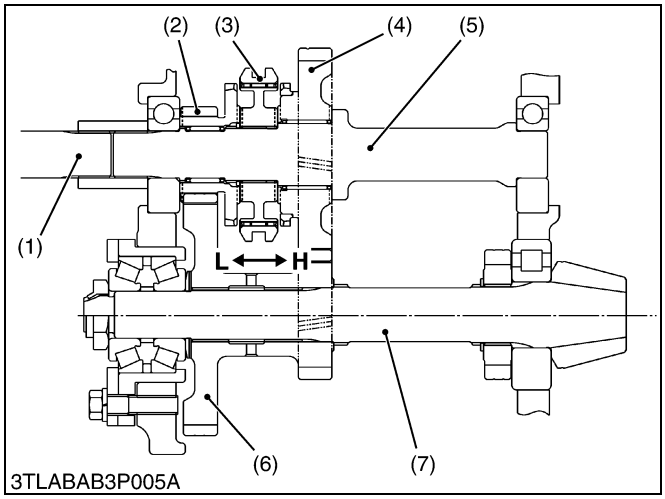
(3) Range Gear Shift Section



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The range gear shift section is located in the differential gear case, and it uses constant mesh.

(1) Shuttle Gear Shaft
(2) Gear for Low
(3) Shifter
(4) Gear for High
(5) Range Gear Shaft
(6) Counter Gear
(7) Spiral Bevel Pinion

L: Low Speed
H: High Speed

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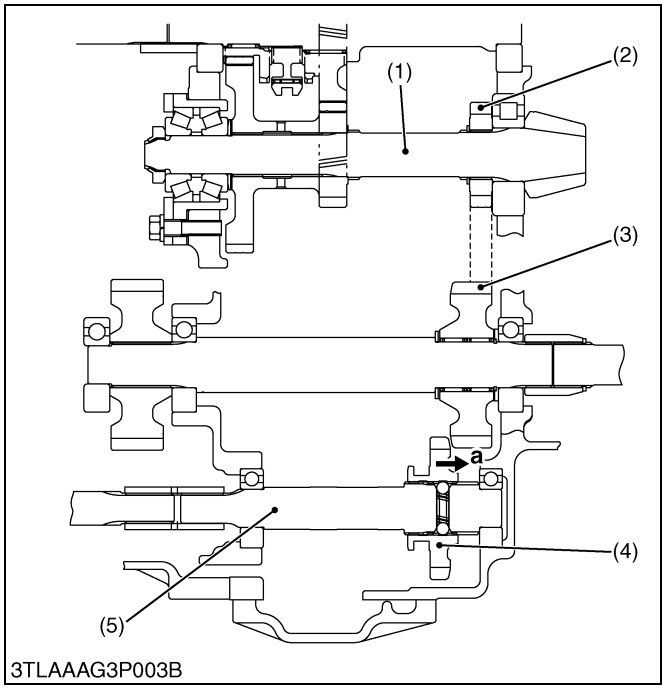
(4) Front Wheel Drive Section



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Front wheel drive shift section is located in the differential gear case. Two wheel drive or four wheel drive is selected by operating the front wheel drive lever to shift the shifter gear (4).

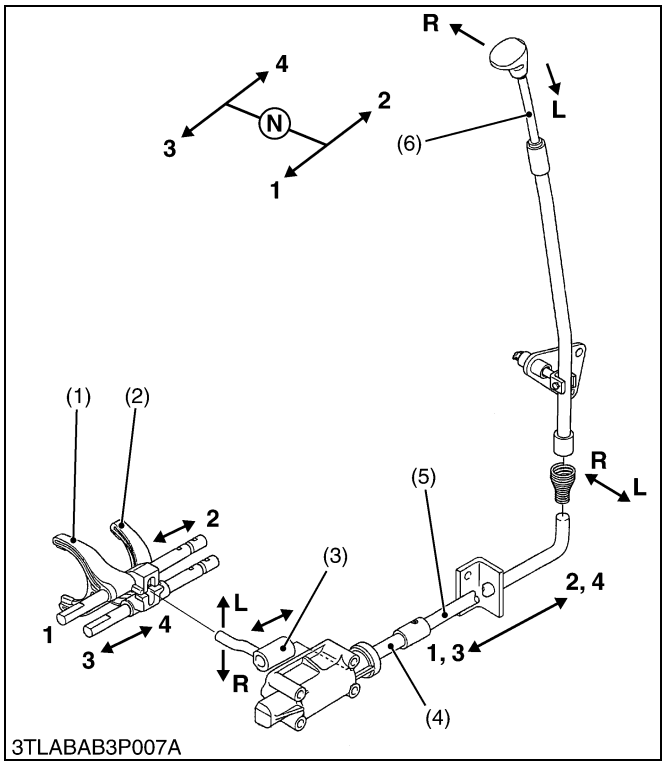
(1) Spiral Bevel Pinion
(2) Gear
(3) Front Wheel Drive Gear
(4) Shifter Gear
(5) Front Wheel Drive Shaft (Connected to Propeller Shaft)

a: Four Wheel Drive Position

9Y1210824TRM0008US0

[2] SHIFT LINKAGE MECHANISM

(1) Main Gear Shift Lever



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The links are connected from the shift lever (6) to the shift forks (1), (2) as shown in the figure. Each speed from the 1st to 4th can be changed by a single shift lever (6).

When the shift lever (6) is moved to the left, the shift arm (3) is engaged with the 1-2 shift fork (1), allowing the operator to change the 1st or the 2nd speed.

When the shift lever (6) is moved to the right, the shift arm (3) is engaged with the 3-4 shift fork (2), allowing the operator to change the 3rd or the 4th speed.

(1)	1-2 Shift Fork	**R:**	**Right Movement**
(2)	3-4 Shift Fork	**L:**	**Left Movement**
(3)	Shift Arm	**1:**	**1st Shift**
(4)	Shift Rod 1	**2:**	**2nd Shift**
(5)	Shift Rod 2	**3:**	**3rd Shift**
(6)	Main Gear Shift Lever	**4:**	**4th Shift**

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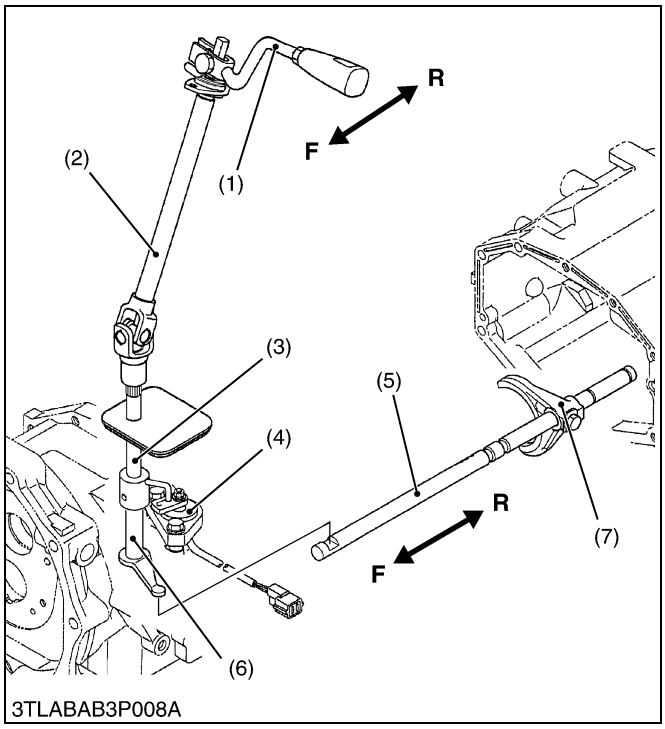
(2) Shuttle Lever



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The links are connected from the shift lever (1) to the shift fork (7) as shown in the figure.

When the shift lever (1) is moved to the **"F"** side, the shift fork (7) is moved toward the **"F"** side, allowing the operator to shift to forward by means of the shuttle universal joint (2), shuttle shift shaft (3), shift arm (6), and shuttle fork rod (5).

When the shift lever (1) is moved to the **"R"** side, the shift fork (7) is shifted to reverse position.

(1)	Shuttle Shift Lever	(6)	Shift Arm
(2)	Shuttle Universal Joint	(7)	Shift Fork
(3)	Shuttle Shift Shaft		
(4)	Shuttle Switch	**F:**	**Forward Shift**
(5)	Shuttle Fork Rod	**R:**	**Reverse Shift**

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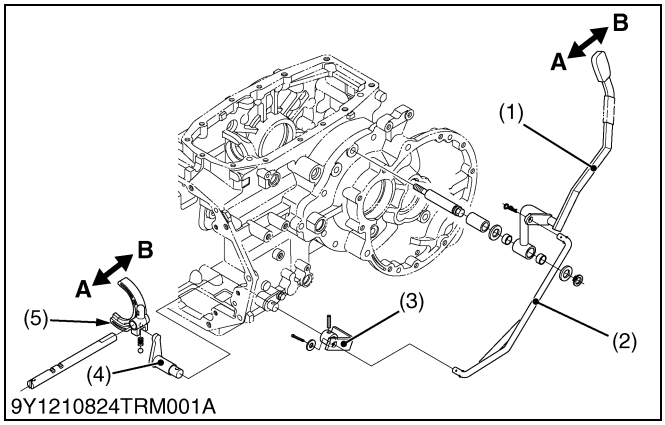
(3) Range Gear Shift Lever



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The links from the shift lever (1) to the shift fork (5) are connected as shown in the figure.

When the shift lever (1) is moved to the **"A"** side, the shift fork (5) is moved to the **"A"** side by means of the rod (2), sub-arm (3), and shift arm (4), changing the shift arm to the Lo-speed side. When the shift lever (1) is moved to the **"B"** side, the shift fork (5) is moved to the Hi-speed side.

(1) Shift Lever
(2) Rod
(3) Sub-arm
(4) Shift Arm
(5) Shift Fork

A: Lo-speed Shift
B: Hi-speed Shift

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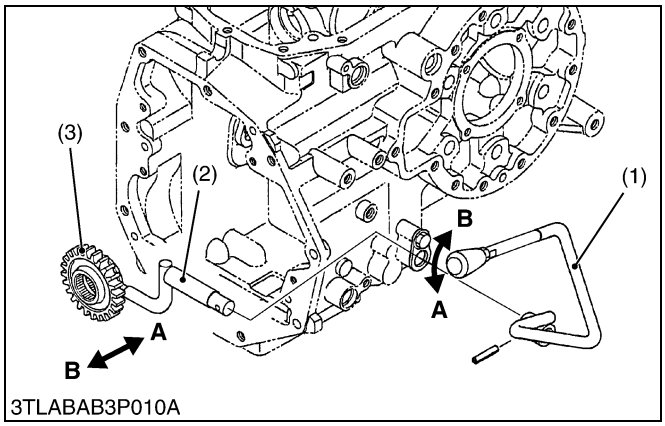
(4) Front Wheel Drive Lever



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The shift lever (1) is connected directly to the shift fork (2).

When the shift lever (1) is moved to the **"A"** side, the shift fork (2) is also moved to the **"A"** side, then the front wheel drive is **"Engaged"**.

When the shift lever (1) is moved to the **"B"** side, the front wheel drive is **"Disengaged"**.

(1) Shift Lever
(2) Shift Fork
(3) Shifter Gear

A: Engaged
B: Disengaged

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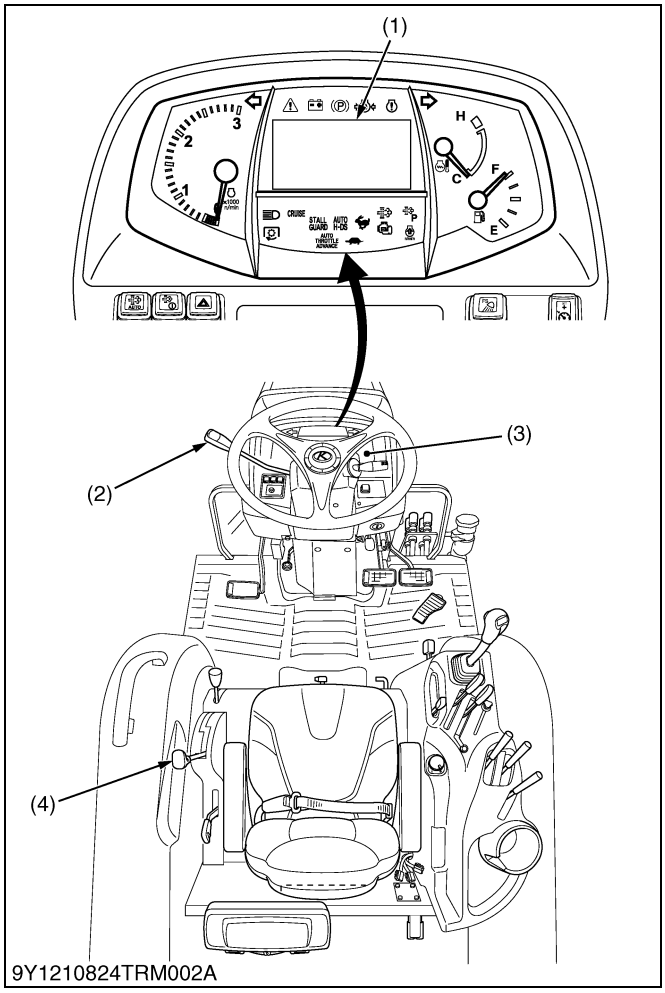
3. GLIDE SHIFT TRANSMISSION (GST)

[1] CHARACTERISTIC AND SYSTEM OUTLINE



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In addition to the former GST system that controls the gear shifting and clutch operation hydraulically, the GST system of L60 series tractor has the function to control these operations electrically.

12 forward and 8 reverse speeds can shift only by operating the main shift lever (GST lever) (4) and shuttle shift lever (2) without the clutch operation as well as the former GST system. In addition, the movement and gear shifting according to the oil temperature and the traveling speed can be achieved by having electronically controlled the GST system, and a smoother operation can be done.

Moreover, because the selected speed and the traveling speed can be checked by the liquid crystal display (LCD) (1) of electronic instrument panel (Intellipanel) (3), which can do a comfortable tractor operation. And it is excellent in service because the error indication can be checked with liquid crystal display (LCD) (1) when the electric wiring is disconnected or short-circuited.

(1) Liquid Crystal Display (LCD)
(2) Shuttle Lever
(3) Electronic Instrument Panel (Intellipanel)
(4) Main Shift Lever (GST Lever)

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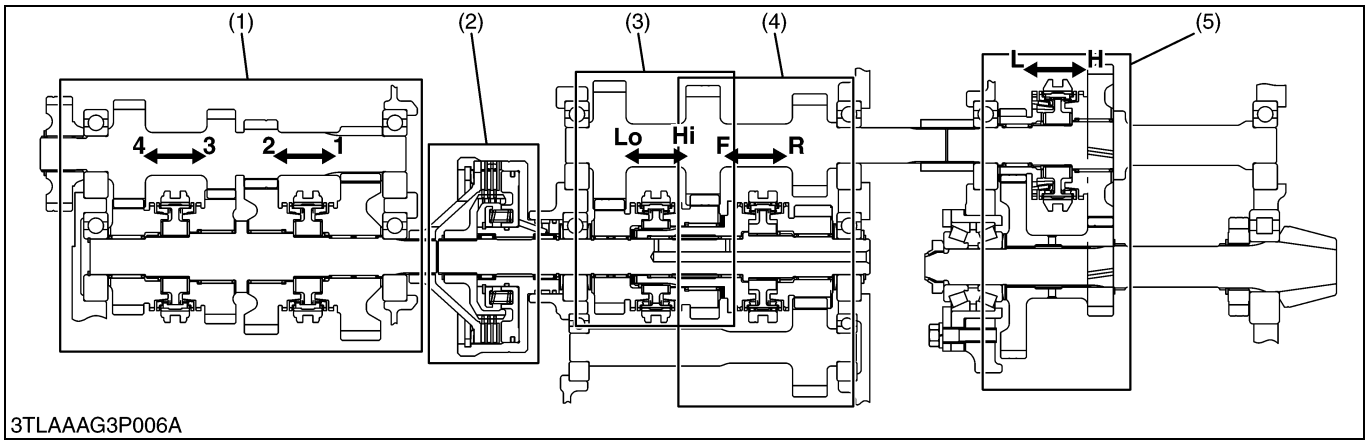
[2] POWER TRAIN



(1) Main Shift Section
(2) GST Clutch Pack
(3) Sub-range Shift Section
(4) Shuttle Shift Section
(5) Main Range Shift Section

The transmission consists of the fully synchronized gear shifting and the hydraulic clutch as shown above figure. And the double cone type synchromesh is adapted on **L** side of main range shift section (5).

As for the speed changing, only by operating the GST lever, the shifter of the gear changing is moved by hydraulic operation which is electrically controlled. And as for each gear changing, each shift is moved according to the shift pattern input to the electric control unit (ECU). The shift pattern is shown in the table below.

Front wheel drive section is basically similar to manual transmission model.

(Forward shift pattern)

Lever Location at Lever Guide	1	2	3	4	5	6	7	8	9	10	11	12
Display on LCD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
(1) Main Shift	1	2	3		4		1		2		3	4
(3) Sub-range Shift	Hi		Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi		
(5) Main Range Shift	L						H					

(Reverse shift pattern)

Lever Location at Lever Guide	1	2	3	4	5	6	7	8	9	10	11	12
Display on LCD	R1	R2	R3		R4		R5		R6		R7	R8
(1) Main Shift	1	2	3		4		1		2		3	4
(5) Main Range Shift	L						H					

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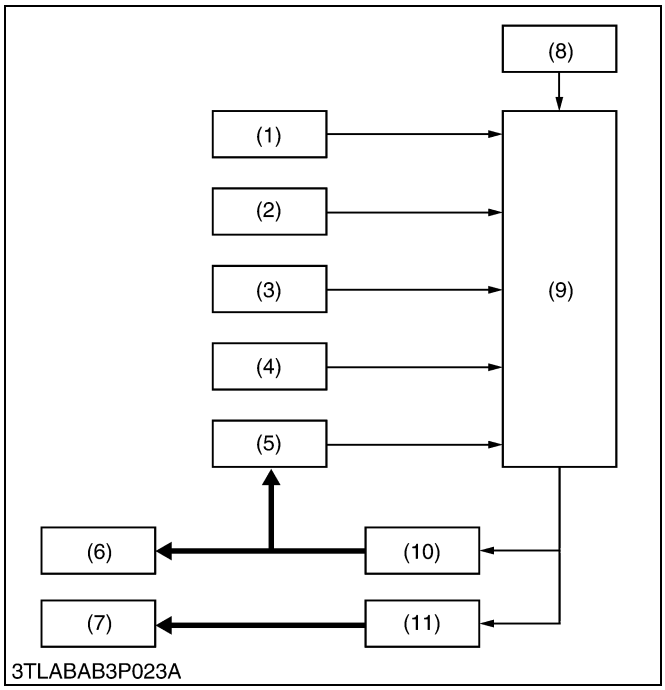
[3] ELECTRICAL CONTROL SYSTEM

(1) Electrical Control



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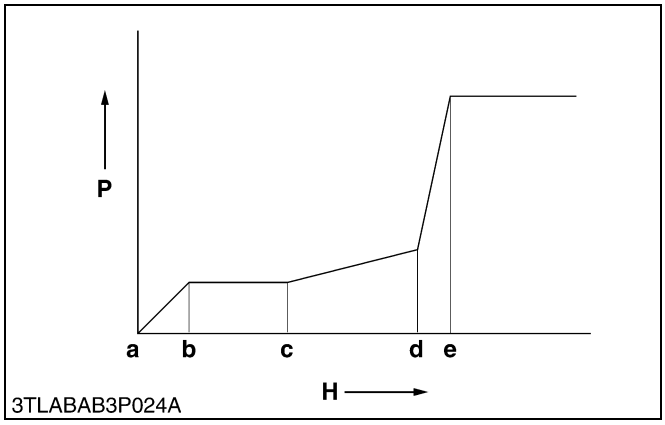

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An electrical control of GST system is as follows.

1. Shift the GST lever and shuttle lever to desired position.
2. The output voltage of selected gear shift position is output to microcomputer of the main ECU by lever sensor.
3. The main ECU detects the gear shift position with GST lever sensor and shuttle switch, and excites various solenoid valves in accordance with selected position.
4. When the desired solenoid is excited, oil is sent to the desired shift piston.
5. A pressure in the circuit is raised because the movement of shift piston shuts the shift check pin. When the pressure in the circuit reaches 0.49 MPa (5 kgf/cm^2, 71 psi), the pressure switch becomes **"ON"**.
6. By means of the pressure switch's **"ON"**, the main ECU detects the present condition (traveling speed, engine speed and oil temperature) from various sensors, and pressure in the hydraulic clutch is raised according to the respective condition.

■ **NOTE**

- **By means of speed increasing, speed decreasing, traveling speed, engine speed and oil temperature, the indicated pressure period from c to d is controlled at appropriate pressure respectively.**

7. A pressurizing to hydraulic clutch has been done until it reaches the system pressure, and pressure in the clutch is kept at this state.

(1) Oil Temperature Sensor
(2) Engine Tachometer Sensor
(3) Traveling Speed Sensor
(4) Shuttle Switch
(5) Pressure Switch
(6) Shift Piston
(7) Clutch Valve
(8) GST Lever Sensor
(9) Main ECU
(10) Solenoid Valves
(11) Proportional Reducing Valve

P: Pressure
H: Time
a: Starting of clutch engaging
b: Low-pas pressure
c: Starting of pressurized
c to d: Specified pressure from Main ECU
e: Gear shifting completion

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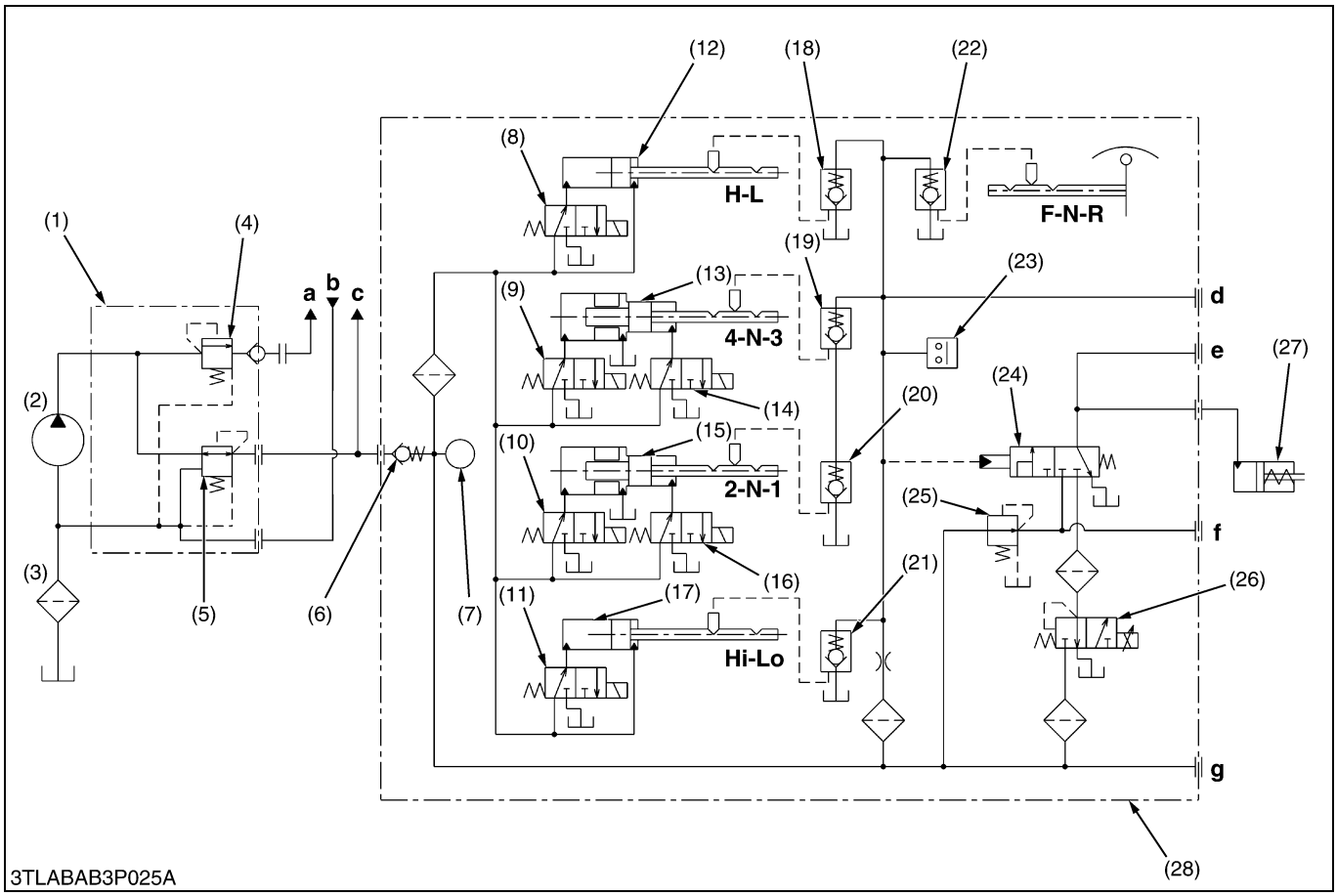
[4] HYDRAULIC CONTROL SYSTEM

(1) Hydraulic Circuit and System Outline



(1) Regulating Valve Assembly
(2) Hydraulic Pump
(3) Hydraulic Oil Filter
(4) Regulating Valve
(5) Pressure Reducing Valve
(6) Check Valve
(7) Oil Temperature Sensor
(8) Solenoid Valve 6 (Main Range Shift)
(9) Solenoid Valve 3
(10) Solenoid Valve 1
(11) Solenoid Valve 5 (Sub-range Shift)
(12) Shift Piston (Main Range Shift)
(13) 3-4 Shift Piston
(14) Solenoid Valve 4
(15) 1-2 Shift Piston
(16) Solenoid Valve 2
(17) Shift Piston (Sub-range Shift)
(18) Shift Check Valve (Main Range Shift)
(19) 3-4 Shift Check Valve
(20) 1-2 Shift Check Valve
(21) Shift Check Valve (Sub-range Shift)
(22) Shift Check Valve, Shuttle
(23) Pressure Switch
(24) Clutch Valve
(25) Low-pass Valve
(26) Proportional Reducing Valve
(27) GST Clutch
(28) GST Valve Assembly

a: To Steering Controller
b: From Steering Controller
c: To PTO Clutch Valve
d: Check port for pilot pressure
e: Check port for clutch pressure
f: Check port for Low-pass pressure
g: Check port for system pressure

1. Oil is supplied from the power steering hydraulic pump (2) while running the engine.
2. The oil entering the regulating valve assembly (1) flows through the pressure reducing valve (5) to the GST circuit. This oil pressure is kept at a fixed level by the pressure reducing valve (5).
3. When the GST lever is operated, the desired shift solenoids (8), (9), (10), (11), (14) or (16) are excited according to the output voltage from the GST lever sensor.
4. When the solenoid valve is operated, oil is supplied to corresponded shift pistons (12), (13), (15) or (17), and the shift piston is moved. The shift arm that is moved by the shift piston moves shifter of synchromesh to shift the gear. At this time, GST clutch (27) has been disengaging until gear shifting is completed.
   The GST clutch (27) is engaging except where the condition is neutral, is gear shifting and is engine stopping.
5. Pressure in the pilot circuit rises because the shift check valves (18), (21) and (19) or (20) are shut by the movements of shift pistons at the same time as completing gear shifting.
6. By means of pressure rising of the circuit, the clutch valve (24) is actuated. And, oil flows through the low-pass valve (25) and the proportional reducing valve (26) to the GST clutch (27). This oil flows until becoming the compound pressure which is both of setting pressure for closing of low-pass valve, and controlled indication pressure of the proportional reducing valve.

(Reference)

- Setting pressure for closing of low-pass valve: 0.24 MPa (2.5 kgf/cm^2, 34.1 psi)

(To be continued)

(Continued)

7. Because pressure in the GST clutch (27) is gradually pressurized by function of proportional reducing valve (26), clutch is able to engage without shock and smoothly.
8. When the pressure in the circuit rises to the system pressure, pressure is kept. And the GST clutch is kept at engaging condition until the next gear shifting.

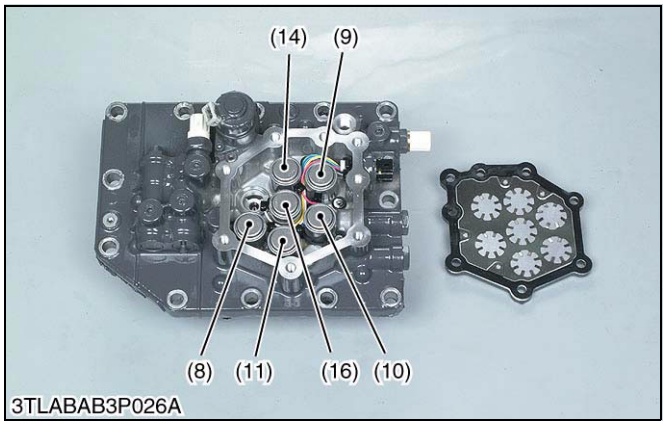
State of energizing of solenoid

(Forward)

	N	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Solenoid 1 (10)		ON						ON	ON				
Solenoid 2 (16)			ON							ON	ON		
Solenoid 3 (9)				ON	ON							ON	
Solenoid 4 (14)						ON	ON						ON
Solenoid 5 (11)				ON		ON		ON		ON			
Solenoid 6 (8)	(ON)	ON	ON	ON	ON	ON	ON						

(Reverse)

	N	1st	2nd	3rd	4th	5th	6th	7th	8th
Solenoid 1 (10)		ON				ON			
Solenoid 2 (16)			ON				ON		
Solenoid 3 (9)				ON				ON	
Solenoid 4 (14)					ON				ON
Solenoid 6 (8)	(ON)	ON	ON	ON	ON				



No.	Solenoid	Color of wiring
(10)	Solenoid 1	Black
(16)	Solenoid 2	White
(9)	Solenoid 3	Red
(14)	Solenoid 4	Green
(11)	Solenoid 5, Sub-range Lo-Hi	Blue
(8)	Solenoid 6, Main range L-H	Yellow

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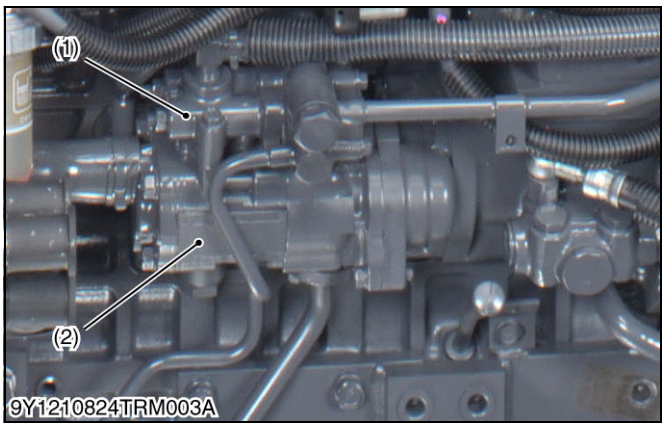
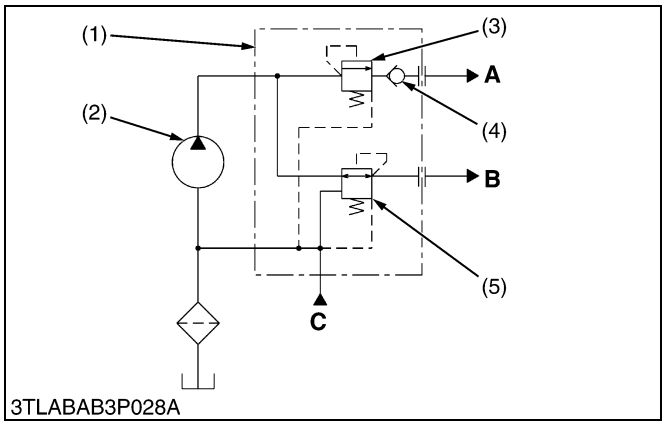
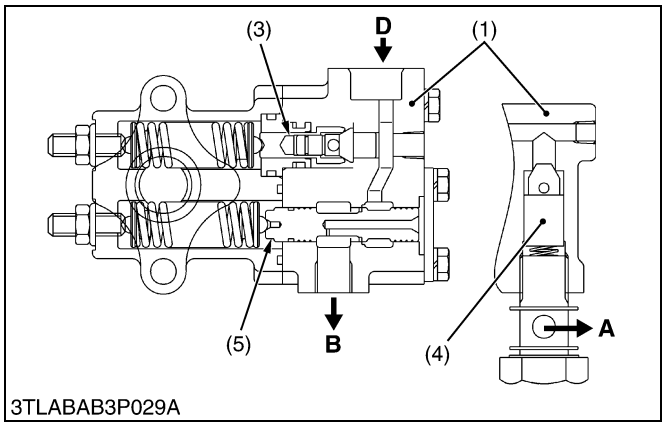
(2) Construction and Function of Components

[A] Regulating Valve







The oil from the hydraulic pump for the power steering system flows to the GST circuit to set the pressure of the circuit. Other oil flows to the power steering circuit.

The oil from the power steering hydraulic pump (2) flows through the pressure reducing valve (5) to the GST circuit. When the oil is filled into the circuit, the pressure reducing valve (5) is closed to keep the pressure in the GST system circuit to 2.45 MPa (25.0 kgf/cm^2, 356 psi).

The oil from the power steering pump passes through the regulating valve (3) and check valve (4), and then it flows to power steering circuit. The regulating valve (3) is provided to keep 2.94 MPa (30.0 kgf/cm^2, 427 psi) at inlet pressure of the pressure reducing valve (5) except when the power steering is operated. Thereby getting 2.45 MPa (25.0 kgf/cm^2, 356 psi) of the GST circuit pressure.

(1)	Regulating Valve Assembly	**A:**	**To Power Steering Circuit**
(2)	Hydraulic Pump	**B:**	**To GST Circuit and PTO Clutch Valve**
(3)	Regulating Valve	**C:**	**From Power Steering Circuit**
(4)	Check Valve	**D:**	**From Hydraulic Pump**
(5)	Pressure Reducing Valve		

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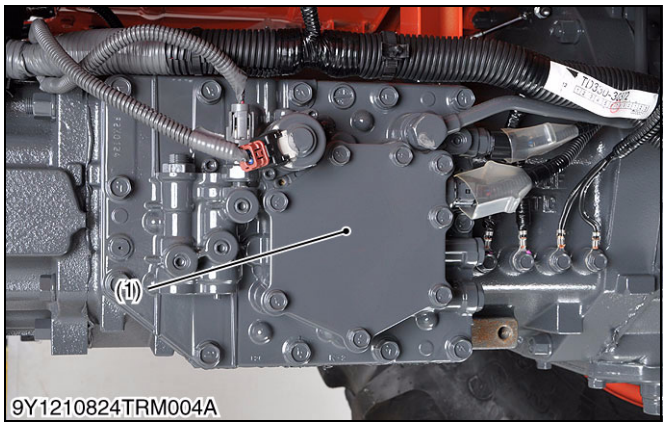
[B] GST Valve



GST Valve Assembly

The GST valve assembly is installed at the left side of the transmission mid case. In the GST valve assembly, many parts comprising the system are installed, including the solenoid valves, shift pistons, shift check valves, low-pass valve, proportional reducing valve, clutch valve, check valves, sensor and switches. The GST valve assembly functions as the central unit of the GST system.

(1) GST Valve Assembly
(2) Clutch Valve
(3) Low-pass Valve
(4) Connector for Pressure Switch
(5) Proportional Reducing Valve
(6) Connector for Oil Temperature Sensor
(7) Connector for Solenoid Valve
(8) Solenoid Valves

a: Oil From Regulating Valve

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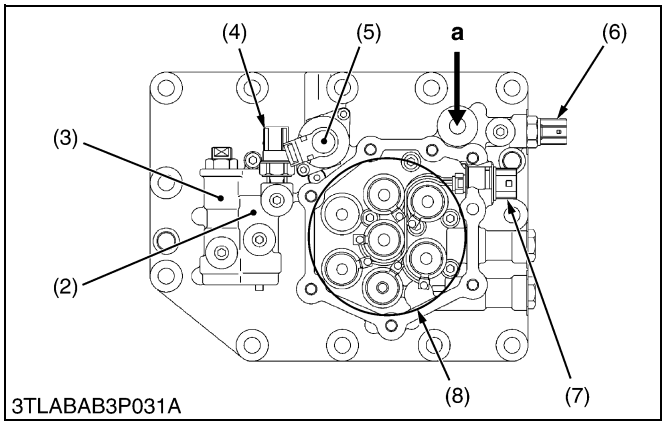
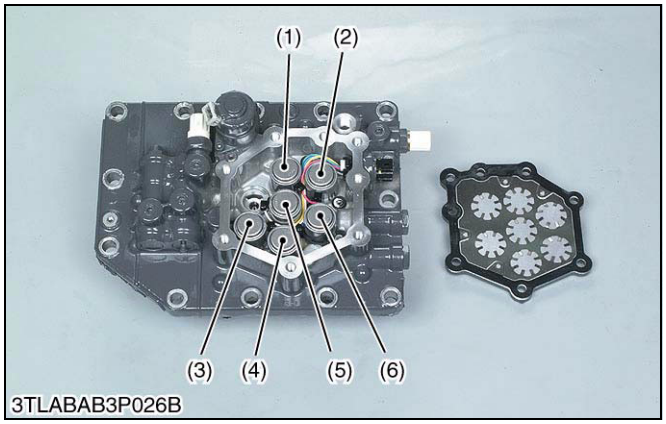


Solenoid Valve

When the GST lever is operated, the solenoid valve controls the flow of oil according to the gear shifting operation.

When the solenoid is not excited, oil from regulating valve flows to the shift piston through the surrounding of the ball (10) in the valve. When the solenoid is excited, plunger (9) presses the ball against the valve seat (11) to open the unload passage (12), and drain the oil.



(1) Solenoid Valve 4
(2) Solenoid Valve 3
(3) Solenoid Valve 6 (Main Range Shift)
(4) Solenoid Valve 5 (Sub-range Shift)
(5) Solenoid Valve 2
(6) Solenoid Valve 1
(7) Coil
(8) Solenoid Valve
(9) Plunger
(10) Ball
(11) Valve Seat
(12) Unload Passage

T: Drain Port
R: IN Port
P: To Shift Piston

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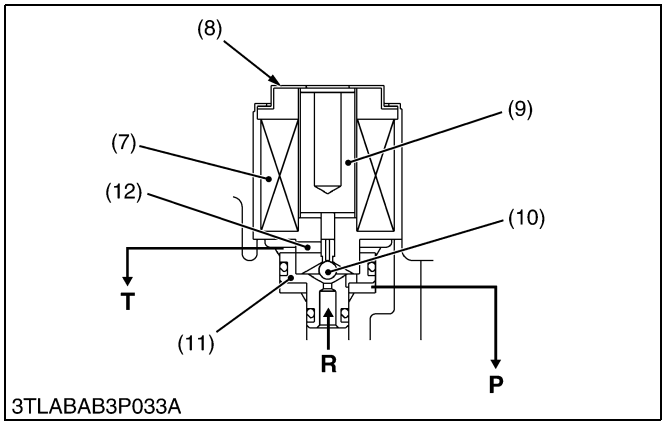

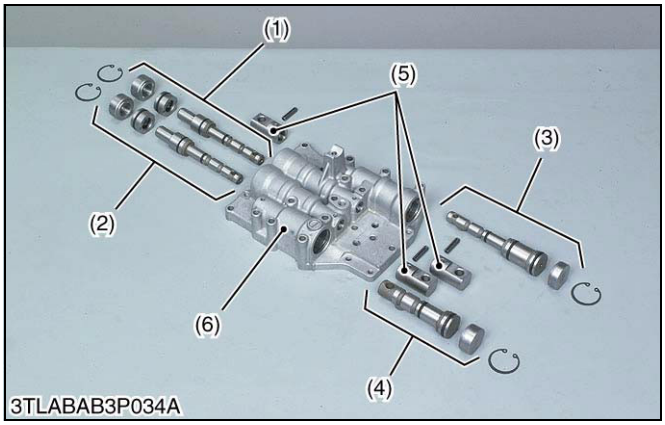

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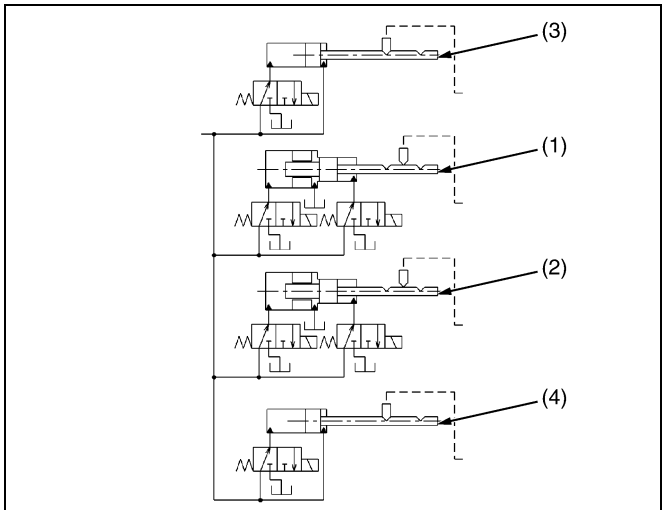

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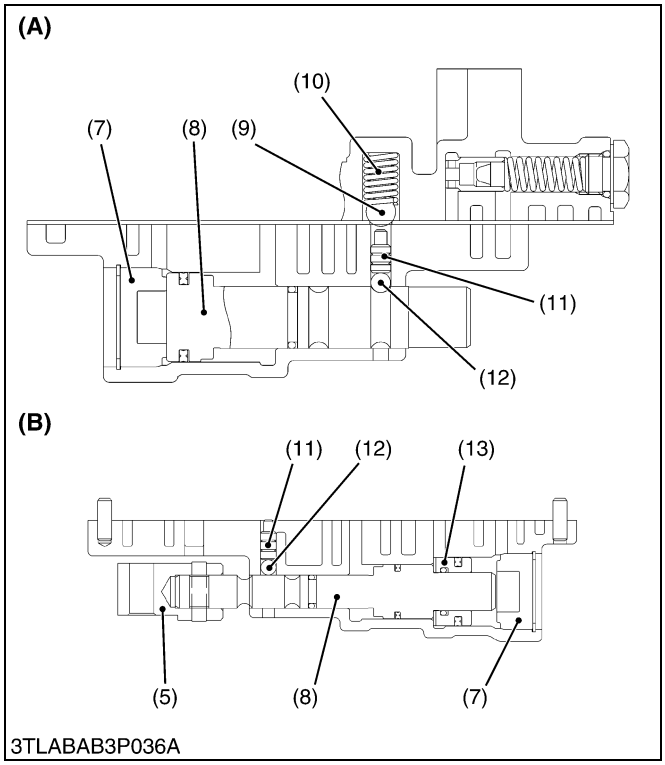

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Shift Piston

The shift pistons (1), (2), (3), (4) are actuated by the oil distributed by the each solenoid valve. At the tip of these shift pistons (1), (2), (3) are installed the shifters (5), which are connected to each shift rod and shift the gear.

There are neutral positions in 1-2 shift piston (2) and 3-4 shift piston (1).

(1) 3-4 Shift Piston
(2) 1-2 Shift Piston
(3) Main Range Shift Piston
(4) Sub-range Shift Piston
(5) Shifter
(6) Valve Body
(7) Cover
(8) Piston
(9) Ball for Check Valve
(10) Spring
(11) Check Pin
(12) Ball for Detent
(13) Neutral Piston

(A) Shift Piston for Main Range Shift
(B) 1-2 and 3-4 Shift Piston

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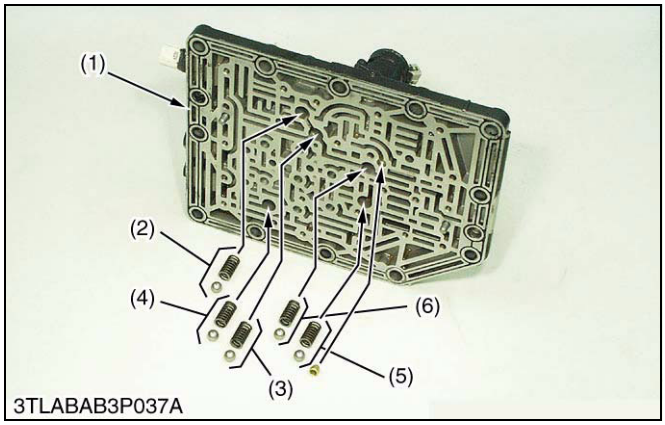

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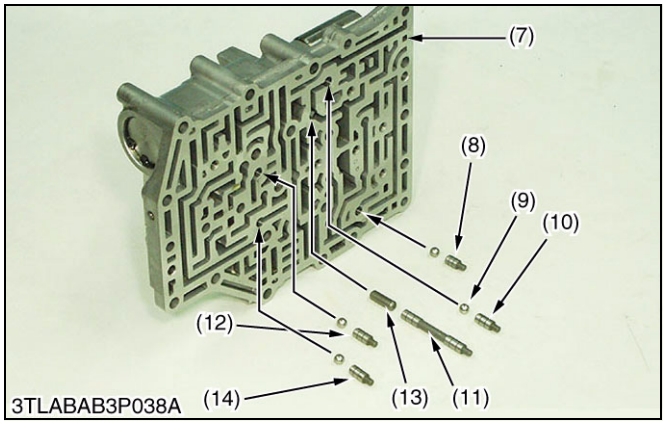

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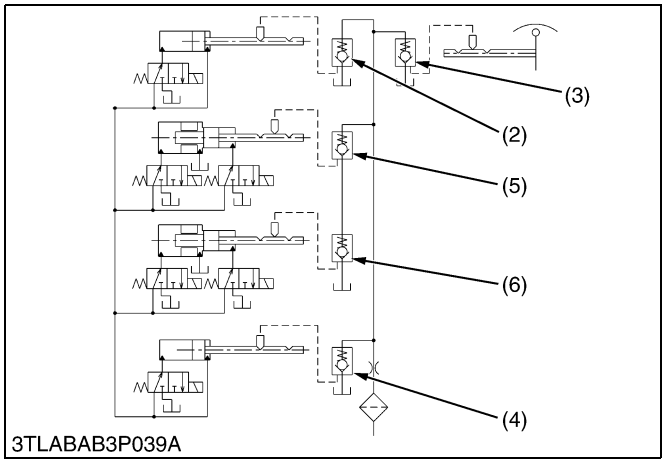

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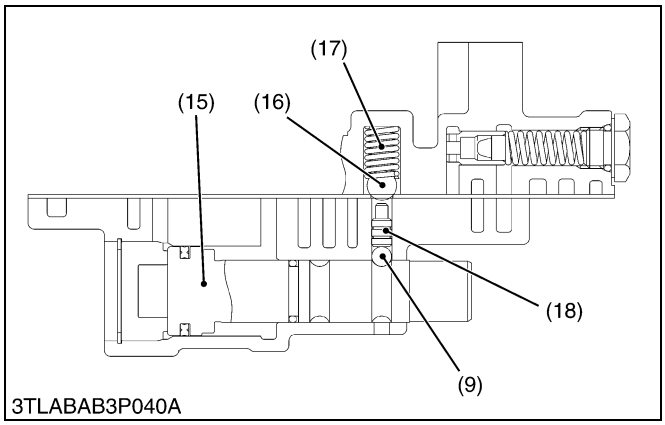

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Shift Check Valve

The shift check valves (2), (3), (4), (5), (6) are provided on each shift piston and the shuttle shift rod.

From the start to the end of gear shifting, the shift check valves (2), (4), (5), (6) of the shift pistons are opened because the ball (9) of the check pin (18) is on the straight portion, the oil in the pilot circuit of the clutch valve passes through the shift check valves (2), (3), (4), (5), (6) to be drained into the tank, causing the GST clutch to be disengaged.

When the gear shifting is completed, the ball (9) of the check pin (18) enters the groove of the shift piston; the check valve is closed, causing the pilot circuit pressure to rise and the clutch valve to open. Thus, the oil flows into the GST clutch to engage it. The 1-2 shift check valve (6) and 3-4 shift check valve (5) compose a serial circuit. When either valve is closed, the oil in the pilot circuit will not be drained into the tank.

In case of the shuttle shifting, the shift check valve (3) is opened and closed by the groove of the shuttle shift rod.

Note that the shuttle shift fork rod has a slot into which the shift fork mounting bolt is inserted. Therefore, when the shuttle shift lever is moved, the shuttle shift fork rod is moved before the shuttle shift fork is moved, disengaging the clutch pack and thus moving the shuttle shift fork.

(1) GST Valve Cover
(2) Main Range Shift Check Valve
(3) Shuttle Shift Check Valve
(4) Sub-range Shift Check Valve
(5) 3-4 Shift Check Valve
(6) 1-2 Shift Check Valve
(7) GST Valve Body
(8) Sub-range Check Pin
(9) Ball for Detent
(10) Main Range Check Pin
(11) Shuttle Check Pin
(12) 3-4 Check Pin
(13) Pin
(14) 1-2 Check Pin
(15) Shift Piston (Sub-range Shift)
(16) Ball
(17) Spring
(18) Check Pin

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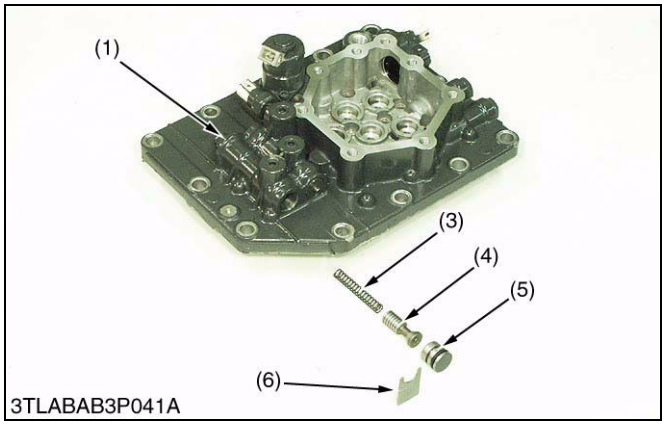

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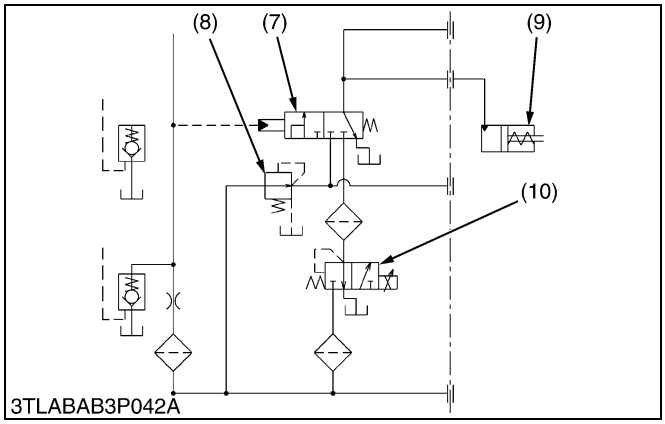

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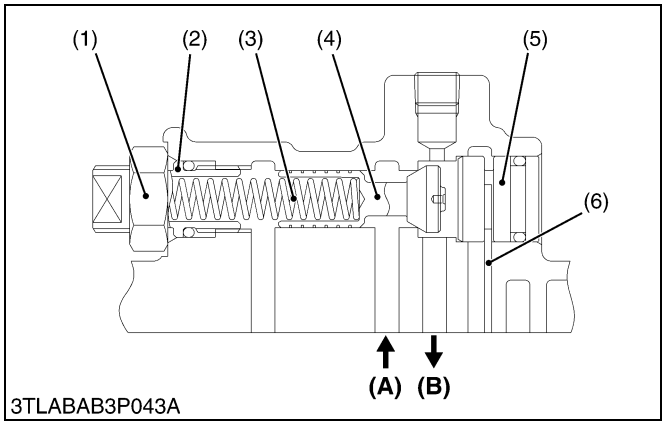

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Low-pass Valve

After completion of the gear shifting, the low-pass valve (8) opens immediately to flow oil into the GST clutch (9), to promote the engagement of the clutch.

When the gear shifting starts, the oil in the GST clutch (9) passes the clutch valve (7) to be drained into the tank. So prior to beginning of the GST clutch connection and after completion of gear shifting, it is necessary to flow oil to the GST clutch quickly. It is the low-pass valve that does this operation with the proportional reducing valve (10) simultaneously.

The oil from the regulating valve flows in from the **IN**-port **(A)**, passes through the low-pass valve poppet (4), flows out from **OUT**-port **(B)**, and flows to the clutch valve (7) and clutch (9). When the pressure on the side of the **OUT**-port **(B)** reaches setting pressure, the poppet (4) pushes the spring (3) to close the circuit.

(1) Nut
(2) Adjuster
(3) Spring
(4) Poppet
(5) Plug
(6) Stopper Plate
(7) Clutch Valve
(8) Low-pass Valve
(9) GST Clutch
(10) Proportional Reducing Valve

(A) IN-Port
(B) OUT-Port

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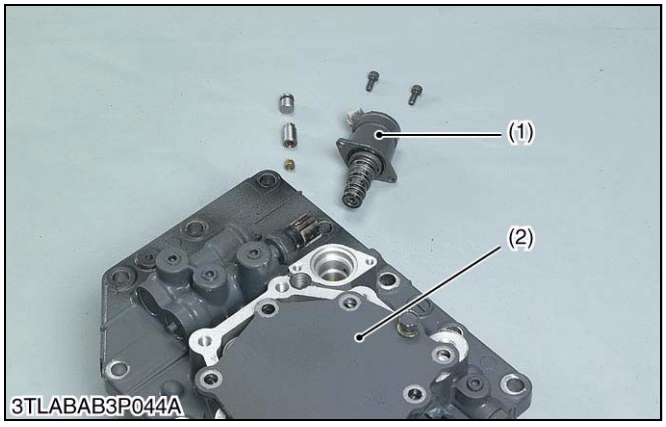

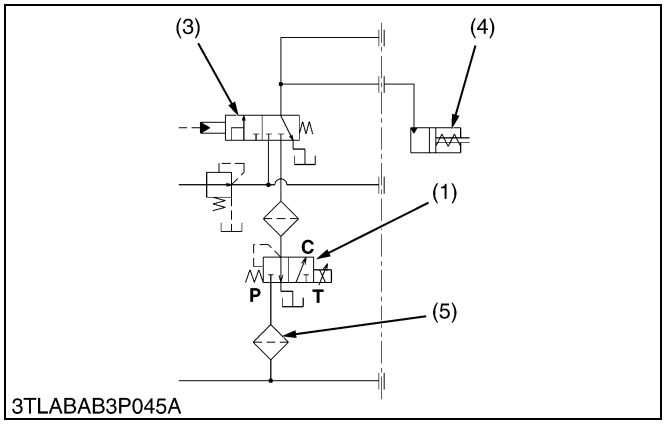

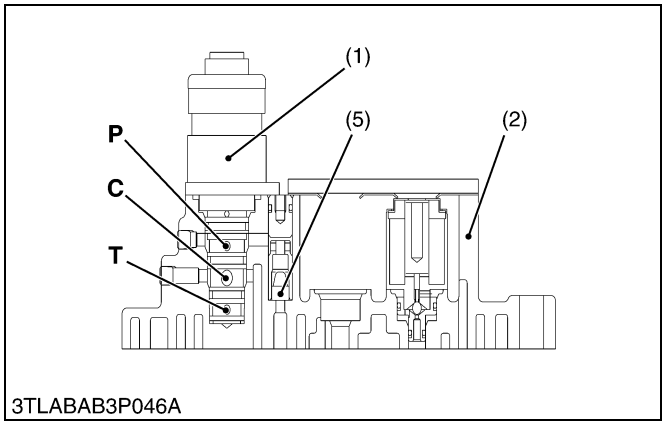

Proportional Reducing Valve

After the gear shifting is completed, this valve has function which gradually rises the pressure in the clutch (4) in order to make a clutch engaging for without shock and smoothly.

When the gear shifting is completed, the pressure switch is turned **"ON"**. By means of turning on the pressure switch, the microcomputer of ECU calculates and judges the charging of pressure and its time according to the oil temperature sensor and gear shifting period, and the traveling speed and speed acceleration according to the traveling speed sensor. By these instructions from microcomputer of ECU, the proportional reducing valve adjusts pressure in the clutch to become a appropriate acceleration.

(1)	Proportional Reducing Valve	**P:**	**IN Port (From Regulating Valve)**
(2)	GST Valve Assembly		
(3)	Clutch Valve	**C:**	**OUT Port (To Clutch Valve)**
(4)	GST Clutch	**T:**	**DRAIN Port (To Tank)**
(5)	Filter		

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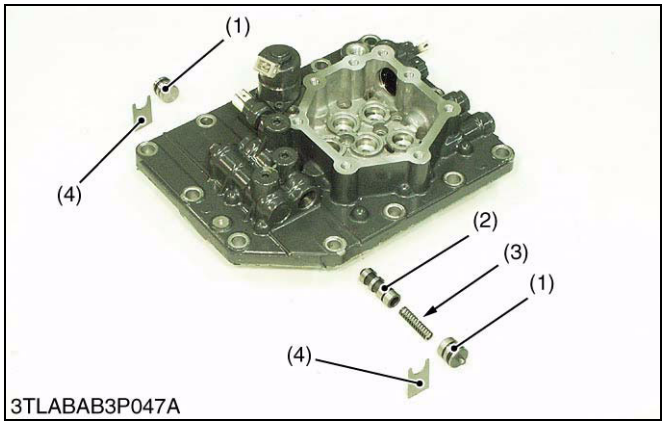

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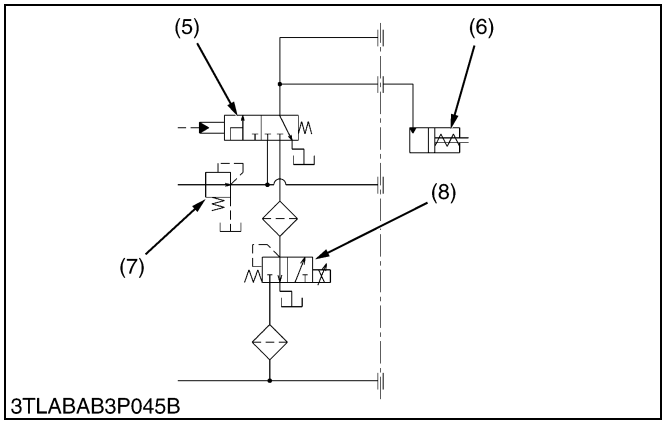

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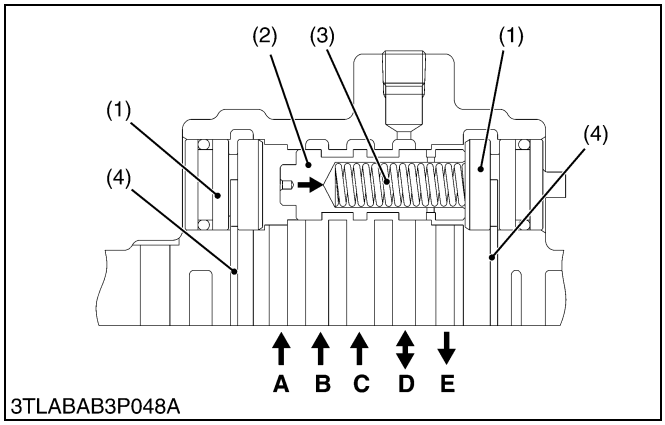

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Clutch Valve

The clutch valve (5) changes the flow of the oil flowing to the GST clutch to do **"ENGAGE"** / **"DISENGAGED"** of the clutch.

Except for during gear shifting, the oil of the pilot circuit flows in from the **A**-port to push the spool to the right when the pilot circuit is pressurized. Therefore, the oil from the low-pass valve (7) and proportional reducing valve (8) flows in from **B** and **C**-port, flows out from the **D**-port, and flows to the GST clutch (6).

When the pilot circuit pressure is zero, that is, from the start to the left with the spring (3) to cut the oil flow of **B** and **C**-port, and stopping the oil flow to the GST clutch (6). Furthermore, the oil of the GST clutch flows in from **D**-port, and is drained from **E**-port, and then the GST clutch is disengaged.

(1)	Plug	**A:**	**A-Port (From Pilot Circuit)**
(2)	Spool	**B:**	**B-Port (From Low-pass Valve)**
(3)	Spring		
(4)	Stopper Plate	**C:**	**C-Port (From Proportional Reducing Valve)**
(5)	Clutch Valve		
(6)	GST Clutch	**D:**	**D-Port (To GST Clutch)**
(7)	Low-pass Valve	**E:**	**E-Port (To Tank)**
(8)	Proportional Reducing Valve		

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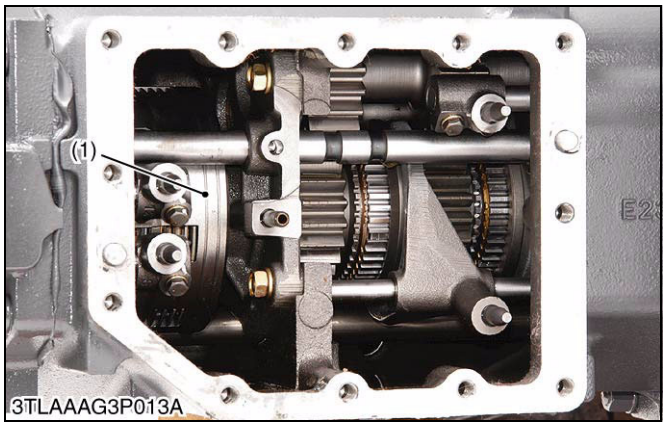
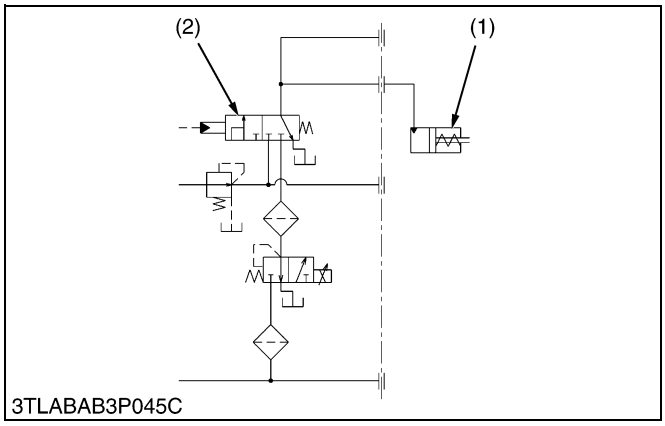
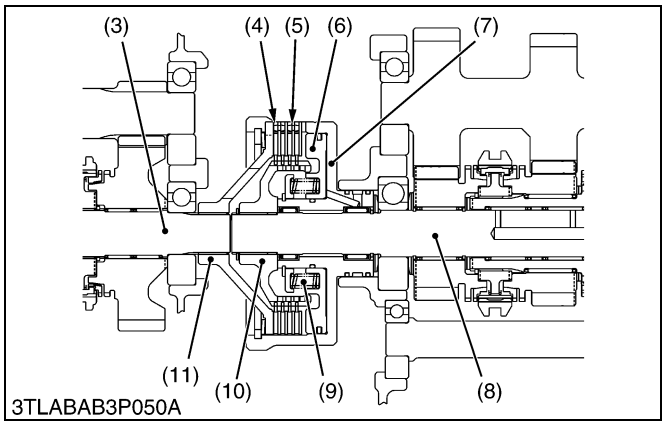
[C] GST Clutch







The GST clutch is hydraulic multiple plate type and is provided between the counter shaft (3) and the shuttle shaft (8), and it **"engages"** and **"disengages"** the power from the engine. This is controlled by the operation of clutch valve (2).

■ **Engaging (When the shift gear is at desired position while engine is running)**

The oil from clutch valve (2) flows in to push the return spring (9) and the piston (6). The piston is pushed to the left by the oil, thereby pushing the clutch discs (4) and the plates (5) to transmit the power.

■ **Disengaging (When the engine stop, the shift levers are neutral position, between from start to end of the gear shifting)**

The oil of the GST clutch (1) is pushed out with return spring (9) and piston (6), and flowed to the tank.

(1) GST Clutch
(2) Clutch Valve
(3) Counter Shaft
(4) Clutch Disc
(5) Plate
(6) Piston
(7) Clutch Case
(8) Shuttle Shaft
(9) Return Spring
(10) Clutch Output Hub
(11) Clutch Input Hub

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[5] SHIFT LINKAGE MECHANISM

The shift linkage mechanisms of **"Shuttle Lever"** and **"Front Wheel Drive Lever"** are similar to manual transmission model.

9Y1210824TRM0026US0

4. HYDROSTATIC TRANSMISSION (HST)

[1] POWER TRAIN

The transmission of this model consists of a series of gears and shafts as shown in previous page. The traveling system chiefly consists of hydrostatic transmission section, range gear shift section and front wheel drive section.

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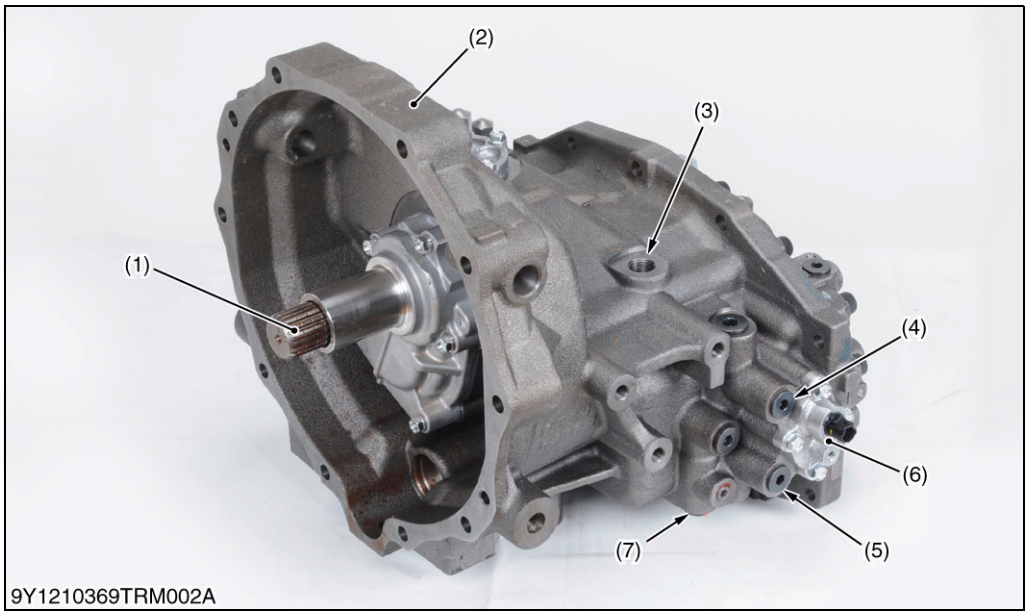
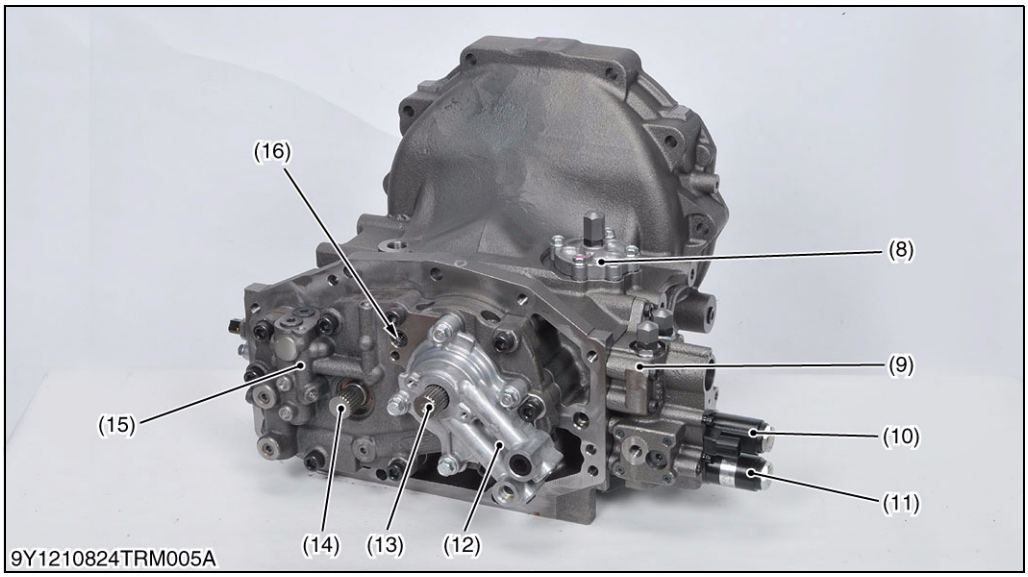
(1) Structure



(1) Input Shaft
(2) HST Case (Clutch Housing)
(3) Outlet Port (To Oil Cooler)
(4) Check and High Pressure Relief Valve (Forward)
(5) Check and High Pressure Relief Valve (Reverse)
(6) Hi-Lo Solenoid Valve
(7) Charge Relief Valve
(8) Servo Piston
(9) Regulator
(10) Proportional Valve (Reverse)
(11) Proportional Valve (Forward)
(12) Charge Pump
(13) Pump Shaft
(14) Output Shaft (Motor Shaft)
(15) Port Block Cover
(16) Case Relief Valve



The HST of L60 series tractor is a built-in type to the clutch housing, and HST with the servomechanism is adapted. The servomechanism controls the pedal operation of HST hydraulically. As a result, the HST pedal feels extremely light and smoother pedal operation can be done.

HST assembly chiefly consists of HST case (clutch housing), variable displacement piston pump, variable displacement piston motor, charge pump, Hi-Lo solenoid valve and proportional valves. Refer to the next page for detailed parts in the HST.

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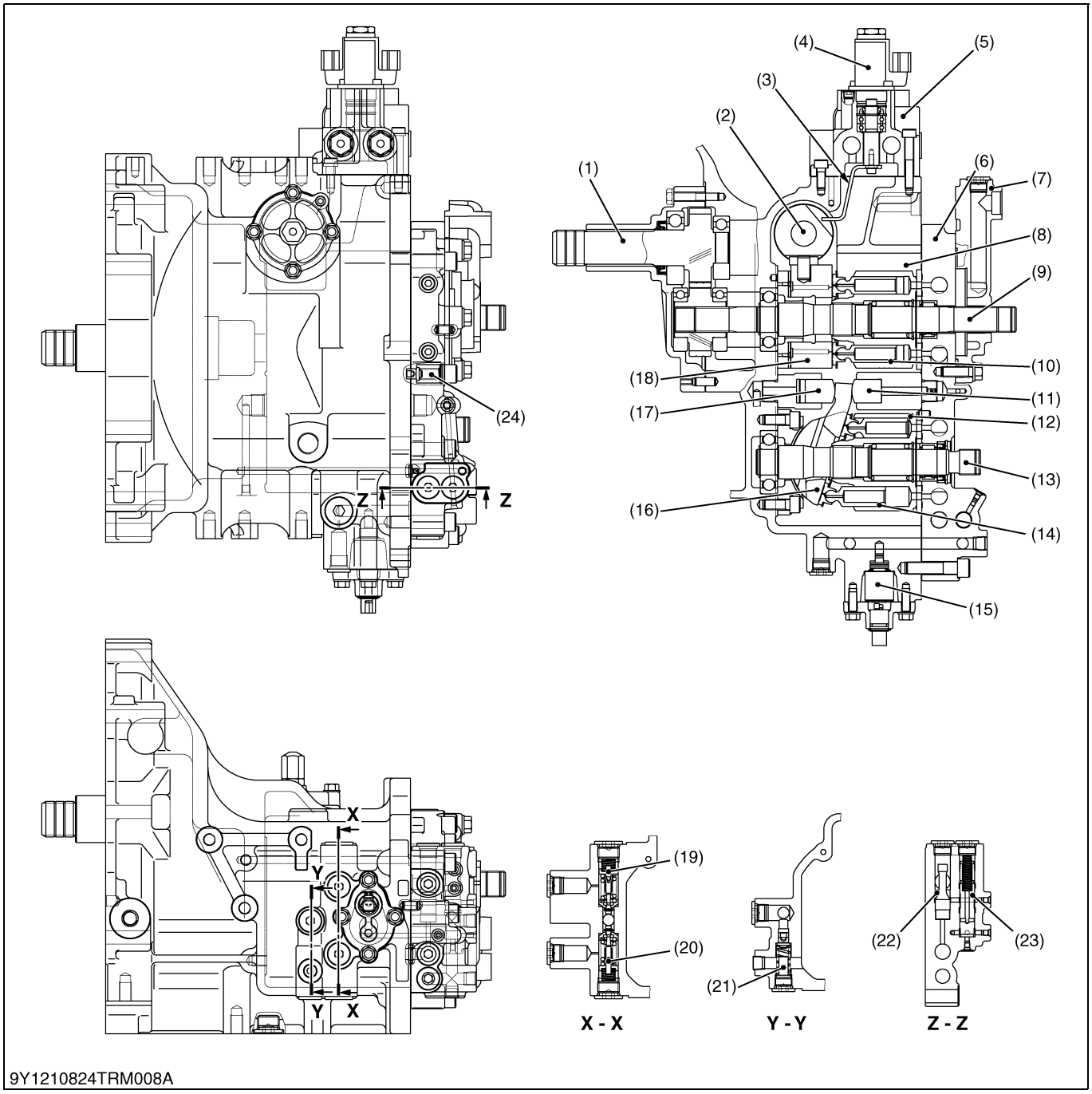

(1) Input Shaft
(2) Servo Piston
(3) Feedback Rod
(4) Proportional Valve
(5) Regulator Assembly
(6) Port Block Cover
(7) Charge Pump
(8) Cylinder Block
(9) Pump Shaft
(10) Piston (Pump)
(11) Piston (Hi)
(12) Cylinder Block (Motor)
(13) Output Shaft (Motor Shaft)
(14) Piston (Motor)
(15) Hi-Lo Solenoid Valve
(16) Variable Swashplate (Motor)
(17) Piston (Lo)
(18) Variable Swashplate (Pump)
(19) Check and High Pressure Relief Valve (Foward)
(20) Check and High Pressure Relief Valve (Reverse)
(21) Charge Relief Valve
(22) Spool (Pressure Selector)
(23) Spool (Hi-Lo)
(24) Case Relief Valve

X: Sectional View X-X
Y: Sectional View Y-Y
Z: Sectional View Z-Z

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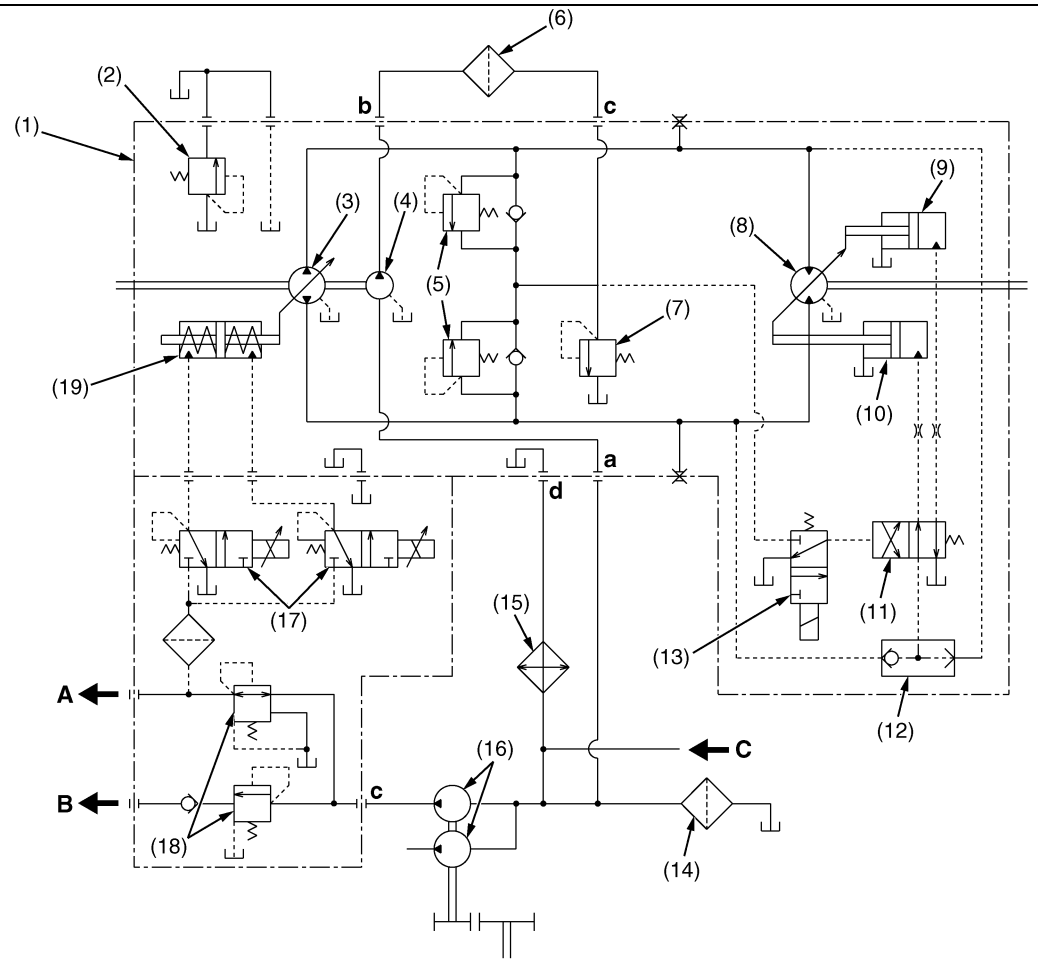
(2) Oil Flow



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(1) HST Assembly
(2) Case Relief Valve
(3) Pump Cylinder Block
(4) Charge Pump
(5) Check and High Pressure Relief Valve
(6) HST Filter
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Piston H
(10) Piston L
(11) Hi-Lo Spool
(12) Spool (Pressure Selector)
(13) Hi-Lo Solenoid Valve
(14) Filter
(15) Oil Cooler
(16) Hydraulic Pump
(17) Proportional Valve
(18) Regulator Valve
(19) Servo Piston

A: To PTO Clutch Valve
B: To Steering Controller
C: From Steering Controller
a: a-port (In from suction line)
b: b-port (Out by charge pump)
c: c-port (In from charge pump)
d: d-port (Out from HST circuit)

Oil is sucked into the charge pump through the **a-port** and pass through the HST filter. Then oil passes through the **b-port** and fed into the HST. Then oil is supplied to the main circuit of the HST as charge oil by means of the charge relief valve.

Oil from the **b-port** passes through the **c-port** and is supplied to the Hi-Lo solenoid valve. When the Hi-Lo solenoid valve is switched, the Hi-Lo spool is switched by the oil pressure of the main circuit of the HST. When the Hi-Lo solenoid valve is switched **"ON"**, the Hi-Lo spool is activated by the oil pressure of the main circuit of the HST. When the Hi-Lo solenoid valve is switched **"OFF"**, the Hi-Lo spool is activated by the charge pressure. When the Hi-Lo spool is switched **"ON"**, oil on the high-pressure side (forward or backward) passes through the spool (pressure selector) and flows to the piston **H** (9).

Oil from the hydraulic pump is fed to the **c-port** of the regulator valve. The regulator valve sets the pressure of the PTO valve and proportional valve.

Oil from the regulator valve is guided to the servo piston by the motion of the proportional valve. The proportional valve is controlled by the operation of the HST pedal.

Oil from the regulator valve is supplied to the PTO valve and power steering controller.

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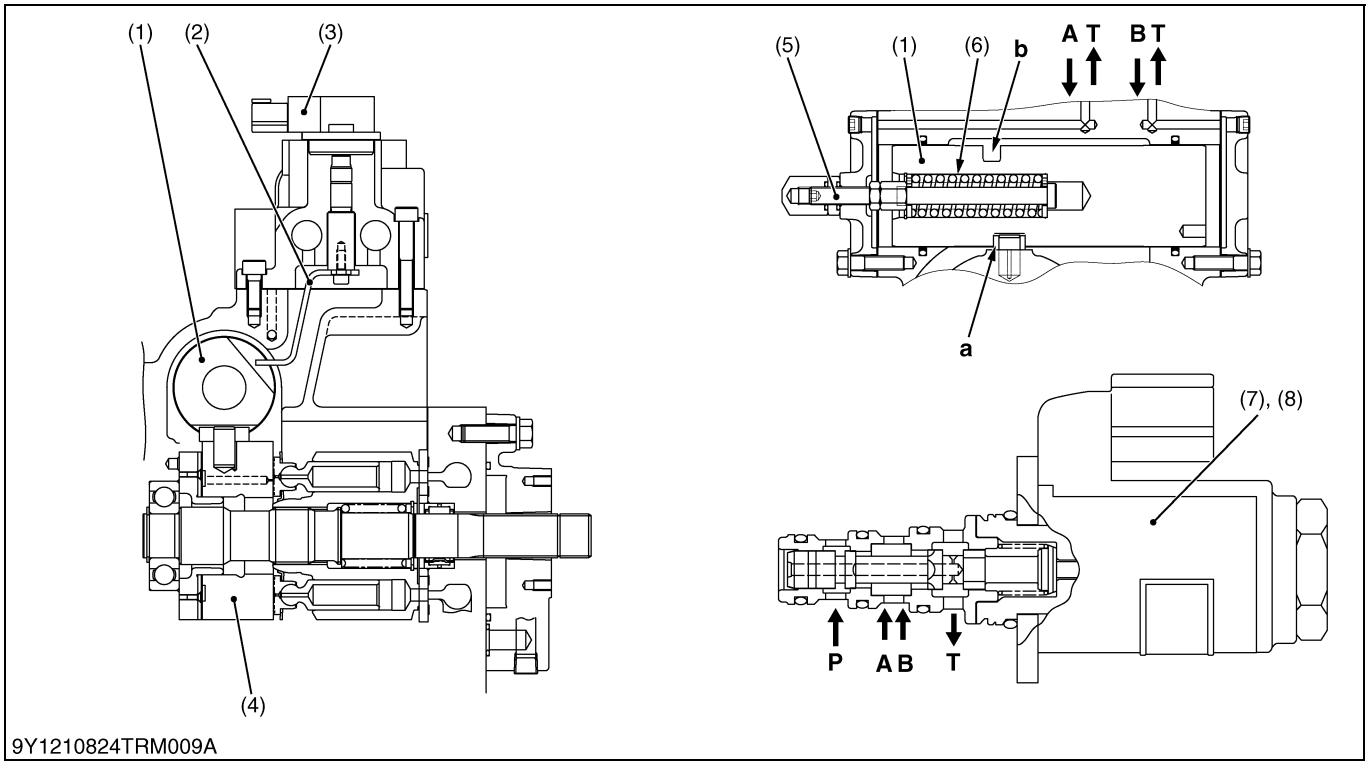
(3) Function of Components

[A] Servomechanism



(1)	Servo Piston	(5)	Piston Adjusting Screw	**A:**	**To Reverse Side**
(2)	Feedback Rod (Connected to Swashplate Position Sensor)	(6)	Spring	**B:**	**To Forward Side**
(3)	Swashplate Position Sensor	(7)	Proportional Valve (Forward)	**a:**	**Slit for Connection of Swashplate**
(4)	Swashplate	(8)	Proportional Valve (Reverse)		

P: **Pump Port**
T: **Tank Port**

The servomechanism is mainly comprised of the servo piston and proportional valve.

Signals from the HST pedal flow to the ECU and transmit from the ECU to the proportional valve.

The servo piston is controlled by oil from the proportional valve.

Refer to Workshop Manual of "TRACTOR MECHANISM" (Code No. 9Y021-18200) for the operation of the servomechanism, that is, the operation of servo piston.

■ **Valves**

Check and high pressure relief. As for the mechanism and function of valve, charge relief valve and case relief valve, Refer to Workshop Manual of "TRACTOR MECHANISM" (Code No. 9Y021-18200).

9Y1210824TRM0031US0

(4) Operation

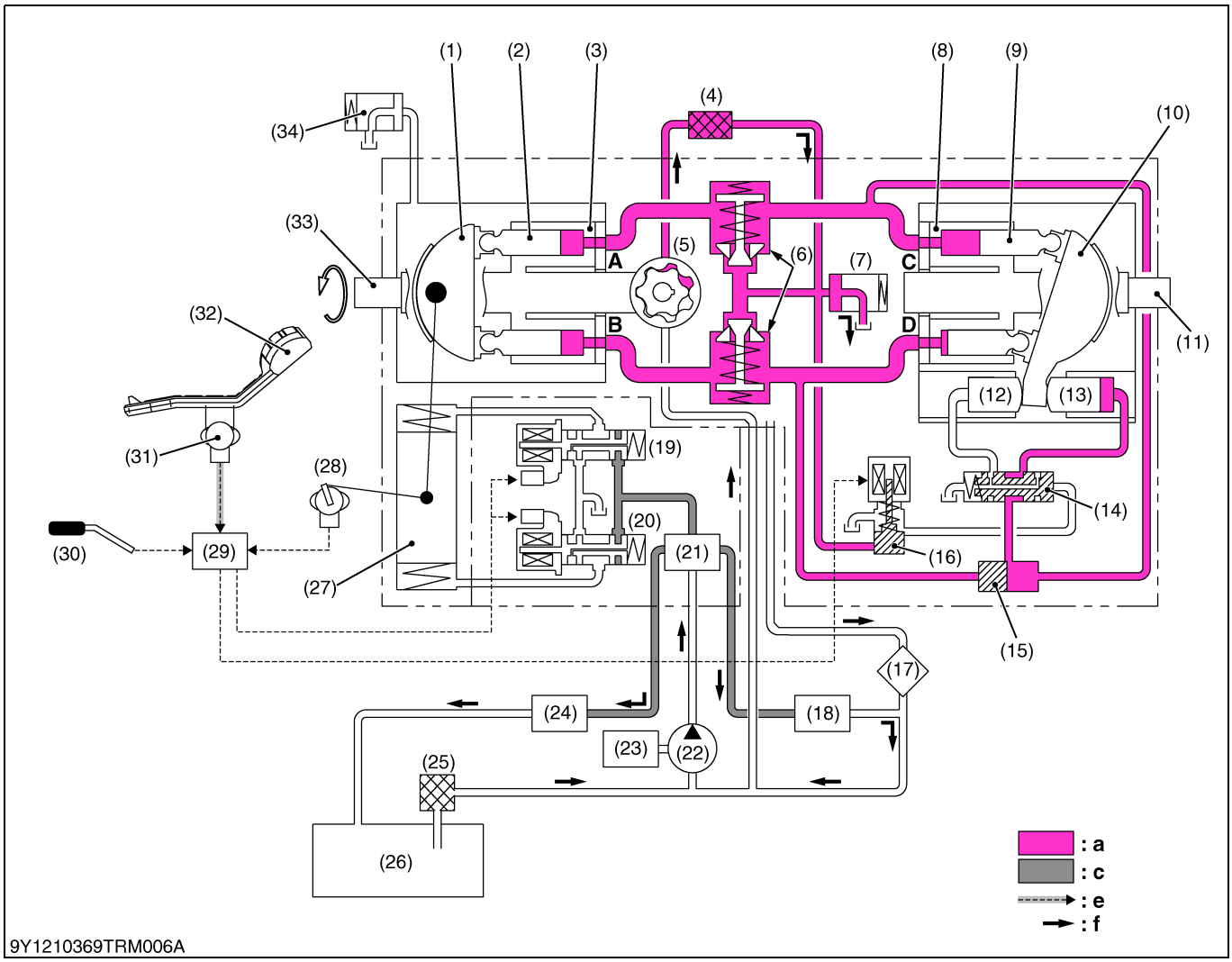
[A] Stage 1

■ When the HST pedal is in the neutral position

[Tractor Condition]

HST pedal: **Neutral** Position

Hi-Lo select lever: **Lo**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
c: Return Oil
e: Signal
f: Oil Flow

When the HST pedal is in the neutral position, the HST pedal sensor continues to send signals to the ECU that the HST pedal is in the neutral position. The ECU does not send a signal to the proportional control valve when it receives a signal from the HST pedal sensor. As a result, the servo piston is kept in the neutral position.

In this state, oil from the charge pump fills the HST housing and then is drained to the transmission case via the case relief valve.

Oil from the hydraulic pump is depressurized by the regulator valve and sent to the PTO valve, power-steering controller, and proportional control valve, respectively.

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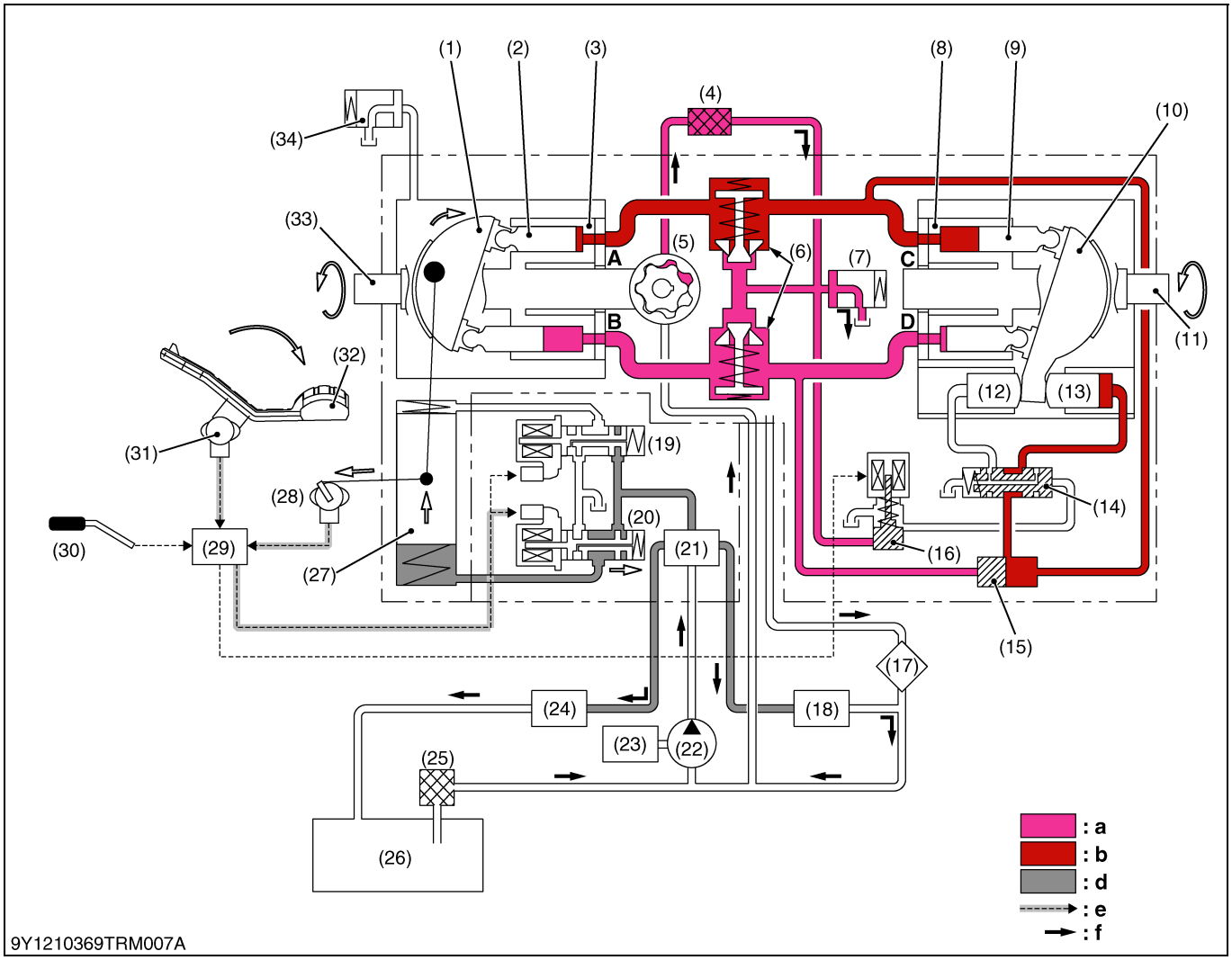
[B] Stage 2

■ **When the pedal is pressed toward the forward side**

[Tractor Condition]

HST pedal: **Forward** Position

Hi-Lo select lever: **Lo**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
b: High Pressure
d: Regulating Pressure
e: Signal
f: Oil Flow

When the HST pedal is pressed toward the forward side, signals from the HST pedal sensor are transmitted to the ECU. Then the signals are transmitted from the ECU to the proportional control valve, which guide oil from the regulator valve and moves the servo piston. With this, the swashplate on the pump side is tilted as shown in the drawing. The speed of the motion and stroke of the servo piston are controlled by the ECU based on the motion of the pedal.

9Y1210824TRM0033US0

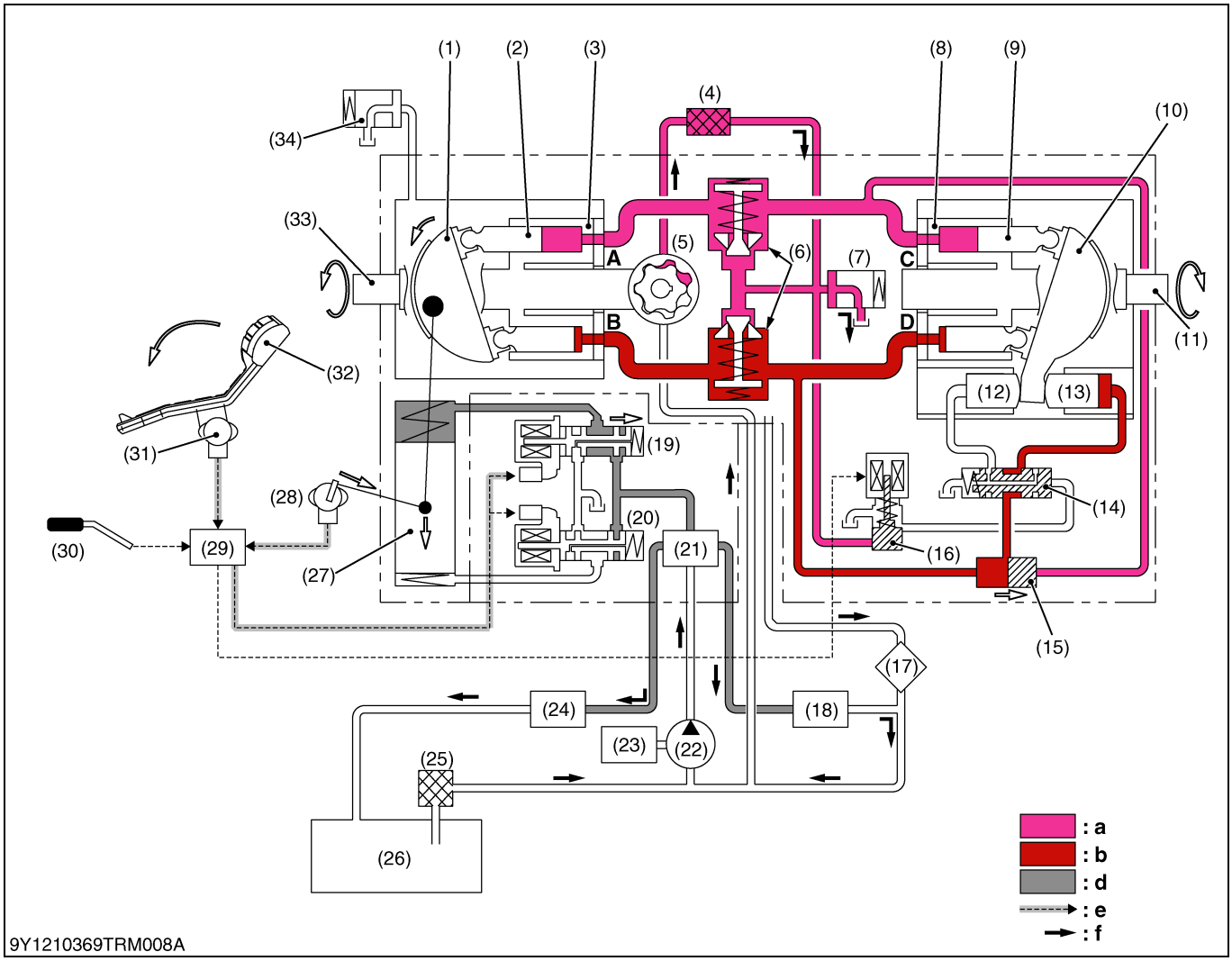
[C] Stage 3

■ **When the pedal is pressed toward the reverse side**

[Tractor Condition]

HST pedal: **Reverse** Position

Hi-Lo select lever: **Lo**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
b: High Pressure
d: Regulating Pressure
e: Signal
f: Oil Flow

When the HST pedal is pressed toward the reverse side, signals from the HST pedal sensor are transmitted to the ECU. Then the signals are transmitted from the ECU to the proportional control valve, which guide oil from the regulator valve and moves the servo piston. As a result, the swashplate on the pump side is tilted as shown in the drawing. The speed of the motion and stroke of the servo piston is controlled by the ECU based on the motion of the pedal.

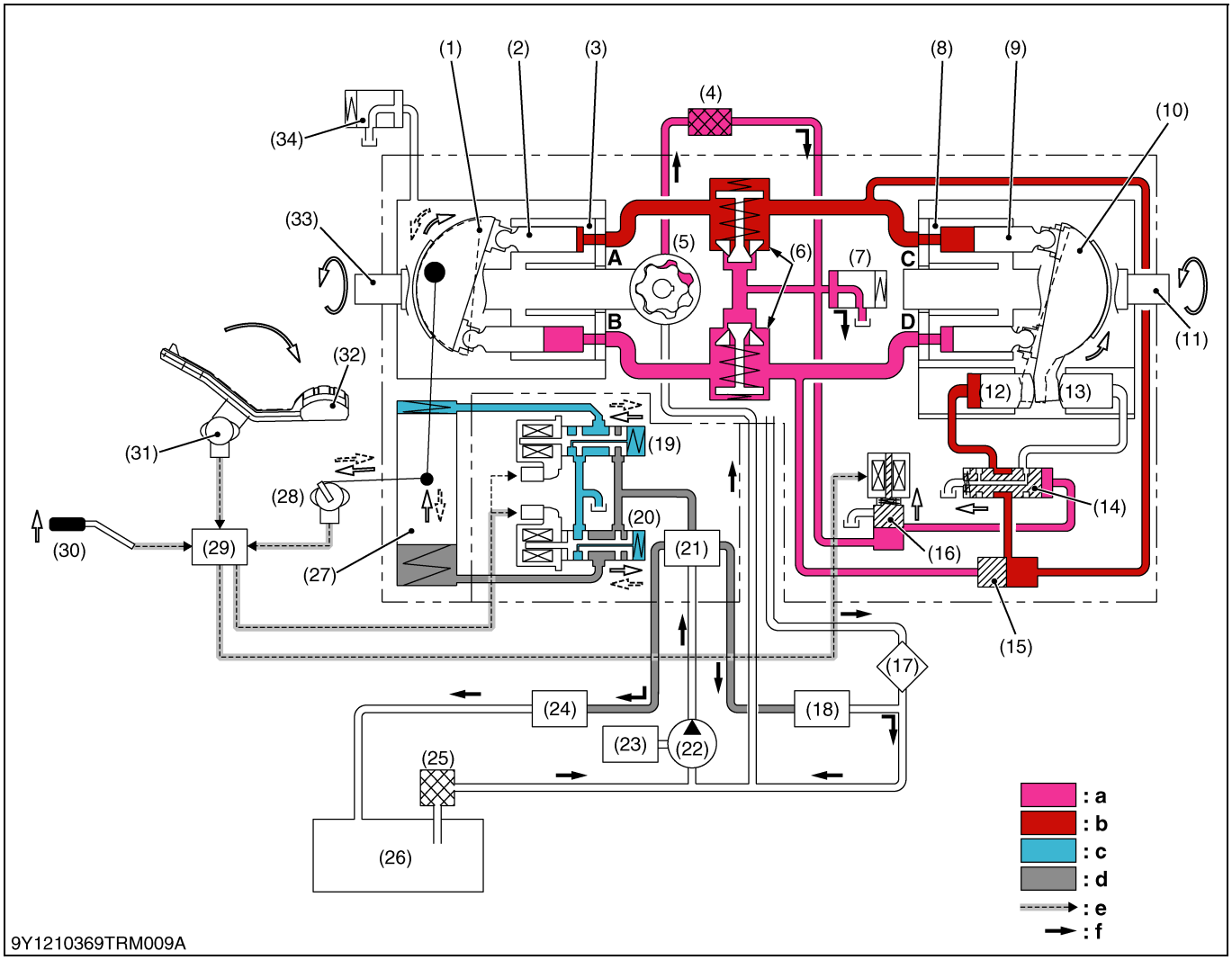
9Y1210824TRM0034US0

[D] Stage 4

■ **When the pedal is located on the forward side and the Hi-Lo change lever is set to "Hi" (The lamp of the rabbit lights up and the turtle goes off)**

[Tractor Condition]

HST pedal: **Forward** Position
Hi-Lo select lever: **Lo → Hi**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
b: High Pressure
c: Return Oil
d: Regulating Pressure
e: Signal
f: Oil Flow

(To be continued)

(Continued)

Signals are sent from the Hi-Lo change lever switch to the ECU. Then the signals are sent from the ECU to the Hi-Lo change valve. Then the Hi-Lo solenoid valve is opened. As a result, the position of the two-speed change spool is changed with charge oil to the position shown in the drawing. In this state, oil between **"A"** and **"C"** (Forward and high pressure side) is guided through the two-speed change spool to the pistons on the Hi side, and the angle of the swashplate on the motor side is changed as shown in the drawing (the inclination angle becomes smaller). As a result, the revolving speed of the motor shaft is increased.

* When the angle of the swashplate on the motor side is changed, the swashplate on the pump side goes back slightly toward the neutral position to achieve smooth shift transmission when speed is changed (from Lo to Hi). After the angle of the swashplate on the motor side is changed, the swashplate on the pump side gradually returns to its original position.

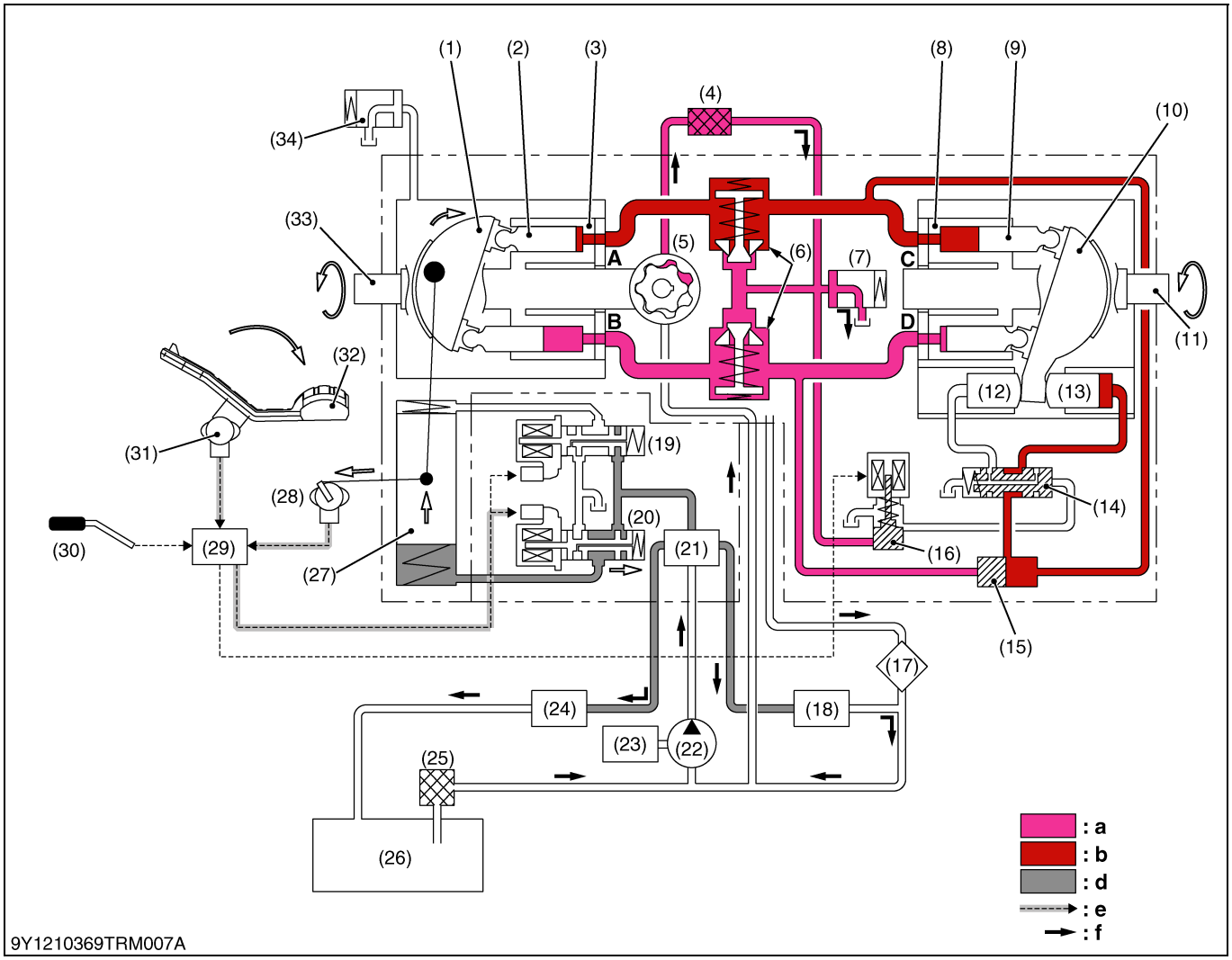
9Y1210824TRM0035US0

[E] Stage 5

■ **When the pedal is located on the forward side and the Hi-Lo change lever is changed from "Hi" to "Lo" (The lamp of the turtle lights up and the rabbit goes off)**

[Tractor Condition]

HST pedal: **Forward** Position
Hi-Lo select lever: **Lo → Hi**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
b: High Pressure
d: Regulating Pressure
e: Signal
f: Oil Flow

(To be continued)

(Continued)

Signals are sent from the Hi-Lo change lever switch to the ECU. Then the signals are sent from the ECU to the Hi-Lo change valve. As a result, the Hi-Lo solenoid valve is closed and the two-speed change spool is changed by the force of the spring to the position shown in the drawing. Then oil between **"A"** and **"C"** (Forward and high pressure side) is guided through the two-speed change spool to the piston on the Lo side and the angle of the swashplate on the motor side is changed as shown in the drawing (The inclination angle becomes larger). As a result, the revolving speed of the motor shaft is decreased.

* When, the angle of the swashplate on the motor side is changed, the swashplate on the pump side is tilted toward the forward side to achieve smooth shift transmission when speed is changed (from Hi to Lo). Almost at the same time that the angle of the swashplate on the motor side is changed, the swashplate on the pump side is inclined toward its original position.

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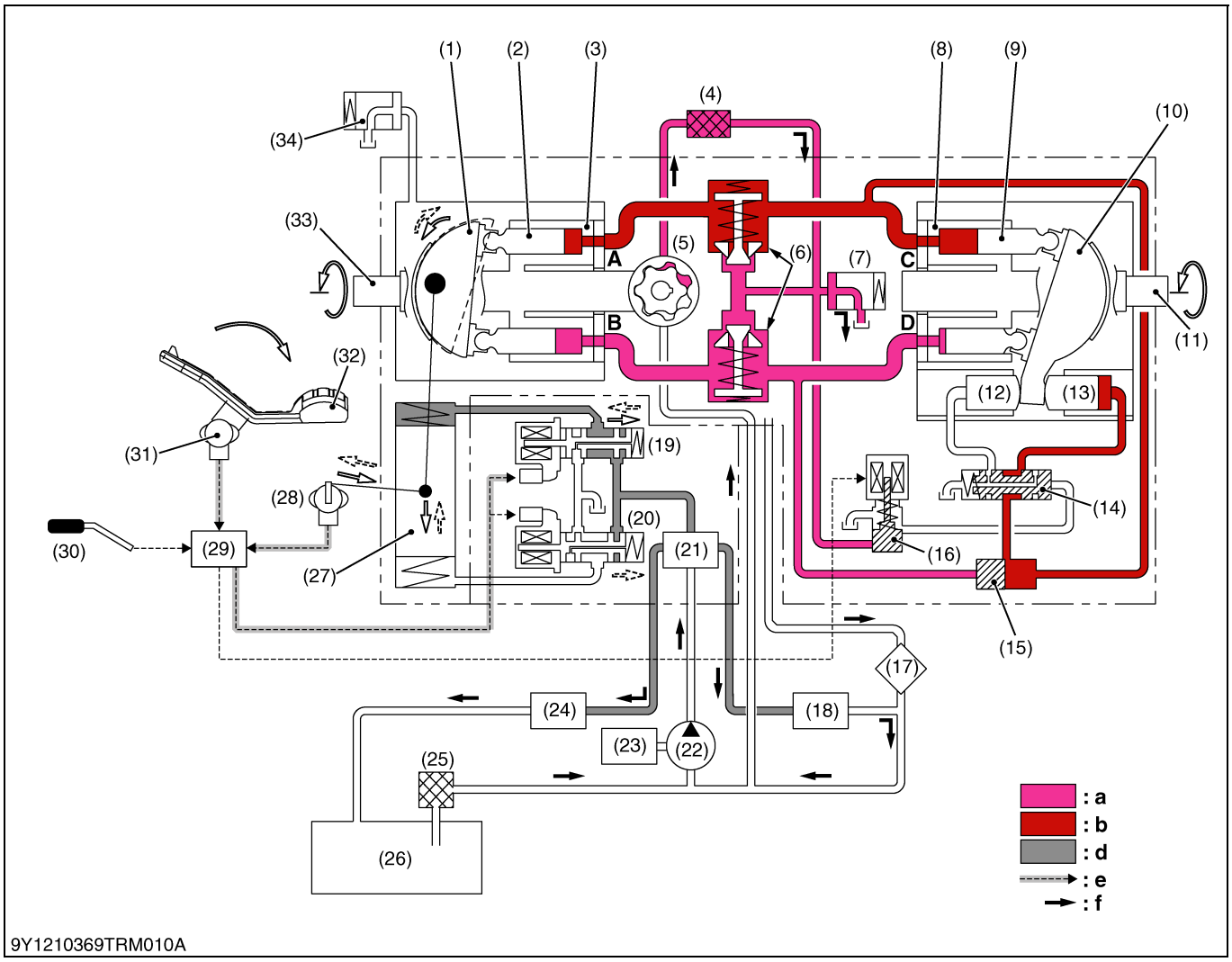
[F] Stage 6

■ **When loads are applied with the pedal located on the forward side and the engine stall prevention function is activated (Stall Guard lamp lights up on the panel)**

[Tractor Condition]

HST pedal: **Forward** Position
Hi-Lo select lever: **Lo**
Stall-Guard: **ON**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
b: High Pressure
d: Regulating Pressure
e: Signal
f: Oil Flow

(To be continued)

(Continued)

Since loads are applied on the motor shaft, the pressure between **"A"** and **"C"** is increased. With the pressure between **"A"** and **"C"** increased, the pump receives more resistance, thereby decreasing the engine speed. The engine stall prevention function is controlled by the engine speed sensor and accelerator opening sensor. Signals are sent continuously from each sensor to the ECU all the time. The ECU controls the proportional control valve so that the engine torque and loads on the HST keep well-balanced relation. (By controlling oil supply from the regulator by the proportional control valve, the servo piston is moved toward the neutral direction. As a result, the swashplate on the pump side moves toward the neutral direction. This decreases loads applied to the pump, resulting in the decrease in loads applied to the motor. In this way, engine stall can be prevented.)

* When the pedal is kept at the same position, the load is decreased and engine speed is increased again. Since signals are being transmitted continuously from the engine speed sensor to the ECU, the signals are sent from the ECU to the proportional control valve. Thereby, more oil is supplied from the regulator to the servo piston. As a result, the swashplate on the pump side returns to its original position (before speed reduction).

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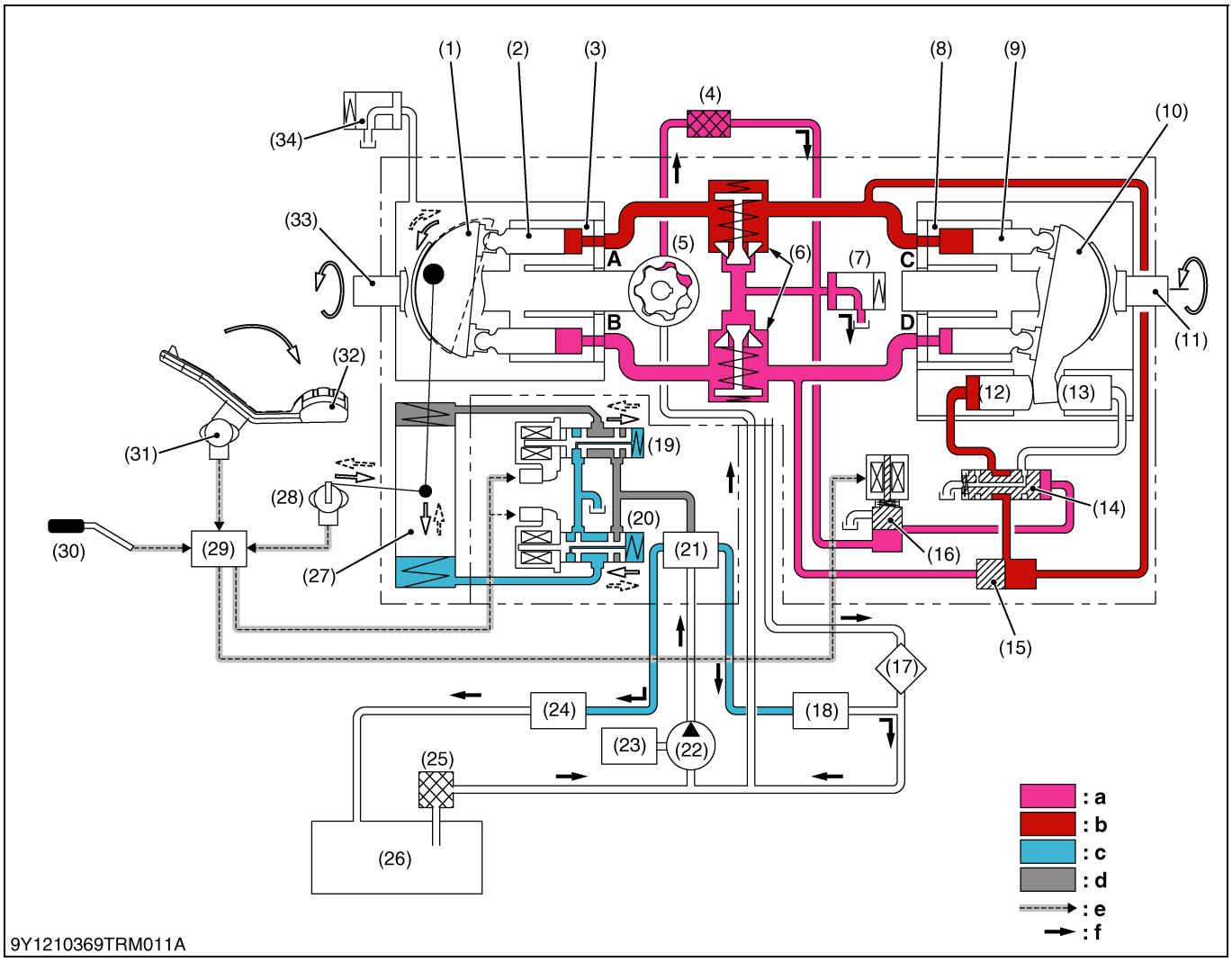
[G] Stage 7

■ **When loads are applied and the engine stall prevention function is activated with the HST pedal located on the forward side, the Hi-Lo lever sets at "Hi" position, and the automatic gear shifting sets at "ON" (Stall Guard lamp and AUTO H-DS lamp light up on the panel)**

[Tractor Condition]

HST pedal: **Forward** Position
Hi-Lo select lever: **Hi**
Stall-Guard: **ON**
Hydro Dual Speed: **ON**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
b: High Pressure
c: Return Oil
d: Regulating Pressure
e: Signal
f: Oil Flow

(To be continued)

(Continued)

With loads applied on the motor shaft, the pressure between **"A"** and **"C"** is increased. With the pressure between **"A"** and **"C"** increased, the pump receives more resistance, thereby decreasing the engine speed. Since the engine stall prevention function starts to operate first, the ECU controls the proportional control valve according to signals from the engine speed sensor and accelerator opening sensor so that the engine torque and loads on the HST should keep well-balanced relation. Loads applied on the engine are controlled by returning the swashplate on the pump side toward the neutral side. When the loads cannot be controlled just by returning the swashplate on the pump side toward the neutral side and the engine speed is decreased more, the Hi-Lo solenoid valve is closed by signals from the ECU (Lo position). Then the position of the two-speed change spool is changed by the force of a spring to the position shown in the drawing. Then oil between **"A"** and **"C"** (Forward and high pressure side) passes through the two-speed change spool and is guided by the piston on the Lo side, and the position of the swashplate on the motor side is changed to the Lo side (the inclination angle becomes larger).

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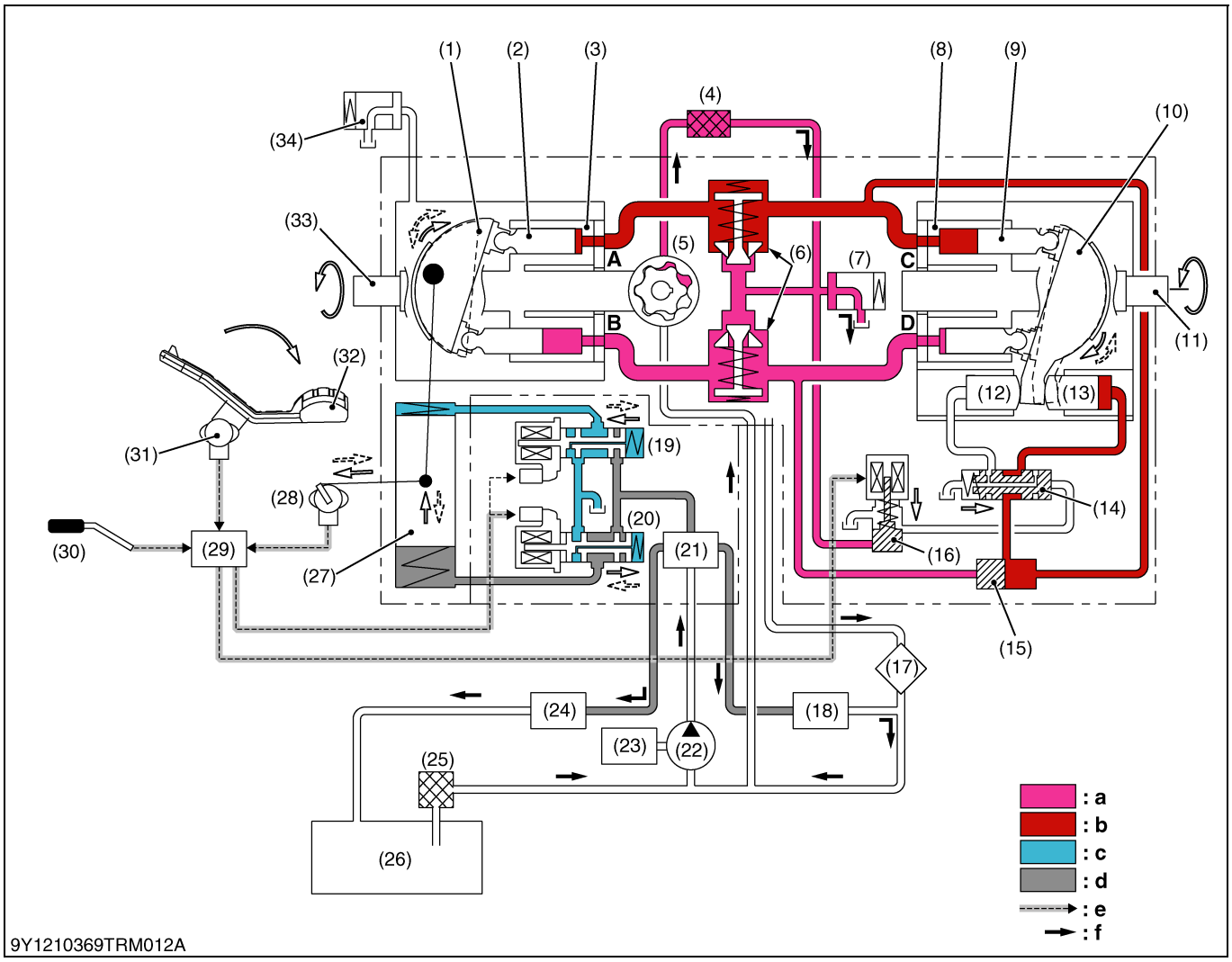
[H] Stage 8

■ **When loads are applied and the engine stall prevention function is activated with the HST pedal located on the forward side, the Hi-Lo lever sets at "Hi", and the automatic gear shifting sets at "ON" (Stall Guard lamp and AUTO H-DS lamp light up on the panel)**

[Tractor Condition]

HST pedal: **Forward** Position
Hi-Lo select lever: **Hi**
Stall-Guard: **ON**
Hydro Dual Speed: **ON**



(1) Pump Swashplate
(2) Pump Piston
(3) Pump Cylinder Block
(4) HST Filter
(5) Charge Pump
(6) Check and High Pressure Relief Valve
(7) Charge Relief Valve
(8) Motor Cylinder Block
(9) Motor Piston
(10) Motor Swashplate
(11) Out Put Shaft (Motor Shaft)
(12) Piston H
(13) Piston L
(14) Hi-Lo Spool
(15) Spool (Pressure Selector)
(16) Hi-Lo Solenoid Valve
(17) Oil Cooler
(18) Power Steering Controller
(19) Proportional Valve (Reverse)
(20) Proportional Valve (Forward)
(21) Regulator Valve
(22) Hydraulic Pump
(23) Engine
(24) PTO Valve
(25) Filter
(26) Transmission Case
(27) Servo Piston
(28) Servo Position
(29) ECU
(30) Hi-Lo Selector Lever
(31) HST Pedal Sensor
(32) HST Pedal
(33) Input Shaft (Pump Shaft)
(34) Case Relief Valve

A: A Port
B: B Port
C: C Port
D: D Port

a: Charge Pressure
b: High Pressure
c: Return Oil
d: Regulating Pressure
e: Signal
f: Oil Flow

(To be continued)

(Continued)

1. The swashplate on the motor side is changed to the Lo side (The lamp of the turtle lights up and the rabbit lamp goes off).
2. At the same time, the swashplate on the pump side is inclined toward the speed increasing side (To achieve smooth shift transmission).
3. Even when the position of the swashplate on the motor side is changed toward the Lo side but a balance between the load and engine torque cannot be achieved, the ECU controls the proportional control valve so that the engine torque and loads on the HST are balanced, activates the servo piston and moves the swashplate on the pump side to the neutral side. As a result, the loads applied on the pump are decreased more and reduces the load on the engine. This increases the engine speed and prevents an engine stall.

* When the pedal is kept at the same position, the load is decreased and engine speed is increased again. In this state, signals are being continuously transmitted from the engine speed sensor to the ECU. Then the signals are sent from the ECU to the proportional control valve and the Hi-Lo solenoid valve. (4) As a result, the swashplate on the pump side returns to its original position (before speed reduction). (5) The position of the swashplate on the motor side is also automatically changed toward the Hi side. (The pump and motor move in almost the same manner as shown in the illustration 4.)

* When the Hi-Lo lever is manually set at **"Lo"** position, the setting is not automatically changed to the Hi side even if the AUTO H-DS function is set to **"ON"**.

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[I] Stage 9

■ Stall Guard on and the PTO is engaged

[Tractor Condition]

Stall-Guard: **ON**
Hydro Dual Speed: **ON**
PTO Switch: **ON**

1. By the load of the PTO, the engine revolution number goes down.
2. When the engine revolution goes down, the ECU will send the message to return the Pump Swashplate to the neutral position.
3. At the Stall Guard PLUS, compared with at the Stall Guard, the Pump Swashplate is set in such a way as to quickly return to the neutral position.
4. On the other hand, when the engine revolution recovers, the Pump Swashplate is set in such a way as to slowly return.
5. The setting is in such a way as the PTO work can be done at the engine revolution of 2000 or higher even when the PTO load is applied at the maximum engine revolution. (At the time of depressing the pedal.)
6. Because the stable engine revolution has priority, the response-dial is not operable for adjustment.

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[J] Stage 10

■ Throttle-up Switch

[Tractor Condition]

HST Pedal : **Forward** Position
Throttle-Up Switch : **"OFF"** → **"ON"** → **"OFF"**

The throttle-up function works while the throttle-up switch is pushed. While holding down the throttle-up switch, the engine revolution increases to the preset revolution. Based on a signal from the throttle-up switch, the main ECU provides an arbitrarily preset engine revolution to the engine ECU. Signals are sent continuously from each sensor to the ECU all the time. Simultaneously, in order to prevent sudden increase in traveling speed as the engine revolution rises, the main ECU controls the proportional control valve so that the increase of engine revolution and swashplate on the HST keeps well-balanced relation. Because the proportional control valve controls the oil supplied from the regulator, the servo piston moved toward the neutral direction. As a result, the swashplate on the pump side moves toward the neutral direction. The signal from the throttle-up switch stops when the throttle-up switch is released.

This enables return of the engine speed to the speed set by the hand throttle lever.

* When the pedal is kept at the same position, the signals are sent from the main ECU to the proportional control valve. Thereby, more oil is supplied from the regulator to the servo piston. As a result, the swashplate on the pump side returns to its original position.

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[K] Stage 11

■ **Cruise Control Switch**

[Tractor Condition]

HST Pedal : **Forward** Position

Cruise Control Switch : **"Set"** and **"Increase"**

The cruise control function is to keep the swashplate at the same angle on the pump side. As the result, the tractor keeps same traveling speed. The cruise control switch, the cruise traveling speed has a function of **"Set"**, **"Increase"**, **"Decrease"** and **"Cancel"**. When the HST pedal is pressed forward, a signal from the HST pedal sensor is communicated to the main ECU. Thereafter, a signal from the main ECU is communicated to the proportional control valve directing oil from the regulator valve, which moves the servo piston. The speed and stroke of movement of the servo piston is controlled by the main ECU based on movement of the pedal. With the HST pedal pressed, pushing the front side of the cruise control switch to the second step enables the ECU to store the position of the HST pedal. Even if the HST pedal is released, the main ECU keeps the servo piston fixed in place in the position of the HST pedal stored by the ECU. Each time the front side of the cruise control switch is pushed to the first step (**"Increase"**), a signal is sent to the ECU. Simultaneously, a signal is communicated from the ECU to the proportional control valve and oil is guided from the regulator valve to the servo piston. As a result, the swashplate on the pump side inclines towards the increase speed position and the traveling speed increases.

[Tractor Condition]

HST Pedal : **Forward** Position

Cruise Control Switch : **"Decrease"** and **"Cancel"**

With the HST pedal pressed, pushing the front side of the cruise control switch to the second step (**"Set"**) enables the main ECU to store the position of the HST pedal. Even if the HST pedal is released, the ECU keeps the servo piston in place in the position of the HST pedal stored by the ECU.Each time the back side of the cruise control switch is pushed to the first step (**"Decrease"**), a signal is communicated from the cruise control switch to the ECU and the swashplate on the pump side is returned to the neutral side. Speed is reduced each time the cruise control switch is pushed. If the cancel switch on the cruise control switch is pushed to the second step (**"Cancel"**), a signal is communicated from the cruise control switch to the ECU and the cruise function is canceled.

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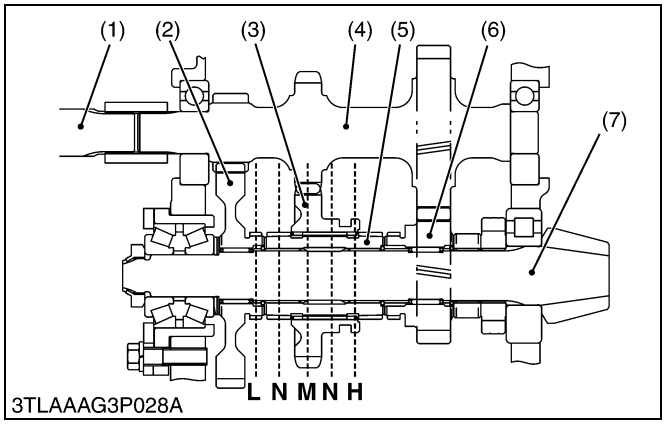
(5) Range Gear Shift Section



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The range gar shift section is located in the differential gear case.

It changes the speed to five positions (**"L"**, **"N"**, **"M"**, **"N"** and **"H"**) by shifting of shifter gear (3) in the straight line on bevel pinion shaft (7).

(1) Counter Shaft
(2) Gear (for L)
(3) Shifter Gear (for M)
(4) Range Gear Shaft
(5) Spline Boss
(6) Gear (for H)
(7) Spiral Bevel Pinion Shaft

L: Low Speed Position
N: Neutral Position
M: Middle Speed Position
H: High Speed Position

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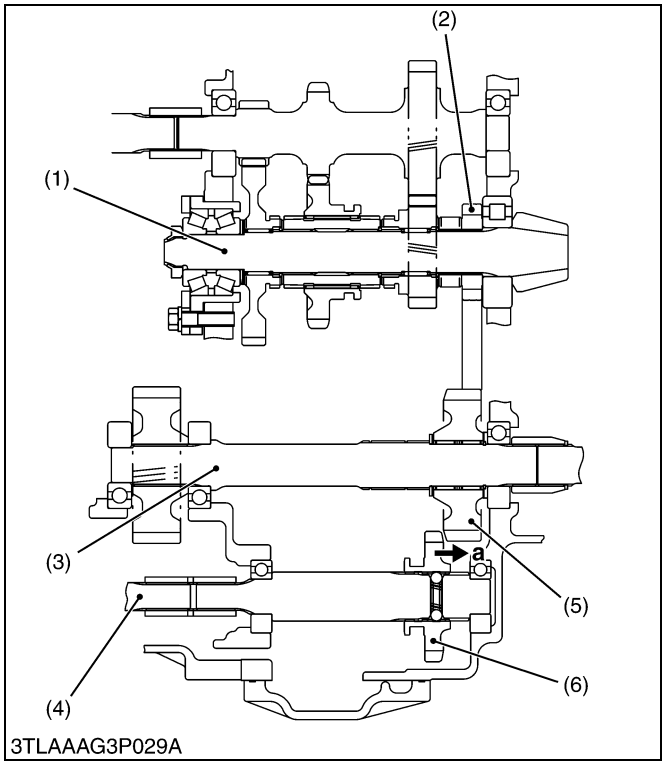
(6) Front Wheel Drive Section



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Front wheel drive section is located in the differential gear case.

2 wheel drive or 4 wheel drive is selected by operating the front wheel drive lever to shift the shifter gear (6).

(1) Spiral Bevel Pinion Shaft
(2) Front Wheel Drive Output Gear
(3) PTO Drive Shaft
(4) Front Wheel Drive Shaft
(5) Front Wheel Drive Gear
(6) Shifter Gear
a: 4 Wheel Drive Position

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[2] SHIFT LINKAGE MECHANISM

The shift linkage mechanism of "Front Wheel Drive Lever", refer to page 3-M7.

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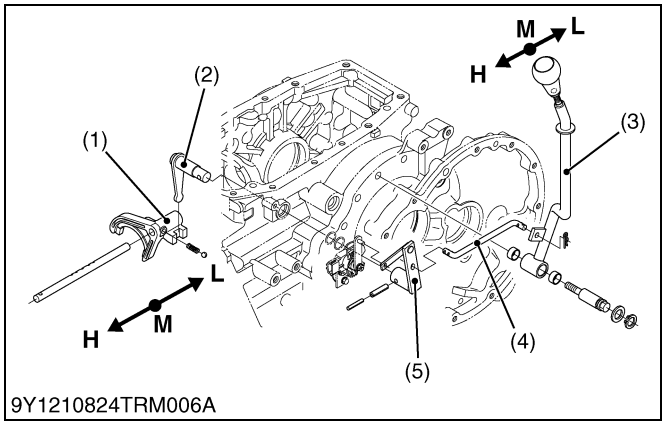
(1) Range Gear Shift Lever



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The links are connected from the shift lever (3) to the shift fork (1) as shown in figure.

(1) Shift Fork
(2) Shift Arm
(3) Range Gear Shift Lever
(4) Rod
(5) Sub-arm

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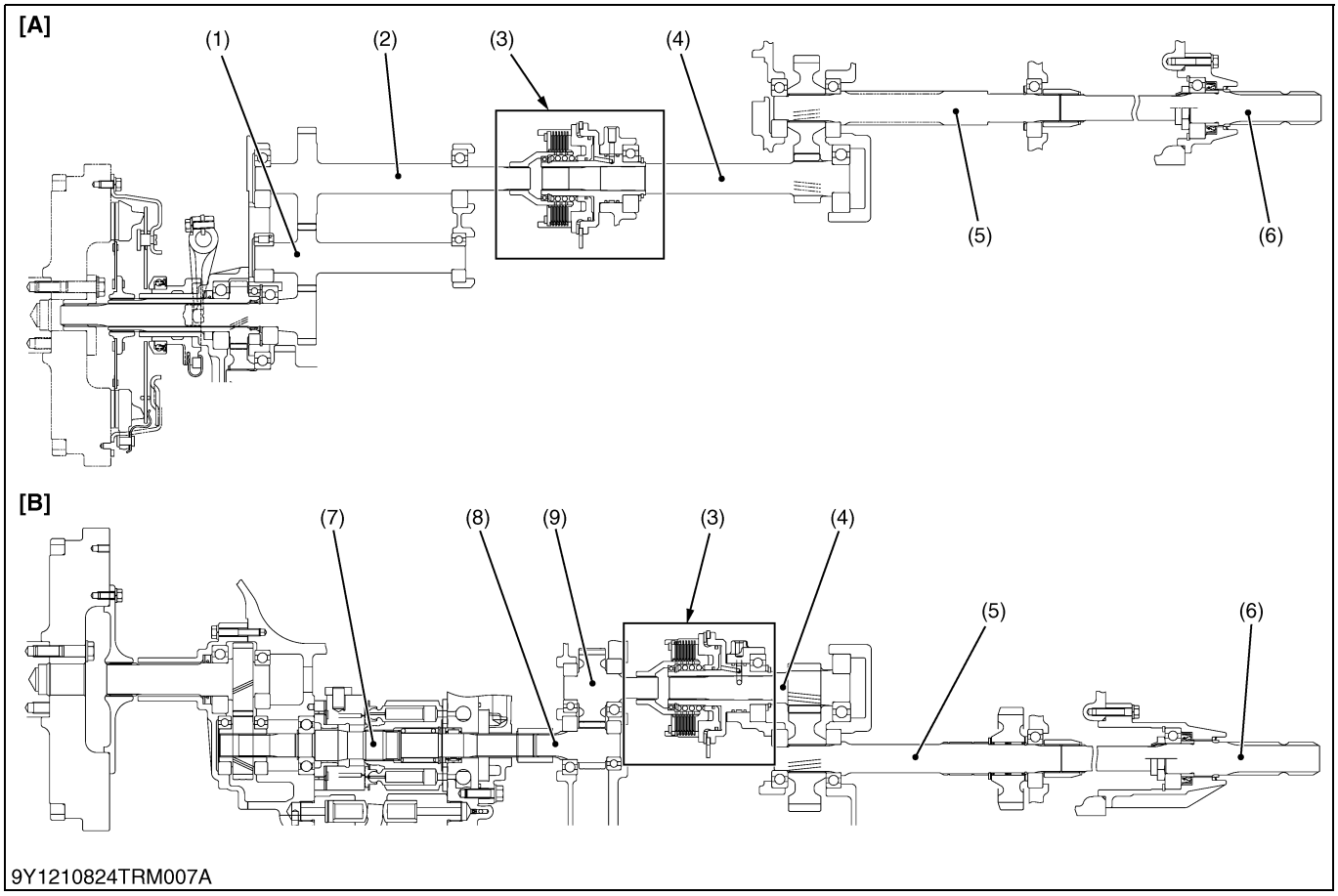
5. PTO SYSTEM

[1] STRUCTURE



(1) PTO Gear Shaft 1
(2) PTO Gear Shaft 2
(3) PTO Clutch Pack
(4) PTO Counter Shaft
(5) PTO Drive Shaft
(6) PTO Shaft
(7) Output Shaft (Motor Shaft)
(8) PTO Gear Shaft 1
(9) PTO Gear Shaft 2
[A] Manual Transmission and GST
[B] HST

The independent PTO operated by hydraulic clutch (3) is adapted for all models. PTO is **"ENGAGED"** or **"DISENGAGED"** by operating the PTO switch of the PTO solenoid valve.

The power train from the clutch to the PTO shaft is shown in figure above.

(Reference)

- PTO speed of each model is as shown in the table below.

Manual Transmission and GST

Rear PTO	All Model	540 min^{-1} (rpm) at 2550 min^{-1} (rpm) engine speed

HST

Rear PTO	L3560	540 min^{-1} (rpm) at 2426 min^{-1} (rpm) engine speed
	L4060, L4760	540 min^{-1} (rpm) at 2476 min^{-1} (rpm) engine speed
	L5460, L6060	540 min^{-1} (rpm) at 2403 min^{-1} (rpm) engine speed

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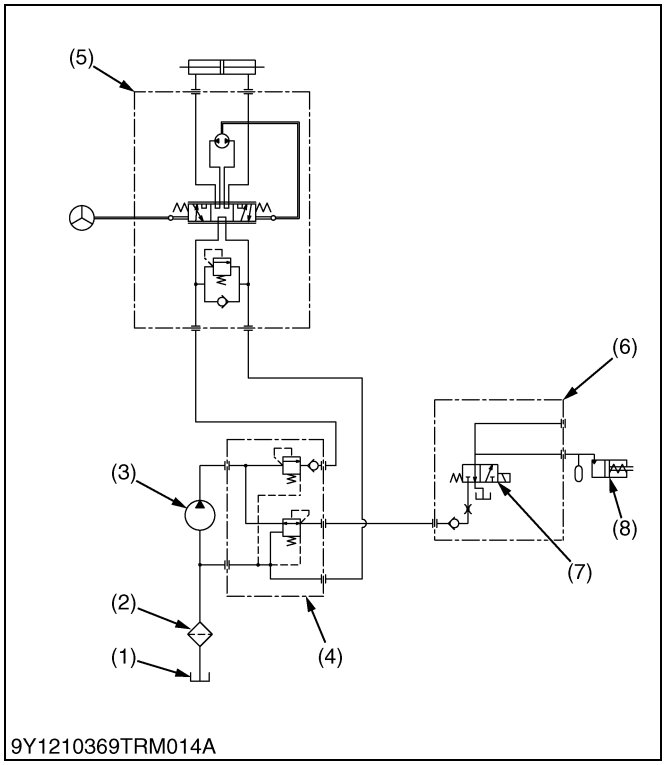

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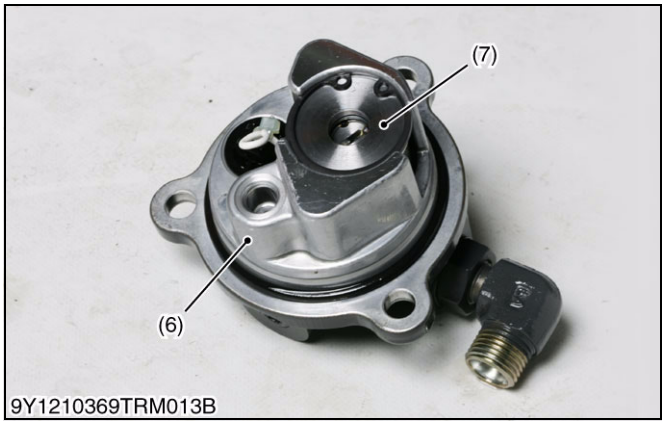

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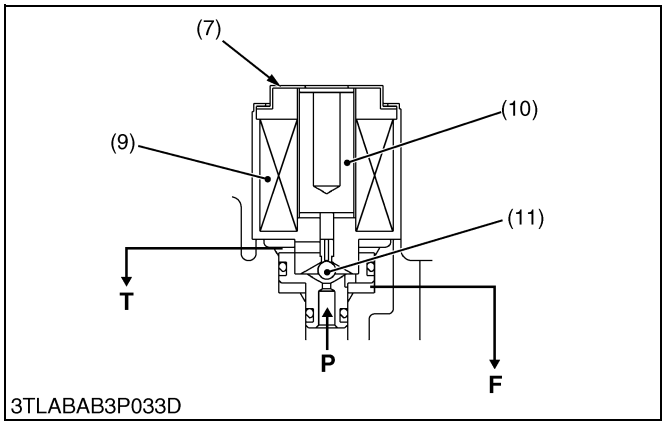

3TLABAB3P033D

Hydraulic Circuit

The oil from the regulator valve (4) flows into the PTO clutch solenoid valve (6).

When PTO switch is at **"OFF"** position, the oil flows is stopped by PTO solenoid valve (6).

When PTO switch is at **"ON"** position, the oil flows PTO clutch through the PTO solenoid valve and PTO clutch is engaged.

(1) Transmission Case
(2) Oil Filter
(3) Hydraulic Pump
(4) Regulator Valve
(5) Power Steering Controller
(6) PTO Valve Assembly
(7) PTO Solenoid Valve
(8) PTO Clutch
(9) Solenoid
(10) Plunger
(11) Ball

P: IN Port
F: To PTO Clutch
T: Drain Port

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SERVICING

CONTENTS

1. TROUBLESHOOTING

[1] GENERAL

Symptom	Probable Cause	Solution	Reference Page
Excessive Transmission Noise	Transmission fluid insufficient	Fill	G-9
	Gear worn or backlash improper	Replace	3-S127
	Bearing worn or broken	Replace	3-S123
	Shift fork worn	Replace	3-S123
	Spline worn	Replace	3-S123
	Snap rings on the shaft come off	Repair or replace	–
	Spiral bevel pinion lock nut improperly tightened	Tighten	3-S73
	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S127
	Improper backlash between differential pinion and differential side gear	Adjust	3-S129
Gear Slip Out of Mesh	Shift linkages rusted	Repair	–
	Shifter or shift fork worn or damaged	Replace	3-S123
	Shift fork interlock ball spring weaken or damaged	Replace	3-S62, 3-S81
	Interlock ball fallen	Reassemble	3-S62, 3-S81
	Synchronizer unit damaged	Replace	3-S124
	Gears worn or broken	Replace	–
Hard Shifting	Shifter or shift fork worn or damaged	Replace	3-S123
	Shift fork bent	Replace	3-S123
	Shift linkage rusted	Repair	–
	Shaft part of shift arms rusted	Repair	–
	Synchronizer unit damaged	Replace	3-S124
Gears Clash When Shifting	Clutch does not release (Except HST)	Adjust or repair	G-20
	Gears worn or damaged	Replace	–
	Synchronizer unit damaged	Replace	3-S124
Differential Lock Can Not Be Set	Differential lock shift fork damaged	Replace	3-S75, 3-S94, 3-S120
	Differential lock shift fork mounting clevis pin damaged	Replace	3-S75, 3-S94, 3-S120
	Differential lock shifter pin bent or damaged	Replace	3-S75, 3-S94, 3-S120
	Differential lock fork shaft bent or damaged	Replace	3-S75, 3-S94, 3-S120

Symptom	Probable Cause	Solution	Reference Page
Differential Lock Pedal Does Not Return	Differential lock pedal return spring weaken or damaged	Replace	–
	Differential lock shifter pin bent or damaged	Replace	3-S75, 3-S94, 3-S120
	Differential lock fork shaft bent	Replace	3-S75, 3-S94, 3-S120
Excessive or Unusual at All Time	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S127
	Improper backlash between differential pinion and differential side gear	Adjust	3-S129
	Bearings worn	Replace	3-S123
	Insufficient or improper type of transmission fluid used	Fill or replace	G-9
Noise While Turning	Differential pinion or differential side gears worn or damaged	Replace	3-S77
	Differential lock binding (does not disengage)	Replace	3-S75, 3-S94, 3-S120
	Bearing worn	Replace	–

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[2] ERROR DISPLAY ON THE INTELLIPANEL

Error Display for Manual Transmission

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™	• CANbus wiring is disconnected or short-circuited • No signals from main ECU for longer than 5 seconds (error cleared if signal sent and received later) • Main ECU damaged	Check the communication line	–
			Check the main ECU connector	9-S38
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble	• Main ECU memory device failure	Replace the main ECU	9-S14
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble	• Power source (5 V) from terminal **A8** of main ECU is dropped below 2.6 V for 0.1 second or more • Wiring for sensor is short-circuited	Check the output voltage at main ECU connector	9-S39
			Check the sensor connector	9-S48
			Check the ground cable	9-S35
ERROR No. 51 Shuttle SWITCH NG	Shuttle lever switch is in trouble	• Shuttle switch failure	Check the shuttle switch	9-S63
			Replace the shuttle switch	9-S63
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble	• Starter relay failure • Wiring for starter relay is disconnected or short-circuited	Engine does not start	–
			Replace the starter relay	9-S66
			Check the wiring connector of starter relay	–
ERROR No. 94 OPC NG	OPC is in trouble	• Wiring for OPC is disconnected or short-circuited	Engine is stopped	–
			Check the wiring connector of OPC	9-S62
			Check the communication line between terminal B18 of main ECU and terminal 20 of engine ECU	–
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble	• PTO solenoid valve failure • Wiring for PTO solenoid valve is disconnected or short-circuited • Grounding plate of solenoid is poor contact with chassis	PTO does not rotate	–
			Check the PTO solenoid valve	3-S20
			Replace the PTO solenoid valve	3-S66
			Check the wiring connector of PTO solenoid valve	–

Error Display for GST

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™	• CANbus wiring is disconnected or short-circuited • No signals from main ECU for longer than 5 seconds (error cleared if signal sent and received later) • Main ECU damaged	Check the communication line	–
			Check the main ECU connector	9-S38
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble	• Main ECU memory device failure	Replace the main ECU	9-S14
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble	• Power source (5 V) from terminal **A8** of main ECU is dropped below 2.6 V for 0.1 second or more • Wiring for sensor is short-circuited	Check the output voltage at main ECU connector	9-S41
			Check the sensor connector	9-S49
			Check the ground cable	9-S35
ERROR No. 50 GST Lever SENSOR NG	GST lever sensor is in trouble	• Lever sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Lever sensor failure • Main Sensor Voltage ≤0.2V or ≥4.9V (60 msec in a row)	Check the sensor voltage by test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S49
			Replace the sensor	9-S49
ERROR No. 51 Shuttle SWITCH NG	Shuttle lever switch is in trouble	• Shuttle switch failure	Check the shuttle switch	9-S63
			Replace the shuttle switch	–
ERROR No. 60 GST SOLENOID NG	Proportional reducing valve is in trouble	• Output voltage of proportional reducing valve terminal or return current is out of specification • Wiring for valve is disconnected or short-circuited • Proportional reducing valve damaged	Check the connector of proportional reducing valve	–
			Check the connector of proportional reducing valve resistance at valve or main ECU connector	9-S41
			Check the ground cable	9-S35
			Connect the emergency connector and moves	–

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 61 1, 7, 8th Speed NG	Solenoid 1 is in trouble (At forward or neutral)	• Solenoid output terminal's voltage is out of specification • Solenoid broken or short-circuited • Wiring harness broken or short-circuited • Grounding plate of solenoid is poor contact with chassis	Able to travel at speeds other than 1, 7 and 8 (Forward) or 1 and 5 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 61 1, 5th Speed NG	Solenoid 1 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S41, 9-S50
			Replace GST valve	3-S79
ERROR No. 62 2, 9, 10th Speed NG	Solenoid 2 is in trouble (At forward or neutral)		Able to travel at speeds other than 2, 9 and 10 (Forward) or 2 and 6 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 62 2, 6th Speed NG	Solenoid 2 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 63 3, 4, 11th Speed NG	Solenoid 3 is in trouble (At forward or neutral)		Able to travel at speeds other than 3, 4 and 11 (Forward) or 3 and 7 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 63 3, 7th Speed NG	Solenoid 3 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 64 5, 6, 12th Speed NG	Solenoid 4 is in trouble (At forward or neutral)		Able to travel at speeds other than 5, 6 and 12 (Forward) or 4 and 8 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 64 4, 8th Speed NG	Solenoid 4 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 65 1-6th Speed NG	Solenoid 5 (Hi-Lo) is in trouble (At forward or neutral)		Able to travel at speeds other than 1 to 6 (Forward) or 1 to 4 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 65 1-4th Speed NG	Solenoid 5 (Hi-Lo) is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 66 3, 5, 7, 9th Speed NG	Solenoid 6 (H-L) is in trouble		Able to travel at speeds other than 3, 5, 7 and 9 (Forward)	–
			Check the wiring connector of solenoid	–
			Check the resistance between solenoid and GND	9-S51
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble	• Starter relay failure • Wiring for starter relay is disconnected or short-circuited	Engine does not start	–
			Replace the starter relay	9-S66
			Check the wiring connector of starter relay	–
ERROR No. 94 OPC NG	OPC is in trouble	• Wiring for OPC is disconnected or short-circuited	Engine is stopped	–
			Check the wiring connector of OPC	9-S62
			Check the communication line between terminal B18 of main ECU and terminal 20 of engine ECU	–
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble	• PTO solenoid valve failure • Wiring for PTO solenoid valve is disconnected or short-circuited • Grounding plate of solenoid is poor contact with chassis	PTO does not rotate	–
			Check the PTO solenoid valve	3-S20
			Replace the PTO solenoid valve	3-S85
			Check the wiring connector of PTO solenoid valve	–

Error Display for HST

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™	• CANbus wiring is disconnected or short-circuited • No signals from main ECU for longer than 5 seconds (error cleared if signal sent and received later) • Main ECU damaged	Check the communication line	–
			Check the main ECU connector	9-S38
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble	• Main ECU memory device failure	Replace the main ECU	9-S14
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble	• Power source (5 V) from terminal **A8** of main ECU is dropped below 2.6 V for 0.1 second or more • Wiring for sensor is short-circuited	Check the output voltage at main ECU connector	9-S43
			Check the sensor connector	9-S53
			Check the ground cable	9-S35
ERROR No. 80 Range Shift SENSOR NG	Sensor for range gear shift lever is in trouble	• Sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Sensor failure	Check the sensor voltage by test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S54
			Replace the sensor	9-S54
ERROR No. 81 HST Pedal SENSOR NG	Sensor for speed control pedal is in trouble	• Sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Sensor failure • Main sensor voltage ≤0.2 V or ≥4.9 V • Sub sensor voltage ≤0.2 V or ≥4.9 V • Main + Sub ≤3.9 V or ≥6.1 V (60 msec in a row)	The running that uses the pedal is impossible, but running with the cruise control switch is possible	–
			Check the sensor voltage by Test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S55
			Replace the sensor	9-S55
ERROR No. 82 Swash Plate SENSOR NG	Sensor for swashplate of HST is in trouble		Travel motion is possible	–
			Check the sensor voltage by Test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S55
			Replace the sensor	9-S55
ERROR No. 83 Cruise SWITCH NG	Cruise control switch is in trouble	• Cruise control switch failure	Check the cruise control switch	9-S57
			Replace the cruise control switch	9-S57
ERROR No. 84 Throttle SENSOR NG	Sensor for engine throttle is in trouble	• Sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Sensor failure • Main sensor voltage ≤0.2 V or ≥4.9 V • Sub sensor voltage ≤0.2 V or ≥4.9 V • Main + Sub ≤3.9 V or ≥6.1 V (60 msec in a row)	Travel motion is possible. The HST electronic control function (Mode 2 and Mode 3) is inoperative condition.	–
			Check the sensor voltage by Test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensorresistance	9-S55
			Replace the sensor	9-S55

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 90 HST-F SOLENOID NG	Proportional valve for forward is in trouble	• Output voltage of proportional valve terminal or return current is out of specification • Wiring for proportional valve is disconnected or short-circuited • Proportional valve failure	Travel motion is possible on the backward side only	–
			Check the connector of proportional	9-S58
			Check the proportional valve by Test mode (Mode A)	9-S17
			Check the proportional valve resistance at valve or main ECU connector	9-S58
			Check the ground cable	9-S35
			Replace the proportional valve	9-S58
ERROR No. 91 HST-R SOLENOID NG	Proportional valve for reverse is in trouble		Travel motion is possible on the forward side only	–
			Check the connector of proportional	9-S58
			Check the proportional valve by Test mode (Mode A)	9-S17
			Check the proportional valve resistance at valve or main ECU connector	9-S58
			Check the ground cable	9-S35
			Replace the proportional valve	9-S58
ERROR No. 92 Hi-Lo SOLENOID NG	Hi-Lo solenoid shift is in trouble	• Hi-Lo solenoid output terminals voltage is out of specification • Hi-Lo solenoid broken or short-circuited • Wiring for Hi-Lo solenoid valve is disconnected or short-circuited	Travel motion is possible. The HST electronic control function (Mode 3) is in the inoperative condition	–
			Check the Hi-Lo solenoid resistance	9-S59
			Replace the Hi-Lo solenoid	9-S59
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble	• Starter relay failure • Wiring for starter relay is disconnected or short-circuited	Engine does not start	–
			Replace the starter relay	9-S66
			Check the wiring connector of starter relay	–
ERROR No. 94 OPC NG	OPC is in trouble	• Wiring for OPC is disconnected or short-circuited	Engine is stopped	–
			Check the wiring connector of OPC	9-S62
			Check the communication line between terminal B18 of main ECU and terminal 20 of engine ECU	–
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble	• PTO solenoid valve failure • Wiring for PTO solenoid valve is disconnected or short-circuited • Grounding plate of solenoid is poor contact with chassis	PTO does not rotate	–
			Check the PTO solenoid valve	3-S20
			Replace the PTO solenoid valve	3-S113
			Check the wiring connector of PTO solenoid valve	–

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Error Message Does not Indicate on LCD (GST)

Symptom	Probable Cause	Solution	Reference Page
The Tractor Does Not Move While Shifted	Oil level is low	Check oil level or fill oil to proper level	G-9
	Clogged hydraulic oil filter	Replace oil filter cartridge	G-31
	Power steering hydraulic pump damaged	Replace	8-S14
	GST system pressure is too low	Solution order 1. Check the regulating valve pressure.	3-S24
		2. Adjust the GST system pressure.	3-S24
	GST pilot pressure is too low	Solution order 1. Check the orifice of the pilot circuit.	3-S25
		2. Check the shift check valves.	3-S100
		3. Check the shift pistons.	3-S101
		4. Check the movement of the shift forks.	–
		5. Check the oil leaking from PTO clutch valve or its clutch pack.	3-S125
	GST clutch pressure is too low	Solution order 1. Check the pressure switch.	9-S50
		2. Check the filter of proportional reducing valve.	3-S102
		3. Check the clutch valve.	3-S102
		4. Check the GST clutch pack.	3-S86, 3-S87
	GST clutch pack damaged	Repair or replace GST clutch pack	3-S86, 3-S87
	Synchronizer units damaged	Replace the synchronizer unit	3-S124
	Gears on the shaft damaged	Replace the gears	–
The Time Needed to Start the Tractor	Oil level is too low	Check oil level or fill oil to proper level	G-9
	Transmission oil quality is too low	Fill correct fluid	G-9
	GST valve improperly adjusted	Adjust GST valve	3-S22
	Shift shock improperly adjusted	Adjust shift shock	3-S23
	Temperature sensor damaged	Replace temperature sensor	9-S50

Symptom	Probable Cause	Solution	Reference Page
Quick Engagement While Starting or Large shock While Shifting	Oil level is too low	Check oil level or fill oil to proper level	G-9
	Transmission oil quality is too low	Fill correct fluid	G-9
	GST valve improperly adjusted	Adjust GST valve	3-S22
	Shift shock improperly adjusted	Adjust shift shock	3-S23
	Temperature sensor damaged	Replace temperature sensor	9-S50
	Pressure switch damaged	Replace pressure switch	9-S50

9Y1210824TRS0173US0

Error Message Does not Indicate on LCD (HST)

Symptom	Probable Cause	Solution	Reference Page
System Will Not Operate in Either Direction	Oil level is low	Check oil level or fill oil to proper level	G-9
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-22
		2. Check charge pressure	3-S32
		3. Inspect or flush charge relief valve	3-S111
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S111
	Component parts damaged	Replace hydrostatic transmission assembly	–
	Electronic control parts damaged	Inspect or replace electronic control parts	–
Vibration and Noise	Oil level is too low	Check oil level or fill oil to proper level	G-9
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-22
		2. Check charge pressure	3-S32
		3. Inspect or flush charge relief valve	3-S111
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S111
	Component parts damaged	Replace hydrostatic transmission assembly	–

Symptom	Probable Cause	Solution	Reference Page
Loss of Power	Oil level is too low	Check oil level or fill oil to proper level	G-9
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-22
		2. Check charge pressure	3-S32
		3. Inspect or flush charge relief valve	3-S111
	Check and high pressure relief valve damaged	Inspect or replace check and high pressure relief valve	3-S111
	Hi-Lo spool is damaged	Inspect or replace Hi-Lo spool	3-S110
	Component parts damaged	Replace hydrostatic transmission assembly	–
	Speed control pedal linkage damaged	Repair linkage	–
	Electronic control parts damaged	Inspect or replace electronic control parts	–
Transmission Oil Over Heats	Low transmission oil level	Fill transmission oil level up to proper level	G-9
	Radiator net clogged	Clean radiator net	G-19
	Excessive machine load	Reduce machine load	–
	Improper charge pressure	Solution order 1. Check high relief pressure	3-S31
		2. Replace transmission oil filter cartridge	G-22
		3. Replace check and high pressure relief valve	3-S111
		4. Inspect and replace charge relief valve	3-S111
	Check and high pressure relief valve damaged	Inspect or replace check and high pressure relief valve	3-S111
Machine Will not Stop in Neutral Position	Potentiometer damaged	Inspect or replace potentiometer	9-S55
System Operates in One Direction Only	Check and high pressure relief valve damaged	Replace check and high pressure relief valve	3-S111
	Potentiometer damaged	Inspect or replace potentiometer	9-S55

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[3] PTO SYSTEM

PTO CLUTCH

Symptom	Probable Cause	Solution	Reference Page
PTO Clutch Slip	Operating pressure is low	Adjust	3-S20
	PTO clutch valve malfunctioning	Repair or replace	3-S66
	Clutch disc or drive plate excessively worn	Replace	3-S68
	Deformation of piston or return plate	Replace	3-S69
PTO Shaft Does Not Rotate	PTO clutch malfunctioning	Repair or replace	3-S66
	PTO propeller shaft coupling disengaged	Engage	–
PTO Clutch Operating Pressure is Low	Transmission oil improper or insufficient	Fill or change	G-9
	Relief valve malfunctioning	Adjust or replace	3-S20
PTO Clutch Drags	Brake plate excessively worn	Replace	3-S69
	Return spring weaken or broken	Replace	3-S69
	Accumulator valve malfunctioning	Repair or replace	3-S68
	Deformation or return plate or steal plate	Replace	3-S68

9Y1210824TRS0170US0

2. SERVICING SPECIFICATIONS

ALL MODEL

Item		Factory Specification	Allowable Limit
Gear to Spline	Clearance	0.030 to 0.078 mm 0.0012 to 0.0030 in.	0.2 mm 0.008 in.
Shift Fork to Shifter Gear Groove	Clearance	0.20 to 0.40 mm 0.0079 to 0.015 in.	0.8 mm 0.03 in.
Gear to Shaft	Clearance	0.021 to 0.054 mm 0.00083 to 0.0021 in.	0.1 mm 0.004 in.
Shift Fork to Shifter Groove	Clearance (Shuttle) (Others)	 0.20 to 0.45 mm 0.0079 to 0.017 in. 0.15 to 0.40 mm 0.0059 to 0.015 in.	 0.8 mm 0.03 in. 0.8 mm 0.03 in.
Synchronizer Ring to Gear (In Contact)	Side Clearance	–	0.35 mm 0.014 in.
Spiral Bevel Gear	Turning Torque	4.0 to 6.3 N·m 0.40 to 0.65 kgf·m 2.9 to 4.7 lbf·ft	–
Spiral Bevel Gear to Spiral Bevel Pinion Shaft	Backlash	0.15 to 0.30 mm 0.0059 to 0.012 in.	0.4 mm 0.02 in.
Differential Case Bore (Differential Case Cover Bore) to Differential Side Gear Boss	Clearance	0.050 to 0.151 mm 0.0020 to 0.00594 in.	0.35 mm 0.014 in.
• Differential Case Bore and Cover Bore	I.D.	40.500 to 40.550 mm 1.5945 to 1.5964 in.	–
• Differential Side Gear Boss	O.D.	40.388 to 40.450 mm 1.5901 to 1.5925 in.	–
Differential Pinion Shaft to Differential Pinion	Clearance	0.060 to 0.102 mm 0.0024 to 0.00401 in.	0.25 mm 0.0098 in.
• Differential Pinion Shaft	O.D.	19.959 to 19.980 mm 0.78579 to 0.78661 in.	–
• Differential Pinion Shaft	I.D.	20.040 to 20.061 mm 0.78898 to 0.78980 in.	–
Differential Pinion to Differential Side Gear	Backlash	0.15 to 0.30 mm 0.0059 to 0.011 in.	0.4 mm 0.02 in.

GST

Item		Factory Specification	Allowable Limit
GST System Pressure **Condition** • Engine Speed Idling • Oil Temperature 40 to 60 °C (104 to 140 °F)	Setting Pressure	2.30 to 2.50 MPa 23.5 to 25.4 kgf/cm^2 334 to 362 psi	–
Regulating Pressure **Condition** • Engine Speed Maximum • Oil Temperature 40 to 60 °C (104 to 140 °F)	Setting Pressure	2.40 to 2.55 MPa 24.5 to 26.0 kgf/cm^2 348 to 369 psi	–
GST Pilot Pressure **Condition** • Engine Speed Maximum • Oil Temperature 40 to 60 °C (104 to 140 °F) • GST Lever 1st • Shuttle Lever Forward or Reverse	Operating Pressure	2.30 to 2.50 MPa 23.5 to 25.5 kgf/cm^2 334 to 363 psi	–
GST System Pressure **Condition** • Engine Speed Idling • Oil Temperature 40 to 60 °C (104 to 140 °F) • GST Lever Neutral to 12th or 8th • Shuttle Lever Neutral to Forward and Reverse	Operating Pressure	2.30 to 2.50 MPa 23.5 to 25.5 kgf/cm^2 334 to 363 psi	–
GST Clutch Disc	Thickness	2.55 to 2.65 mm 0.101 to 0.104 in	2.50 mm 0.0984 in.
GST Steel Plate	Thickness	1.55 to 1.65 mm 0.0611 to 0.0649 in.	1.50 mm 0.0591 in.
GST Piston	Flatness	–	0.15 mm 0.0059 in.
GST Steel Plate	Flatness	–	0.30 mm 0.012 in.
GST Clutch Piston Return Spring	Free Length	19.9 to 20.1 mm 0.784 to 0.791 in.	18.0 mm 0.709 in.
GST Clutch Seal Ring	Thickness	2.45 to 2.50 mm 0.0965 to 0.0984 in.	2.0 mm 0.079 in.

HST

Item		Factory Specification	Allowable Limit
Check and High Pressure Relief Valve **Condition** • Engine Speed Rated Speed • Oil Temperature 40 to 60 °C (104 to 140 °F) • Range Gear Shift Lever H Position • HST Pedal Depress Forward or Reverse with Brake	Setting Pressure	33.3 to 36.3 MPa 340 to 370 kgf/cm^2 4830 to 5260 psi	–
Charge Relief Valve **Condition** • Engine Speed Rated Speed • Oil Temperature 40 to 60 °C (104 to 140 °F) • HST Pedal Neutral	Setting Pressure	2.50 to 2.85 MPa 25.5 to 29.0 kgf/cm^2 363 to 413 psi	–

PTO CLUTCH

Item		Factory Specification	Allowable Limit
PTO Clutch Valve **Condition** • Engine Speed Maximum • Oil Temperature 40 to 60 °C (104 to 140 °F)	Operating Pressure (Manual transmission and GST Model)	2.30 to 2.50 MPa 23.5 to 25.4 kgf/cm^2 334 to 362 psi	–
	Operating Pressure (HST Model)	2.50 to 2.85 MPa 25.5 to 29.0 kgf/cm^2 363 to 413 psi	–
PTO Clutch Disc	Thickness	1.70 to 1.90 mm 0.0670 to 0.0748 in.	1.55 mm 0.0610 in.
PTO Clutch Plate	Thickness	1.15 to 1.25 mm 0.045 to 0.049 in.	1.10 mm 0.043 in.
PTO Piston	Flatness	–	0.15 mm 0.0059 in.
PTO Return Spring	Free Length	42.5 to 43.5 mm 1.68 to 1.71 in.	38.25 mm 1.506 in.
Seal Ring	Thickness	2.45 to 2.50 mm 0.0965 to 0.0984 in.	2.0 mm 0.079 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

ROPS TYPE

Item	N·m	kgf·m	lbf·ft
ROPS plate mounting screw (M14 × 40)	138 to 147	14.0 to 15.0	102 to 108
ROPS plate mounting screw (M14 × 30)	167 to 196	17.0 to 20.0	123 to 145
Lift arm pin lock mounting nut	78 to 90	7.9 to 9.2	58 to 66
Lift arm pin lock nut	63 to 72	6.4 to 7.4	47 to 53
ROPS fulcrum bolt and nut	118 to 137	12.0 to 14.0	86.8 to 102
Step mounting bolt and nut	124 to 147	12.6 to 15.0	91.1 to 108
Floor seat mounting bolt and nut	196 to 225	20.0 to 23.0	145 to 166
ROPS lower frame mounting screw	167 to 196	17.0 to 20.0	123 to 144

CABIN TYPE

Item	N·m	kgf·m	lbf·ft
Outer roof mounting screw	3.5 to 4.0	0.36 to 0.40	2.6 to 2.9
Cabin mounting bolt and nut	124 to 147	12.6 to 15.0	91.2 to 108

ALL MODEL

Item	N·m	kgf·m	lbf·ft
Joint bolt for main delivery pipe	118 to 137	12.0 to 14.0	86.8 to 101
Front loader pipe retaining nut	90.0 to 108	9.18 to 11.0	66.4 to 79.6
Joint bolt for PTO delivery pipe	35 to 39	3.5 to 4.0	26 to 28
Engine and clutch housing mounting screw	78 to 90	7.9 to 9.2	58 to 66
Engine and clutch housing mounting nut	103 to 117	10.5 to 12.0	76.0 to 86.7
Clutch housing and mid case mounting nut	103 to 117	10.5 to 12.0	76.0 to 86.7
Clutch housing and mid case mounting screw	78 to 90	7.9 to 9.2	58 to 66
Clutch housing bearing holder mounting screw	48 to 55	4.9 to 5.7	36 to 41
Stopper screw	35 to 44	3.5 to 4.5	26 to 32
Mid case and transmission case mounting screw	78 to 90	7.9 to 9.2	58 to 66
Mid case and transmission case mounting nut	103 to 117	10.5 to 12.0	76.0 to 86.7
PTO clutch valve mounting screw	23.5 to 27.4	2.40 to 2.74	17.4 to 20.2
Mid case bearing holder mounting screw	48 to 55	4.9 to 5.7	36 to 41
Rear wheel mounting screw and nut	220	22	160
Brake case mounting screw and nut	78 to 90	7.9 to 9.2	58 to 66
Lift arm pin mounting nut	78 to 90	7.9 to 9.2	58 to 66
Lift arm pin lock nut	63 to 72	6.4 to 7.4	47 to 53
Drawbar frame mounting screw (M12)	78 to 90	7.9 to 9.2	58 to 66
Drawbar frame mounting screw (M14)	167 to 196	17.0 to 20.0	123 to 144
Hydraulic cylinder hose retaining nut	35 to 48	3.5 to 4.9	26 to 35
Rear axle mounting screw and nut (M10 screw)	48 to 55	4.9 to 5.7	36 to 41
Rear axle mounting screw and nut (M10 nut (9T))	61 to 70	6.2 to 7.2	45 to 52
Rear axle mounting screw and nut (M12 screw)	78 to 90	7.9 to 9.2	58 to 66
Brake case mounting screw and nut	78 to 90	7.9 to 9.2	58 to 66
Lock nut (Spiral bevel pinion shaft)	150 to 190	15 to 20	110 to 140
Pinion bearing case mounting screw	40 to 44	4.0 to 4.5	29 to 32
Transmission bearing holder mounting screw	48 to 55	4.9 to 5.7	36 to 41
Lock nut (PTO shaft)	150 to 190	15 to 20	110 to 140
Bearing case mounting screw (PTO shaft)	24 to 27	2.4 to 2.8	18 to 20
Differential support mounting screw	48 to 55	4.9 to 5.7	36 to 41
Differential case cover mounting screw	48 to 55	4.9 to 5.7	36 to 41
Spiral bevel gear UBS screw	69 to 88	7.0 to 9.0	51 to 65

MANUAL TRANSMISSION

Item	N·m	kgf·m	lbf·ft
Release fork mounting screw	24 to 27	2.4 to 2.8	18 to 20
Main shift base mounting screw	24 to 27	2.4 to 2.8	18 to 20
Main shift arm mounting screw	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Fulcrum screw	40 to 44	4.0 to 4.5	29 to 32

GLIDE SHIFT TRANSMISSION

Item	N·m	kgf·m	lbf·ft
Release fork mounting screw	24 to 27	2.4 to 2.8	18 to 20
Shift pin mounting screw	13 to 14	1.3 to 1.5	9.4 to 10
GST valve mounting screw	43 to 48	4.3 to 4.9	32 to 35
Fulcrum screw	40 to 44	4.0 to 4.5	29 to 32
Shift pin mounting screw	13 to 14	1.3 to 1.5	9.4 to 10
GST valve mounting screw	43 to 48	4.3 to 4.9	32 to 35
Joint bolt for power steering delivery pipe and regulating valve	40 to 49	4.0 to 5.0	29 to 36
Joint bolt for delivery pipe and hydraulic pump	40 to 49	4.0 to 5.0	29 to 36
Regulating valve mounting screw	18 to 20	1.8 to 2.1	13 to 15
Plate (Regulating valve)	9.8	1.0	7.2
Regulating valve case and support mounting screw	9.8	1.0	7.2
Joint bolt for GST delivery pipe to GST valve	35 to 39	3.5 to 4.0	26 to 28
Lower body mounting hex. socket head cap screw	9.8 to 10	1.0 to 1.1	7.3 to 7.9

HYDROSTATIC TRANSMISSION

Item	N·m	kgf·m	lbf·ft
Joint bolt for PTO delivery pipe	35 to 39	3.5 to 4.0	26 to 28
Joint bolt for HST return pipe	88 to 98	9.0 to 9.9	65 to 72
Joint bolt for main delivery pipe	40 to 49	4.0 to 4.9	29 to 36
Joint bolt for oil cooler	88 to 98	9.0 to 9.9	65 to 72
Hi-Lo valve assembly mounting hex. socket head screw	24 to 28	2.5 to 2.8	18 to 20
Regulating valve assembly mounting hex. socket head screw	48 to 56	4.9 to 5.7	36 to 41
Port block mounting hex. socket head screw	103 to 118	10.5 to 12.5	76.0 to 87.0
Port block mounting hex. socket head screw	31 to 36	3.2 to 3.6	23 to 26
Piston H	59 to 78	6.1 to 7.9	44 to 57
Shaft case mounting bolt	24 to 28	2.5 to 2.8	18 to 20
Cradle bearing bracket mounting hex. socket head screw	61 to 71	6.3 to 7.2	45 to 52
Servo piston and cover mounting hex. screw	24 to 28	2.5 to 2.8	18 to 20
Regulating valve assembly	29 to 34	3.0 to 3.4	22 to 25
Hex. socket head plug of charge relief valve	49 to 59	5.0 to 6.0	37 to 43
Hex. socket head plug of check and high pressure relief valve	59 to 78	6.1 to 7.9	44 to 57
Joint bolt for delivery pipe	40 to 49	4.0 to 4.9	29 to 36
Fulcrum screw	63 to 72	6.4 to 7.4	47 to 53
Differential support mounting screw	49 to 59	5.0 to 6.0	37 to 43

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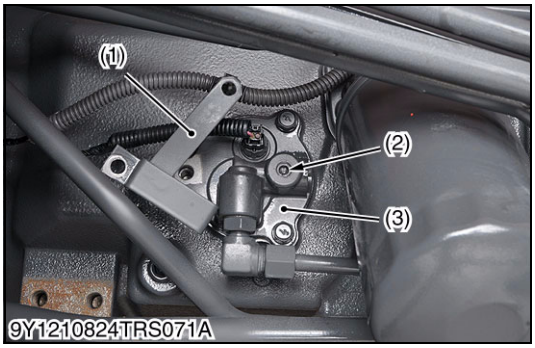
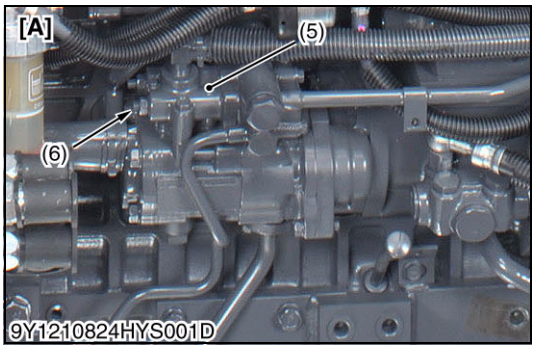
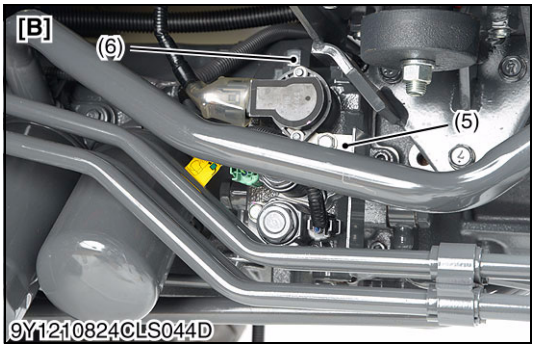
4. CHECKING AND ADJUSTING

[1] PTO CLUTCH







PTO Clutch Operating Pressure

■ **IMPORTANT**
- **Do not connect the universal joint of the implement to the tractor PTO shaft while testing.**
- **Set the main shift lever, shuttle lever and HST pedal in Neutral position.**
- **Set the parking brake lever in parking position.**

1. Remove the valve cover (1).
2. Remove the plug (PT 1/8) (2) on the PTO solenoid valve (3).
3. Set the pressure gauge.
4. Start the engine and set the engine speed to maximum.
5. Turn on the PTO switch (4) and measure the oil pressure.
6. If only the pressure in PTO clutch engaged position is low, check the hydraulic PTO clutch system.
7. If the measurement is not within the factory specifications, measure the system pressure, and adjust the system pressure with regulator valve (5) if necessary.

PTO operating pressure	When PTO shift lever is **"ENGAGED"** position	Manual transmission and GST	2.30 to 2.50 MPa 23.5 to 25.4 kgf/cm^2 334 to 362 psi
		HST	2.50 to 2.85 MPa 25.5 to 29.0 kgf/cm^2 363 to 413 psi
	When PTO shift lever is **"DISENGAGED"** position		No pressure

Condition
- Engine speed
  Maximum
- Oil temperature
  40 to 60 °C (104 to 140 °F)

(Reference)
- Turn to clockwise direction → Pressure is increased
- Turn to counterclockwise direction → Pressure is decreased

(1) Valve Cover
(2) Plug (PT 1/8)
(3) PTO Solenoid Valve
(4) PTO Switch
(5) Regulating Valve Assembly
(6) Pressure Reducing Valve Adjustor

[A] Manual Transmission and GST
[B] HST

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[2] GLIDE SHIFT TRANSMISSION (GST)

(1) Electrical Adjusting [GST Fine-adjustment with Electronic Instrument Panel (Intellipanel)]

■ **NOTE**

- **The fine-adjustment function is a function to update the data of the memory device in the main ECU when a sensor, a valve, and an electronic instrument panel which relates to the GST system are repaired or are re-installed. There are three kinds of fine-adjustment functions in the GST system.**

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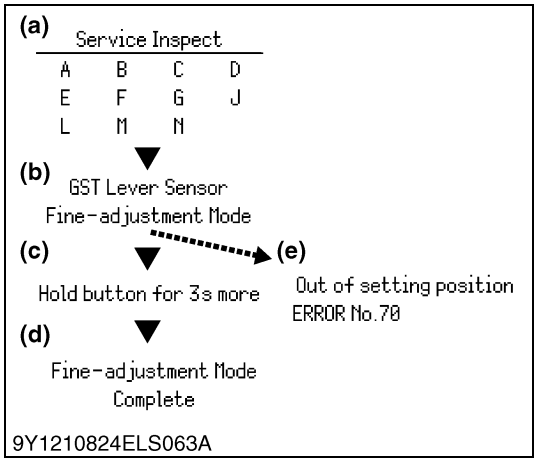

GST Lever Sensor Fine-adjustment (Setting the GST lever's neutral position with its sensor)

■ **IMPORTANT**

- **As for the fine-adjustment, make sure to set it correctly to have the standard control thereafter.**

■ **NOTE**

- **When the GST lever sensor, the main ECU or the electronic instrument panel is replaced, this adjustment is required.**

1. Set the GST shift lever to **Neutral** position.
2. While holding down the display mode switch (2), turn on the main switch.
3. Mode selection display **(a)** is indicated on the LCD (1).
4. Press the display mode switch (2). The buzzer rings and the marked display moves.
5. Select the Mode **"E"**.
6. Hold down the display mode switch (2) for more than 2 seconds.
7. When **"GST Lever Sensor Fine-adjustment Mode"** is displayed **(b)**, release the display mode switch (2).
8. **"Hold button for 3s more"** is displayed **(c)**.
9. Hold down the display mode switch (2) for more than 3 seconds to preserves the adjustment value to the main ECU.
   "Fine-adjustment Mode Complete" is displayed **(d)**.
10. Fine-adjustment preserves to main ECU has been input correctly.
    Turn off the main switch.
11. If **"Out of setting position Error No. 70"** shows up **(e)**, the GST lever sensor voltage is out of specifications.
    - Make sure that GST lever is in the **Neutral** position.
    - Check the GST lever sensor voltage in the Test Mode (Mode **A**). If out of specifications, replace the sensor.
12. If **"Not Complete"** is displayed : Incorrect input. Repeat the procedure.
13. Turn off the main switch.

(1) LCD (Liquid Crystal Display)
(2) Display Mode Switch

(a) Mode Selection Display
(b) Information Display
(c) Adjusting Display
(d) Correct Preserving Display
(e) Error Display

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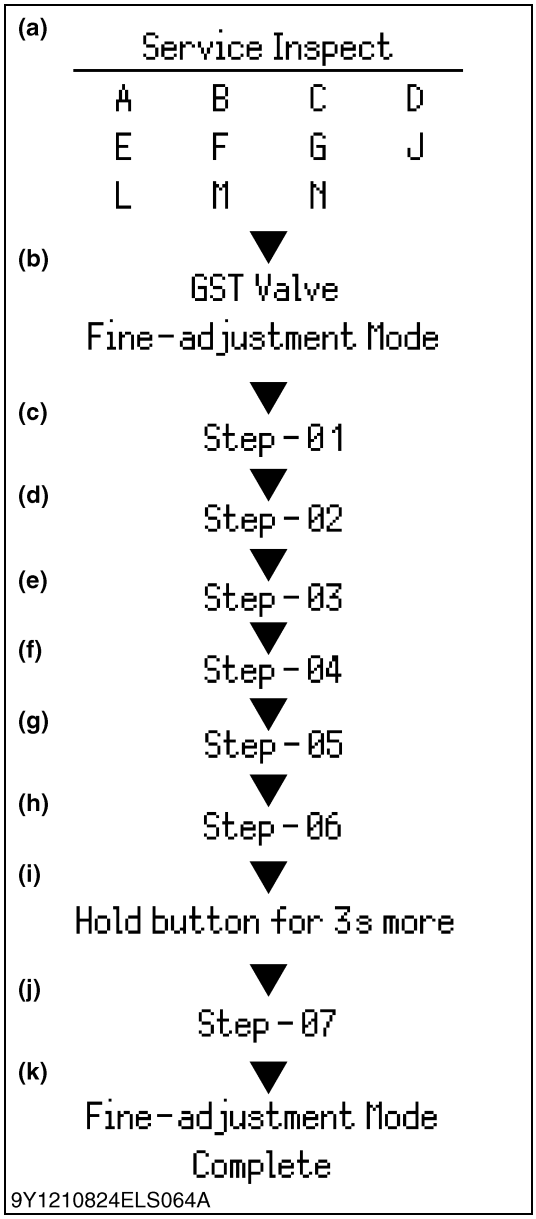

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GST Valve Fine-adjustment (Setting the function of proportional reducing valve)

CAUTION
- **Use extra caution when setting the Mode "F", because the tractor will move and stop automatically.**

■ **NOTE**
- **When the main ECU or GST valve is replaced, this adjustment is required.**

1. Park the machine on firm and level ground.
2. Set the parking brake.
3. While holding down the display mode switch, start the engine.
4. Mode selection display **(a)** is indicated on the LCD. Press the display mode switch. The buzzer rings and the marked display moves.
5. Select the Mode **"F"**.
6. Hold down the display mode switch for more than 2 seconds.
7. When **"GST Valve Fine-adjustment Mode"** is displayed **(b)**, release the display mode switch.

■ **NOTE**
- **To make this adjustment, follow these steps in the exact order described. (Otherwise the switch does not work to go next step can be moved without their settings.)**

8. **"Step-01"** is displayed **(c)**.
   - Release the parking brake.
9. **"Step-02"** is displayed **(d)**.
   - Set the engine speed from 1000 to 1400 min^{-1} (rpm).
10. **"Step-03"** is displayed **(e)**.
    - Set the front tire straight ahead.
    - Press the display mode switch.
11. **"Step-04"** is displayed **(f)**.
    - Disengaged the clutch and shift the GST lever to the desired position (From 1 through 12) several times.
    - Press the display mode switch.
12. **"Step-05"** is displayed **(g)**.
    - Shift the GST lever to **"Neutral"** position and engage the clutch.
    - Press the display mode switch.
13. **"Step-06"** is displayed **(h)**.
    - Set the shuttle lever to **"Forward"** position
    - Press the display mode switch.
14. **"Hold button for 3s more"** is displayed **(i)**.
    - Hold down the display mode switch for more than 3 seconds.
15. **"Step-07"** is displayed **(j)**.
    - After a short delay, the tractor will begin to move slowly and stops automatically.
    - Fine-adjustment is being done.
16. **"Fine-adjustment Mode Complete"** is displayed **(k)**.
    - The setting has been preserved correctly to the main ECU.
17. Turn off the main switch.
18. If **"Not Complete"** is displayed.
    The setting has not been correctly saved in the ECU.
    Repeat the entire procedure.

(a) Mode Selection Display
(b) Information Display
(c) Setting Display-1
(d) Setting Display-2
(e) Setting Display-3
(f) Setting Display-4
(g) Setting Display-5
(h) Setting Display-6
(i) Adjusting Display
(k) Correct Preserving Display

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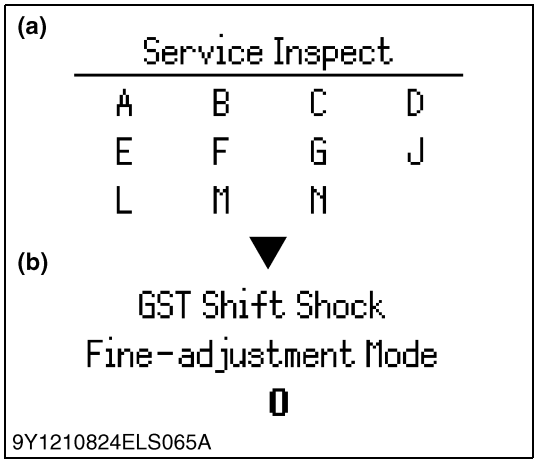

GST Shift Shock Fine-adjustment Mode (Adjusting the clutch engaging interval)

■ **NOTE**
- **Perform Mode G for adjusting the GST shifting shock.**

1. While holding down the display mode switch, start the engine.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch and the buzzer rings and marked display moves.
4. Select the Mode **"G"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **"GST Shift Shock Fine-adjustment Mode 0"** is displayed **(b)**. The number **"–9"** through **"+9"** can be displayed. This has been factory-adjustment to **"0"**.
7. Each time pressing the display mode switch, the number on the display changes.
8. Setting
   - Select the GST shifting shock feeling number.
   - For higher shifting shock; Press the display mode switch to increase the number.
   - For lighter shifting shock; Press the display mode switch to reduce the number.
9. Move the tractor to check the shifting shock feeling.
10. Turn off the main switch.

(a) Mode Selection Display **(b) Setting Display**

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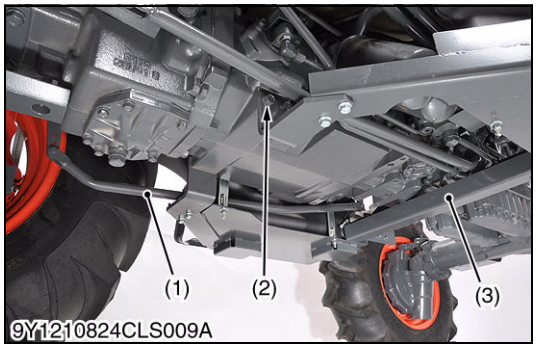
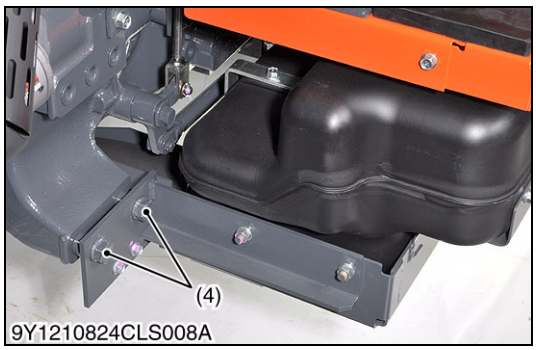
(2) Hydraulic Checking





Fuel Tanks

1. Remove the left step.
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (1).
4. Place the disassembling stands under the left fuel tank L.H. (5).
5. Remove the front (4) and rear support mounting screws (2) of the left fuel tank L.H. (5).
6. Lower the fuel tank L.H. (5) together with the disassembling stands.
7. Reattach the brake rod L.H. (1).

(1) Brake Rod L.H.
(2) Rear Support Mounting Screw
(3) Fuel Hose Cover
(4) Front Support Mounting Screw
(5) Fuel Tank L.H.

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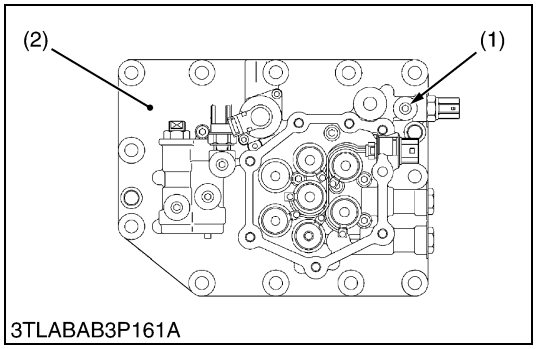

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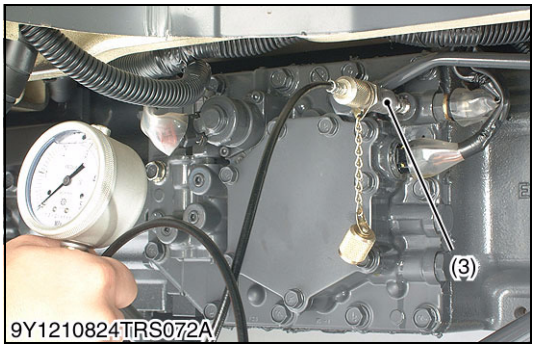

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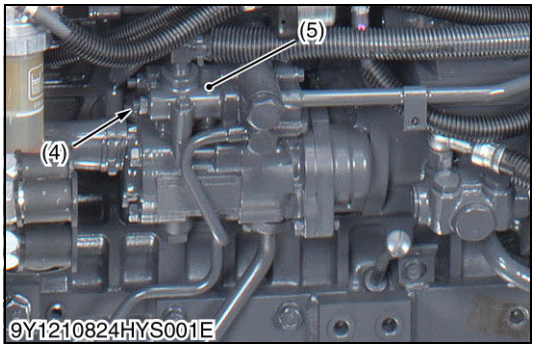

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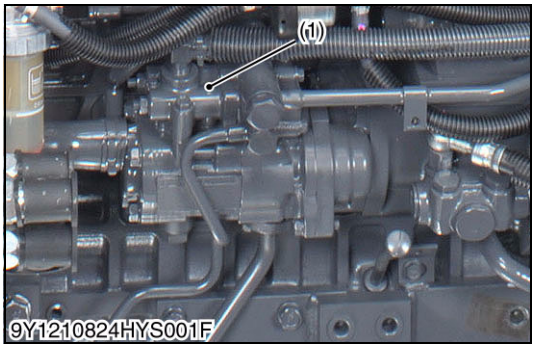

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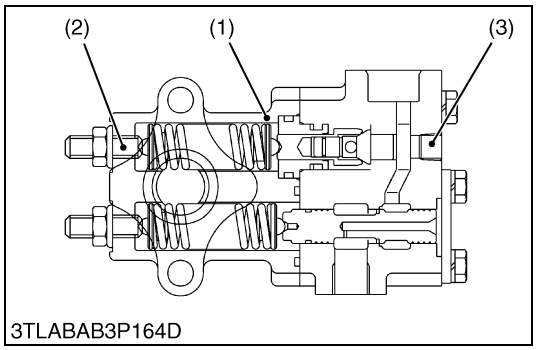

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Checking GST System Pressure

1. Start the engine and warm up the transmission fluid, and then stop the engine.
2. Remove the GST system pressure checking port (1) plug (PT 1/8) on the GST valve (2).
3. Install the GST valve adaptor (see page G-64) to checking port (1), and then install the threaded joint, cable and pressure gauge.
4. Start the engine and set the idling speed. Set the shift levers to **"Neutral"**.
5. Measure the pressure.
6. If the measurement is not within factory specifications, adjust the pressure reducing valve adjustor (4) on the regulating valve assembly (5).

GST system pressure	Factory specification	2.30 to 2.50 MPa 23.5 to 25.4 kgf/cm^2 334 to 362 psi

Condition

- Engine speed
  Idling speed
- Oil temperature
  40 to 60 °C (104 to 140 °F)

(Reference)

- Turn to clockwise direction → Pressure is increased
- Turn to counterclockwise direction → Pressure is decreased

(1) GST System Pressure Checking Port (PT 1/8)
(2) GST Valve
(3) GST Valve Adaptor
(4) Pressure Reducing Valve Adjustor
(5) Regulating Valve Assembly

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Checking Regulating Valve Setting Pressure

1. Start the engine and warm up the transmission fluid, and then stop the engine.
2. Remove the pressure checking port (3) plug (PT 1/8).
3. Install the adaptor **"7"** to checking port (3) and then install the adaptor **"D"**, the threaded joint, cable and pressure gauge.
4. Start the engine and set the maximum engine speed. Set the shift levers to **"Neutral"**.
5. Measure the pressure. (Do not turn the steering wheel.)
6. If the measurement is not within factory specifications, adjust the regulating valve adjustor (2) on the regulating valve assembly (1).

Regulating valve setting pressure	Factory specification	2.40 to 2.55 MPa 24.5 to 26.0 kgf/cm^2 348 to 369 psi

Condition

- Engine speed
  Maximum
- Oil temperature
  40 to 60 °C (104 to 140 °F)

(Reference)

- Turn to clockwise direction → Pressure is increased
- Turn to counterclockwise direction → Pressure is decreased

(1) Regulating Valve Assembly
(2) Regulating Valve Adjustor
(3) Checking Port (PT 1/8)

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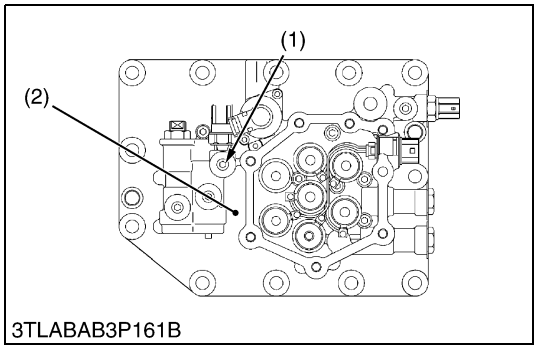

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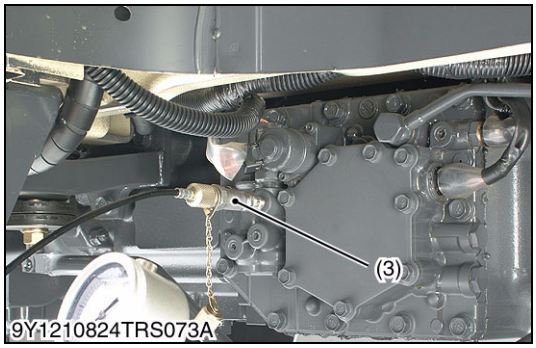

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Checking Pilot Pressure

1. Start the engine and warm up the transmission fluid, and then stop the engine.
2. Remove the pilot pressure checking port plug (PT 1/8) on the GST valve (2).
3. Install the adaptor **"D"** or GST valve adaptor (3) to the checking port (1), and then install the threaded joint, cable and pressure gauge.
4. Start the engine and set the maximum speed.
5. Disengage the main clutch and shift the GST lever to **"1st"** position, shuttle shift lever to **"Forward"** or **"Reverse"** position.
6. Measure the pressure.
7. When the pilot pressure is not within factory specifications: Check the pilot orifice is clogged, movement of the shift forks, shift pistons and shift check valves.

■ **IMPORTANT**

- **Do not engage the main clutch while checking.**

Pilot pressure	Factory specification	2.30 to 2.50 MPa 23.5 to 25.5 kgf/cm^2 334 to 363 psi

Condition

- Engine speed
  Maximum
- Oil temperature
  40 to 60 °C (104 to 140 °F)
- Shifting
  GST lever to be **"1st"**
  Shuttle shift lever to be **"Forward"** or **"Reverse"**

(1) Pilot Pressure Checking Port (PT 1/8)
(2) GST Valve
(3) Adaptor

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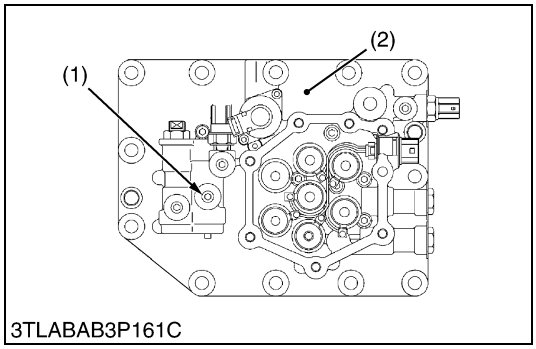

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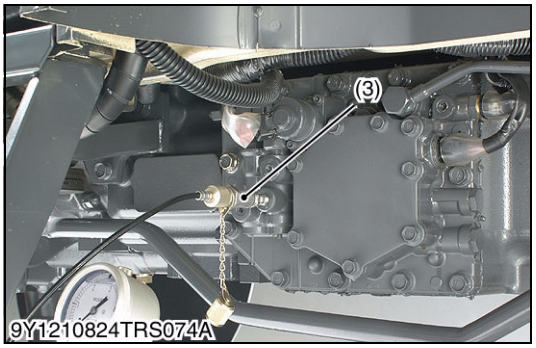

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Checking Clutch Pack Pressure

1. Start the engine and warm up the transmission fluid, and then stop the engine.
2. Remove the clutch pack pressure checking port plug (PT 1/8) on the GST valve (2).
3. Install the adaptor **"D"** or GST valve adaptor to the checking port (1), and then install the threaded joint, cable and pressure gauge.
4. Start the engine and set the idling speed.
5. Disengage the main clutch and shift the GST lever to **"1st"** position, shuttle shift lever to **"Forward"** position.
6. Measure the pressure.
7. When the clutch pack pressure is not within factory specifications:
   Check the clutch valve and clutch pack.
8. Check the pressure changes while shifting the shuttle shift lever **"Reverse"** to **"Forward"** and shifting the GST lever from **"Neutral"** to **"12th"** or **"8th"**.
9. If the pressure does not change correctly, check the low-pass valve and proportional reducing valve.

■ **IMPORTANT**

- **Do not engage the main clutch while checking.**

Clutch pack pressure	Factory specification	2.30 to 2.50 MPa 23.5 to 25.5 kgf/cm^2 334 to 363 psi
Pressure changing while shifting the shuttle shift lever and main shift lever		It drops on 0.29 MPa (3 kgf/cm^2, 43 psi) once, and it rises to factory specification quickly.

Condition

- Engine speed
  Maximum
- Oil temperature
  40 to 60 °C (104 to 140 °F)
- Shifting
  GST lever **"Neutral"** to **"1st"** to **"12th"** or **"8th"**
  Shuttle shift lever **"Neutral"** to **"Forward"** or **"Reverse"**

(1) Clutch Pack Pressure Checking Port (PT 1/8)
(2) GST Valve
(3) Adaptor

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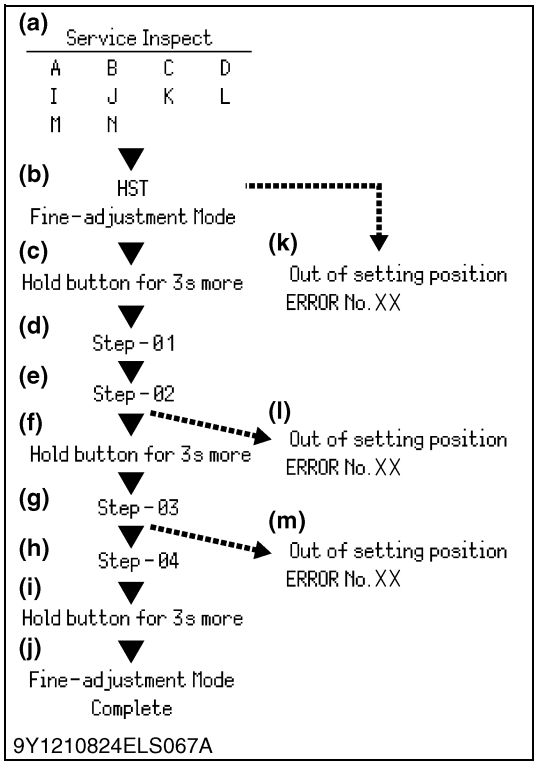
[3] HYDROSTATIC TRANSMISSION (HST)

(1) Electrical Adjusting [Adjustment with Electronic Instrument Panel (Intellipanel)]



Adjustment of HST Sensor (HST Pedal and Range Shift Lever Fine-adjustment Mode)

■ **NOTE**

- **When one of the followings is replaced, this adjustment is required. (Main ECU, HST pedal sensor, swashplate position sensor, range gear shift sensor, HST proportional valve (Forward and Reverse)).**

(Tractor Condition)

- Hand Throttle Lever : Idling position
- Parking Brake : Engaged position
- HST Pedal : Neutral Position
- Range Gear Shift Lever : Neutral Position (between **L** and **M**)
- Auto Throttle Advance function : **"OFF"**

1. While holding down the display mode switch (2), turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD (1).
3. Depress the HST pedal **"Fully in forward"** position, then **"Fully in reverse"** position.
4. Start the engine at idling speed.
5. Press the display mode switch (2) and the buzzer rings and marked display moves.
6. Select the Mode **"K"**.
7. Hold down the display mode switch (2) for more than 2 seconds.
8. When **"HST Fine-adjustment Mode"** is displayed **(b)**, release the display mode switch (2).

■ **NOTE**

- **When the engine is not setting at the idling position or the parking brake is not engaged. "HST Fine-adjustment Mode" display (b) does not change.**
- **When "Out of Setting Position ERROR No. ** (71, 72 or 73)" is displayed (k), refer to the below chart.**

9. **"Hold button for 3s more"** is displayed **(c)**.
   Hold down the display mode switch (2) for more than 3 seconds.
10. **"Step-01"** is displayed **(d)**.
    Keep the HST pedal at the **"Full forward"** position.
11. Wait until **"Step-02"** is displayed **(e)**. Then proceed to the next step.

(1) LCD (Liquid Crystal Display)
(2) Display Mode Switch
(3) Auto Throttle Advance Switch

(a) Mode Selection Display
(b) Information Display
(c) Setting Display-1
(d) Adjusting Display-1
(e) Setting Display-2
(f) Adjusting Display-2
(g) Setting Display-3
(h) Setting Display-4
(i) Adjusting Display-3
(j) Correct Preserving Display
(k) Error Display-1
(l) Error Display-2
(m) Error Display-3

(To be continued)

(Continued)

■ **NOTE**
- **When "Out of Setting Position ERROR No. ** (72 or 73)" is displayed (l), refer to the below chart.**

12. **"Hold button for 3s more"** is displayed **(f)** : Hold down the display mode switch (2) for more than 3 seconds.
13. **"Step-03"** is displayed **(g)** : Follow the procedure as follow. Keep the HST pedal at the **"Full reverse"** position.
14. Wait until **"Step-04"** is displayed. Then proceed to the next step.

■ **NOTE**
- **When "Out of Setting Position ERROR No.** (72 or 73)" is displayed, refers to the below**

15. **"Hold button for 3s more"** is displayed **(i)** : Hold down the display mode switch (2) for more than 3 seconds.
16. **"Complete"** is displayed **(j)** : The setting has been preserved correctly to the main ECU.
17. If **"Not Complete"** is displayed, repeat the procedure.
18. Turn off the main switch.

■ **IMPORTANT**
- **After setting the mode "N", reset the mode "K" and "L".The tractor does not move normally without resetting mode "K" and "L". (HST only)**

Error Display	Fine-adjustment
ERROR No.71	Range Gear Shift Lever Sensor
ERROR No.72	HST Pedal Sensor
ERROR No.73	Swashplate Position Sensor
ERROR No.75	Throttle Sensor

(a) Mode Selection Display
(b) Information Display
(c) Setting Display-1
(d) Adjusting Display-1
(e) Setting Display-2
(f) Adjusting Display-2
(g) Setting Display-3
(h) Setting Display-4
(i) Adjusting Display-3
(j) Correct Preserving Display
(k) Error Display-1
(l) Error Display-2
(m) Error Display-3

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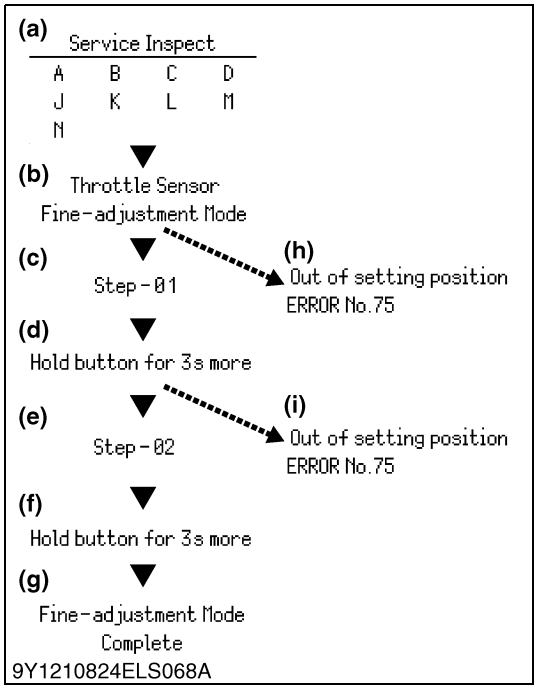

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Adjustment of Throttle Sensor

■ **NOTE**
- **When the main ECU or throttle sensor is replaced, this adjustment is required.**

(Tractor condition)
- Parking Brake: Engaged position
- HST Pedal : Neutral position
- Range Gear Shift Lever : Neutral position
- Hand Throttle Lever : Idling position

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Depress the HST pedal **"Fully in forward"** position, then **"Fully in reverse"** position.
4. Start the engine at idling speed.
5. Press the display mode switch and the buzzer rings and marked display moves.
6. Select the Mode **"L"**.
7. Hold down the display mode switch for more than 2 seconds.
8. **"Throttle Sensor Fine-adjustment Mode"** is displayed **(b)**. Release the display mode switch.

■ **NOTE**
- **"Step-01" is displayed (c) : The engine revolution is not idling revolution.**
  If "Out of Setting Position ERROR No.75" is displayed (h), the hand throttle lever is not at the correct idling position.

9. **"Hold button for 3s more"** is displayed **(d)**.
   Hold down the display mode switch for more than 3 seconds.
10. When **"Step-02"** is displayed **(e)**, release the display mode switch.
11. Set the accelerator lever to **"Maximum speed"** position.

■ **NOTE**
- **If the engine revolution is not maximum revolution, Step-02 does not changed**
  If "Out of Setting Position ERROR No.75" is displayed (i), the hand throttle lever is not at the correct maximum speed position.

12. **"Hold button for 3s more"** is displayed **(f)**.
    Hold down the display mode switch for more than 3 seconds.
    "Fine-adjustment Mode Complete" is displayed **(g)**.
13. If **"Not Complete"** is displayed, repeat the procedure.
14. Turn off the main switch.

(a) Mode Selection Display
(b) Information Display
(c) Error Display-1
(d) Setting Display-1
(e) Adjusting Display-1
(f) Setting Display-2
(g) Correct Preserving Display
(h) Error Display-2
(i) Error Display-3

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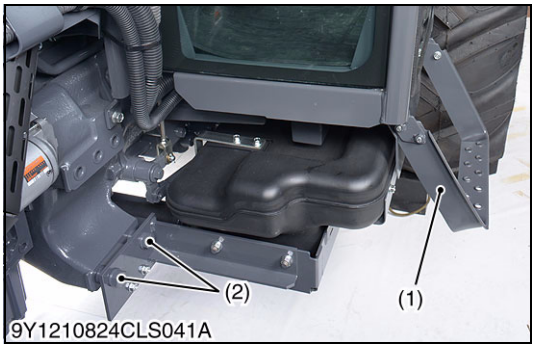
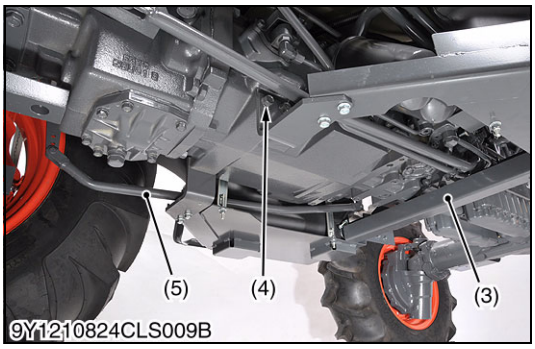
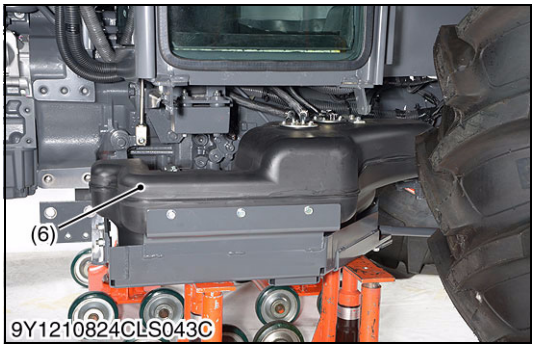
(2) Hydraulic Checking and Adjusting







Fuel Tank

1. Remove the left step (1).
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (5).
4. Place the disassembling stands under the left fuel tank L.H. (6).
5. Remove the front (2) and rear support mounting screws (4) of the left fuel tank L.H. (6).
6. Lower the fuel tank L.H. (6) together with the disassembling stands.
7. Reattach the brake rod L.H. (5).

(1) Step
(2) Front Support Mounting Screw
(3) Fuel Hose Cover
(4) Rear Support Mounting Screw
(5) Brake Rod L.H.
(6) Fuel Tank L.H.

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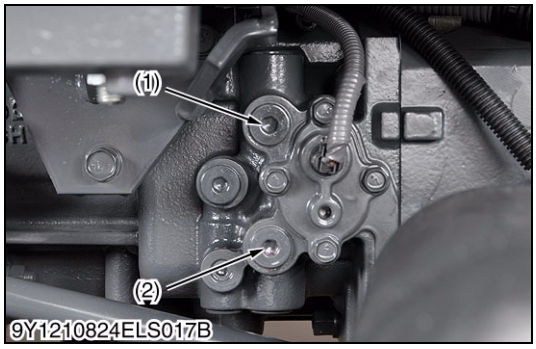

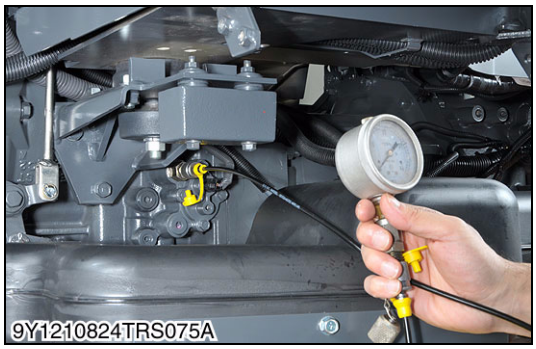

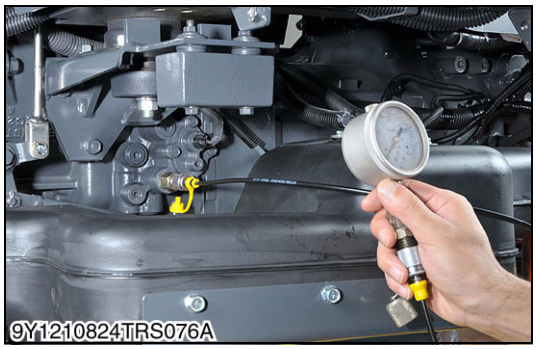

Checking High Pressure Relief Valve Pressure

CAUTION

- **When checking, park the machine on flat ground, apply the parking brake.**

1. Remove the hex. socket head plug from **P1** or **P2** port. (**P1** is for forward and **P2** is for reverse.)
2. Assemble adaptor **C** (07916-50371) and threaded joint (07916-50341) with the gasket between them.
3. Install the assemble adaptor **C** and threaded joint to **P1** (forward) or **P2** (reverse) port.
4. Install the cable, threaded joint in relief valve set pressure tester and high pressure gauge to threaded joint in order.
5. Check to see that parking brake is applied.
6. Run the engine at rated speed.
7. Place the range gear shift lever in **H** position.
8. Depress the HST pedal, and measure the check and high pressure relief valve pressure.
9. If the measurement is not within the factory specification, check the check and high relief valve assembly.

Check and high relief pressure (Oil temperature at 40 to 60 °C (104 to 140 °F))	Factory specification	33.3 to 36.3 MPa 340 to 370 kgf/cm^2 4830 to 5260 psi

IMPORTANT

- **Measure quickly so that the relief valve may not be in operation more than 10 seconds.**

NOTE

- **High pressure gauge is 40 MPa (400 kgf/cm^2, 5800 psi) full scale.**

(When reassembling)

- Install the hex. socket head plug to the port with O-ring.

(1) **P1** Port (for Forward) (2) **P2** Port (for Reverse)

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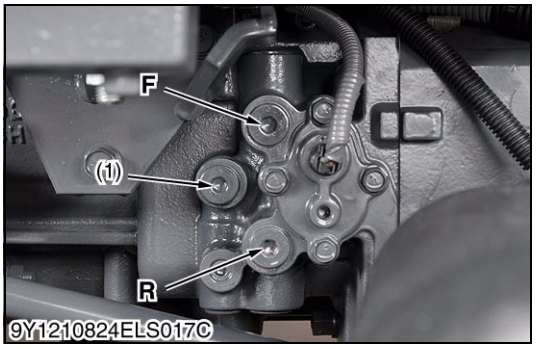

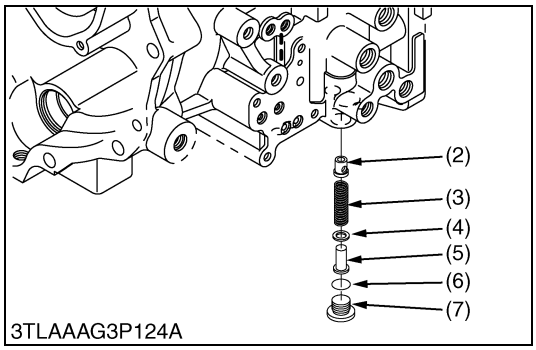

Checking Charge Relief Pressure

CAUTION

- **When checking, park the machine on flat ground, apply the parking brake.**

NOTE

- **Use a new transmission oil filter.**

1. Remove the hex. socket head plug from charge pressure check port (1).
2. Assemble adaptor **C** (07916-50371) and thread joint (07916-50341) with the gasket between them.
3. Install the assembled adaptor **C** and thread joint to charge pressure check port (1).
4. Install the cable, thread joint in relief valve set pressure tester and low pressure gauge to threaded joint in order.
5. Place the range gear shift lever in neutral.
6. Run the engine at rated speed.
7. Release the HST pedal to set in neutral, and measure the charge pressure.
8. If the measurement is not within the factory specifications, check charge relief valve or adjust with adjusting shim.

NOTE

- **Adjusting shim is located on between spring guide and plug (7).**

(Reference)

- Thickness of adjusting shim: 0.2 mm (0.0082 in.)
- Pressure charge per 0.2 mm (0.008 in.) of shim: Approx. 50 kPa (0.51 kgf/cm^2, 7.3 psi)
- Pressure change per 0.5 mm (0.02 in.) of shim: Approx. 125 kPa (1.27 kgf/cm^2, 18.1 psi)

Charge pressure (Oil temperature at 50 to 60 °C (122 to 140 °F))	Factory specification	2.50 to 2.85 MPa 25.5 to 29.0 kgf/cm^2 363 to 413 psi

NOTE

- **Low pressure gauge is 5 MPa (50 kgf/cm^2, 711 psi) full scale.**

(1) Charge Pressure Check Port
(2) Poppet
(3) Spring
(4) Shim
(5) Holder
(6) O-ring
(7) Plug

F: Forward Side
R: Reverse Side

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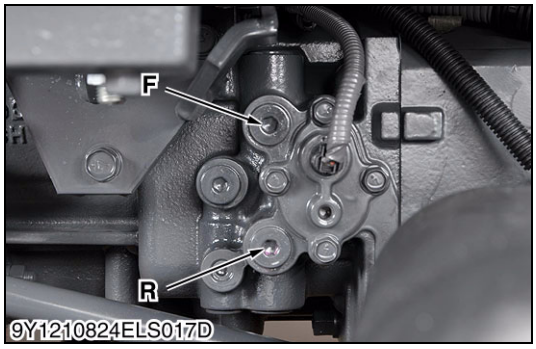

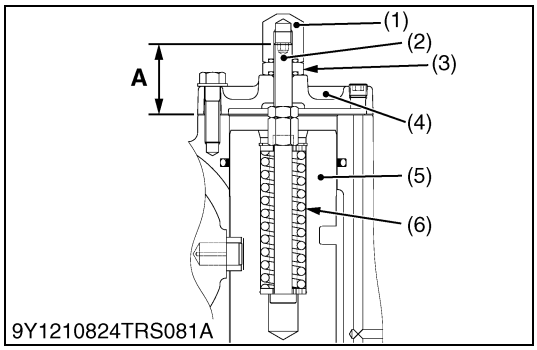

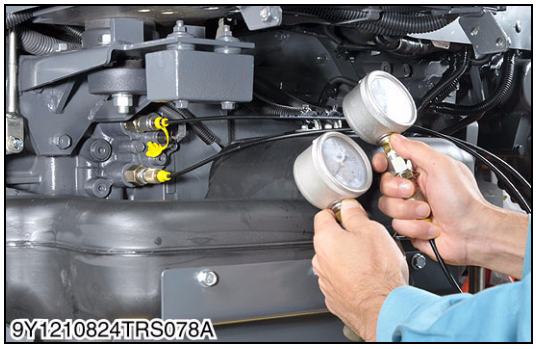

Checking and Adjusting HST Neutral Position

CAUTION

- **Park the tractor on a flat place and keep all the levers at neutral position.**
- **Jack up the engine tractor and bring it in the 2WD mode.**

1. Fit the HST mechanism first and then exterior components until the engine can get started.
2. Remove the hex. socket head plug from **F** and **R** ports.
3. Assemble adaptor **C** (07916-50371) and thread joint (07916-50341) with the gasket between them.
4. Install the assembled adaptor **C** and thread joint **F** and **R** ports.
5. Measure the **F** and **R** HST charge pressures. Place 5 MPa (50 kgf/cm^2, 725 psi) gauges on the two spots in the photo.
6. Lift up the entire steps, as shown below, so that the piston can be adjusted.
7. If any of the servo piston parts has been replaced, readjust the HST neutral position, referring to the dimension **"A"** of the servo piston adjusting screw (2).
8. Start the engine and measure the **F** and **R** charge pressures. Now adjust the piston neutral position so that the **F** port side pressure and the **R** port side one be the same. (Take the measurement with the engine rpm at MAX.).
9. Finally lock the piston adjusting nut and fit the exterior components.

Differential pressure **F**-**R**	Factory specification	−0.3 to +0.3 MPa −3 to +3 kgf/cm^2 −40 to +40 psi

Condition

- Engine speed
  Maximum Speed
- Oil temperature
  40 to 60 °C (104 to 140 °F)

(Reference)

- Dimension **"A"**: 19.4 mm (0.764 in.)

(1) Cap Nut
(2) Adjusting Screw
(3) Lock Nut
(4) Cover
(5) Servo Piston
(6) Spring

F: Forward Side
R: Reverse Side

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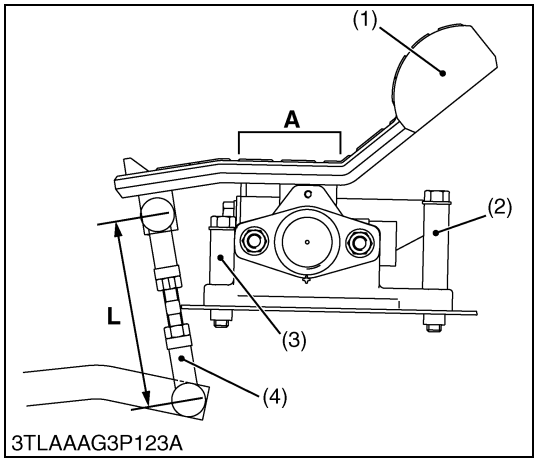

HST Pedal

■ **NOTE**

- **When removing the HST pedal, do the following adjustment.**

1. Adjust the rod length **"L"** so that the face of the HST pedal **"A"** becomes horizontal.
2. After adjusting the HST pedal perform **"Mode K"**. (See page 3-S27.)

(Reference)

- Rod length **"L"**: 109 mm (4.29 in.)

(1) HST Pedal
(2) Stopper Bolt (Forward)
(3) Stopper Bolt (Reverse)
(4) Rod

A: Face of HST Pedal

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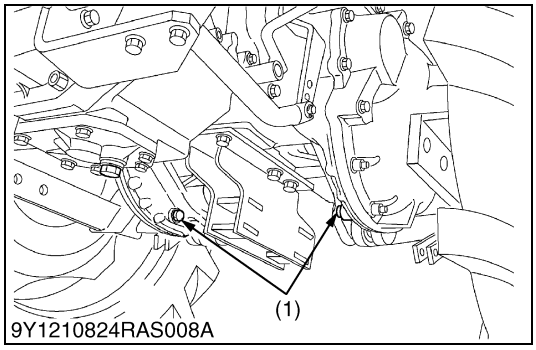
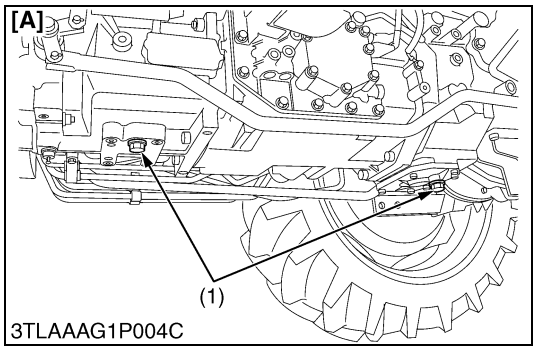
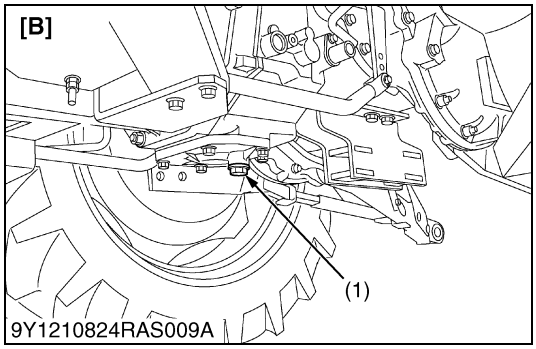
5. PREPARATION

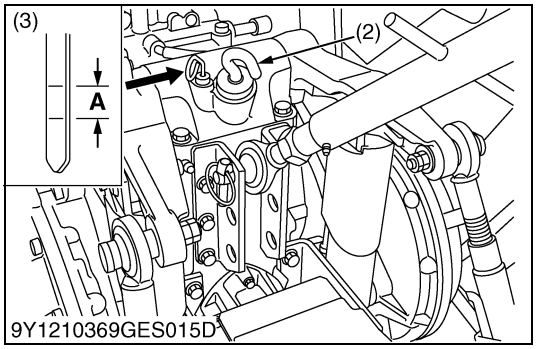
[1] ROPS TYPE

(1) Dismounting the step and floor seat









Draining the Transmission Fluid

CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5060 L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

■ **IMPORTANT**

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

[A] Manual Transmission / GST
[B] HST
A: Oil level is acceptable within this range.

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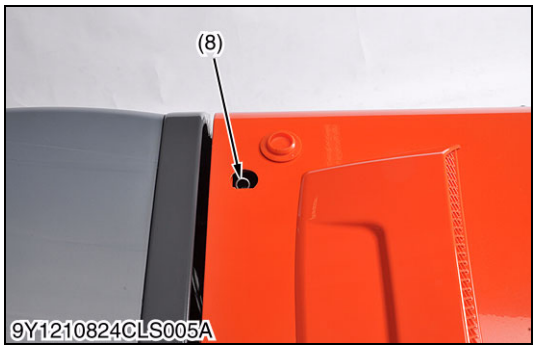

Front Grill, Skirts and Bonnet

1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Disconnect the head light connector (6).
5. Remove the damper (7).
6. Remove the β pin (8), then the bonnet.

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Head Light Connector
(7) Damper
(8) β Pin

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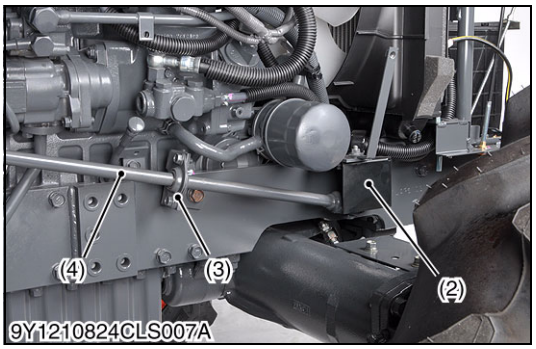

Steering Joint Shaft

1. Remove the steering joint screw (1).
2. Remove the steering joint cover (2) and the steering joint support (3).
3. Remove the steering joint shaft (4).

(1) Steering Joint Screw
(2) Steering Joint Cover
(3) Steering Joint Support
(4) Steering Joint Shaft

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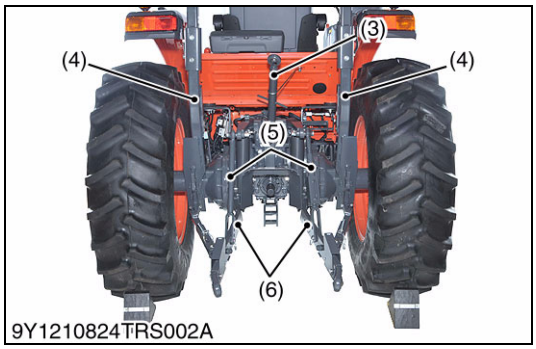

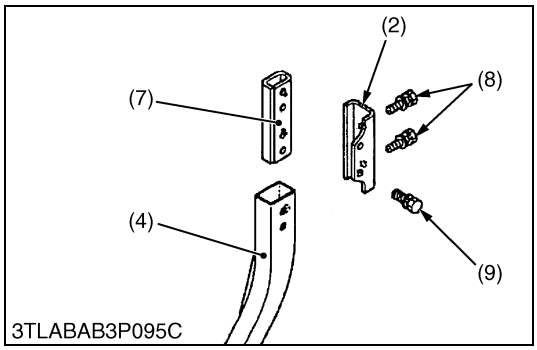

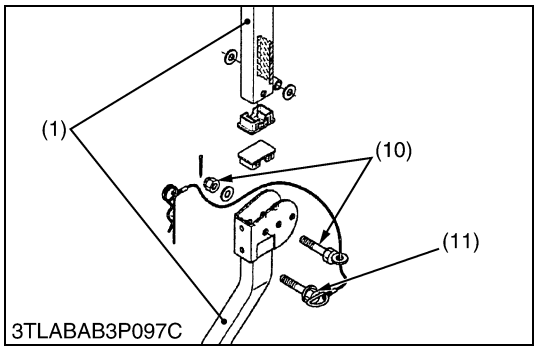

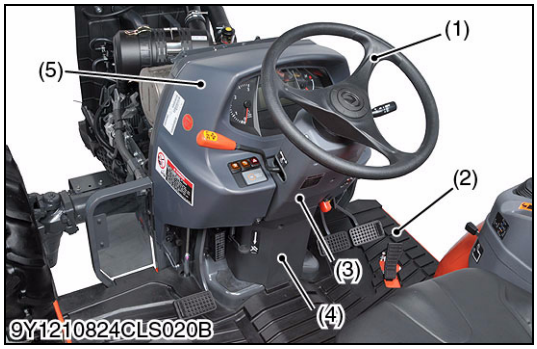

ROPS

1. Remove the plates (2) and the upper frame (1) mounting screws (8), (9).
2. Remove the top link (3), lift rods (5) and lower links (6).

(When reassembling)

■ **NOTE**

- **Do not firmly tighten all screws until most components are attached.**

Tightening torque	Plate mounting screw (8)	138 to 147 N·m 14.0 to 15.0 kgf·m 102 to 108 lbf·ft
	Plate mounting screw (9)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 145 lbf·ft
	Lift arm pin mounting nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Lift arm pin lock nut	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

(Reference)

Tightening torque	Fulcrum bolt and nut (10)	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 102 lbf·ft

(1) Upper Frame
(2) Plate
(3) Top Link
(4) Lower Frame
(5) Lift Rod
(6) Lower Link
(7) Connector
(8) Screw (M14 × 40 mm)
(9) Screw (M14 × 30 mm)
(10) Fulcrum Bolt and Nut
(11) Lock Bolt

9Y1210824TRS0001US0

Steering and Panel Cover

1. Remove the steering wheel (1).
2. Remove the mat (2).
3. Remove the steering post cover 2 (4) and steering post cover 1 (3).
4. Remove the meter panel cover (5).

(1) Steering Wheel
(2) Mat
(3) Steering Post Cover 1
(4) Steering Post Cover 2
(5) Meter Panel Cover

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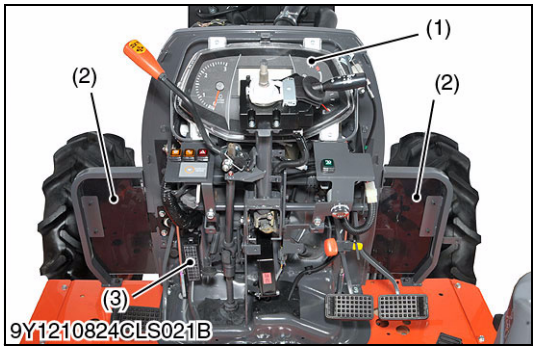

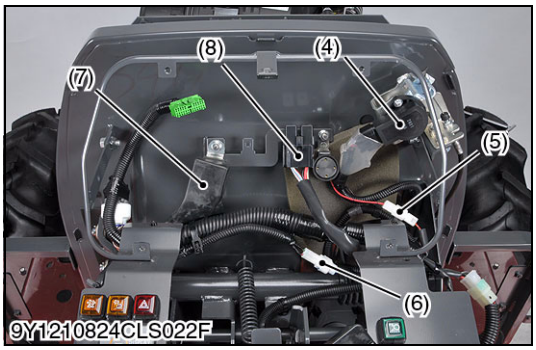

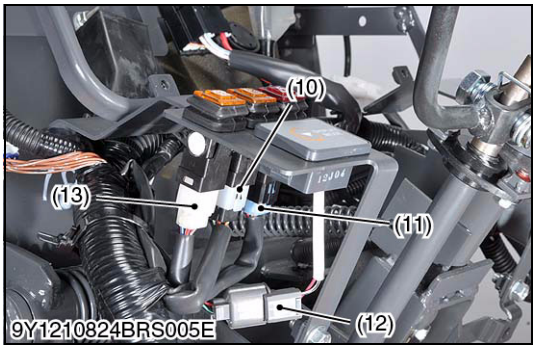

Meter Panel and Wiring Harness

1. Remove the meter panel (1).
2. Remove the right and left mud shields (2).
3. Remove the fuse box (3) and relay box (8).
4. Disconnect the flasher relay connector (7), buzzer connector (5) and parking brake switch connector (6).
5. Disconnect the foot throttle sensor connector (4). (Manual Transmission and GST only)
6. Disconnect the cruise control switch connector (9). (HST only)
7. Disconnect the DPF auto switch connector (13), DPF switch connector (10), hazard switch connector (11) and display mode switch connector (12).

(1) Meter Panel
(2) Mud Shield
(3) Fuse Box
(4) Foot Throttle Sensor Connector
(5) Buzzer Connector
(6) Parking Brake Switch Connector
(7) Flasher Unit
(8) Relay Box
(9) Cruise Control Switch
(10) DPF Switch Connector
(11) Hazard Switch Connector
(12) Display Mode Switch Connector
(13) DPF Auto Switch Connector

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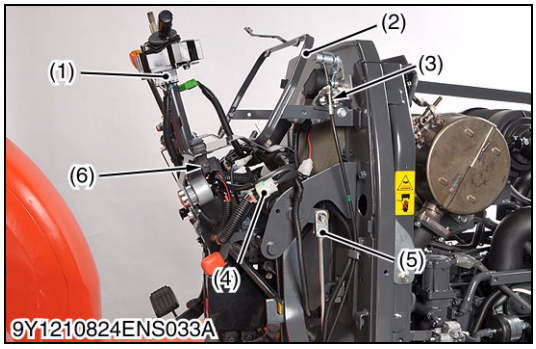

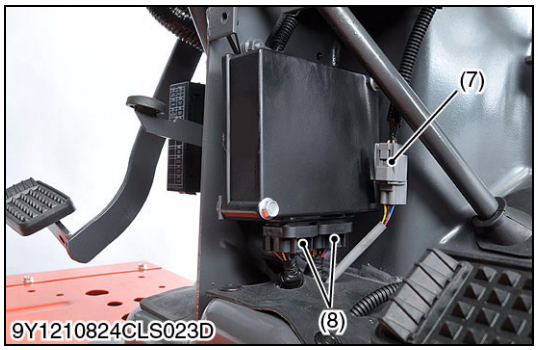

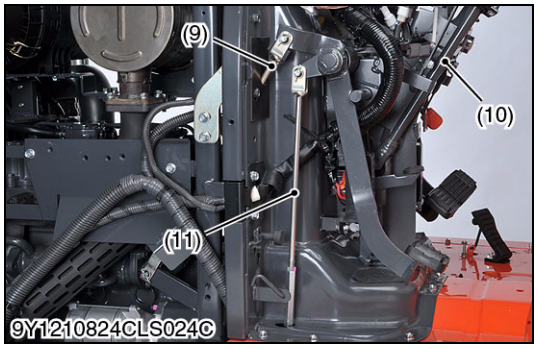

Wiring Harness

1. Disconnect the multi function combination switch connector (1), side working light connector (6) and main switch connector (4).
2. Disconnect the shuttle switch connector (7) and the foot throttle wire (3). (ManualTransmission and GST only)
3. Remove the meter panel support (2) and brake pedal rod R.H. (5).
4. Remove the main ECU connectors (8).
5. Remove the shuttle link (10) and clutch pedal rod (9). (Manual transmission and GST only)
6. Remove the brake pedal rod L.H. (11) and both sides of support plates (11).

(1) Multi Function Combination Switch Connector
(2) Meter Panel Support
(3) Foot Throttle Wire
(4) Main Switch Connector
(5) Brake Pedal Rod R.H.
(6) Side Working Light Connector
(7) Shuttle Switch Connector
(8) Main ECU Connector
(9) Clutch Pedal Rod
(10) Shuttle Link
(11) Brake Pedal Rod L.H.

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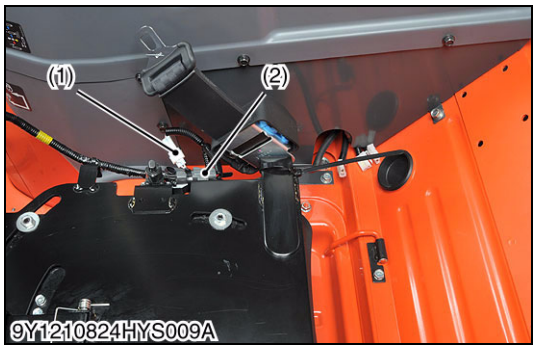

Seat and Seat Bracket

1. Disconnect the seat switch connector (1) and seat tilt switch connector (2).
2. Remove the seat (3).
3. Remove the seat suspension (4) together with seat bracket (5).

(1) Seat Switch Connector
(2) Seat Tilt Switch Connector
(3) Seat
(4) Seat Suspension
(5) Seat Bracket

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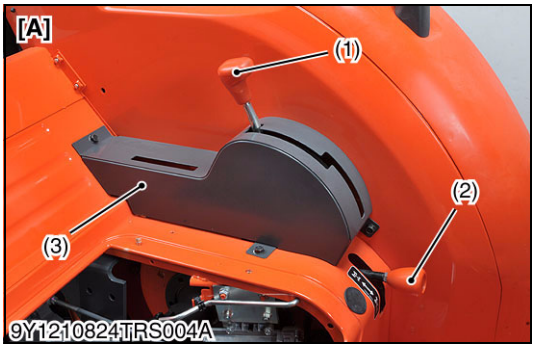

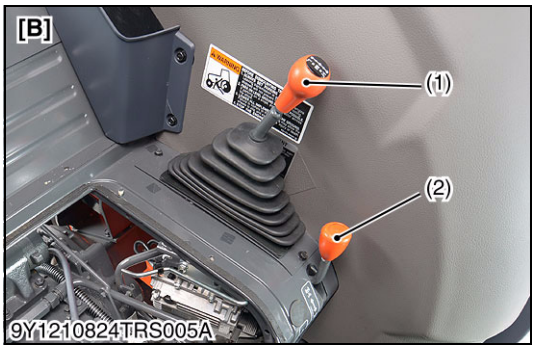

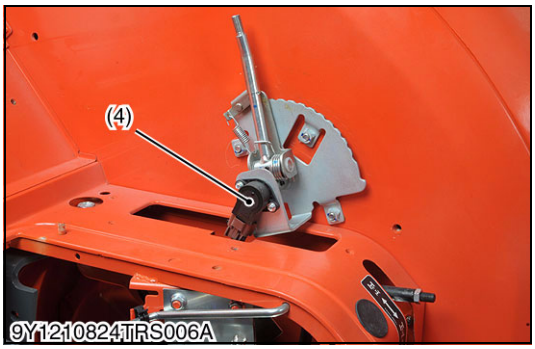

Lever Grips and Lever Guide

1. Remove the front wheel drive lever grip (2) and range gear shift lever grip (1).
2. Remove the lever guide (3).
3. Disconnect the range gear sensor connector (4).

(1) Range Gear Shift Lever Grip
(2) Front Wheel Drive Lever Grip
(3) Lever Guide
(4) Range Gear Sensor Connector

[A] Manual Transmission / GST
[B] HST

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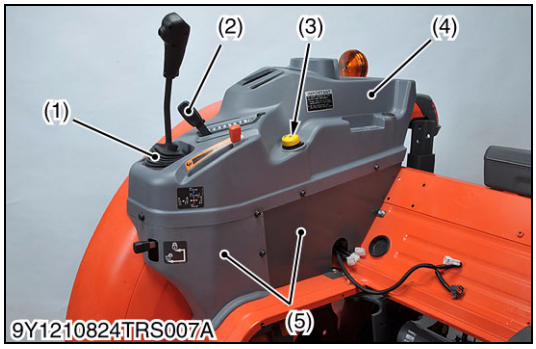

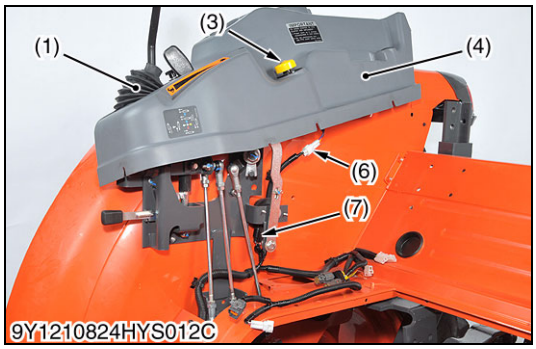

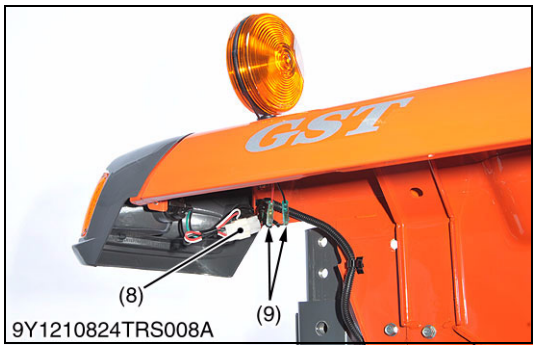

PTO Switch Connector and Lever Guide

1. Remove the position control lever grip (2) and covers (5).
2. Disconnect the PTO switch connector (6) and accelerator sensor connector (7).
3. Disconnect the boots (1) from lever guide (4) then remove the lever guide (4).
4. Disconnect the left and right hazard light connector (9) and rear combination light connector (8).

(1) Boots
(2) Position Control Lever Grip
(3) PTO Switch
(4) Lever Guide
(5) Cover
(6) PTO Switch Connector
(7) Accelerator Sensor Connector
(8) Rear Combination Light Switch
(9) Hazard Light Connector

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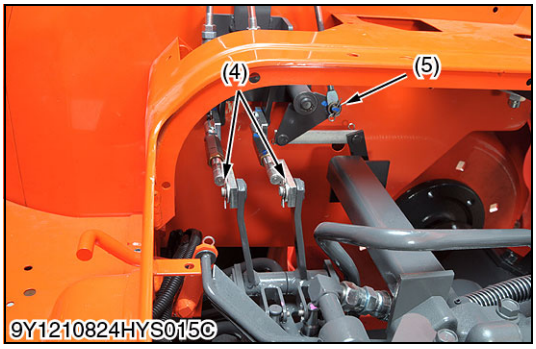

Linkages

1. Disconnect the differential lock rod (1).
2. Remove the lowering adjusting knob (2).
3. Remove the range gear shift rod (3). [HST]
4. Disconnect the front loader control lever linkage ß pins (4) to release the links.
5. Disconnect the position lever linkage ß pin (5) to release the link.

(1) Differential Lock Rod
(2) Lowering Adjusting Knob
(3) Range Gear Shift Rod
(4) ß Pin
(5) ß Pin

[A] Manual Transmission / GST
[B] HST

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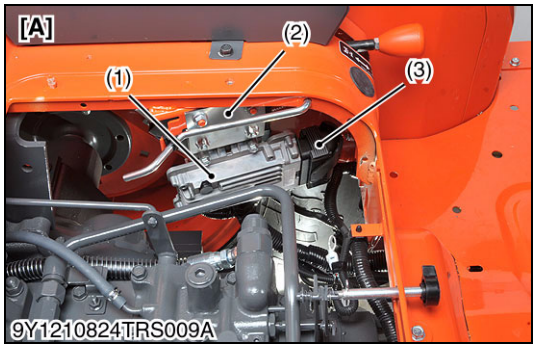

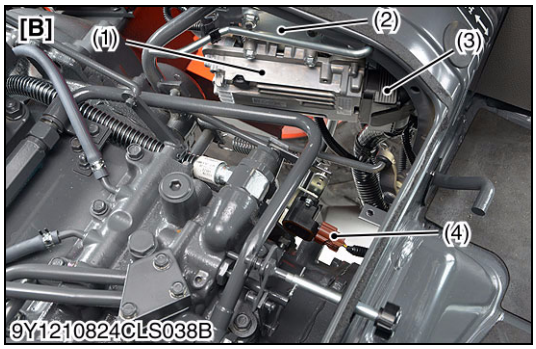

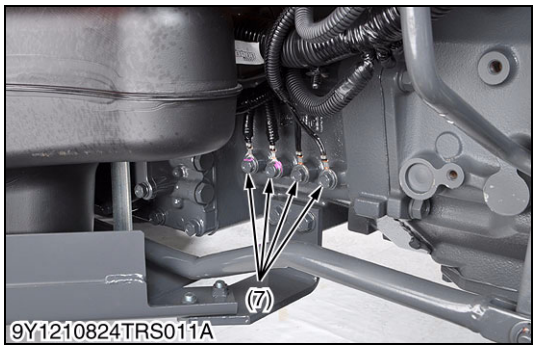

Rear Wiring Harness

1. Remove the engine ECU support (2).
2. Disconnect the engine ECU connector (3).
3. Disconnect the range gear sensor connector (4).
4. Disconnect the joint connector (5).
5. Remove the engine ECU power relay (6) and glow relay from the engine ECU support.
6. Disconnect the earth cables (7).

(1) Engine ECU
(2) Engine ECU Support
(3) Engine ECU Connector
(4) Range Gear Sensor Connector
(5) Joint Connector
(6) Engine ECU Power Relay
(7) Earth Cable

[A] Manual Transmission / GST
[B] HST

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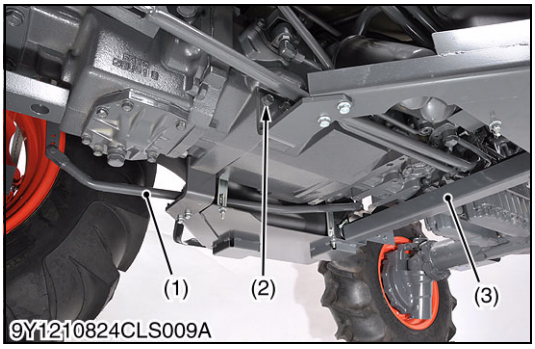

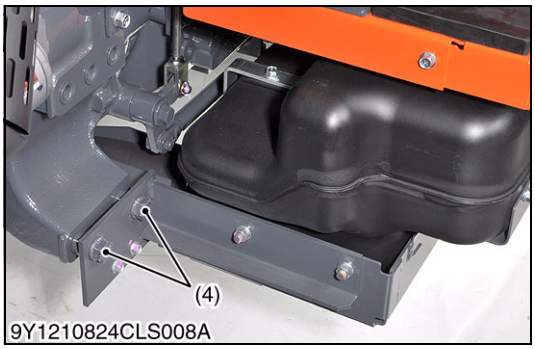

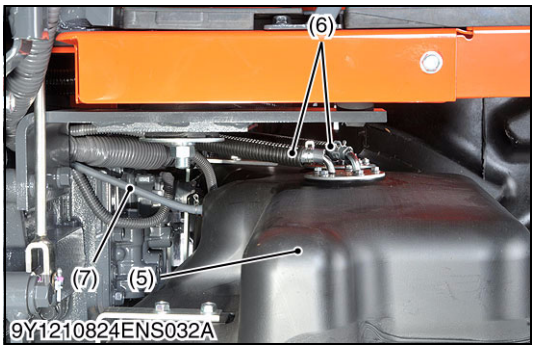

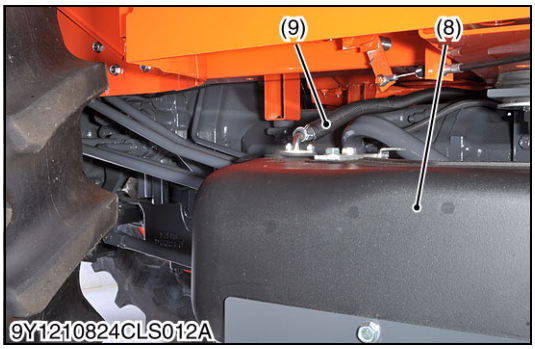

Fuel Tanks

1. Remove the left step.
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (1).
4. Place the disassembling stands under the right and left fuel tanks (5), (8).
5. Remove the front (4) and rear support mounting screws (2) of the right and left fuel tanks (5), (8).
6. Lower the fuel tanks (5), (8) together with the disassembling stands.
7. Disconnect the fuel hoses (6), overflow hose (7) and fuel level sensor connector from the fuel tank L.H. (5).
8. Disconnect the fuel hose (9) from the fuel tank R.H. (8).

(1) Brake Rod L.H.
(2) Rear Support Mounting Screw
(3) Fuel Hose Cover
(4) Front Support Mounting Screw
(5) Fuel Tank L.H.
(6) Fuel Hose
(7) Overflow Hose
(8) Fuel Tank R.H.
(9) Fuel Hose

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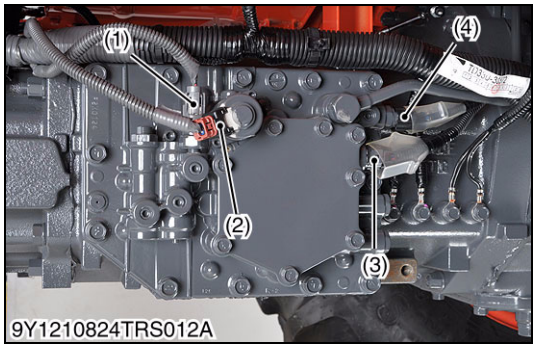

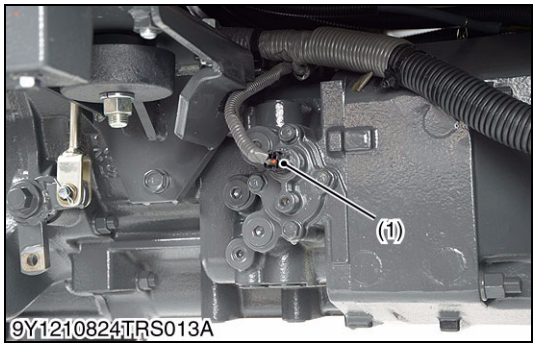

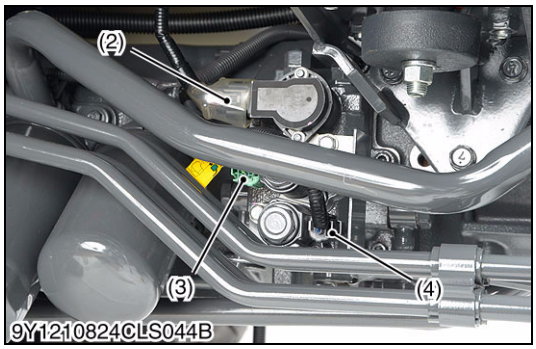

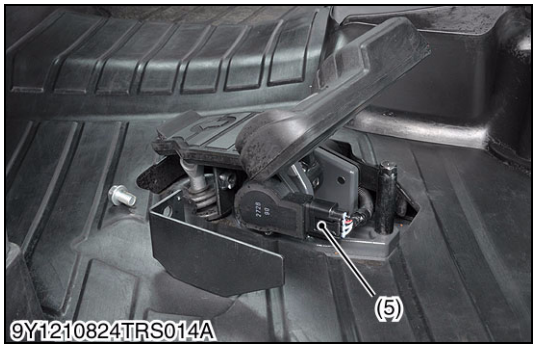

Electric Connector for GST

1. Disconnect the pressure switch connector (1), proportional reducing valve connector (2), solenoid valve connector (3), oil temperature sensor connector (4).

(1) Pressure Switch Connector
(2) Proportional Reducing Valve Connector
(3) Solenoid Valve Connector
(4) Oil Temperature Sensor Connector

9Y1210824TRS0005US0

Electric Connector for HST

1. Remove the Hi-Lo solenoid valve cover.
2. Disconnect the Hi-Lo solenoid valve connector (1).
3. Remove the proportional valve cover.
4. Disconnect the swashplate position sensor connector (2) and proportional valve connectors (3), (4).
5. Remove the HST pedal sensor connector (5).

■ **IMPORTANT**

- **In installing the connector of the proportional valve, pay attention to the color of the connector to ensure correct installation.**

(1) Hi-Lo Solenoid Valve Connector
(2) Swashplate Position Sensor Connector
(3) Proportional Valve Connector (Green)
(4) Proportional Valve Connector (Gray)
(5) HST Pedal Sensor Connector

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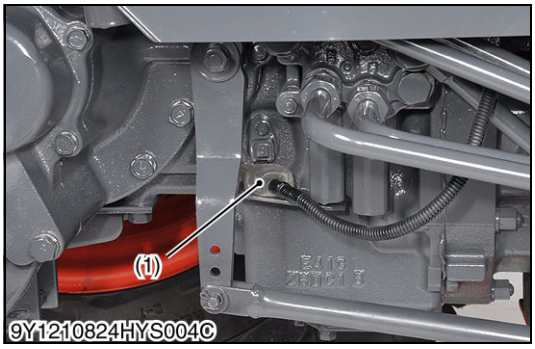

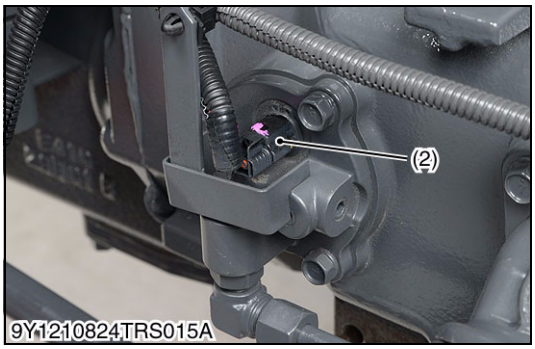

PTO Connector and Electric Connector

1. Disconnect the traveling speed sensor connector (1).
2. Disconnect the PTO connector (2).

(1) Traveling Speed Sensor Connector (2) PTO Connector

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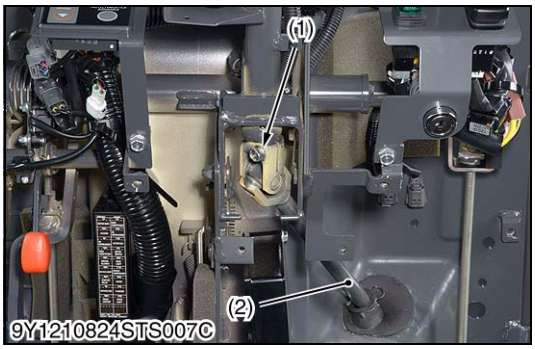


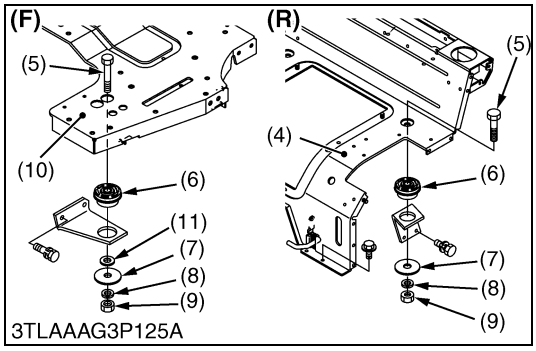
Step and Floor Seat

1. Remove the universal joint bolt (1) and disconnect the steering joint shaft 1 (2).
2. Disconnect the rear support plate (3).
3. Remove the step and floor seat mounting bolt and nut.
4. Lift up a little the step, fender, floor seat and panel frame as a unit with the hoist.
5. Disconnect all the harness clips from the step, fenders and floor seat.
6. Remove the harness.
7. Make sure that all the harnesses are removed.
8. Dismount the step, fender, floor seat and panel frame as a unit.

(When reassembling)

- Be sure to set the washers and rubber plates of the floor seat and step mounting bolt at an original positions as shown in figure.
- Before mounting the floor seat and step, be sure to set both the shuttle lever rod and the shuttle arm to the neutral position, and then connect the shuttle lever rod securely.

Tightening torque	Step mounting bolt and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.1 to 108 lbf·ft
	Floor seat mounting bolt and nut	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft



(1) Universal Joint Bolt
(2) Steering Joint Shaft 1
(3) Rear Support Plate
(4) Floor Seat
(5) Bolt
(6) Rubber Plate
(7) Washer
(8) Spring Washer
(9) Nut
(10) Step
(11) Washer (L.H. Only)

(F) Front Side
(R) Rear Side

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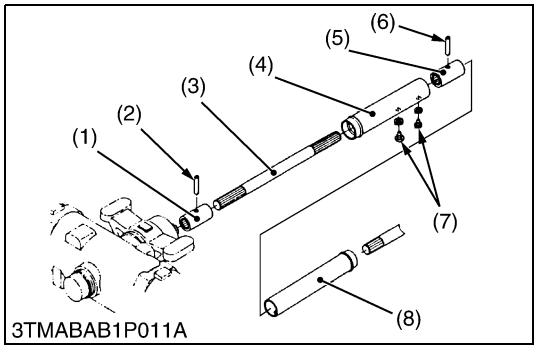

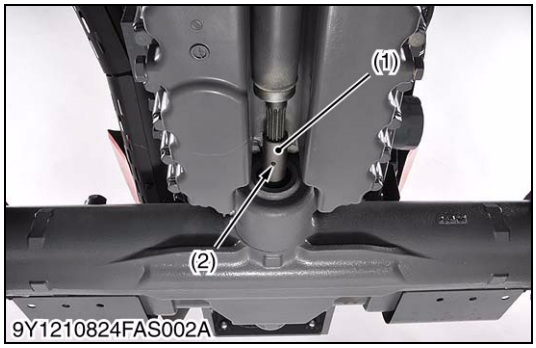

Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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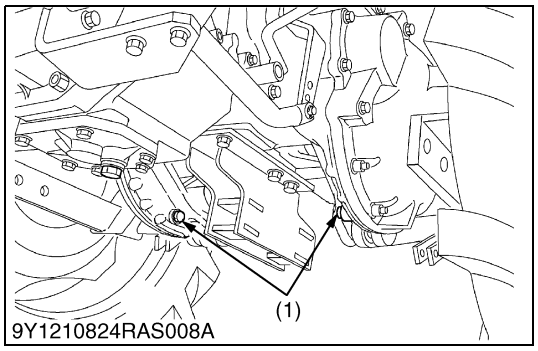
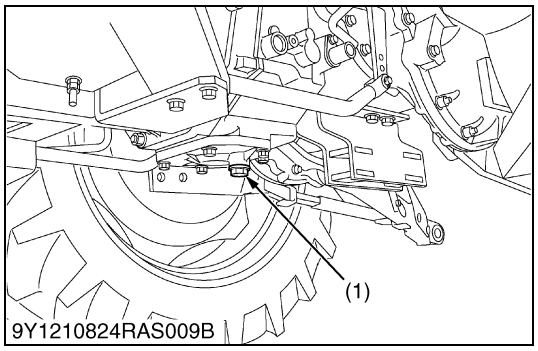
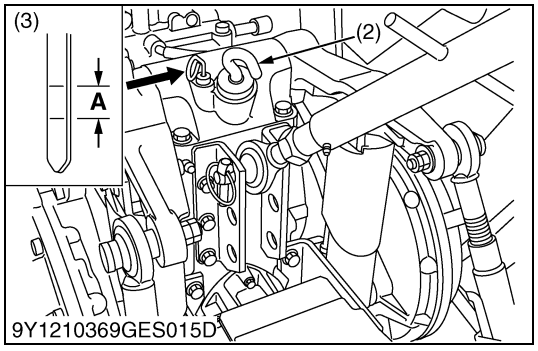
[2] CABIN TYPE

(1) Separating Cabin from Tractor







Draining the Transmission Fluid

CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

HST

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

■ IMPORTANT

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

A: Oil level is acceptable within this range.

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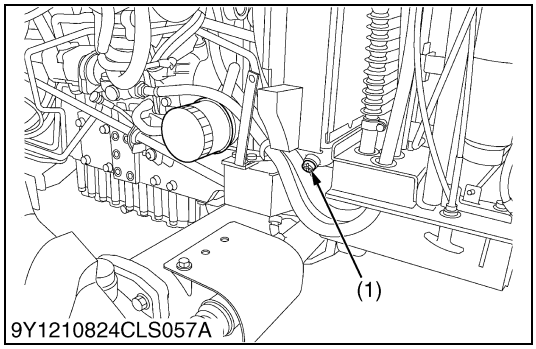

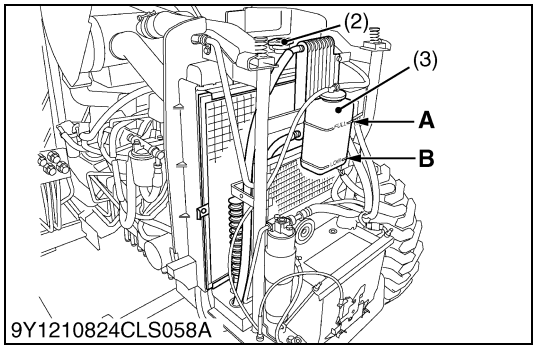

Draining Coolant

WARNING

To avoid personal injury or death:

- **Do not remove radiator cap while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.**

1. Stop the engine, remove the key and let it cool down.
2. To drain the coolant, open the radiator drain plug and remove radiator cap. The radiator cap must be removed to completely drain the coolant.
3. After all coolant is drained, reinstall the drain plug.

(When refilling)

- Fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap securely.
- Fill with coolant up to **"FULL"** mark on the recovery tank.
- Start and operate the engine for few minutes.
- Stop the engine and let cool. Check coolant level of recovery tank and add coolant if necessary.

IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh soft water and anti-freeze to fill the radiator and recovery tank.**
- **When mixing the anti-freeze with water, the anti-freeze mixing ratio is 50 %.**
- **Securely tighten radiator cap. If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**
- **Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.**

NOTE

- **On cab type machines, coolant circulates through the heater. This means that one more liter or so of coolant is required.**
  In changing coolant, pour coolant up to the filler port of the recovery tank. Turn ON the heater (shift the temperature control lever toward WARM), and run the engine for a while in order to warm coolant. Then stop the engine.
  When coolant has cooled down, some of the coolant in the recovery tank is sucked. Now the recovery tank is appropriately filled with coolant.

Coolant capacity (without recovery tank)	L3560 L4060	7.5 L 7.9 U.S.qts 6.6 Imp.qts
	L4760 L5060 L5460 L6060	8.2 L 8.7 U.S.qts 7.2 Imp.qts

(1) Drain Plug
(2) Radiator Cap
(3) Recovery Tank

A: FULL
B: LOW

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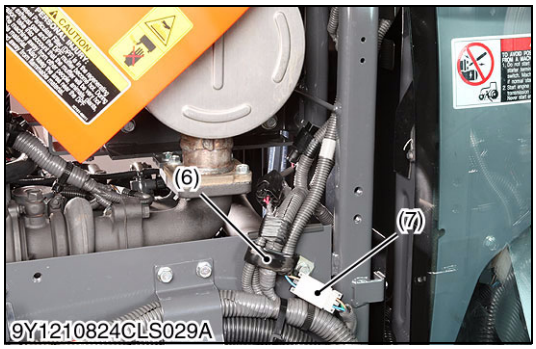

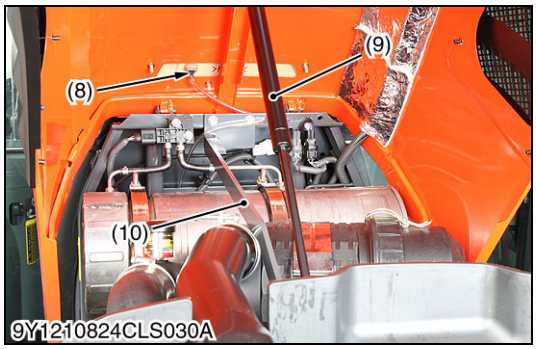

Front Grill, Skirts and Bonnet

1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Remove the clamp (6) and disconnect the head light connector (7).
5. Disconnect the window washer hose (8) and remove the damper (9).
6. Remove the plug (11) and the ß pin inside, then the bonnet.
7. Remove the damper support (10).

■ **NOTE**

- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Clamp
(7) Head Light Connector
(8) Window Washer Hose
(9) Damper
(10) Damper Support
(11) Plug

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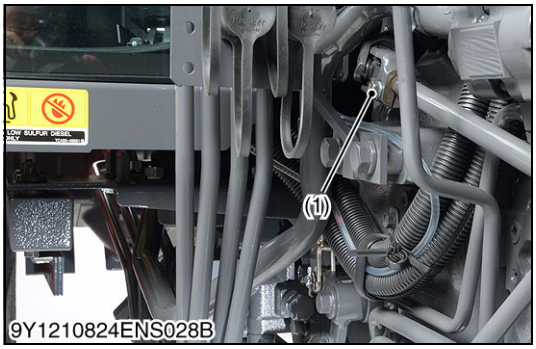

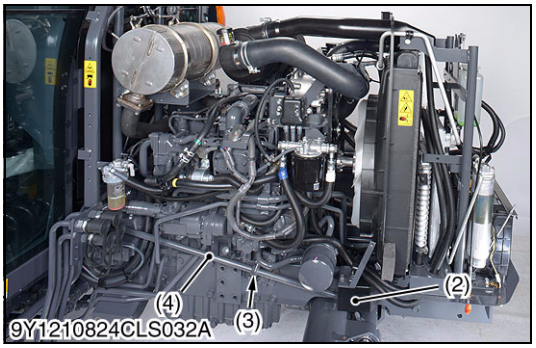

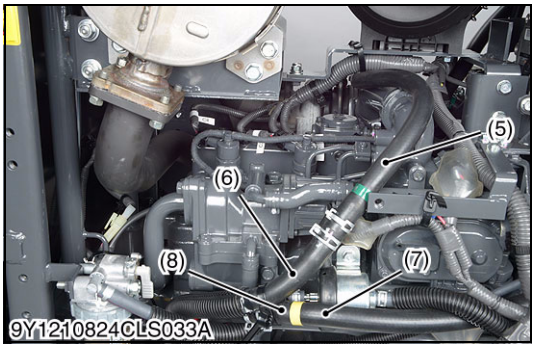

Steering Joint Shaft

1. Remove the steering joint screw (1).
2. Remove the steering joint cover (2) and the steering joint support (3).
3. Remove the steering joint shaft (4).
4. Disconnect the heater hose (5) from the heater hose (6) and the heater hose (7) from the heater hose (8) inside, then reconnect the heater hose (5), (7) and heater hose (6), (8) to make the loop.

■ **NOTE**

- **Put a mark to each heater hose before disconnecting.**

(1) Steering Joint Screw
(2) Steering Joint Cover
(3) Steering Joint Support
(4) Steering Joint Shaft
(5) Heater Hose
(6) Heater Hose
(7) Heater Hose
(8) Heater Hose

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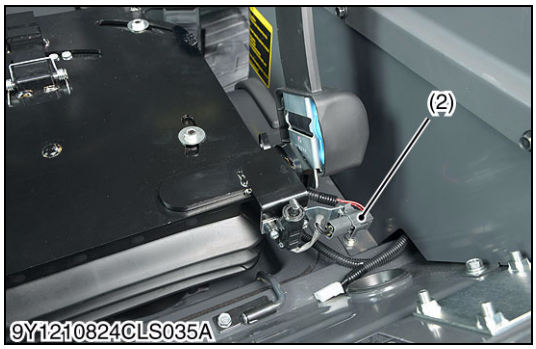

Seat and Seat Bracket

1. Disconnect the seat switch connector (1) and seat tilt switch connector (2).
2. Remove the seat (3).
3. Remove the seat suspension (4) together with seat bracket (5).

(1) Seat Switch Connector
(2) Seat Tilt Switch Connector
(3) Seat
(4) Seat Suspension
(5) Seat Bracket

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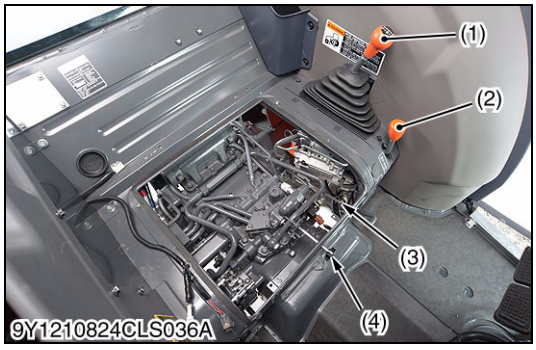

Lever Grips, Differential Lock Rod and Lowering Speed Adjusting Knob

1. Remove the range gear shift lever grip (1) and front wheel drive lever grip (2).
2. Remove the differential lock rod (3) and the lowering speed adjusting knob (4).
3. Remove the range gear shift rod (5).

(1) Range Gear Shift Lever Grip
(2) Front Wheel Drive Lever Grip
(3) Differential Lock Rod
(4) Lowering Speed Adjusting Knob
(5) Range Gear Shift Rod

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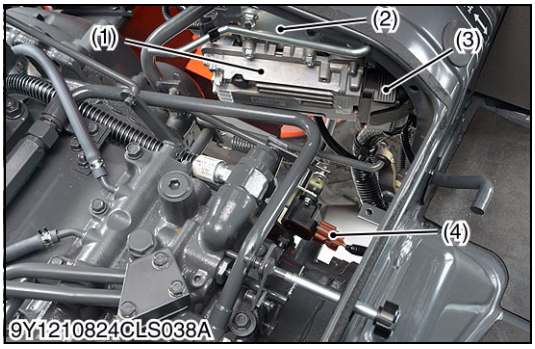

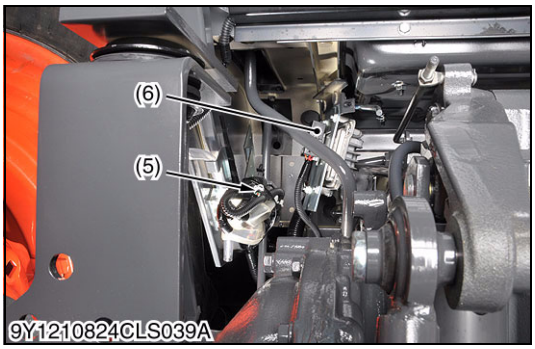

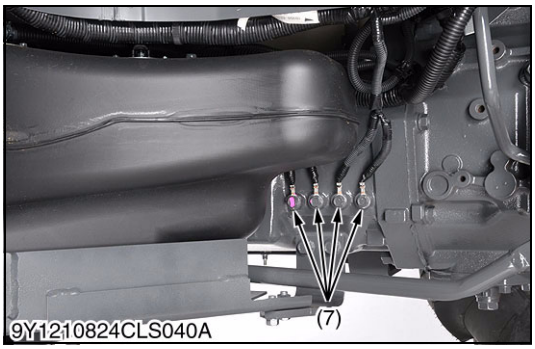

Rear Wiring Harness

1. Remove the engine ECU support (2).
2. Disconnect the engine ECU connector (3).
3. Disconnect the range gear sensor connector (4).
4. Disconnect the joint connectors (5).
5. Remove the engine ECU power relay and glow relay (6) from the engine ECU support (2).
6. Disconnect the earth cables (7).

(1) Engine ECU
(2) Engine ECU Support
(3) Engine ECU Connector
(4) Range Gear Sensor Connector
(5) Joint Connector
(6) Glow Relay
(7) Earth Cable

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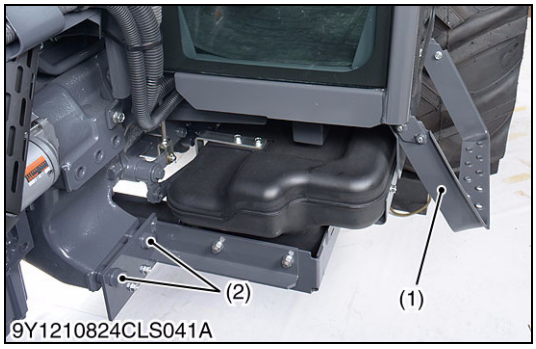

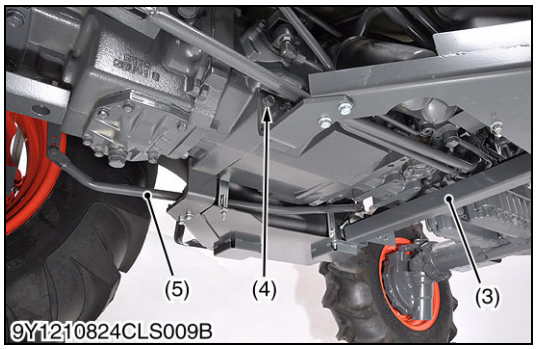

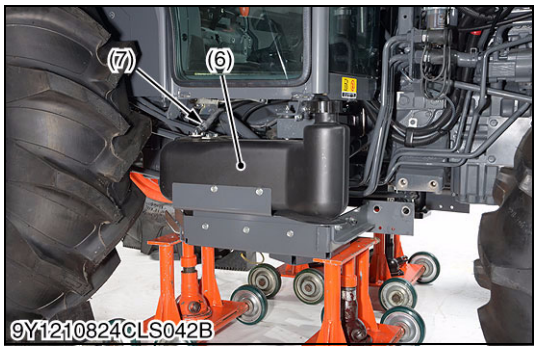

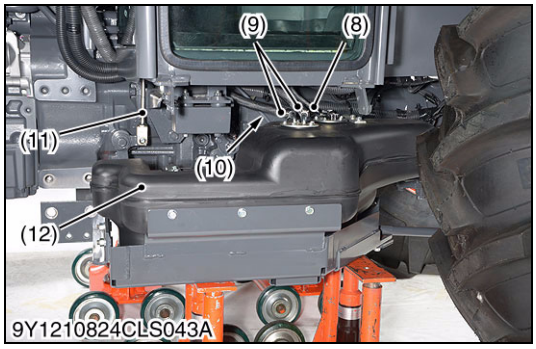

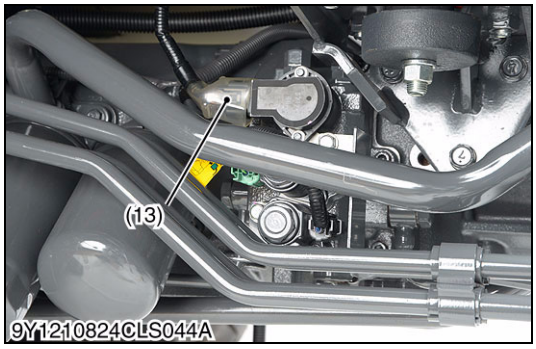

Fuel Tanks

1. Remove the right and left steps (1).
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (5).
4. Place the disassembling stands under the right and left fuel tanks (6), (12).
5. Remove the front (2) and rear support mounting screws (4) of the right and left fuel tanks (6), (12).
6. Lower the fuel tanks (6), (12) together with the disassembling stands.
7. Disconnect the fuel hoses (9), overflow hose (10) and fuel level sensor connector (8) from the fuel tank L.H. (12).
8. Disconnect the fuel hose (7) from the fuel tank R.H. (6).
9. Remove the right and left brake pedal rod (11).
10. Disconnect the swashplate position sensor connector (10).

(1) Step
(2) Front Support Mounting Screw
(3) Fuel Hose Cover
(4) Rear Support Mounting Screw
(5) Brake Rod L.H.
(6) Fuel Tank R.H.
(7) Fuel Hose
(8) Fuel Level Sensor Connector
(9) Fuel Hose
(10) Overflow Hose
(11) Brake Pedal Rod L.H.
(12) Fuel Tank L.H.
(13) Swashplate Position Sensor Connector

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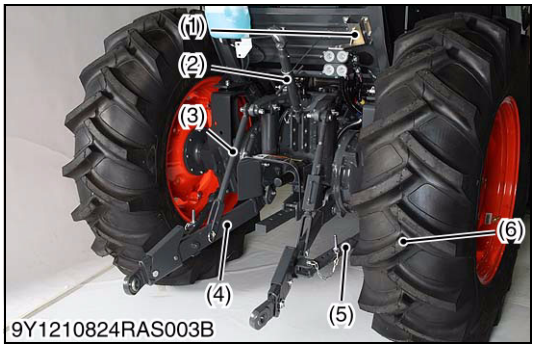

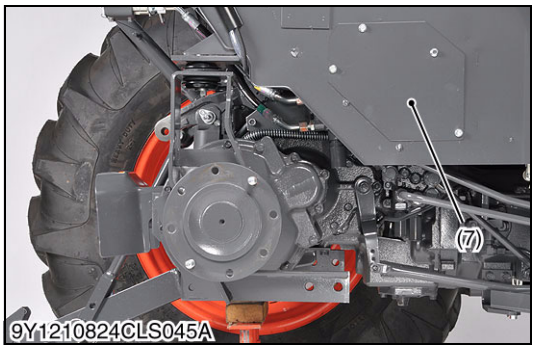

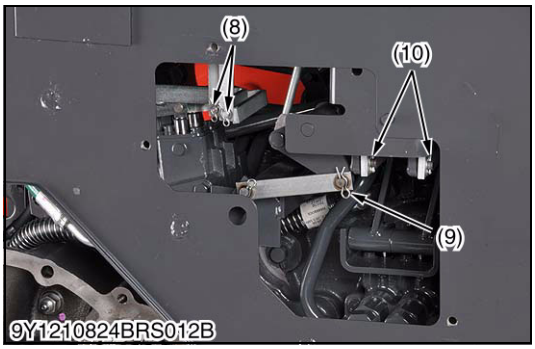

Linkage and Remote Control Valve

1. Remove the remote control valve support (1) together with the couplers. (If equipped.)
2. Remove the top link (2), right and left lift rods (3), lower links (4) and stabilizers (5).
3. Remove the rear tire R.H. (6) and fender plate (7).
4. Disconnect the remote control valve linkage ß pins (8) to release the links. (If equipped.)
5. Disconnect the position lever linkage ß pin (9) to release the link.
6. Disconnect the front loader control linkage ß pins (10) to release the links.

(1) Remote Control Valve
(2) Top Link
(3) Lift Rod
(4) Lower Link
(5) Stabilizer
(6) Rear Tire R.H.
(7) Fender Plate
(8) ß Pin
(9) ß Pin
(10) ß Pin

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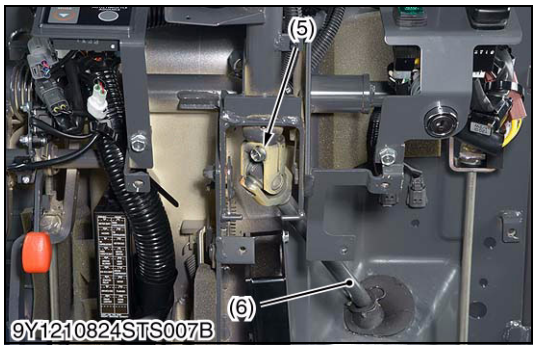

Mat, Panel Cover and Linkage

1. Remove the step mat (1) and sound absorber (2).
2. Remove the steering post cover 1 and 2 (4).
3. Remove the panel cover (3).
4. Remove the universal joint screw (5) and disconnect the steering joint shaft (6).

(1) Step Mat
(2) Sound Absorber
(3) Panel Cover
(4) Steering Post Cover
(5) Universal Joint Screw
(6) Steering Joint Shaft

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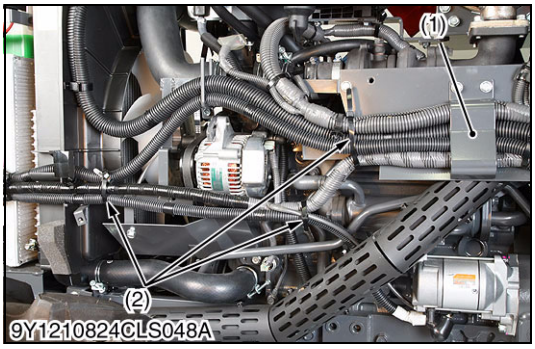

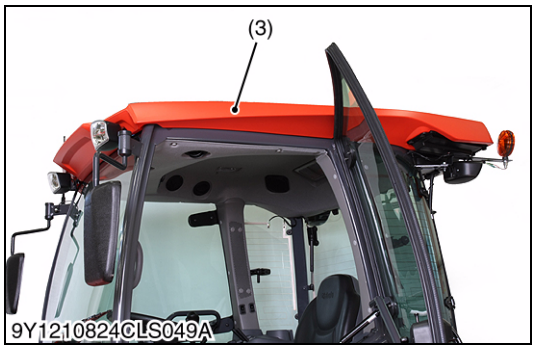

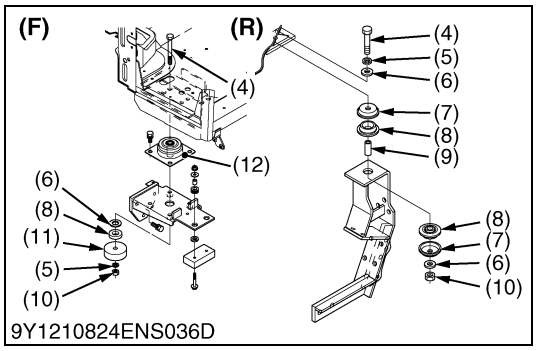

Dismounting Cabin

1. Remove the wiring harness cover (1) and wiring harness tighteners (2).
2. Remove the cabin outer roof (3).
3. Secure the cabin with nylon straps and hoist.
4. Remove the cabin mounting bolts and nuts.
5. Dismount the cabin from the tractor body with careful attention to the hoses connecting to the air conditioner, then set the cabin to the left side of the tractor body.

■ **NOTE**

- **Lift the cabin while making sure it does not catch on anything.**

(When reassembling)

- Be sure to install the washers and mount rubbers, etc. in their original positions as shown in figure.

Tightening torque	Outer roof mounting screw	3.5 to 4.0 N·m 0.36 to 0.40 kgf·m 2.6 to 2.9 lbf·ft
	Cabin mounting bolt and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft

(1) Wiring Harness Cover
(2) Wiring Harness Tightener
(3) Outer Roof
(4) Bolt
(5) Spring Washer
(6) Washer
(7) Cup
(8) Rubber
(9) Collar
(10) Nut
(11) Damper
(12) Cabin Rubber

(F) Front Side
(R) Rear Side

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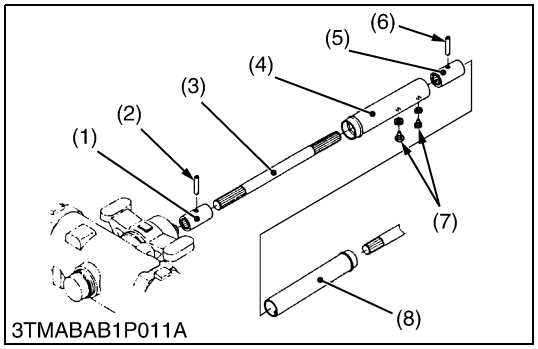

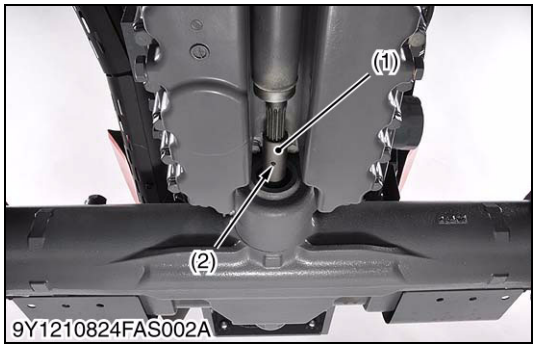

Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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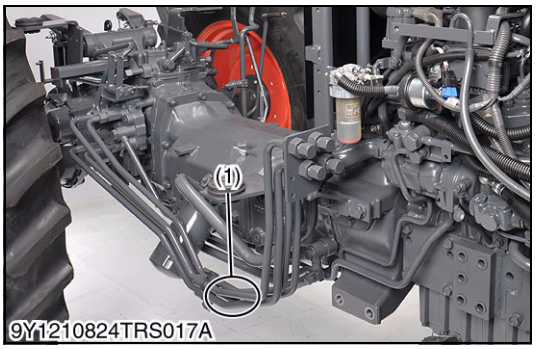
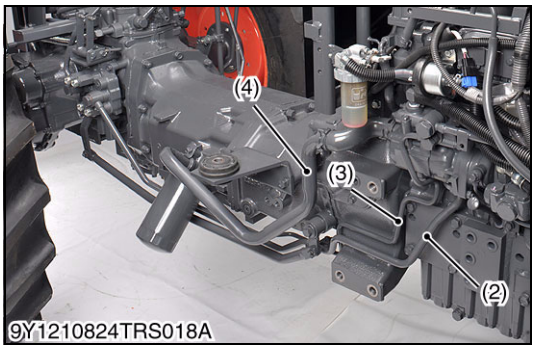
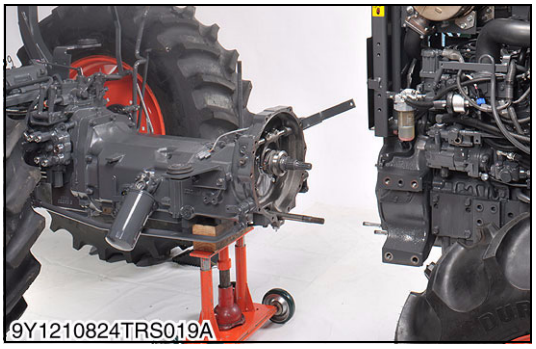
6. DISASSEMBLING AND ASSEMBLING

[1] MANUAL TRANSMISSION

(1) Clutch Housing







Hydraulic Pipe

1. Remove the front loader pipes (1).
2. Disconnect the suction pipe (4).
3. Remove the main delivery pipe (2) and PTO delivery pipe (3).

(When reassembling)

Tightening torque	Joint bolt for main delivery pipe	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft
	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft

(1) Front Loader Pipe
(2) Main Delivery Pipe 1
(3) PTO Delivery Pipe
(4) Suction Pipe

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Separating Engine and Clutch Housing

1. Place the disassembling stands under the engine and clutch housing.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine and clutch housing.

(When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1211 or equivalent) to joint face of the flywheel housing and clutch housing.

Tightening torque	Engine and clutch housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Engine and clutch housing mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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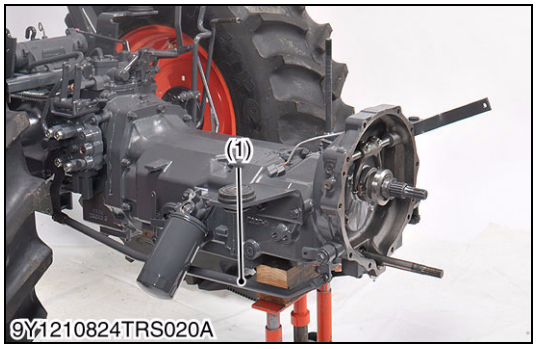

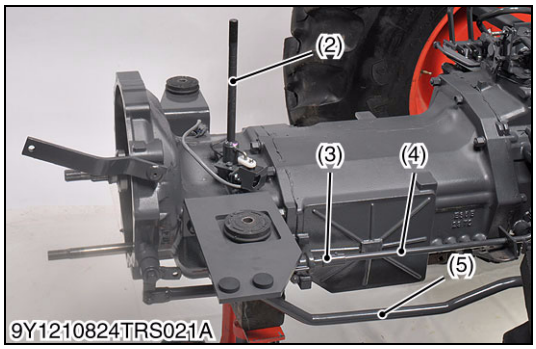

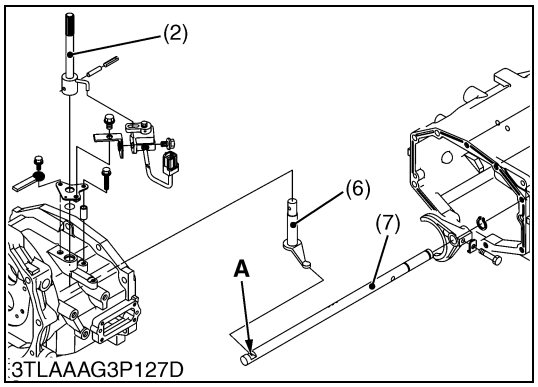

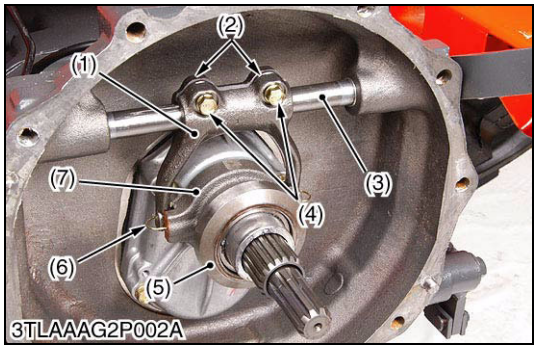

Shift Levers

1. Disconnect the brake rods (1), (5).
2. Tap out the spring pins (3) of main shift rod 1 (4).
3. Remove the shuttle shift arm stopper mounting screw, and then pull the shuttle shift shaft (2) with shuttle shift arm (6) up.

(When reassembling)

- Tap in the spring pins (3) so that their split portion may face forward.
- When reassembling the shuttle shift arm (6) to the shuttle fork rod (7), be sure to install it to the groove **"A"**.

(1) Brake Rod
(2) Shuttle Shift Shaft
(3) Spring Pin
(4) Main Shift Rod 1
(5) Brake Rod
(6) Shuttle Shift Arm
(7) Shuttle Fork Rod

A: Fork Rod Groove

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Release Hub and Clutch Lever

1. Draw out the clutch release hub (7) and the release bearing (5) as a unit.
2. Remove the release fork setting screws (4) and fork keys (2).
3. Draw out the clutch lever (3) to remove the release fork (1).

(When reassembling)

- Make sure the direction of the release fork (1) is correct.
- Inject grease to the release hub (7).
- Be sure to set the snap pins (6).

Tightening torque	Release fork setting screws	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Release Fork
(2) Fork Key
(3) Clutch Lever
(4) Setting Screw
(5) Release Bearing
(6) Snap Pin
(7) Release Hub

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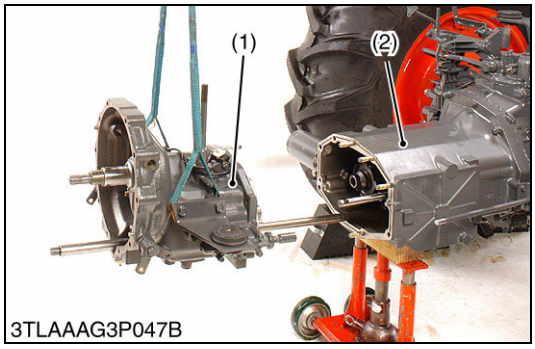


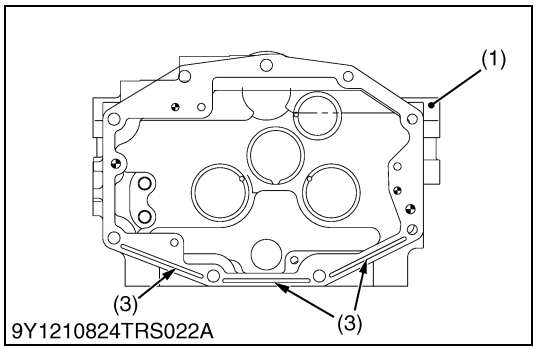
Separating Clutch Housing and Mid Case

1. Remove the clutch housing and mid case mounting screws and nuts.
2. Separate the clutch housing (1) and mid case (2).

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the clutch housing and mid case.
- Make sure to apply liquid gasket to elongated grooves (3) on the mid case face and to those on the lower side of the clutch housing face.

Tightening torque	Clutch housing and mid case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Clutch housing and mid case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft



(1) Clutch Housing
(2) Mid Case
(3) Elongated Groove

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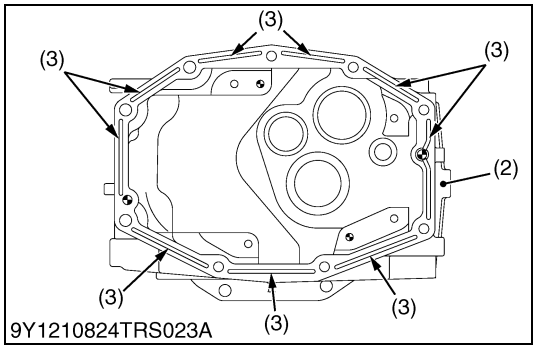

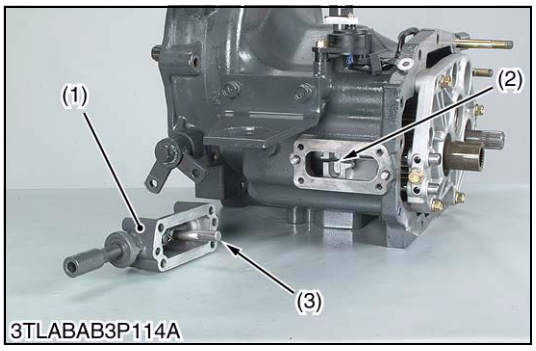

Main Shift Base

1. Remove the main shift base mounting screws.
2. Remove the main shift base (1) and main shift arm (3) as a unit.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the clutch housing case and main shift base.
- The main shift arm should be fitted on to the shift fork grooves (2) after setting the shift forks to neutral position.

Tightening torque	Main shift base mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Main shift arm setting screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft

(1) Main Shift Base
(2) Shift Fork Grooves
(3) Main Shift Arm

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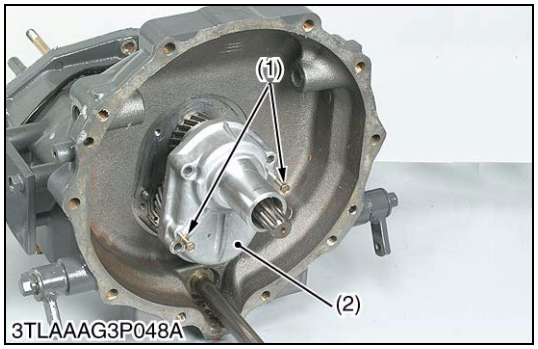

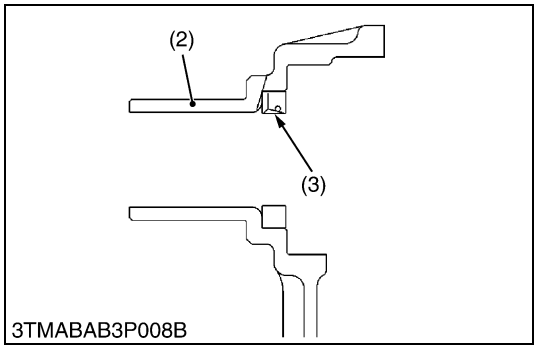

Shaft Case

1. Remove the shaft case mounting screws.
2. Screw down the two M6 jack bolts (1) into the shaft case (2) and pull it out.
3. Remove the shaft case (2).

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the shaft case and clutch housing.

(When replacing oil seal in shaft case)

- Install the oil seal (3) as shown in the figure, noting its direction.
- Apply grease to the oil seal (3).

(1) M6 Jack Bolt
(2) Shaft Case
(3) Oil Seal

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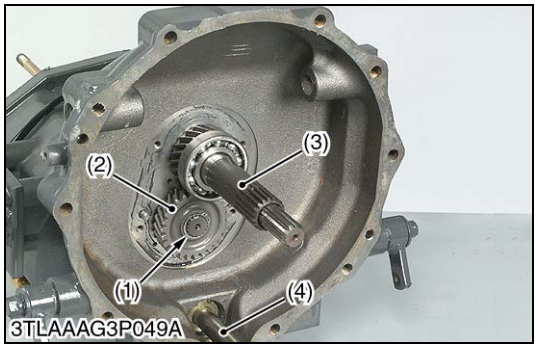

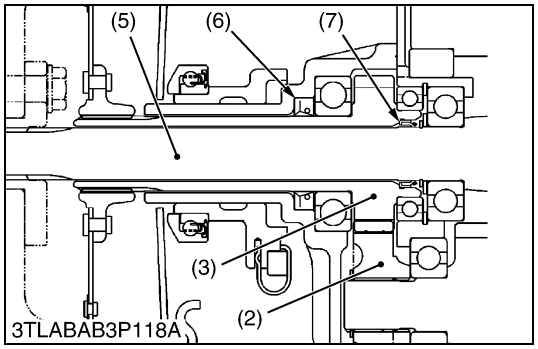

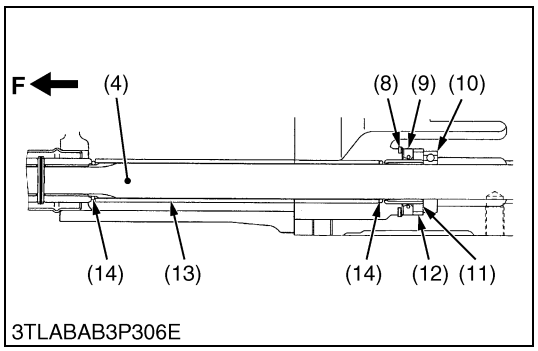

23T Gear Shaft, 27T Gear and Front Axle Drive Shaft

1. Remove the 23T gear shaft (3).
2. Remove the external snap ring (1) and 27T gear (2).
3. Pull out the front axle drive shaft (4) to the rear side (4WD only).

(When reassembling)

- Install the oil seal (7) on the 18T gear shaft (5), noting the direction of the oil seal (7) as shown in the figure.
- Direct the boss side of the gear (2) to the bearing side.
- Apply small amount of the grease to the oil seal (6), (7).
- Install the front axle drive shaft (4) from front side after assembling the clutch housing case and mid case. Then install the bearing (10), sleeve (11), collar (12), oil seal (9), internal snap ring (8), O-ring (14) and spacer (13) in order.

(1) External Snap Ring
(2) 27T Gear (L3560, L4060)
(3) 23T Gear Shaft (L3560, L4060)
(4) Front Axle Drive Shaft
(5) 18T Gear Shaft
(6) Oil Seal
(7) Oil Seal
(8) Internal Snap Ring
(9) Oil Seal
(10) Bearing
(11) Sleeve
(12) Collar
(13) Spacer
(14) O-ring

F: Front Side

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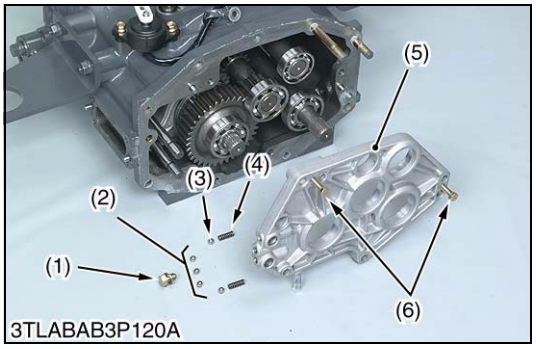

Clutch Housing Bearing Holder

1. Remove the three interlock balls (2) after removing the stopper screw (1).
2. Pull out the clutch housing bearing holder (5) with using two jack bolts (6).

■ **NOTE**

- **Be careful not to fly out the detent balls (3) and springs (4) when pull out the bearing holder (5).**

(When reassembling)

- Tap in the clutch housing bearing holder (5) with plastic hummer until contact to clutch housing case, and then tighten the screws to specified torque.
- Install the three interlock balls (2) with a small amount of grease to the clutch housing bearing holder (5) after setting the shift forks and shift rods to the neutral position.

Tightening torque	Clutch housing bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Stopper screw	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft

(1) Stopper Screw
(2) Interlock Ball
(3) Detent Ball
(4) Spring
(5) Clutch Housing Bearing Holder
(6) Jack Bolt

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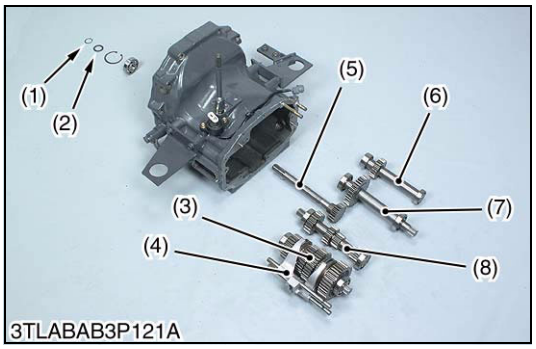

Shaft Assemblies

1. Remove the external snap ring (1) and collar (2).
2. Draw out the shaft assemblies (3), (5), (6), (7), (8).

(1) External Snap Ring
(2) Collar
(3) Counter Shaft Assembly
(4) Shift Rods
(5) 18T Gear Shaft Assembly
(6) Idle Shaft Assembly
(7) PTO Counter Shaft Assembly
(8) Main Gear Shaft Assembly

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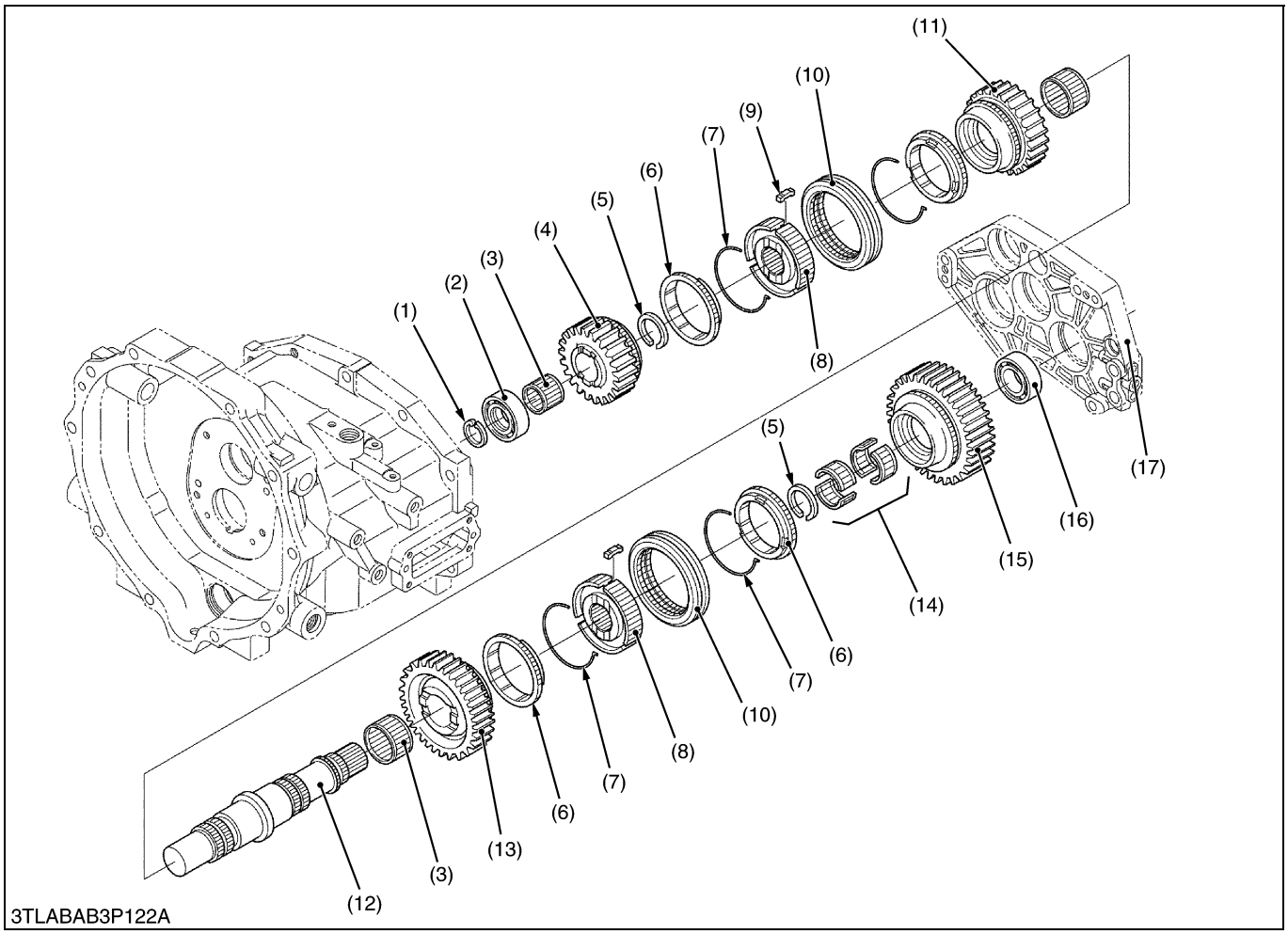
Counter Shaft



(1) Internal Snap Ring
(2) Bearing
(3) Needle Bearing
(4) 24T Gear (4th)
(5) External Snap Ring
(6) Synchronizer Ring
(7) Synchronizer Spring
(8) Hub
(9) Synchronizer Key
(10) Shifter
(11) 29T Gear (3rd)
(12) Counter Shaft
(13) 34T Gear (2nd)
(14) Needle Bearing
(15) 37T Gear (1st)
(16) Bearing
(17) Bearing Holder

1. Remove the internal snap ring (1) and remove both side of the bearings (2), (16).
2. Remove the gears on the counter shaft (12) and external snap rings (5).

(When reassembling)

- Reinstall the synchronizer keys (9) in the key grooves of the synchronizer rings (6) firmly.

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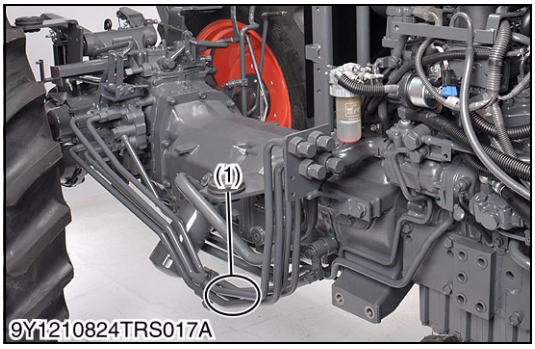
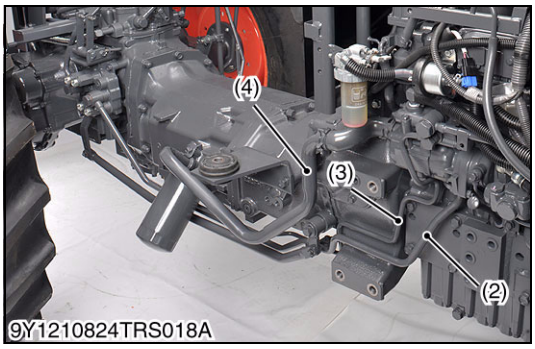
(2) Mid Case





Hydraulic Pipe

1. Remove the front loader pipes (1).
2. Disconnect the suction pipe (4).
3. Remove the main delivery pipe (2) and PTO delivery pipe (3).

(When reassembling)

Tightening torque	Joint bolt for main delivery pipe	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft
	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft

(1) Front Loader Pipe
(2) Main Delivery Pipe 1
(3) PTO Delivery Pipe
(4) Suction Pipe

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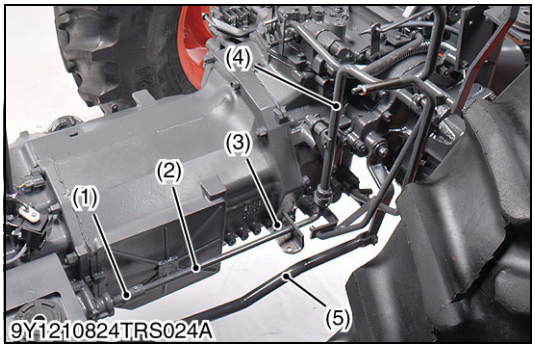

Main Shift Lever and Brake Rods

1. Tap out the spring pins (1) of main shift rod (2).
2. Remove the main gear shift lever (4) with the support (3).
3. Remove the brake rod (5).

(When reassembling)

- Tap in the spring pins (1) so that their split portion may face forward.

(1) Spring Pin
(2) Main Shift Rod
(3) Support
(4) Main Gear Shift Lever
(5) Brake Rod

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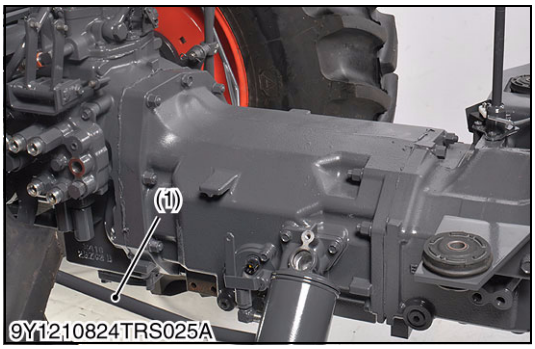

Separating Mid Case and Transmission Case

1. Remove the brake rod (1).
2. Separate the mid case and transmission case after removing their mounting screws.

(When reassembling)

- Make sure to insert the PTO shaft to PTO clutch firmly, turning the PTO shaft.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the mid case and transmission case.

Tightening torque	Mid case and transmission case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

(1) Brake Rod

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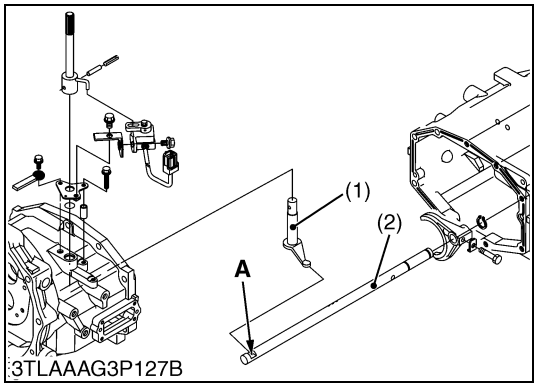

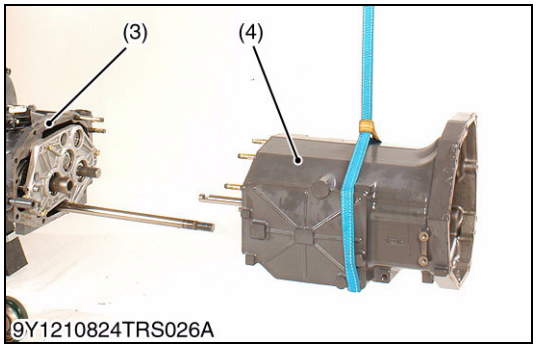

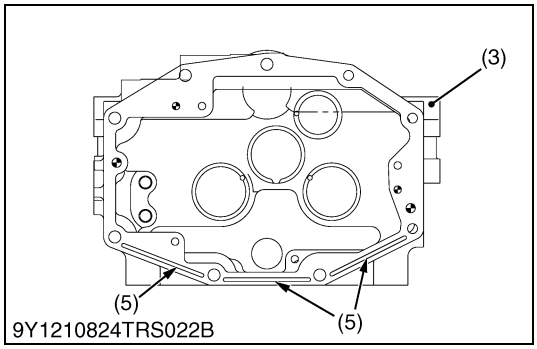

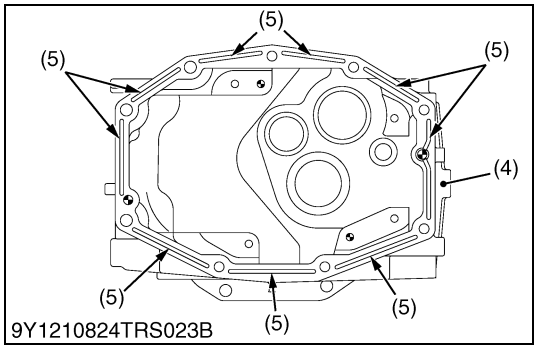

Separating Mid Case

1. Lift up the shuttle shift arm (1).
2. Separate the mid case (4) from the clutch housing (3) after removing their mounting screws.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of clutch housing (3) and mid case (4).
- When reassembling the shuttle shift arm (1) to the shuttle fork rod (2), be sure to install it to the groove **"A"**.
- Make sure to apply liquid gasket to elongated grooves (5) on the mid case face and to those on the lower side of the clutch housing face.

Tightening torque	Clutch housing and mid case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Clutch housing and mid case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

(1) Shuttle Shift Arm
(2) Shuttle Fork Rod
(3) Clutch Housing
(4) Mid Case
(5) Elongated Groove

A: Fork Rod Groove

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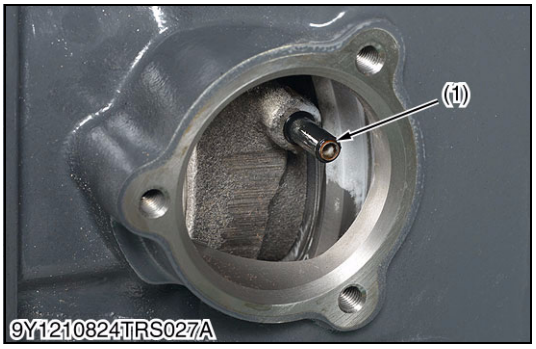


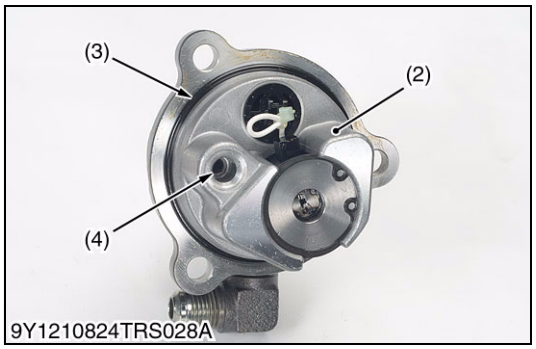
PTO Clutch Valve

1. Remove the PTO clutch valve (2) as a unit.
2. Pull out the pipe (1).

(When reassembling)

- Apply small amount of grease for the O-ring (3).
- Install the pipe (1) to the hole (4) of the PTO clutch valve (2) firmly.
- Replace the pipe (1) with a new one.

Tightening torque	PTO clutch valve mounting screw	23.5 to 27.4 N·m 2.40 to 27.4 kgf·m 17.4 to 20.2 lbf·ft



(1) Pipe
(2) PTO Clutch Valve
(3) O-ring
(4) Hole

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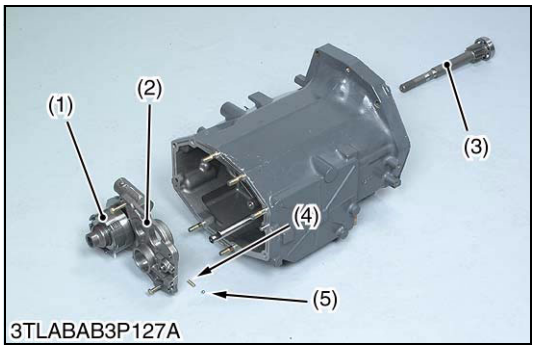

Mid Case Bearing Holder

1. Remove the PTO drive shaft (3).
2. Remove the mid case bearing holder mounting screws.
3. Remove the bearing holder (2) with PTO clutch (1) as a unit.

■ **NOTE**

- **Be careful not to fly out the ball (5) and spring (4) when pull out the bearing holder (2).**

(When reassembling)

- Tap in the mid case bearing holder (2) with plastic hummer until contact to mid case, and then tighten the screws to specified torque.

Tightening torque	Mid case bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) PTO Clutch
(2) Mid Case Bearing Holder
(3) PTO Drive Shaft
(4) Spring
(5) Ball

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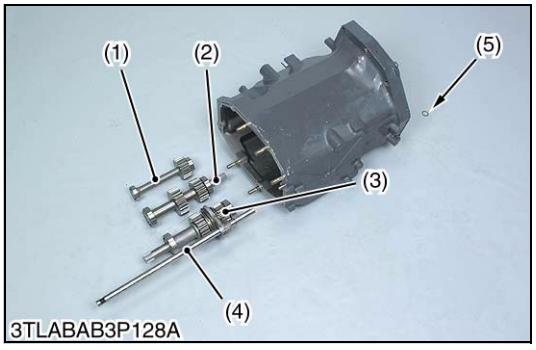

Shaft Assemblies

1. Remove the external snap ring (5).
2. Draw out the shaft assemblies (1), (2), (3) and shuttle fork rod (4).

(1) Reverse Gear Shaft
(2) Shuttle Gear Shaft
(3) Shuttle Shaft Assembly
(4) Shuttle Fork Rod
(5) External Snap Ring

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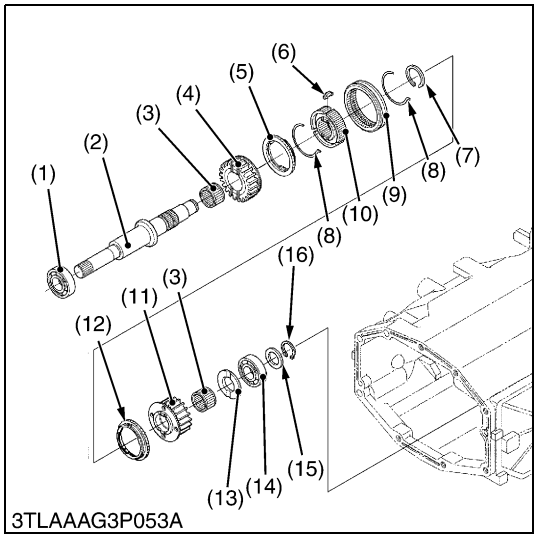

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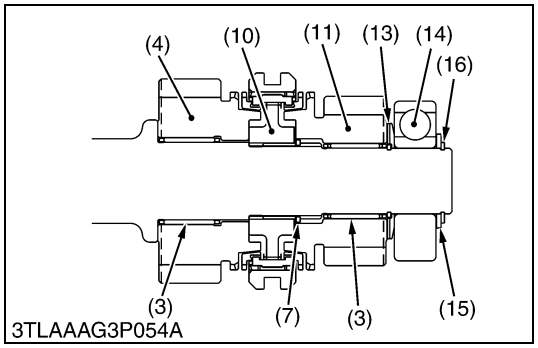

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Shuttle Shaft

1. Remove the external snap ring (16) and collar (15).
2. Draw out the bearing (14) with the bearing puller.
3. Remove the thrust collar (13), 18T gear (11) and synchronizer ring (12).
4. Remove the external snap ring (7), and remove the hub (10) with shifter (9) and synchronizer ring (5).
5. Remove the 22T gear (4).

(When reassembling)

- Apply enough transmission fluid to the needle bearings (3) and thrust collar (13).
- Direct the grooved side of the thrust collar (13) to the needle bearing (3) side.
- Install the external snap ring (7) to the groove of the shuttle shaft (2) firmly.
- Install the synchronizer keys (6) in the key grooves of the synchronizer rings (5), (12) firmly.

(1) Bearing
(2) Shuttle Shaft
(3) Needle Bearing
(4) 22T Gear (Forward)
(5) Synchronizer Ring
(6) Synchronizer Key
(7) External Snap Ring
(8) Synchronizer Spring
(9) Shifter
(10) Hub
(11) 18T Gear (Reverse)
(12) Synchronizer Ring
(13) Thrust Collar
(14) Bearing
(15) Collar
(16) External Snap Ring

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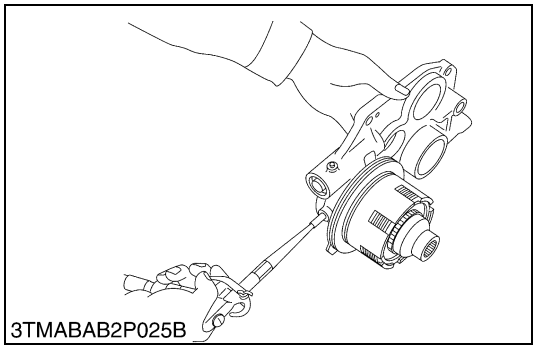
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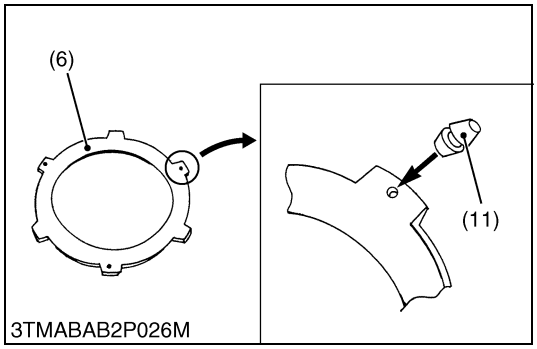

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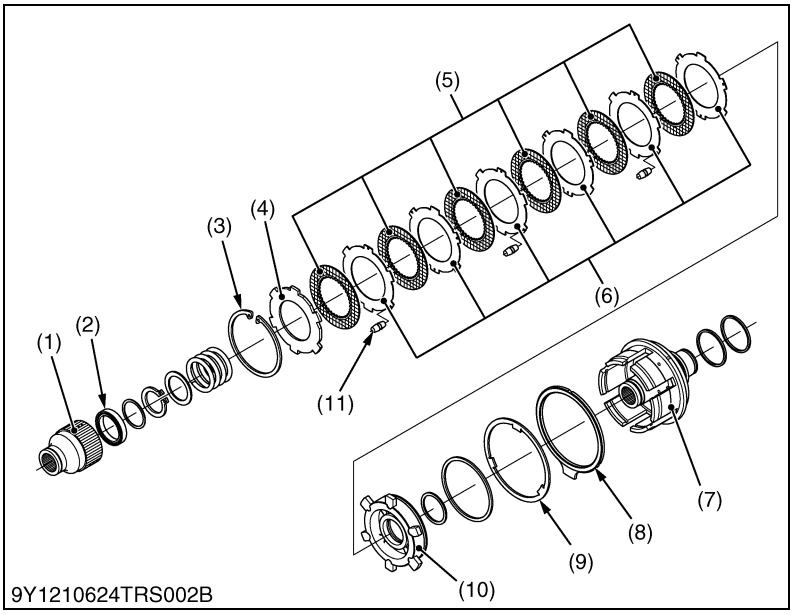
Clutch Discs and Hub of PTO Clutch

1. Remove the internal snap ring (3).
2. Remove the back plate (4), clutch discs (5), clutch plates (6), hub (1) and bearing (2).

(When reassembling)

- Install the clutch plates (5) and clutch plates (6) mutually.
- Do not confuse the two types of clutch plates (6). The clutch plates with the plug rubbers (11) are clutch plates (7) and without plug rubbers are clutch plates (6).
- Do not confuse the back plate (4) and clutch plates (6). The back plate (4) is thicker than the clutch plates (6).
- Assemble the plug rubbers (11) portion 08 the clutch plates (6) are same positions while assemble them.)
- Apply the enough transmission fluid to the clutch discs (5).
- Make sure the moving of the piston (10) smoothly when pressure air at 0.29 to 0.39 MPa (3 to 4 kgf/cm^2, 42 to 57 psi) is sent to clutch pack.



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(1) Hub
(2) Bearing
(3) Internal Snap Ring
(4) Back Plate
(5) Clutch Disc
(6) Clutch Plate
(7) Clutch Case
(8) Brake Disc
(9) Brake Plate
(10) Piston
(11) Plug Rubber

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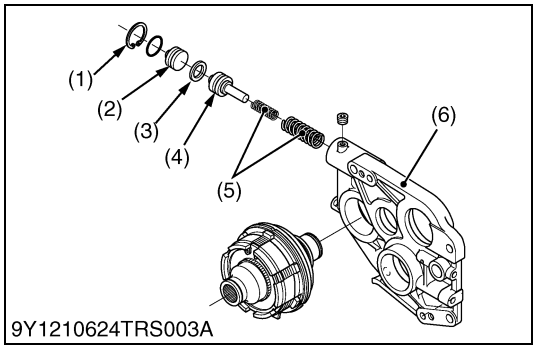

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Accumulator of PTO Clutch

1. Remove the internal snap ring (1).
2. Remove the cover (2).
3. Draw out the piston (4) and springs (5).

(When reassembling)

- Apply small amount of the grease to the O-ring and the piston seal (3).

(1) Internal Snap Ring
(2) Cover
(3) Piston Seat
(4) Piston
(5) Spring
(6) Bearing Holder

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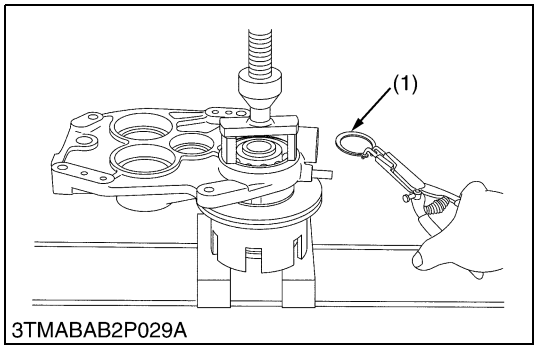

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Clutch Case

1. Remove the external snap ring (5).
2. Remove the clutch case (1).

(When reassembling)

- Apply small amount of the grease to the seal rings (2).

(1) Clutch Case
(2) Seal Ring
(3) Bearing Holder
(4) Bearing
(5) External Snap Ring

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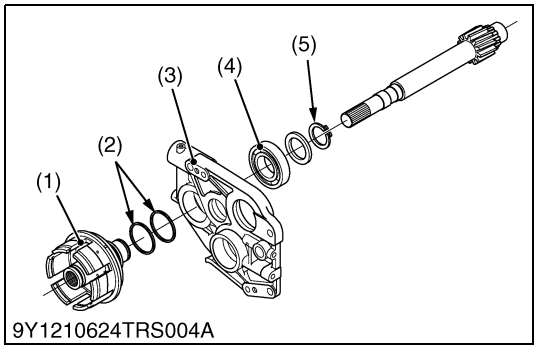

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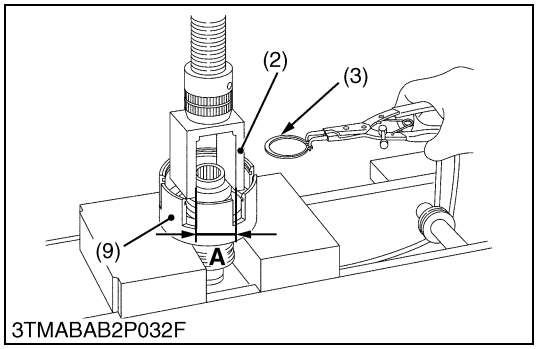


3TMABAB2P032F

Piston

1. Press the washer (2) lightly by the hand press, using the hand made jig. (Refer to the figure left.)
2. Remove the external snap ring (1), washer (2) and spring (3).
3. Draw out the piston (4).
4. Draw out the ring (5), outer ring (6), brake plate (7) and brake disc (8).

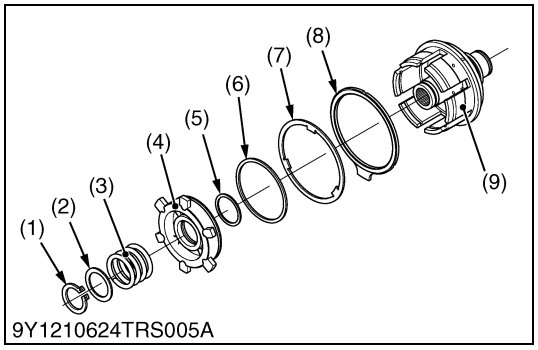
(When reassembling)

- Apply enough transmission fluid to rings (5), (6).

(1) External Snap Ring
(2) Washer
(3) Spring
(4) Piston
(5) Ring
(6) Outer Ring
(7) Brake Plate
(8) Brake Disc
(9) Clutch Case

A: 41 mm (1.6 in.)

9Y1210824TRS0030US0



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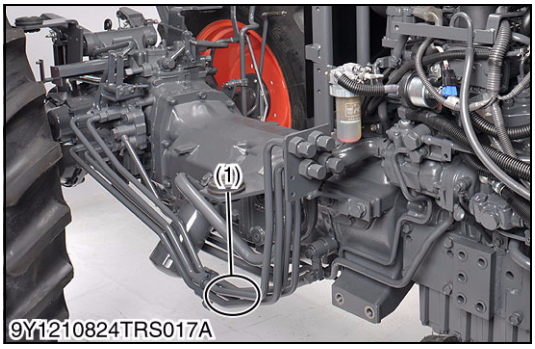
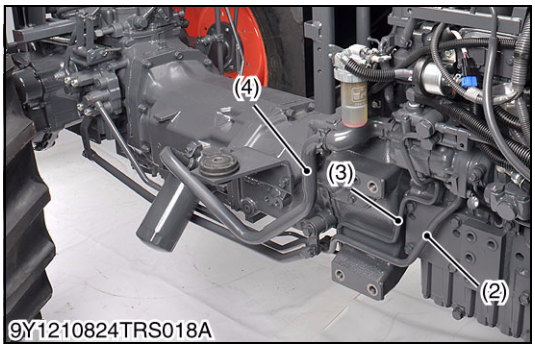
(3) Transmission Case





Hydraulic Pipe

1. Remove the front loader pipes (1).
2. Disconnect the suction pipe (4).
3. Remove the main delivery pipe (2) and PTO delivery pipe (3).

(When reassembling)

Tightening torque	Joint bolt for main delivery pipe	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft
	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft

(1) Front Loader Pipe
(2) Main Delivery Pipe 1
(3) PTO Delivery Pipe
(4) Suction Pipe

9Y1210824TRS0009US0

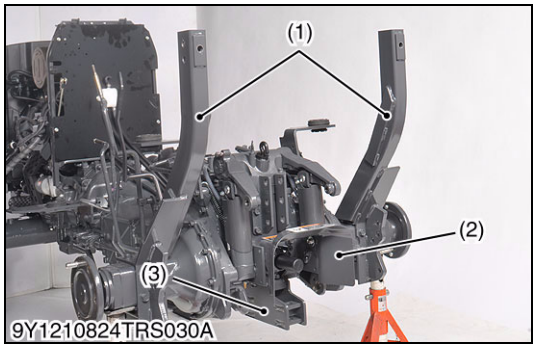
Rear Wheel

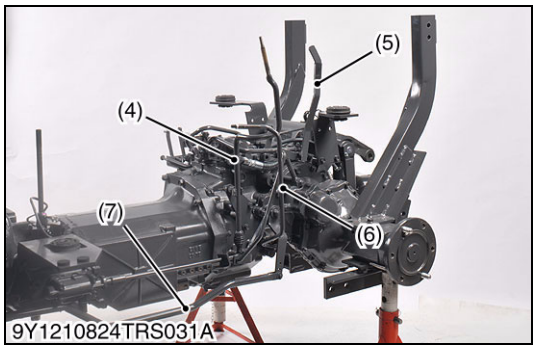
1. Place disassembling stand under the transmission case and support it with a jack.
2. Remove the rear wheels.
3. After removing the rear wheels, support it at both sides of rear axle by stands.

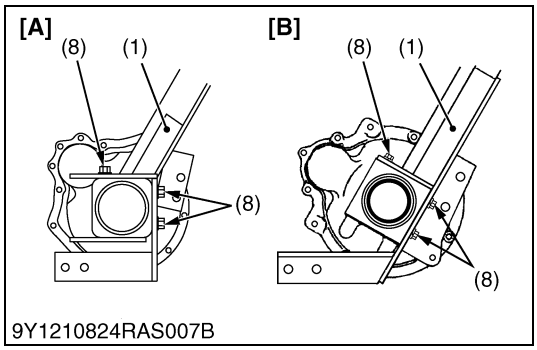
(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	220 N·m 22 kgf·m 160 lbf·ft

9Y1210824TRS0031US0







ROPS, 3 Point Linkages and Others

1. Remove the PTO shaft cover (2).
2. Remove the drawbar frame (3).
3. Remove the main gear shift lever (4), range gear shift lever (5) and four wheel drive lever (6).
4. Disconnect the brake rods (7).
5. Remove the ROPS lower frames (1).

(When reassembling)

Tightening torque	Drawbar frame mounting screw (M12)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Drawbar frame mounting screw (M14)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS lower frame mounting screw	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) ROPS Lower Frame
(2) PTO Shaft Cover
(3) Drawbar Frame
(4) Main Gear Shift Lever
(5) Range Gear Shift Lever
(6) Four Wheel Drive Lever
(7) Brake Rod
(8) Screw (M14 × 30 mm)

[A] L3560
[B] L4060

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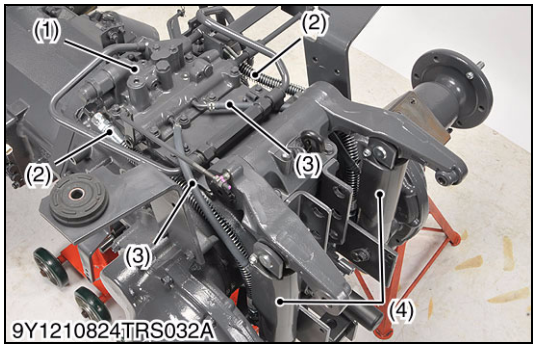

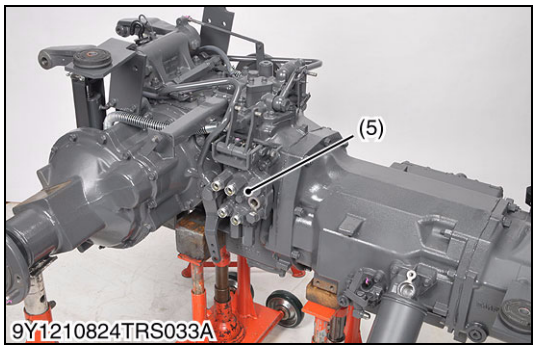

Hydraulic Cylinders and Front Loader Control Valve

1. Disconnect the hydraulic cylinder hoses (2) and return hoses (3) at the rear hydraulic block (1).
2. Remove the two pins, and remove the hydraulic cylinders (4).
3. Remove the front loader control valve (5) with front loader control valve bracket assembly.

Tightening torque	Hydraulic cylinder hose retaining nut	35 to 48 N·m 3.5 to 4.9 kgf·m 26 to 35 lbf·ft

(1) Rear Hydraulic Block
(2) Hydraulic Cylinder Hose
(3) Return Hose
(4) Hydraulic Cylinder
(5) Front Loader Control Valve

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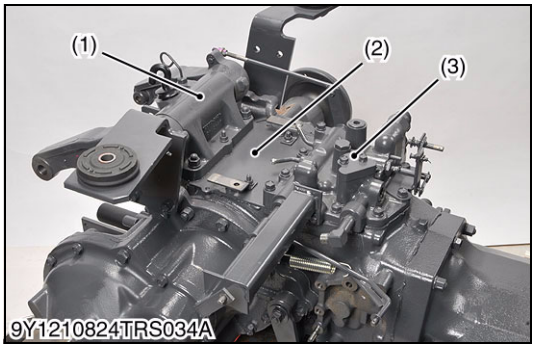

Rear Hydraulic Block and Lift Arm Support

1. Remove the rear hydraulic block (3), cover (2) and lift arm support (1) as a unit.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the differential case and cover (2).

(1) Lift Arm Support
(2) Cover
(3) Rear Hydraulic Block

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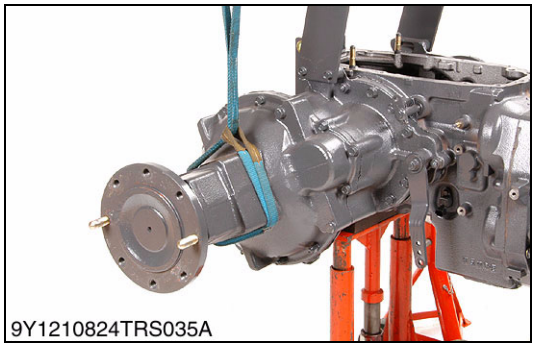

Rear Axle

1. Separate the rear axle case from brake case.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the rear axle and brake case.

Tightening torque	Rear axle case mounting screw and nut	M10 screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
		M10 nut (9T) (Except L3560)	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
		M12 screw (Except L3560)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

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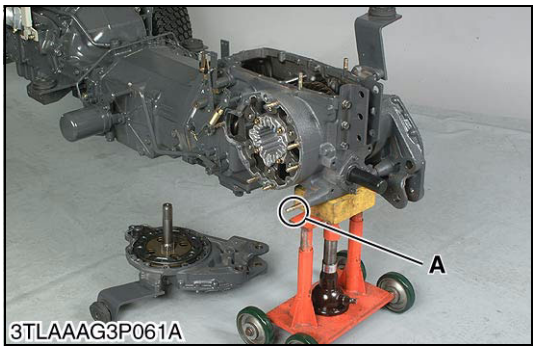

Brake Case

1. Remove the range gear shift lever fulcrum screw.
2. Remove the brake case mounting screws and nuts.
3. Separate the brake case, tapping the brake case lever lightly.

(When reassembling)

- Apply grease to the steel ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the brake cae and transmission case.
- Apply liquid lock to the fulcrum screw.
- Be sure to apply liquid gasket to **"A"** position.
- Be sure to fix the brake cam and cam plate.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.

Tightening torque	Brake case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Fulcrum screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

9Y1210824TRS0036US0

Separating Mid Case and Transmission Case

1. Separate the mid case and transmission case after removing their mounting screws and nut.

(When reassembling)

- Make sure to insert the PTO shaft to PTO clutch firmly, turning the PTO shaft.
- Make sure to insert the front wheel drive shaft to coupling firmly.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the mid case and transmission case.

Tightening torque	Mid case and transmission case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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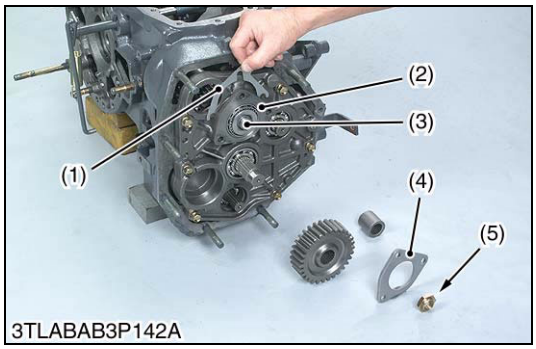


Pinion Bearing Cover

1. Remove the stake of lock nut (5).
2. Lock the turning of spiral bevel pinion and remove the lock nut (5).
3. Remove the pinion bearing case mounting screws.
4. Remove the pinion bearing cover (4) and shims (1).

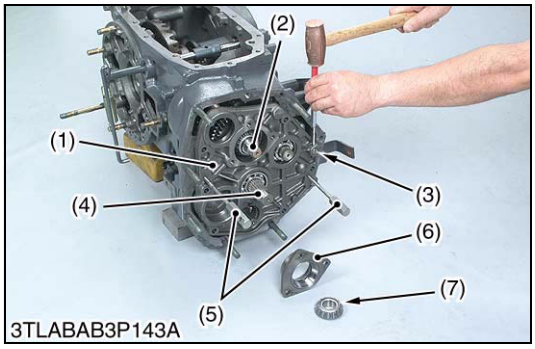
(When reassembling)

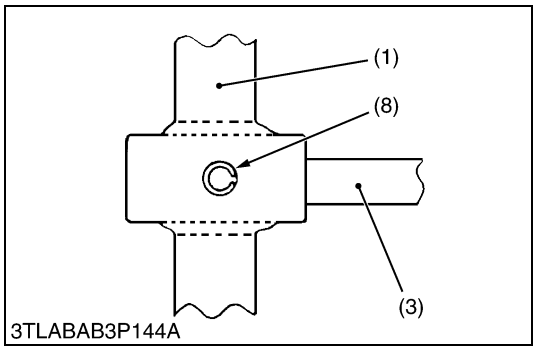
- Make sure of the number of shims in the pinion bearing case.
- Replace the lock nut (5) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

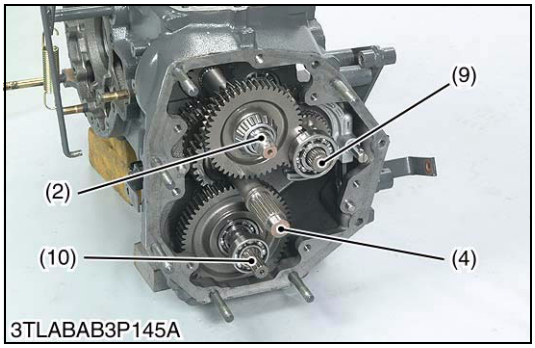
Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Pinion bearing case mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

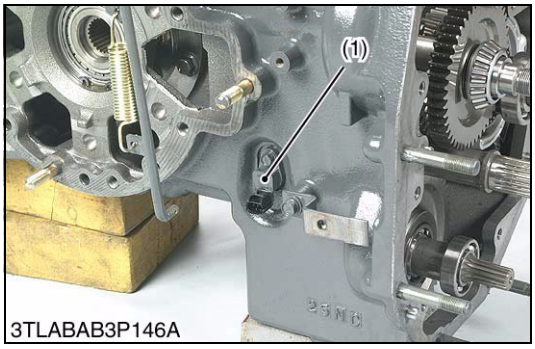
(1) Shim
(2) Pinion Bearing Case
(3) Spiral Bevel Pinion Shaft
(4) Pinion Bearing Cover
(5) Lock Nut

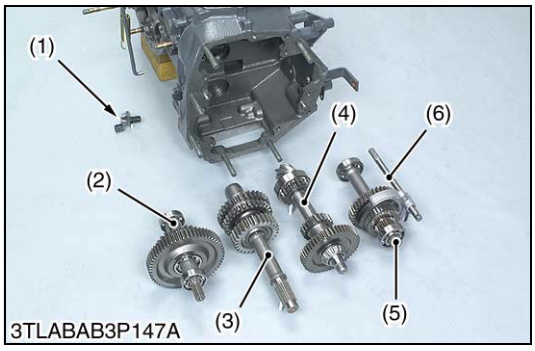
9Y1210824TRS0038US0











Transmission Bearing Holder

1. Remove the transmission bearing holder mounting screws.
2. Tap out the spring pin (8) on the shift fork rod (3).
3. Jack up the bearing holder (1) by using the two jack bolts (5) until the taper roller bearing (7) can be removed.

■ **NOTE**

- **Jack up the bearing holder while hitting the two shafts (2), (4) by copper hammer or soft hammer.**

4. Jack up more and remove the transmission bearing holder (1).

(When reassembling)

- Tap in the transmission bearing holder with soft hammer until contact to transmission case, and then tighten the screws to specified torque.
- Tap in the spring pin (8) so that its split portion may face forward. (Refer to figure.)

Tightening torque	Transmission bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Transmission Bearing Holder
(2) Spiral Bevel Pinion Shaft
(3) Shift Fork Rod for Range Gear Shift
(4) PTO Drive Shaft
(5) Jack Bolt
(6) Pinion Bearing Case
(7) Taper Roller Bearing
(8) Spring Pin
(9) Range Gear Shaft
(10) Front Wheel Drive Shaft

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Shaft Assemblies

1. Remove the traveling speed sensor (1).
2. Remove the spiral bevel pinion shaft assembly (4), range gear shaft assembly (5) with shift fork (6) and PTO drive shaft assembly (3).
3. Remove the front wheel drive shaft (2).

(1) Traveling Speed Sensor
(2) Front Wheel Drive Shaft
(3) PTO Drive Shaft
(4) Spiral Bevel Pinion Shaft
(5) Range Gear Shaft
(6) Shift Fork

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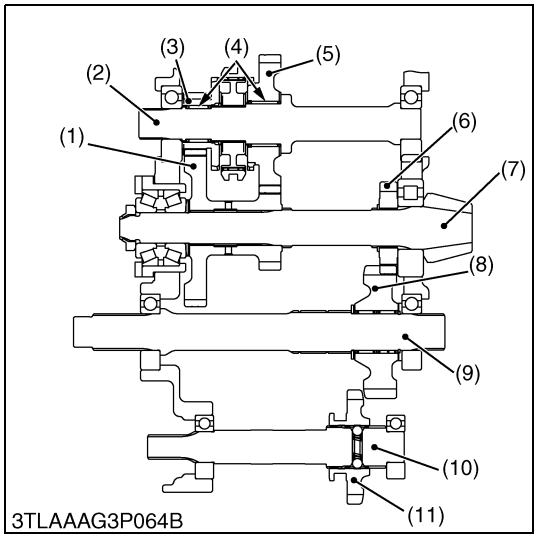

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Disassembling Shaft Assemblies

1. Disassembling the each shaft referring to the figure.

(1) 20T-49T Gear
(2) Range Gear Shaft
(3) 17T Gear
(4) Needle Bearing
(5) 34T Gear
(6) 18T Gear (L3560)
19T Gear (L4060)
(7) Spiral Bevel Pinion Shaft
(8) 29T Gear (L3560)
31T Gear (L4060)
(9) PTO Drive Shaft
(10) Front Wheel Drive Shaft
(11) 24T Shifter Gear

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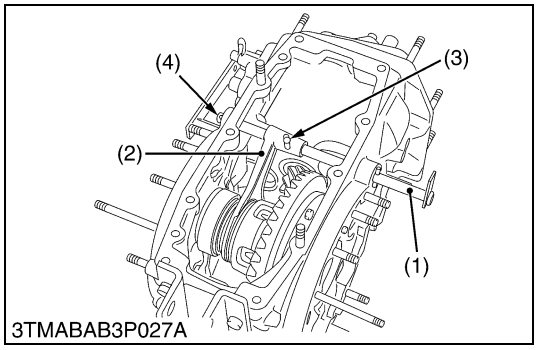

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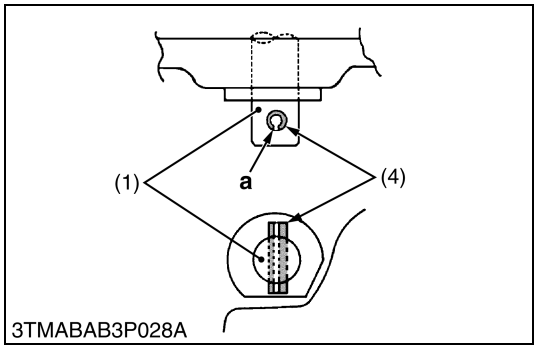
Differential Lock Shift Fork

1. Tap out the left side spring pin (4).
2. Remove the cotter pin and clevis pin (3).
3. Draw out the differential lock fork shaft (1) and remove differential lock shift fork (2).

(When reassembling)

- Apply grease to the left and right oil seals on the transmission case.
- Insert the clevis pin (3) from the top and install the washer and cotter pin.
- Tap in the spring pin (4) so that its split portion **"a"** may face outward as shown in the figure.



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(1) Differential Lock Fork Shaft
(2) DIfferential Lock Shift Fork
(3) Clevis Pin
(4) Spring Pin

a: Split Portion

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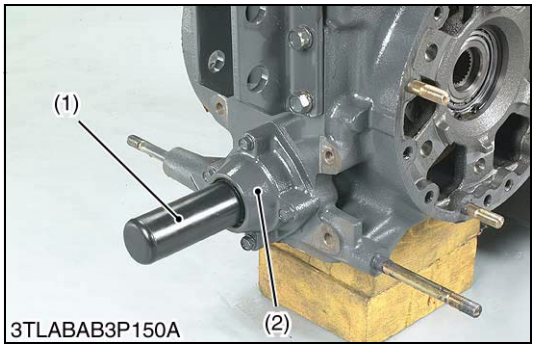


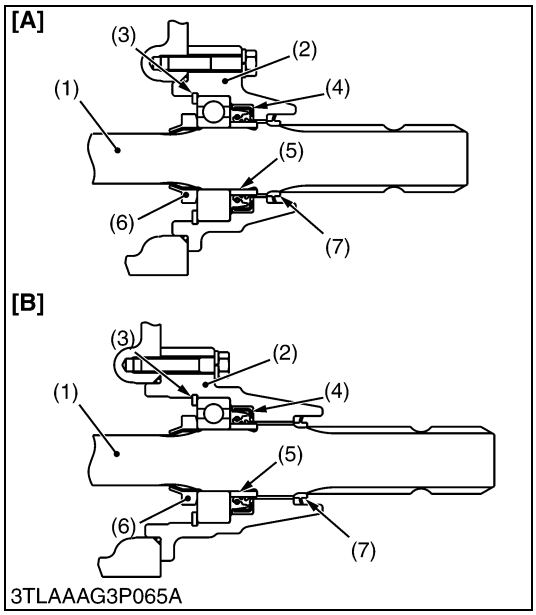
PTO Shaft

1. Remove the PTO shaft cover.
2. Remove the bearing case mounting screws, and draw out the PTO shaft (1) with bearing case (2).
3. Remove the internal snap ring (3).
4. Top out the PTO shaft (1) to the front.

(When reassembling)

- If the lock nut (6) was removed, replace it with a new one. After replacing, be sure to stake it firmly.
- Install the slinger (7) firmly.
- Apply grease to the oil seal (4) and install it, noting its direction.

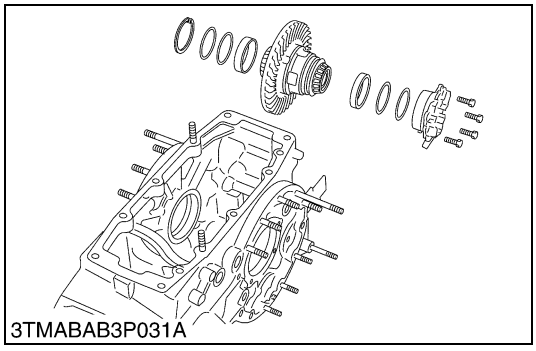
Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Bearing case mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft



(1) PTO Shaft
(2) Bearing Case
(3) Internal Snap Ring
(4) Oil Seal
(5) Oil Seal Collar
(6) Lock Nut
(7) Slinger

[A] L3560
[B] L4060

9Y1210824TRS0043US0



Differential Gear Assembly

1. Remove the differential support, noting the number of left shims.
2. Remove the differential gear assembly, noting the number of right shims.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion.
- Use same number of shims as before disassembling.

Tightening torque	Differential support mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

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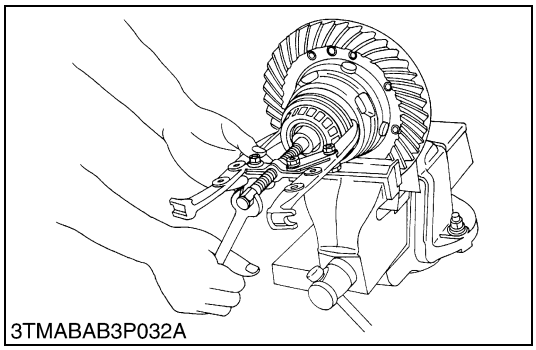

Bearing and Differential Lock Shifter

1. Secure the differential gear in a vise.
2. Remove the differential lock shifter and taper roller bearing as a unit with a puller.

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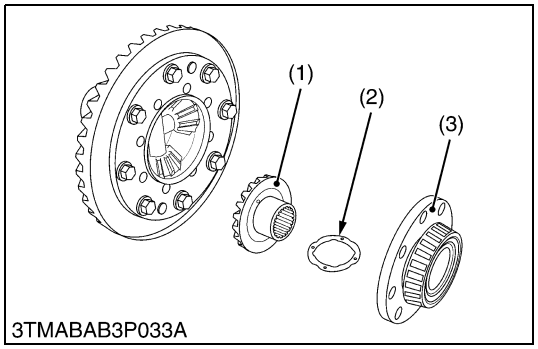

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Differential Case Cover and Differential Side Gear

1. Remove the differential case cover (3).
2. Remove the differential side gear (1) and differential side gear washer (2).

(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gear boss.

Tightening torque	Differential case cover mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Differential Side Gear
(2) Differential Side Gear Washer
(3) Differential Case Cover

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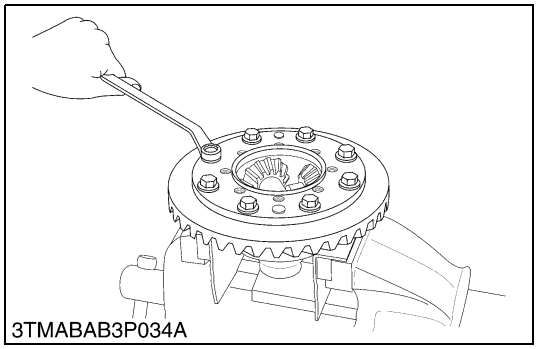
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Spiral Bevel Gear

1. Remove the spiral bevel gear.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion shaft.
- Apply liquid lock (Three Bond 1372 or equivalent) to the spiral bevel gear UBS screws.

Tightening torque	Spiral bevel gear UBS screw	69 to 88 N·m 7.0 to 9.0 kgf·m 51 to 65 lbf·ft

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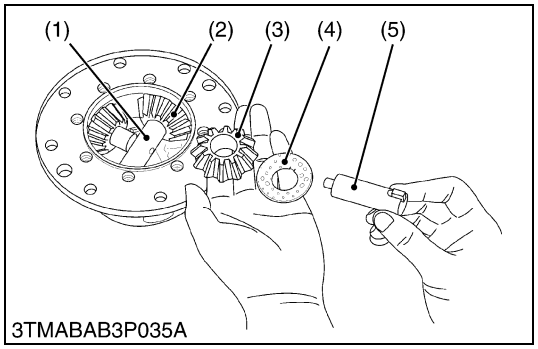

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Differential Pinion Shaft and Differential Pinion

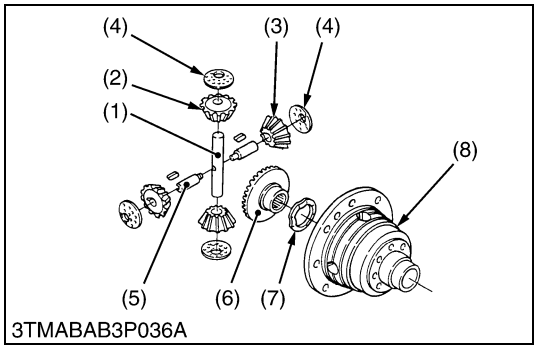
1. Draw out the differential pinion shaft 2 (5), and remove the differential pinion (3) and differential pinion washer (4).
2. Draw out the differential pinion shaft (1), and remove the differential pinion (2) and differential pinion washer.

■ **NOTE**

- **Arrange the parts to know their original position.**

(When reassembling)

- Check the differential pinions (2) and (3), and pinion shaft (1) and (5) for excessive wear. If these parts are damaged or excessively worn, replace their parts they are in mesh with, or they sliding on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential pinions.
- Install the parts to their original position.
- Install the differential pinion washer (4), noting its groove position.



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(1) Differential Pinion Shaft
(2) Differential Pinion
(3) Differential Pinion
(4) Differential Pinion Washer
(5) Differential Pinion Shaft 2
(6) Differential Side Gear
(7) Differential Side Gear Washer
(8) Differential Case

A: Fit Groove

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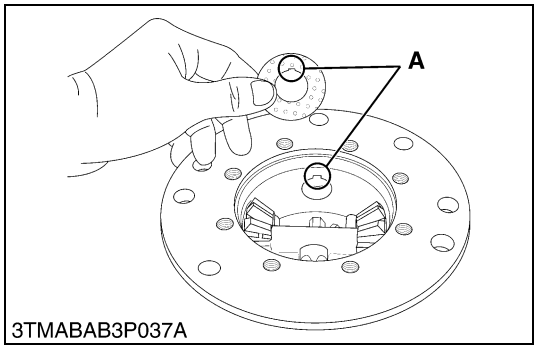

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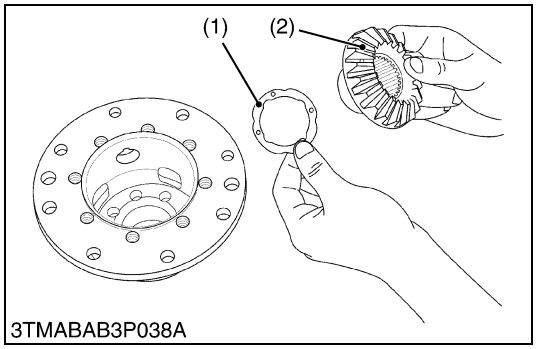


Differential Side Gear

1. Remove the differential side gear (2) and differential side gear washer (1).

(When reassembling)

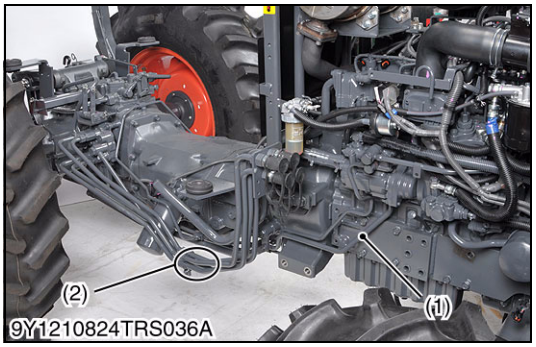
- Check the thrust and bearing surface of both differential side gears (2). If they are worn or damaged, bores in the differential case may also be damaged. Be sure to replace their parts.

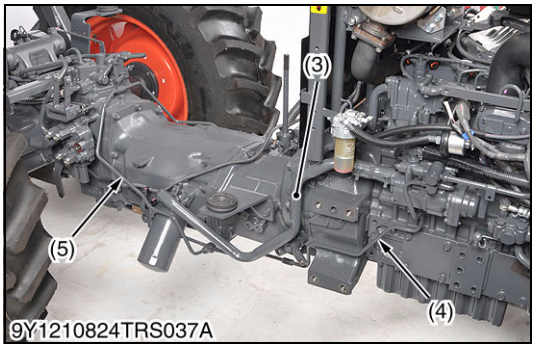
(1) Differential Side Gear Washer (2) Differential Side Gear

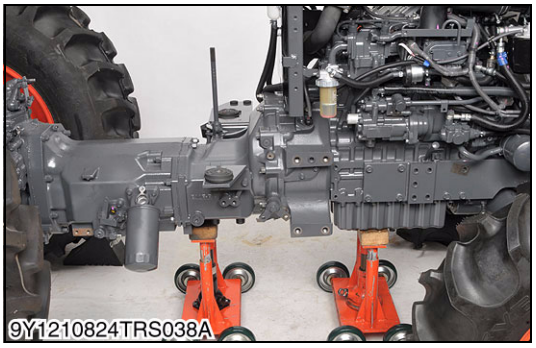
9Y1210824TRS0049US0

[2] GLIDE SHIFT TRANSMISSION

(1) Clutch Housing







Hydraulic Pipe

1. Remove the front loader pipes (2) and main delivery pipe (1).
2. Remove the left and right brake rods.
3. Disconnect the suction pipe (3).
4. Remove the GST delivery pipe (5) and PTO delivery pipe (4).

(When reassembling)

Tightening torque	Joint bolt for main delivery pipe	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft
	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

(1) Main Delivery Pipe
(2) Front Loader Pipe
(3) Suction Pipe
(4) PTO Delivery Pipe
(5) GST Delivery Pipe

9Y1210824TRS0052US0

Separating Engine and Clutch Housing

1. Place the disassembling stands under the engine and clutch housing.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine and clutch housing.

(When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1211 or equivalent) to joint face of the flywheel housing and clutch housing.

Tightening torque	Engine and clutch housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Engine and clutch housing mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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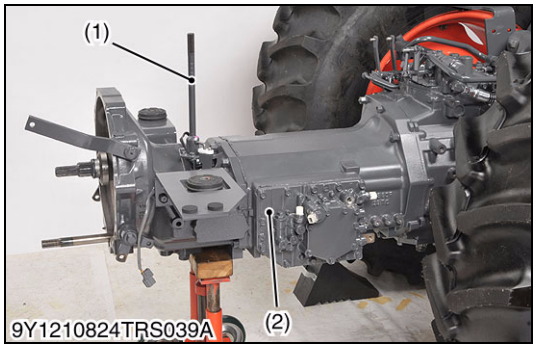

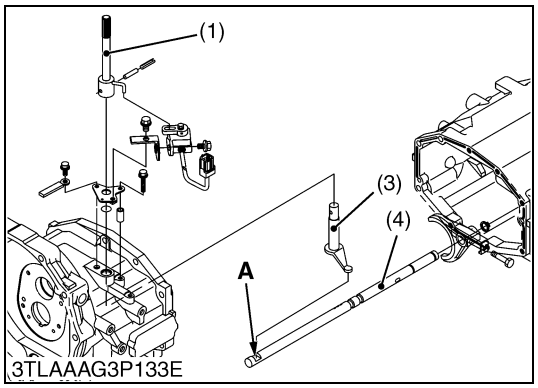

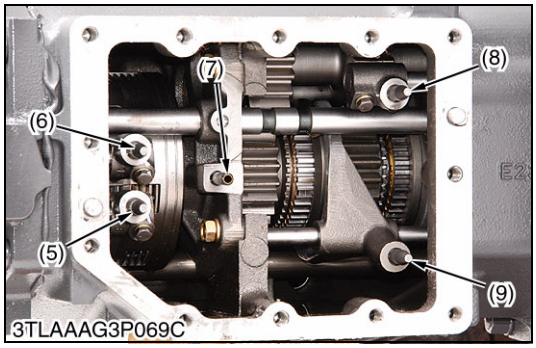

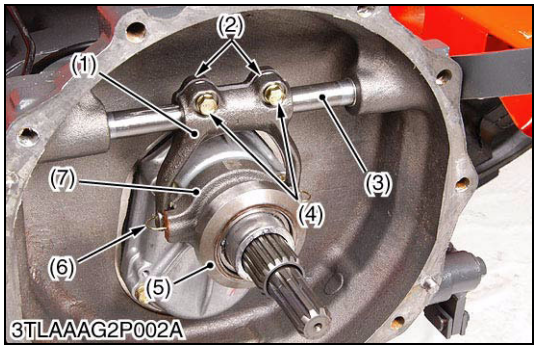

Shuttle Shift Arm and GST Valve Assembly

1. Remove the shuttle shift arm stopper screw, and then pull the shuttle shift shaft (1) with shuttle shift arm (3) up.
2. Remove the GST valve (2) using two jack bolts.
3. Remove the shift pins (5) (6).

■ **NOTE**

- **Do not fall down the shift pin while disassembling.**

(When reassembling)

- When reassembling the shuttle shift arm (3) to the shuttle fork rod (4), be sure to install it to the groove **"A"**.
- Place the 1-2 shift pin (5) and the 3-4 shift pin (6) at **neutral** position, main range shift pin (8) at **L** position (forward) and sub-range shift pin (9) at **Hi** position (rearward), and then assemble the GST valve.
- Be sure to match the each shift pin and shift piston.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the GST valve assembly.
- Install the GST valve (2) by hand, and then tighten the screws. Do not use the hummer.
- Replace the pipe (7) with a new one, if damaged.

Tightening torque	Shift pin mounting screws	13 to 14 N·m 1.3 to 1.5 kgf·m 9.4 to 10 lbf·ft
	GST valve mounting screws	43 to 48 N·m 4.3 to 4.9 kgf·m 32 to 35 lbf·ft

(1) Shuttle Shift Shaft
(2) GST Value
(3) Shuttle Shift Arm
(4) Shuttle Fork Rod
(5) 1-2 Shift Pin
(6) 3-4 Shift Pin
(7) Pipe
(8) Main Range Shift Pin
(9) Sub-range Shift Pin

A: Fork Rod Groove

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Release Hub and Clutch Lever

1. Draw out the clutch release hub (7) and the release bearing (5) as a unit.
2. Remove the release fork setting screws (4) and fork keys (2).
3. Draw out the clutch lever (3) to remove the release fork (1).

(When reassembling)

- Make sure the direction of the release fork (1) is correct.
- Inject grease to the release hub (7).
- Be sure to set the snap pins (6).

Tightening torque	Release fork setting screws	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Release Fork
(2) Fork Key
(3) Clutch Lever
(4) Setting Screw
(5) Release Bearing
(6) Snap Pin
(7) Release Hub

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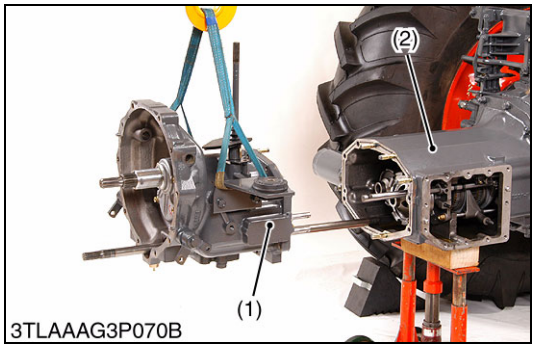


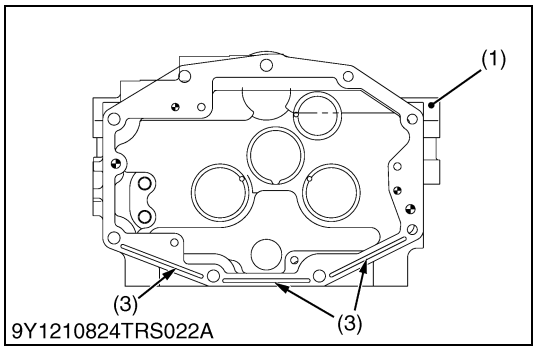
Separating Clutch Housing and Mid Case

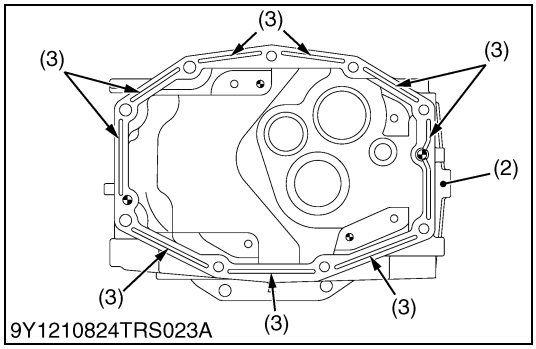
1. Remove the clutch housing and mid case mounting screws and nuts.
2. Separate the clutch housing (1) and mid case (2).

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the clutch housing and mid case.
- Make sure to apply liquid gasket to elongated grooves (3) on the mid case face and to those on the lower side of the clutch housing face.

Tightening torque	Clutch housing and mid case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Clutch housing and mid case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft





(1) Clutch Housing
(2) Mid Case
(3) Elongated Groove

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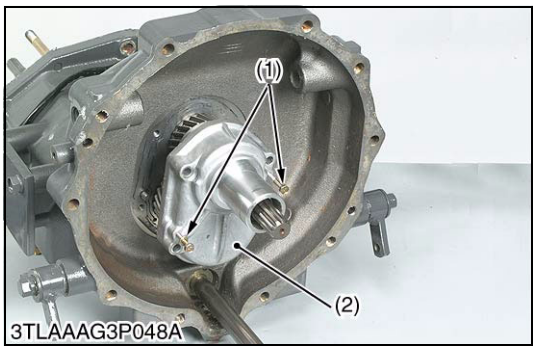


Shaft Case

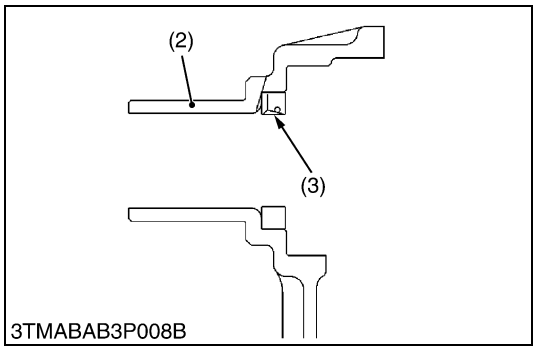
1. Remove the shaft case mounting screws.
2. Screw down the two M6 jack bolts (1) into the shaft case (2) and pull it out.
3. Remove the shaft case (2).

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the shaft case and clutch housing.

(When replacing oil seal in shaft case)

- Install the oil seal (3) as shown in the figure, noting its direction.
- Apply grease to the oil seal (3).



(1) M6 Jack Bolt
(2) Shaft Case
(3) Oil Seal

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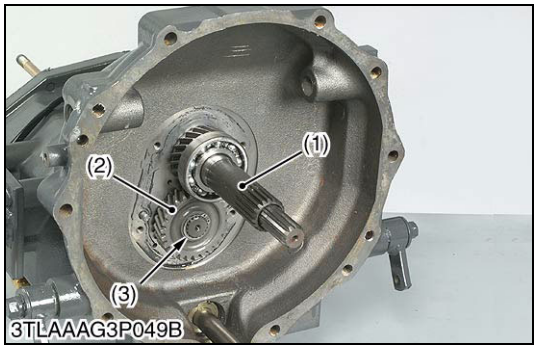

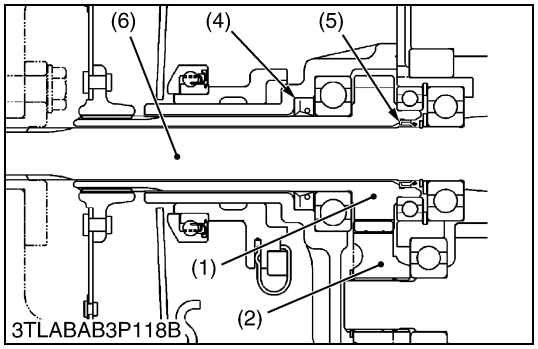

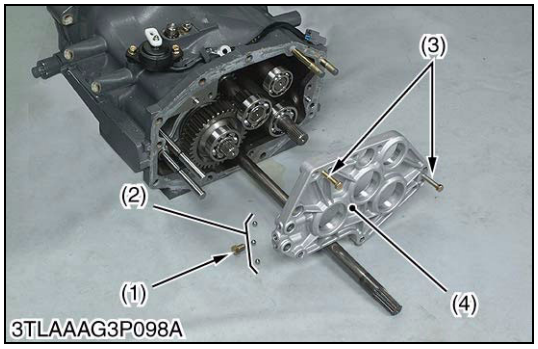

23T (24T) Gear Shaft and 27T (26T) Gear

1. Remove the 23T (24T) gear shaft (1).
2. Remove the external snap ring (3) and 27T (26T) gear (2).

(When reassembling)

- Install the oil seal (4) on the 18T gear shaft (6), noting the direction of the oil seal (4) as shown in the figure.
- Direct the boss side of the gear (2) to the bearing side.
- Apply small amount of the grease to the oil seal (4), (5).

(1) 23T Gear Shaft (L3560, L4060, L4760) 24T Gear Shaft (L5060)
(2) 27T Gear (L3560, L4060, L4760) 26T Gear (L5060)
(3) External Snap Ring
(4) Oil Seal
(5) Oil Seal
(6) 18T Gear Shaft

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Clutch Housing Bearing Holder

1. Remove the three interlock balls (2) after removing the stopper screw (1).
2. Pull out the clutch housing bearing holder (4) with using two jack bolts (3).

(When reassembling)

- Tap in the clutch housing bearing holder (4) with plastic hammer until contact to clutch housing case, and then tighten the screws to specified torque.
- Install the three interlock balls (2) with a small amount of grease to the clutch housing bearing holder (4) after setting the shift forks and shift rods to the neutral position.

Tightening torque	Clutch housing bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Stopper screw	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft

(1) Stopper Screw
(2) Interlock Ball
(3) Jack Bolt
(4) Clutch Housing Bearing Holder

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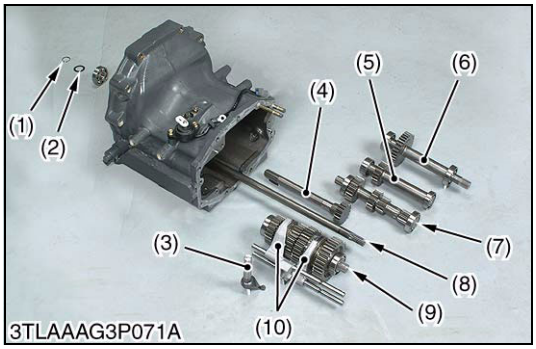

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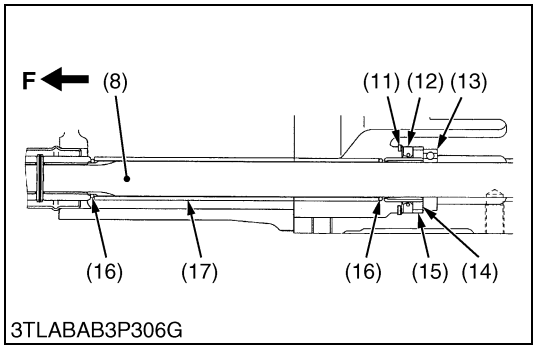

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Shaft Assemblies

1. Remove the external snap ring (1) and thrust collar (2).
2. Draw out the shaft assemblies (4), (5), (6), (7), (9) and shift forks (10) and rods.
3. Pull out the front axle drive shaft (8) to the rear side.

(When reassembling)

- Install the front axle drive shaft (8) from front side after assembling the clutch housing and mid case. Then install the bearing (13), sleeve (14), collar (15), oil seal (12), internal snap ring (11), O-ring (16) and spacer (17) in order.

(1) External Snap Ring
(2) Collar
(3) Shuttle Shift Arm
(4) 18T Gear Shaft Assembly
(5) Idle Shaft Assembly
(6) PTO Counter Shaft Assembly
(7) Main Gear Shaft Assembly
(8) Front Axle Drive Shaft
(9) Counter Shaft Assembly
(10) Shift Fork
(11) Internal Snap Ring
(12) Oil Seal
(13) Bearing
(14) Sleeve
(15) Collar
(16) O-ring
(17) Spacer

F: Front Side

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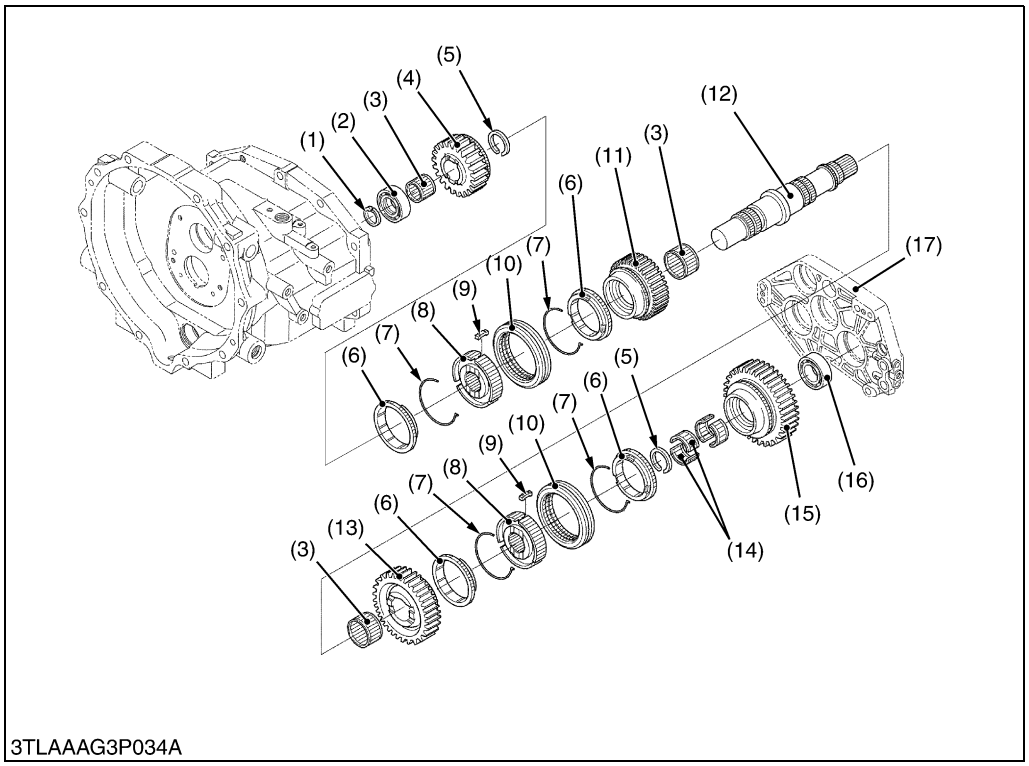
Counter Shaft



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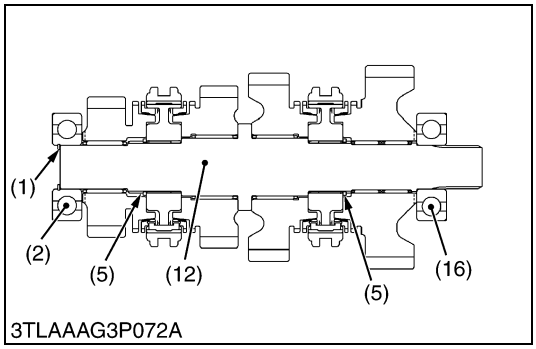
(1) Internal Snap Ring
(2) Bearing
(3) Needle Bearing
(4) 24T Gear (4th)
(5) External Snap Ring
(6) Synchronizer Ring
(7) Synchronizer Spring
(8) Hub
(9) Synchronizer Key
(10) Shifter
(11) 29T Gear (3rd)
(12) Counter Shaft
(13) 34T Gear (2nd)
(14) Needle Bearing
(15) 37T Gear (1st)
(16) Bearing
(17) Bearing Holder



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1. Remove the internal snap ring (1) and remove both side of the bearings (2), (16).
2. Remove the gears on the counter shaft (12) and external snap rings (5).

(When reassembling)

- Reinstall the synchronizer keys (9) in the key grooves of the synchronizer rings (6) firmly.

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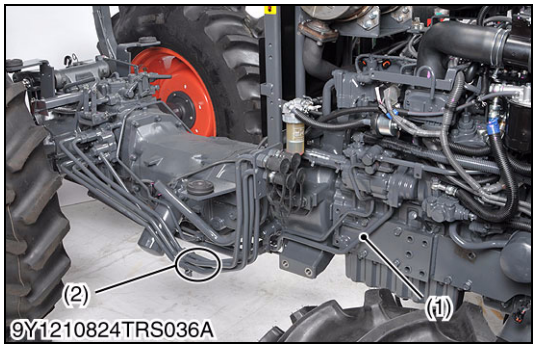
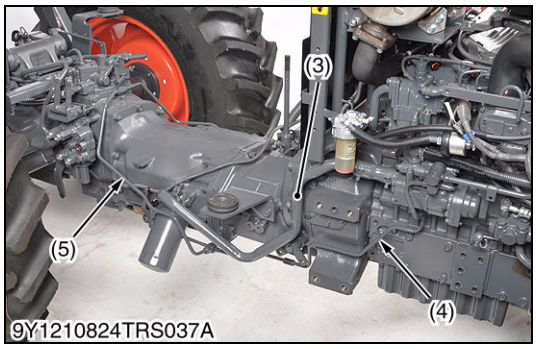
(2) Mid Case





Hydraulic Pipe

1. Remove the front loader pipes (2) and main delivery pipe (1).
2. Remove the left and right brake rods.
3. Disconnect the suction pipe (3).
4. Remove the GST delivery pipe (5) and PTO delivery pipe (4).

(When reassembling)

Tightening torque	Joint bolt for main delivery pipe	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft
	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

(1) Main Delivery Pipe
(2) Front Loader Pipe
(3) Suction Pipe
(4) PTO Delivery Pipe
(5) GST Delivery Pipe

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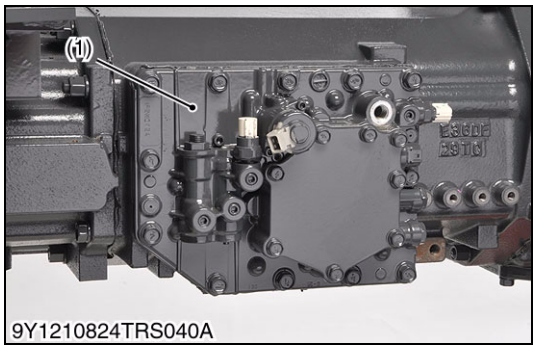

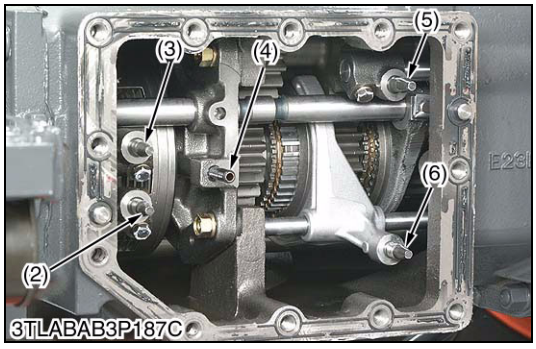

GST Valve Assembly

1. Remove the GST valve (1) with using two jack bolts.
2. Remove the shift pin (2), (3) and (5).

■ **NOTE**

- **Do not fall down the shift pin while disassembling.**

(When reassembling)

- Place the 1-2 (2) and 3-4 shift pins (3) at **neutral** position, sub-range shift pin (6) at **Hi** position (rearward) and main range shift pin (5) at **L** position (forward), and then assemble the GST valve.
- Be sure to match the each shift pin and shift piston.
- Install the GST valve (1) by hand, and then tighten the screws. Do not use the hummer.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the GST valve assembly.
- Replace the pipe (4) with a new one, if damaged.

Tightening torque	GST valve mounting screws	43 to 48 N·m 4.3 to 4.9 kgf·m 32 to 35 lbf·ft
	Shift pin mounting screw	13 to 14 N·m 1.3 to 1.5 kgf·m 9.4 to 10 lbf·ft

(1) GST Valve
(2) 1-2 Shift Pin
(3) 3-4 Shift Pin
(4) Pipe
(5) Main Range Shift Pin
(6) Sub-range Shift Pin

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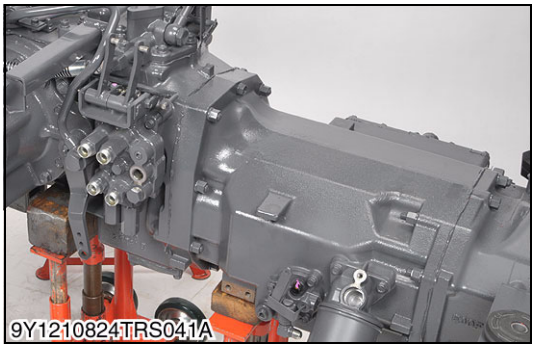

Separating Mid Case and Transmission Case

1. Separate the mid case and transmission case after removing their mounting screws.

(When reassembling)

- Make sure to insert the PTO shaft to PTO clutch firmly, turning the PTO shaft.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the mid case and transmission case.

Tightening torque	Mid case and transmission case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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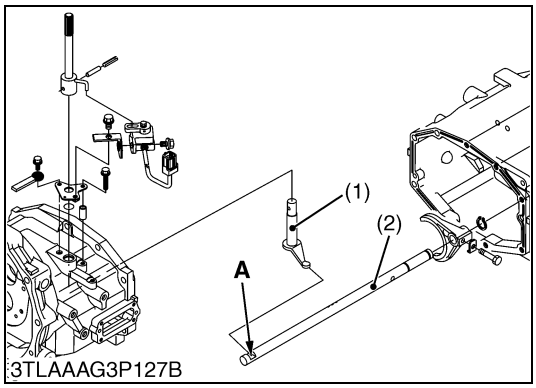


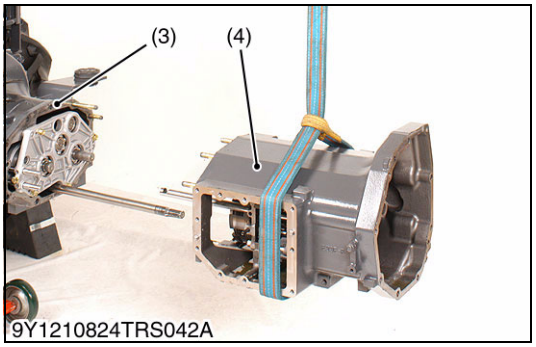
Separating Mid Case

1. Lift up the shuttle shift arm (1).
2. Separate the mid case (4) from the clutch housing (3) after removing their mounting screws.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of clutch housing (3) and mid case (4).
- Make sure to apply liquid gasket to elongated grooves (5) on the mid case face and to those on the lower side of the clutch housing face.
- When reassembling the shuttle shift arm (1) to the shuttle fork rod (2), be sure to install it to the groove **"A"**.

Tightening torque	Clutch housing and mid case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Clutch housing and mid case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft



(1) Shuttle Shift Arm
(2) Shuttle Fork Rod
(3) Clutch Housing
(4) Mid Case
(5) Elongated Groove

A: Fork Rod Groove

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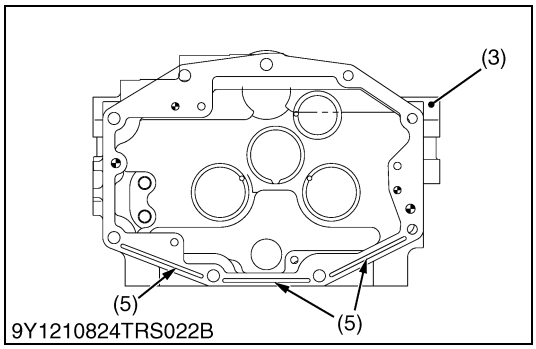

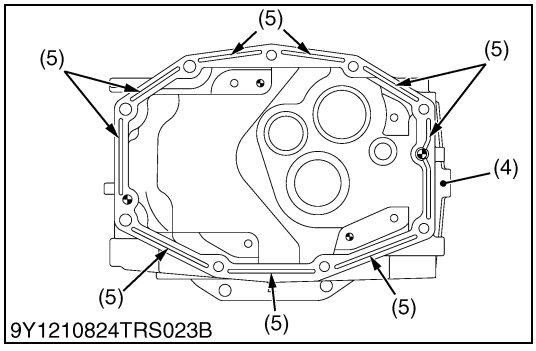

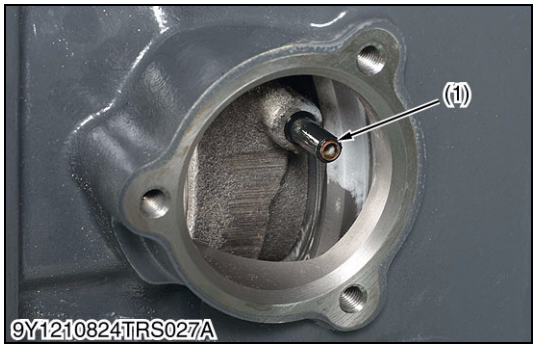

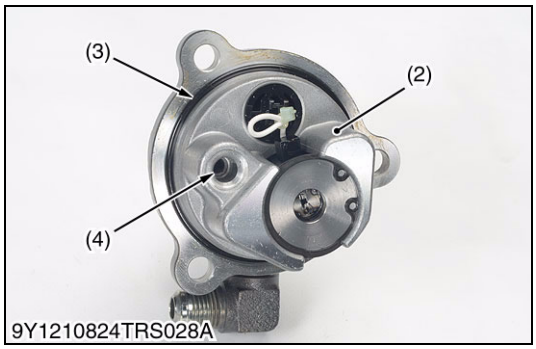

PTO Clutch Valve

1. Remove the PTO clutch valve (2) as a unit.
2. Pull out the pipe (1).

(When reassembling)

- Apply small amount of grease for the O-ring (3).
- Install the pipe (1) to the hole (4) of the PTO clutch valve (2) firmly.
- Replace the pipe (1) with a new one.

Tightening torque	PTO clutch valve mounting screw	23.5 to 27.4 N·m 2.40 to 27.4 kgf·m 17.4 to 20.2 lbf·ft

(1) Pipe
(2) PTO Clutch Valve
(3) O-ring
(4) Hole

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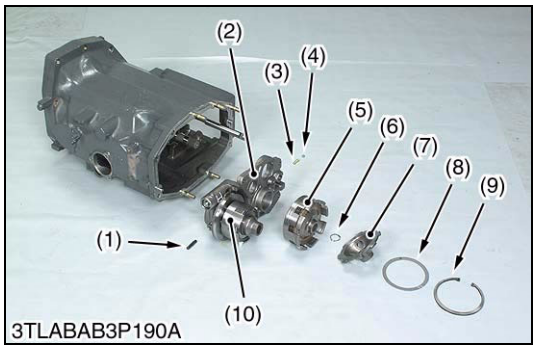

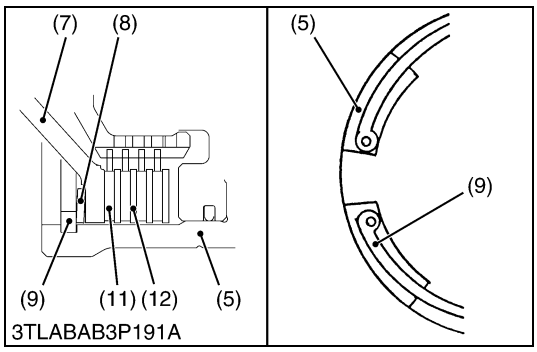

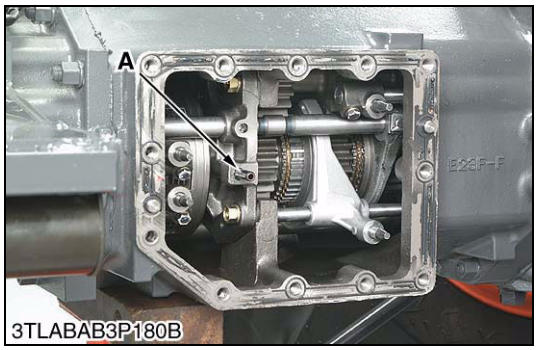

Mid Case Bearing Holder

1. Remove the internal snap ring (9) and remove the disc spring (8) and clutch input hub (7).
2. Remove the external snap ring (6) and remove the GST clutch case (5).
3. Remove the mid case bearing holder mounting screws.
4. Remove the bearing holder (2) with PTO clutch (10) by using two jack bolts.

■ **NOTE**

- **Be careful not to fly out the ball (4) and spring (3) when pull out the bearing holder (2).**

(When reassembling)

- Tap in bearing holder (2) with plastic hummer until contact to case, and then tighten the screws to specified torque.
- Assemble the disc spring (8) as shown in the figure.
- Install the internal snap ring (9) to the clutch case (5) as shown in the figure.
- Make sure the piston moves smoothly when pressure air at 0.29 to 0.39 MPa (3 to 4 kgf/cm^2, 42 to 57 psi) is sent to clutch pack. (Air must be sent from hole **"A"**.)

Tightening torque	Mid case bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) PTO Clutch Pipe
(2) Mid Case Bearing Holder
(3) Spring
(4) Ball
(5) Clutch Case
(6) External Snap Ring
(7) Clutch Input Hub
(8) Disc Spring
(9) Internal Snap Ring
(10) PTO Clutch
(11) Clutch Disc
(12) Steel Plate

A: Oil Inlet Port for GST Clutch

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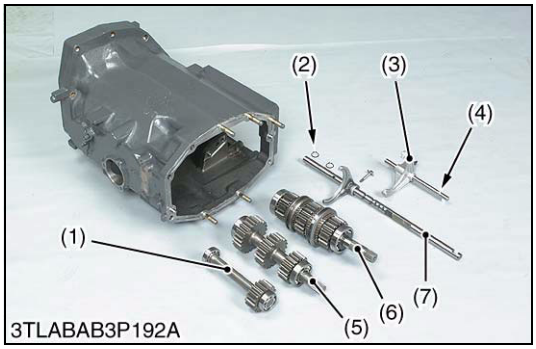

Shaft Assemblies

1. Pull out the sub-range shift rod (4) and remove the shift fork (3).
2. Remove the external snap ring (2) which is located at rear side of the mid case.
3. Draw out the shaft assemblies (1), (5), (6) and shuttle fork rod (7).

(1) Reverse Gear Shaft
(2) External Snap Ring
(3) Shift Fork
(4) Sub-range Shift Fork Rod
(5) Shuttle Gear Shaft
(6) Shuttle Shaft
(7) Shuttle Fork Rod

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Disassembling PTO Clutch

• See page 3-S68.

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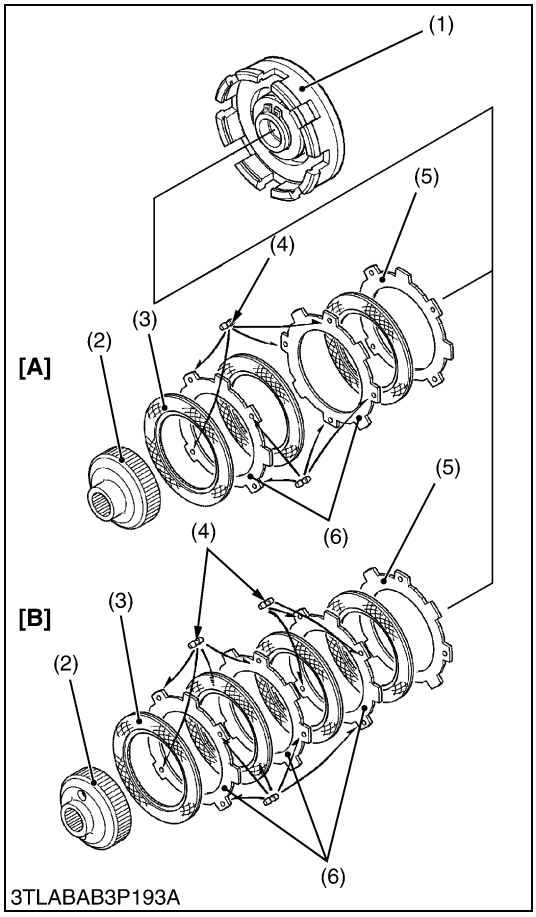

GST Clutch Discs

1. Remove the clutch hub (2), clutch disc (3) and steel plate (5), (6) from clutch case (1).

(When reassembling)

- Assemble the two (L3560) or three (L4060, L4760, L5060) steel plates (6) with plug rubbers (4) to the front side, one steel plate (5) without plug rubber to the piston side. (Steel plate (5), (6) are used same part.)
- Do not pile up the plug rubber (4) portion on steel plates (6) while reassembling as shown in the figure.

(1) Clutch Case
(2) Clutch Hub
(3) Clutch Disc (Three pieces for L3560, four pieces for L4060, L4760, L5060)
(4) Plug Rubber
(5) Steel Plate without Plug Rubber
(6) Steel Plate with Plug Rubber (Two pieces for L3560, three pieces for L4060, L4760, L5060)

[A] L3560
[B] L4060, L4760, L5060

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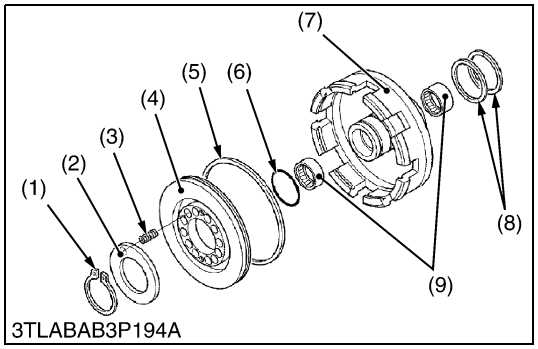

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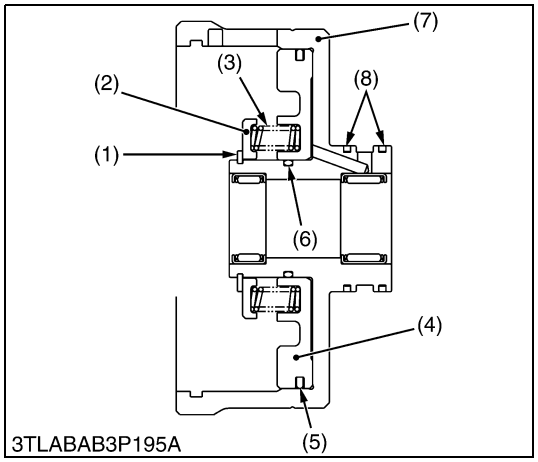

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Clutch Case and GST Clutch Piston

1. Remove the external snap ring (1) while pushing the spring retainer (2) by hand press.
2. Remove the spring retainer (2), springs (3) and piston (4).

(When reassembling)

- Apply small amount of the grease to the seal rings (8) when assemble the clutch case (7).
- Apply enough transmission fluid to the O-ring (6) and D-ring (5).

(1) External Snap Ring
(2) Spring Retainer
(3) Spring
(4) Piston
(5) D-ring
(6) O-ring
(7) Clutch Case
(8) Seal Ring
(9) Needle Bearing

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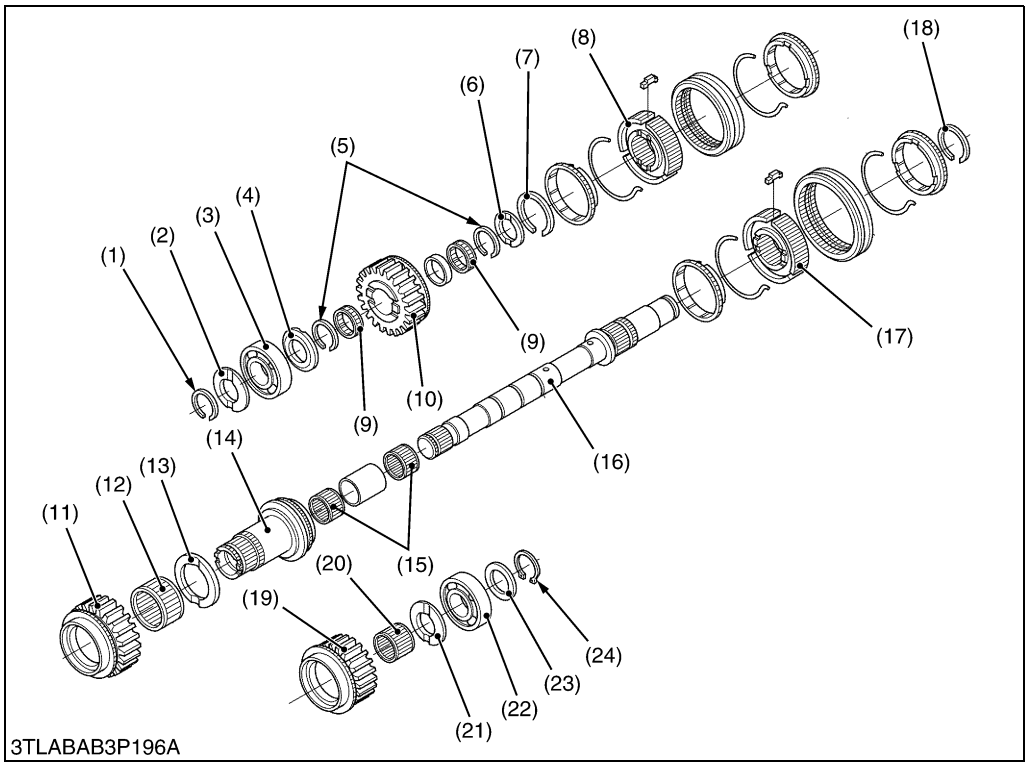
Shuttle Shift Gears



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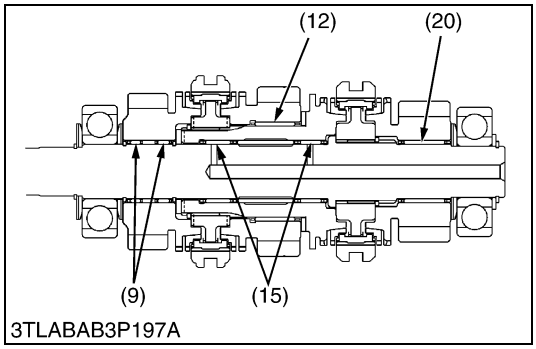
(1) External Snap Ring
(2) Thrust Collar
(3) Bearing
(4) Thrust Collar
(5) External Snap Ring
(6) Thrust Collar
(7) External Snap Ring
(8) Hub
(9) Needle Bearing
(10) 20T Gear
(11) 22T Gear
(12) Needle Bearing
(13) Thrust Collar
(14) Shuttle Forward Shaft
(15) Needle Bearing
(16) Shuttle Shaft
(17) Hub
(18) External Snap Ring
(19) 18T Gear
(20) Needle Bearing
(21) Thrust Collar
(22) Bearing
(23) Collar
(24) External Snap Ring



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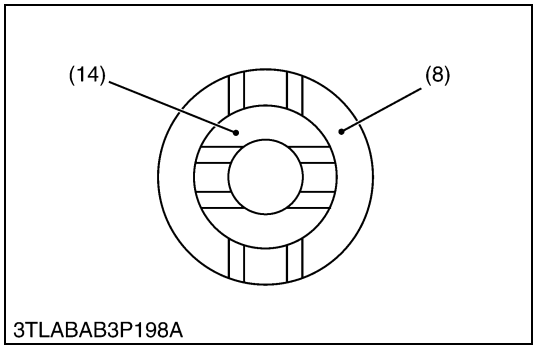

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1. Remove the external snap ring (1) and thrust collar (2).
2. Remove the bearing (3) and remove the thrust collar (4), 20T gear (10) and synchronizer ring.
3. Remove the external snap ring (7) and remove the hub (8) with shifter, synchronizer ring and 22T gear (11).
4. Remove the external snap rings (5) and remove the needle bearings, thrust collars (6), (13) and shuttle forward shaft (14).
5. Remove the external snap ring (24) and collar (23) and remove the bearing (22), thrust collar (21), 18T gear (19) and synchronizer rings.
6. Remove the external snap ring (18) and remove the hub (17) with shifter and synchronizer rings.

(When reassembling)

- Direct the groove side of the thrust collars (4), (21) to the gear side.
- Reinstall the synchronizer keys in the key grooves of the synchronizer rings.
- Direct the groove side of the hub (8) and shuttle forward shaft (14) as shown in figure.
- Apply enough transmission fluid to the needle bearings (9), (12), (15), (20).

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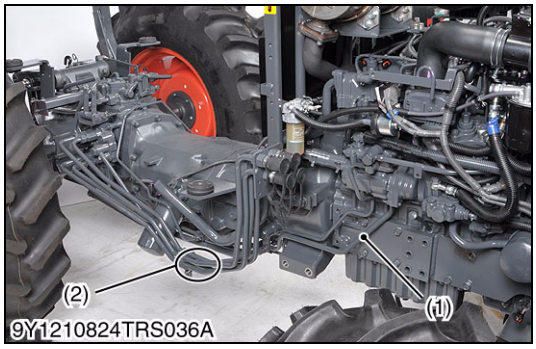
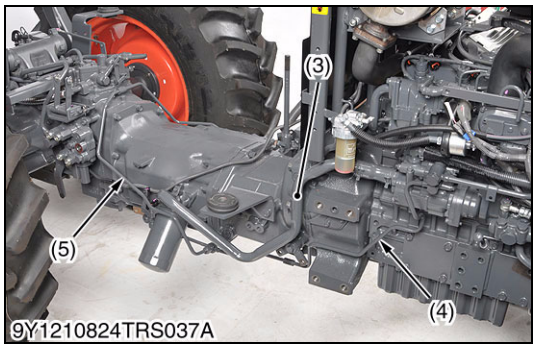
(3) Transmission Case





Hydraulic Pipe

1. Remove the front loader pipes (2) and main delivery pipe (1).
2. Remove the left and right brake rods.
3. Disconnect the suction pipe (3).
4. Remove the GST delivery pipe (5) and PTO delivery pipe (4).

(When reassembling)

Tightening torque	Joint bolt for main delivery pipe	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft
	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

(1) Main Delivery Pipe
(2) Front Loader Pipe
(3) Suction Pipe
(4) PTO Delivery Pipe
(5) GST Delivery Pipe

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Rear Wheel

1. Place disassembling stand under the transmission case, and support it with a jack.
2. Remove the rear wheels.
3. After removing the rear wheels, support it at both sides of rear axle by stands.

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	220 N·m 22 kgf·m 160 lbf·ft

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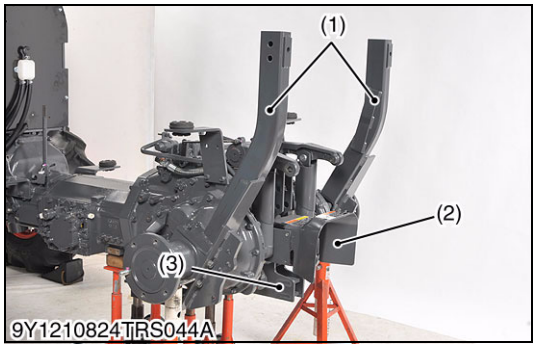
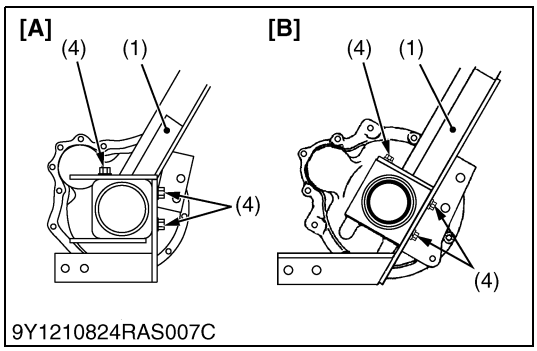


ROPS, 3 Point Linkages and Others

1. Remove the PTO shaft cover (2).
2. Remove the drawbar frame (3).
3. Remove the ROPS lower frames (1).
4. Remove the four wheel drive lever.

(When reassembling)

Tightening torque	Drawbar frame mounting screw (M12)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Drawbar frame mounting screw (M14)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS lower frame mounting screw	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft



(1) ROPS Lower Frame
(2) PTO Shaft Cover
(3) Drawbar Frame
(4) Screw (M14 × 30 mm)

[A] L3560
[B] L4060, L4760, L5060

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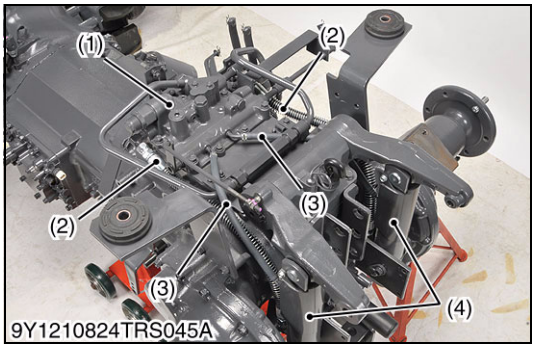

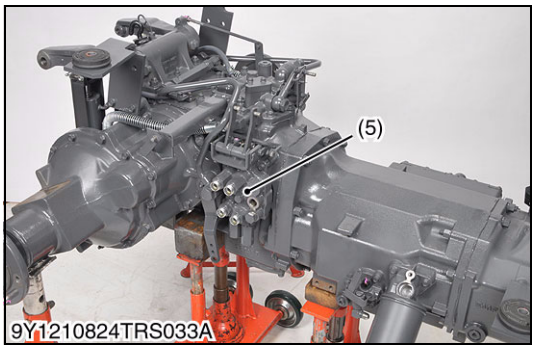

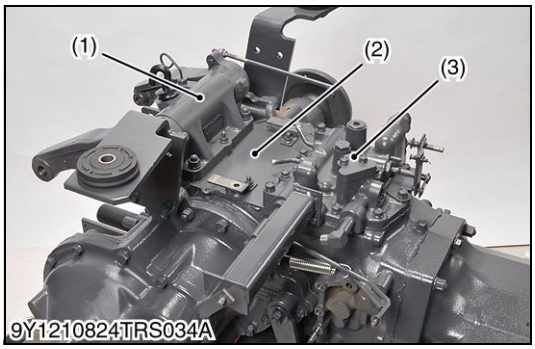

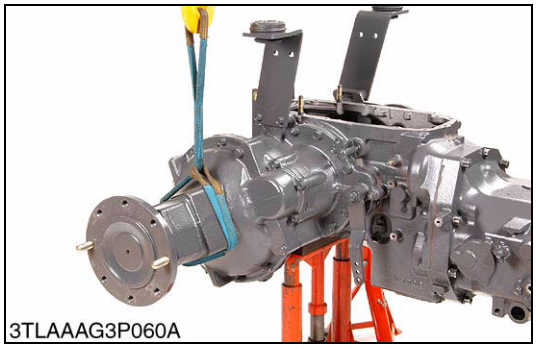

Hydraulic Cylinders and Front Loader Control Valve

1. Disconnect the hydraulic cylinder hoses (2) and return hoses (3) at the rear hydraulic block (1).
2. Remove the two pins, and remove the hydraulic cylinders (4).
3. Remove the front loader control valve (5) with front loader control valve bracket assembly.

Tightening torque	Hydraulic cylinder hose retaining nut	35 to 48 N·m 3.5 to 4.9 kgf·m 26 to 35 lbf·ft

(1) Rear Hydraulic Block
(2) Hydraulic Cylinder Hose
(3) Return Hose
(4) Hydraulic Cylinder
(5) Front Loader Control Valve

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Rear Hydraulic Block and Lift Arm Support

1. Remove the rear hydraulic block (3), cover (2) and lift arm support (1) as a unit.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the differential case and cover (2).

(1) Lift Arm Support
(2) Cover
(3) Rear Hydraulic Block

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Rear Axle

1. Separate the rear axle case from brake case.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the rear axle and brake case.

Tightening torque	Rear axle case mounting screw and nut	M10 screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
		M10 nut (9T) (Except L3560)	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
		M12 screw (Except L3560)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

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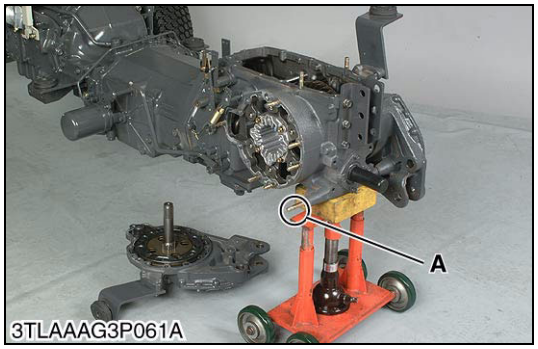

Brake Case

1. Remove the range gear shift lever fulcrum screw.
2. Remove the brake case mounting screws and nuts.
3. Separate the brake case, tapping the brake case lever lightly.

(When reassembling)

- Apply grease to the steel ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the brake cae and transmission case.
- Apply liquid lock to the fulcrum screw.
- Be sure to apply liquid gasket to **"A"** position.
- Be sure to fix the brake cam and cam plate.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.

Tightening torque	Brake case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Fulcrum screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

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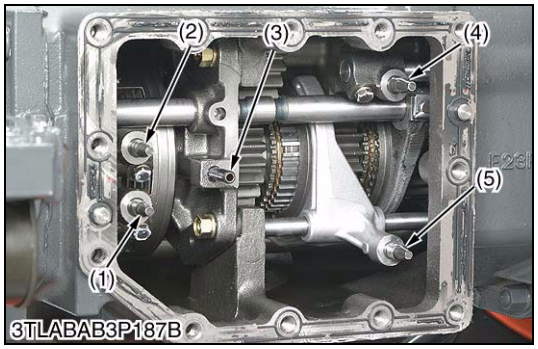

GST Valve Assembly

1. Remove the GST valve assembly with using two jack bolts.
2. Remove the shift pin (4).

■ **NOTE**

- **Do not fall down the shift pin while disassembling.**

(When reassembling)

- Place the 1-2 (1) and 3-4 (2) shift pins at **neutral** position, sub-range shift pin (5) at **Hi** position (rearward) and main range shift pin (4) at **"L"** position (forward), and then assemble the GST valve.
- Be sure to match the each shift pin and shift piston.
- Install the GST valve by hand, and then tighten the screws. Do not use the hummer.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the GST valve assembly.
- Replace the pipe (3) with a new one, if damaged.

Tightening torque	GST valve mounting screw	43 to 48 N·m 4.3 to 4.9 kgf·m 32 to 35 lbf·ft
	Shift pin mounting screw	13 to 14 N·m 1.3 to 1.5 kgf·m 9.4 to 10 lbf·ft

(1) 1-2 Shift Pin
(2) 3-4 Shift Pin
(3) Pipe
(4) Main Range Shift Pin
(5) Sub-range Shift Pin

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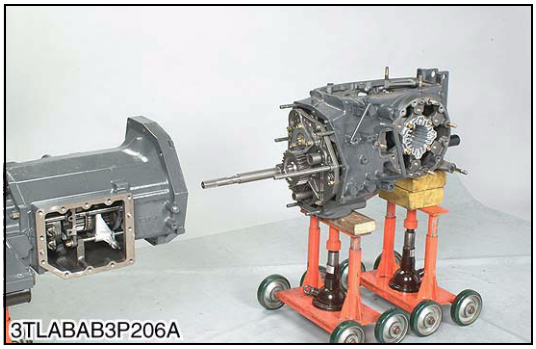

Separating Mid Case and Transmission Case

1. Separate the mid case and transmission case after removing their mounting screws and nut.

(When reassembling)

- Make sure to insert the PTO shaft to PTO clutch firmly, turning the PTO shaft.
- Make sure to insert the front wheel drive shaft to coupling firmly.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the mid case and transmission case.

Tightening torque	Mid case and transmission case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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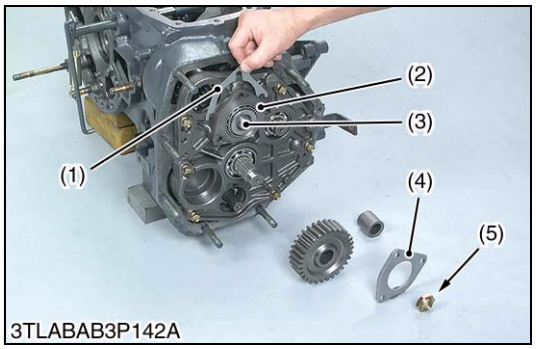

Pinion Bearing Cover

1. Remove the stake of lock nut (5).
2. Lock the turning of spiral bevel pinion and remove the lock nut (5).
3. Remove the pinion bearing case mounting screws.
4. Remove the pinion bearing cover (4) and shims (1).

(When reassembling)

- Make sure of the number of shims in the pinion bearing case.
- Replace the lock nut (5) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Pinion bearing case mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Shim
(2) Pinion Bearing Case
(3) Spiral Bevel Pinion Shaft
(4) Pinion Bearing Cover
(5) Lock Nut

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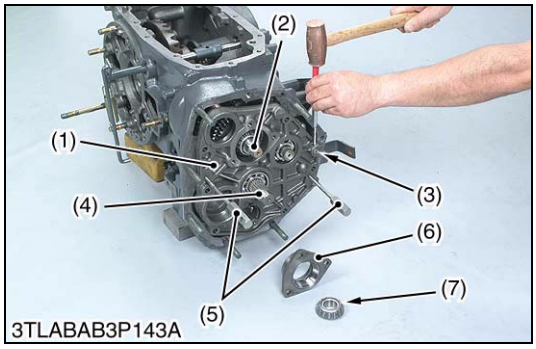

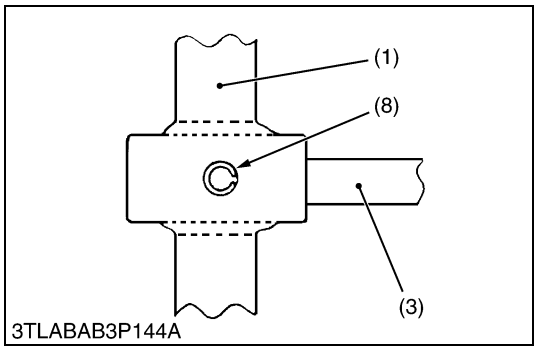

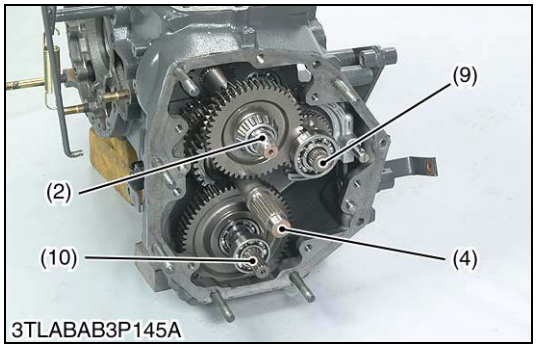

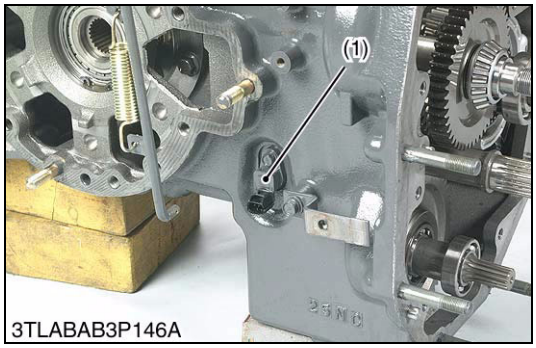

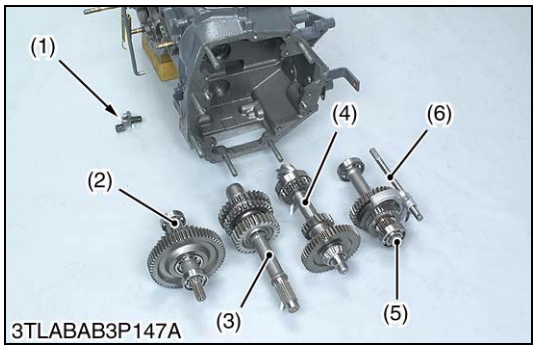

Transmission Bearing Holder

1. Remove the transmission bearing holder mounting screws.
2. Tap out the spring pin (8) on the shift fork rod (3).
3. Jack up the bearing holder (1) by using the two jack bolts (5) until the taper roller bearing (7) can be removed.

■ **NOTE**

- **Jack up the bearing holder while hitting the two shafts (2), (4) by copper hammer or soft hammer.**

4. Jack up more and remove the transmission bearing holder (1).

(When reassembling)

- Tap in the transmission bearing holder with soft hammer until contact to transmission case, and then tighten the screws to specified torque.
- Tap in the spring pin (8) so that its split portion may face forward. (Refer to figure.)

Tightening torque	Transmission bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Transmission Bearing Holder
(2) Spiral Bevel Pinion Shaft
(3) Shift Fork Rod for Range Gear Shift
(4) PTO Drive Shaft
(5) Jack Bolt
(6) Pinion Bearing Case
(7) Taper Roller Bearing
(8) Spring Pin
(9) Range Gear Shaft
(10) Front Wheel Drive Shaft

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Shaft Assemblies

1. Remove the traveling speed sensor (1).
2. Remove the spiral bevel pinion shaft assembly (4), range gear shaft assembly (5) with shift fork (6) and PTO drive shaft assembly (3).
3. Remove the front wheel drive shaft (2).

(1) Traveling Speed Sensor
(2) Front Wheel Drive Shaft
(3) PTO Drive Shaft
(4) Spiral Bevel Pinion Shaft
(5) Range Gear Shaft
(6) Shift Fork

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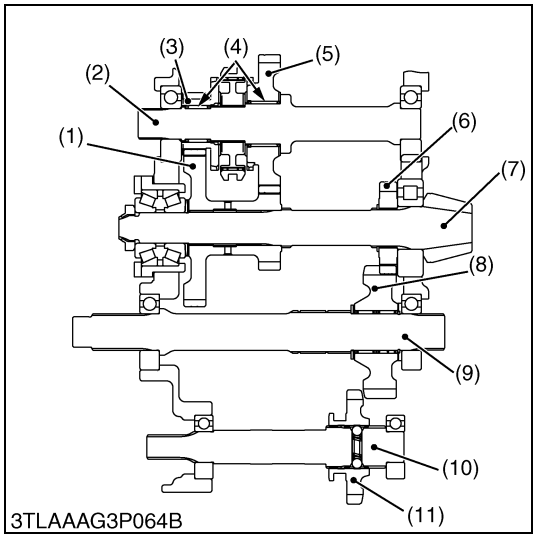

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Disassembling Shaft Assemblies

1. Disassemble the each shaft referring to the figure.

(1) 20T-49T Gear
(2) Range Gear Shaft
(3) 17T Gear
(4) Needle Bearing
(5) 35T Gear
(6) 18T Gear (L3560, L5060)
19T Gear (L4060)
16T Gear (L4760)
(7) Spiral Bevel Pinion Shaft
(8) 29T Gear (L3560, L4060,L5060)
31T Gear (L4760)
(9) PTO Drive Shaft
(10) Front Wheel Drive Shaft
(11) 24T Shifter Gear

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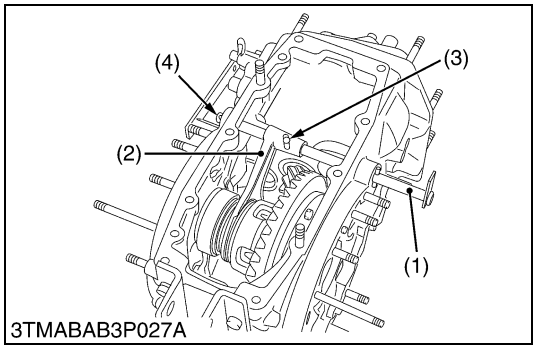

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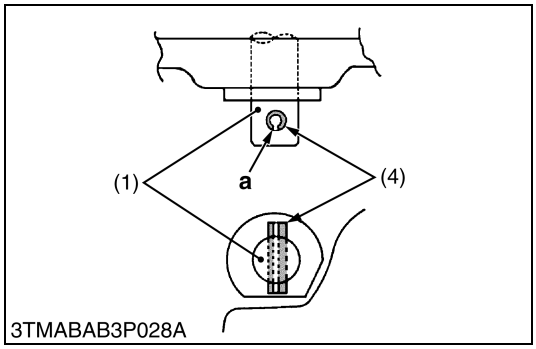
Differential Lock Shift Fork

1. Tap out the left side spring pin (4).
2. Remove the cotter pin and clevis pin (3).
3. Draw out the differential lock fork shaft (1) and remove differential lock shift fork (2).

(When reassembling)

- Apply grease to the left and right oil seals on the transmission case.
- Insert the clevis pin (3) from the top and install the washer and cotter pin.
- Tap in the spring pin (4) so that its split portion **"a"** may face outward as shown in the figure.



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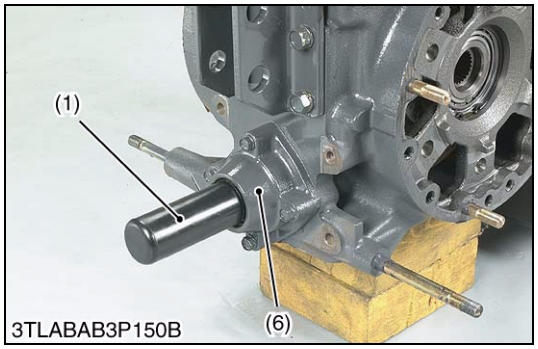
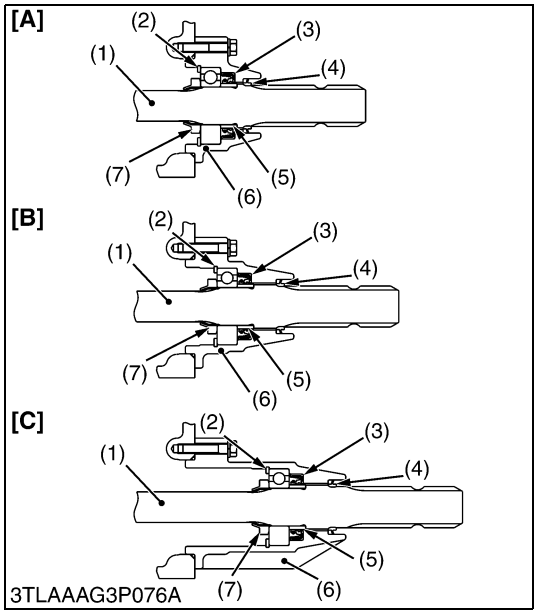
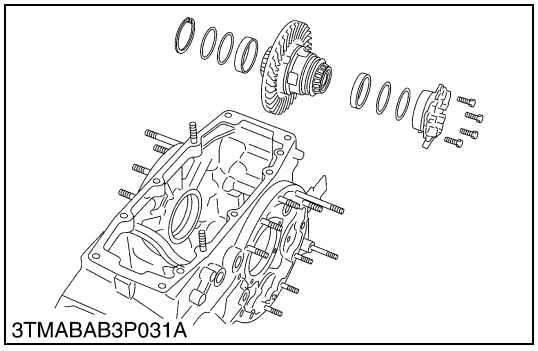
(1) Differential Lock Fork Shaft
(2) DIfferential Lock Shift Fork
(3) Clevis Pin
(4) Spring Pin

a: Split Portion

9Y1210824TRS0042US0







PTO Shaft

1. Remove the PTO shaft cover.
2. Remove the bearing case mounting screws, and draw out the PTO shaft (1) with bearing case (6).
3. Remove the internal snap ring (2).
4. Top out the PTO shaft (1) to the front.

(When reassembling)

- If the lock nut (7) was removed, replace it with a new one. After replacing, be sure to stake it firmly.
- Install the slinger (4) firmly.
- Apply grease to the oil seal (3) and install it, noting its direction.

Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Bearing case mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) PTO Shaft
(2) Internal Snap Ring
(3) Oil Seal
(4) Slinger
(5) Oil Seal Collar
(6) Bearing Case
(7) Lock Nut

[A] L3560
[B] L4060, L4760
[C] L5060

9Y1210824TRS0076US0

Differential Gear Assembly

1. Remove the differential support, noting the number of left shims.
2. Remove the differential gear assembly, noting the number of right shims.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion.
- Use same number of shims as before disassembling.

Tightening torque	Differential support mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

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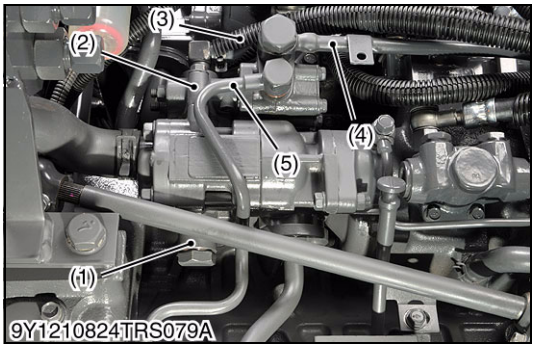
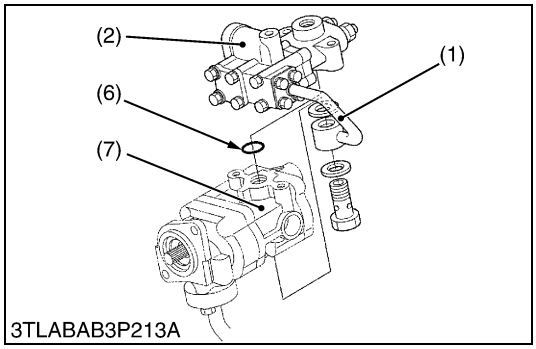
Disassembling Differential Gears

- See page 3-S76.

9Y1210824TRS0078US0

(4) Regulating Valve





Front Grille, Skirt and Battery Cable

1. Open the bonnet (1) and disconnect the battery negative cable (2).
2. Remove the skirt RH (4). and front grille (3).

(1) Bonnet
(2) Battery Negative Cable
(3) Front Grille
(4) Skirt RH

9Y1210824TRS0079US0

Hydraulic Pipes and Regulating Valve Assembly

1. Disconnect the PTO (GST) delivery pipe (5), power steering return hose (3) and power steering delivery pipe (4) from regulating valve assembly (2).
2. Remove the delivery pipe (1).
3. Loosen and remove the regulating valve mounting screws.
4. Remove the regulating valve assembly (2) from the power steering hydraulic pump (7).

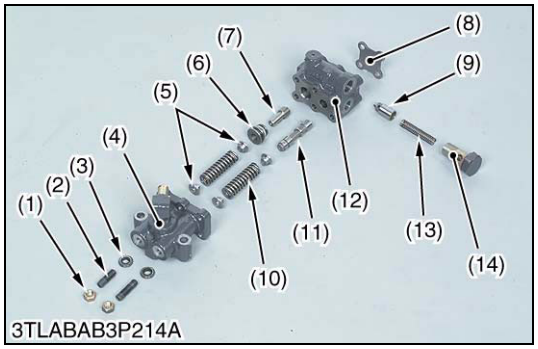
(When reassembling)

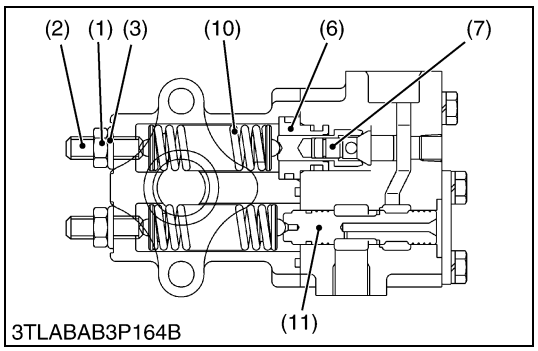
- Install the copper washers firmly.
- Apply grease to the O-ring (6) and be careful not to damage it.

Tightening torque	Joint bolt for PTO (GST) delivery pipe (5) and regulating valve	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Joint bolt for power steering delivery pipe (4) and regulating valve	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Joint bolt for delivery pipe (1) and hydraulic pump	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Regulating valve mounting screws	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Delivery Pipe
(2) Regulating Valve Assembly
(3) Power Steering Return Hose
(4) Power Steering Delivery Pipe
(5) PTO (GST) Delivery Pipe
(6) O-ring
(7) Power Steering Hydraulic Pump

9Y1210824TRS0080US0





Disassembling Regulating Valve

■ **NOTE**

- **The regulating valve has been precisely machined and assembled. It is advisable not to disassemble it as long as there is no necessary.**

1. Remove the plate (8), reducing spool (11), spring retainer (5) and spring (10).
2. Separate the regulating valve case (12) and support (4).
3. Remove the bush (6) and poppet (7).
4. Remove the joint bolt (14).
5. Remove the spring (13) and the poppet (9).
6. Remove the spring retainer (5) and spring (10).

(When reassembling)

- Be careful not to damage the O-rings.

■ **IMPORTANT**

- **After reassembling, the adjustment of regulating pressure should be performed.**

Tightening torque	Joint bolt (14)	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Plate (8)	9.8 N·m 1.0 kgf·m 7.2 lbf·ft
	Regulating valve case and support mounting screws	9.8 N·m 1.0 kgf·m 7.2 lbf·ft

(1) Nut
(2) Adjustor
(3) Washer with Rubber
(4) Support
(5) Spring Retainer
(6) Bush
(7) Poppet
(8) Plate
(9) Poppet
(10) Spring
(11) Reducing Spool
(12) Regulating Valve Case
(13) Spring
(14) Joint Bolt

9Y1210824TRS0081US0

(5) GST Valve Assembly

■ **NOTE**

- **The GST valve has been precisely machined and assembled.**
  It is advisable not to disassemble it. If unavoidably necessary to do it, take the following precautions.

1. Tighten up the screws and nuts to their specified torques.
2. Be sure to clean the disassembled parts and dry them up with compressed air.
3. Do not wear any gloves other than rubber ones not use waste cloth. This is important for keeping the parts clean and free from rust.
4. Be careful not to drop the parts on the floor or workbench. Check any part, if dropped, for hit mark, scratch and burr.
5. Be sure to use a rubber or plastic hammer for reassembling.
6. Do not use a wire brush nor polish any part with sandpaper.
7. Apply super UDT oil to the O-rings and oil seals before reassembling. Do not use any metal-cleaning liquid.

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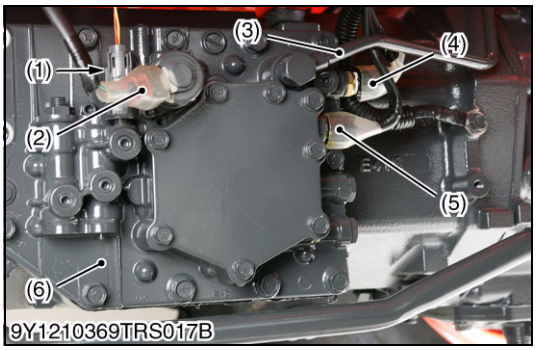

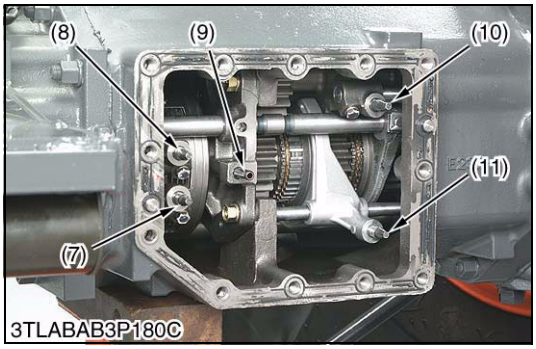

GST Valve Assembly

1. Remove the GST valve cover.
2. Disconnect the pressure switch connector (1), proportional reducing valve connector (2) solenoid connector (4) and oil temperature sensor connector (5).
3. Disconnect the GST delivery pipe (3).
4. Remove the GST valve assembly (6) with using two jack bolts.

■ **NOTE**

- **Do not fall down the shift pin while assembling.**

(When reassembling)

- Place the 1-2 shift pin (7) and the 3-4 shift pin (8) at **neutral** position, main range shift pin (10) at **L** position (forward) and sub-range pin (11) at **Hi** position (rearward), and then assemble the GST valve.
- Be sure to match the each shift pin and shift piston.
- Install the GST valve assembly (6) by hand, and then tighten the screws. Do not use the hummer.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the GST valve assembly.

Tightening torque	GST valve assembly mounting screw	43 to 48 N·m 4.3 to 4.9 kgf·m 32 to 35 lbf·ft
	Joint bolt for GST delivery pipe to GST valve	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

(1) Pressure Switch Connector
(2) Proportional Reducing Valve Connector
(3) GST Delivery Pipe
(4) Oil Temperature Sensor Connector
(5) Solenoid Valve Connector
(6) GST Valve Assembly
(7) 1-2 Shift Pin
(8) 3-4 Shift Pin
(9) Pipe
(10) Main Range Shift Pin
(11) Sub-range Shift Pin

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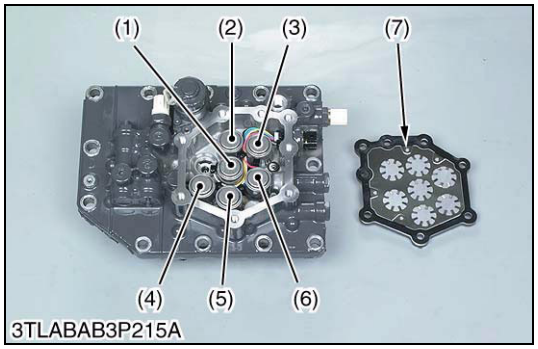

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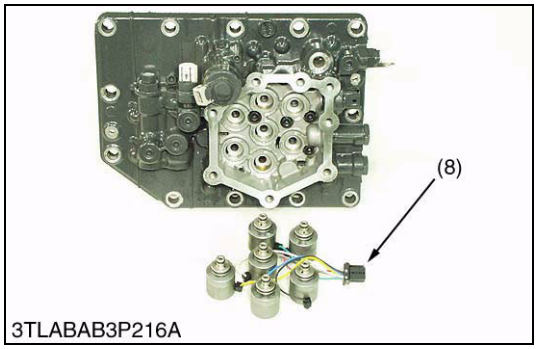

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Solenoid Valve

1. Remove the cover (7).
2. Disconnect the connector (8) and remove the solenoid valves.

(When reassembling)

- Be sure to install the each solenoid valve to their original positions as shown in the photo and table below.

No.	Solenoid Name	Color of wiring
(6)	Shift Solenoid 1 (1st shift)	Black
(1)	Shift Solenoid 2 (2nd shift)	White
(3)	Shift Solenoid 3 (3rd shift)	Red
(2)	Shift Solenoid 4 (4th shift)	Green
(5)	Shift Solenoid 5 (Sub-range shift)	Blue
(4)	Shift Solenoid 6 (Main range shift)	Yellow

(1) Solenoid 2
(2) Solenoid 4
(3) Solenoid 3
(4) Solenoid 6
(5) Solenoid 5
(6) Solenoid 1
(7) Cover
(8) Connector

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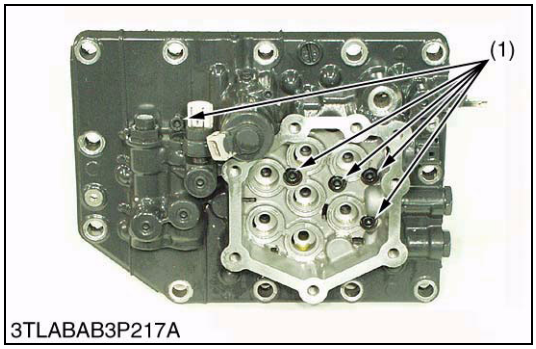

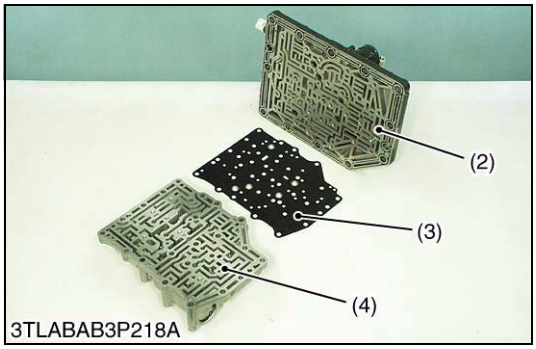

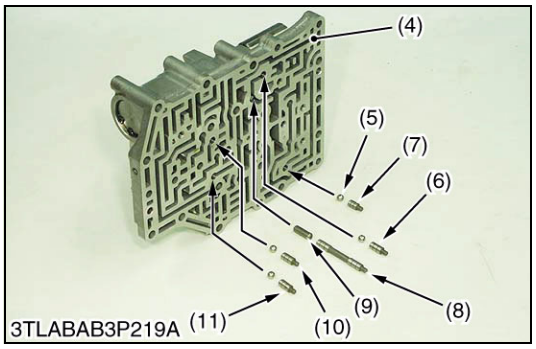

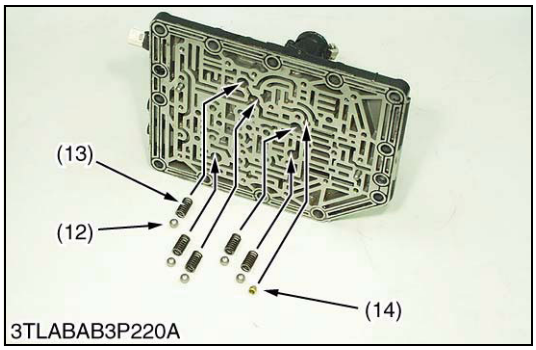

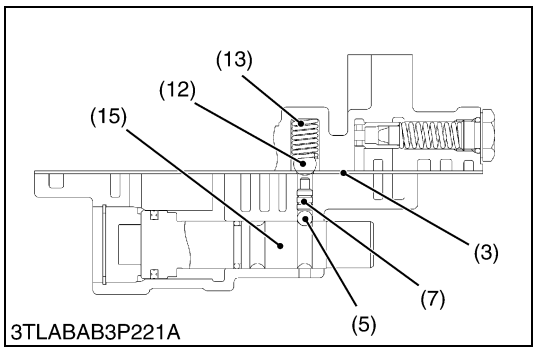

Shift Check Valve

1. Remove the lower body mounting hex. socket head cap screws (1).
2. Separate the upper body (2) and lower body (4).
3. Remove the 1-2, 3-4 shift check pin (10), (11), sub-range shift check pin (7), main range shift check pin (6), shuttle shift check pin (8), balls (5) and pin (9) from lower body (4).
4. Remove the springs (13), balls (12) and filter (14) from upper body (2).

(When reassembling)

- Make sure that the main range shift check pin (7) is the shortest pin.

Tightening torque	Lower body mounting hex. socket head cap screw	9.8 to 10 N·m 1.0 to 1.1 kgf·m 7.3 to 7.9 lbf·ft

(1) Hex. Socket Head Cap Screw
(2) Upper Body
(3) Plate
(4) Lower Body
(5) Ball
(6) Main Range Shift Check Pin
(7) Sub-range Shift Check Pin
(8) Shuttle Shift Check Pin
(9) Shuttle Shift Pin
(10) 3-4 Shift Check Pin
(11) 1-2 Shift Check Pin
(12) Ball
(13) Spring
(14) Filter
(15) Shift Piston

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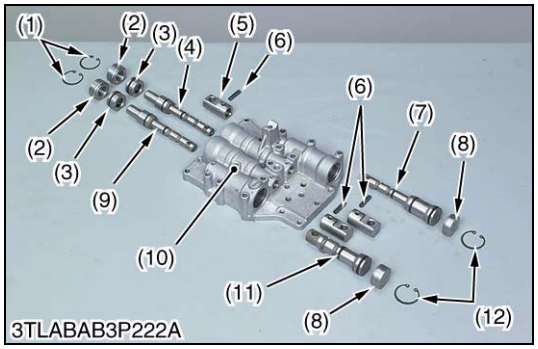

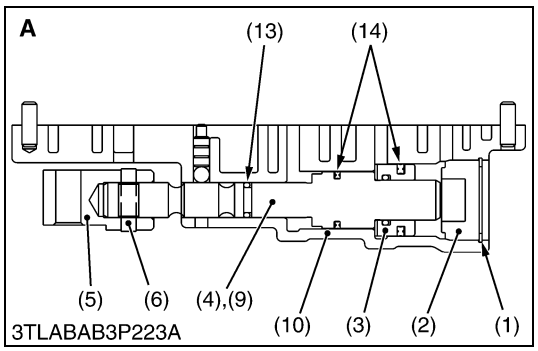

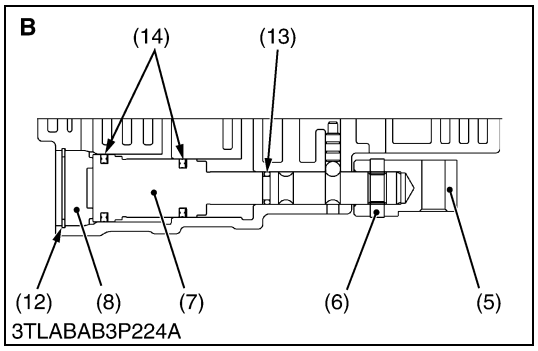

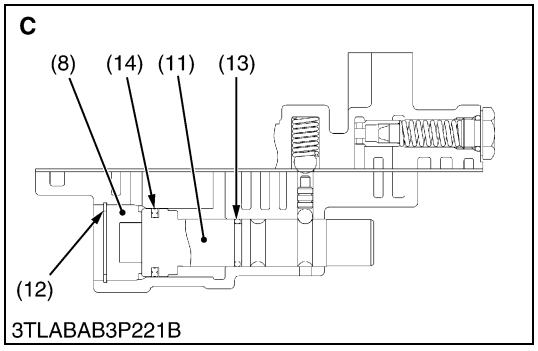

Shift Piston

1. Separate the upper body, and lower body. (See page 3-S100.)
2. Tap out the spring pins (6), and remove the shifters (5). (For 1-2, 3-4 and sub-range shift piston)
3. Remove the internal snap ring (1), cover (2) and shift piston (4), (9) with neutral piston (3). (For 1-2 and 3-4 shift piston)
4. Remove the internal snap ring (12), cover (8) and the shift piston (7), (11). (For main range and sub-range shift piston)

(When reassembling)

- Be careful not to damage the O-ring (13) and piston seal (14).

(1) Internal Snap Ring
(2) Cover
(3) Neutral Piston
(4) 3-4 Shift Piston
(5) Shifter
(6) Spring Pin
(7) Sub-range Shift Piston
(8) Cover
(9) 1-2 Shift Piston
(10) Lower Body
(11) Main Range Shift Piston
(12) Internal Snap Ring
(13) O-ring
(14) Piston Seal

A: 1-2 and 3-4 Shift Piston
B: Sub-range Shift Piston
C: Main Range Shift Piston

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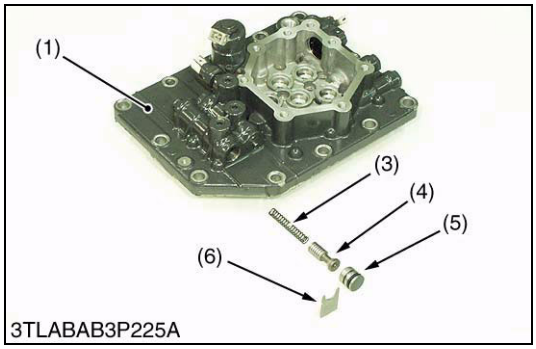

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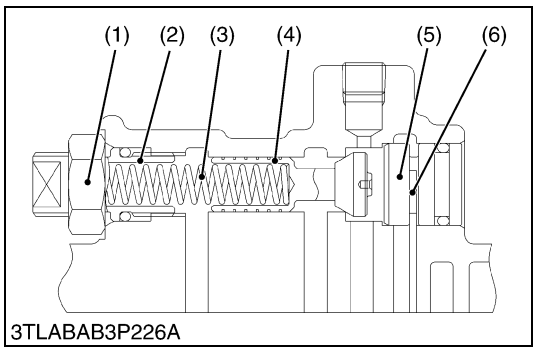

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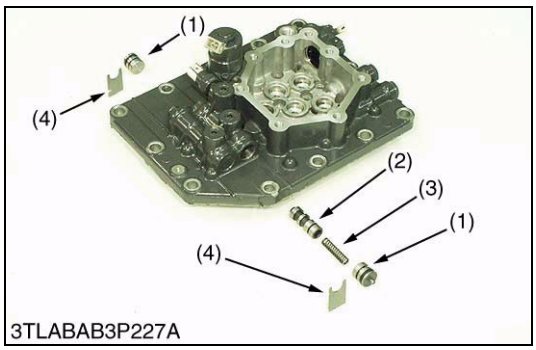

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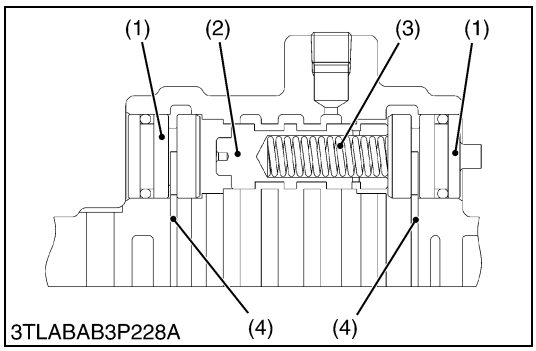

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Low-pass Valve

■ **IMPORTANT**

- **Do not adjust or remove the adjustor (2), otherwise the GST clutch engagement feeling will be changed.**
  If this valve is disassembled, be sure to check and adjust the low-pass pressure.

1. Separate the upper body and lower body.
2. Remove the plug (5).
3. Remove the stopper plate (6) and remove the low-pass poppet (4) and spring (3).

(1) Lock Nut
(2) Adjustor
(3) Spring
(4) Low-pass Poppet
(5) Plug
(6) Stopper Plate

9Y1210824TRS0087US0

Clutch Valve

1. Separate the upper body and lower body.
2. Remove the stopper plate (4) while pushing the plug (1).
3. Remove the spool (2) and spring (3).

(When reassembling)

- Be careful about the direction of the spool (2) and the plugs (1) referring to the figure.

(1) Plug
(2) Spool
(3) Spring
(4) Stopper Plate

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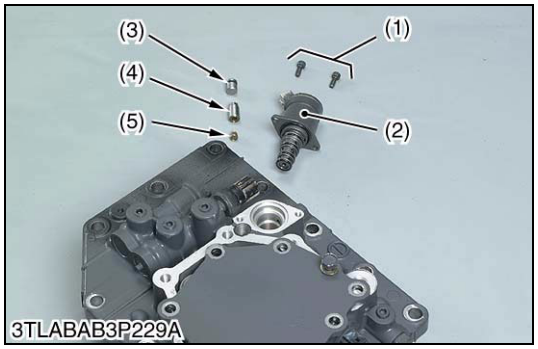

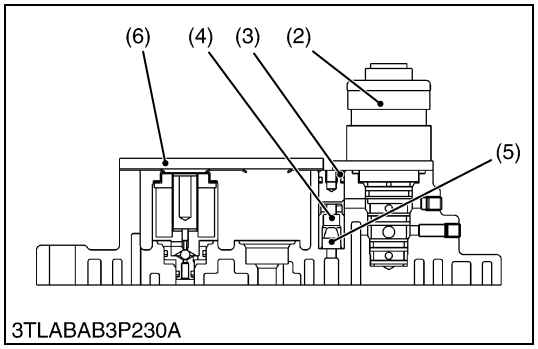

Proportional Reducing Valve and Filter

1. Remove the valve mounting hex. socket head cap screws.
2. Remove the proportional reducing valve (2).
3. Remove the cover (6).
4. Remove the plug (3) and orifice support (4) with filter (5).

(When reassembling)

- Be careful not to damage the O-ring.

(1) Hex. Socket Head Cap Screw
(2) Proportional Reducing Valve
(3) Plug
(4) Orifice Support
(5) Filter
(6) Cover

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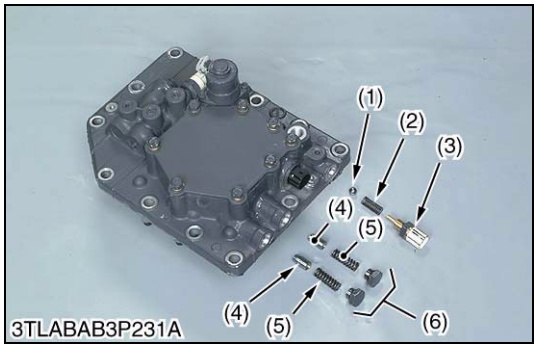


Check Valve, Oil Temperature Sensor, Orifice and Filter

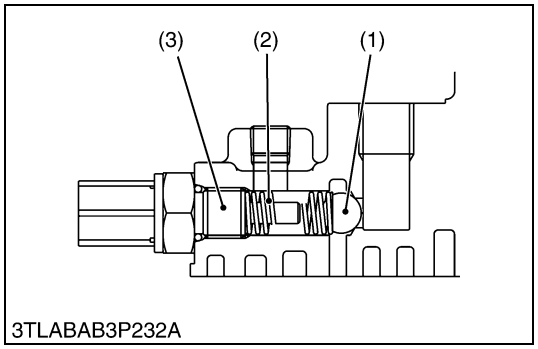
1. Remove the oil temperature sensor (3), spring (2) and ball (1).
2. Remove the plug (6), spring (5) and orifice plug (4) with filter (7).

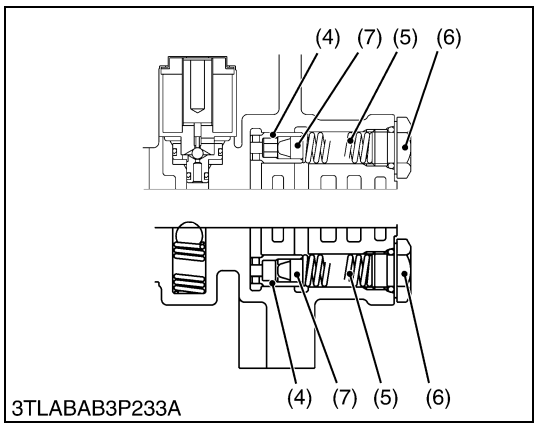
(When reassembling)

- Be careful about the direction of the orifice support (4) and filter (7).

(1) Ball
(2) Spring
(3) Oil Temperature Sensor
(4) Orifice Support
(5) Spring
(6) Plug
(7) Filter

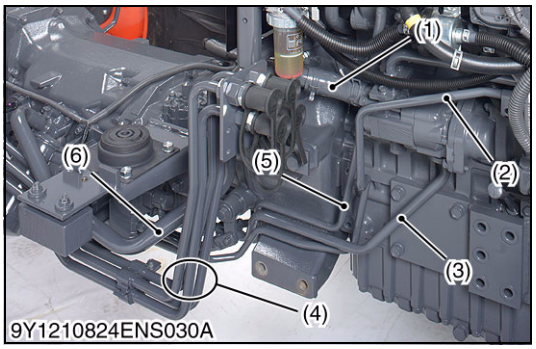
9Y1210824TRS0090US0





[3] HYDROSTATIC TRANSMISSION

(1) Clutch Housing



Hydraulic Pipe

1. Remove the front loader pipes (4).
2. Disconnect the suction hose (1) and suction pipe (6).
3. Remove the main delivery pipe (3), power steering delivery pipe (2) and delivery pipe (5).

(When reassembling)

Tightening torque	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft
	Joint bolt for main delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft
	Joint bolt for delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft

(1) Suction Hose
(2) Power Steering Delivery Pipe
(3) Main Delivery Pipe
(4) Front Loader Pipe
(5) Delivery Pipe
(6) Suction Pipe

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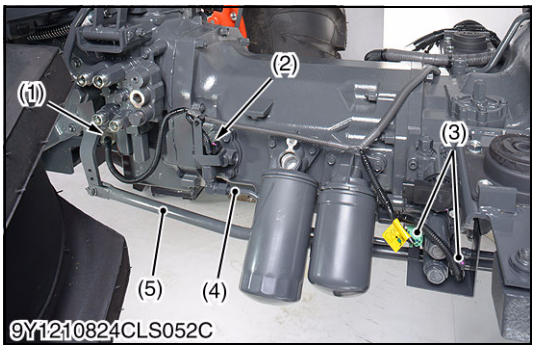

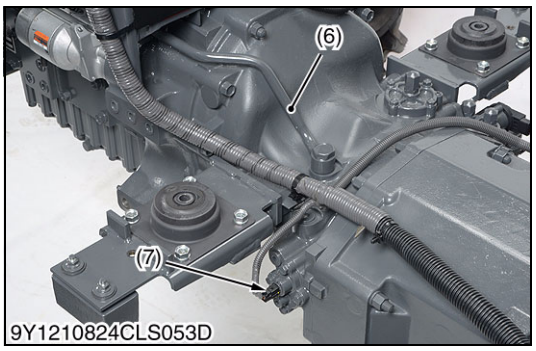

Hydraulic Pipe and Wiring Harness

1. Disconnect the travling speed sensor connector (1).
2. Disconnect the PTO clutch valve connector (2).
3. Disconnect the proportional valve connectors (3).
4. Remove the brake rod R.H. (5).
5. Remove the PTO delivery pipe (4).
6. Disconnect the solenoid valve connector (7).
7. Set aside the main wiring harness to the front.
8. Remove the HST return pipe (6).

(When reassembling)

■ **IMPORTANT**

- **In installing the connector of the proportional valve, pay attention to the color of the connector to ensure correct installation.**

Tightening torque	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Joint bolt for HST return pipe	88 to 98 N·m 9.0 to 9.9 kgf·m 65 to 72 lbf·ft

(1) Traveling Speed Sensor Connector
(2) PTO Clutch Valve Connector
(3) Proportional Valve Connector
(4) PTO Delivery Pipe
(5) Brake Rod R.H.
(6) HST Return Pipe
(7) Solenoid Valve Connector

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Separating Engine from Clutch Housing

1. Place the disassembling stands under the engine and clutch housing.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine from clutch housing.

(When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1211 or equivalent) to joint face of the flywheel housing and clutch housing.

Tightening torque	Engine and clutch housing mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Engine and clutch housing mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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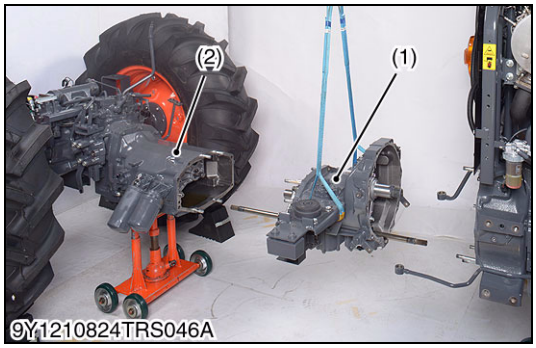


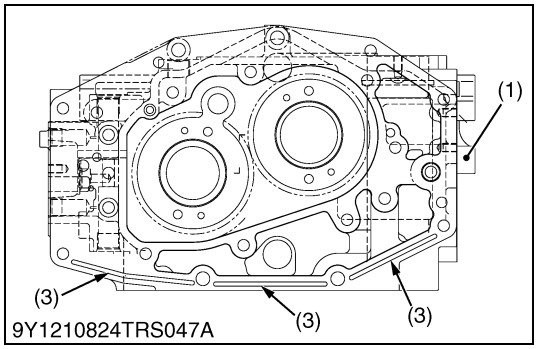
Separating Clutch Housing and Mid Case

1. Remove the clutch housing and mid case mounting screws and nuts.
2. Separate the clutch housing (1) and mid case (2).

(When reassembling)

- Gasket should be replaced with new one.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the clutch housing (1) and mid case (2).
- Make sure to apply liquid gasket to elongated grooves (3) on the mid case face and to those on the lower side of the clutch housing face.

Tightening torque	Clutch housing and mid case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Clutch housing and mid case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft



(1) Clutch Housing
(2) Mid Case
(3) Elongated Groove

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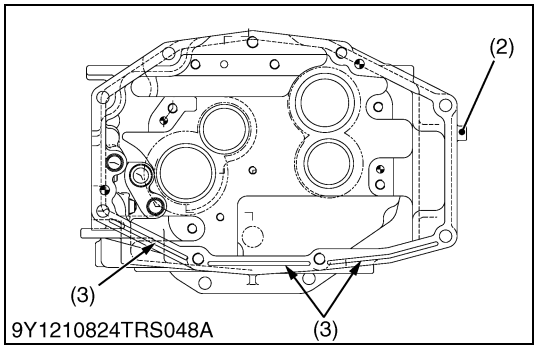

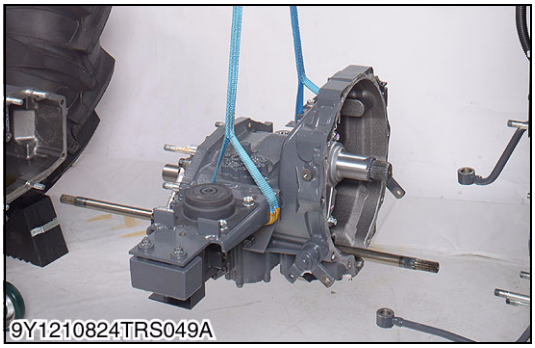
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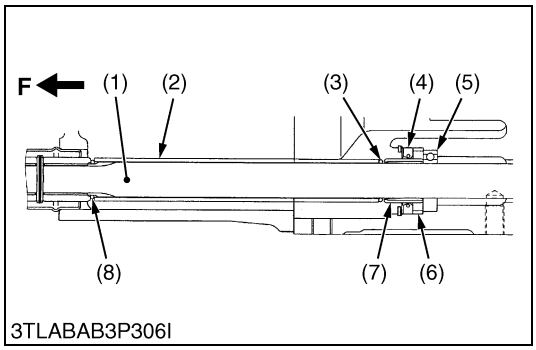

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Front Axle Drive Shaft

1. Pull out the front axle drive shaft (1) to the rear side.

(When reassembling)

- Install the front axle drive shaft (1) from front side after assembling the clutch housing case (HST unit) and mid case. Then install the bearing (5), sleeve (7), collar (6), oil seal (8), internal snap ring, O-ring (3) and spacer (2) in order.
- Apply grease to the oil seal (4).

(1) Front Axle Drive Shaft
(2) Spacer
(3) O-ring
(4) Oil Seal
(5) Bearing
(6) Collar
(7) Sleeve
(8) Oil Seal

F: Front Side

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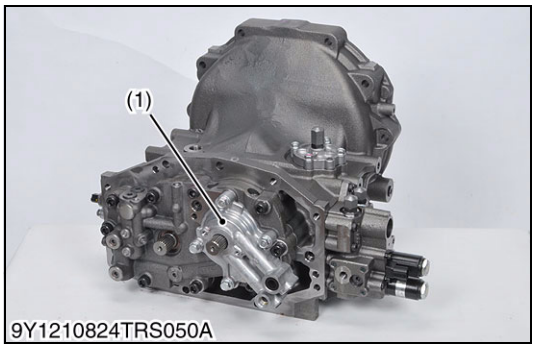

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Charge Pump

1. Remove the charge pump (2).

(When reassembling)

■ **NOTE**

- **Replace the O-ring with a new one.**
- **Alignment mark should be front side.**

(1) Charge Pump
(2) Outer Rotor
(3) Inner Rotor
(4) Alignment Mark

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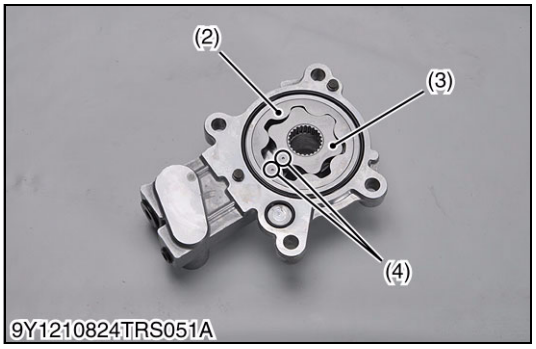

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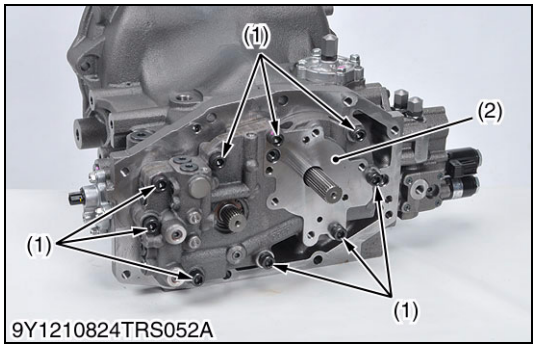

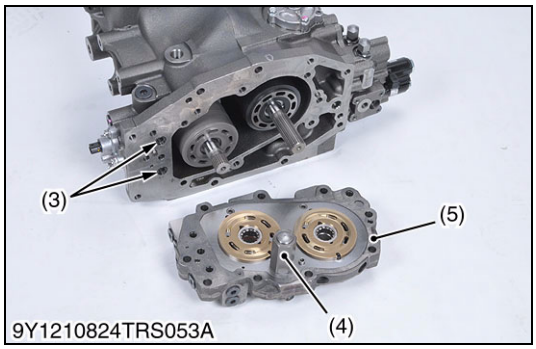

Port Block

1. Remove the port block mounting hex. socket head screws (1).
2. Pull and remove the port block (2) from the HST housing.

(When reassembling)

- Install port block with O-rings (3), valve plates and gasket in place.
- Replace the gasket (5) with a new one.

■ **NOTE**

- **Valve plates may stick to the port block but they are not fixed. Be careful not to drop them.**
  And these valve plates are not interchangeable.

Tightening torque	Port block mounting hex. socket head screw	103 to 118 N·m 10.5 to 12.5 kgf·m 76.0 to 87.0 lbf·ft
	Piston H (5)	59 to 78 N·m 6.1 to 7.9 kgf·m 44 to 57 lbf·ft

(1) Head Screw
(2) Port Block
(3) O-ring
(4) Piston H
(5) Gasket

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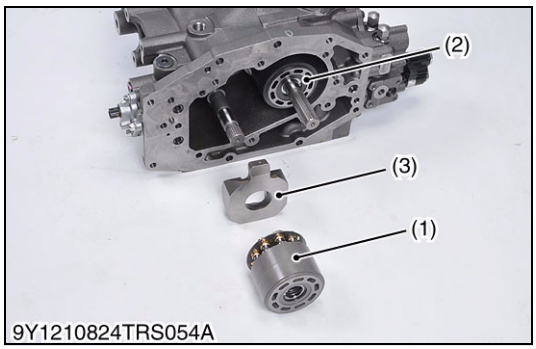

Cylinder Block Assemblies

1. Remove both motor and pump cylinder block (1), (2) with pistons.
2. Remove the motor swashplate (3).

(When reassembling)

- Apply clean hydrostatic transmission oil to cylinder blocks.

■ **NOTE**

- **Be careful not to damage the surface of cylinder blocks and pistons.**
- **Do not interchange pistons between pump and motor cylinder block.**

(1) Motor Cylinder Block
(2) Pump Cylinder Block
(3) Motor Swashplate

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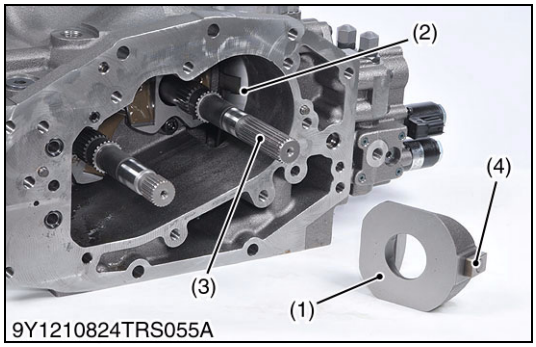

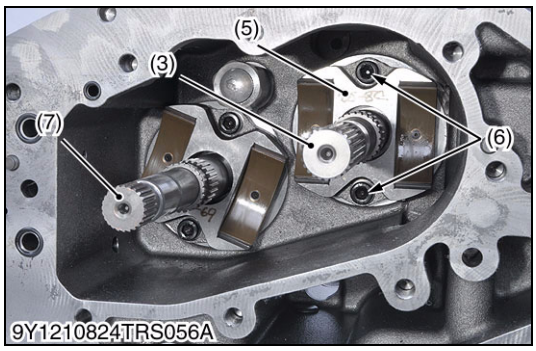

Swashplate, Pump Shaft and Motor Shaft

1. Remove the swashplate (1).
2. Remove the cradle bearing bracket mounting hex. socket head screws (6).
3. Tap the pump shaft (3) with a plastic hammer slightly to slide out it with cradle bearing bracket (5) to the rear side.
4. Pull out the motor shaft (7).

(When reassembling)

- Place the swashplate (1) into the housing, align the slot guide (4) of swashplate and groove (2) of servo piston.
- Apply clean transmission oil to the surface of swashplate and cradle bearing.

Tightening torque	Cradle bearing bracket mounting hex. socket head screw	61 to 71 N·m 6.3 to 7.2 kgf·m 45 to 52 lbf·ft

(1) Swashplate
(2) Groove
(3) Pump Shaft
(4) Slot Guide
(5) Cradle Bearing Bracket
(6) Hex. Socket Head Screw
(7) Motor Shaft

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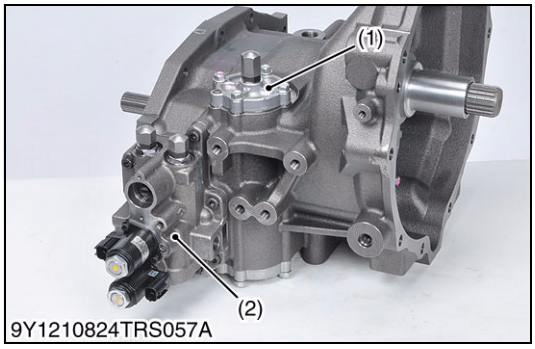

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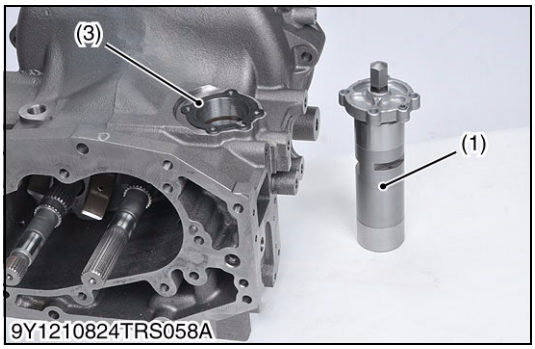

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Servo Piston Assembly

■ **NOTE**
- **The servo piston has been precisely machined and assembled. It is advisable not to disassemble it as long as there is no necessary.**

1. Remove the regulating valve assembly (2).
2. Remove the servo piston under cover.
3. Remove the servo piston assembly mounting hex. socket head screw.
4. Push the piston from bottom side slightly and pull out the servo piston assembly (1).

(When reassembling)
- Replace the gasket (3) with a new one.

■ **NOTE**
- **Be careful not to do damage the surface of servo piston.**

■ **IMPORTANT**
- **When disassembling the servo piston, be sure to adjust the neutral position of HST. (See page 3-S33.)**

Tightening torque	Regulating valve assembly mounting hex. socket head screw	48 to 56 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Servo piston and cover mounting hex. socket head screw	24 to 28 N·m 2.5 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Servo Piston Assembly
(2) Regulating Valve Assembly
(3) Gasket

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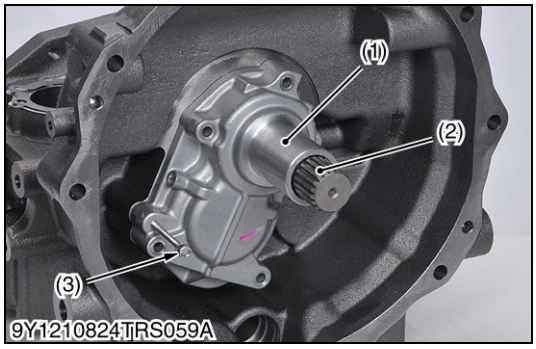

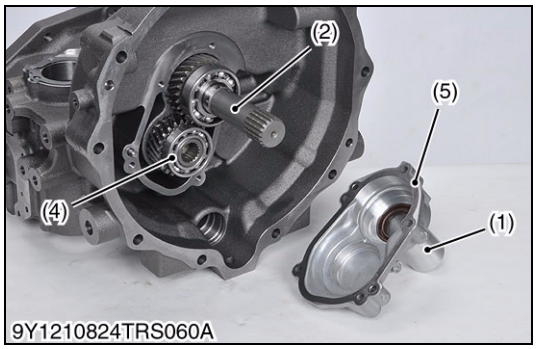

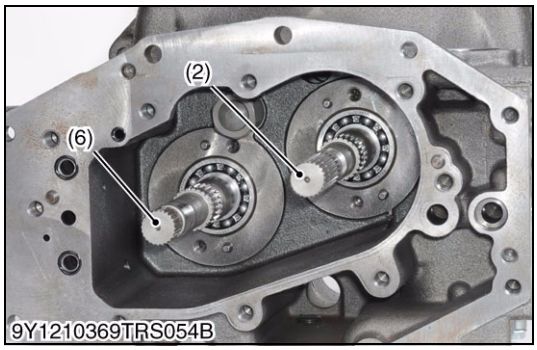

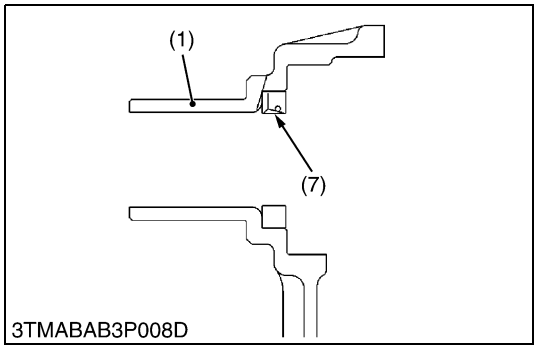

Shaft Case, Input Shaft, Motor Shaft and Gear

1. Remove the shaft case mounting screws.
2. Screw down the M6 jack bolt (3) into the shaft case (1) and pull it out.
3. Remove the shaft case (1).
4. Remove the 22T (23T, 26T) gear shaft (2).
5. Remove the 28T (27T, 24T) gear (4).

(When reassembling)

- Be sure to install the gasket (5).

(When replacing oil seal in shaft case)

- Install the oil seal (7) as shown in the figure, noting its direction.
- Apply grease to the oil seal (7).
- Replace the gasket (5) with a new one.

Tightening torque	Shaft case mounting bolt	24 to 28 N·m 2.5 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Shaft Case
(2) 22T Gear Shaft (L3560)
23T Gear Shaft (L4060, L4760)
26T Gear Shaft (L5460, L6060)
(3) M6 Jack Bolt
(4) 28T Gear (L3560)
27T Gear (L4060, L4760)
24T Gear (L5460, L6060)
(5) Gasket
(6) Motor Shaft
(7) Oil Seal

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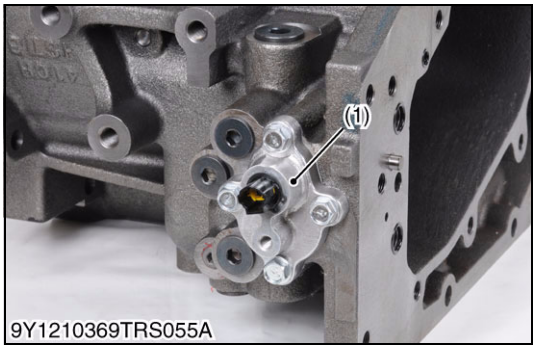

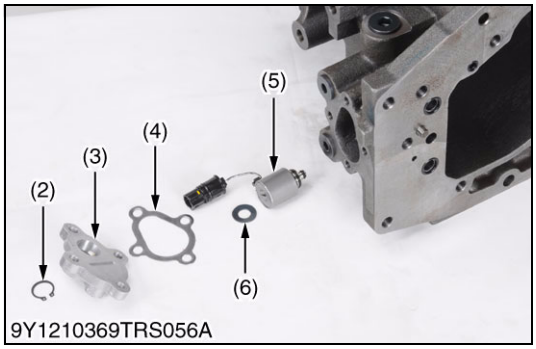

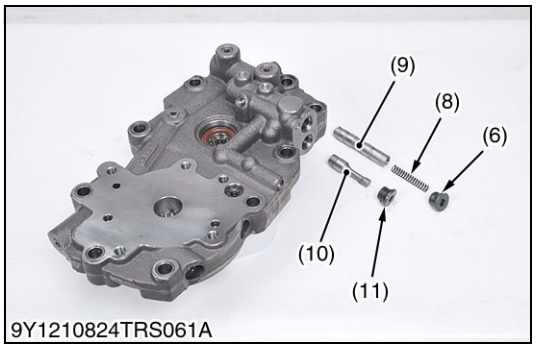

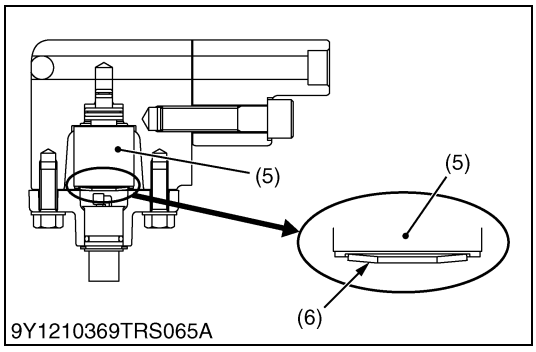

Hi-Lo Valve

1. Remove the Hi-Lo solenoid valve assembly (1).
2. Remove the external snap ring (2).
3. Remove the Hi-Lo solenoid (5) with connector.
4. Remove the hex. socket head screw (7) and remove the spring (8) and Hi-Lo spool (9).
5. Remove the hex. socket head screw (11) and remove the pressure selector (10).

(When reassembling)

- Be sure to install direction of the belleville spring (6).
- Replace the gasket (4) with a new one.

Tightening torque	Hi-Lo solenoid valve assembly mounting hex. socket head screw	24 to 28 N·m 2.5 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Hi-Lo Solenoid Valve Assembly
(2) External Snap Ring
(3) Cover
(4) Gasket
(5) Hi-Lo Solenoid
(6) Belleville Spring
(7) Hex. Socket Head Screw
(8) Spring
(9) Hi-Lo Spool
(10) Pressure Selector
(11) Hex. Socket Head Screw

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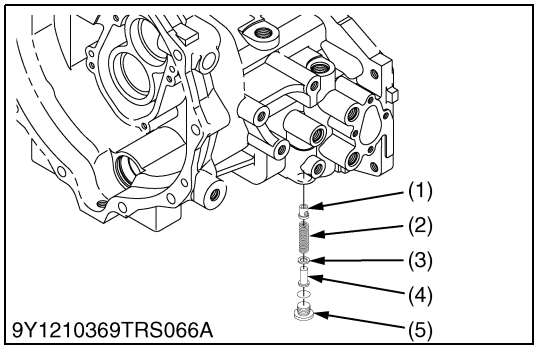

Charge Relief Valve

1. Remove the hex. socket head plug (5).
2. Remove the spring guide (3), shim (4), spring (2) and valve poppet (1).

(When reassembling)

■ **NOTE**

- **Install valve component, noting the number of shims (4) in the charge relief valve.**
- **Be careful not to damage the O-ring.**
- **When replacing the valves, check and adjust the setting pressure. (See page 3-S32.)**

Tightening torque	Hex. socket head plug of charge relief valve	49 to 59 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft

(1) Valve Poppet
(2) Spring
(3) Spring Guide
(4) Shim
(5) Hex.Socket Head Plug

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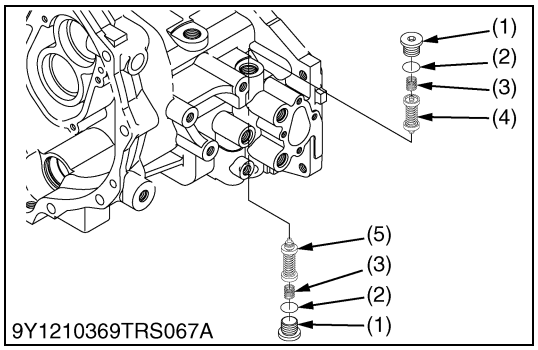

Check and High Pressure Relief Valve

1. Remove the hex. socket head plug (1) and remove the spring (3) and relief valve assembly (4), (5).

(When reassembling)

- Be careful not to damage the O-ring on the plug.

Tightening torque	Hex. Socket head plug of check and high pressure relief valve	59 to 78 N·m 6.1 to 7.9 kgf·m 44 to 57 lbf·ft

(1) Plug
(2) O-ring
(3) Spring
(4) Check and High Pressure Relief Valve Assembly (Forward)
(5) Check and High Pressure Relief Valve Assembly (Reverse)

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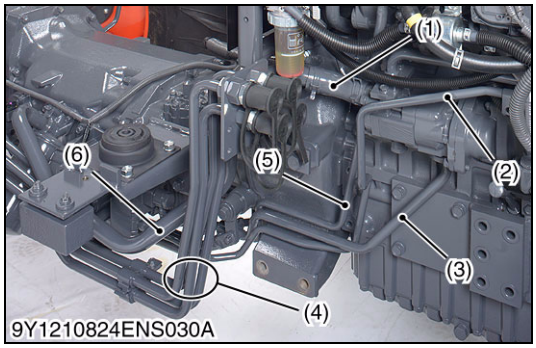
(2) Mid Case



Hydraulic Pipe

1. Remove the front loader pipes (4).
2. Disconnect the suction hose (1) and suction pipe (6).
3. Remove the main delivery pipe (3), power steering delivery pipe (2) and delivery pipe (5).

(When reassembling)

Tightening torque	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft
	Joint bolt for main delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft
	Joint bolt for delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft

(1) Suction Hose
(2) Power Steering Delivery Pipe
(3) Main Delivery Pipe
(4) Front Loader Pipe
(5) Delivery Pipe
(6) Suction Pipe

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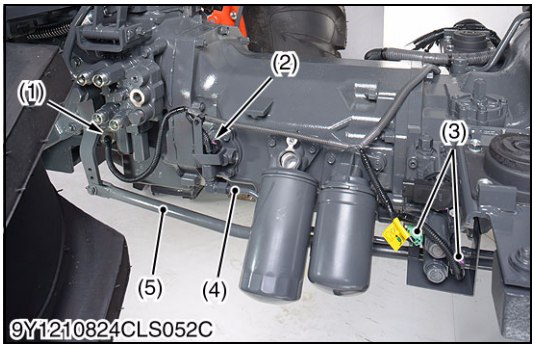

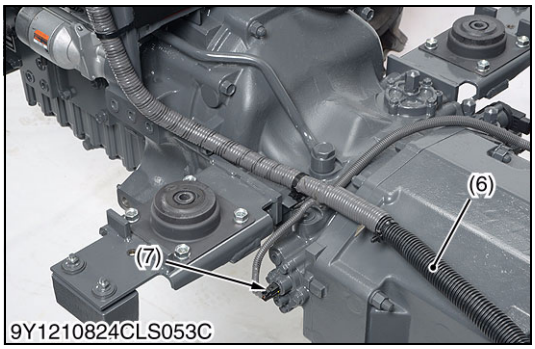

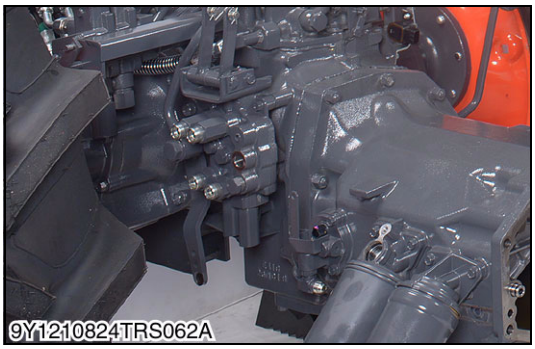

Hydraulic Pipe and Wiring Harness

1. Disconnect the speed sensor connector (1).
2. Disconnect the PTO clutch valve connector (2).
3. Disconnect the proportional valve connector (3).
4. Remove the brake rod R.H. (5).
5. Remove the PTO delivery pipe (4).
6. Disconnect the solenoid valve connector (7).
7. Set aside the main wiring harness (6) to the front.

Tightening torque	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Joint bolt for HST return pipe	88 to 98 N·m 9.0 to 9.9 kgf·m 65 to 72 lbf·ft

(1) Speed Sensor Connector
(2) PTO Clutch Valve Connector
(3) Proportional Valve Connector
(4) PTO Delivery Pipe
(5) Brake Rod R.H.
(6) Main Wiring Harness
(7) Solenoid Valve Connector

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Separating Mid Case and Transmission Case

1. Separate the mid case and transmission case after removing their mounting screws.

(When reassembling)

- Make sure to insert the PTO shaft to PTO clutch firmly, turning the PTO shaft.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the mid case and transmission case.

Tightening torque	Mid case and transmission case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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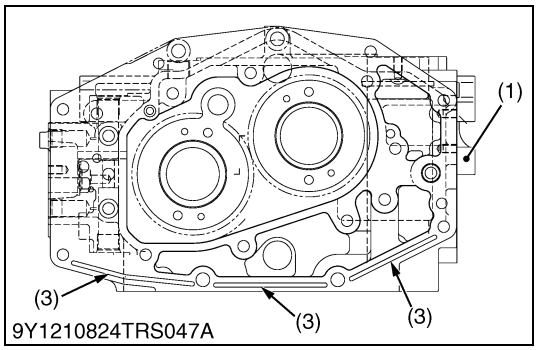
Separating Clutch Housing and Mid Case

1. Remove the clutch housing and mid case mounting screws and nuts.
2. Separate the clutch housing (1) and mid case (2).

(When reassembling)

- Gasket should be replaced with new one.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the clutch housing (1) and mid case (2).
- Make sure to apply liquid gasket to elongated grooves (3) on the mid case face and to those on the lower side of the clutch housing face.

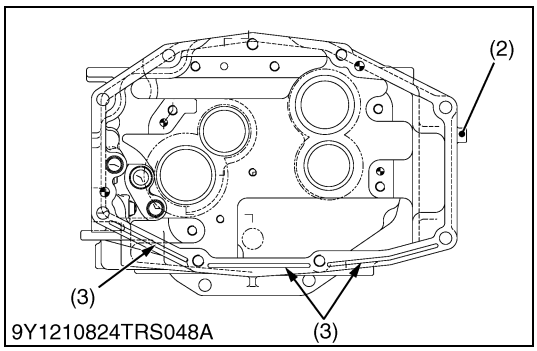
Tightening torque	Clutch housing and mid case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Clutch housing and mid case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft



9Y1210824TRS047A

(1) Clutch Housing
(2) Mid Case
(3) Elongated Groove

9Y1210824TRS0114US0



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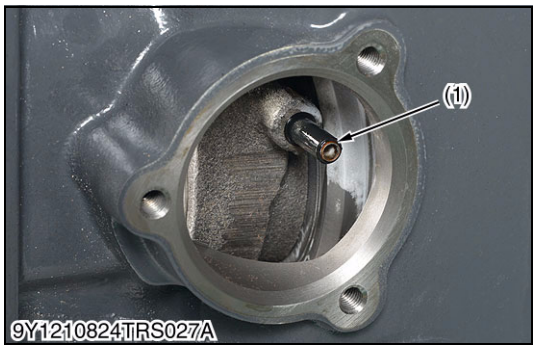


9Y1210824TRS027A

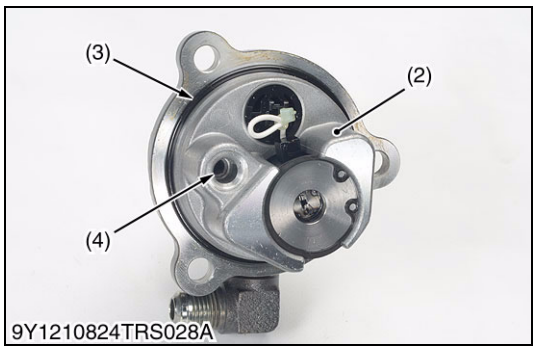
PTO Clutch Valve

1. Remove the PTO clutch valve (2) as a unit.
2. Pull out the pipe (1).

(When reassembling)

- Apply small amount of grease for the O-ring (3).
- Install the pipe (1) to the hole (4) of the PTO clutch valve (2) firmly.
- Replace the pipe (1) with a new one.

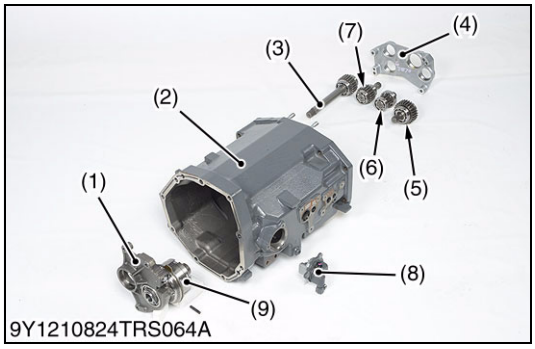
Tightening torque	PTO clutch valve mounting screw	23.5 to 27.4 N·m 2.40 to 27.4 kgf·m 17.4 to 20.2 lbf·ft



9Y1210824TRS028A

(1) Pipe
(2) PTO Clutch Valve
(3) O-ring
(4) Hole

9Y1210824TRS0023US0



Mid Case Bearing Holder with Gears

1. Remove the mid case bearing holder 1 (4).
2. Remove the gear shafts (3), (7), (6), (5).
3. Remove the mid case bearing holder 2 (1) with PTO clutch (9).

(When reassembling)

- Tap in the mid case bearing holder (1), (4) with plastic hummer until contact to mid case, and then tighten the screws to specified torque.

Tightening torque	Mid case bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Mid Case Bearing Holder 2
(2) Mid Case
(3) 20T Gear Shaft (L5460, L6060)
22T Gear Shaft (L3560, L4060, L4760)
(4) Mid Case Bearing Holder 1
(5) 24T Gear Shaft (L3560)
25T Gear Shaft (L4060, L4760)
27T Gear Shaft (L5460, L6060)
(6) 14T Gear Shaft (L5460, L6060)
15T Gear Shaft (L4060, L4760)
15T Gear Shaft (L3560)
(7) 21T Gear Shaft (L3560, L4060, L4760)
22T Gear Shaft (L5460, L6060)
(8) PTO Clutch Valve
(9) PTO Clutch

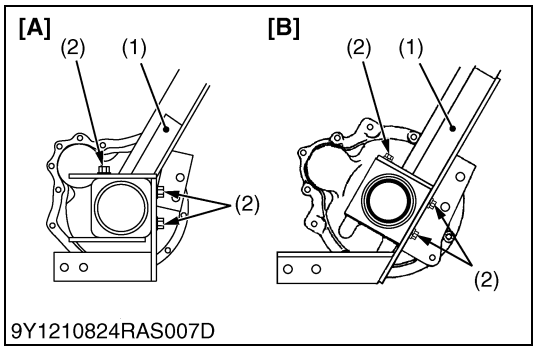
9Y1210824TRS0115US0

Disassembling PTO Clutch

- See page 3-S68.

9Y1210824TRS0065US0

(3) Transmission Case



Rear Wheel and ROPS Lower Frame

1. Place disassembling stand under the transmission case, and support it with a jack.
2. Remove the rear wheels.
3. After removing the rear wheels, support it at both sides of rear axle by stands.
4. Remove the ROPS lower frame mounting screws (2).
5. Remove the ROPS lower frames (1).

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	220 N·m 22 kgf·m 160 lbf·ft
	ROPS lower frame mounting torque	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) ROPS Lower Frame
(2) Screw (M14 × 30)

[A] L3560
[B] L4060, L4760, L5460, L6060

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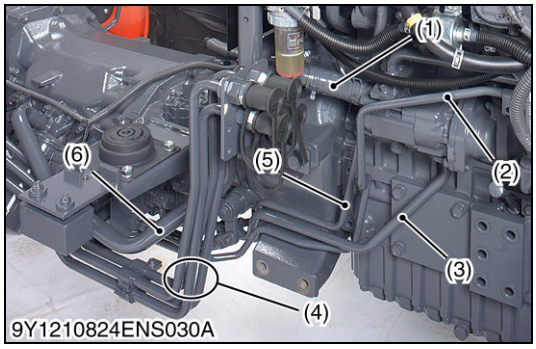

Hydraulic Pipe

1. Remove the front loader pipes (4).
2. Disconnect the suction hose (1) and suction pipe (6).
3. Remove the main delivery pipe (3), power steering delivery pipe (2) and delivery pipe (5).

(When reassembling)

Tightening torque	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft
	Joint bolt for main delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft
	Joint bolt for delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft

(1) Suction Hose
(2) Power Steering Delivery Pipe
(3) Main Delivery Pipe
(4) Front Loader Pipe
(5) Delivery Pipe
(6) Suction Pipe

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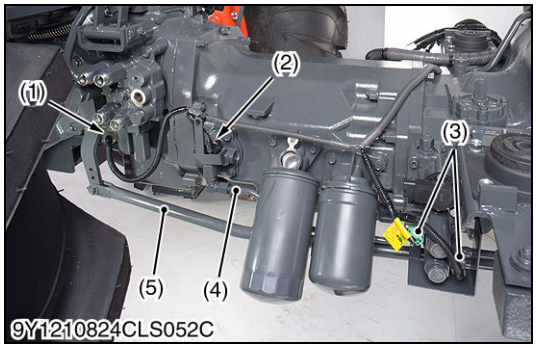

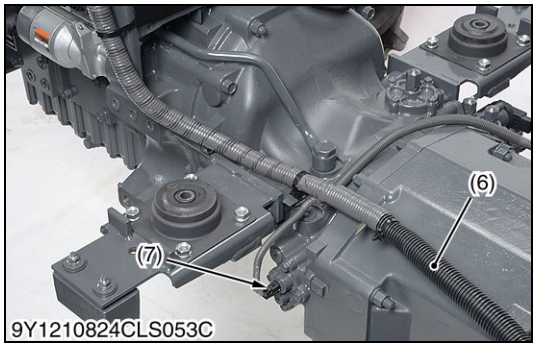

Hydraulic Pipe and Wiring Harness

1. Disconnect the speed sensor connector (1).
2. Disconnect the PTO clutch valve connector (2).
3. Disconnect the proportional valve connector (3).
4. Remove the brake rod R.H. (5).
5. Remove the PTO delivery pipe (4).
6. Disconnect the solenoid valve connector (7).
7. Set aside the main wiring harness (6) to the front.

Tightening torque	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Joint bolt for HST return pipe	88 to 98 N·m 9.0 to 9.9 kgf·m 65 to 72 lbf·ft

(1) Speed Sensor Connector
(2) PTO Clutch Valve Connector
(3) Proportional Valve Connector
(4) PTO Delivery Pipe
(5) Brake Rod R.H.
(6) Main Wiring Harness
(7) Solenoid Valve Connector

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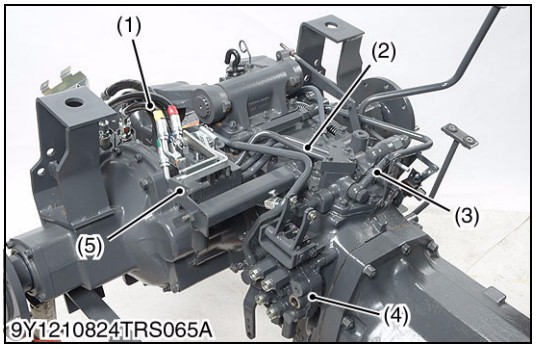

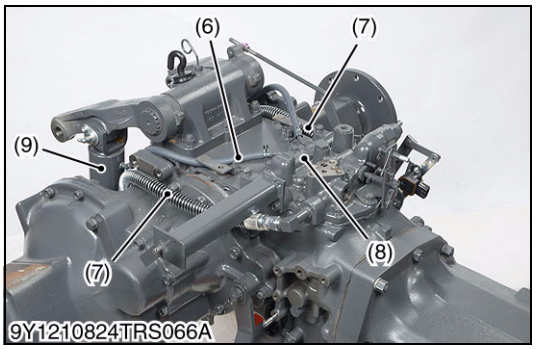

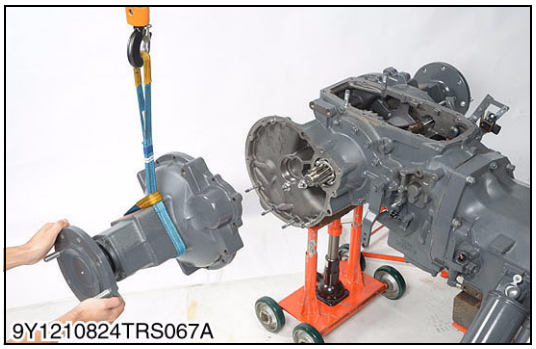

Hydraulic Cylinders and Front Loader Control Valve

1. Remove the remote control hoses (1).
2. Remove the remote control valve (5) and pipe (2).
3. Remove the delivery pipe (3).
4. Remove the front loader control valve (4) with front loader control valve bracket assembly.
5. Disconnect the hydraulic cylinder hoses (7) and return hoses (6) at the rear hydraulic block (8).
6. Remove the pins, and remove the hydraulic cylinders (9).

Tightening torque	Joint bolt for delivery pipe	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft
	Hydraulic cylinder hose retaining nut	35 to 48 N·m 3.5 to 4.9 kgf·m 26 to 35 lbf·ft

(1) Hose
(2) Pipe
(3) Delivery Pipe
(4) Front Loader Control Valve
(5) Remote Control Valve
(6) Return Hose
(7) Hydraulic Cylinder Hose
(8) Rear Hydraulic Block
(9) Hydraulic Cylinder

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Rear Axle

1. Separate the rear axle case from brake case.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the rear axle and brake case.

Tightening torque	Rear axle case mounting screw and nut	M10 screw and nut (7T)	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
		M10 nut (9T) (Except L3560)	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
		M12 screw (Except L3560)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

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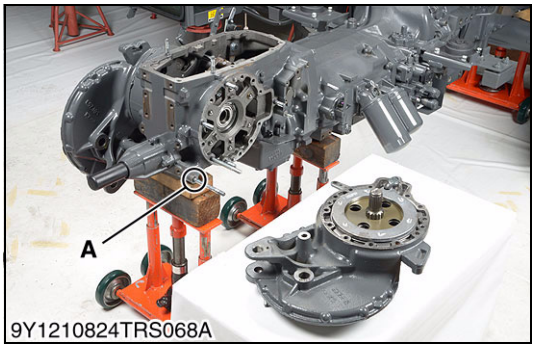

Brake Case

1. Remove the range gear shift lever fulcrum screw.
2. Remove the brake case mounting screws and nuts.
3. Separate the brake case, tapping the brake case lever lightly.

(When reassembling)

- Apply grease to the steel ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the brake case and transmission case.
- Apply liquid lock to the fulcrum screw.
- Be sure to apply liquid gasket to **"A"** position.
- Be sure to fix the brake cam and cam plate.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.

Tightening torque	Brake case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Fulcrum screw	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

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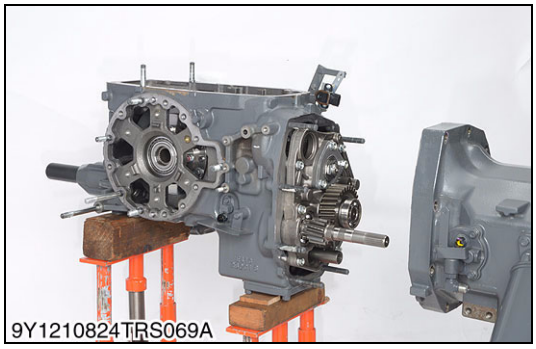

Separating Mid Case and Transmission Case

1. Separate the mid case and transmission case after removing their mounting screws and nut.

(When reassembling)

- Make sure to insert the PTO shaft to PTO clutch firmly, turning the PTO shaft.
- Make sure to insert the front wheel drive shaft to coupling firmly.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the mid case and transmission case.

Tightening torque	Mid case and transmission case mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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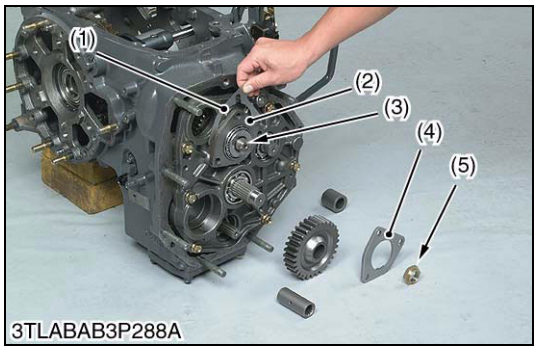

Pinion Bearing Cover

1. Remove the stake of lock nut (5).
2. Lock the turning of spiral bevel pinion and remove the lock nut (5).
3. Remove the pinion bearing case mounting screws.
4. Remove the pinion bearing cover (4) and shims (1).

(When reassembling)

- Make sure of the number of shims in the pinion bearing case.
- Replace the lock nut (5) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Pinion bearing case mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Shim
(2) Pinion Bearing Case
(3) Spiral Bevel Pinion Shaft
(4) Pinion Bearing Cover
(5) Lock Nut

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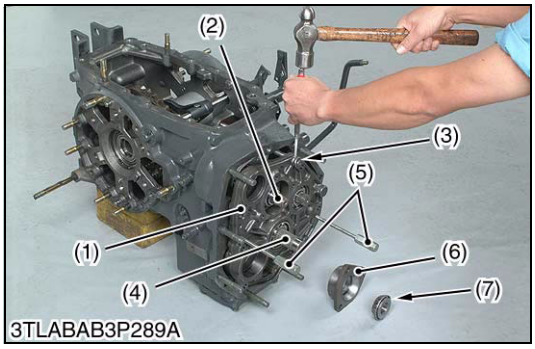

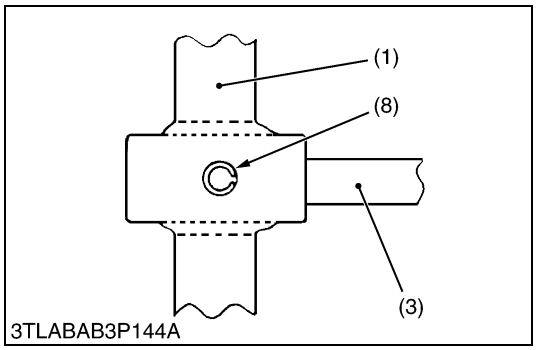

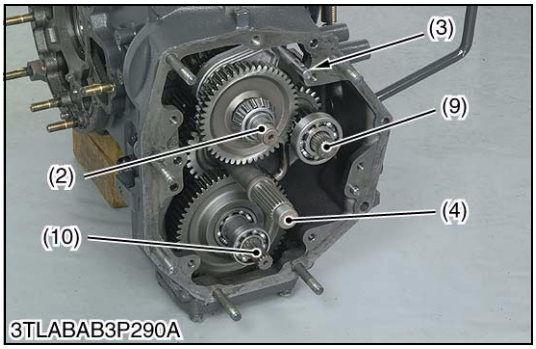

Transmission Bearing Holder

1. Remove the transmission bearing holder mounting screws.
2. Tap out the spring pin (8) on the shift fork rod (3).
3. Jack up the bearing holder (1) by using the two jack screws (5) until the taper roller bearing (7) can be removed.

■ **NOTE**

- **Jack up the bearing holder while hitting the two shafts (2), (4) by copper hummer or soft hummer.**

4. Jack up more and remove the transmission bearing holder (1).

(When reassembling)

- Tap in the transmission bearing holder with soft hummer until contact to transmission case, and then tighten the screws to specified torque.
- Tap in the spring pin (8) so that its split portion may face forward. (Refer to figure.)

Tightening torque	Transmission bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Transmission Bearing Holder
(2) Spiral Bevel Pinion Shaft
(3) Shift Fork Rod for Range Gear Shift
(4) PTO Drive Shaft
(5) Jack Screw
(6) Pinion Bearing Case
(7) Taper Roller Bearing
(8) Spring Pin
(9) Range Gear Shaft
(10) Front Wheel Drive Shaft

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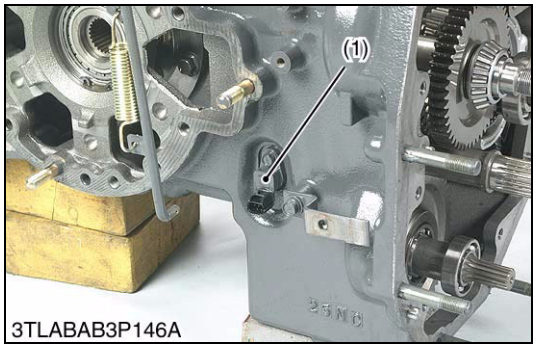

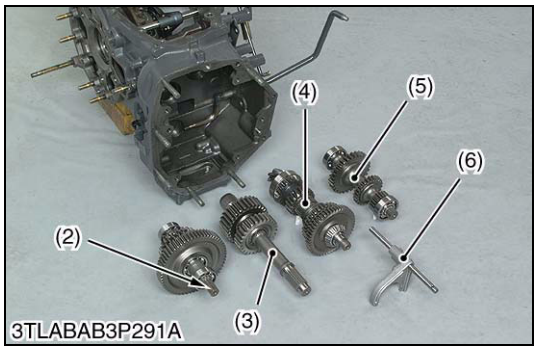

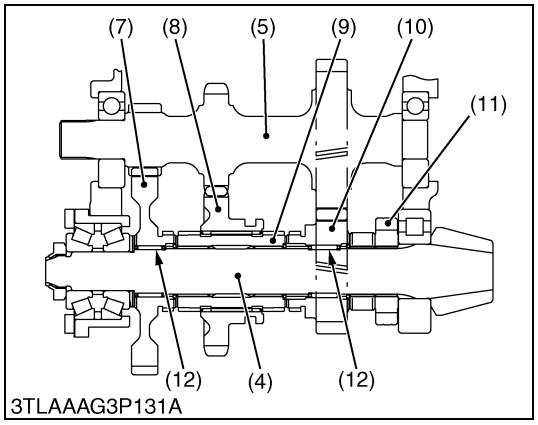

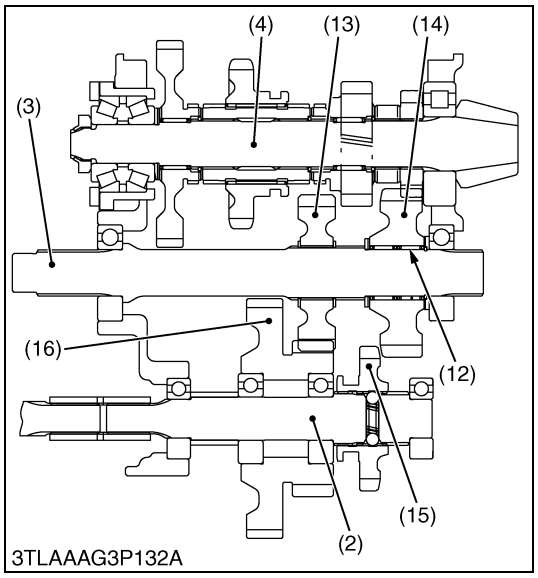

Shaft Assemblies

1. Remove the traveling speed sensor (1).
2. Remove the spiral bevel pinion shaft assembly (4) with shift fork (6), range gear shaft assembly (5) and PTO drive shaft assembly (3).
3. Remove the front wheel drive shaft (2).

(When reassembling)

- Apply transmission fluid to needle bearings (12).

(1) Traveling Speed Sensor
(2) Front Wheel Drive Shaft
(3) PTO Drive Shaft
(4) Spiral Bevel Pinion Shaft
(5) Range Gear Shaft
(6) Shift Fork
(7) 52T Gear
(8) 35T Shifter Gear
(9) Spline Boss
(10) 20T Gear
(11) 18T Gear (L3560, L5460, L6060)
19T Gear (L4060)
16T Gear (L4760)
(12) Needle Bearing
(13) 27T Gear (CABIN Model)
(14) 29T Gear
(L3560, L4060, L5460, L6060)
31T Gear (L4760)
(15) 24T Shifter Gear
(16) 26T-60T Gear (CABIN Model)

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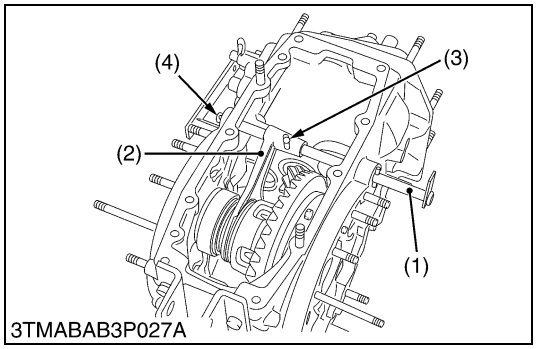

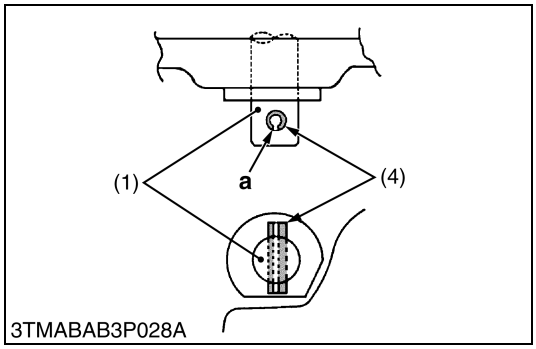

Differential Lock Shift Fork

1. Tap out the left side spring pin (4).
2. Remove the cotter pin and clevis pin (3).
3. Draw out the differential lock fork shaft (1) and remove differential lock shift fork (2).

(When reassembling)

- Apply grease to the left and right oil seals on the transmission case.
- Insert the clevis pin (3) from the top and install the washer and cotter pin.
- Tap in the spring pin (4) so that its split portion **"a"** may face outward as shown in the figure.

(1) Differential Lock Fork Shaft
(2) DIfferential Lock Shift Fork
(3) Clevis Pin
(4) Spring Pin

a: Split Portion

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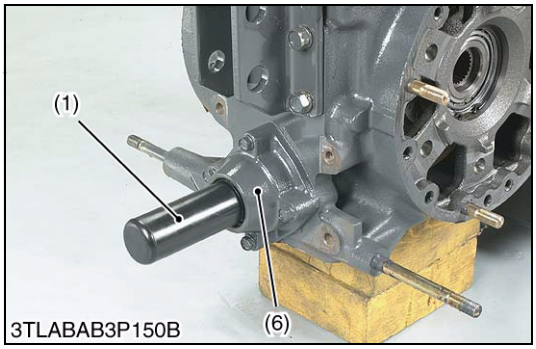


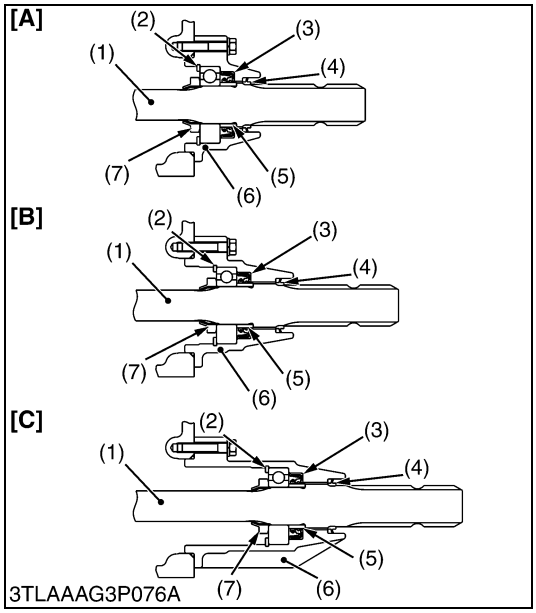
PTO Shaft

1. Remove the PTO shaft cover.
2. Remove the bearing case mounting screws, and draw out the PTO shaft (1) with bearing case (6).
3. Remove the internal snap ring (2).
4. Top out the PTO shaft (1) to the front.

(When reassembling)

- If the lock nut (7) was removed, replace it with a new one. After replacing, be sure to stake it firmly.
- Install the slinger (4) firmly.
- Apply grease to the oil seal (3) and install it, noting its direction.

Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Bearing case mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft



(1) PTO Shaft
(2) Internal Snap Ring
(3) Oil Seal
(4) Slinger
(5) Oil Seal Collar
(6) Bearing Case
(7) Lock Nut

[A] L3560
[B] L4060, L4760
[C] L5460, L6060

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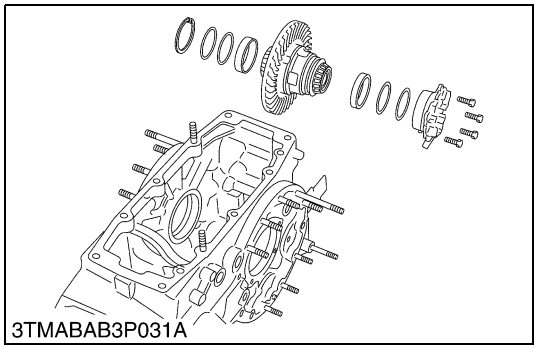

Differential Gear Assembly

1. Remove the differential support, noting the number of left shims.
2. Remove the differential gear assembly, noting the number of right shims.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion.
- Use same number of shims as before disassembling.

Tightening torque	Differential support mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

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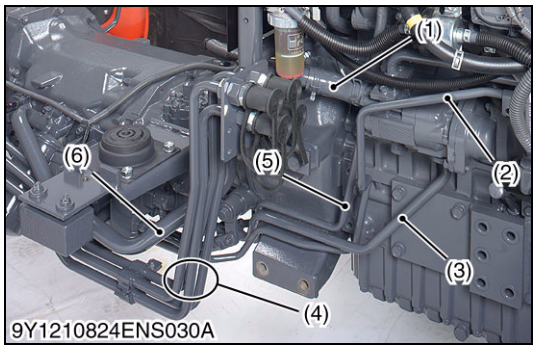
(4) Regulating Valve



Hydraulic Pipe

1. Remove the front loader pipes (4).
2. Disconnect the suction hose (1) and suction pipe (6).
3. Remove the main delivery pipe (3), power steering delivery pipe (2) and delivery pipe (5).

(When reassembling)

Tightening torque	Front loader pipe retaining nut	90.0 to 108 N·m 9.18 to 11.0 kgf·m 66.4 to 79.6 lbf·ft
	Joint bolt for main delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft
	Joint bolt for delivery pipe	40 to 49 N·m 4.0 to 4.9 kgf·m 29 to 36 lbf·ft

(1) Suction Hose
(2) Power Steering Delivery Pipe
(3) Main Delivery Pipe
(4) Front Loader Pipe
(5) Delivery Pipe
(6) Suction Pipe

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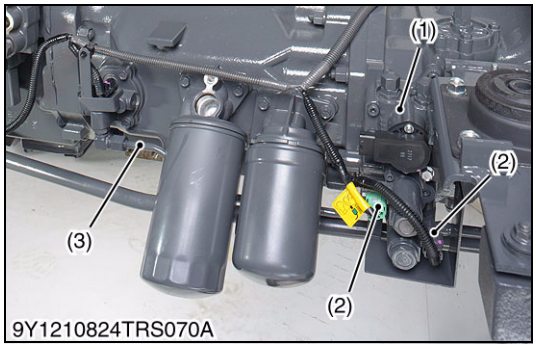


PTO Delivery Pipe and Regulating Valve Assembly

1. Disconnect the proportional valve connector (2).
2. Remove the PTO delivery pipe (3).
3. Remove the regulating valve assembly (1).

(When reassembling)

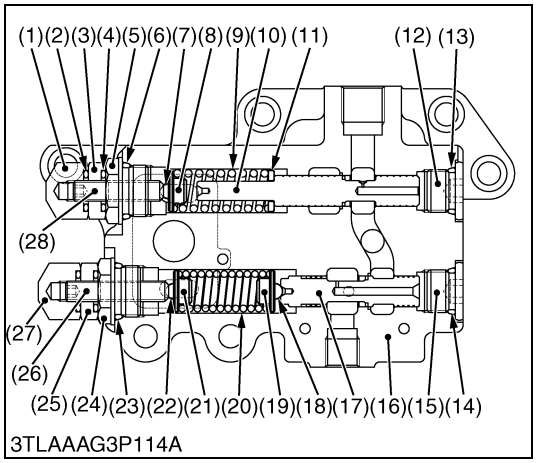
■ **IMPORTANT**

- **In installing the connector of the proportional valve, pay attention to the color of the connector to ensure correct installation.**

Tightening torque	Joint bolt for PTO delivery pipe	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

(1) Regulating Valve
(2) Proportional Valve Connector
(3) PTO Delivery Pipe

9Y1210824TRS0125US0



Disassembling Regulating Valve

■ **NOTE**

- **The regulating valve has been precisely machined and assembled. It is advisable not to disassemble it as long as there is no necessary.**

1. Remove the cap nuts (1), (27) and lock nuts (3), (25).
2. Remove the plugs (5), (24) with adjustor (28), (26).
3. Remove the plugs (12), (15).
4. Remove the spring retainers (8), (21) with balls (7), (22).
5. Remove the springs (9), (20).
6. Remove the collar (11) and retainer (8) with ball (7).
7. Remove the spools (10), (17).

(When reassembling)

- Be careful not to damage the O-rings.

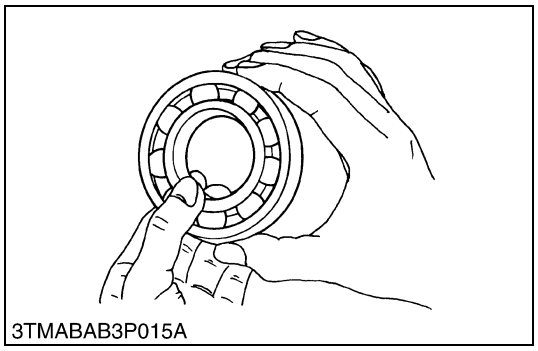
(1) Cap Nut
(2) O-ring
(3) Lock Nut
(4) O-ring
(5) Plug
(6) O-ring
(7) Ball
(8) Retainer
(9) Spring
(10) Spool
(11) Collar
(12) Plug
(13) O-ring
(14) O-ring
(15) Plug
(16) Valve Body
(17) Spool
(18) Ball
(19) Retainer
(20) Spring
(21) Retainer
(22) Ball
(23) O-ring
(24) Plug
(25) Lock Nut
(26) Adjustor
(27) Cap Nut
(28) Adjustor

9Y1210824TRS0126US0

7. SERVICING

[1] MANUAL TRANSMISSION

(1) Bearing, Gear and Shaft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Checking Bearing

1. Hold the inner race, and push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then turn the outer race to check rotation.
3. If there is any problem, replace it.

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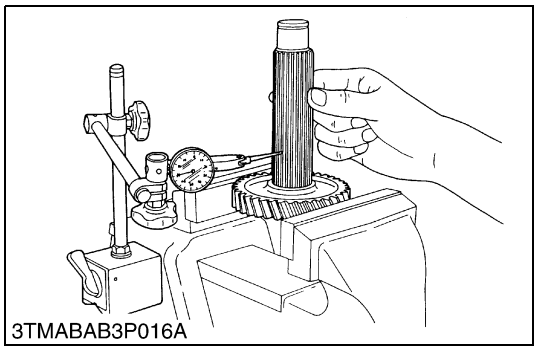
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Clearance between Gear and Spline

1. Secure the gear with a vise.
2. Set a dial indicator (lever type) with its finger on the spline.
3. Move the shaft to measure the clearance.
4. If the clearance exceeds the allowable limit, replace them.

Clearance between gear and spline	Factory specification	0.030 to 0.078 mm 0.0012 to 0.0030 in.
	Allowable limit	0.2 mm 0.008 in.

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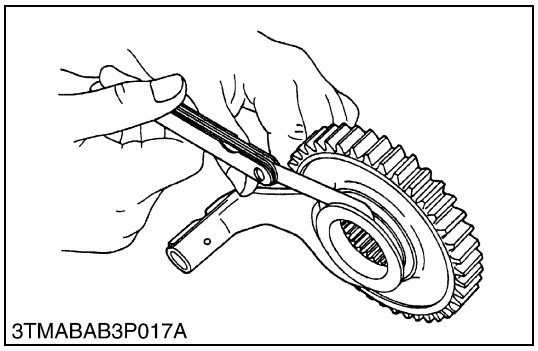
3TMABAB3P017A

Clearance between Shift Fork and Shift Gear Groove

1. Place for in the groove to check clearance with feeler gauge.
2. If the clearance exceeds allowable limit, replace.

Clearance between shift fork and shift gear groove	Factory specification	0.20 to 0.40 mm 0.0079 to 0.015 in.
	Allowable limit	0.8 mm 0.03 in.

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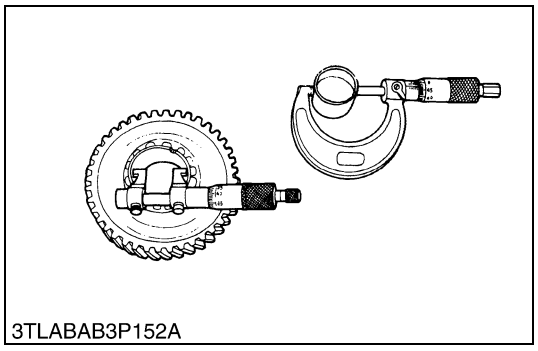
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Clearance between Gear and Shaft

1. Measure the shaft O.D. (rubbing surface).
2. Measure the gear I.D. (rubbing surface).
3. Measure the O.D. of the two needles installed diagonally in the needle bearing.
4. Calculate the clearance
   (Clearance = Gear I.D. – {(2 × needle O.D.) + shaft O.D.})
5. If the clearance exceeds the allowable limit, replace them.

Clearance between gear and shaft	Factory specification	0.021 to 0.054 mm 0.00083 to 0.0021 in.
	Allowable limit	0.1 mm 0.004 in.

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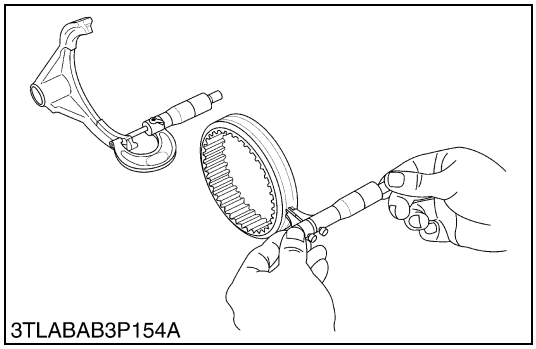
(2) Synchronized Gear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Clearance between Shift Fork and Shifter Groove

1. Measure the width of shift fork.
2. Measure the shifter groove width, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

Clearance between shift fork and shifter groove	Factory specification	Shuttle F-R	0.20 to 0.45 mm 0.0079 to 0.017 in.
		Other	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	Shuttle F-R	0.80 mm 0.03 in.
		Other	0.80 mm 0.03 in.

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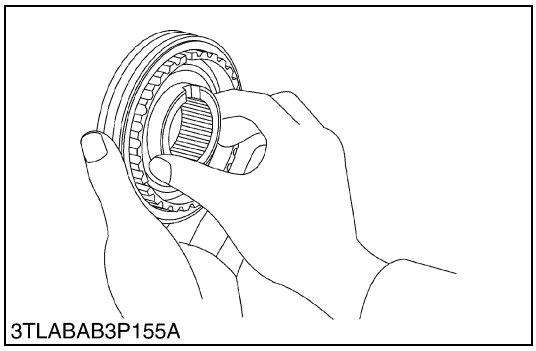
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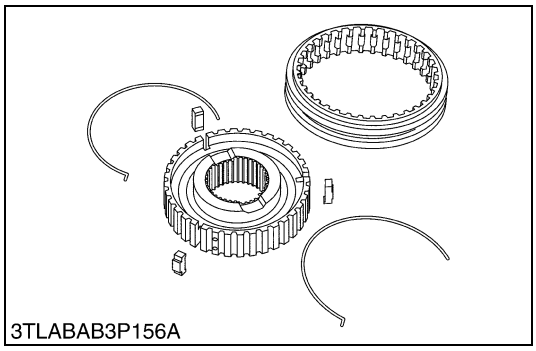
Checking Contact between Coupling and Shifter

1. Check to see if there is flaw or wear on the spline of the coupling and shifter, and the key groove on the coupling.
2. Engage the shifter with the coupling, and check that they slide smoothly.
3. Similarly, check that there is any flaw or wear on the gear splines.
4. If there is any problem, replace them.

9Y1210824TRS0132US0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Flaw on Synchronizer Key and Spring

1. Check the projection in the center of the synchronizer key for wear.
2. Check the spring for fatigue or wear on the area where the spring contacts with the keys.
3. If there is any problem, replace them.

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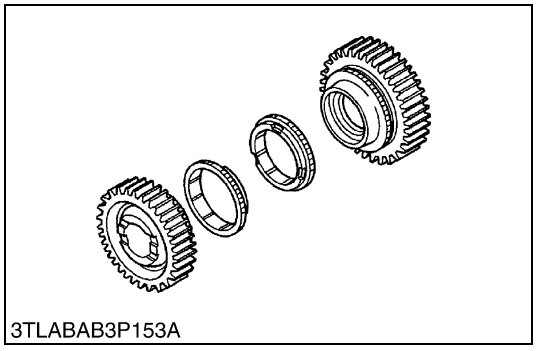
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Side Clearance between Synchronizer Ring and Gear (In Contact)

1. Press the synchronizer ring against the tapered portion of the gear, and measure the side clearance.
2. Apply thin film of red lead to the tapered portion, press the ring against it by hand, rub them together a few times, and check the contact.
3. Check the tooth surface and key grooves of the ring for wear.
4. If the side clearance exceeds the allowable limit or if there is any problem, replace the synchronizer ring.

Side clearance	Allowable limit	0.35 mm 0.014 in.

Contact condition of tapered portion	Allowable limit	More than 80 %

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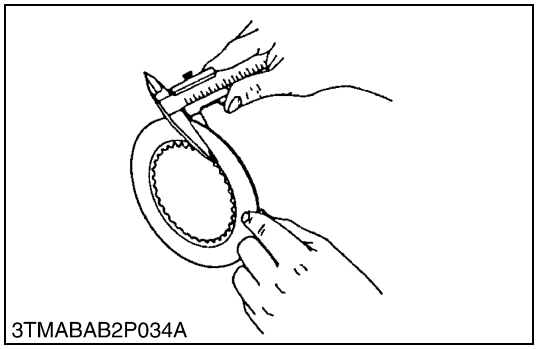
(3) PTO Clutch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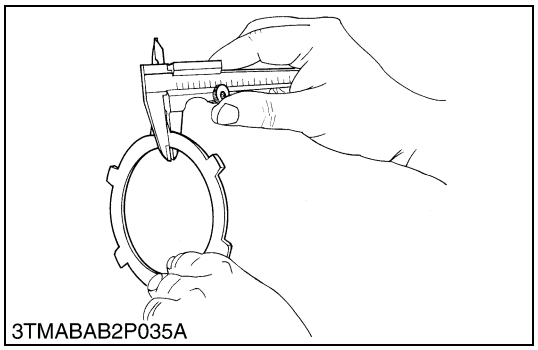
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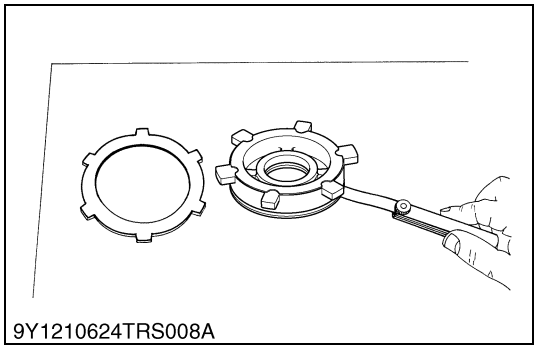
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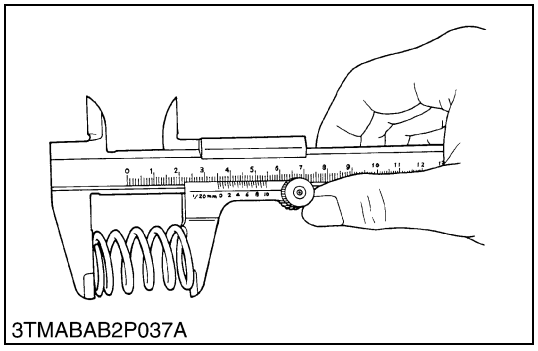
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PTO Clutch Disc Wear

1. Measure the thickness of PTO clutch disc with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of PTO clutch disc	Factory specification	1.70 to 1.90 mm 0.0670 to 0.0748 in.
	Allowable limit	1.55 mm 0.0610 in.

9Y1210824TRS0135US0

PTO Clutch Plate Wear

1. Measure the thickness of PTO steel plate with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of PTO steel plate	Factory specification	1.15 to 1.25 mm 0.045 to 0.049 in.
	Allowable limit	1.10 mm 0.043 in.

9Y1210824TRS0136US0

Flatness of PTO Piston and PTO Steel Plate

1. Place the part on a surface plate.
2. Check it unable to insert a feeler gauge (allowable limit size) underneath it at least four points.
3. If the gauge can be inserted, replace it.

Flatness of PTO piston	Allowable limit	0.15 mm 0.0059 in.

9Y1210824TRS0137US0

Piston Return Spring Free Length

1. Measure the free length of spring with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

PTO return spring free length	Factory specification	42.5 to 43.5 mm 1.68 to 1.71 in.
	Allowable limit	38.25 mm 1.506 in.

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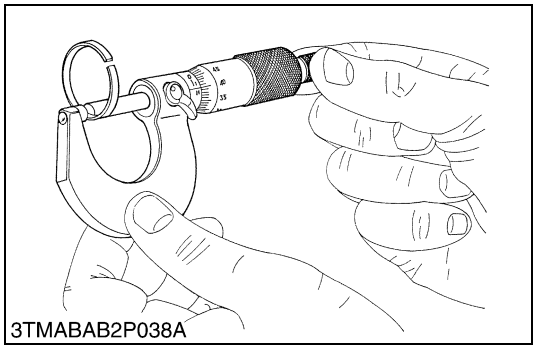
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Thickness of Seal Ring

1. Measure the thickness of seal rings (1) with an outside micrometer.
2. If the measurement is less than the allowable limit, replace it.

Thickness of seal ring	Factory specification	2.45 to 2.50 mm 0.0965 to 0.0984 in.
	Allowable limit	2.0 mm 0.079 in.

(1) Seal Ring

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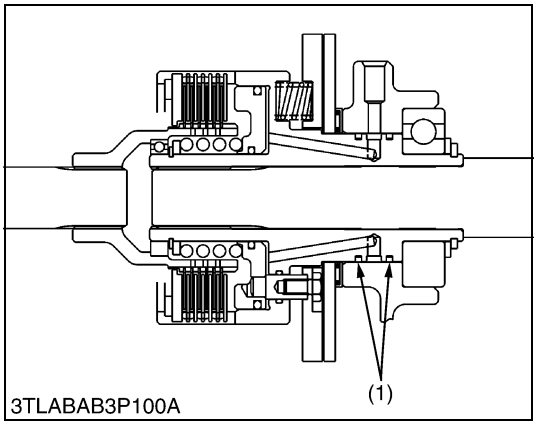

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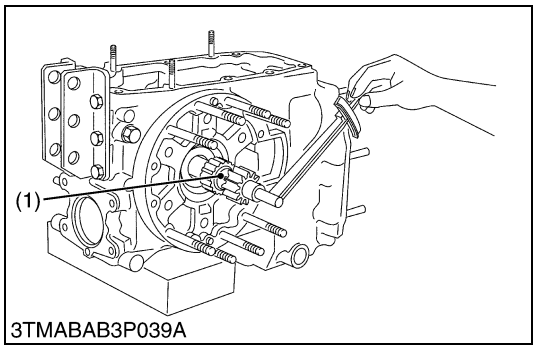
(4) Differential Gears



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Spiral Bevel Gear Turning Torque

■ **NOTE**

- **It is necessary to adjust the spiral bevel gear turning torque, when replacing the differential gears, transmission case or other relative parts.**

1. Assemble the differential gears to transmission case. At this time, install the some shims (3) to the spiral bevel gear side.
2. Check the turning torque by using turning torque tool (1).
   Turning Torque Tool:
   Weld socket on the brake shaft
   (Brake shaft Part No. TA040-26710)
3. Add or reduce the thickness of shims (3) to make the specified turning torque.
4. After getting the specified turning torque, divide the thickness of shims to left and right side.
5. Assemble the transmission case and adjust the backlash and tooth contact with spiral bevel pinion.

Turning torque of 37T spiral bevel gear	Factory specification	4.0 to 6.3 N·m 0.40 to 0.65 kgf·m 2.9 to 4.7 lbf·ft

(1) Turning Torque Tool
(2) 37T Spiral Bevel Gear
(3) Adjusting Shim
(4) Differential Support

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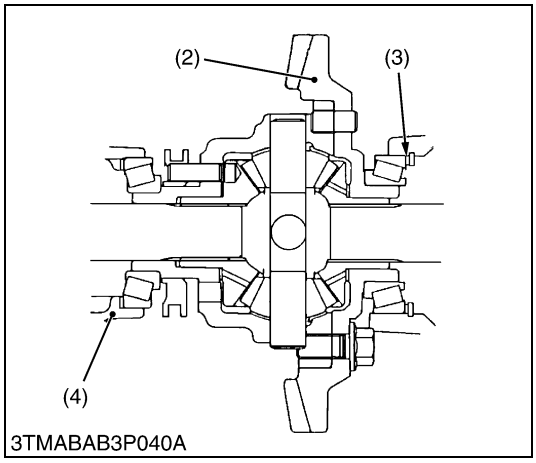

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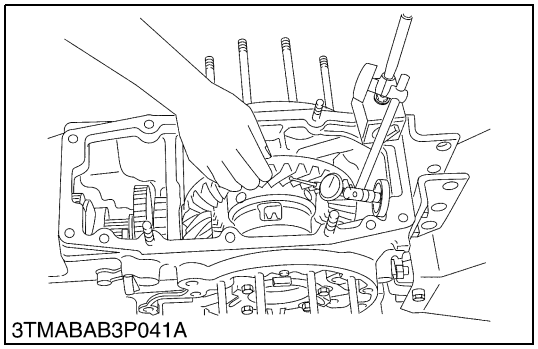
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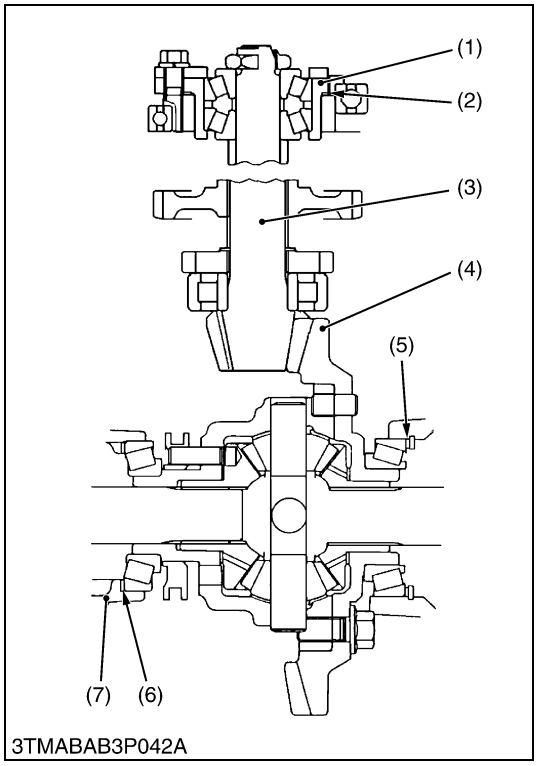

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Backlash and Tooth Contact between Spiral Bevel Gear and Spiral Bevel Pinion Shaft

1. Set the dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the spiral bevel pinion shaft (3) and moving the spiral bevel gear (4) by hand.
3. When the backlash is too large, decrease the number of shims (6) in the side of the spiral bevel gear, and insert the shims (5) of the same thickness as the removed ones to the opposite side. When the backlash is too small, do the opposite way to increase backlash.
4. Adjust the backlash periphery by repeating the above procedure.
5. Apply red lead lightly over several teeth at three positions equally spaced on the spiral bevel gear.
6. Turn the spiral bevel pinion shaft, while pressing a wooden piece against the periphery on the spiral bevel gear.
7. Check the tooth contact. If not proper, adjust according to the instructions below.

Backlash between spiral bevel gear and spiral bevel pinion shaft	Factory specification	0.15 to 0.30 mm 0.0059 to 0.012 in.
	Allowable limit	0.4 mm 0.02 in.

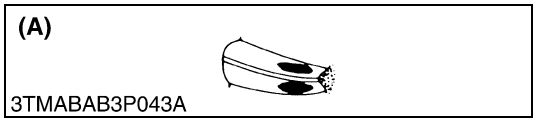
(Reference)

- Thickness of shims (2)
  0.1 mm (0.004 in.)
  0.2 mm (0.008 in.)
  0.5 mm (0.02 in.)
- Thickness of shims (5)
  0.4 mm (0.016 in.)
  0.5 mm (0.020 in.)
  0.6 mm (0.024 in.)
  0.7 mm (0.028 in.)
  0.8 mm (0.031 in.)
  0.9 mm (0.035 in.)
  1.0 mm (0.039 in.)
  1.2 mm (0.047 in.)
  1.4 mm (0.055 in.)
- Thickness of shims (6)
  0.4 mm (0.016 in.)
  0.6 mm (0.024 in.)
  0.8 mm (0.031 in.)
  1.0 mm (0.039 in.)
  1.2 mm (0.047 in.)
  1.6 mm (0.063 in.)

(1) Pinion Bearing Case
(2) Shim
(3) Spiral Bevel Pinion Shaft
(4) Spiral Bevel Gear
(5) Shim
(6) Shim
(7) Differential Support

(To be continued)

(Continued)



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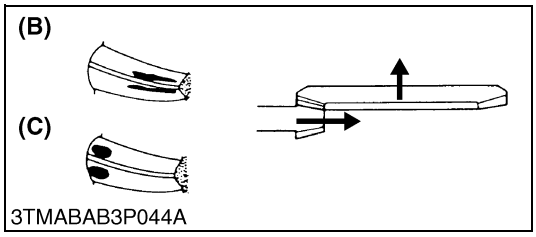

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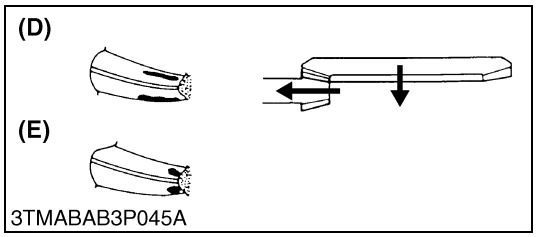

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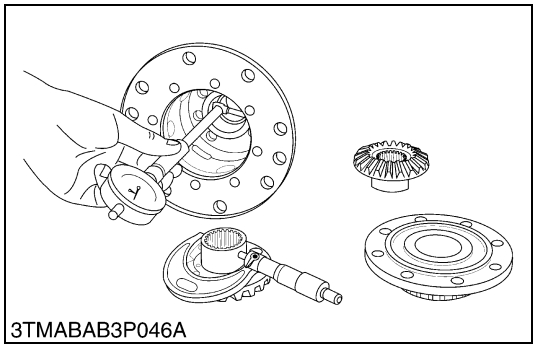
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More than 35 % contact area on the gear tooth surface.

The center of tooth contact at 1/3 of the entire width from the small end.

Replace the adjusting shim (2) with thicker one to move the spiral bevel pinion shaft backward.

For move the spiral bevel gear rightward, reduce right side shim (5) and add shim (6) of the same thickness as the right side to left side.

Replace the shim (2) with a thinner one to move the spiral bevel pinion shaft forward.

For move the spiral bevel gear leftward, reduce left side shim (6) and add shim (5) of the same thickness as the left side to right side.

Repeat above until the proper tooth contact and backlash are achieved.

(A) Proper Contact
(B) Shallow Contact
(C) Heel Contact
(D) Deep Contact
(E) Toe Contact

9Y1210824TRS0141US0

Clearance between Differential Case Bore (Differential Case Cover Bore) and Differential Side Gear Boss

1. Measure the bore I.D. of the differential case and differential case cover.
2. Measure the differential side gear boss O.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

Clearance between differential case bore and differential side gear boss	Factory specification	0.050 to 0.151 mm 0.0020 to 0.00594 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case bore I.D.	Factory specification	40.500 to 40.550 mm 1.5945 to 1.5964 in.
Differential side gear boss O.D.	Factory specification	40.388 to 40.450 mm 1.5901 to 1.5925 in.

Clearance between differential case cover bore and differential side gear boss	Factory specification	0.050 to 0.151 mm 0.0020 to 0.00594 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case cover bore I.D.	Factory specification	40.500 to 40.550 mm 1.5945 to 1.5964 in.
Differential side gear boss O.D.	Factory specification	40.388 to 40.450 mm 1.5901 to 1.5925 in.

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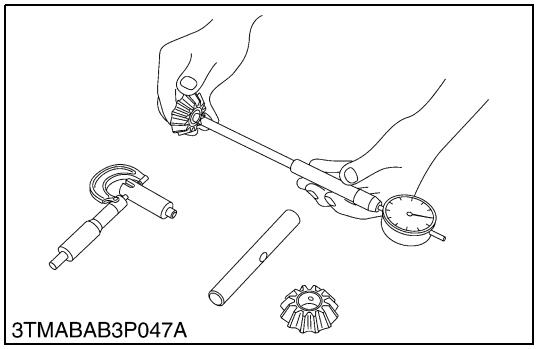
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Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceed the allowable limit, replace them.

Clearance between differential pinion shaft and differential pinion	Factory specification	0.060 to 0.102 mm 0.0024 to 0.00401 in.
	Allowable limit	0.25 mm 0.0098 in.

Differential pinion shaft O.D.	Factory specification	19.959 to 19.980 mm 0.78579 to 0.78661 in.
Differential pinion I.D.	Factory specification	20.040 to 20.061 mm 0.78898 to 0.78980 in.

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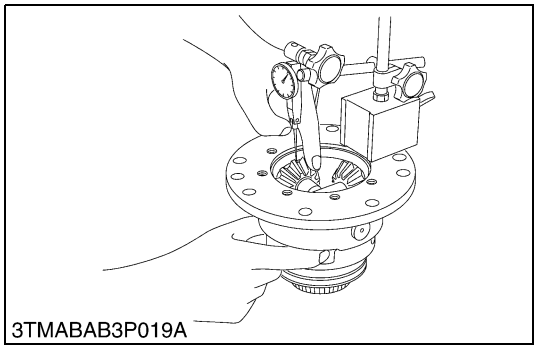
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Backlash between Differential Pinion and Differential Side Gear

1. Set a dial indicator (lever type) on the tooth of the differential pinion.
2. Hold the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement is not within the factory specifications, adjust with the differential side gear washer.

Backlash between differential pinion and differential side gear	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

(Reference)

- Thickness of differential side gear washer
  1.5 mm (0.059 in.)
  1.6 mm (0.063 in.)
  1.7 mm (0.067 in.)

9Y1210824TRS0144US0

[2] GLIDE SHIFT TRANSMISSION (GST)

(1) Bearing, Gear and Shaft

Refer to 3-S123.

9Y1210824TRS0145US0

(2) Synchronizer Gear

Refer to 3-S124.

9Y1210824TRS0146US0

(3) PTO Clutch

Refer to 3-S125.

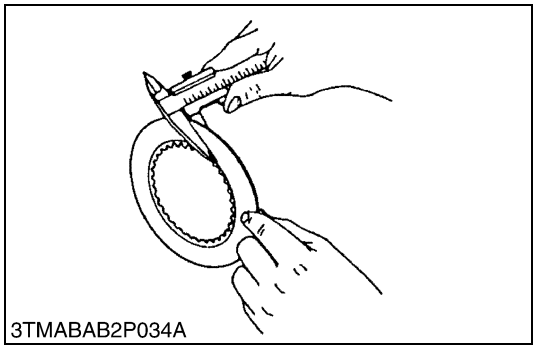
9Y1210824TRS0147US0

(4) Differential Gears

Refer to 3-S126.

9Y1210824TRS0148US0

(5) GST Clutch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Clutch Disc Wear

1. Measure the thickness of GST clutch disc with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of GST clutch disc	Factory specification	2.55 to 2.65 mm 0.101 to 0.104 in.
	Allowable limit	2.50 mm 0.0984 in.

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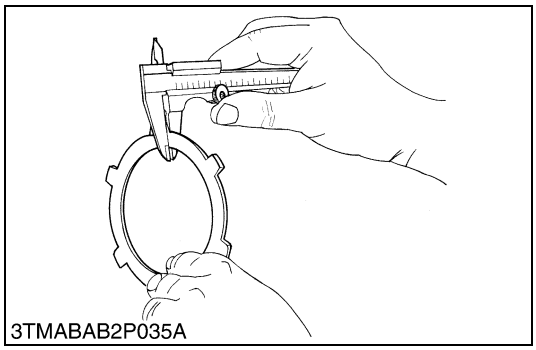
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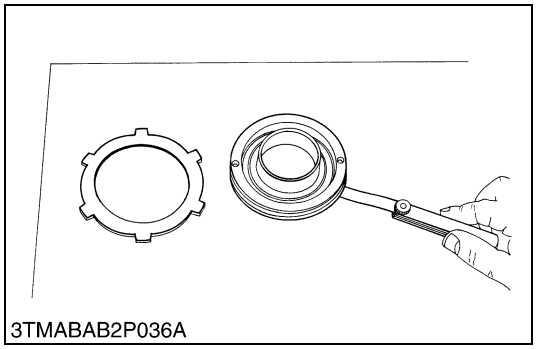
Steel Plate Wear

1. Measure the thickness of GST steel plate with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of GST steel plate	Factory specification	1.55 to 1.65 mm 0.0611 to 0.0649 in.
	Allowable limit	1.50 mm 0.0591 in.

9Y1210824TRS0150US0


3TMABAB2P036A

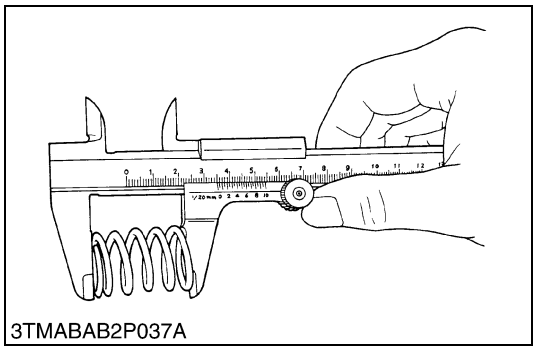
Flatness of Piston and Steel Plate

1. Place the part on a surface plate.
2. Check it unable to insert a feeler gauge (allowable limit size) underneath it at least four points.
3. If the gauge can be inserted, replace it.

Flatness of GST piston	Allowable limit	0.15 mm 0.0059 in.

Flatness of GST steel plate	Allowable limit	0.30 mm 0.012 in.

9Y1210824TRS0151US0

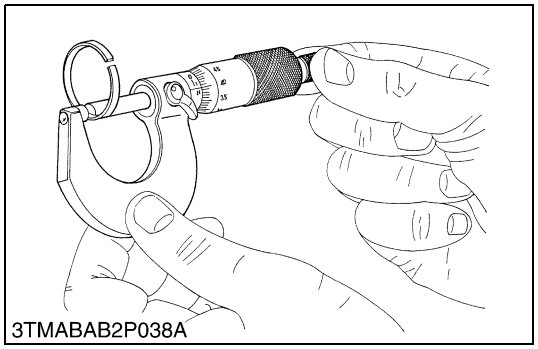

3TMABAB2P037A

Piston Return Spring Free Length

1. Measure the free length of spring with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Piston return spring free length	Factory specification	19.9 to 20.1 mm 0.784 to 0.791 in.
	Allowable limit	18.0 mm 0.709 in.

9Y1210824TRS0152US0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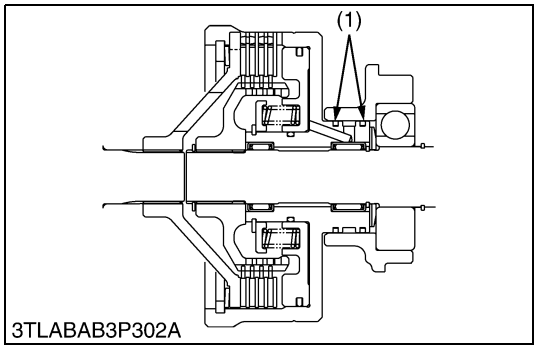


3TLABAB3P302A

Thickness of Seal Ring

1. Measure the thickness of seal rings (1) with an outside micrometer.
2. If the measurement is less than the allowable limit, replace it.

Thickness of seal ring	Factory specification	2.45 to 2.50 mm 0.0965 to 0.0984 in.
	Allowable limit	2.0 mm 0.079 in.

(1) Seal Ring

9Y1210824TRS0153US0

[3] HYDROSTATIC TRANSMISSION (HST)

(1) Bearing, Gear and Shaft

Refer to 3-S123.

9Y1210824TRS0145US0

(2) PTO Clutch

Refer to 3-S125.

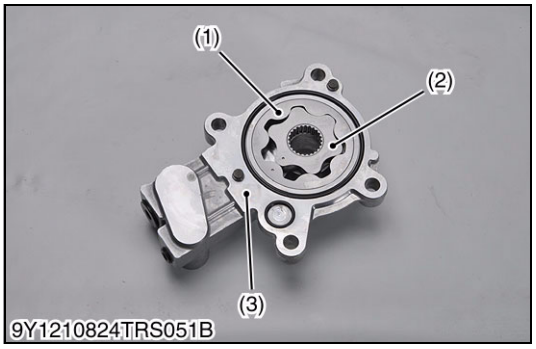
9Y1210824TRS0147US0

(3) Differential Gears

Refer to 3-S126.

9Y1210824TRS0148US0

(4) HST

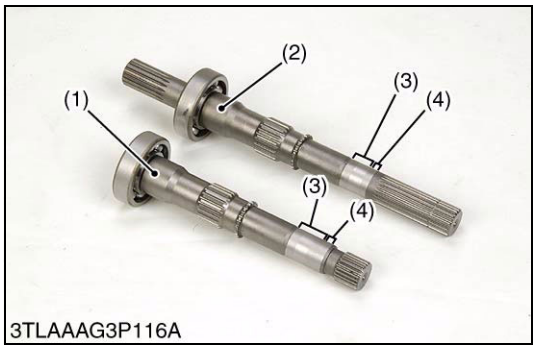


Charge Pump

1. Check the charge pump housing and the rotor (1), (2) for scratches and wear.
2. If scratch or worn, replace the charge pump complete assembly.

(1) Inner Rotor
(2) Outer Rotor
(3) Pump Cover

9Y1210824TRS0157US0

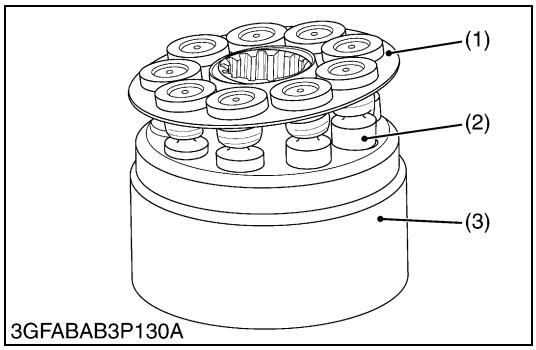


Pump Shaft and Motor Shaft

1. Check the seal surface (4) and the bearing surface (3).
2. If the shaft is rough or groove, replace it.

(1) Motor Shaft
(2) Pump Shaft
(3) Bearing Surface
(4) Seal Surface

9Y1210824TRS0158US0

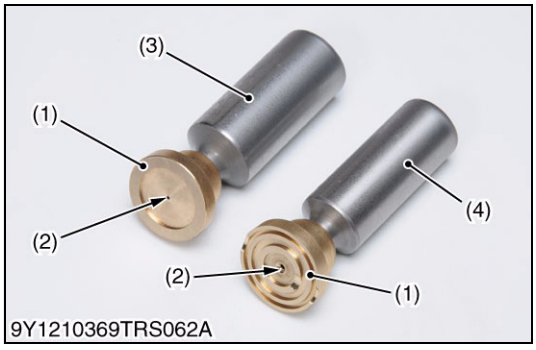


Cylinder Block Bore and Pistons

1. Lift the pistons gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace cylinder block assembly.

(1) Retainer Plate
(2) Piston
(3) Cylinder Block

9Y1210824TRS0159US0

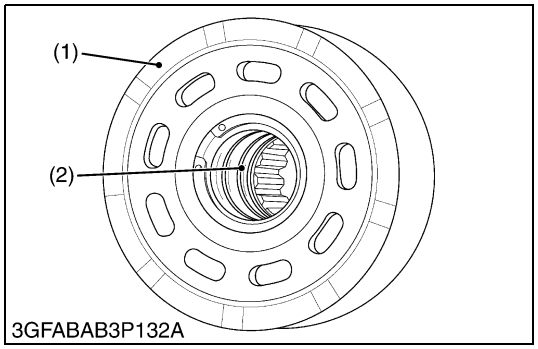


Piston Slipper

1. Check the slipper (1) for flatness.
2. If rounded, replace the cylinder block assembly.
3. Check the lubricant hole (2) for clogging.

(1) Piston Slipper
(2) Lubricant Hole
(3) Motor Piston
(4) Pump Piston

9Y1210824TRS0160US0

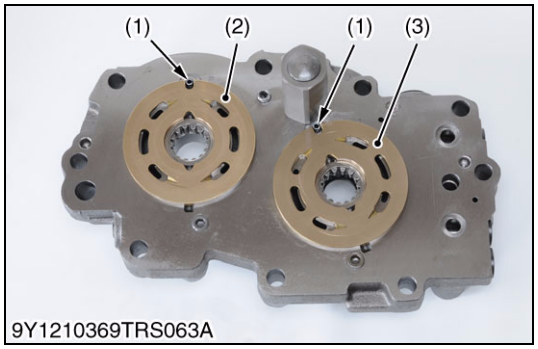


Cylinder Block Face

1. Check the polished face (1) of cylinder block for scoring.
2. If scored, replace cylinder block assembly.
3. Check the spring (2) for breakage.
4. If broken, replace cylinder block assembly.

(1) Polished Face
(2) Spring

9Y1210824TRS0161US0



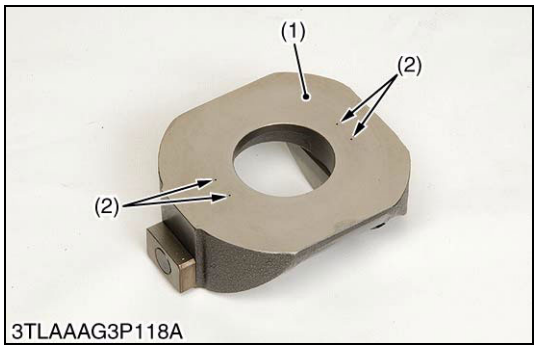
Valve Plate

1. Check the engagement of the valve plate (2), (3) and the anchor pin (1).
2. Pushing the valve plate against the anchor pin, lift it to remove.
3. Check the valve plate for foreign particles.
4. Clean the valve plate and dry with compressed air.
5. Check the valve plate for scratches, wear and erosion. (Run a finger nail across the valve plate surface. If worn, it will be felt.)
6. If worn or scored, replace.

■ **NOTE**
- **After checking, coat them with transmission oil.**
- **Valve plates are not interchangeable.**

(1) Anchor Pin
(2) Valve Plate (Pump)
(3) Valve Plate (Motor)

9Y1210824TRS0162US0

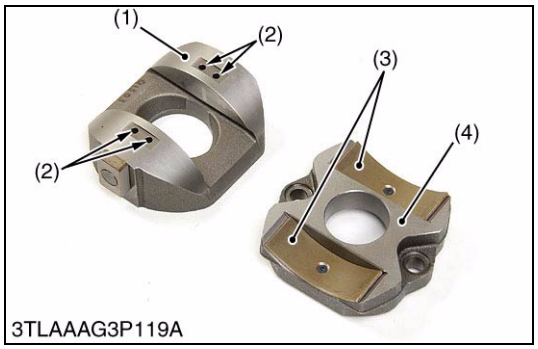


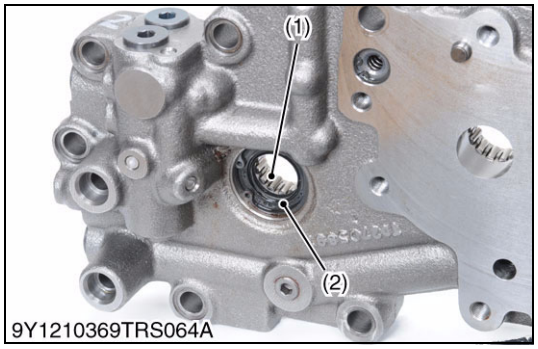
Swashplate and Cradle Bearing

1. Check the piston contact face of swashplate (1) for scratched and excessive wear and check the holes (2) of swashplate (1) for clogged.
2. If worn or scored, replace and if holes are clogged, clean them.
3. Check the surface of cradle bearings (3) for scratches and excessive wear.
4. If worn or scored, replace.

(1) Swashplate
(2) Hole
(3) Cradle Bearing
(4) Cradle Bearing Bracket

9Y1210824TRS0163US0





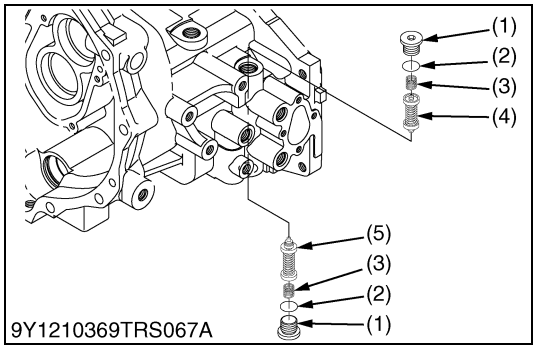
Oil Seals and Bearing for Shaft

1. Remove the internal snap ring and check the oil seals (2) for damage.
2. Check the bearings (1) for wear.
3. If the bearings are worn, replace.

■ **NOTE**
- **After checking, coat the bearing with transmission oil and the oil seal lip with grease.**

(1) Needle Bearing
(2) Oil Seal

9Y1210824TRS0164US0

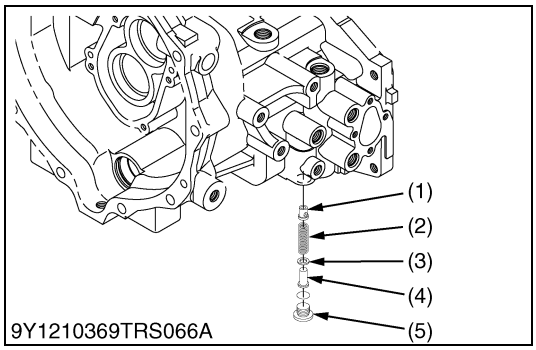


Check and High Pressure Relief Valve

1. Check the valve plug (1) and valve for scratches and damage.
2. Check the valve seat in the port block for damage.
3. Check the spring (3) for breakage and wear.
4. If anything unusual, replace the check and high pressure relief valve assembly.

(1) Plug
(2) O-ring
(3) Spring
(4) Check and High Pressure Relief Valve Assembly (Forward)
(5) Check and High Pressure Relief Valve Assembly (Reverse)

9Y1210824TRS0165US0



Charge Relief Valve

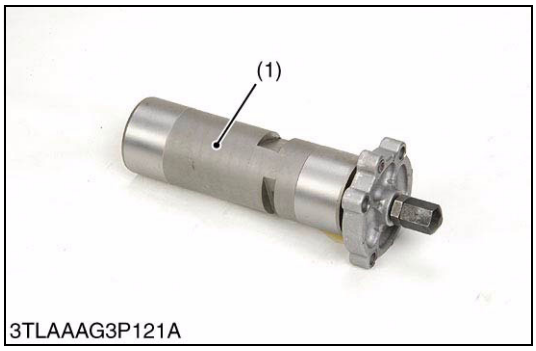
1. Check the spring guide (3), spring (2) and valve poppet (1) for scratches, breakage and damage.
2. If anything unusual. replace.

■ **NOTE**

- **When re-installing the charge relief valve, never change the number of shims.**
- **If replace with a new one, be sure to check and adjust the setting pressure. (See page 3-S32.)**

(1) Valve Poppet
(2) Spring
(3) Spring Guide
(4) Shim
(5) Hex. Socket Head Plug

9Y1210824TRS0166US0

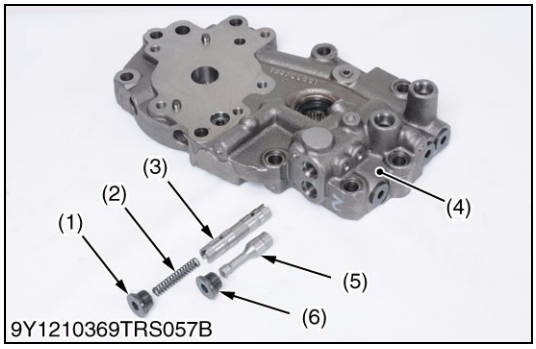


Servo Piston

1. Check the surface of servo piston for scratches and excessive wear.
2. If worn or scored, replace the servo piston assembly.

(1) Servo Piston Assembly

9Y1210824TRS0167US0



Hi-Lo Spool and Pressure Selector

1. Check the surface of Hi-Lo spool (3) and pressure selector (5) for scratches and damage.
2. If anything unusual, replace the Hi-Lo spool (3) and pressure selector (5).

(1) Hex. Socket Head Screw
(2) Spring
(3) Hi-Lo Spool
(4) Port Block
(5) Pressure Selector
(6) Hex. Socket Head Screw

9Y1210824TRS0168US0

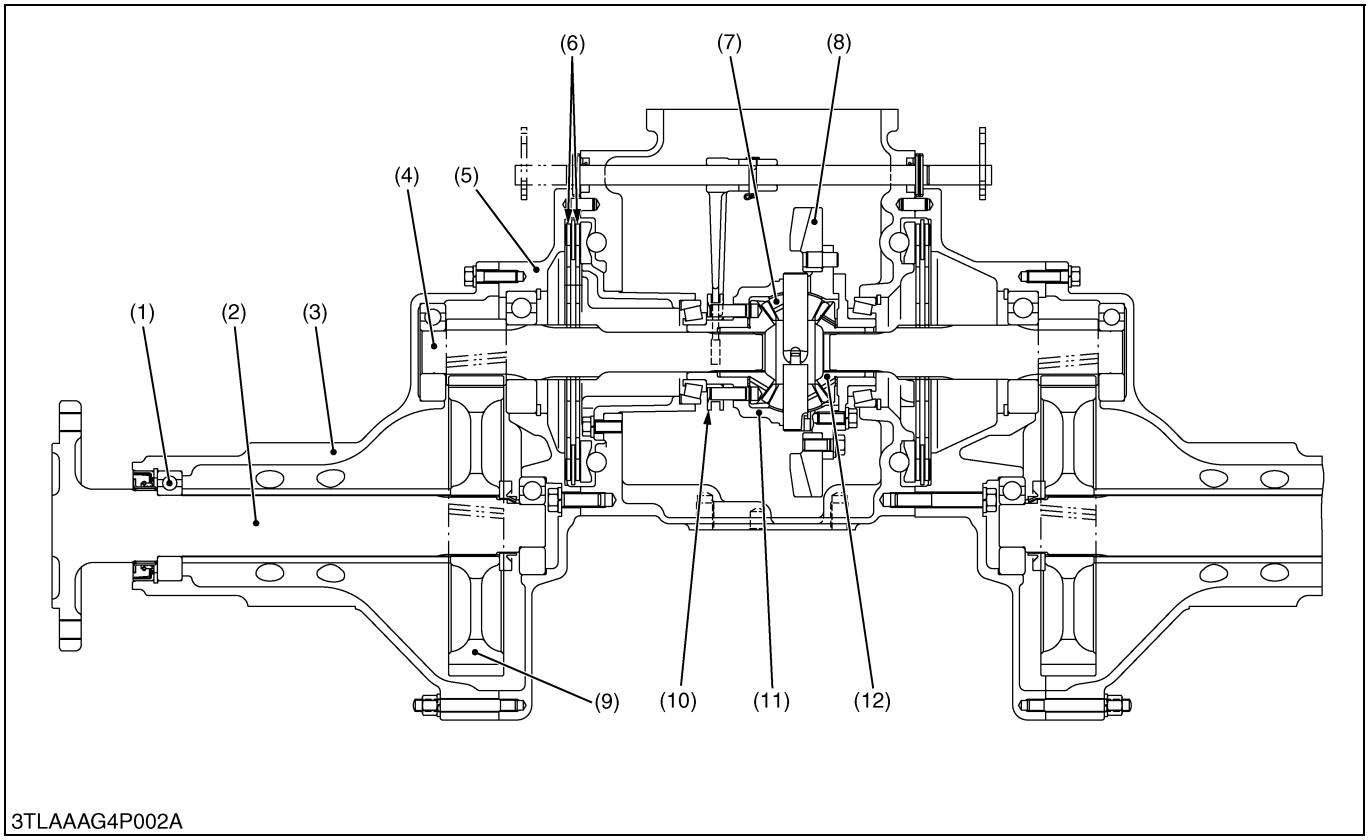
4 REAR AXLE

MECHANISM

CONTENTS

1. STRUCTURE

[L3560, L4060 and L4760]



3TLAAAG4P002A

(1) Ball Bearing
(2) Rear Axle
(3) Rear Axle Case
(4) Differential Gear Shaft
(5) Brake Case
(6) Brake Disc
(7) Differential Pinion
(8) Ring Gear
(9) Final Gear
(10) Differential Lock Shifter
(11) Differential Case
(12) Differential Side Gear

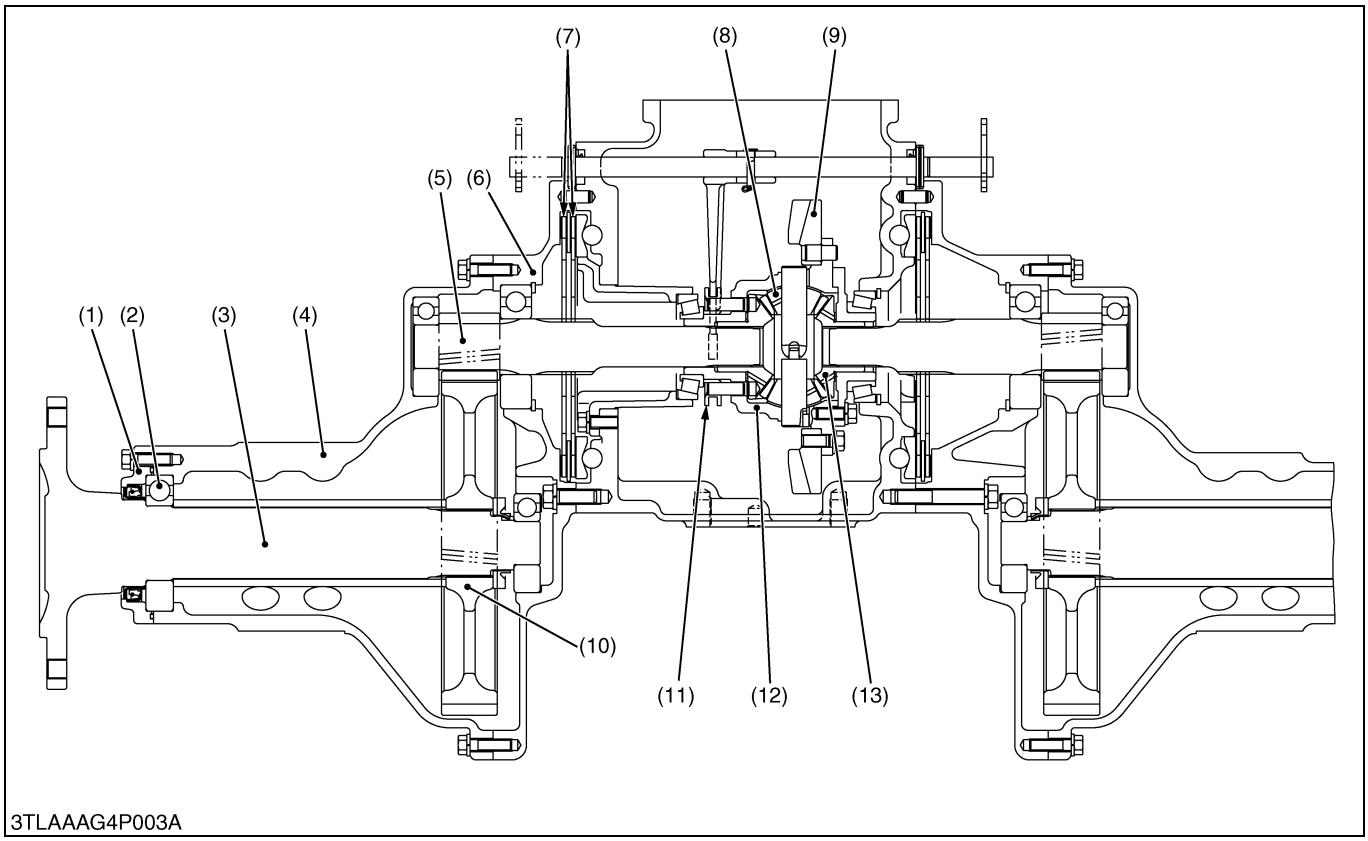
The final gear (9) are final reduction mechanism which further reduces the speed of rotation. The direction of power transmitted is changed by the differential gear.

The rear axles (2) are the final transmission mechanism which transmit the power from the transmission to the rear wheels. The rotation speed is reduced by the final gears (9).

The rear axles are the semi-floating type with the ball bearing (1) between the rear axle (2) and rear axle case (3), which support the rear wheel load besides transmitting power to the rear wheel. The rear axles also support the weight of the tractor.

9Y1210824RAM0001US0

[L5060, L5460 and L6060]



3TLAAAG4P003A

(1) Rear Axle Cover
(2) Ball Bearing
(3) Rear Axle
(4) Rear Axle Case
(5) Differential Gear Shaft
(6) Brake Case
(7) Brake Disc
(8) Differential Pinion
(9) Ring Gear
(10) Final Gear
(11) Differential Lock Shifter
(12) Differential Case
(13) Differential Side Gear

9Y1210824RAM0002US0

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual Noise at All Time	Bearing worn	Replace	4-S7
	Insufficient or improper type of transmission fluid used	Fill or change	G-9
Noise while Turning	Differential gear shaft and final gear worn or damaged	Replace	4-S7

9Y1210824RAS0001US0

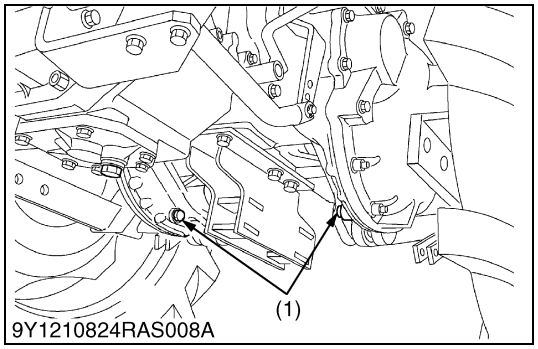
2. TIGHTENING TORQUES

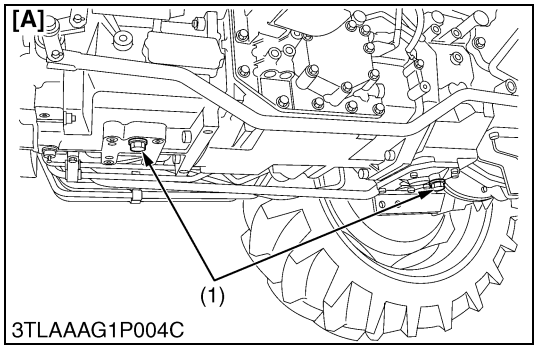
Tightening torques of screws and nuts on the table below are especially specified.
(For general use screws and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

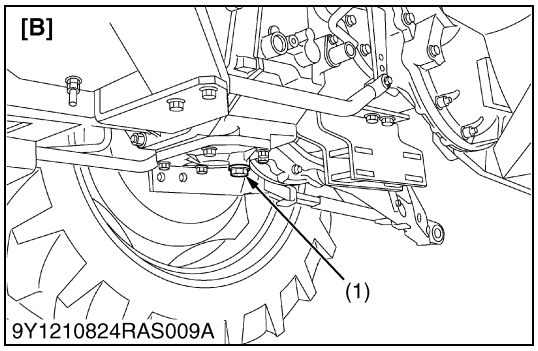
Item	N·m	kgf·m	lbf·ft
Rear wheel mounting screw and nut	197 to 225	20.0 to 23.0	145 to 166
ROPS lower frame mounting screw	167 to 196	17.0 to 20.0	123 to 144
Cabin mounting bolt and nut	124 to 147	12.6 to 15.0	91.5 to 108
Cabin mount bracket mounting screw (7T)	124 to 147	12.6 to 15.0	91.5 to 108
Cabin mount bracket mounting screw (9T)	167 to 196	17.0 to 20.0	123 to 144
Rear axle case mounting screw (M10)	48 to 55	4.9 to 5.7	36 to 41
Rear axle case mounting nut (M10, 9T)	61 to 70	6.2 to 7.2	45 to 52
Rear axle case mounting screw (M12)	78 to 90	7.9 to 9.2	58 to 66
Rear axle lock nut	197 to 245	20.0 to 25.0	145 to 180

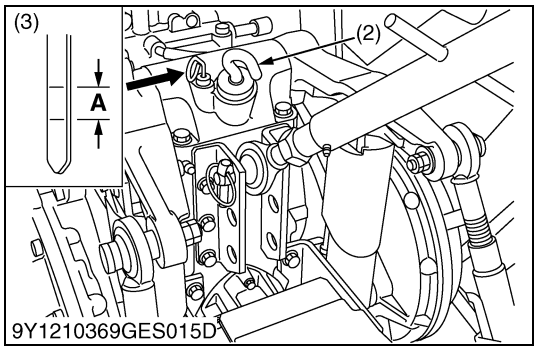
9Y1210824RAS0002US0

3. PREPARATION









Draining the Transmission Fluid

CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5060 L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

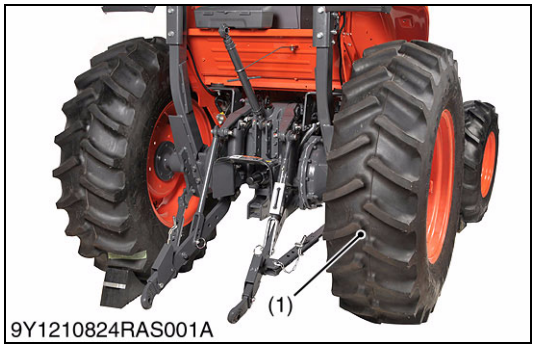
■ **IMPORTANT**

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

[A] Manual Transmission / GST
[B] HST
A: Oil level is acceptable within this range.

9Y1210824CLS0005US0



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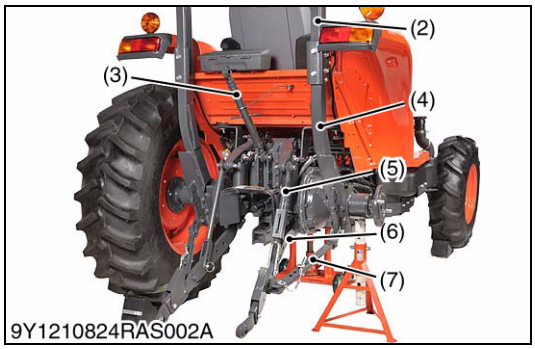

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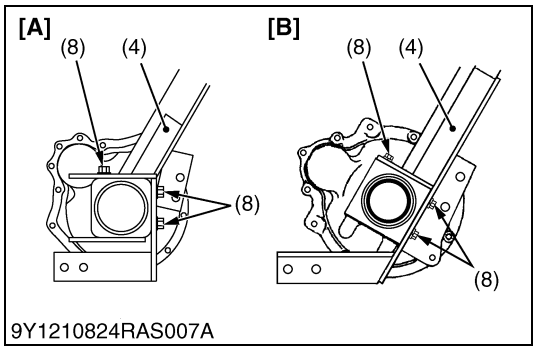


9Y1210824RAS007A

Rear Wheel and ROPS (ROPS Type)

1. Place the disassembling stand under the transmission case.
2. Remove the rear wheel mounting screws and nuts.
3. Remove the rear wheels (1).
4. Remove the top link (3) and lift rod (5).
5. Disconnect the stabilizer (7) and remove the lower link (6).
6. Remove the ROPS lower frame mounting screws (8).
7. Dismount the ROPS assembly (2), (4).

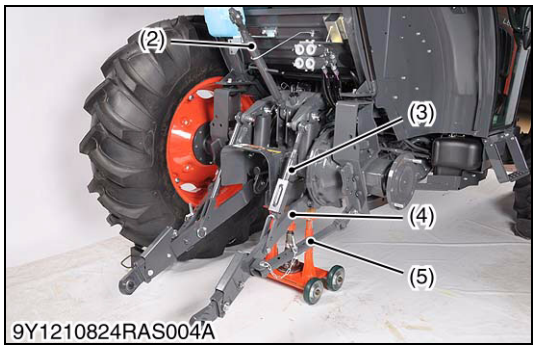
(When reassembling)

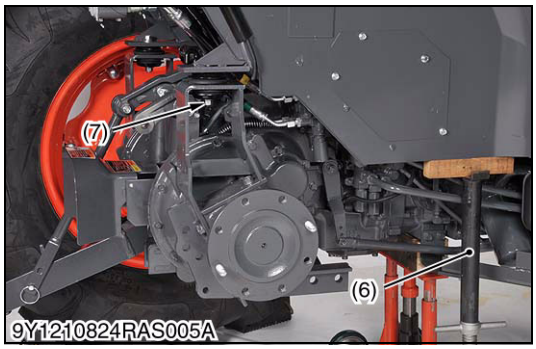
Tightening torque	Rear wheel mounting screw and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	ROPS lower frame mounting screw	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

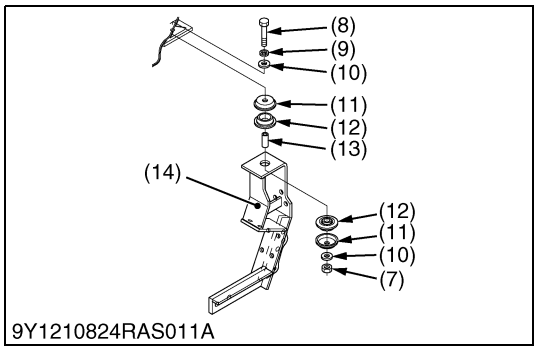
(1) Rear Wheel
(2) ROPS Upper Frame
(3) Top Link
(4) ROPS Lower Frame
(5) Lift Rod
(6) Lower Link
(7) Stabilizer
(8) Screw (M14 × 30)

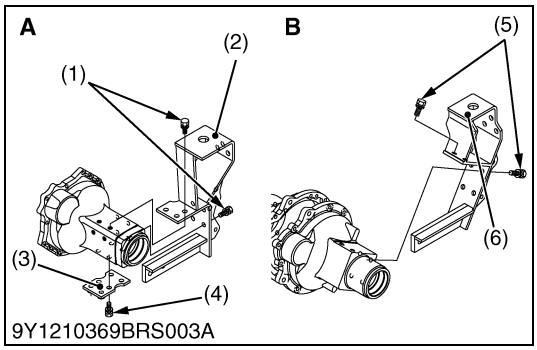
[A] L3560
[B] L4060, L4760, L5060, L5460, L6060

9Y1210824RAS0004US0









Rear Wheel and Cabin Mount Screw (Cabin Type)

1. Place the disassembling stand under the mid case.
2. Remove the rear wheels (1).
3. Remove the top link (2) and lift rod (3).
4. Disconnect the stabilizer (5) and remove the lower link (4).
5. Place a stand (6) under the cabin.
6. Remove the cabin mount bracket mounting bolt (8) and nut (7).

(When reassembling)

- Be sure to install the washers, plate and mount rubbers, etc. in their original positions.

Tightening torque	Rear wheel mounting screw and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Cabin mounting bolt and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.5 to 108 lbf·ft

(1) Rear Wheel
(2) Top Link
(3) Lift Rod
(4) Lower Link
(5) Stabilizer
(6) Stand
(7) Nut
(8) Bolt (M14 × 90)
(9) Spring Washer
(10) Plain Washer
(11) Plate
(12) Mount Rubber
(13) Collar
(14) Cabin Mount Bracket

9Y1210824RAS0005US0

Cabin Mount Bracket (Cabin Type)

1. Remove the cabin mount bracket (2), (3) or (6).

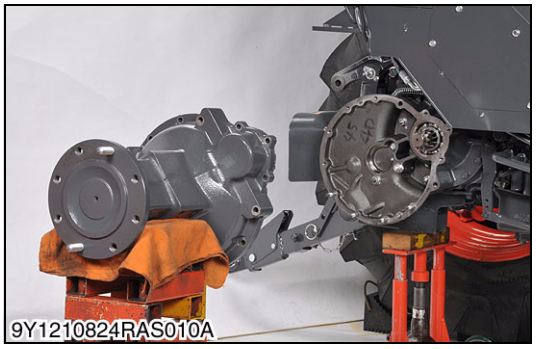
(When reassembling)

Tightening torque	Cabin mount bracket mounting screw (7T)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.5 to 108 lbf·ft
	Cabin mount bracket mounting screw (9T)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Screw (7T)
(2) Cabin Mount Upper Bracket
(3) Cabin Mount Lower Bracket
(4) Screw (9T)
(5) Screw (7T)
(6) Cabin Mount Bracket

A: L3560
B: L4060, L4760, L5060, L5460, L6060

9Y1210824RAS0006US0



Rear Axle Case

1. Place the disassembling stand under the rear axle case.
2. Remove the rear axle mounting screws and nuts.
3. Separate the rear axle case from brake case.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the rear axle case and brake case.

Tightening torque	Rear axle case mounting screw and nut	M10 screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
		M10 nut (9T) (Except L3560)	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
		M12 screw (Except L3560)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

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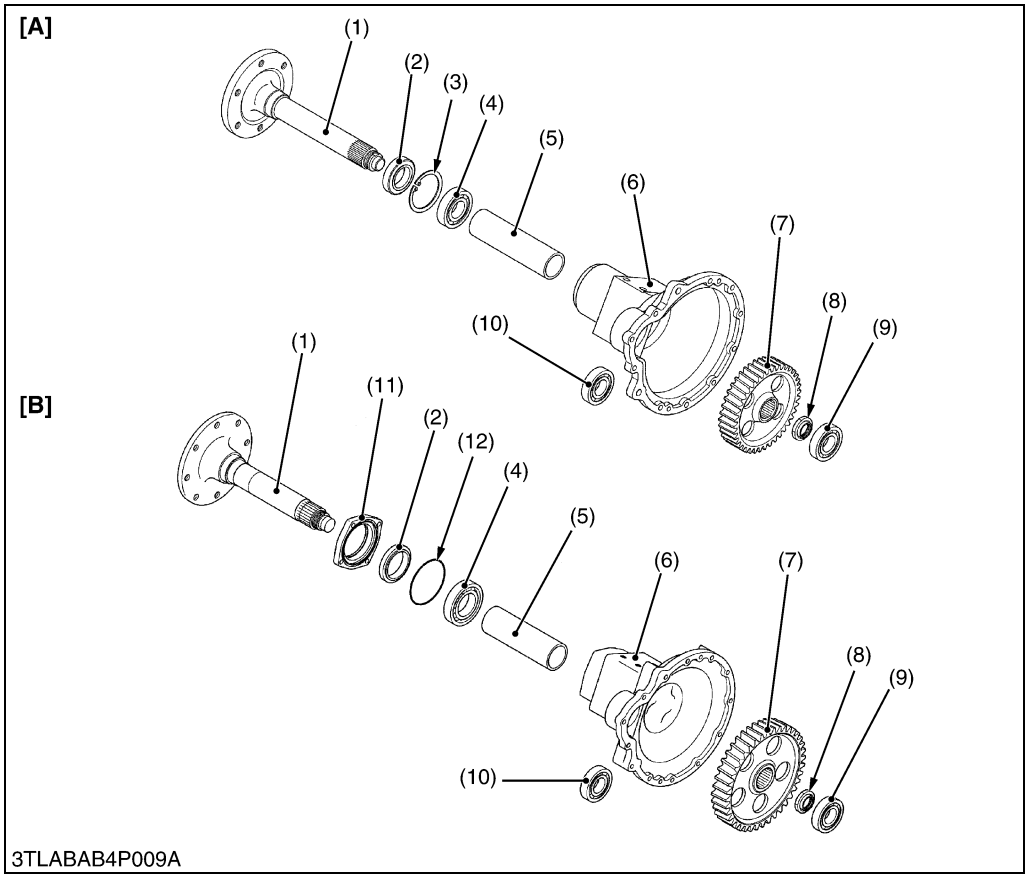
4. DISASSEMBLING AND ASSEMBLING

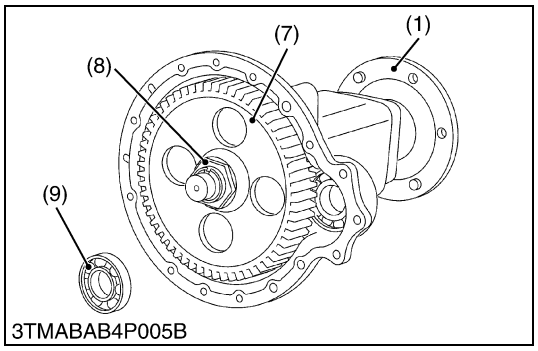
Rear Axle



3TLABAB4P009A

(1) Rear Axle
(2) Oil Seal
(3) Internal Snap Ring
(4) Ball Bearing
(5) Spacer
(6) Rear Axle Case
(7) Gear
(8) Lock Nut
(9) Ball Bearing
(10) Ball Bearing
(11) Rear Axle Cover
(12) O-ring

[A] L3560, L4060, L4760
[B] L5060, L5460, L6060



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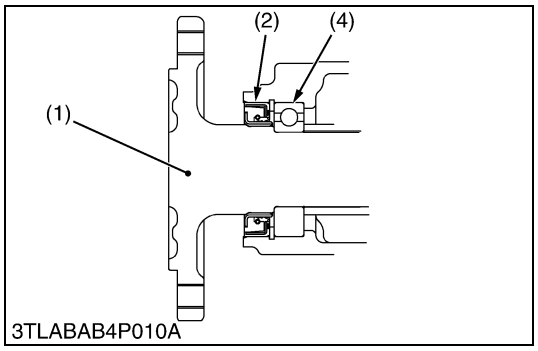

3TLABAB4P010A

1. Remove the ball bearing (9) with a puller.
2. Remove the stake of lock nut (8).
3. Secure the rear axle (1) in a vise and remove the lock nut.
4. Remove the gear (7) and spacer (5).
5. Tap out the rear axle (1).
6. Remove the rear axle cover (11). (L5060, L5460, L6060)

(When reassembling)

- Apply grease to the oil seal (2) and install it.
- Replace the lock nut with new one, and after tightening it to specified torque, stake it firmly.
- Assemble the oil seal (2) with correct direction. (See figure.)

Tightening torque	Lock nut	197 to 245 N·m 20.0 to 25.0 kgf·m 145 to 180 lbf·ft

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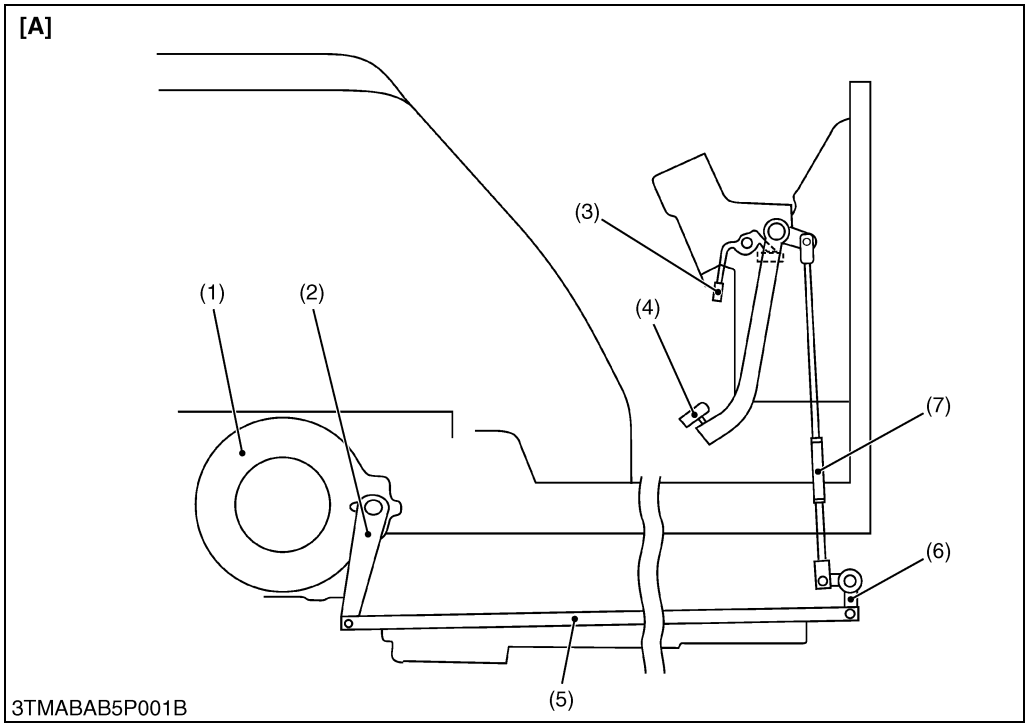
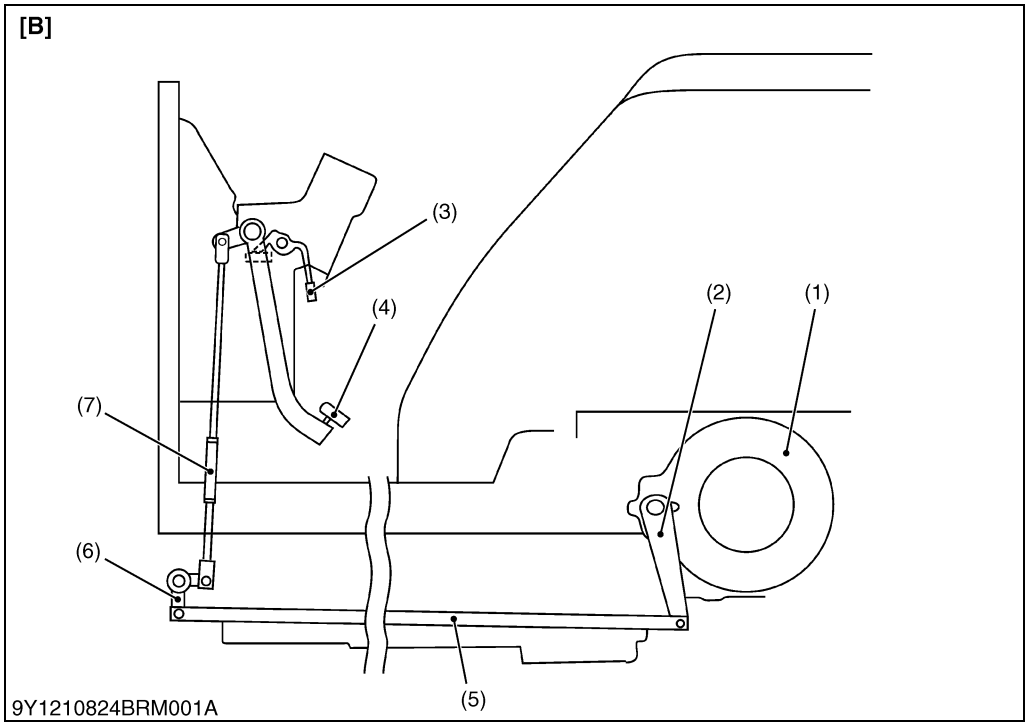
5 BRAKES

MECHANISM

CONTENTS

1. STRUCTURE





(1) Brake Case
(2) Brake Cam Lever
(3) Parking Brake Lever
(4) Brake Pedal
(5) Brake Rod
(6) Brake Lever Link
(7) Turnbuckle

[A] Manual Transmission and GST
[B] HST

This is used hanging type brake pedals (4) to have wider space of the platform.

Independent mechanical wet disc brakes are used for the right and left travelling brakes. They are operated by the brake pedals (4) through the mechanical linkages.

The parking brake is a mechanical type which is designed to actuate the travelling brakes. Pulling the parking brake lever (3) results in the same state as that obtained when the brake pedals (4) are pressed.

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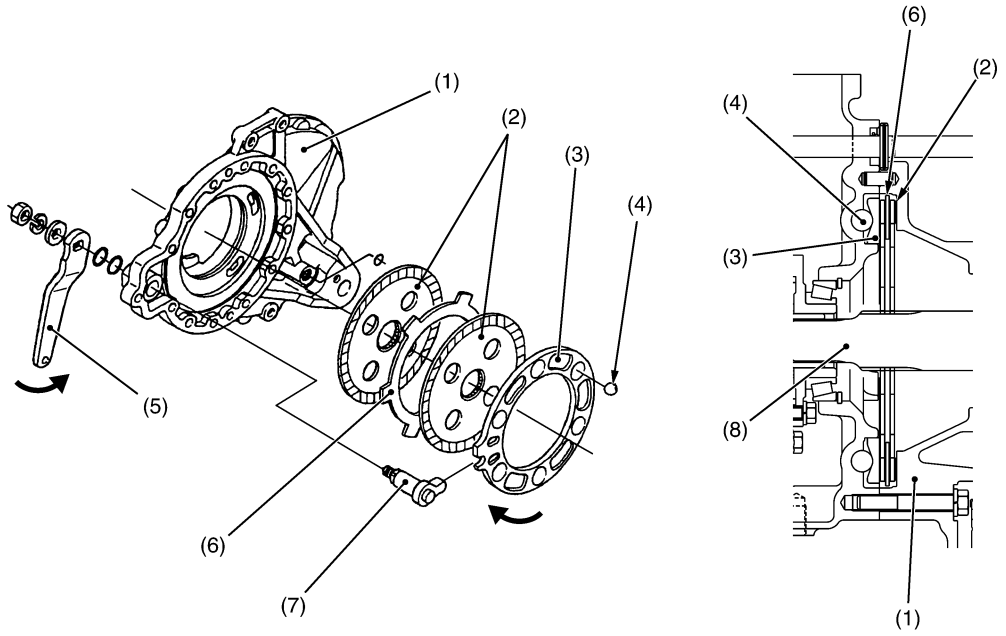
2. OPERATION



3TLABAB5P001A

(1) Brake Case
(2) Brake Disc
(3) Cam Plate
(4) Steel Ball
(5) Brake Cam Lever
(6) Plate
(7) Brake Cam
(8) Brake Shaft

The brakes are provided on the power transmitting shafts (brake shafts (8)) through which power is transmitted to the final reduction system. The brakes are incorporated in the brake case (1) filled with transmission oil. They are designed to brake when the brake discs (2), spline-coupled and rotating with the brake shaft (8), are pressed against the brake case (1) by cam plate (3) with the cam mechanism incorporating steel balls (4). For greater braking force, two brake discs (2) are provided respectively, and the plate (6) fixed to the brake case (1) are arranged between the brake discs (2).

■ **During Braking**

When the brake pedal is pressed, the force causes the brake cam lever (5) to move in the direction of allow through the brake rod. At the same time, the brake cam (7) spline-couples with the brake cam lever (5) also moves. Due to this force, cam plate (3) moves in the direction of arrow. Since the steel balls (4) are set in the grooves of differential case, cam plate (3) is pushed out against the brake discs (2), causing braking with the friction force created.

9Y1210824BRM0002US0

SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Uneven Braking Force	Brake pedal play unevenly adjusted	Adjust	5-S4
	Brake disc worn	Replace	5-S15
	Cam plate warped	Replace	5-S15
Brake Drags	Brake pedal play too small	Adjust	5-S4
	Ball holes of cam plate for uneven wear	Replace	5-S15
	Brake pedal return spring weaken or broken	Replace	–
	Brake cam rusted	Repair	5-S14
Poor Braking Force	Brake pedal play excessive	Adjust	5-S4
	Brake disc worn	Replace	5-S15
	Cam plate warped	Replace	5-S15
	Brake cam or lever damaged	Replace	5-S14
	Transmission fluid improper	Change	G-9

9Y1210824BRS0001US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Brake Pedal	Free Travel	15 to 20 mm 0.59 to 0.78 in.	–
Cam Plate	Flatness	–	0.30 mm 0.012 in.
Cam Plate and Ball	Height	20.9 to 21.1 mm 0.823 to 0.830 in.	20.5 mm 0.807 in.
Brake Disc	Thickness	4.60 to 4.80 mm 0.181 to 0.188 in.	4.20 mm 0.165 in.
Plate	Thickness	2.54 to 2.66 mm 0.100 to 0.104 in.	2.1 mm 0.083 in.

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3. TIGHTENING TORQUES

Tightening torques of screws and nuts in the table below are especially specified.
(For general use screws and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting screw and nut	197 to 225	20.0 to 23.0	145 to 166
ROPS lower frame mounting screw	167 to 196	17.0 to 20.0	123 to 144
Cabin mounting bolt and nut	124 to 147	12.6 to 15.0	91.5 to 108
Cabin mount bracket mounting screw (7T)	124 to 147	12.6 to 15.0	91.5 to 108
Cabin mount bracket mounting screw (9T)	167 to 196	17.0 to 20.0	123 to 144
Rear axle case mounting screw (M10)	48 to 55	4.9 to 5.7	36 to 41
Rear axle case mounting nut (M10, 9T)	61 to 70	6.2 to 7.2	45 to 52
Rear axle case mounting screw (M12)	78 to 90	7.9 to 9.2	58 to 66
Brake case mounting screw and nut	78 to 90	7.9 to 9.2	58 to 66
Floor seat mounting bolt and nut	200 to 220	20 to 23	150 to 160
Fulcrum screw (Manual tranmission and GST)	40 to 44	4.0 to 4.5	29 to 32
Fulcrum screw (HST)	63 to 72	6.4 to 7.4	47 to 53
Brake cam lever mounting nut	63 to 72	6.4 to 7.4	47 to 53

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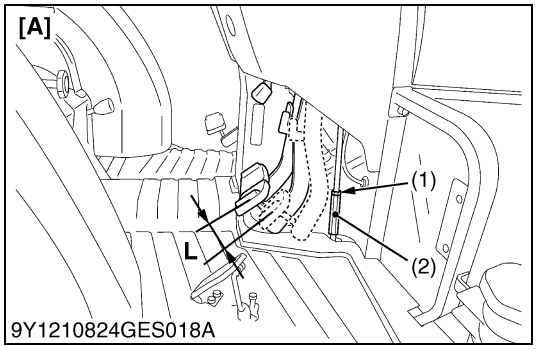
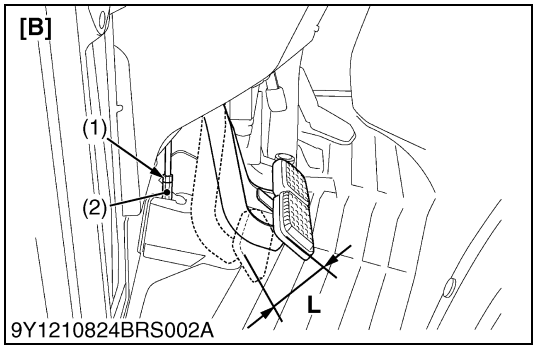
4. CHECKING AND ADJUSTING

[1] BRAKE PEDAL





Checking Brake Pedal Free Travel

CAUTION

- **Stop the engine and chock the wheels before checking brake pedal.**

1. Release the parking brake.
2. Slightly depress the brake pedal and measure free travel **"L"** at top of pedal stroke.
3. If the measurement is not within the factory specifications, loosen the lock nut (1) and turn the turnbuckle (2) to adjust the rod length within acceptable limits.
4. Retighten the lock nut (1) securely.
   Keep the free travel in the right and left brake pedals equal.

Brake pedal free travel **"L"**	Factory specification	15 to 20 mm 0.59 to 0.78 in.

(1) Lock Nut
(2) Turnbuckle

[A] GST / Manual Transmission
[B] HST
L: Free Travel

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5. DISASSEMBLING AND ASSEMBLING

[1] BRAKE PEDAL

Panel Cover

1. Remove the panel cover (1).
2. Remove the steering post covers (2).

(1) Panel Cover
(2) Steering Post Cover

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Meter Panel (Electronic Instrument Panel)

1. Remove the meter panel (1).
2. Disconnect the cruise switch connector (2). [HST only]
3. Disconnect the main switch connector (4) and side working light connector (3).
4. Disconnect the DPF switch connector (5), DPF auto switch connector (8), hazard switch connector (6) and display mode switch connector (7).

(1) Meter Panel
(2) Cruise Switch Connector
(3) Side Working Light Connector
(4) Main Switch Connector
(5) DPF Switch Connector
(6) Hazard Switch Connector
(7) Display Mode Switch Connector
(8) DPF Auto Switch Connector

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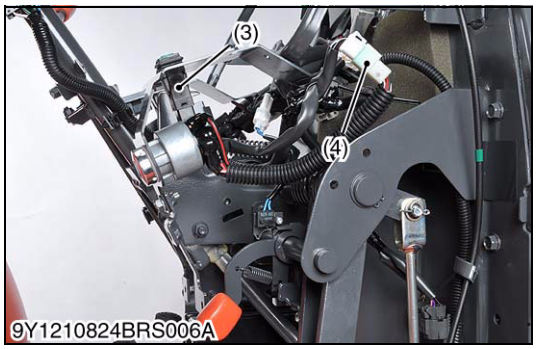
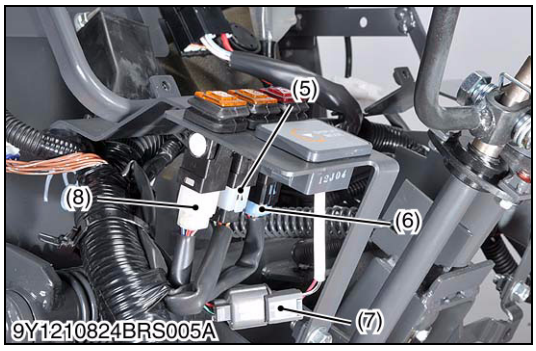
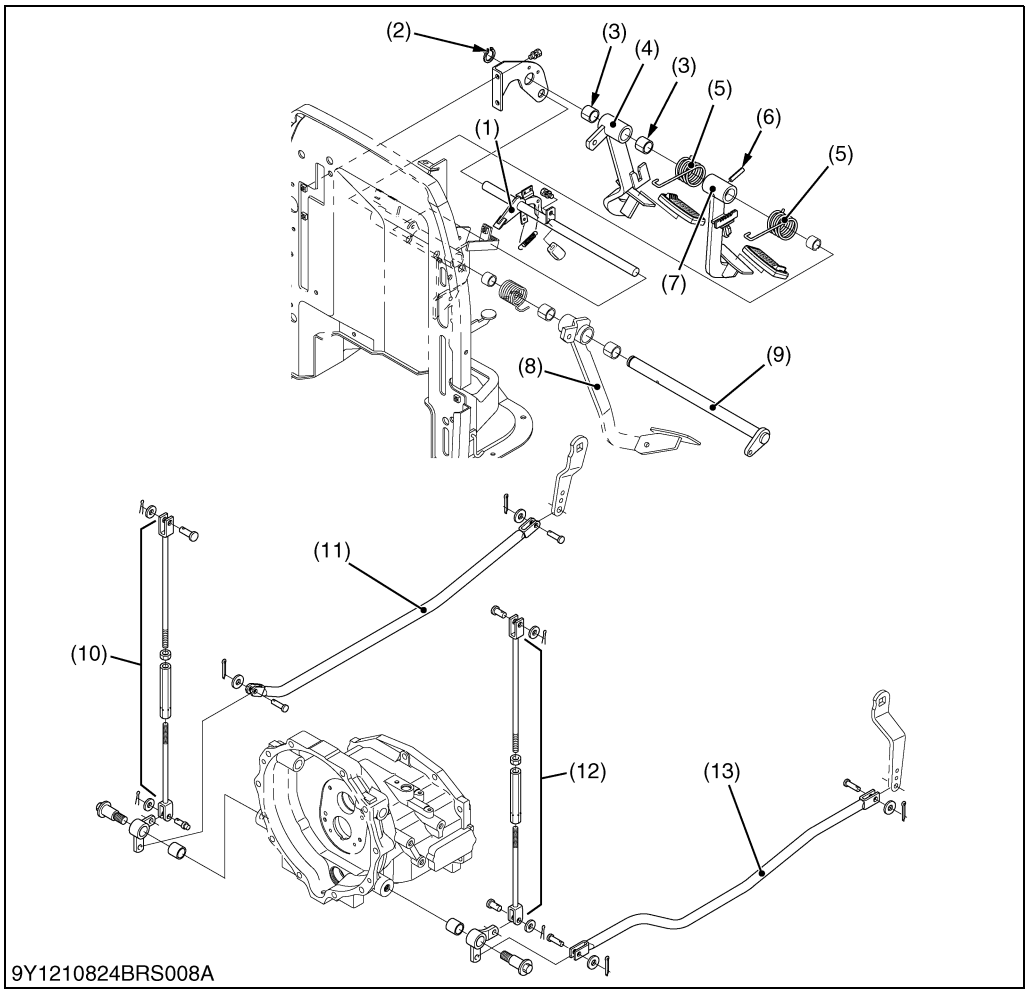




Brake Pedal and Brake Rod (Manual Transmission / GST)



(1) Parking Brake Lever
(2) External Snap Ring
(3) Bush
(4) Brake Pedal RH
(5) Spring
(6) Spring Pin
(7) Brake Pedal LH
(8) Clutch Pedal
(9) Brake Pedal Shaft
(10) Brake Pedal Rod RH
(11) Brake Rod RH
(12) Brake Pedal Rod LH
(13) Brake Rod LH

1. Remove the brake rods (11), (13).
2. Remove the brake pedal rods (10), (12).
3. Disconnect the clutch pedal rod.
4. Remove the external snap ring (2).
5. Tap out the spring pin (6) and pull out the brake pedal shaft (9) with clutch pedal (8).
6. Remove the brake pedals (4), (7) and springs (5).
7. Remove the parking brake lever (1).

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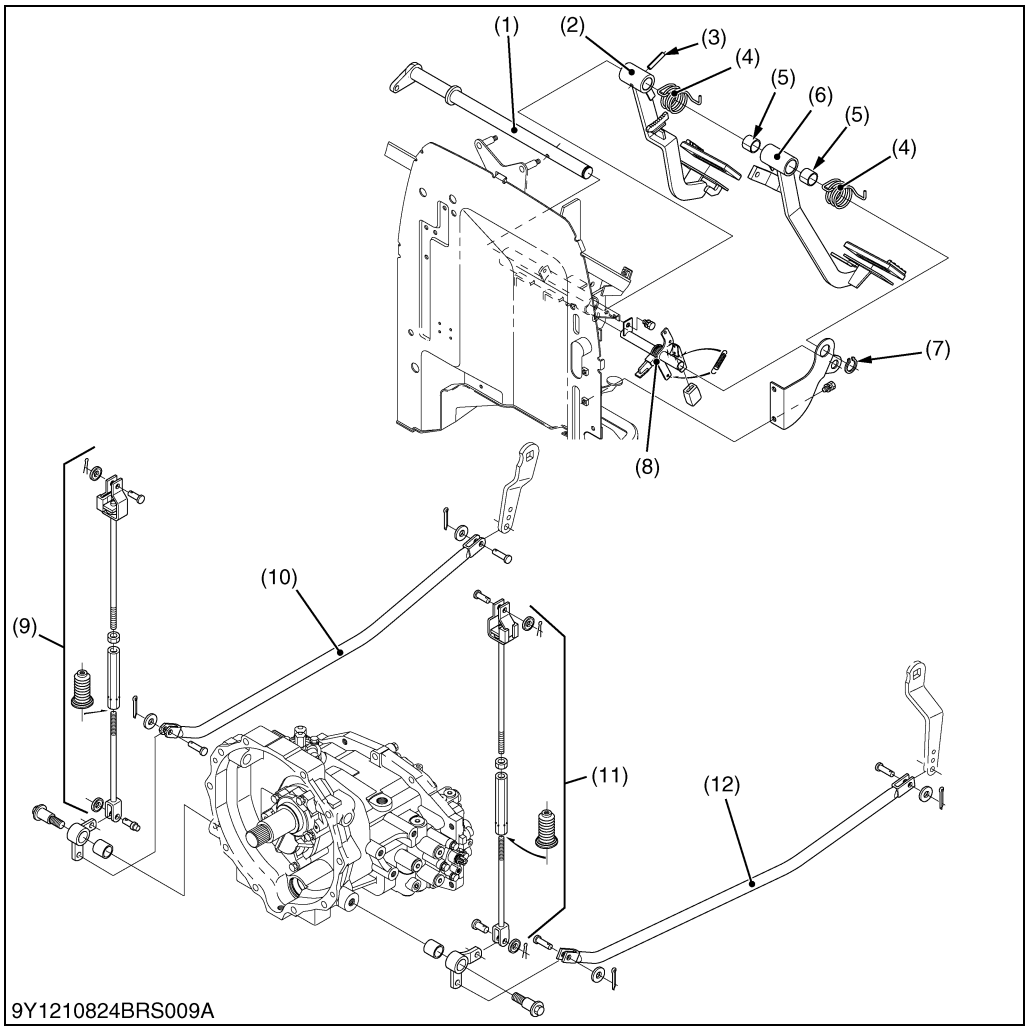
Brake Pedal and Brake Rod (HST)



(1) Brake Pedal Shaft
(2) Brake Pedal RH
(3) Spring Pin
(4) Spring
(5) Bush
(6) Brake Pedal LH
(7) External Snap Ring
(8) Parking Brake Lever
(9) Brake Pedal Rod RH
(10) Brake Rod RH
(11) Brake Pedal Rod LH
(12) Brake Rod LH

1. Remove the brake rods (10), (12).
2. Remove the brake pedal rods (9), (11).
3. Disconnect the clutch pedal rod.
4. Remove the external snap ring (7).
5. Tap out the spring pin (3) and pull out the brake pedal shaft (11).
6. Remove the brake pedals (2), (6) and springs (4).
7. Remove the parking brake lever (8).

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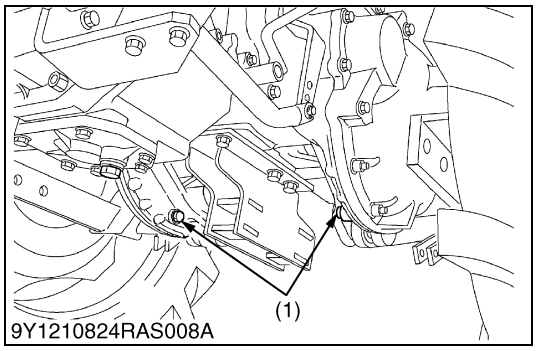
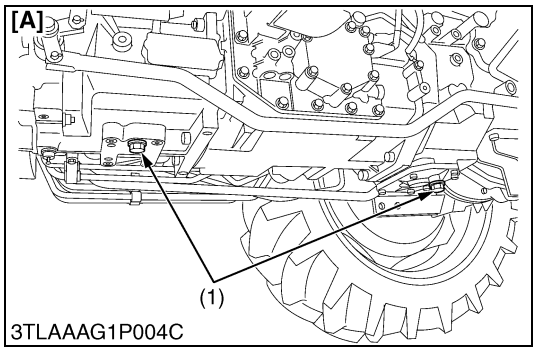
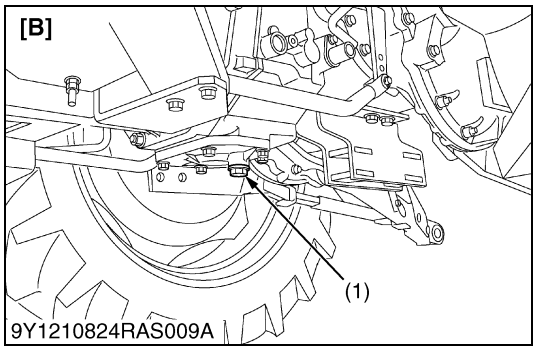
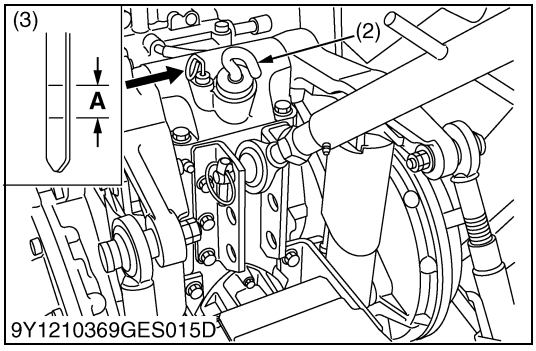
[2] BRAKE CASE









Draining the Transmission Fluid

CAUTION

- **Allow the engine to cool down sufficiently, oil can be hot and burn.**

1. Place oil pans underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid completely.
4. Reinstall the drain plugs (1).

(When refilling)

- Fill up from filling port after removing the filling plug (2) until reaching the upper notch on the dipstick (3).
- After running the engine for a few minutes, stop it and check the oil level again, add the fluid to prescribed level if it is not correct level.

Transmission fluid capacity	L3560	42 L 11.1 U.S.gals 9.24 Imp.gals
	L4060 L4760	43 L 11.4 U.S.gals 9.5 Imp.gals
	L5060 L5460 L6060	45 L 11.9 U.S.gals 9.90 Imp.gals

■ **IMPORTANT**

- **Use only KUBOTA SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.)**
- **Do not mix different brands of fluid together.**

(1) Drain Plugs
(2) Filling Plug
(3) Dipstick

[A] Manual Transmission / GST
[B] HST
A: Oil level is acceptable within this range.

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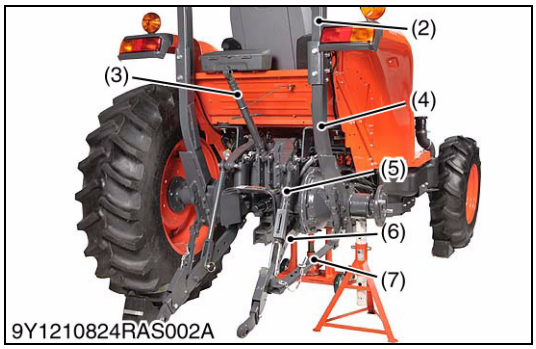

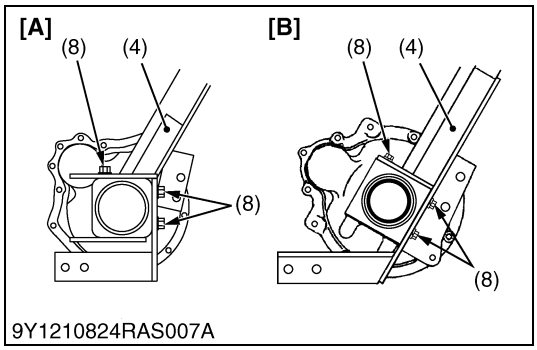

Rear Wheel and ROPS (ROPS Type)

1. Place the disassembling stand under the transmission case.
2. Remove the rear wheel mounting screws and nuts.
3. Remove the rear wheels (1).
4. Remove the top link (3) and lift rod (5).
5. Disconnect the stabilizer (7) and remove the lower link (6).
6. Remove the ROPS lower frame mounting screws (8).
7. Dismount the ROPS assembly (2), (4).

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	ROPS lower frame mounting screw	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Rear Wheel
(2) ROPS Upper Frame
(3) Top Link
(4) ROPS Lower Frame
(5) Lift Rod
(6) Lower Link
(7) Stabilizer
(8) Screw (M14 × 30)

[A] L3560
[B] L4060, L4760, L5060, L5460, L6060

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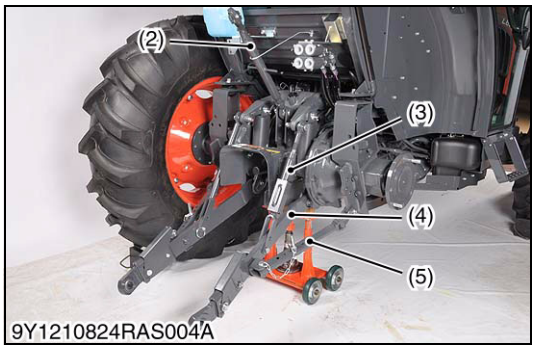

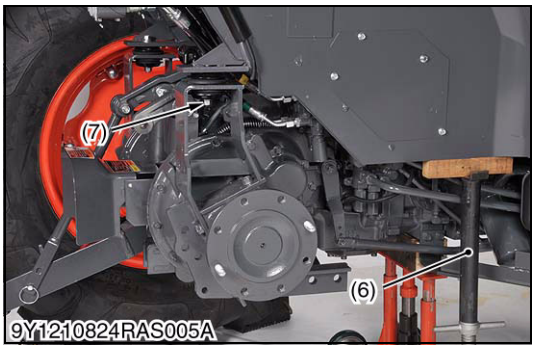

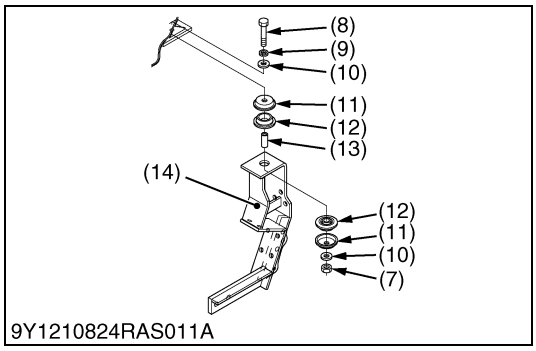

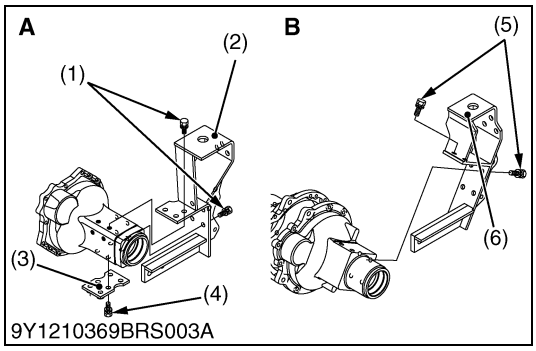

Rear Wheel and Cabin Mount Screw (Cabin Type)

1. Place the disassembling stand under the mid case.
2. Remove the rear wheels (1).
3. Remove the top link (2) and lift rod (3).
4. Disconnect the stabilizer (5) and remove the lower link (4).
5. Place a stand (6) under the cabin.
6. Remove the cabin mount bracket mounting bolt (8) and nut (7).

(When reassembling)

- Be sure to install the washers, plate and mount rubbers, etc. in their original positions.

Tightening torque	Rear wheel mounting screw and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Cabin mounting bolt and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.5 to 108 lbf·ft

(1) Rear Wheel
(2) Top Link
(3) Lift Rod
(4) Lower Link
(5) Stabilizer
(6) Stand
(7) Nut
(8) Bolt (M14 × 90)
(9) Spring Washer
(10) Plain Washer
(11) Plate
(12) Mount Rubber
(13) Collar
(14) Cabin Mount Bracket

9Y1210824RAS0005US0

Cabin Mount Bracket (Cabin Type)

1. Remove the cabin mount bracket (2), (3) or (6).

(When reassembling)

Tightening torque	Cabin mount bracket mounting screw (7T)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.5 to 108 lbf·ft
	Cabin mount bracket mounting screw (9T)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Screw (7T)
(2) Cabin Mount Upper Bracket
(3) Cabin Mount Lower Bracket
(4) Screw (9T)
(5) Screw (7T)
(6) Cabin Mount Bracket

A: L3560
B: L4060, L4760, L5060, L5460, L6060

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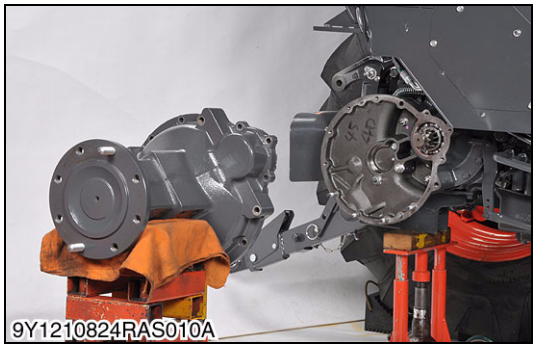

Rear Axle Case

1. Place the disassembling stand under the rear axle case.
2. Remove the rear axle mounting screws and nuts.
3. Separate the rear axle case from brake case.

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the rear axle case and brake case.

Tightening torque	Rear axle case mounting screw and nut	M10 screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
		M10 nut (9T) (Except L3560)	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
		M12 screw (Except L3560)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

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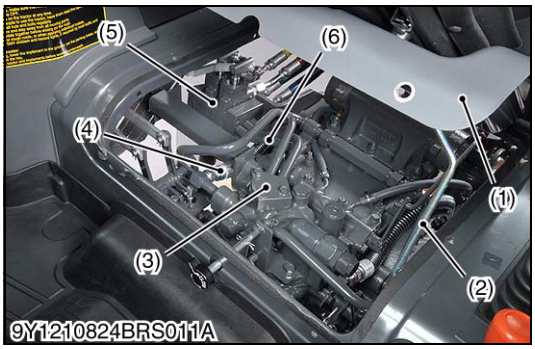

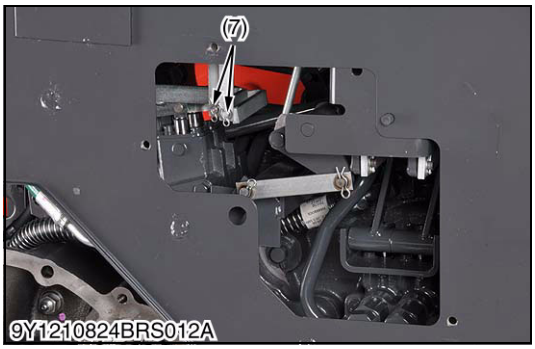

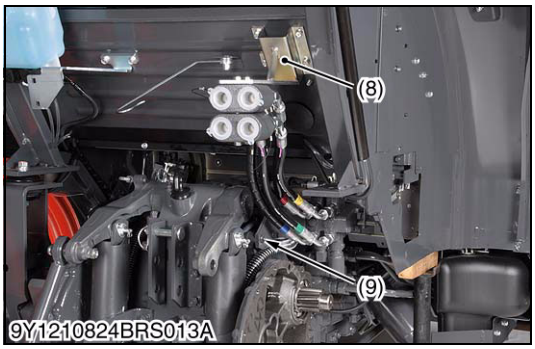

Remote Control Valve (If Equipped)

1. Remove the seat bracket (1) screws and nuts.
2. Open the seat bracket (1) and set the seat stand (2).
3. Remove the hydraulic pipe screw (3) of remote control valve (5).
4. Remove the fender plate and remote control valve linkage (7).
5. Disconnect the hydraulic cylinder hose (4).
6. Remove the bracket (8) on the coupler side of the remote valve.
7. Remove the screw (9) of the remote control valve bracket.
8. Remove the remote control valve assembly and the return pipe (6).

(1) Seat Bracket
(2) Seat Stand
(3) Hydraulic Pipe Screw
(4) Hydraulic Cylinder Hose
(5) Remote Control Valve
(6) Return Pipe
(7) Remote Control Valve Linkage
(8) Bracket
(9) Screw

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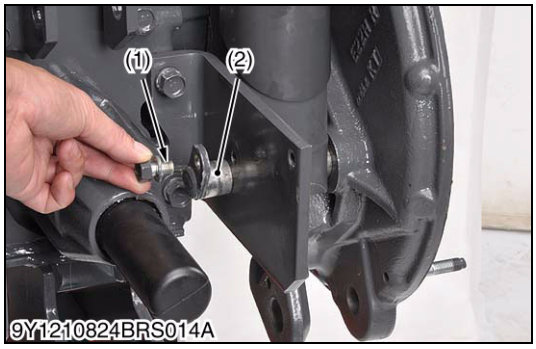

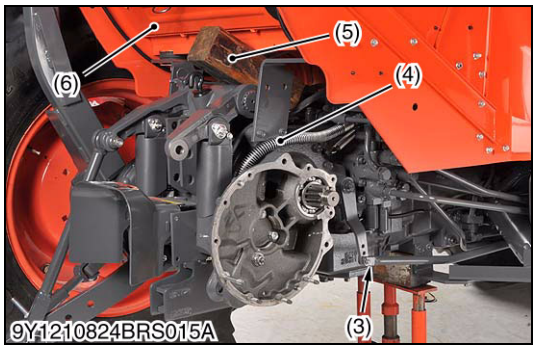

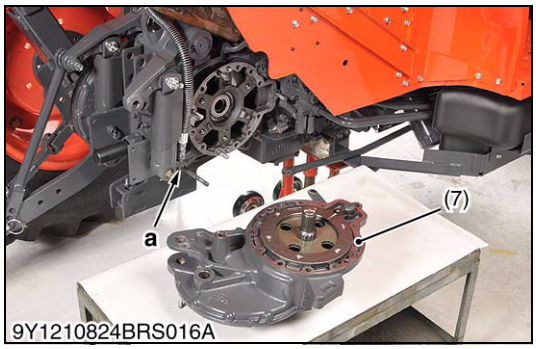

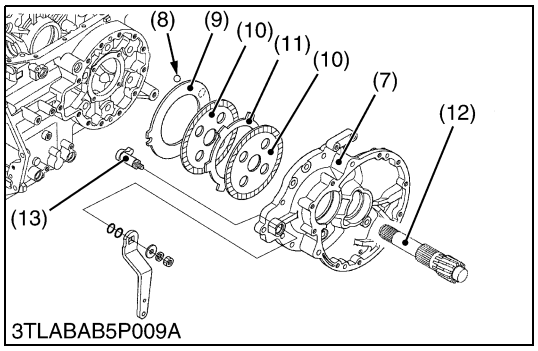

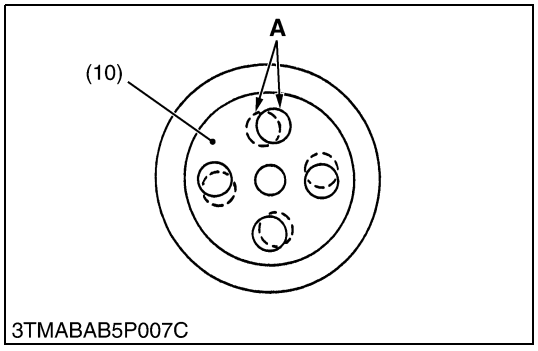

Brake Case

1. Remove the PTO cover.
2. Remove the screw (1) and displace the hydraulic cylinder pin (2) to drawbar side.
3. Disconnect the brake rod (3).
4. Place a block of wood (5) between floor seat (6) and lift arm support to support the floor seat. [ROPS type]
5. Remove the hydraulic cylinder hose (4).
6. Remove the brake case (7).

(When reassembling)

- Place the brake discs (10) so that the hole **"A"** of brake discs should be overlapped 50 % or more.
- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the brake case and differential gear case.
- Apply the liquid lock to the fulcrum screw.
- Be sure to apply the liquid gasket to **"a"** position.
- Apply grease to the steel ball seats. (Do not grease excessively.)
- Be sure to fix the brake cam (13) and cam plate (9).
- Before installing the brake case to the transmission case, install the cam plate (9) to the transmission case.

Tightening torque	Brake case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Floor seat mounting bolt and nut	200 to 220 N·m 20 to 23 kgf·m 150 to 160 lbf·ft
	Fulcrum screw (Manual tranmission and GST)	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
	Fulcrum screw (HST)	63 to 72 N·m 4.6 to 7.4 kgf·m 47 to 53 lbf·ft

(1) Screw
(2) Hydraulic Cylinder Pin
(3) Brake Rod
(4) Hydraulic Cylinder Hose
(5) Block of Wood
(6) Floor Seat
(7) Brake Case
(8) Steel Ball
(9) Cam Plate
(10) Brake Disc
(11) Plate
(12) Brake Shaft
(13) Brake Cam

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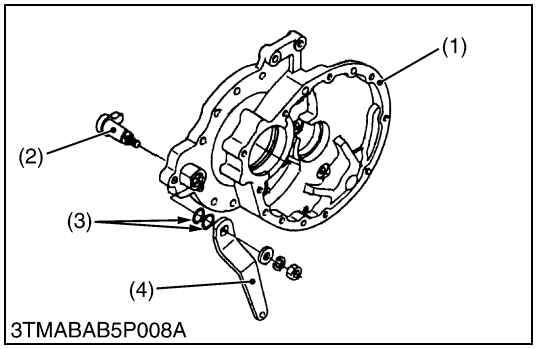

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Brake Cam and Brake Cam Lever

1. Remove the brake cam mounting nut and remove the brake cam (2) and brake cam lever (4).

(When reassembling)

- Apply grease to the O-ring (3) and be careful not damage the O-ring.

Tightening torque	Brake cam lever mounting nut	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

(1) Brake Case
(2) Brake Cam
(3) O-ring
(4) Brake Cam Lever

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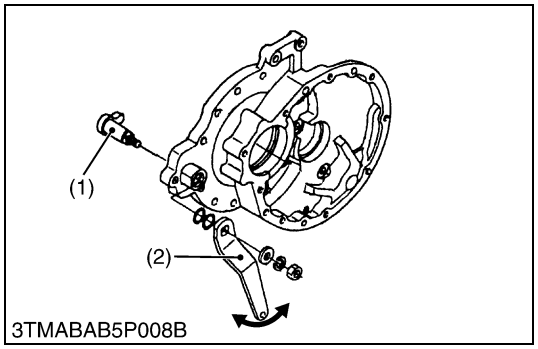
6. SERVICING



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Brake Cam Lever Movement

1. Assemble the brake cam (1) and brake cam lever (2).
2. Move the brake cam lever by hand to check the movement.
3. If the movement is heavy, refine the brake cam lever or brake case with sandpaper.

(1) Brake Cam (2) Brake Cam Lever

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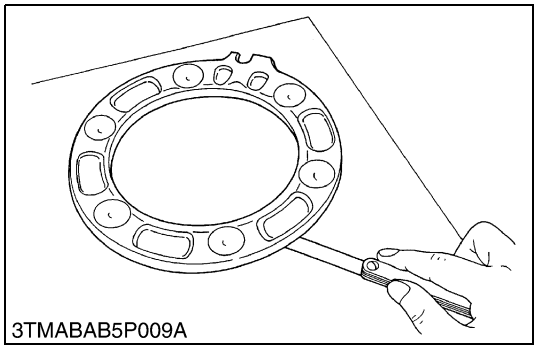
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Cam Plate Flatness

1. Place the cam plate on the surface plate.
2. Measure the flatness of cam plate with a feeler gauge at four points on a diagonal line.
3. If the measurement exceed the allowable limit, replace it.

Cam plate flatness	Allowable limit	0.30 mm 0.012 in.

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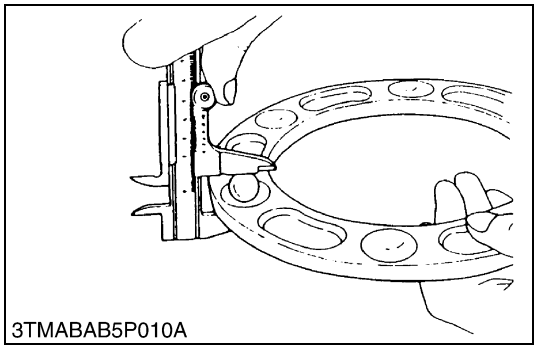
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Height of Cam Plate and Ball

1. Measure the dimension of the cam plate with the ball installed.
2. If the measurement is less than the allowable limit, replace the cam plate and balls.
3. Inspect the ball holes of cam plate for uneven wear. If the uneven wear is found, replace it.

Height of cam plate and ball	Factory specification	20.9 to 21.1 mm 0.823 to 0.830 in.
	Allowable limit	20.5 mm 0.807 in.

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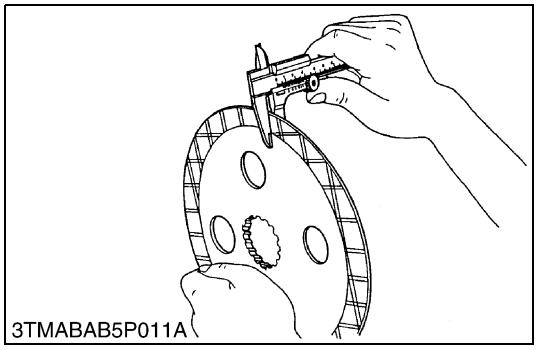
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Brake Disc Wear

1. Measure the brake disc thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Brake disc thickness	Factory specification	4.60 to 4.80 mm 0.181 to 0.188 in.
	Allowable limit	4.20 mm 0.165 in.

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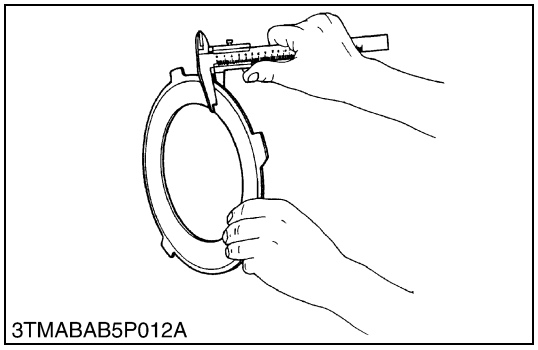
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Plate Wear

1. Measure the plate thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Plate thickness	Factory specification	2.54 to 2.66 mm 0.100 to 0.104 in.
	Allowable limit	2.1 mm 0.083 in.

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6 FRONT AXLE

MECHANISM

CONTENTS

1. STRUCTURE

The four-wheel drive axle has powered front wheels.

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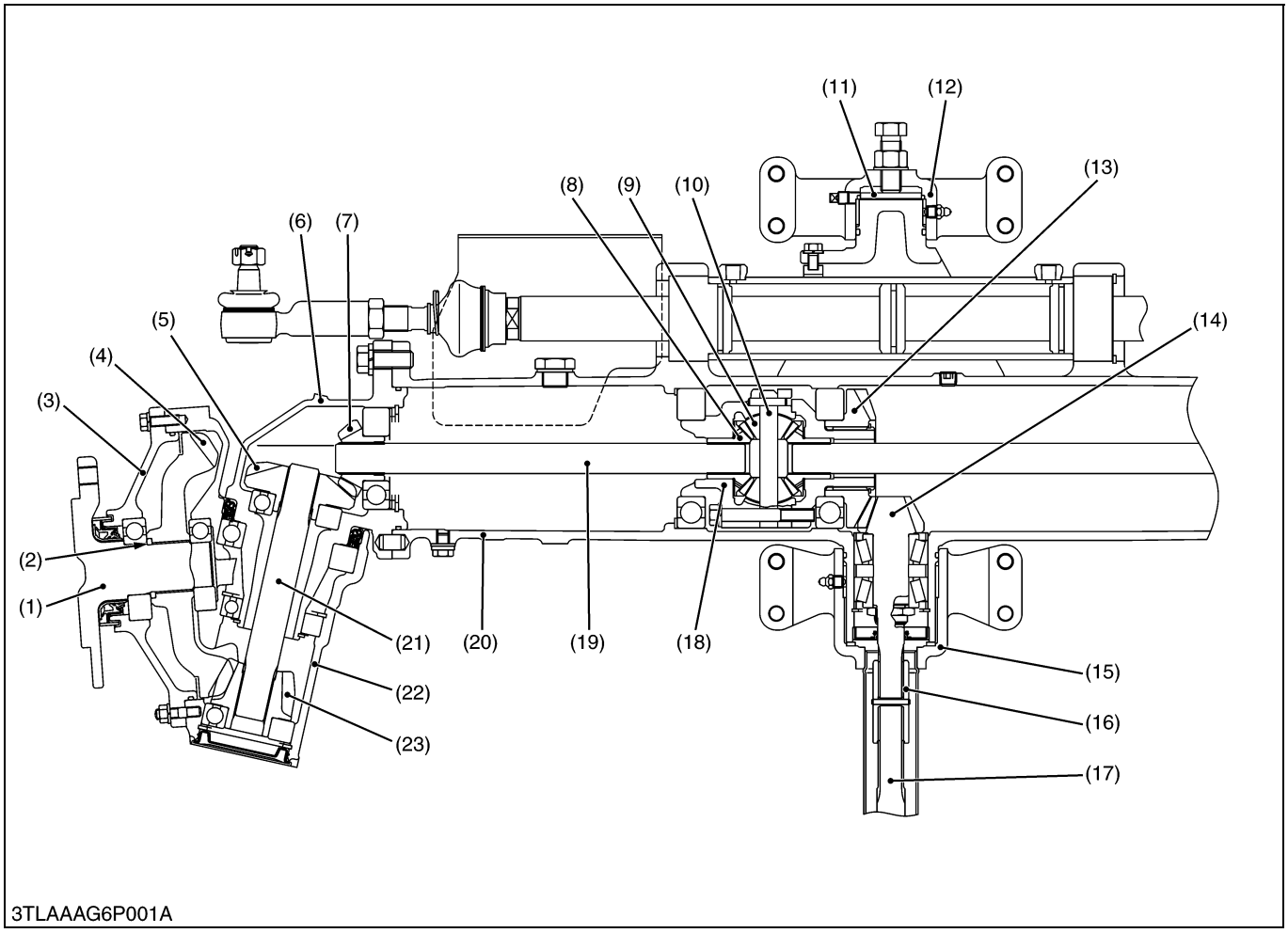
L3560 and L4060



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(1) Axle
(2) Collar
(3) Axle Flange
(4) Bevel Gear
(5) Bevel Gear
(6) Bevel Gear Case
(7) Bevel Gear
(8) Differential Side Gear
(9) Differential Pinion
(10) Pinion Shaft
(11) Collar
(12) Front Axle Bracket, Front
(13) Spiral Bevel Gear
(14) Spiral Bevel Pinion Shaft
(15) Front Axle Bracket, Rear
(16) Coupling
(17) Propeller Shaft
(18) Differential Case
(19) Differential Yoke Shaft
(20) Front Axle Case
(21) Bevel Gear Shaft
(22) Front Gear Case
(23) Bevel Gear

The front axle of the 4WD is constructed as shown above. Power is transmitted from the transmission through the propeller shaft (17) and to the spiral bevel pinion shaft (14), then to the spiral bevel gear (13) after that to the differential gear.

The power through the differential is transmitted to the differential yoke shaft (19), and to the bevel gear shaft (21) in the bevel gear case (6).

The revolution is greatly reduced by the bevel gears (23), (4), then the power is transmitted to the axle (1).

The differential system allows each wheel to rotate at a different speed to make turning easier.

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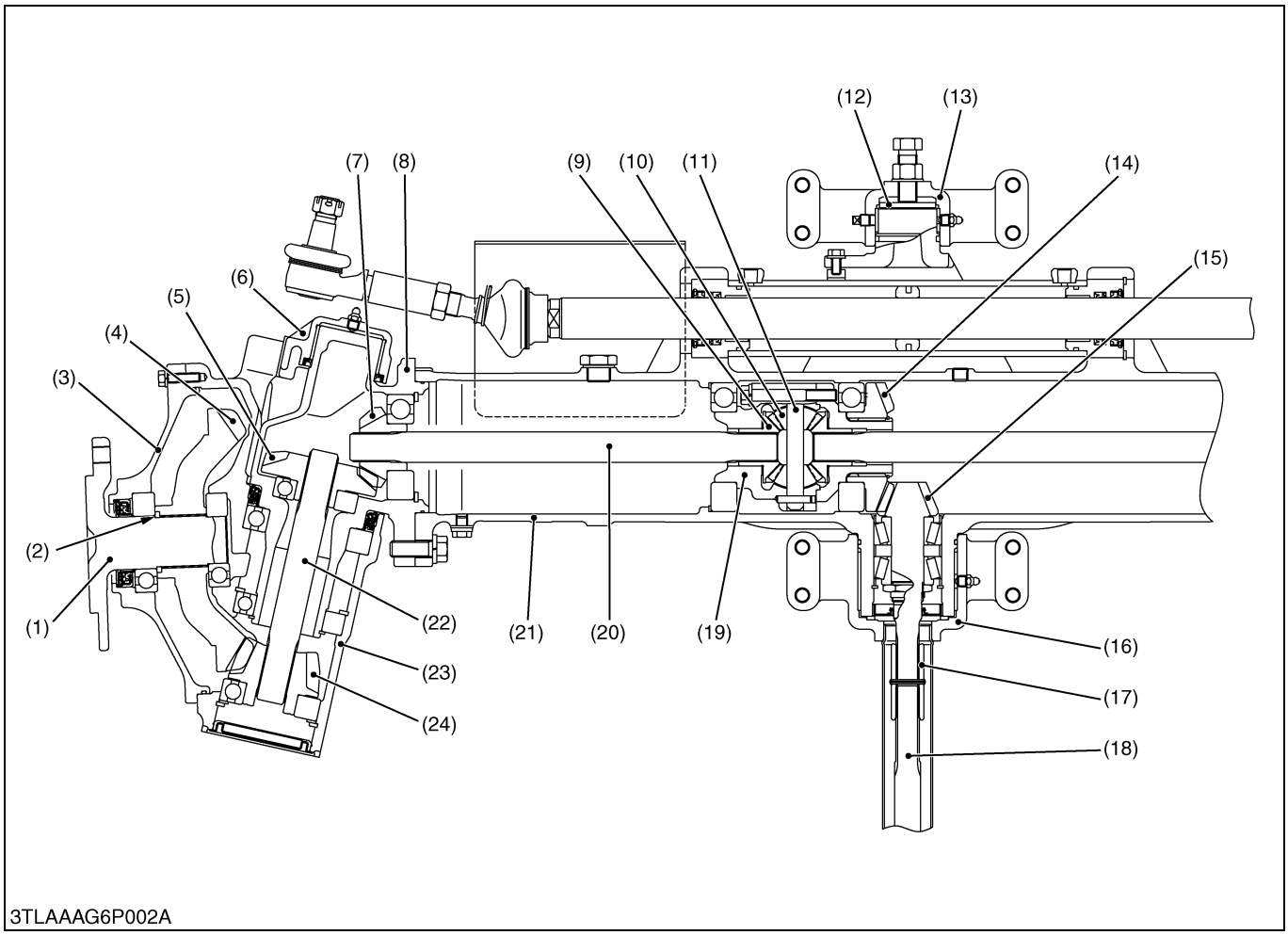
L4760, L5060, L5460 and L6060



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(1) Axle
(2) Collar
(3) Axle Flange
(4) Bevel Gear
(5) Bevel Gear
(6) Axle Case Support
(7) Bevel Gear
(8) Bevel Gear Case
(9) Differential Side Gear
(10) Differential Pinion
(11) Pinion Shaft
(12) Collar
(13) Front Axle Bracket, Front
(14) Spiral Bevel Gear
(15) Spiral Bevel Pinion Shaft
(16) Front Axle Bracket, Rear
(17) Coupling
(18) Propeller Shaft
(19) Differential Case
(20) Differential Yoke Shaft
(21) Front Axle Case
(22) Bevel Gear Shaft
(23) Front Gear Case
(24) Bevel Gear

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SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Wander to Right or Left	Tire pressure uneven	Adjust	G-73
	Improper toe-in adjustment (improper alignment)	Adjust	6-S5
	Clearance between front axle case boss and front axle bracket (front, rear) bushing excessive	Replace	6-S19
	Front axle rocking force too small	Adjust	6-S6
	Front wheel sway excessive	Replace	6-S5
	Tie-rod end loose	Tighten	6-S9
	Air sucked in power steering circuit	Bleed	7-S5
Front Wheels Can Not Be Driven	Propeller shaft broken	Replace	6-S9
	Front wheel drive gears in transmission broken	Replace	3-S75, 3-S94, 3-S119
	Front differential gear broken	Replace	6-S14
	Shift fork broken	Replace	–
	Coupling displaced	Reassemble	6-S9
Noise	Gear backlash excessive	Adjust or replace	6-S15
	Oil insufficient	Fill	G-9
	Bearings damaged or broken	Replace	–
	Gears damaged or broken	Replace	–
	Spiral bevel pinion shaft turn force improper	Adjust	6-S17

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Front Wheel Alignment	Toe-in	2 to 8 mm 0.08 to 0.3 in.	–
Front Wheel	Axial Sway	5.0 mm 0.20 in.	–
Bevel Gear Case to Stopper (L4760, L5060, L5460 and L6060)	Clearance	1.0 to 3.0 mm 0.040 to 0.11 in.	–
Differential Case, Differential Case Cover to Differential Side Gear (L3560 and L4060)	Clearance	0.050 to 0.151 mm 0.0020 to 0.00594 in.	0.20 mm 0.0079 in.
• Differential Case	I.D.	32.000 to 32.062 mm 1.2599 to 1.2622 in.	–
• Differential Case Cover	I.D.	32.000 to 32.025 mm 1.2599 to 1.2608 in.	–
• Differential Side Gear	O.D.	31.911 to 31.950 mm 1.2564 to 1.2578 in.	–
Differential Case, Differential Case Cover to Differential Side Gear (L4760, L5060, L5460 and L6060)	Clearance	0.050 to 0.114 mm 0.0020 to 0.00448 in.	0.20 mm 0.0079 in.
• Differential Case	I.D.	32.000 to 32.025 mm 1.2599 to 1.2608 in.	–
• Differential Case Cover	I.D.	32.000 to 32.025 mm 1.2599 to 1.2608 in.	–
• Differential Side Gear	O.D.	31.911 to 31.950 mm 1.2564 to 1.2578 in.	–
Pinion Shaft to Differential Pinion	Clearance	0.064 to 0.100 mm 0.0026 to 0.00393 in.	0.25 mm 0.0098 in.
• Pinion Shaft	O.D.	13.950 to 13.968 mm 0.54922 to 0.54992 in.	–
• Differential Pinion	I.D.	14.032 to 14.050 mm 0.55244 to 0.55314 in.	–
Differential Pinion to Differential Side Gear (L3560 and L4060)	Backlash	0.10 to 0.30 mm 0.0040 to 0.011 in.	0.40 mm 0.016 in.
Differential Pinion to Differential Side Gear (L4760, L5060, L5460 and L6060)	Backlash	0.20 to 0.30 mm 0.0079 to 0.011 in.	0.40 mm 0.016 in.
Spiral Bevel Pinion Shaft	Turning Torque	0.98 to 1.1 N·m 0.10 to 0.12 kgf·m 0.73 to 0.86 lbf·ft	–
Spiral Bevel Pinion Shaft to Spiral Bevel Gear (L3560 and L4060)	Backlash	0.10 to 0.30 mm 0.0040 to 0.011 in.	–
Spiral Bevel Pinion Shaft to Spiral Bevel Gear (L4760, L5060, L5460 and L6060)	Backlash	0.20 to 0.30 mm 0.0079 to 0.011 in.	–
Bevel Gear to Bevel Gear (L3560 and L4060)	Backlash	0.15 to 0.30 mm 0.0059 to 0.011 in.	–
Bevel Gear to Bevel Gear (L4760, L5060, L5460 and L6060)	Backlash	0.20 to 0.30 mm 0.0079 to 0.011 in.	–

KiSC issued 03, 2016 A

Item		Factory Specification	Allowable Limit
Front Axle Case Boss (Front) to Bracket Bushing	Clearance	0.120 to 0.275 mm 0.00473 to 0.0108 in.	0.50 mm 0.020 in.
• Front Axle Case Boss (Front)	O.D.	49.950 to 49.975 mm 1.9666 to 1.9675 in.	–
• Bushing	I.D.	50.095 to 50.225 mm 1.9723 to 1.9773 in.	–
Front Axle Case Boss (Rear) to Bracket Bushing (L3560 and L4060)	Clearance	0.100 to 0.292 mm 0.00394 to 0.0114 in.	1.0 mm 0.039 in.
• Front Axle Case Boss (Rear)	O.D.	69.970 to 70.000 mm 2.7548 to 2.7559 in	–
• Bushing	I.D.	70.100 to 70.262 mm 2.7599 to 2.7662 in.	–
Front Axle Case Boss (Rear) to Bracket Bushing (L4760, L5060, L5460 and L6060)	Clearance	0.025 to 0.195 mm 0.00099 to 0.00767 in.	0.50 mm 0.020 in.
• Front Axle Case Boss (Rear)	O.D.	80.000 to 80.035 mm 3.1496 to 3.1509 in.	–
• Bushing	I.D.	80.060 to 80.195 mm 3.1520 to 3.1572 in.	–
Bevel Gear Case Boss to Front Axle Support Bushing (L4760, L5060, L5460 and L6060)	Clearance	0.080 to 0.248 mm 0.0032 to 0.00976 in.	1.0 mm 0.039 in.
• Bevel Gear Case Boss	O.D.	54.970 to 55.000 mm 2.1642 to 2.1653 in.	–
• Front Axle Support Bushing	I.D.	55.080 to 55.218 mm 2.1685 to 2.1739 in.	–

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

Item	N·m	kgf·m	lbf·ft
Tie-rod lock nut	167 to 196	17.0 to 20.0	123 to 144
Front axle pivot lock nut	59 to 98	6.0 to 10	44 to 72
Power steering hose retaining nut	25 to 29	2.5 to 3.0	18 to 21
Cylinder cover mounting screw	61 to 70	6.2 to 7.2	45 to 52
Front wheel mounting nut	137	14.0	101
Bracket mounting screw and nut (L3560, L4060, L4760 and L5060)	78 to 90	7.9 to 9.2	58 to 66
Bracket mounting screw and nut (L5460 and L6060)	103 to 117	10.5 to 12.0	76.0 to 86.7
Tie-rod end nut (L3560 and L4060)	40 to 45	4.0 to 4.6	29 to 33
Tie-rod end nut (L4760, L5060, L5460 and L6060)	157 to 176	16.0 to 18.0	116 to 130
Bevel gear case mounting screw (L3560)	124 to 147	12.6 to 15.0	91.2 to 108
Bevel gear case mounting screw (L4060, L4760, L5060, L5460 and L6060)	167 to 196	17.0 to 20.0	123 to 144
Axle flange mounting screw and nut (L3560 and L4060)	24 to 27	2.4 to 2.8	18 to 20
Axle flange mounting screw and nut (L4760, L5060, L5460 and L6060)	30 to 34	3.0 to 3.5	22 to 25
Axle case support mounting screw	128 to 142	13.0 to 14.5	94.1 to 104
Tie-rod joint to steering cylinder	167 to 196	17.0 to 20.0	123 to 144
Differential case cover mounting screw (L3560 and L4060)	48 to 58	4.9 to 6.0	36 to 43
Differential case cover mounting screw (L4760, L5060, L5460 and L6060)	61 to 70	6.2 to 7.2	45 to 52

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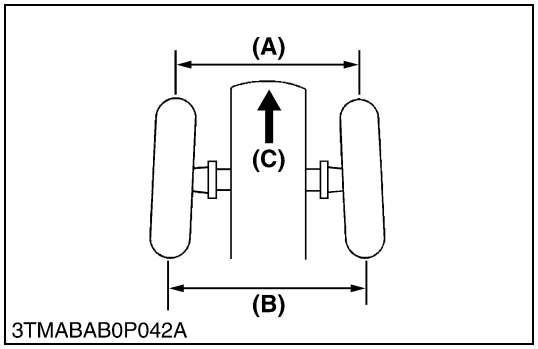
4. CHECKING AND ADJUSTING



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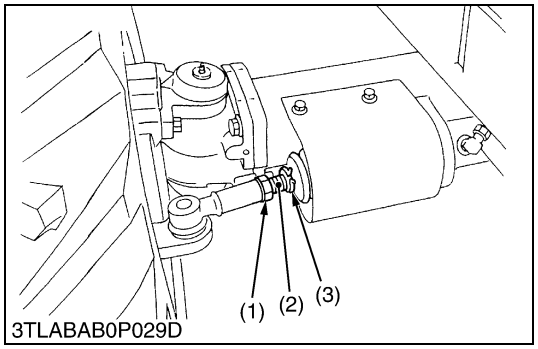

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Toe-in

1. Park the tractor on the flat place.
2. Inflate the tires to the specified pressure.
3. Turn steering wheel so front wheels are in the straight ahead position.
4. Lower the implement, lock the parking brake and stop the engine.
5. Measure distance between tire beads at front of tire, hub height.
6. Measure distance between tire beads at rear of tire, hub height.
7. Front distance should be 2 to 8 mm (0.08 to 0.3 in.) less than rear distance.
8. If the measurement is not within the factory specifications, adjust by changing the tie-rod length.

Toe-in (**B - A**)	Factory specification	2 to 8 mm 0.08 to 0.3 in.

■ **Adjusting**

1. Remove the snap ring (3).
2. Loosen the tie-rod lock nut (1).
3. Turn the tie-rod joint (2) to adjust the rod length until the proper toe-in measurement is obtained.
4. Retighten the tie-rod lock nut (1).
5. Attach the snap ring (3).

Tightening torque	Tie-rod lock nut	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

■ **IMPORTANT**

- **A right and left tie-rod joint is adjusted to the same length.**

(1) Tie-rod Lock Nut
(2) Tie-rod Joint
(3) Snap Ring
(A) Wheel to Wheel Distance at front
(B) Wheel to Wheel Distance at rear
(C) Front

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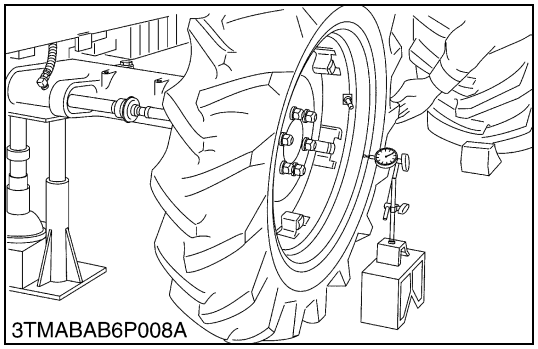
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Axial Sway of Front Wheel

1. Jack up the front side of tractor.
2. Set a dial gauge on the outside of rim.
3. Turn the wheel slowly and read the runout of rim.
4. If the measurement exceeds the factory specifications, check the bearing, rim and front wheel hub.

Axial sway of front wheel	Factory specification	Less than 5.0 mm 0.20 in.

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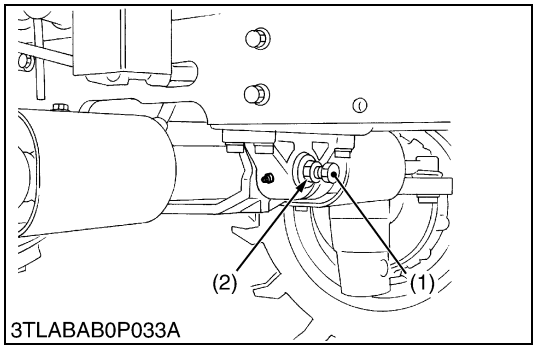

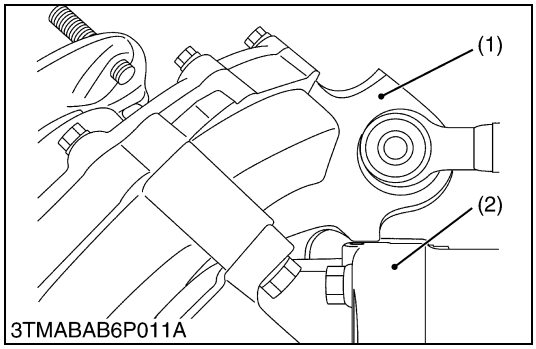

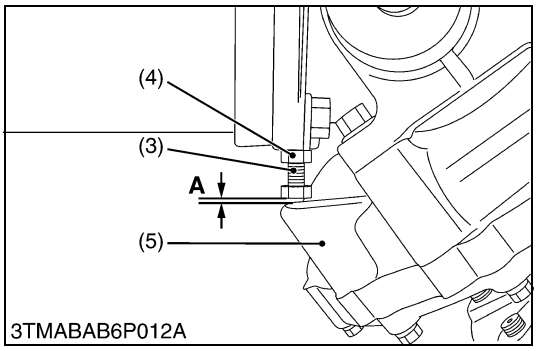

Adjust Front Axle Pivot

1. Loosen the lock nut (2), tighten the adjusting screw (1) all the way, and then loosen the adjusting screw (1) by 1/6 turn.
2. Retighten the lock nut (2).

■ **NOTE**

- **If the axle pivot pin adjustment is not correct, front wheel vibration can occur causing vibration in the steering wheel.**

Tightening torque	Lock nut	59 to 98 N·m 6.0 to 10 kgf·m 44 to 72 lbf·ft

(Reference)

- Measure the adjusting screw tightening torque.
- If tightening torque is not within the factory specifications, adjust the adjusting screw (1).
- After adjustment, tighten the lock nut (2) firmly.

Tightening torque	Front axle adjusting screw	20 to 29 N·m 2.0 to 3.0 kgf·m 15 to 21 lbf·ft

(1) Adjusting Screw
(2) Lock Nut

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Front Wheel Steering Angle (L4760, L5060, L5460 and L6060)

1. Inflate the tires to the specified pressure.
2. Steer the wheels to the extreme right until the front gear case (1) contacts with the bevel gear case (2) at right hand side of the front axle.
3. If the front gear case (1) can not be contacted with the bevel gear case (2), shorten the length of stopper (3).
4. Keeping the front gear case (1) contact with the bevel gear case (2), make a specified clearance **"A"** as shown in the lower table.
5. After adjustment, secure the stopper with the lock nut (4).
6. For adjusting the left steering angle, perform the same procedure as mentioned in right steering angle.

Clearance **"A"** between bevel gear case and stopper	Factory specification	1.0 to 3.0 mm 0.040 to 0.11 in.

(1) Front Gear Case
(2) Bevel Gear Case
(3) Stopper
(4) Lock Nut
(5) Front Gear Case
A: Clearance

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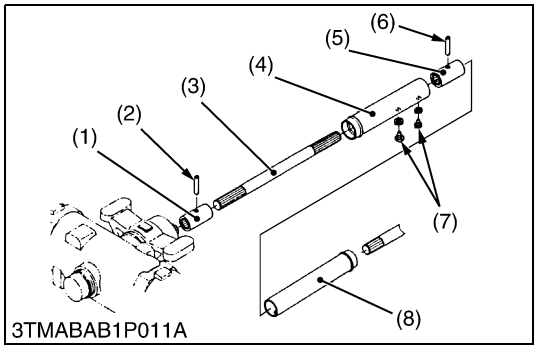
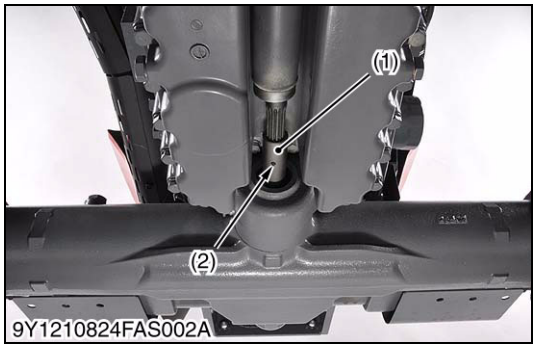
5. DISASSEMBLING AND ASSEMBLING

[1] SEPARATING FRONT AXLE ASSEMBLY





Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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Power Steering Hoses

1. Disconnect the power steering hoses (1), (2) from steering cylinder.
2. Remove the cylinder cover (3).

(When reassembling)

Tightening torque	Power steering hose retaining nut	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft
	Cylinder cover mounting screw	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft

(1) Power Steering Hose, RH (with Red Tape)
(2) Power Steering Hose, LH (with Blue Tape)
(3) Cylinder Cover

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Front Wheel and Front Axle Assembly

1. Check the front axle and engine are securely mounted on the disassembly stand.
2. Loosen the front wheel mounting nuts.
3. Lift the front axle and remove the front wheels.
4. Remove the bracket (front) mounting screws and nuts.
5. Remove the bracket (rear) mounting screws and nuts.
6. Separate the front axle from front axle bracket.

(When reassembling)

■ **NOTE**

- **Be sure to adjust the front axle rocking force. (See page 6-S6.)**

Tightening torque	Front wheel mounting nut		137 N·m 14.0 kgf·m 101 lbf·ft
	Bracket mounting screw and nut	L3560 L4060 L4760 L5060	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
		L5460 L6060	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

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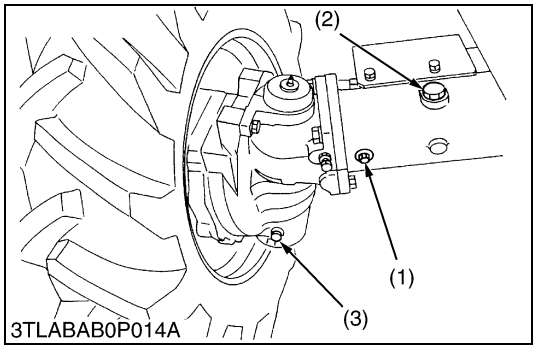
[2] DISASSEMBLING FRONT AXLE



Draining Front Axle Case Oil

CAUTION

- **Be sure to stop the engine before changing the front axle case oil.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. Remove the right and left drain plugs (3) and filling plug (2) at the front axle case and drain the oil completely.
2. After draining, reinstall the drain plugs (3).

(When refilling)

- Remove the right and left check plugs (1).
- Fill new oil from filling port with specified amount of oil.
- Reinstall the filling plug (2) and check plug (1).

Capacity	Front axle case oil	L3560 L4060	6.5 L 6.9 U.S.qts 5.7 Imp.qts
		L4760 L5060 L5460 L6060	8.5 L 9.0 U.S.qts 7.5 Imp.qts

■ **IMPORTANT**

- **Use KUBOTA SUPER UDT fluid or SAE80, 90 gear oil. Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.**

(1) Check Plug
(2) Filling Plug
(3) Drain Plug

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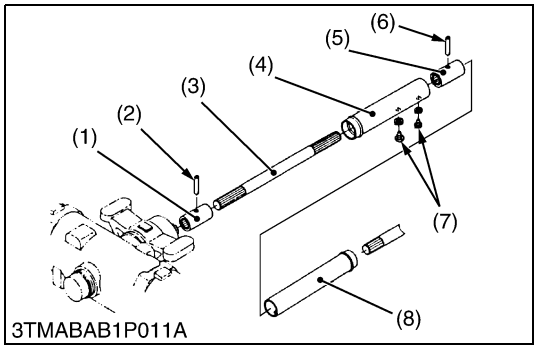

Propeller Shaft

1. Slide the propeller shaft cover (4) and (8) after removing the screws (7).
2. Tap out the spring pins (2), (6) and slide the couplings (1), (5) and then remove the propeller shaft with covers (4), (8).

(When reassembling)

- Apply grease to the splines of propeller shaft (3).

(1) Coupling
(2) Spring Pin
(3) Propeller Shaft
(4) Propeller Shaft Cover
(5) Coupling
(6) Spring Pin
(7) Screws
(8) Propeller Shaft Cover

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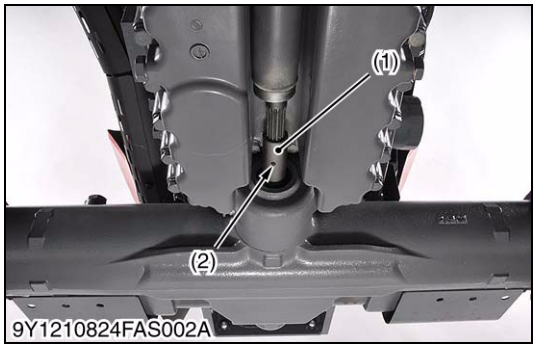
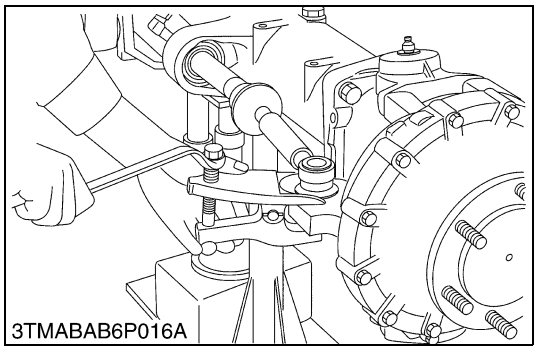


Tie-rods

1. Jack up the front side of tractor.
2. Remove the front wheels and cylinder covers.
3. Pull out the cotter pin and remove the tie-rod end slotted nuts.
4. Remove the tie-rod with a tie-rod end lifter (Code No. 07909-39051).

(When reassembling)

- After tightening the tie-rod end nut to the specified torques, install a cotter pin as shown in the figure left.



Tightening torque	Tie-rod end nut	L3560 L4060	40 to 45 N·m 4.0 to 4.6 kgf·m 29 to 33 lbf·ft
		L4760 L5060 L5460 L6060	157 to 176 N·m 16.0 to 18.0 kgf·m 116 to 130 lbf·ft

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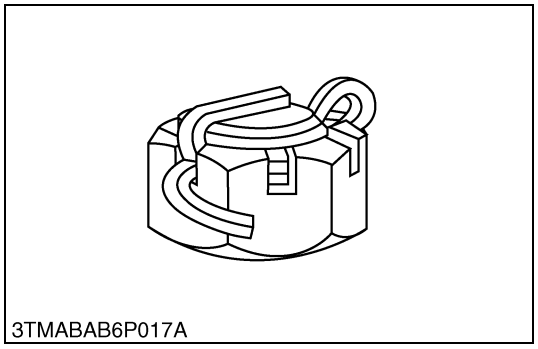
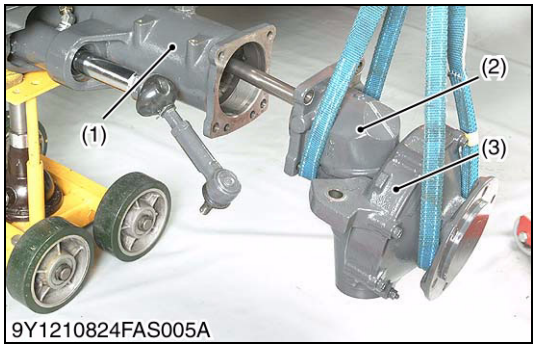


Bevel Gear Case and Front Gear Case (L3560 and L4060)

1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (2) and front gear case (3) as a unit from the front axle case (1).

(When reassembling)



Tightening torque	Bevel gear case mounting screw	L3560	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
		L4060	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Front Axle Case
(2) Bevel Gear Case
(3) Front Gear Case

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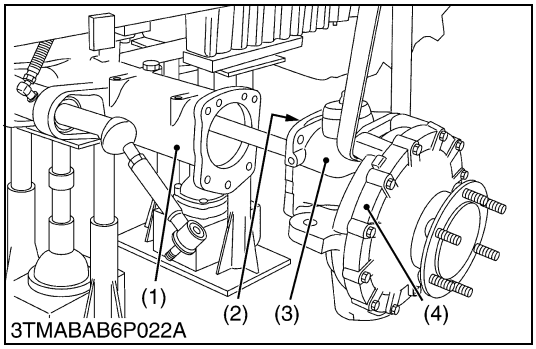

Bevel Gear Case and Front Gear Case (L4760, L5060, L5460 and L6060)

1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (3) and front gear case (4) as a unit from the front axle case (1).

(When reassembling)

- Apply grease to the O-ring (2) and be careful not to damage it.
- Do not interchange right and left bevel gear case assemblies.

Tightening torque	Bevel gear case mounting screw	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Front Axle Case
(2) O-ring
(3) Bevel Gear Case
(4) Front Gear Case

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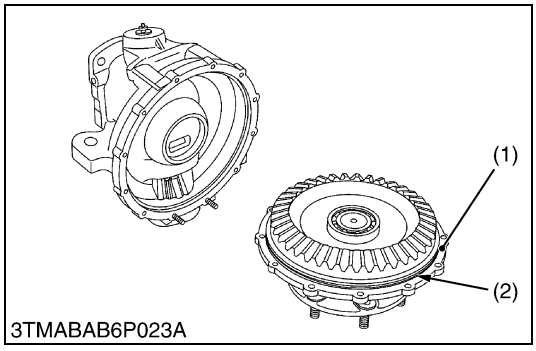

Axle Flange and Front Gear Case

1. Remove the axle flange mounting screws.
2. Remove the axle flange (1).

(When reassembling)

- Apply grease to the O-ring (2) of axle flange.
- Tighten the axle flange mounting screws and nuts diagonally in several steps.

Tightening torque	Axle flange mounting screw and nut	L3560 L4060	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
		L4760 L5060 L5460 L6060	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft

(1) Axle Flange
(2) O-ring

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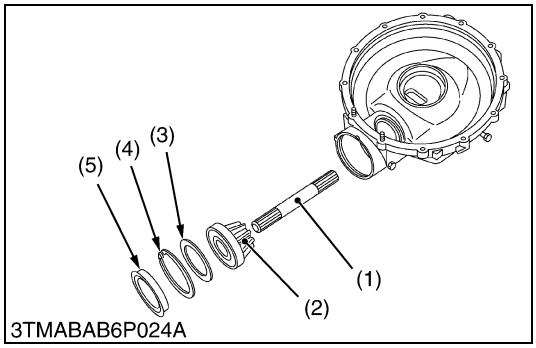

Bevel Gear and Bevel Gear Shaft

1. Remove the plug (5).
2. Remove the internal snap ring (4) and shim (3).
3. Tap out the bevel gear (2) with ball bearing.
4. Draw out the bevel gear shaft (1).

(1) Bevel Gear Shaft
(2) Bevel Gear
(3) Shim
(4) Internal Snap Ring
(5) Plug

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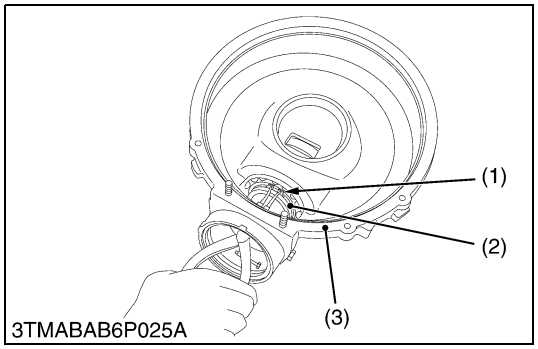

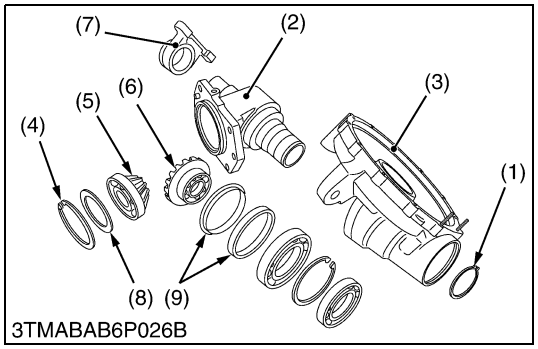

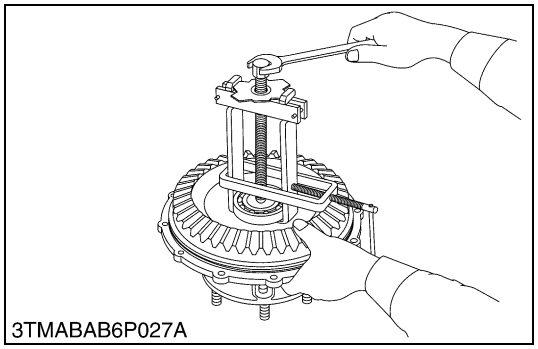

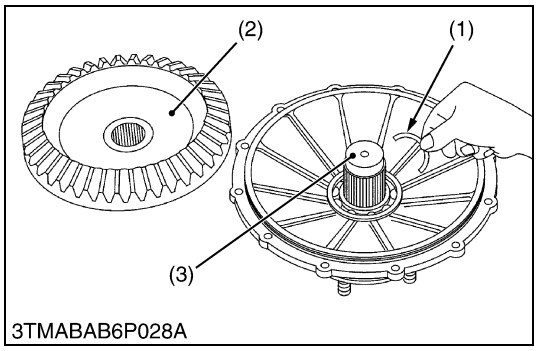

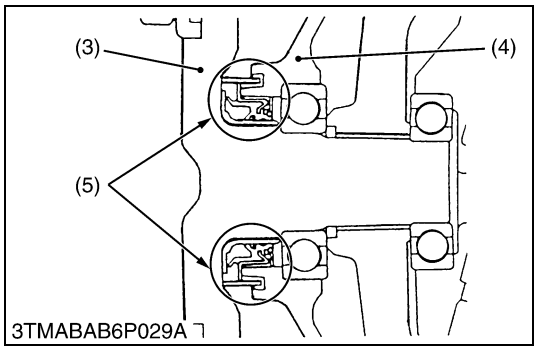

Bevel Gear Case and Gears

1. Remove the axle case support (7). (except L3560 and L4060)
2. Remove the external snap ring (1).
3. Tap the bevel gear case (2) and separate it from the front gear case (3).
4. Remove the internal snap ring (4).
5. Remove the bevel gears (5), (6) with ball bearings, and shims (8).

(When reassembling)

- Install the shims (8) to their original position.
- Install the oil seal (9) of bevel gear case, noting its direction.

Tightening torque	Axle case support mounting screw	128 to 142 N·m 13.0 to 14.5 kgf·m 94.1 to 104 lbf·ft

(1) External Snap Ring
(2) Bevel Gear Case
(3) Front Gear Case
(4) Internal Snap Ring
(5) Bevel Gear
(6) Bevel Gear
(7) Axle Case Support
(8) Shim
(9) Oil Seal

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Axle

1. Remove the bearing with a special use puller set (Code No. 07916-09032).
2. Remove the bevel gear (2).
3. Remove the collar (1).
4. Tap out the axle (3).

(When reassembling)

- Install the oil seal (5) of axle flange (4), noting its direction as shown in the figure below.

(1) Collar
(2) Bevel Gear
(3) Axle
(4) Axle Flange
(5) Oil Seal

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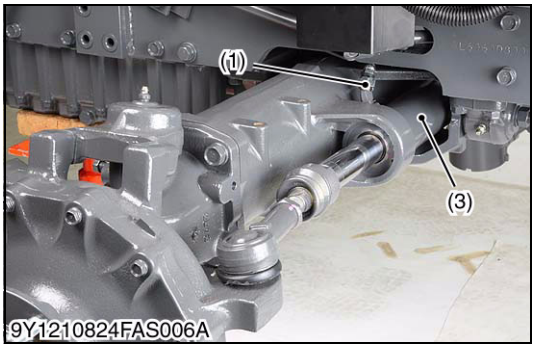

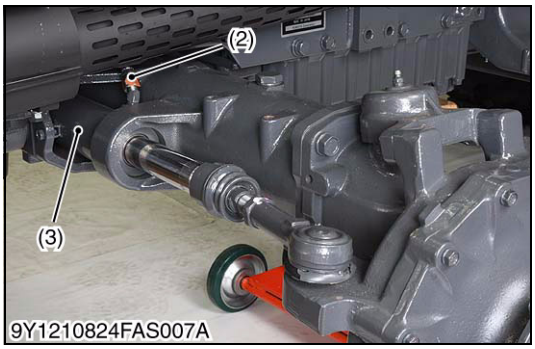

Power Steering Hoses

1. Disconnect the power steering hoses R.H. (1) and L.H. (2) from steering cylinder (3).

(When reassembling)

Tightening torque	Power steering hose retaining nut	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft
	Cylinder cover mounting screw	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft

(1) Power Steering Hose R.H.
(2) Power Steering Hose L.H.
(3) Steering Cylinder

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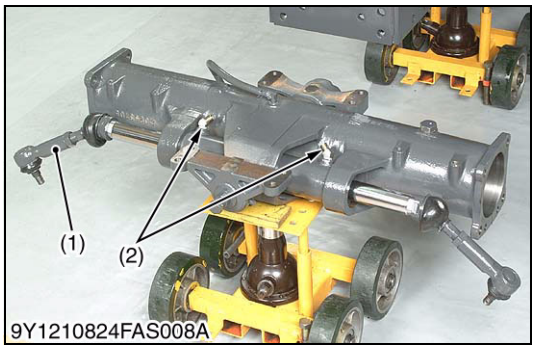

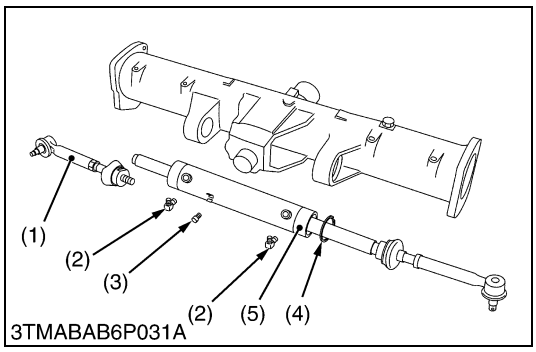

Steering Cylinder

1. Support the engine and front axle case by disassembling stands.
2. Remove the bracket mounting screw and nut, and remove the front axle case.
3. Remove the tie-rod joint (1) (right side).
4. Remove the cylinder set screw (3).
5. Remove the fittings (2) from steering cylinder.
6. Remove the internal snap ring (4).
7. Draw out the steering cylinder (5).

(When reassembling)

- Apply liquid lock (Three Bond 1324 or equivalent) to the tie-rod joint.

Tightening torque	Tie-rod joint to steering cylinder	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Tie-rod Joint
(2) Fitting
(3) Cylinder Set Screw
(4) Internal Snap Ring
(5) Steering Cylinder

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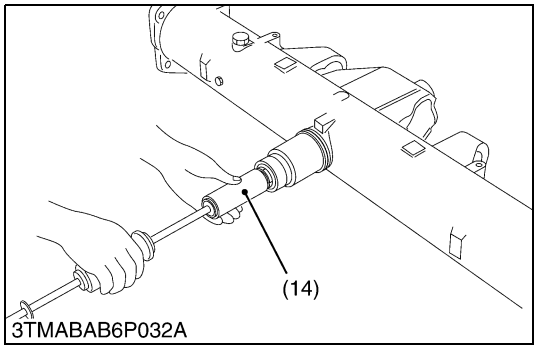

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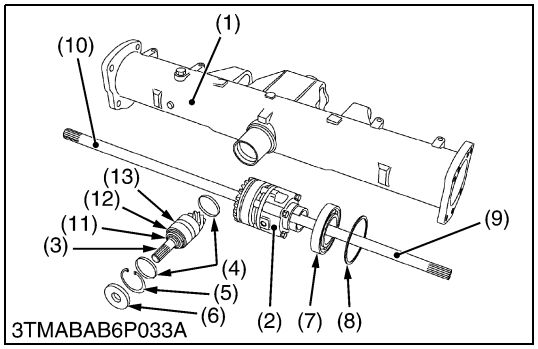

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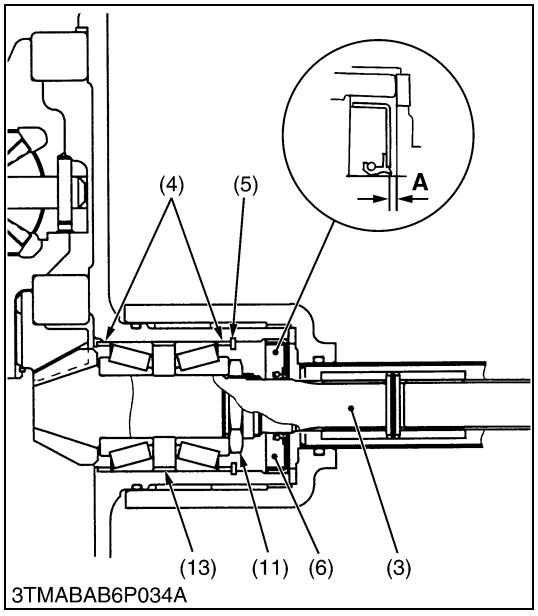

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Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Remove the differential yoke shaft (9), (10) both sides.
2. Remove the oil seal (6) and internal snap ring (5).
3. Remove the collar (4).
4. Remove the spiral bevel pinion shaft (3) by the pinion shaft remover 1 (14). [L3560 and L4060]
   Remove the spiral bevel pinion shaft (3) by the pinion shaft remover 2 (14) [L4760, L5060, L5460 and L6060]

■ **NOTE**
- **Refer to G-66 for the pinion shaft remover 1 and 2.**

5. Remove the differential gear assembly (2), ball bearing (7) and shim (8) from left side of front axle case (1).
6. Remove the stake of lock nut (11), and then remove the lock nut (11).
7. Remove the taper roller bearings (12).

(When reassembling)
- Replace the lock nut (11) and oil seal (6) with new ones.
- Apply grease to the oil seal (6).
- Install the shims and collars to their original position.
- Install the taper roller bearings correctly, noting their direction and apply gear oil to them.
- Tighten up the lock nut (11) until the turning force of the spiral bevel pinion shaft reaches the factory specification.
- When press-fitting an oil seal (6), observe the dimension **"A"** described in the figure.

■ **IMPORTANT**
- **After adjusting the turning torque stake the lock nut (11) firmly.**

Turning torque of spiral bevel pinion shaft	Factory specification	0.98 to 1.1 N·m 0.10 to 0.12 kgf·m 0.73 to 0.86 lbf·ft

(1) Front Axle Case
(2) Differential Gear Assembly
(3) Spiral Bevel Pinion Shaft
(4) Adjusting Collar
(5) Internal Snap Ring
(6) Oil Seal
(7) Ball Bearing
(8) Shim
(9) Differential Yoke Shaft R.H.
(10) Differential Yoke Shaft L.H.
(11) Lock Nut
(12) Taper Roller Bearing
(13) Collar
(14) Pinion Shaft Remover

A: Dimension A:
0.50 to 1.0 mm (0.020 to 0.039 in.)

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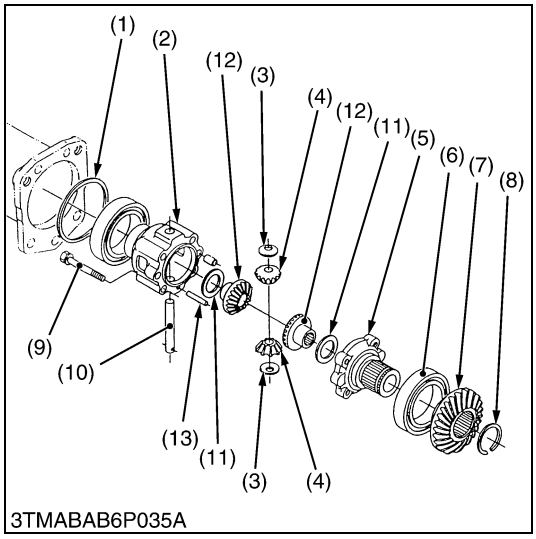

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Differential Gear

1. Remove the differential case cover mounting screws (9).
2. Remove the differential case cover (5), ball bearing (6) and spiral bevel gear (7) as a unit
3. Remove the external snap ring (8), and then remove the ball bearing (6) and spiral bevel gear (7) as a unit with a puller.
4. Remove the straight pin (13).
5. Pull out the pinion shaft (10) and remove the differential pinions (4) and differential side gears (12).

(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gears (12) and differential pinions (4).

Tightening torque	Differential case cover mounting screw	L3560 L4060	48 to 58 N·m 4.9 to 6.0 kgf·m 36 to 43 lbf·ft
		L4760 L5060 L5460 L6060	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft

(1) Shim
(2) Differential Case
(3) Thrust Collar
(4) Differential Pinion
(5) Differential Case Cover
(6) Ball Bearing
(7) Spiral Bevel Gear
(8) External Snap Ring
(9) Differential Case Cover Mounting Screw
(10) Pinion Shaft
(11) Shim
(12) Differential Side Gear
(13) Straight Pin

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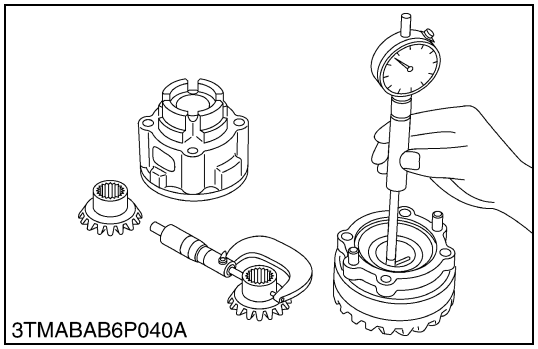
6. SERVICING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Clearance between Differential Case (Differential Case Cover) and Differential Side Gear

1. Measure the differential side gear O.D..
2. Measure the differential case bore I.D. and calculate the clearance.
3. Measure the differential case cover bore I.D. and calculate the clearance.
4. If the clearance exceeds the allowable limit, replace faulty parts.

(L3560 and L4060)

Clearance between differential case (differential case cover) and differential side gear	Factory specification	0.050 to 0.151 mm 0.0020 to 0.00594 in.
	Allowable limit	0.20 mm 0.0079 in.

Differential case bore I.D.	Factory specification	32.000 to 32.062 mm 1.2599 to 1.2622 in.
Differential case cover bore I.D.	Factory specification	32.000 to 32.025 mm 1.2599 to 1.2608 in.
Differential side gear O.D.	Factory specification	31.911 to 31.950 mm 1.2564 to 1.2578 in.

(L4760, L5060, L5460 and L6060)

Clearance between differential case (differential case cover) and differential side gear	Factory specification	0.050 to 0.114 mm 0.0020 to 0.00448 in.
	Allowable limit	0.20 mm 0.0079 in.

Differential case bore I.D.	Factory specification	32.000 to 32.025 mm 1.2599 to 1.2608 in.
Differential case cover bore I.D.	Factory specification	32.000 to 32.025 mm 1.2599 to 1.2608 in.
Differential side gear O.D.	Factory specification	31.911 to 31.950 mm 1.2564 to 1.2578 in.

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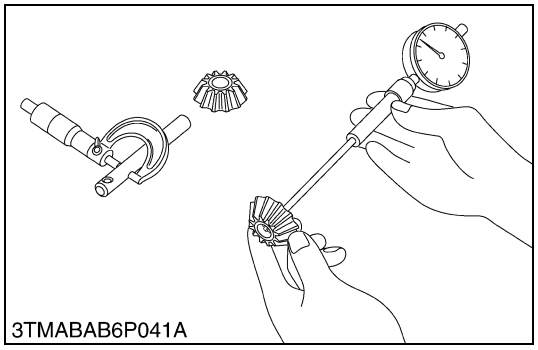
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Clearance between Pinion Shaft and Differential Pinion

1. Measure the pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between pinion shaft and differential pinion	Factory specification	0.064 to 0.100 mm 0.0026 to 0.00393 in.
	Allowable limit	0.25 mm 0.0098 in.

Pinion shaft O.D.	Factory specification	13.950 to 13.968 mm 0.54922 to 0.54992 in.
Differential pinion I.D.	Factory specification	14.032 to 14.050 mm 0.55244 to 0.55314 in.

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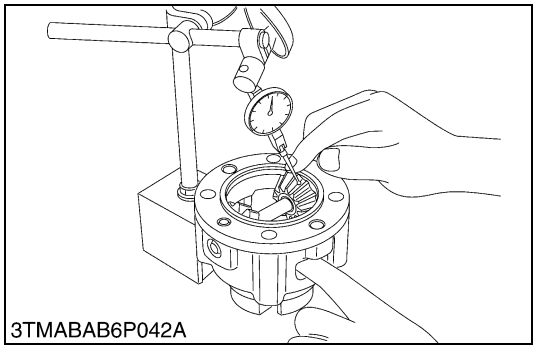
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Backlash between Differential Pinion and Differential Side Gear

1. Set a dial gauge (lever type) on a tooth of the differential pinion.
2. Fix the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement exceeds the factory specifications, adjust with the differential side gears shims.

Backlash between differential pinion and differential side gear	Factory specification	L3560 L4060	0.10 to 0.30 mm 0.0040 to 0.011 in.
		L4760 L5060 L5460 L6060	0.20 to 0.30 mm 0.0079 to 0.011 in.
	Allowable limit		0.40 mm 0.016 in.

(Reference)

- Thickness of adjusting shims
  0.4 mm (0.016 in.)
  0.6 mm (0.024 in.)
  0.8 mm (0.031 in.)
  1.0 mm (0.039 in.)
  1.2 mm (0.047 in.)
- Tooth contact: More than 35 %

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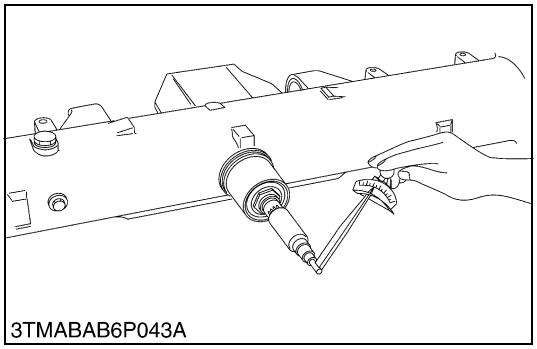
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Turning Torque of Spiral Bevel Pinion Shaft (Pinion Shaft Only)

1. Install the spiral bevel pinion shaft assembly only to the front axle case.
2. Measure the turning torque of spiral bevel pinion shaft.
3. If the turning torque is not within the factory specifications, adjust with the lock nut.
   If the turning torque is not able to adjust by lock nut (2), change the thickness of collar (1) and adjust with lock nut (2) again.

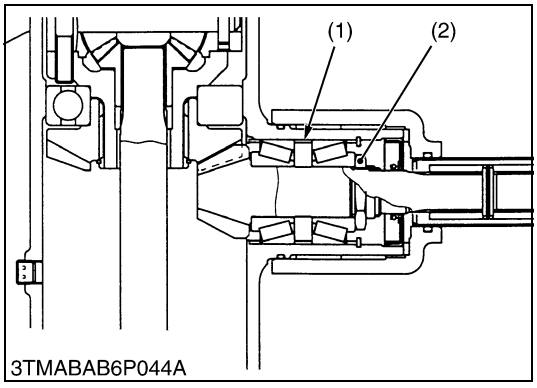
(Reference)

- Standard size of collar (1): 10.0 mm (0.394 in.) of thickness

Turning torque of spiral bevel pinion shaft	Factory specification	0.98 to 1.1 N·m 0.10 to 0.12 kgf·m 0.73 to 0.86 lbf·ft

■ **NOTE**

- **After turning torque adjustment, be sure to stake the lock nut.**



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(1) Collar (2) Lock Nut

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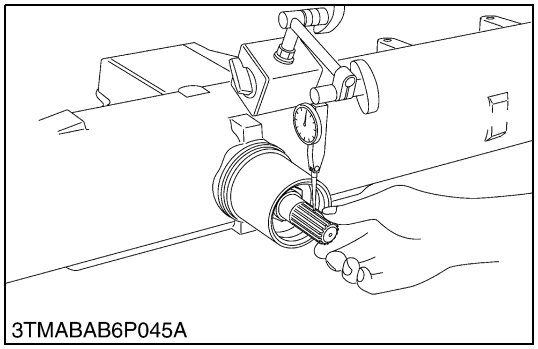
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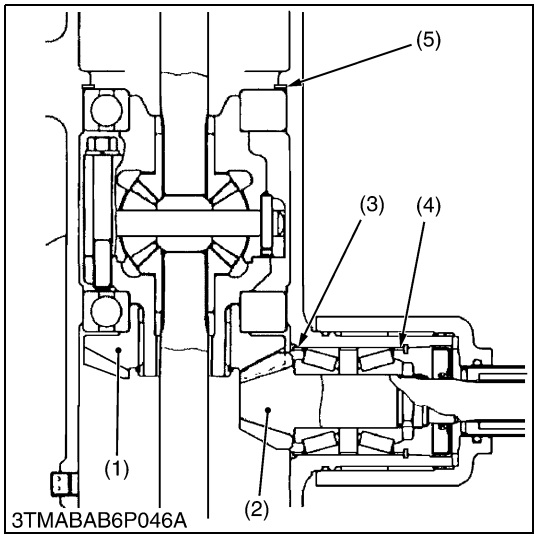

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Backlash between Spiral Bevel Pinion Shaft and Spiral Bevel Gear

1. Set a dial gauge (lever type) with its finger on the spline of spiral bevel pinion shaft.
2. Measure the backlash by moving the spiral bevel pinion shaft by hand lightly.
3. Calculate the backlash from the ratio of the shaft diameter to the gear diameter. (Backlash = Play × 2.0)
4. If the backlash is not within the factory specifications, change the adjusting collar (3), (4).
   For example, when the backlash is too large, change the collar (3) to thinner one and change the collar (4) to thicker one. At this time, if the collar (3) is thinned by 12 mm, the collar (4) must be thickened by 1 mm.

(Reference)

- Standard size of adjusting collar (3), (4)
  6.0 mm (0.236 in.) of thickness (total 12.0 mm)
- Standard size of adjusting shim (5)
  2.0 mm (0.079 in.) of thickness

5. Adjust the backlash properly by repeating the above procedures.

Backlash between spiral bevel pinion shaft and spiral bevel gear	Factory specification	L3560 L4060	0.10 to 0.30 mm 0.0040 to 0.011 in.
		L4760 L5060 L5460 L6060	0.20 to 0.30 mm 0.0079 to 0.011 in.

(1) Spiral Bevel Gear
(2) Spiral Bevel Pinion Shaft
(3) Adjusting Collar
(4) Adjusting Collar
(5) Adjusting Shim

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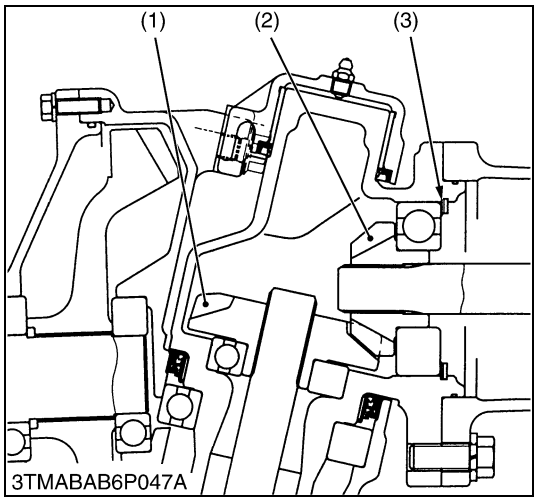

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Backlash between Bevel Gear and Bevel Gear

1. Stick a strip of plastigauge to three spots on the bevel gear (1) with grease.
2. Fix the front axle case, bevel gear case and front gear case.
3. Turn the axle.
4. Remove the bevel gear case from front axle case and measure the thickness of the fuses with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between bevel gear (2) and bevel gear (1)	Factory specification	L3560 L4060	0.15 to 0.30 mm 0.0059 to 0.011 in.
		L4760 L5060 L5460 L6060	0.20 to 0.30 mm 0.0079 to 0.011 in.

(Reference)

- Thickness of adjusting shims
  0.4 mm (0.016 in.)
  0.6 mm (0.024 in.)
  0.8 mm (0.031 in.)
  1.0 mm (0.039 in.)
  1.2 mm (0.047 in.)
- Tooth contact: More than 35 %

(1) Bevel Gear
(2) Bevel Gear
(3) Shim

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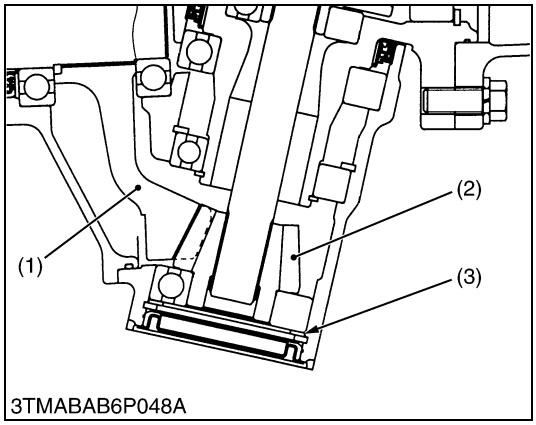

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Backlash between Bevel Gear and Bevel Gear

1. Stick a strip of plastigauge to three spots on the bevel gear (1) with grease.
2. Fix the axle flange and front gear case.
3. Turn the axle.
4. Remove the axle flange from front gear case and measure the thickness of the fuse with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between bevel gear (2) and bevel gear (1)	Factory specification	L3560 L4060	0.15 to 0.30 mm 0.0059 to 0.011 in.
		L4760 L5060 L5460 L6060	0.20 to 0.30 mm 0.0079 to 0.011 in.

(Reference)

- Thickness of adjusting shims
  0.4 mm (0.016 in.)
  0.5 mm (0.020 in.)
  2.0 mm (0.079 in.)
- Tooth contact:
  More than 35 % (L3560 and L4060)
  More than 30 % (L4760, L5060, L5460 and L6060)

(1) Bevel Gear
(2) Bevel Gear
(3) Shim

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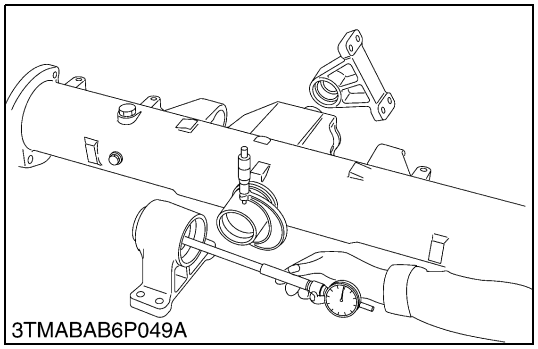
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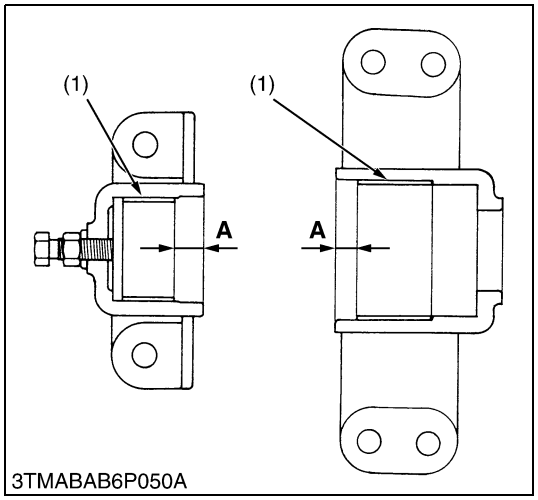

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Clearance between Front Axle Case Bosses and Bracket Bushings

1. Measure the front axle case bosses O.D. with an outside micrometer.
2. Measure the bracket bushing I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bracket bushing.

Clearance between front axle case boss (front) and bracket bushing (front)	Factory specification	0.120 to 0.275 mm 0.00473 to 0.0108 in.
	Allowable limit	0.50 mm 0.020 in.

Front axle case boss (front) O.D.	Factory specification	49.950 to 49.975 mm 1.9666 to 1.9675 in.
Bracket bushing (front) I.D.	Factory specification	50.095 to 50.225 mm 1.9723 to 1.9773 in.

(L3560 and L4060)

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory specification	0.100 to 0.292 mm 0.00394 to 0.0114 in.
	Allowable limit	1.0 mm 0.039 in.

Front axle case boss (rear) O.D.	Factory specification	69.970 to 70.000 mm 2.7548 to 2.7559 in.
Bracket bushing (rear) I.D.	Factory specification	70.100 to 70.262 mm 2.7599 to 2.7662 in.

(L4760, L5060, L5460 and L6060)

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory specification	0.025 to 0.195 mm 0.00099 to 0.00767 in.
	Allowable limit	0.50 mm 0.020 in.

Front axle case boss (rear) O.D.	Factory specification	80.000 to 80.035 mm 3.1496 to 3.1509 in.
Bracket bushing (rear) I.D.	Factory specification	80.060 to 80.195 mm 3.1520 to 3.1572 in.

■ **Press-fitting Bushing**

- When press-fitting a new bushing, observe the dimension described in the figure.

Press-fit depth of bushing **"A"**	Factory specification	12.0 to 13.0 mm 0.473 to 0.511 in.

■ **NOTE**

- **After replacing the bushing, be sure to adjust the front axle rocking force. (See page 6-S6.)**

(1) Bushing **A: Depth of Bushing**

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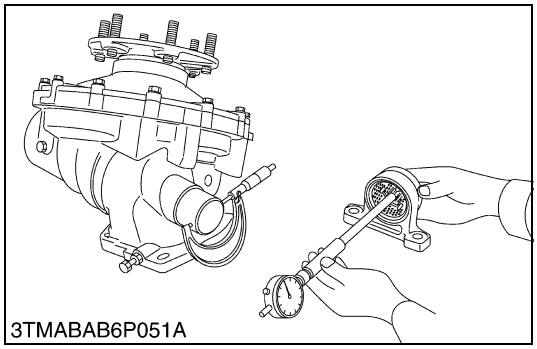
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Clearance between Bevel Gear Case Boss and Front Axle Support Bushing (for L4760, L5060, L5460 and L6060)

1. Measure the bevel gear case boss O.D. with an outside micrometer.
2. Measure the support bushing I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between bevel gear case boss and front axle support bushing	Factory specification	0.080 to 0.248 mm 0.0032 to 0.00976 in
	Allowable limit	1.0 mm 0.039 in.

Bevel gear case boss O.D.	Factory specification	54.970 to 55.000 mm 2.1642 to 2.1653 in.
Front axle support bushing I.D.	Factory specification	55.080 to 55.218 mm 2.1685 to 2.1739 in.

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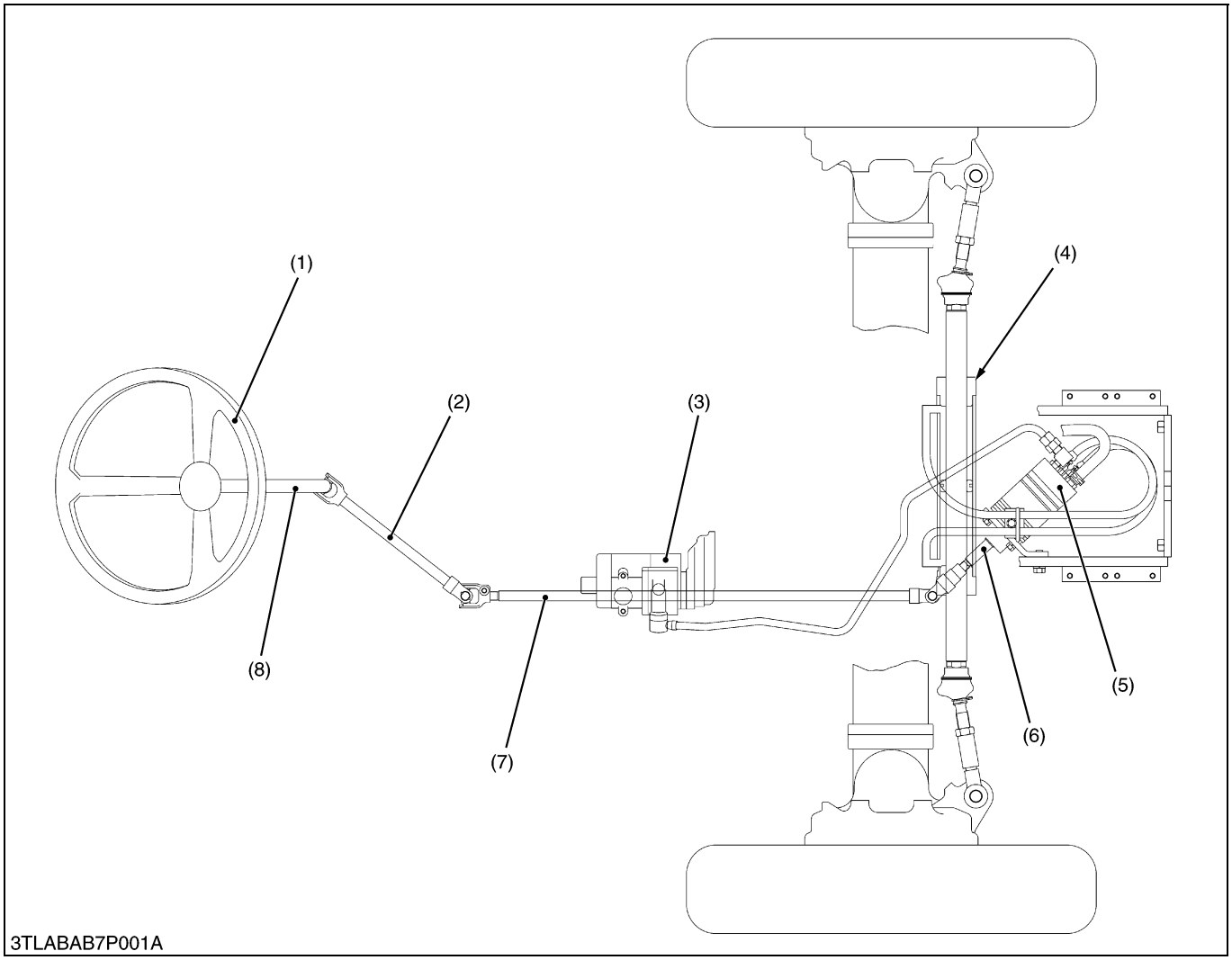
7 STEERING

MECHANISM

CONTENTS

1. STRUCTURE



(1) Steering Wheel
(2) Steering Joint Shaft 1
(3) Hydraulic Pump
(4) Steering Cylinder
(5) Steering Controller
(6) Steering Joint Shaft 3
(7) Steering Joint Shaft 2
(8) Steering Shaft

The full hydrostatic type power steering is used on these tractors. This steering system consists of steering wheel (1), steering joint shafts (2), steering controller (5), steering cylinder (4) and other components shown in the figure.

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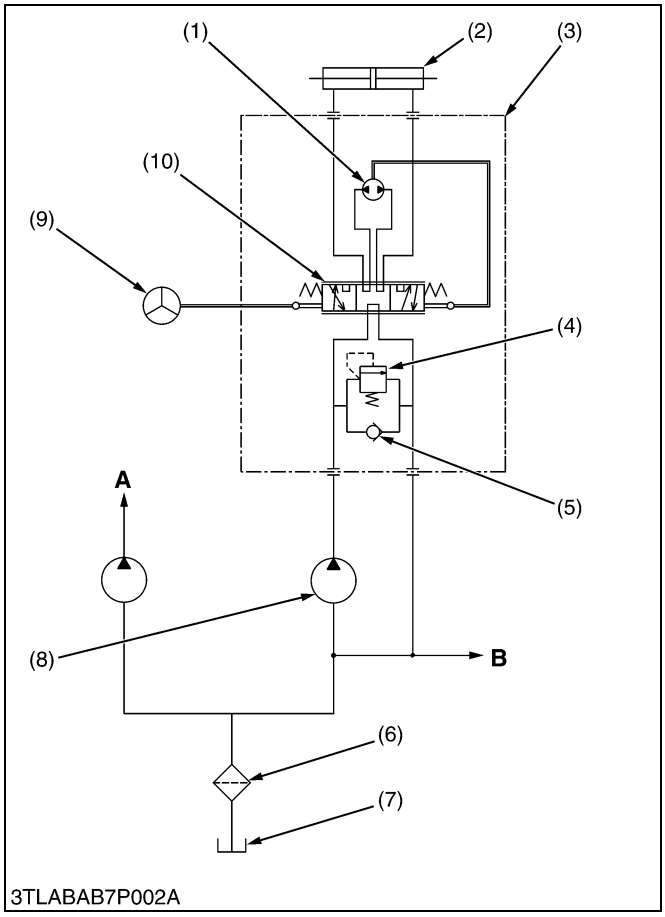
2. HYDRAULIC CIRCUIT



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When the engine starts, the hydraulic pump (8) pressure-feeds the oil, drawn from the transmission case (7) through the oil filter (6), to the steering controller (3).

The oil which has entered steering controller (3) is directed to control valve (10).

As the steering wheel is turned, control valve (10) operates and the oil passes through gerotor (1) and into steering cylinder (2). The cylinder rod then moves to control the directional movement of the front wheels.

Return oil from steering cylinder (2) passes through control valve (10) is sent to the PTO clutch valve, HST, GST valve, etc..

When the engine is not operating, and the steering wheel is turned, gerotor (1) rotates to supply oil to steering cylinder (2). Thus the machine can be steered manually.

(1) Gerotor
(2) Steering Cylinder
(3) Steering Controller
(4) Relief Valve
(5) Check Valve
(6) Oil Filter
(7) Transmission Case
(8) Hydraulic Pump
(9) Steering Wheel
(10) Control Valve

A: To Three Point Hydraulic System and Others
B: To PTO Clutch Valve, HST, GST Valve, etc.

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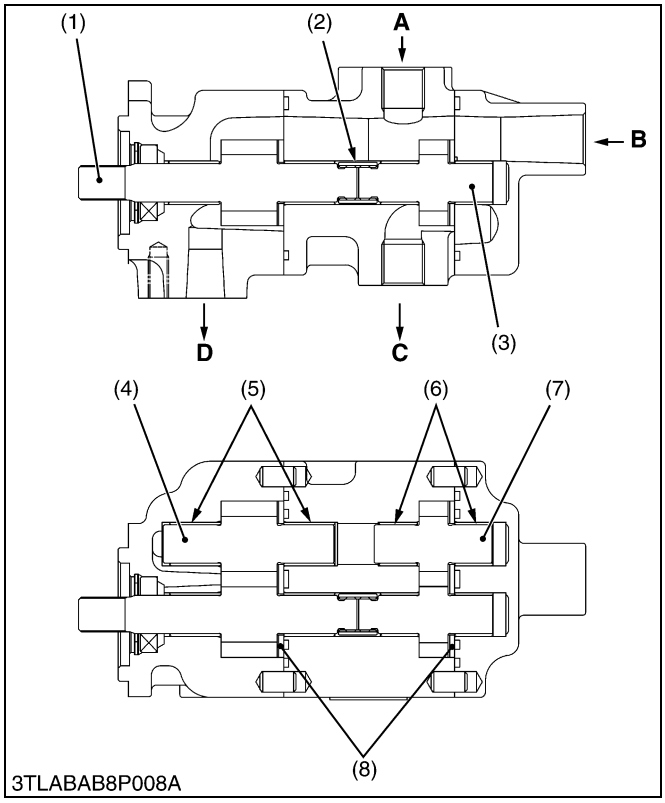
3. HYDRAULIC PUMP



The gear type hydraulic pump is adopted for these tractor. This pump is tandem type, consists of two pair of gears, side plates, bushings and other components as shown in the figure.

The hydraulic pump pressure-fed the oil drawn from the transmission case through oil filter to power steering circuit and main hydraulic circuit.

(1) Drive Gear 1
(2) Coupling
(3) Drive Gear 2
(4) Driven Gear 1
(5) Bushing
(6) Bushing
(7) Driven Gear 2
(8) Side Plate

A: From Power Steering Controller
B: From Transmission Case
C: To Power Steering Controller
D: To Main Hydraulic Circuit

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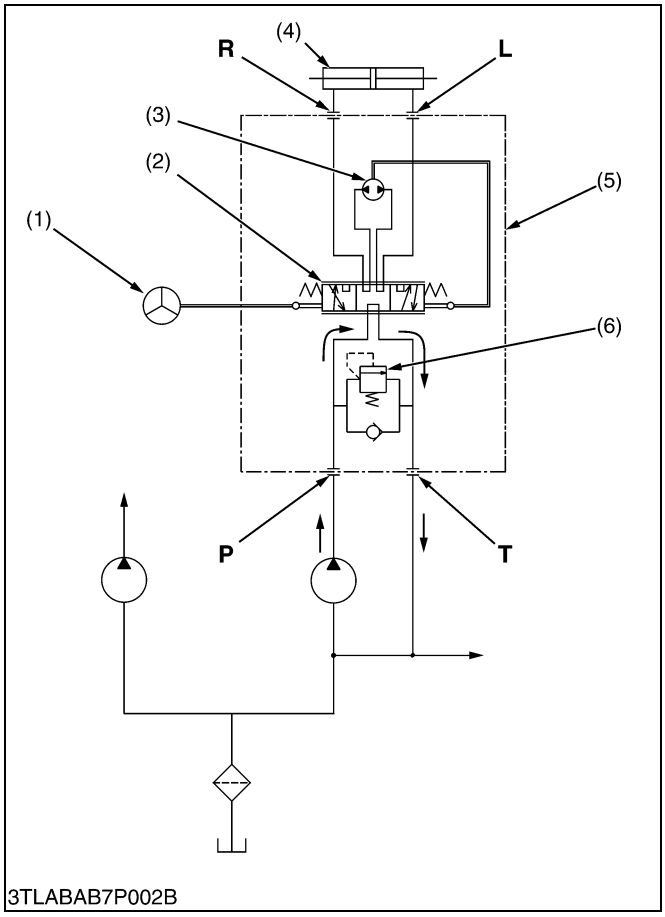
4. STEERING CONTROLLER



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Neutral Position

When the steering wheel (1) is not being turned, valve plate (2) is held in the neutral position by centering spring. Under this condition, an oil passage is formed between **P** port (from pump) and **T** port (to transmission case) in the control valve, and all oil from the hydraulic pump flows to **T** port.

(1) Steering Wheel
(2) Valve Plate
(3) Gerotor
(4) Steering Cylinder
(5) Steering Controller
(6) Relief Valve

P: Pump Port
T: Tank Port
R: Cylinder Port R
L: Cylinder Port L

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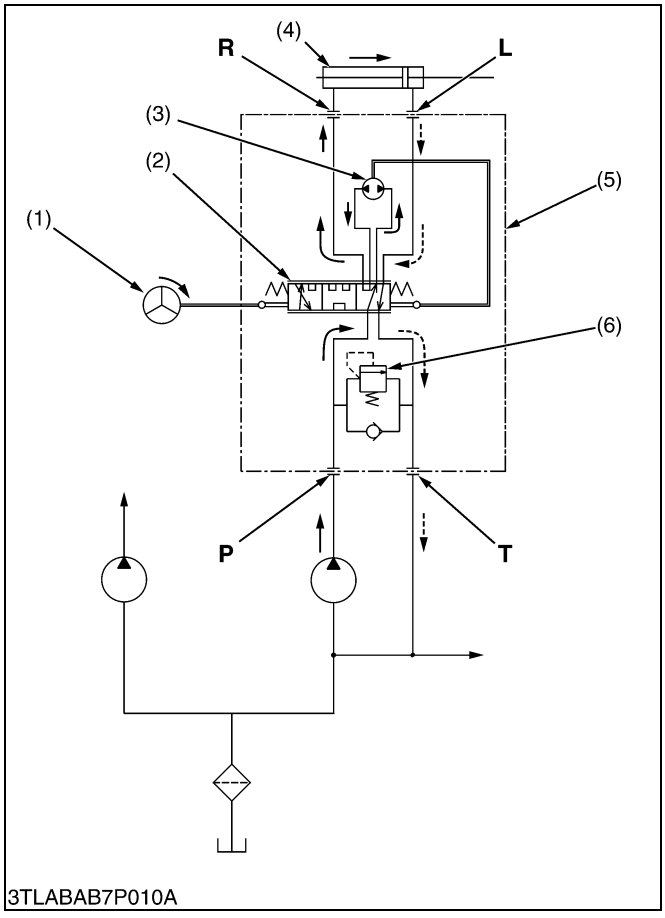

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Right Turn

When the steering wheel (1) is turned to the right, the action is transmitted through the drive plate, gerotor (3), and drive link to the control valve. Valve plate (2) then rotates to the right on manifolds, located on the opposite faces of the valve plate (2). Thus, the **P** port passage in the control valve is connected with gerotor (3).

The stator of gerotor (3) turns by the amount corresponding to the turn of the steering wheel (1), and the gerotor (3) performs the metering function and lets oil through it, the amount of which corresponds to the turn of the steering wheel (1).

The oil which has passed through gerotor (3) flows back to the control valve, in which it is directed to cylinder port **R** to operate steering cylinder (4). Consequently, the front wheels are moved to the right through the angle corresponding to the amount of the oil.

When steering cylinder (4) operates, oil returning to cylinder port **L** flows back to the transmission case through the passage connected to **T** port in the control valve.

(1) Steering Wheel
(2) Valve Plate
(3) Gerotor
(4) Steering Cylinder
(5) Steering Controller
(6) Relief Valve

P: Pump Port
T: Tank Port
R: Cylinder Port R
L: Cylinder Port L

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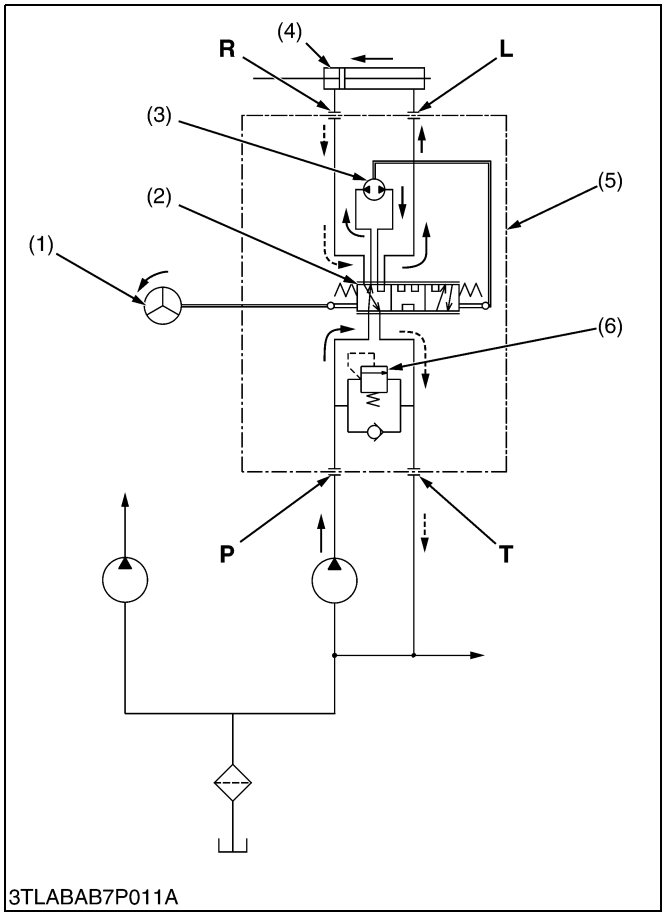

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Left Turn

The steering system operates in the same way at a left-turn as well, except that oil flows into and out of steering cylinder (4) in the directions opposite to those at a right-turn.

(1) Steering Wheel
(2) Valve Plate
(3) Gerotor
(4) Steering Cylinder
(5) Steering Controller
(6) Relief Valve

P: Pump Port
T: Tank Port
R: Cylinder Port R
L: Cylinder Port L

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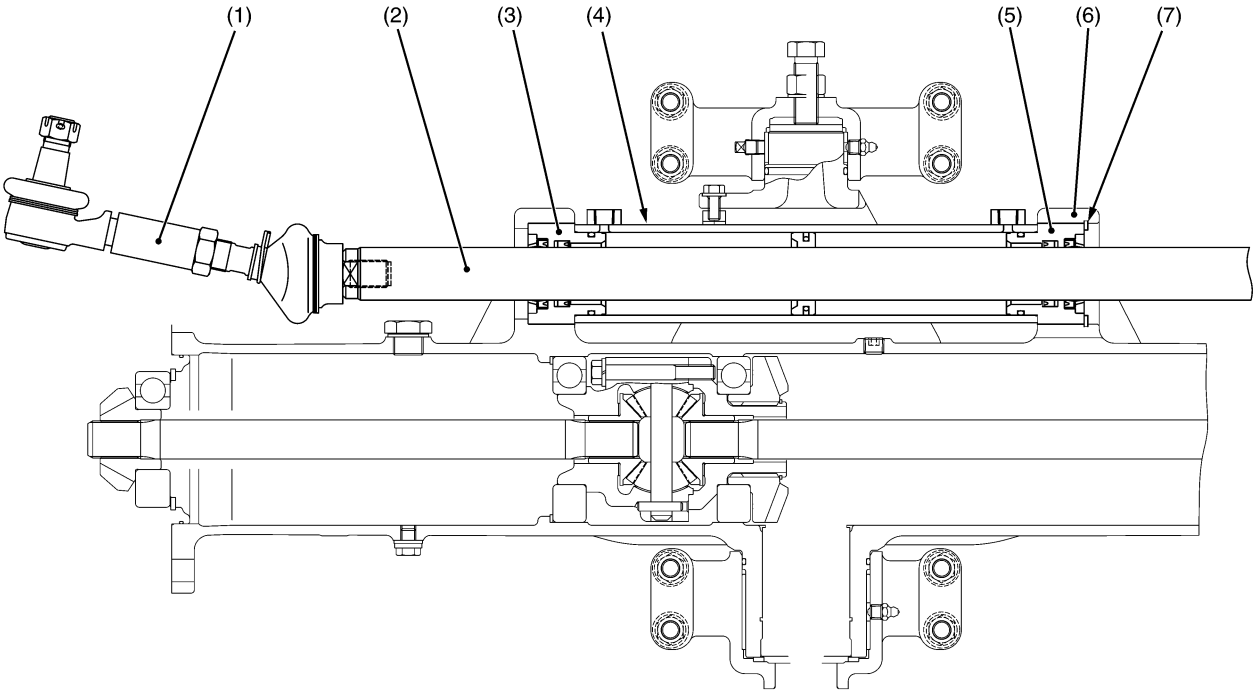
5. STEERING CYLINDER



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(1) Tie-rod
(2) Piston Rod
(3) Head Cover
(4) Cylinder Tube
(5) Head Cover
(6) Front Axle Case
(7) Internal Snap Ring

The steering cylinder is single piston both rod double-acting type. This steering cylinder is installed parallel to the front axle and connected to tie-rods (1).

The tie-rods (1) connected to both knuckle arm guarantees equal steering movement to both front wheels.

The steering cylinder provides force in both directions. Depending upon direction the steering wheel is turned pressure oil enters at one end of the cylinder to extend, or the other end to retract it, thereby turning front wheel of the tractor.

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SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Tractor Can Not Be Steered	Steering controller broken	Replace	7-S5
	Steering linkage broken	Replace	7-S5
	Pipe broken	Replace	–
Front Wheels Vibrate	Improper toe-in adjustment	Adjust	6-S5
	Air in the hydraulic system	Bleed	7-S5
	Improperly mounted wheels	Replace	7-S7
	Tie-rod end loose or worn	Retighten or replace	7-S7
	Clearance between front axle center pivots and bracket bushing excessive	Replace	6-S19
	Steering controller malfunctioning	Replace	7-S5
Hard Steering	Steering linkage bushings sticking	Replace	–
	Hydraulic pump malfunctioning	Replace	8-S14
	Overload	–	–
	Transmission fluid improper or insufficient	Change or fill	G-9
	Oil leak from pipe joint	Retighten	–
	Insufficient tire pressure	Inflate	G-73
	Steering controller malfunctioning	Replace	7-S5
	Relief valve malfunctioning	Replace	7-S4
Steering Force Fluctuates	Air sucked in pump due to leaking or missing of oil	Fill	–
	Air sucked in pump from suction circuit	Repair	–
Excessive Steering Wheel Play	Steering linkage worn	Replace	7-S5
Front Wheels Wander to Right or Left	Air sucked in pump due to leak of oil	Fill	–
	Air sucked in pump from suction circuit	Repair	–
	Tire pressure uneven	Inflate	G-73
	Insufficient bleeding	Bleed	7-S5
	Improper toe-in adjustment	Adjust	6-S5
	Clearance between front axle center pivots and brackets bushings excessive	Replace	6-S19
	Tie-rod end loose or worn	Retighten or replace	7-S7
	Steering linkage worn	Replace	7-S5
	Steering controller malfunctioning	Replace	7-S5
Wheels Are Turned to a Direction Opposite to Steering Direction	Power steering hoses connected in reverse	Repair	7-S5
Noise	Air sucked in pump due to lack of oil	Fill	–
	Air sucked in pump from suction circuit	Repair	–
	Pipe deformed	Replace	–

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2. SERVICING SPECIFICATIONS

STEERING CONTROLLER

Item		Factory Specification	Allowable Limit
Relief Valve **Condition** • Engine Speed Maximum • Oil Temperature 40 to 60 °C (104 to 140 °F)	Setting Pressure L3560, L4060 L4760, L5060, L5460, L6060	 10.7 to 11.7 MPa 110 to 119 kgf/cm^2 1560 to 1690 psi 12.7 to 13.7 MPa 130 to 139 kgf/cm^2 1850 to 1980 psi	 – –

STEERING CYLINDER

Item		Factory Specification	Allowable Limit
Steering Cylinder	I.D.	55.000 to 55.074 mm 2.1654 to 2.1682 in.	55.100 mm 2.1693 in.
Rod to Bushing	Clearance	0.00900 to 0.127 mm 0.000355 to 0.00500 in.	0.135 mm 0.00531 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

Item	N·m	kgf·m	lbf·ft
Power steering hose retaining nut	25 to 29	2.5 to 3.0	18 to 21
Power steering delivery pipe retaining nut	49 to 58	5.0 to 6.0	37 to 43
Front wheel mounting nut	137	14.0	101
Tie-rod end slotted nut (L3560, L4060)	40 to 45	4.0 to 4.6	29 to 33
Tie-rod end slotted nut (L4760, L5060, L5460, L6060)	157 to 176	16.0 to 18.0	116 to 130
Tie-rod joint	167 to 196	17.0 to 20.0	123 to 144
Tie-rod joint lock nut	167 to 196	17.0 to 20.0	123 to 144
Steering wheel mounting nut	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2

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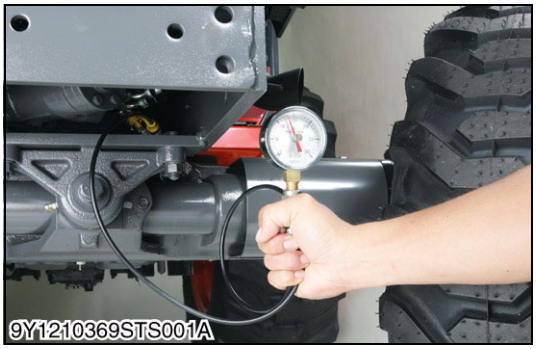
4. CHECKING AND ADJUSTING

[1] STEERING CONTROLLER



Relief Valve Setting Pressure Test

1. Disconnect the power steering hose L.H..
2. Install the power steering tee fitting adaptor to the steering cylinder and connect the power steering hose L.H..
3. Install the adaptor **D** to the power steering tee fitting adaptor and set the cable and pressure gauge.
4. Start the engine and set the engine speed at maximum speed.
5. Fully turn the steering wheel to the left and read the pressure when the relief valve functions.
6. Stop the engine.
7. If the pressure is not within the factory specifications, check the pump delivery line or replace the steering controller assembly.

Power steering relief valve setting pressure	Factory specification	L3560 L4060	10.7 to 11.7 MPa 110 to 119 kgf/cm^2 1560 to 1690 psi
		L4760 L5060 L5460 L6060	12.7 to 13.7 MPa 130 to 139 kgf/cm^2 1850 to 1980 psi

Tightening torque	Power steering hose retaining nut	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

Condition

- Engine speed
  Maximum
- Oil temperature
  40 to 60 °C (104 to 140 °F)

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5. DISASSEMBLING AND ASSEMBLING

[1] STEERING CONTROLLER

■ **IMPORTANT**

- **Use only the transmission fluid (see page G-9.), in no case use mixture of oils of different brands.**
- **Before disassembling the power steering system hydraulic components, check the performance of hydraulic pump and power steering using a flowmeter.**
- **After removing or disassembling the power steering hydraulic components, be sure to bleed air.**

[Bleeding]

1. Start the engine.
2. Turn the steering wheels slowly in both directions all the way alternately several times, and stop the engine.

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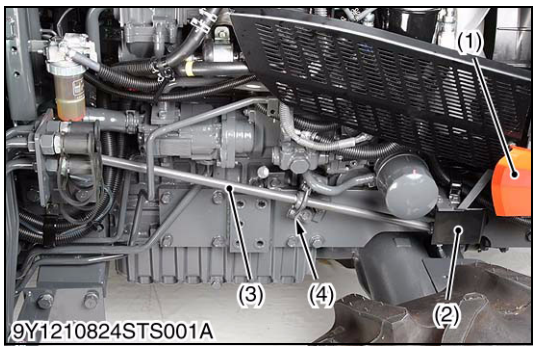

Steering Joint Cover and Steering Joint Shaft

1. Pull down the knob and open the bonnet.
2. Remove the front grill (1).
3. Remove the steering joint cover (2).
4. Remove the steering joint screw (5) and the steering joint support (4).
5. Remove the steering joint shaft (3).

(When reassembling)

- Tighten the steering joint shaft support mounting screw after adjusting the position of steering joint shaft support (4) for smooth rotation of the steering wheel.

(1) Front Grill
(2) Steering Joint Cover
(3) Steering Joint Shaft
(4) Steering Joint Shaft Support
(5) Steering Joint Screw

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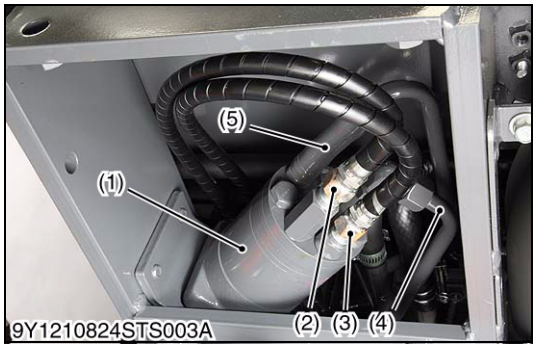

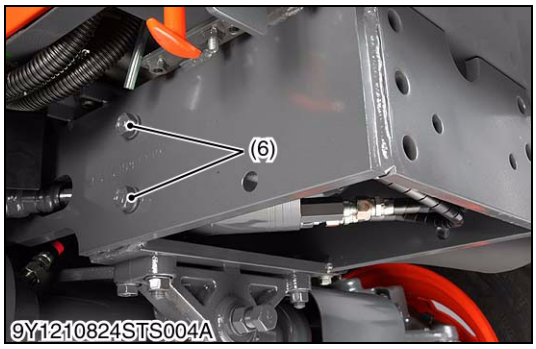

Steering Controller Assembly

1. Disconnect the power steering delivery pipe (4), steering hoses (2), (3) and return hose (5).
2. Remove the steering controller mounting screw (6) and steering controller assembly (1).

(When reassembling)

- Reinstall the steering hoses (2), (3) to their original position.

Tightening torque	Power steering delivery pipe retaining nut	49 to 58 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
	Power steering hose retaining nut	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

(1) Steering Controller
(2) Steering Hose RH
(3) Steering Hose LH
(4) Power Steering Delivery Pipe
(5) Return Hose
(6) Screw

9Y1210824STS0007US0

[2] STEERING LINKAGE

Steering Wheel and Steering Post Covers

1. Remove the steering wheel (1).
2. Remove the steering panel cover (2).
3. Remove the steering post cover 1 (3) and the steering post cover 2 (4).

(When reassembling)

Tightening torque	Steering wheel mounting nut	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft

(1) Steering Wheel
(2) Panel Cover
(3) Steering Post Cover 1
(4) Steering Post Cover 2

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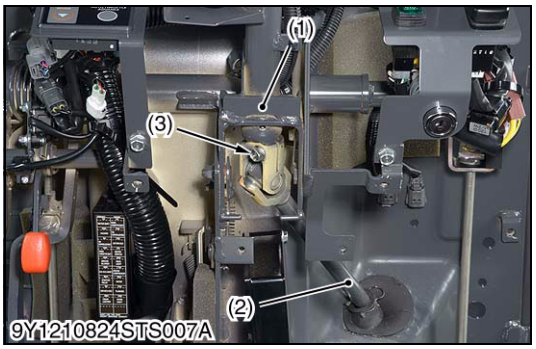
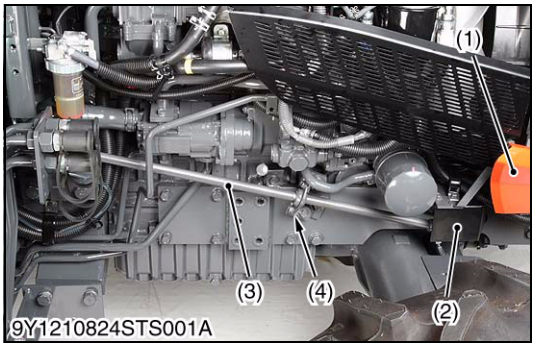


Steering Joint Shaft and Steering Post

1. Remove the steering joint screw (3) and the steering joint shaft (2).
2. Remove the steering post (1).

(1) Steering Post
(2) Steering Joint Shaft
(3) Steering Joint Screw

9Y1210824STS0011US0



Steering Joint Cover and Steering Joint Shaft

1. Pull down the knob and open the bonnet.
2. Remove the front grill (1).
3. Remove the steering joint cover (2).
4. Remove the steering joint screw (5) and the steering joint support (4).
5. Remove the steering joint shaft (3).

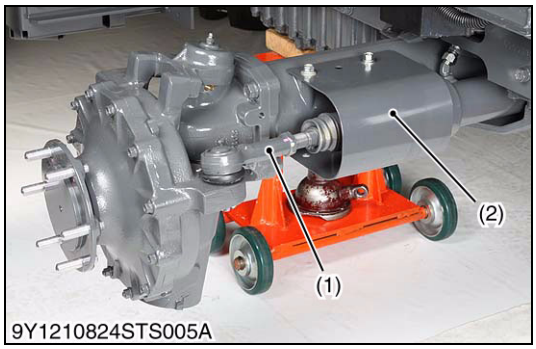
(When reassembling)

- Tighten the steering joint shaft support mounting screw after adjusting the position of steering joint shaft support (4) for smooth rotation of the steering wheel.

(1) Front Grill
(2) Steering Joint Cover
(3) Steering Joint Shaft
(4) Steering Joint Shaft Support
(5) Steering Joint Screw

9Y1210824STS0006US0

[3] STEERING CYLINDER



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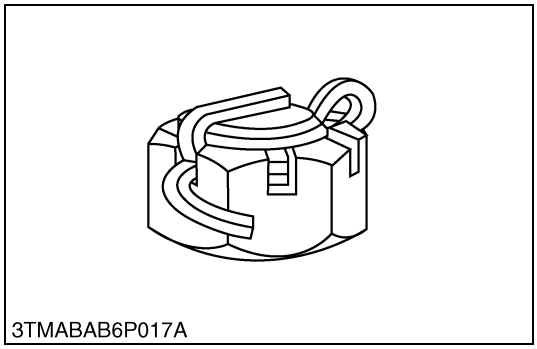
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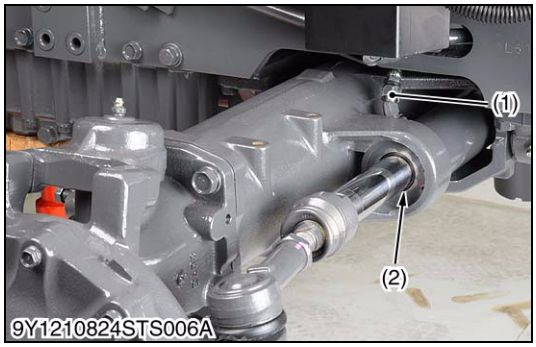

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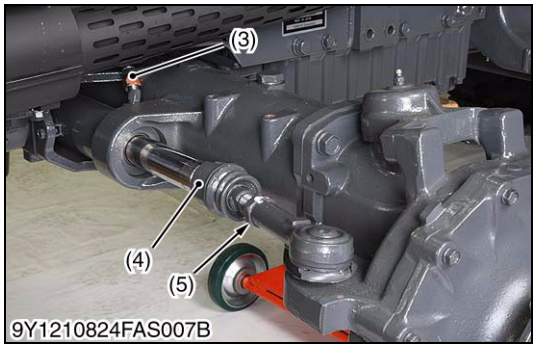

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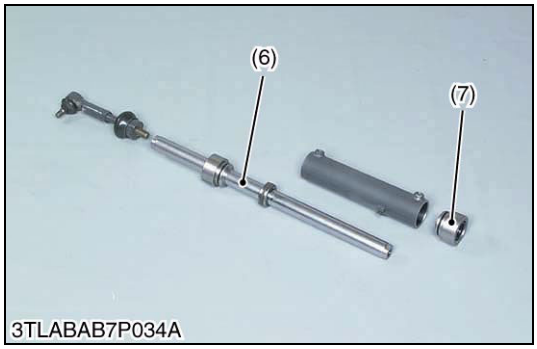

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Front Wheel, Cylinder Cover and Tie-rod

1. Place a disassembly stand under the engine and support it with a jack.
2. Remove the front wheel and cylinder cover (2).
3. Pull out the cotter pin and remove the tie-rod end slotted nut.
4. Disconnect the tie-rod (1).

(When reassembling)

- After tightening the tie-rod end slotted nut to the specified torque, install a cotter pin as shown in the figure.

Tightening torque	Front wheel mounting nut		137 N·m 14.0 kgf·m 101 lbf·ft
	Tie-rod end slotted nut	L3560 L4060	40 to 45 N·m 4.0 to 4.6 kgf·m 29 to 33 lbf·ft
		L4760 L5060 L5460 L6060	157 to 176 N·m 16.0 to 18.0 kgf·m 116 to 130 lbf·ft

(1) Tie-rod
(2) Cylinder Cover

9Y1210824STS0008US0

Steering Cylinder

1. Disconnect the power steering hoses (1), (3) and remove the elbows.
2. Disconnect the tie-rod joint L.H. (4).
3. Remove the internal snap ring (2).
4. Remove the steering cylinder to the left.
5. Remove the head cover (7) and draw out the cylinder rod (6).

(When reassembling)

- Apply transmission fluid to the oil seal and O-ring.
- Apply liquid lock (Three Bond 1324B or equivalent) to the thread of tie-rod joint (4).

Tightening torque	Power steering hose retaining nut	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft
	Tie-rod joint	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Tie-rod joint lock nut	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

(1) Power Steering Hose R.H.
(2) Internal Snap Ring
(3) Power Steering Hose L.H.
(4) Tie-rod Joint
(5) Lock Nut
(6) Cylinder Rod
(7) Head Cover

9Y1210824STS0009US0

6. SERVICING

[1] STEERING CYLINDER

Steering Cylinder I.D.

1. Measure the steering cylinder I.D. with a cylinder gauge.
2. If the cylinder I.D. exceed the allowable limit, replace the cylinder tube.

Steering cylinder I.D.	Factory specification	55.000 to 55.074 mm 2.1654 to 2.1682 in.
	Allowable limit	55.100 mm 2.1693 in.

9Y1210824STS0012US0

Clearance between Rod and Bushing

1. Measure the bushing I.D. with a cylinder gauge.
2. Measure the rod O.D. with a outside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace as a unit.

Clearance between rod and bushing	Factory specification	0.00900 to 0.127 mm 0.000355 to 0.00500 in.
	Allowable limit	0.135 mm 0.00531 in.

9Y1210824STS0013US0

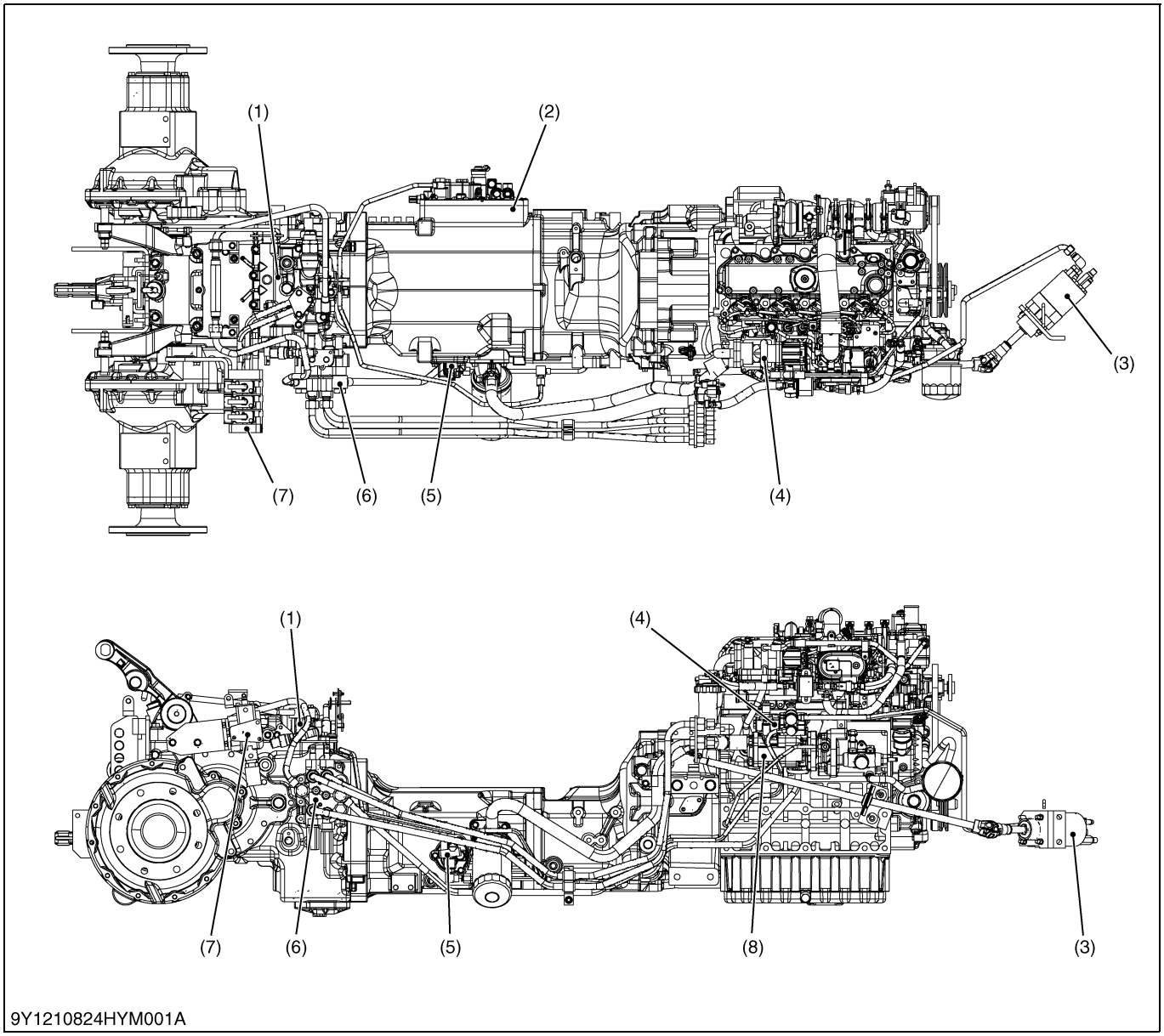
8 HYDRAULIC SYSTEM

MECHANISM

CONTENTS

1. STRUCTURE

[1] MANUAL TRANSMISSION AND GLIDE SHIFT TRANSMISSION



9Y1210824HYM001A

(1) Hydraulic Block
(2) GST Valve (GST Only)
(3) Power Steering Controller
(4) Regulating Valve
(5) PTO Solenoid Valve
(6) Front Loader Control Valve
(7) Auxiliary Control Valve (If Equipped)
(8) Hydraulic Pump

The hydraulic system of machine consists of a hydraulic pump (8), front loader control valve (6), hydraulic cylinder and other components.

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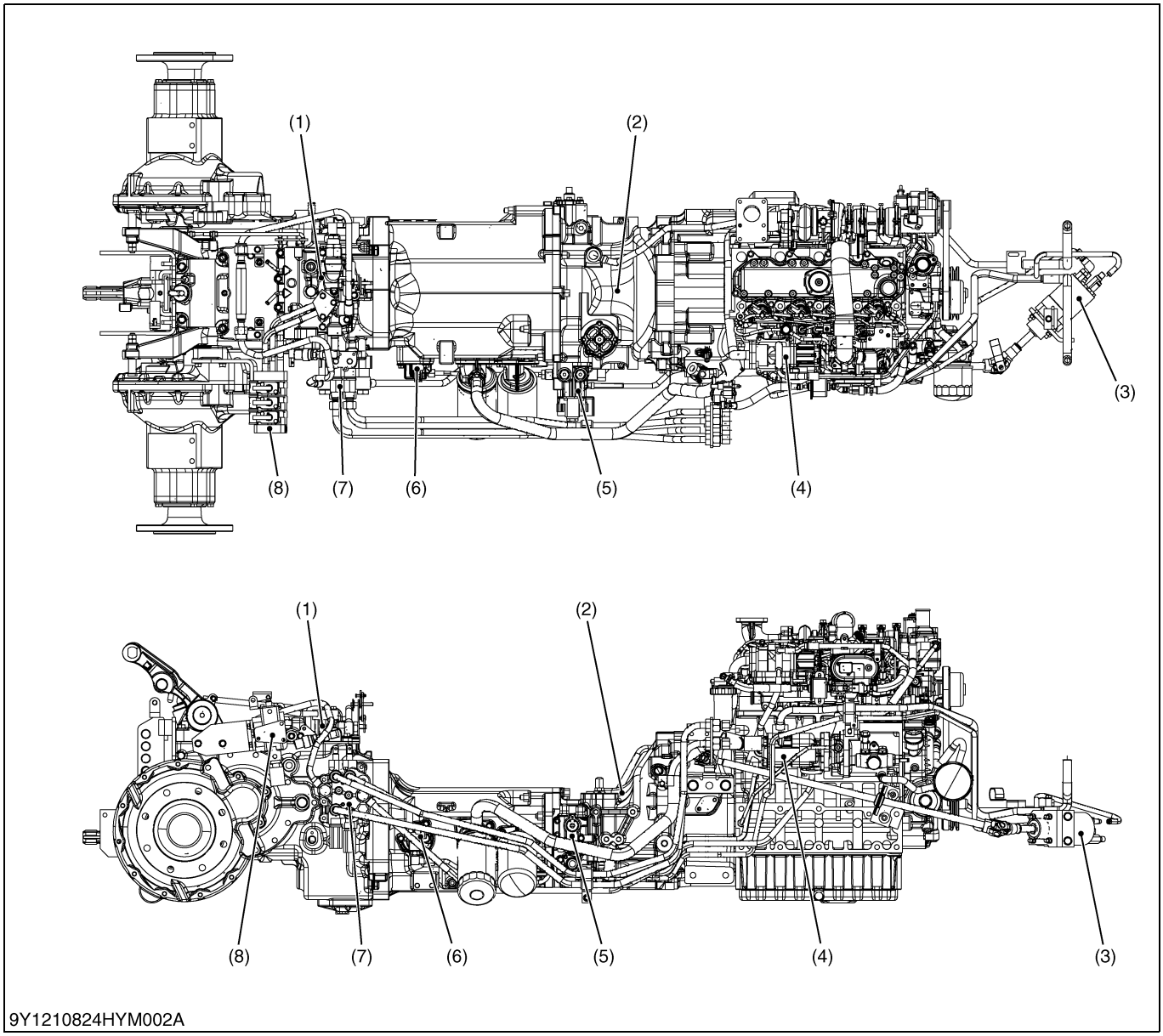
[2] HYDROSTATIC TRANSMISSION



9Y1210824HYM002A

(1) Hydraulic Block
(2) HST Unit
(3) Power Steering Cylinder
(4) Hydraulic Pump
(5) Regulating Valve
(6) PTO Solenoid Valve
(7) Front Loader Control Valve
(8) Auxiliary Control Valve (If Equipped)

The hydraulic system of machine consists of a hydraulic pump (4), front loader control valve (7), hydraulic cylinder and other components.

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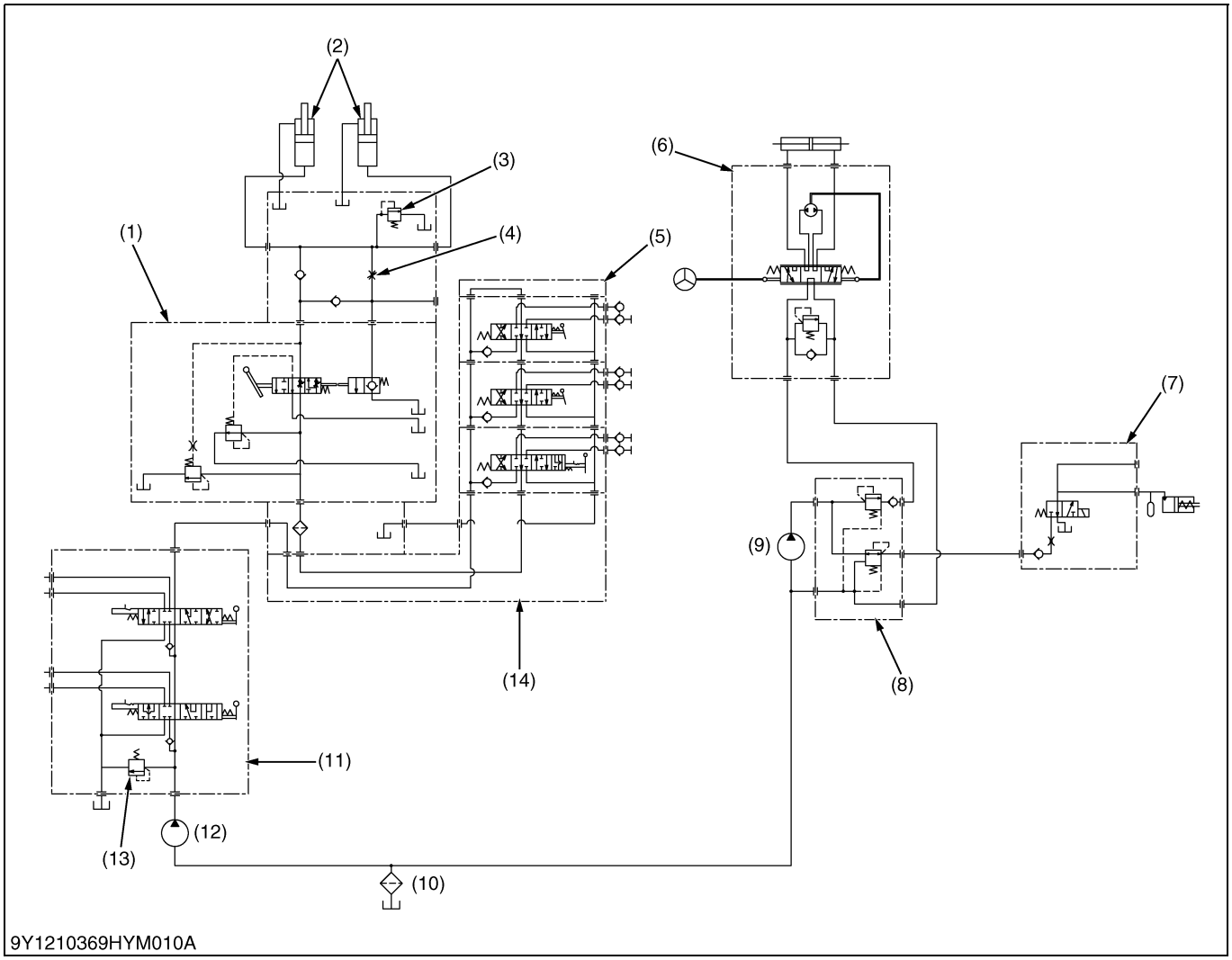
2. HYDRAULIC CIRCUIT

[1] MANUAL TRANSMISSION



(1) Position Control Valve
(2) Hydraulic Cylinder
(3) Cylinder Safety Valve
(4) Lowering Speed Adjusting Valve
(5) Auxiliary Control Valve
(6) Power Steering Controller
(7) PTO Clutch Valve
(8) Regulating Valve
(9) Hydraulic Pump 2
(10) Oil Filter
(11) Front Loader Control Valve
(12) Hydraulic Pump 1
(13) Relief Valve
(14) Rear Hydraulic Block

Hydraulic oil operates power steering controller (6), PTO clutch valve (7) and 3 point hitch.

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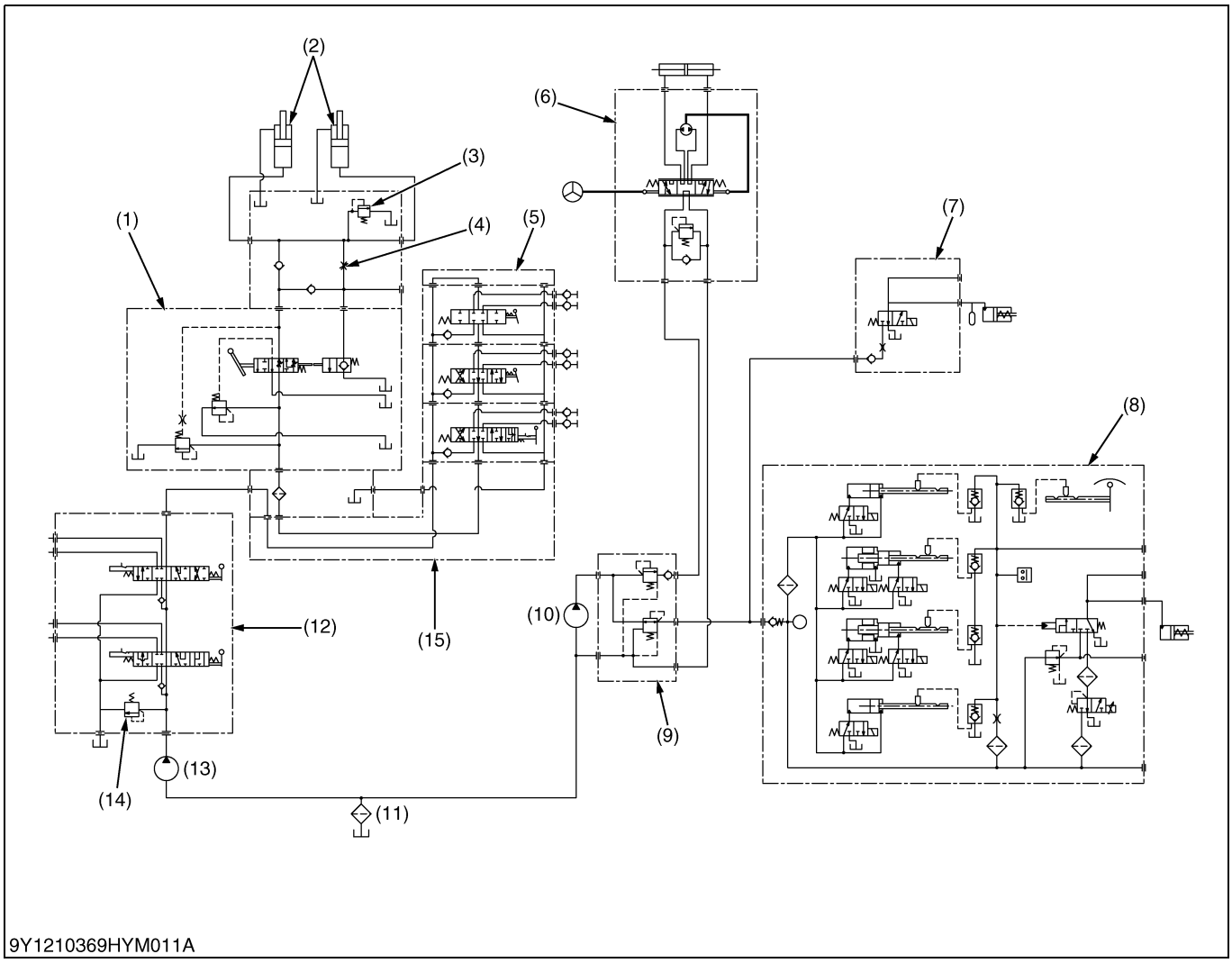
[2] GLIDE SHIFT TRANSMISSION (GST)



9Y1210369HYM011A

(1) Position Control Valve
(2) Hydraulic Cylinder
(3) Cylinder Safety Valve
(4) Lowering Speed Adjusting Valve
(5) Auxiliary Control Valve
(6) Power Steering Controller
(7) PTO Clutch Valve
(8) GST Valve Assembly
(9) Regulating Valve
(10) Hydraulic Pump 2
(11) Oil Filter
(12) Loader Control Valve
(13) Hydraulic Pump 1
(14) Relief Valve
(15) Rear Hydraulic Block

Hydraulic oil operates GST valve assembly (8), power steering controller (6), PTO clutch valve (7) and 3 point hitch.

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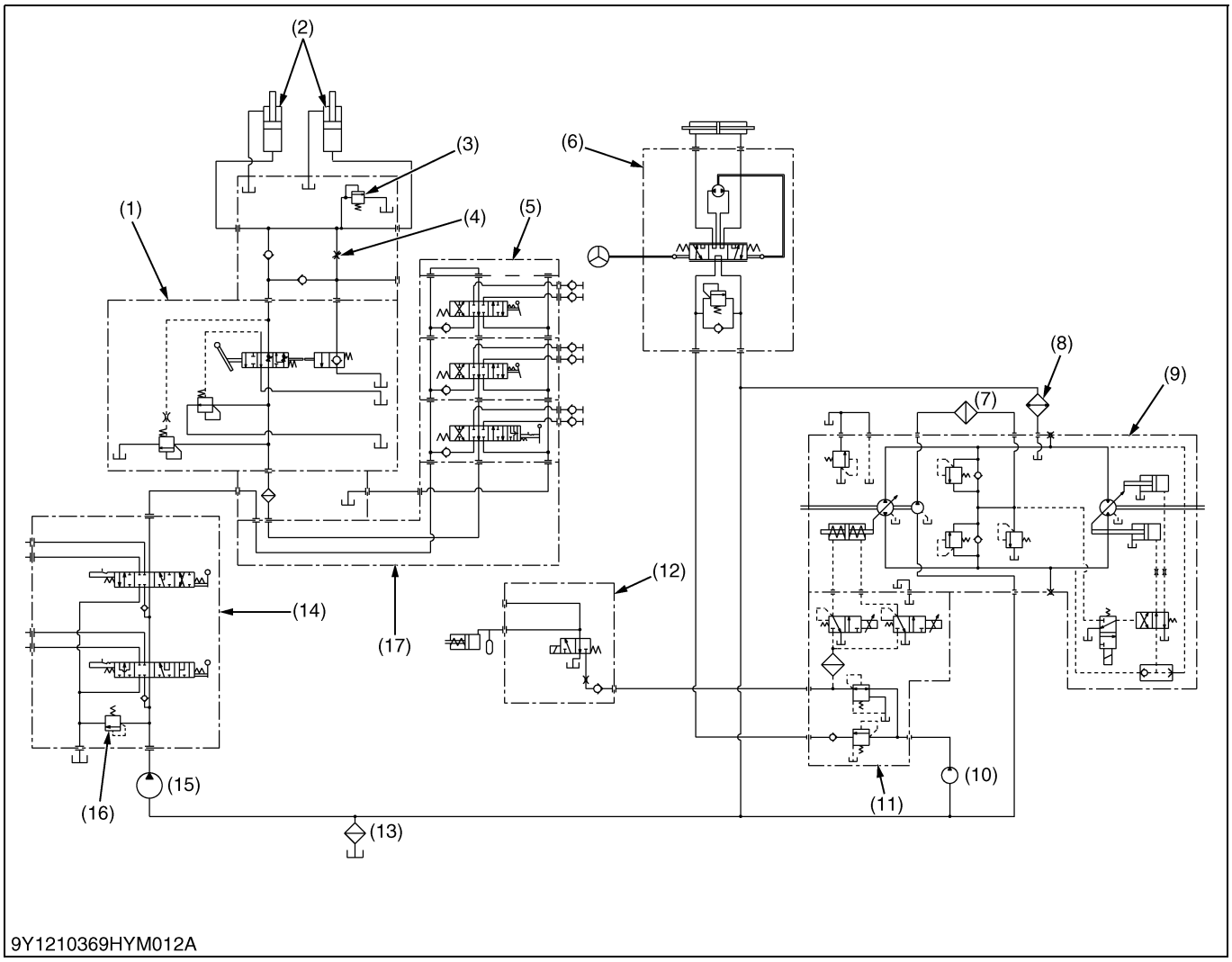
[3] HYDROSTATIC TRANSMISSION (HST)



(1) Position Control Valve
(2) Hydraulic Cylinder
(3) Cylinder Safety Valve
(4) Lowering Speed Adjusting Valve
(5) Auxiliary Control Valve
(6) Power Steering Controller
(7) Oil Filter
(8) Oil Cooler
(9) Hydrostatic Transmission (HST)
(10) Hydraulic Pump 2
(11) Regulating Valve
(12) PTO Clutch Valve
(13) Oil Filter
(14) Front Loader Control Valve
(15) Hydraulic Pump 1
(16) Relief Valve
(17) Rear Hydraulic Block

Hydraulic oil operates hydrostatic transmission (HST) (9), power steering controller (6), PTO clutch valve (12) and 3 point hitch.

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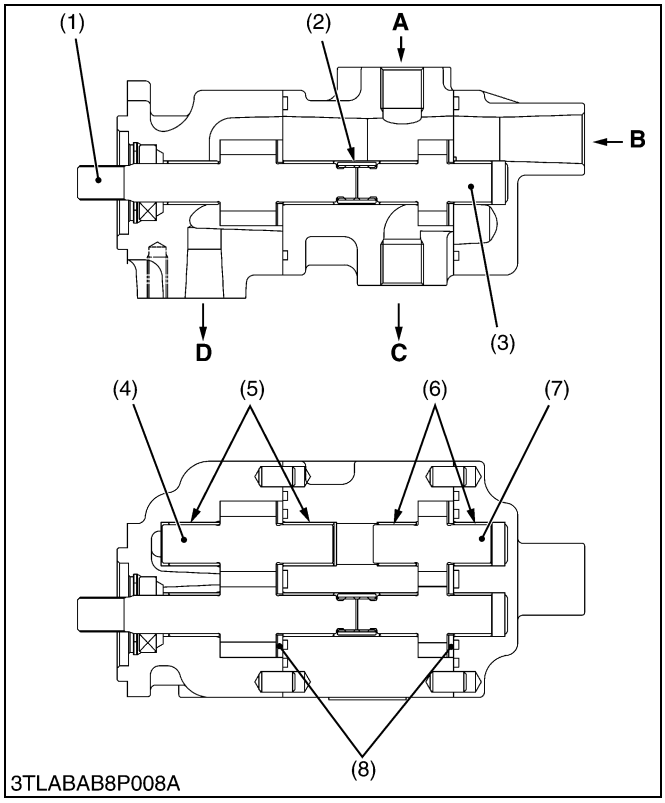
3. HYDRAULIC PUMP



The gear type hydraulic pump is adopted for these tractor. This pump is tandem type consists of two pair of gears, side plates, bushings and other components as shown in the figure.

The hydraulic pump pressure-fed the oil drawn from the transmission case through oil filter to power steering circuit and main hydraulic circuit.

(1) Drive Gear 1
(2) Coupling
(3) Drive Gear 2
(4) Driven Gear 1
(5) Bushing
(6) Bushing
(7) Driven Gear 2
(8) Side Plate

A: From Power Steering Controller
B: From Transmission Case
C: To Power Steering Controller
D: To Main Hydraulic Circuit

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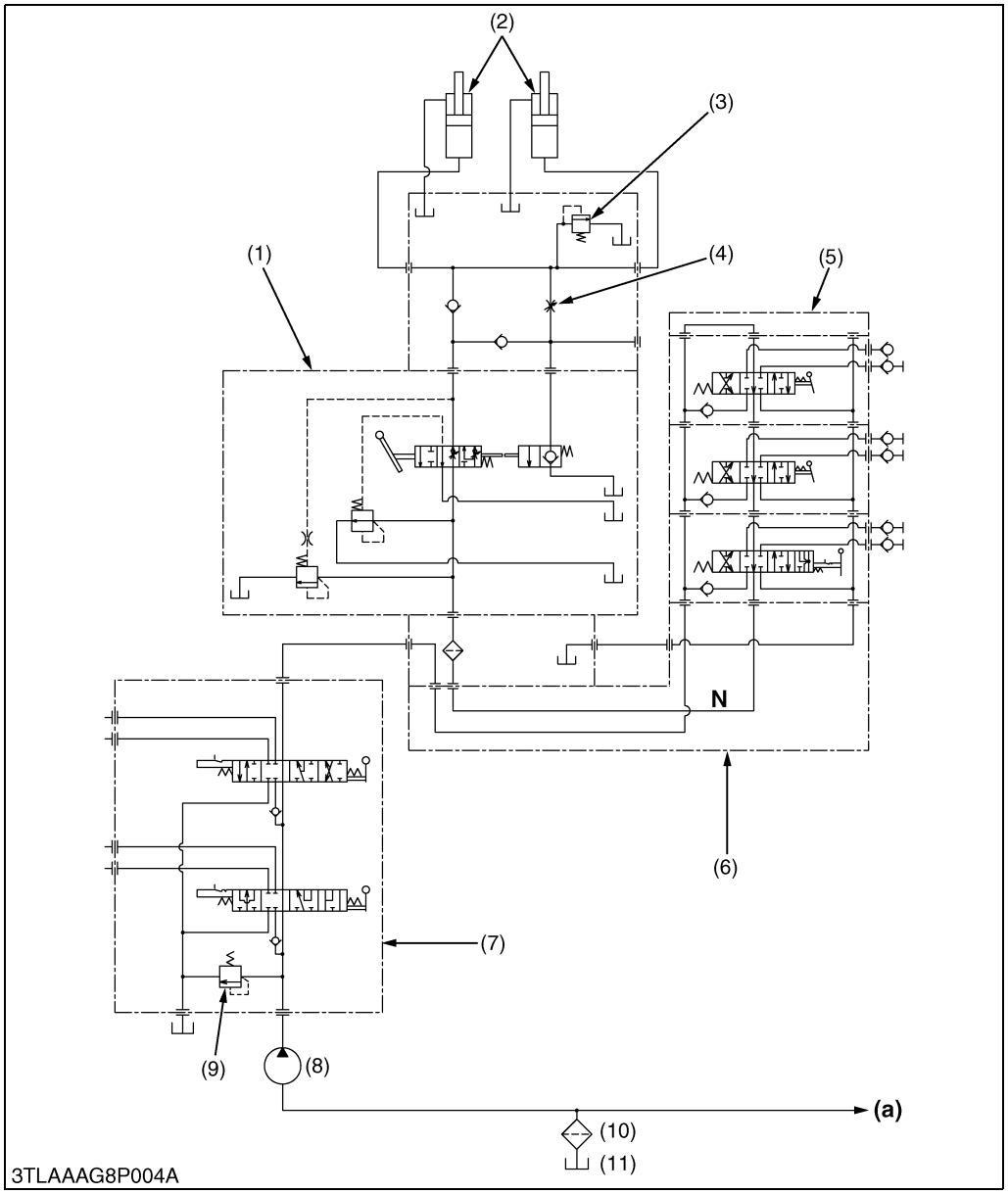
4. THREE POINT HITCH HYDRAULIC SYSTEM

[1] THREE POINT HITCH HYDRAULIC CIRCUIT



(1) Position Control Valve
(2) Hydraulic Cylinder
(3) Cylinder Safety Valve
(4) Lowering Speed Adjusting Valve
(5) Auxiliary Control Valve
(6) Rear Hydraulic Block
(7) Front Loader Control Valve
(8) Hydraulic Pump 1
(9) Relief Valve
(10) Oil Filter Cartridge
(11) Transmission Case

(a) To Power Steering Controller
N: N Port

1. When the engine is started, the hydraulic pump 1 (8) is rotated to draw oil from transmission case (11) through the suction pipe.
   Supplied oil is filtered by the hydraulic oil filter cartridge (10).
2. Filtered oil is forced out by the hydraulic pump to the auxiliary control valve (5) through the front loader control valve (7).
3. With the auxiliary control valve (5) in neutral position, oil is channeled from **"N"** port to the control valve (1).
4. The hydraulic system has a relief valve (9) which restricts the maximum pressure in the circuit.
   The hydraulic cylinders (2) have a cylinder safety valve (3) to relieve shock pressure due to heavy implement bounce.
5. The control valve (1) is actuated by the mechanical linkage for **"Position control function"**.

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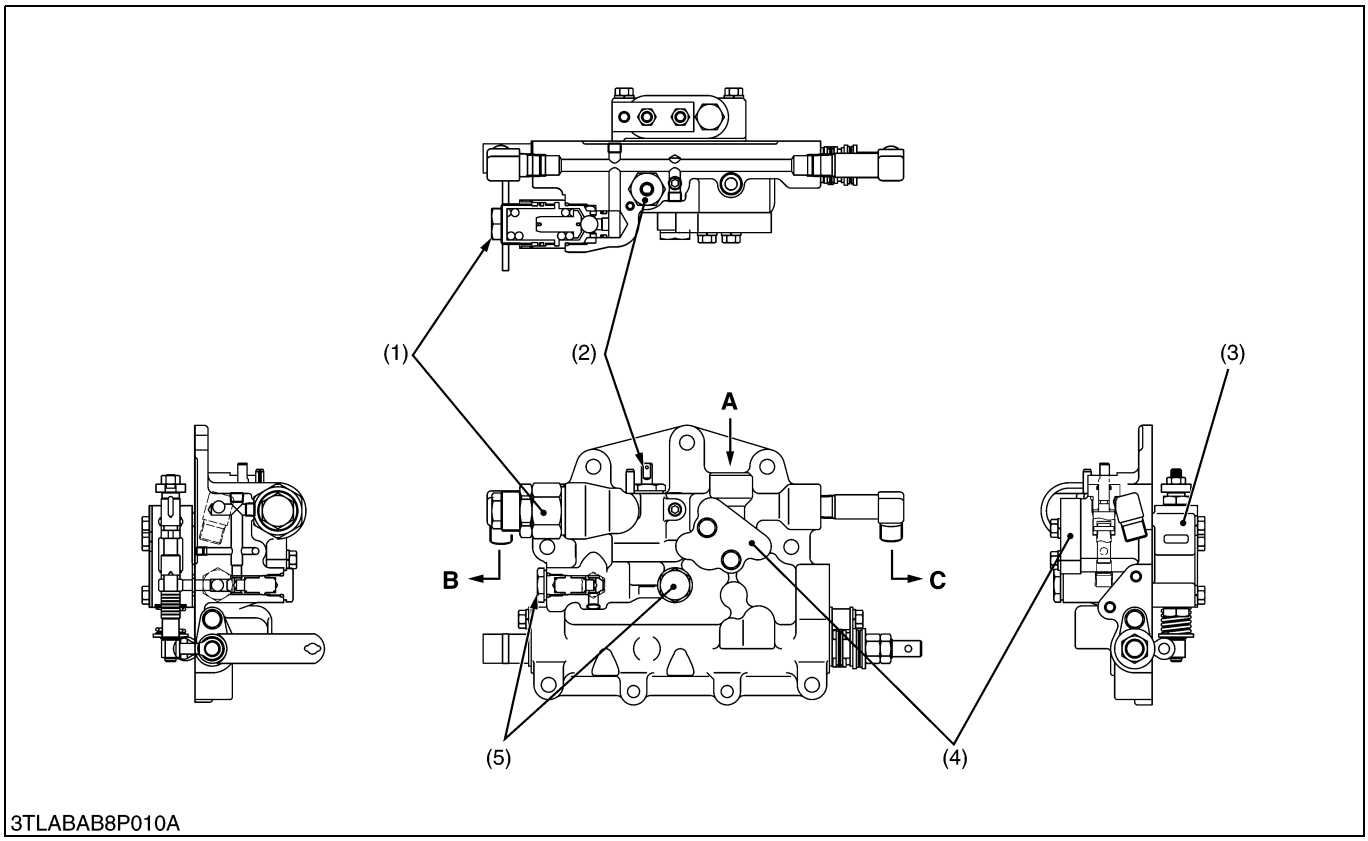
[2] REAR HYDRAULIC BLOCK



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(1) Cylinder Safety Valve
(2) Lowering Speed Adjusting Valve
(3) Position Control Valve
(4) Cover (Rear Hydraulic Outlet Port)
(5) Check Valve

A: From Hydraulic Pump
B: To or From Hydraulic Cylinder
C: To or From Hydraulic Cylinder

The rear hydraulic block is equipped with cylinder safety valve (1), lowering speed adjusting valve (2) and check valve (5), etc. besides hydraulic outlet port.

The hydraulic outlet port is located top of the rear hydraulic block to take power out from the tractor to operate the hydraulic cylinders on the implement.

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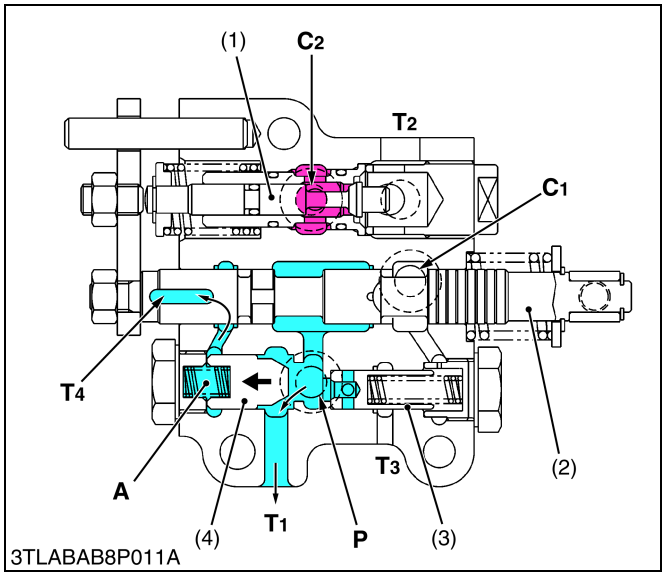
[3] POSITION CONTROL VALVE



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Neutral

Pressurized oil flows at the **P** port, pushes open unload poppet 1 (4) and returns to tank from **T1** port.

The oil in the chamber **A** behind the unload poppet 1 (4) returns to the tank from **T4** port. The oil in the hydraulic cylinder does not flow out because the circuit is cut off by the actions of poppet 2 (1) and check valve in the rear hydraulic block.

This allows the implement to be kept at a steady height.

(1) Poppet 2
(2) Spool
(3) Unload Poppet 2
(4) Unload Poppet 1

A: Chamber A
P: Pump Port
C1: Cylinder Port 1
C2: Cylinder Port 2
T1: Tank Port 1
T2: Tank Port 2
T3: Tank Port 3
T4: Tank Port 4

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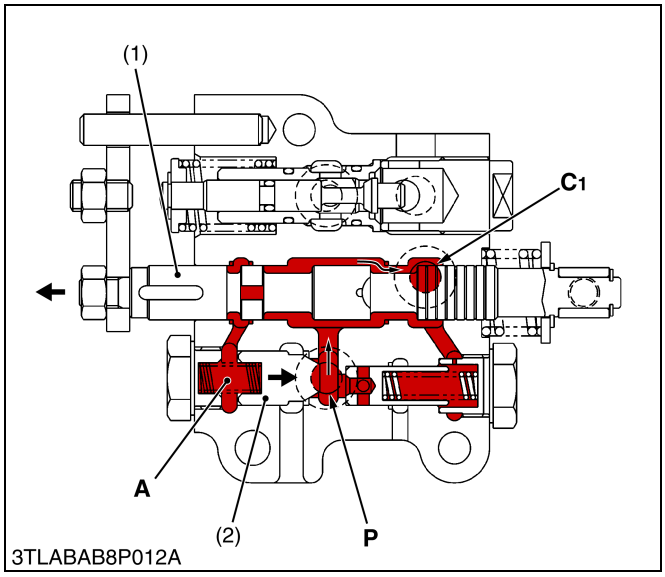

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Lifting

When the control lever is moved to **"LIFT"** position, spool (1) is pushed by the spool operating lever, forming a circuit with the **P** port and chamber **A**.

The pressurized oil thus flows into the chamber **A** and closes unload poppet 1 (2).

The oil from **C1** port flows into hydraulic cylinder through check valve in the rear hydraulic block to lift the implement.

(1) Spool
(2) Unload Poppet 1

A: Chamber A
P: Pump Port
C1: Cylinder Port 1

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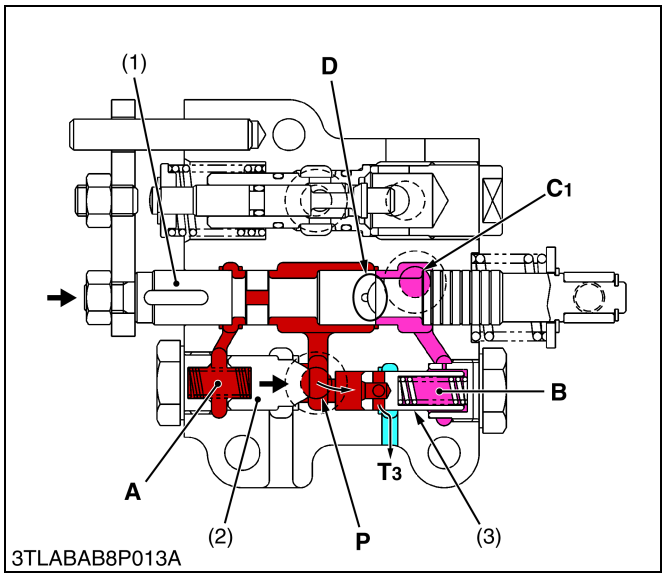

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Lifting to Neutral (Acting the shockless mechanism)

In returning from Lifting to Neutral, the spool (1) is pushed back to the arrow-mark direction. When the **Neutral** position comes near, the groove part **D** of the spool (1) makes the pressure difference at the **P** port and **C1** port. Therefore, the check valve in the rear hydraulic block gradually closes, and absorbs any shock at lifting stop. In that case, since oil is remained in the chamber **A** of the unload poppet 1 (2) and closes. However, the unload poppet 2 (3) opens because of low pressure in chamber **B**, and then the oil from the pump returns to the transmission case through **T3** port until unload poppet 1 (2) opens.

(1) Spool
(2) Unload Poppet 1
(3) Unload Poppet 2

A: Chamber A
B: Chamber B
D: Groove
P: Pump Port
C1: Cylinder Port 1
T3: Tank Port 3

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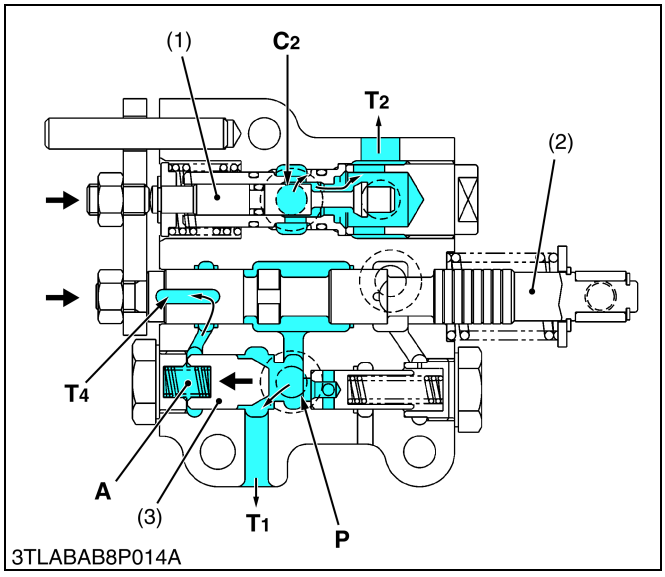

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Lowering

When the control lever is moved to **"DOWN"** position, spool (2) moves to arrow-mark direction, and pushes the poppet 2 (1). It forms a circuit with the **C2** port and **T2** port.

The oil in the hydraulic cylinder is forced out by the weight of the implement, and returns to the tank through the **C2** port and **T2** port, lowering the implement.

The pressurized oil at the **P** port pushes open unload poppet 1 (3) and returns to tank from **T1** port.

Floating

When the control lever is moved all the way to the bottom, spool (2) and poppet 2 (1) remain in the position described for **"Lowering"**. The oil flows freely between the hydraulic pump, hydraulic cylinder and tank.

(1) Poppet 2
(2) Spool
(3) Unload Poppet 1

A: Chamber A
P: Pump Port
C2: Cylinder Port 2
T1: Tank Port 1
T2: Tank Port 2
T4: Tank Port 4

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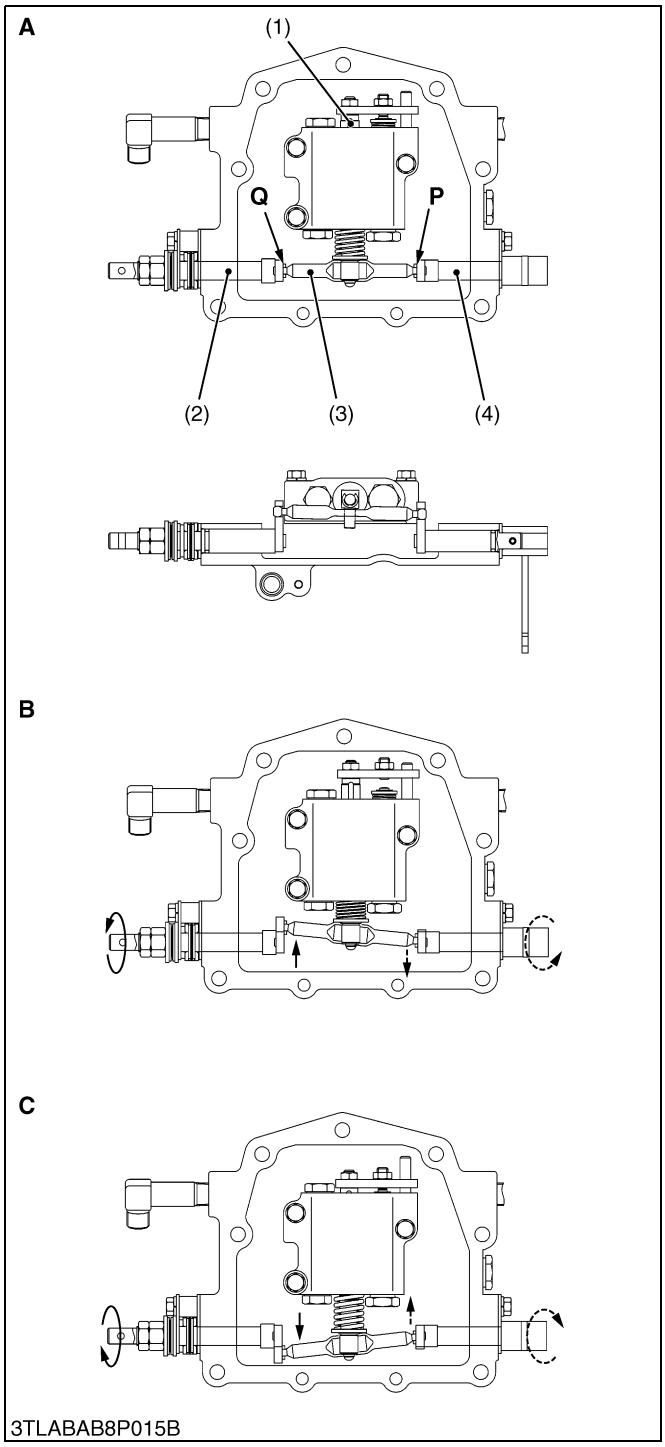
[4] POSITION CONTROL LINKAGE



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Position control is a mechanism to raise or lower the implement attached to the tractor in proportion to the movement of the control lever.

The implement can be set at any height by moving the position control lever. Fine position adjustment is also easy.

■ **Lift**

1. When the position control lever is moved to the **LIFT** position, the control arm shaft (2) rotates to the arrow. Therefore, the spool drive lever (3) moves around the fulcrum **P** and push the spool (1) opening the **LIFT** circuit.
2. When the lift arm moves upward, the feedback lever shaft (4) is rotated to the arrow, since the feedback rod is actuated. Therefore, the spool drive lever (3) moves around the fulcrum **Q** and pull the spool (1).
3. The lift arm stops when the spool returns to the neutral position.

■ **Down**

1. When the position control lever is moved to the **DOWN** position, the control arm shaft (2) rotates to the arrow. Therefore, the spool drive lever (3) moves around the fulcrum **P** and pull the spool (1) opening the **DOWN** circuit.
2. When the lift arm moves downward, the feedback lever shaft (4) is rotated to the arrow, since the feedback rod is actuated. Therefore, the spool drive lever (3) moves around the fulcrum **Q** and pushes the spool (1).
3. The lift arm stops when the spool (1) returns to the neutral position.

(1)	Spool	**A:**	**Neutral**
(2)	Control Arm Shaft	**B:**	**Lift**
(3)	Spool Drive Lever	**C:**	**Down**
(4)	Feedback Lever Shaft		

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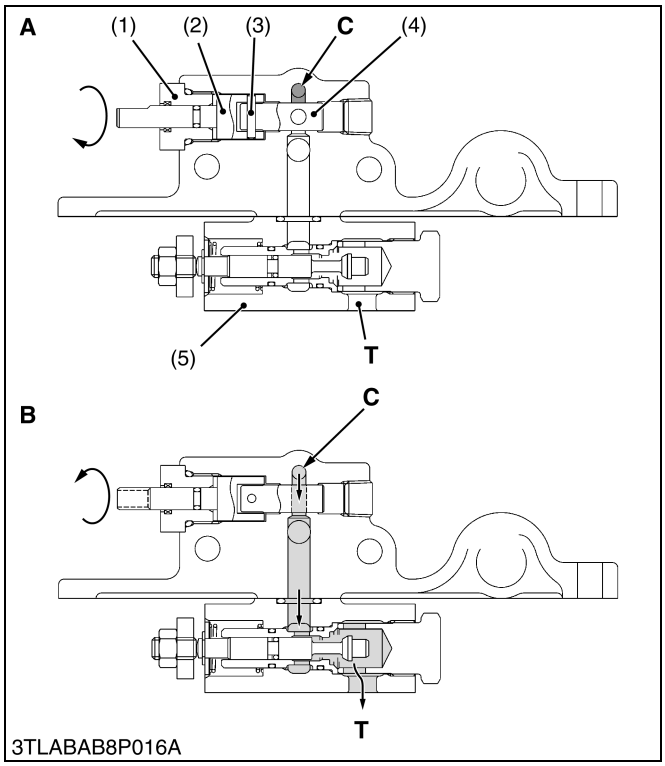
[5] LOWERING SPEED ADJUSTING VALVE



Turning the rotor shaft (2) clockwise decreases the lowering speed, and counterclockwise increases lowering speed of the three points linkage. When the rotor shaft (2) is completely closed, the three point linkage is held at its position since oil in the hydraulic cylinder is sealed between the hydraulic cylinder and rotor (4).

(1) Holder
(2) Rotor Shaft
(3) Pin
(4) Rotor
(5) Position Control Valve

A: Closed Position
B: Open Position

C: Cylinder Port
T: Tank Port

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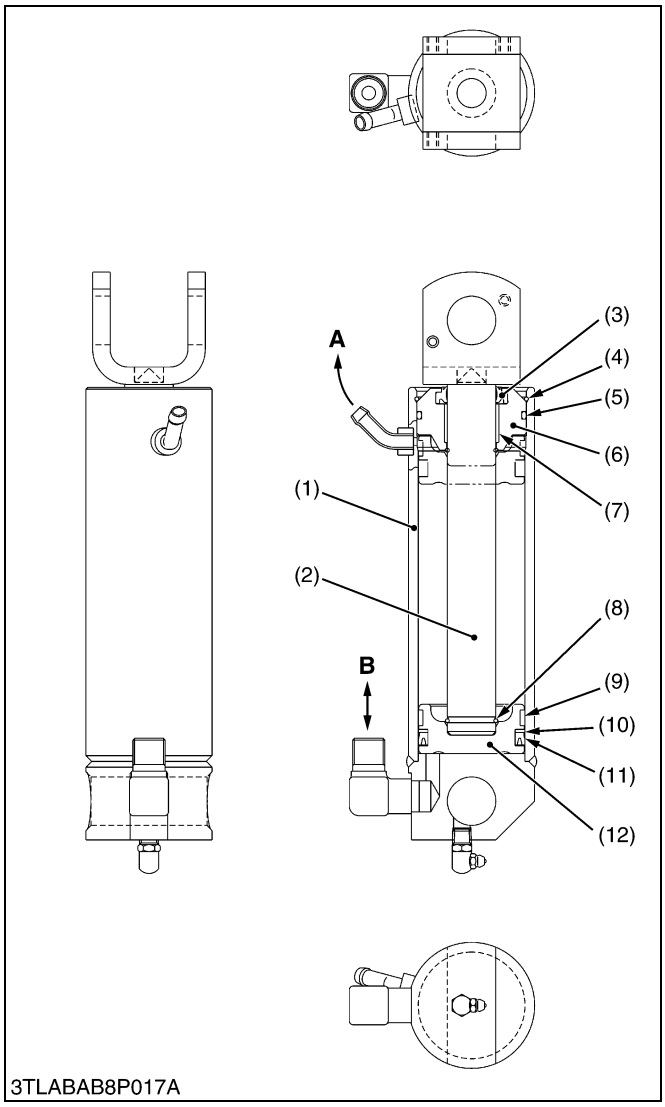
[6] HYDRAULIC CYLINDER



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The external type hydraulic cylinders are used for three point linkage system. This hydraulic cylinder is single acting type, and it is installed directly between hydraulic lift arm and lower link.

The main components of the hydraulic cylinder are shown in the figure.

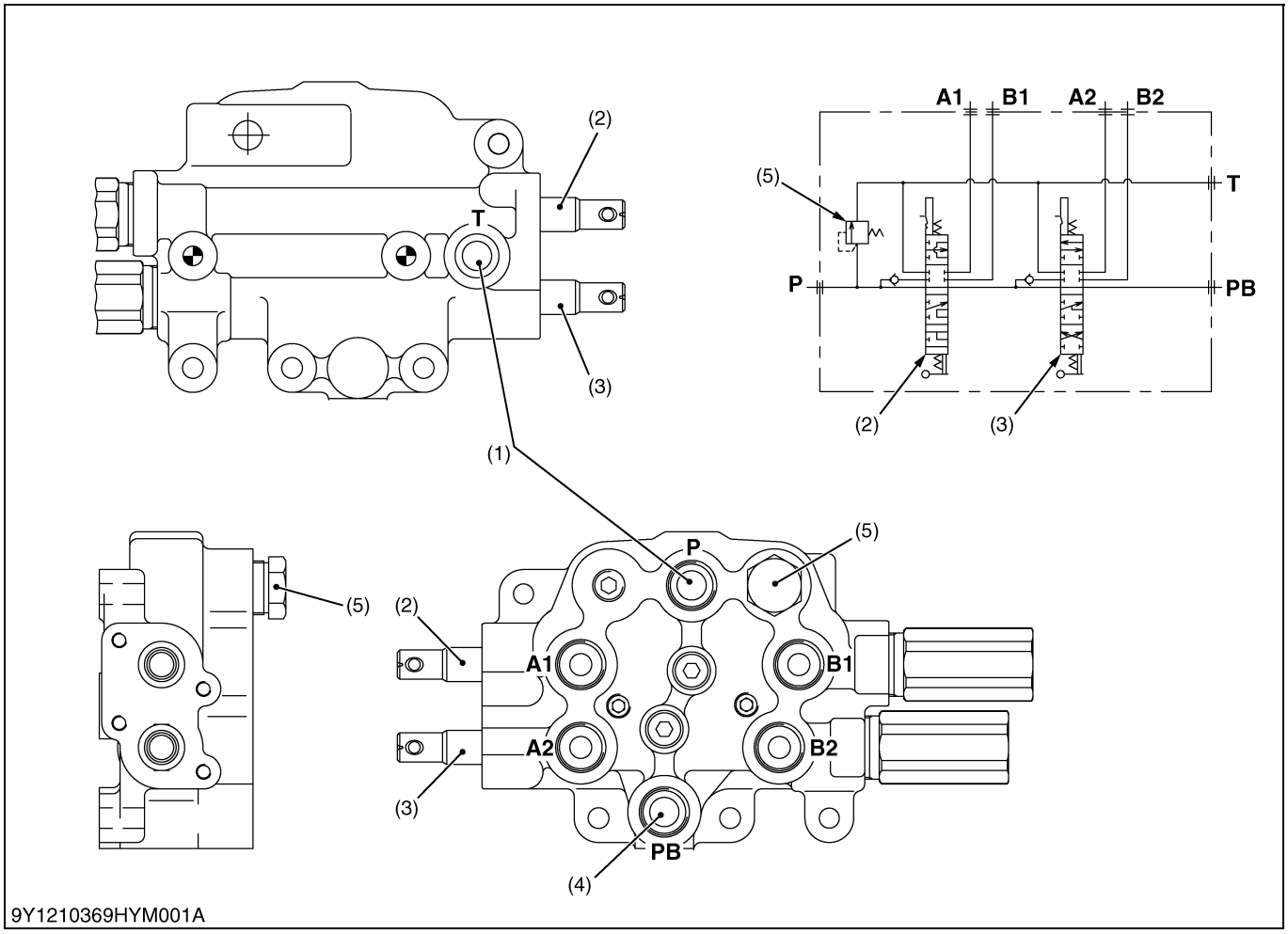
(1) Cylinder Tube
(2) Rod
(3) Wiper
(4) Snap Ring
(5) O-ring
(6) Head
(7) Bushing
(8) Snap Ring
(9) Bearing Ring
(10) Backup Ring
(11) Seal
(12) Piston

A: To Transmission Case
B: To or From Position Control Valve

9Y1210824HYM0015US0

5. FRONT LOADER CONTROL VALVE ASSEMBLY

[1] STRUCTURE



(1) Inlet and Outlet Section
(2) Boom Control Valve
(3) Bucket Control Valve
(4) Power Beyond
(5) Relief Valve

P: Pump Port
T: Tank Port
A1: A1 Port
A2: A2 Port
B1: B1 Port
B2: B2 Port
PB: Power Beyond Port

The control valve assembly consists of one casting block and four major section as shown above.

(1) Inlet and Outlet Section

This section has **P** and **T** ports.

The **P** port is connected to the **OUTLET** port of hydraulic pump by the hydraulic pipe.

The **T** port is connected to the **TANK** port of transmission case by the hydraulic pipe.

(2) Boom Control Section

The boom control valve is of 4-position, 6-connection, detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A1** and **B1** ports and controls oil flow to the boom cylinder.

(3) Bucket Control Section

The bucket control valve is of 4-position, 6-connection, no detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A2** and **B2** ports and controls oil flow to the bucket cylinder.

(4) Power Beyond

This section has **PB** port which is connected to the **INLET** port of hydraulic block by the hydraulic hose, and feeds oil to the three point hydraulic control valve.

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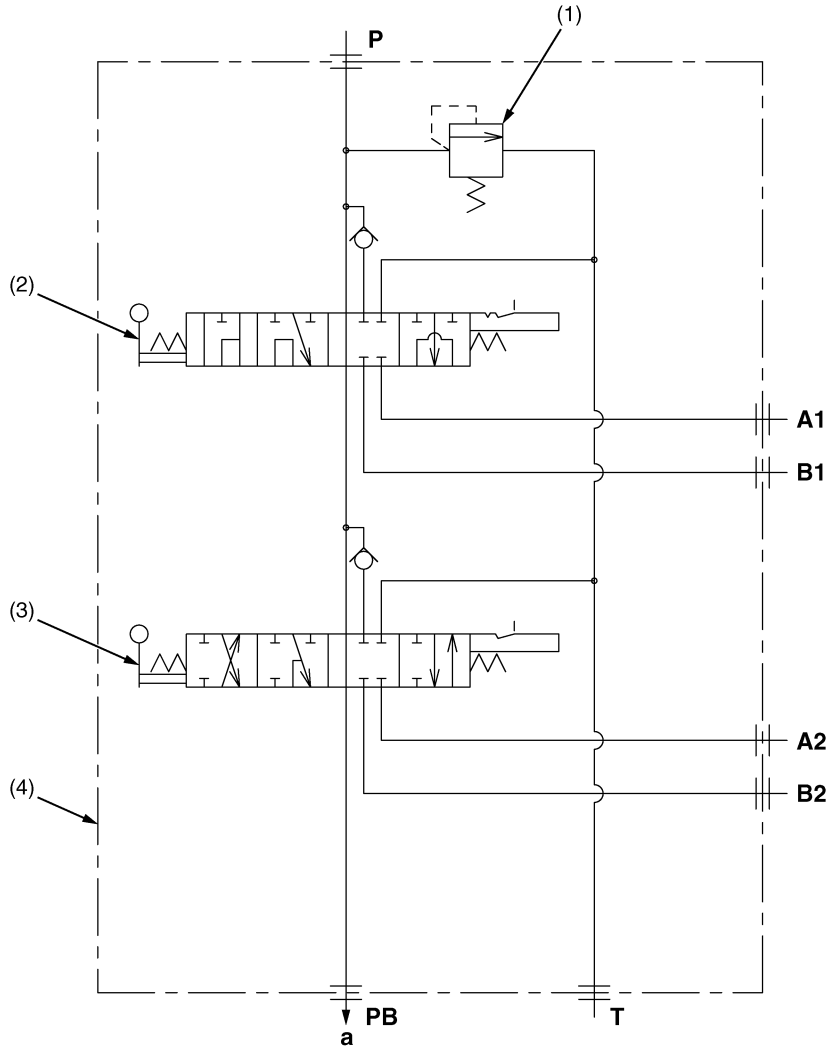
[2] FRONT LOADER HYDRAULIC CIRCUIT



9Y1210369HYM002A

(1) Relief Valve
(2) Boom Control Valve
(3) Bucket Control Valve
(4) Front Loader Control Valve

P: Pump Port
T: Tank Port

A1: A1 Port
A2: A2 Port
B1: B1 Port
B2: B2 Port
PB: Power Beyond Port

a: To Hydraulic Block

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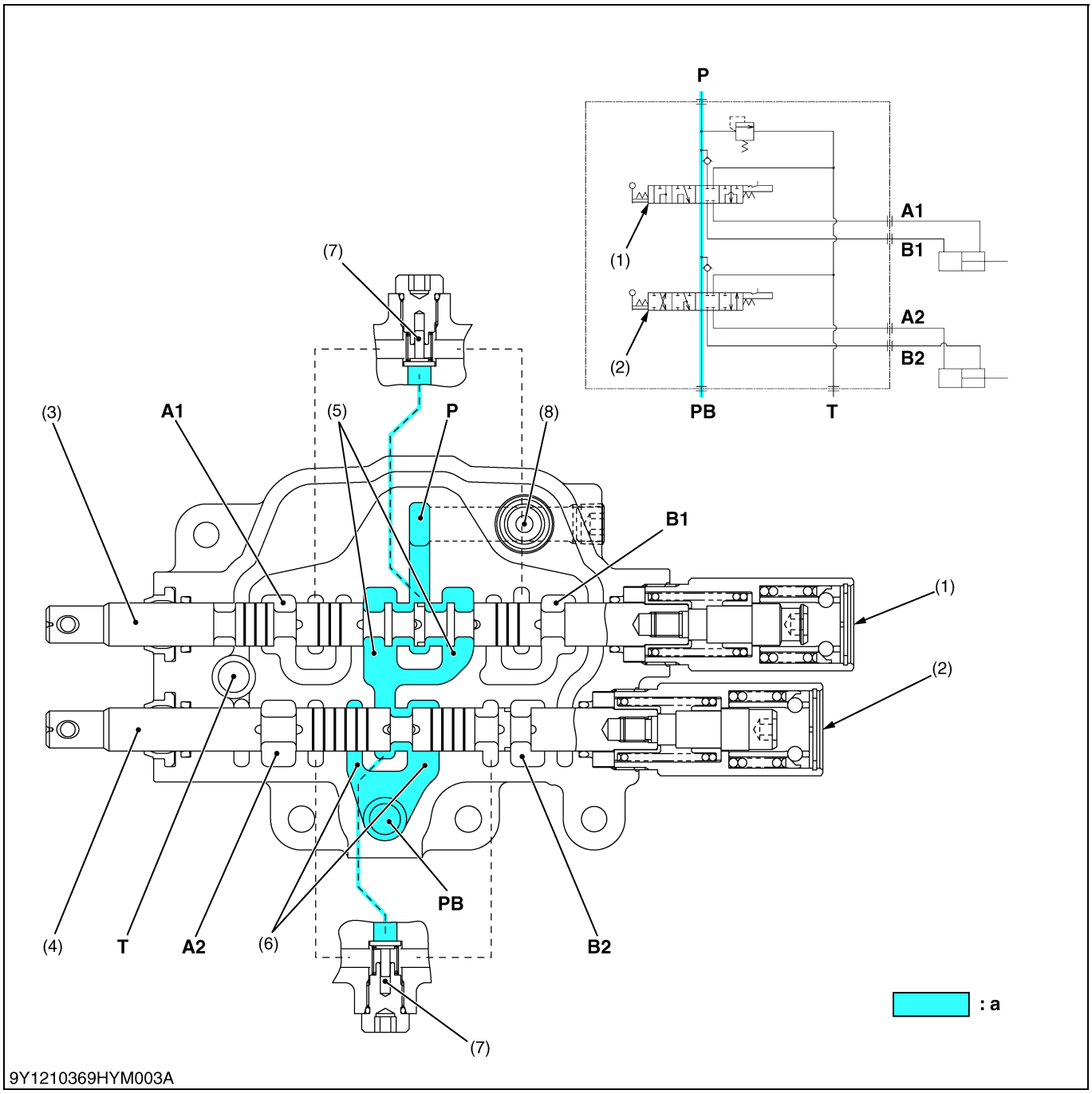
[3] OPERATION

Neutral



(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) Spool
(5) **PB** Passage 1
(6) **PB** Passage 2
(7) Load Check Valve
(8) Relief Valve

T: Tank Port
P: Pump Port
A1: A1 Port
A2: A2 Port
B1: B1 Port
B2: B2 Port
PB: Power Beyond Port

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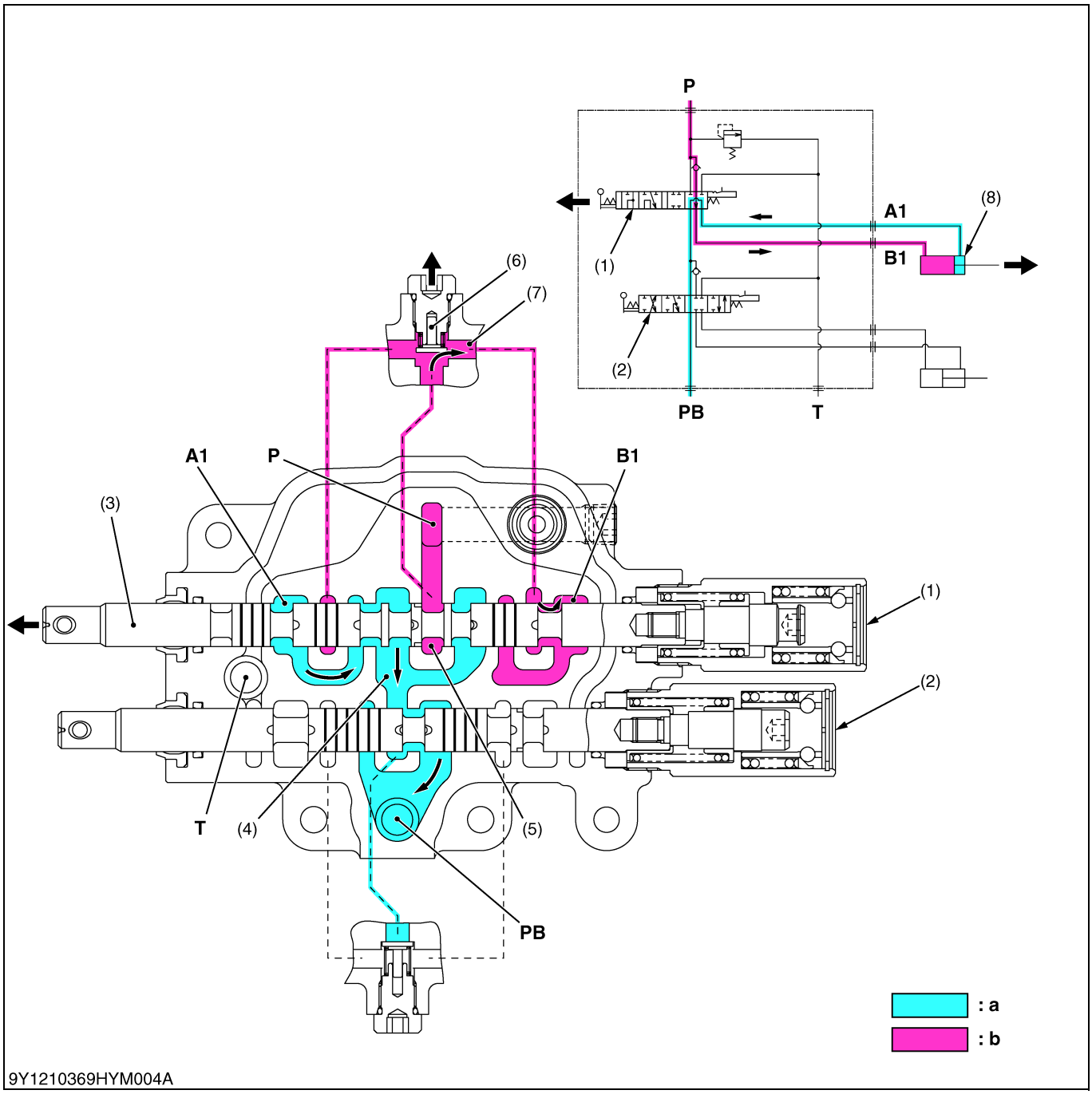
Up



(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) **PB** Passage 1
(5) Neutral Passage 1
(6) Load Check Valve
(7) Passage 1
(8) Boom Cylinder

P: Pump Port
T: Tank Port

A1: A1 Port (From Boom Cylinder)
B1: B1 Port (To Boom Cylinder)
PB: Power Beyond Port
a: Low Pressure
b: High Pressure

1. When the hydraulic control lever is set to the **"UP"** position, the spool (3) of the boom control section (1) moves to the left, which forms oil passages between passage 1 (7) and **B1** port, and between **A1** port and **PB** passage 1 (4).
2. As the oil passage from the neutral passage 1 (5) to the **PB** passage 1 (4) is closed by the spool (3), the pressure-fed oil from the **P** port opens the load check valve (6) and flows through the notched section of the spool (3) and **B1** port to extend the boom cylinder (8).
3. Return oil from the boom cylinder (8) flows from the **A1** port through the passage in the spool (3) and **PB** passage 1 (4) to the bucket control section (2).

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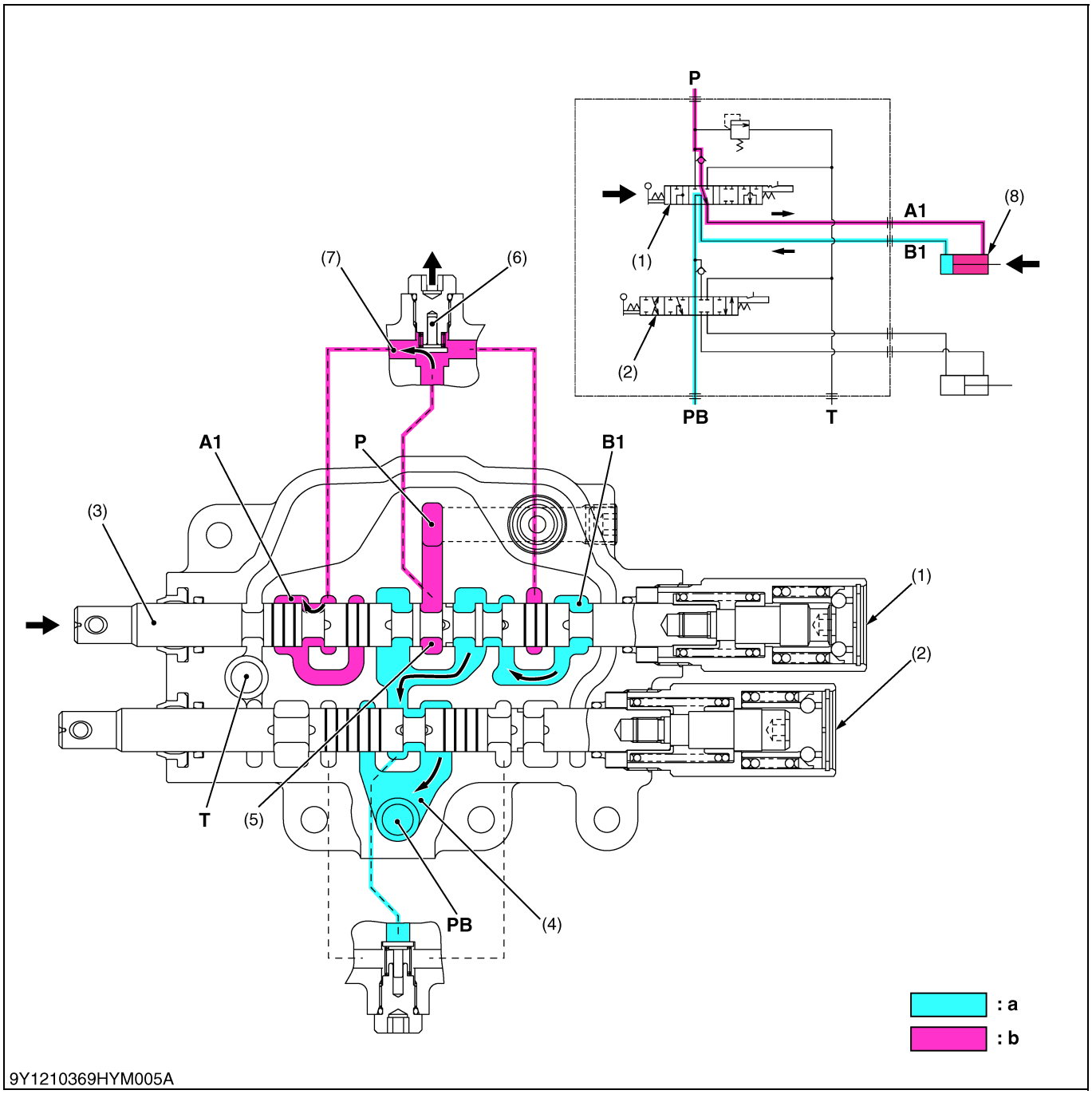
Down



(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) **PB** Passage 1
(5) Neutral Passage 1
(6) Load Check Valve
(7) Passage 1
(8) Boom Cylinder

P: Pump Port
T: Tank Port

A1: A1 Port (To Boom Cylinder)
B1: B1 Port (From Boom Cylinder)
PB: Power Beyond Port
a: Low Pressure
b: High Pressure

1. When the hydraulic control lever is set to the **"DOWN"** position, the spool (3) moves to the right, which forms oil passages between passage 1 (7) and **A1** port, and between **B1** port and **PB** passage 1 (4).
2. As the oil passage from the neutral passage 1 (5) to the **PB** passage 1 (4) is closed by the spool (3), the pressure-fed oil from the **P** port opens the load check valve (6) and flows through the notched section of the spool (3) and **A1** port to retract the boom cylinder (8).
3. Return oil from the boom cylinder (8) flows from the **B1** port through the passage in the spool (3) and **PB** passage 1 (4) to the bucket control section (2).

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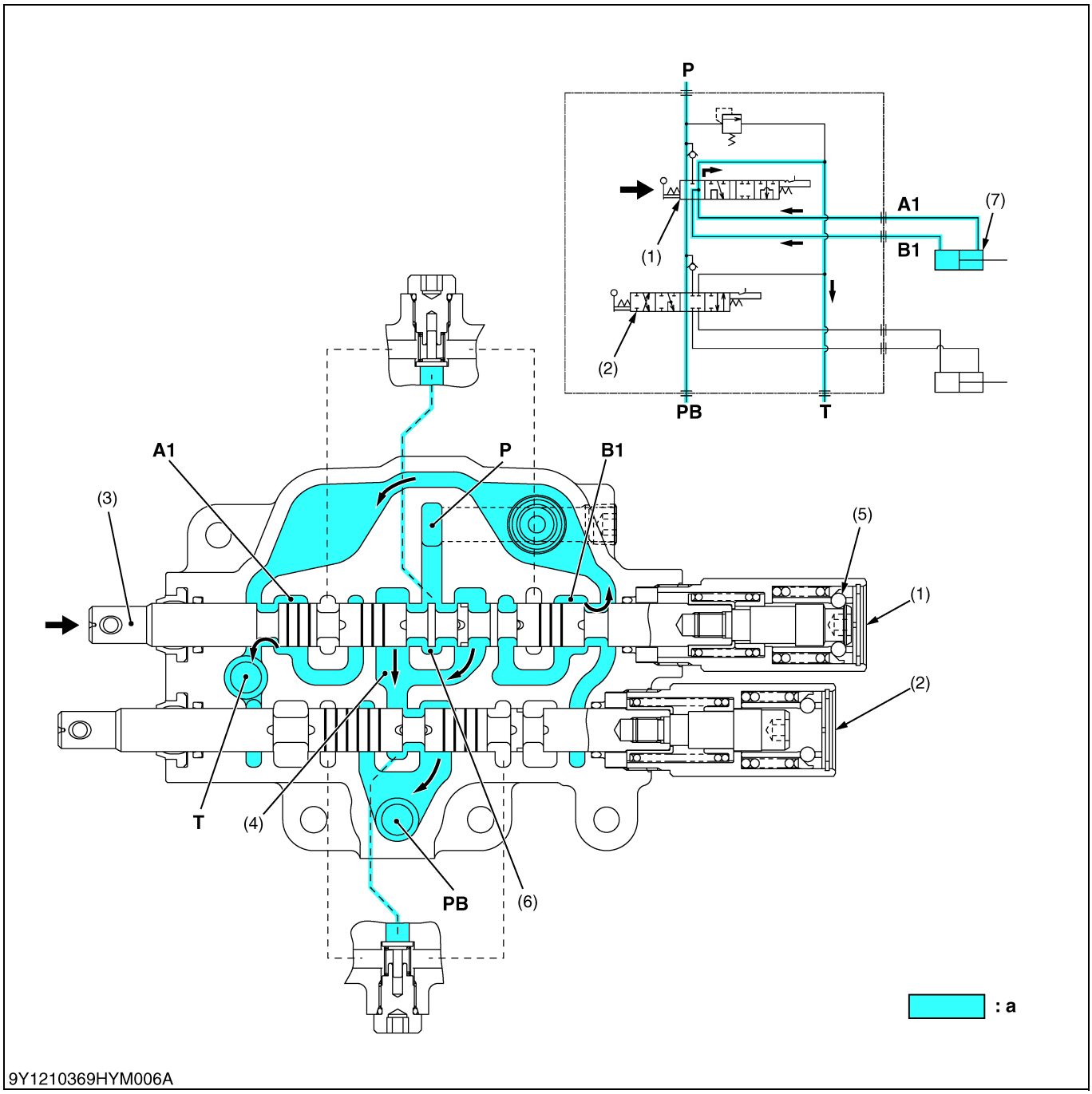
Floating



(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) **PB** Passage 1
(5) Detent Mechanism
(6) Neutral Passage 1
(7) Boom Cylinder

P: Pump Port
T: Tank Port

A1: A1 Port
B1: B1 Port
PB: Power Beyond Port
a: Low Pressure

1. When the hydraulic control lever is set to the **"FLOAT"** position, the spool (3) moves further to the right from the **"DOWN"** position and is retained by the detent mechanism (5).
2. This forms oil passages among the **A1** port, **B1** port and **T** port. As a result, oil in the boom cylinder (7) flows freely from the **A1** port and **B1** port through the **T** port to the transmission case.
3. Oil entering the **P** port flows to the bucket control section (2) through the neutral passage 1 (6) and **PB** passage 1 (4).

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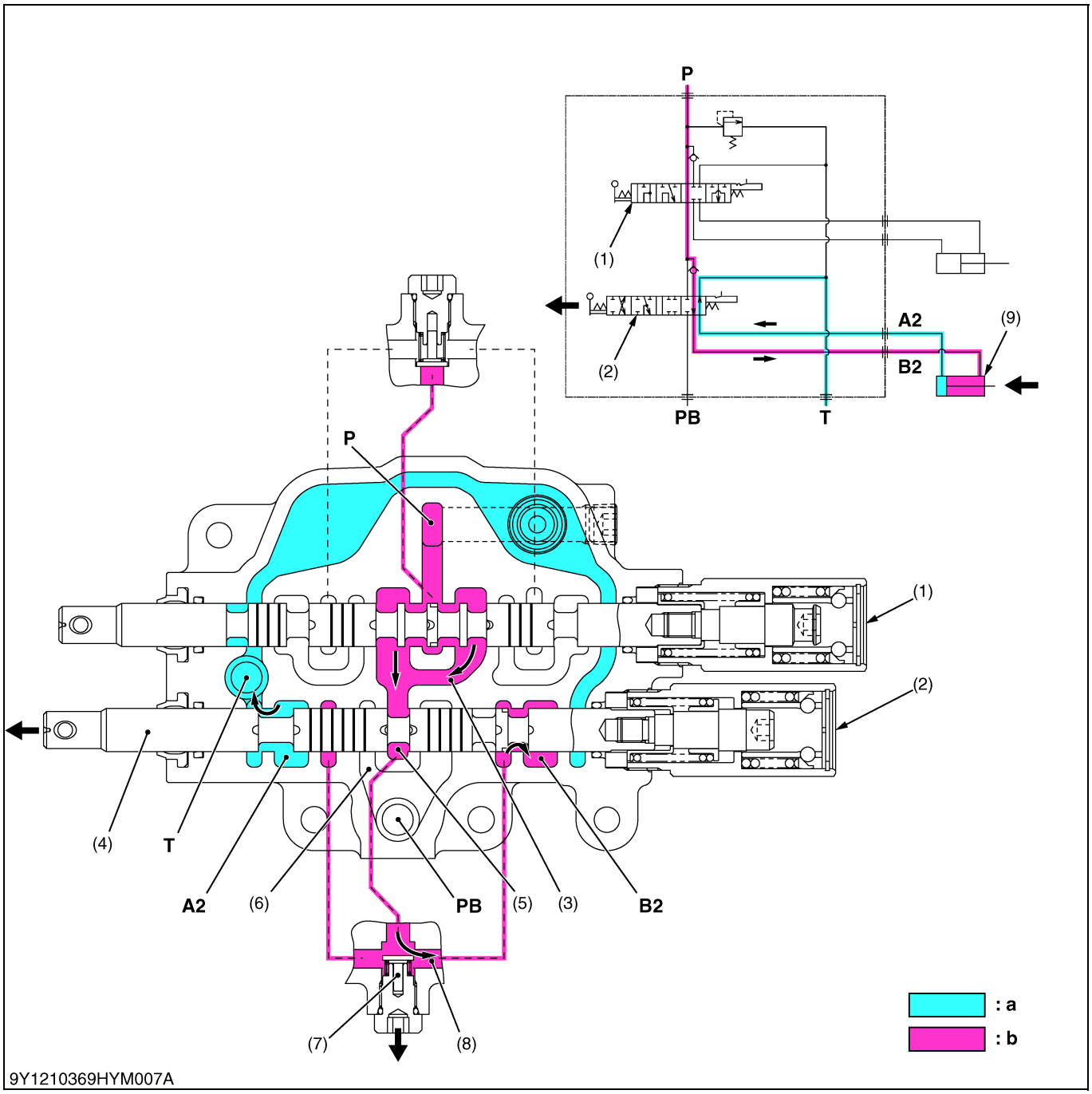
Roll-back



(1) Boom Control Section
(2) Bucket Control Section
(3) **PB** Passage 1
(4) Spool
(5) Neutral Passage 2
(6) **PB** Passage 2
(7) Load Check Valve
(8) Passage 2
(9) Bucket Cylinder

P: Pump Port
T: Tank Port
PB: Power Beyond Port
A2: A2 Port (From Bucket Cylinder)
B2: B2 Port (To Bucket Cylinder)
a: Low Pressure
b: High Pressure

1. When the hydraulic control lever is set to the **"ROLL-BACK"** position, the spool (4) of the bucket control section (2) moves to the left, which forms oil passages between passage 2 (8) and **B2** port, and between **A2** port and **T** port.
2. The pressure-fed oil from the **P** port flows to the neutral passage 2 (5) through the boom control section (1) and **PB** passage 1 (3). As the oil passage from the neutral passage 2 (5) to the **PB** passage 2 (6) is closed by the spool (4), this oil opens the load check valve (7), and flows through the notched section of the spool (4) and **B2** port to retract the bucket cylinder (9).
3. Return oil from the bucket cylinder (9) flows to the transmission case through the **A2** port and **T** port.

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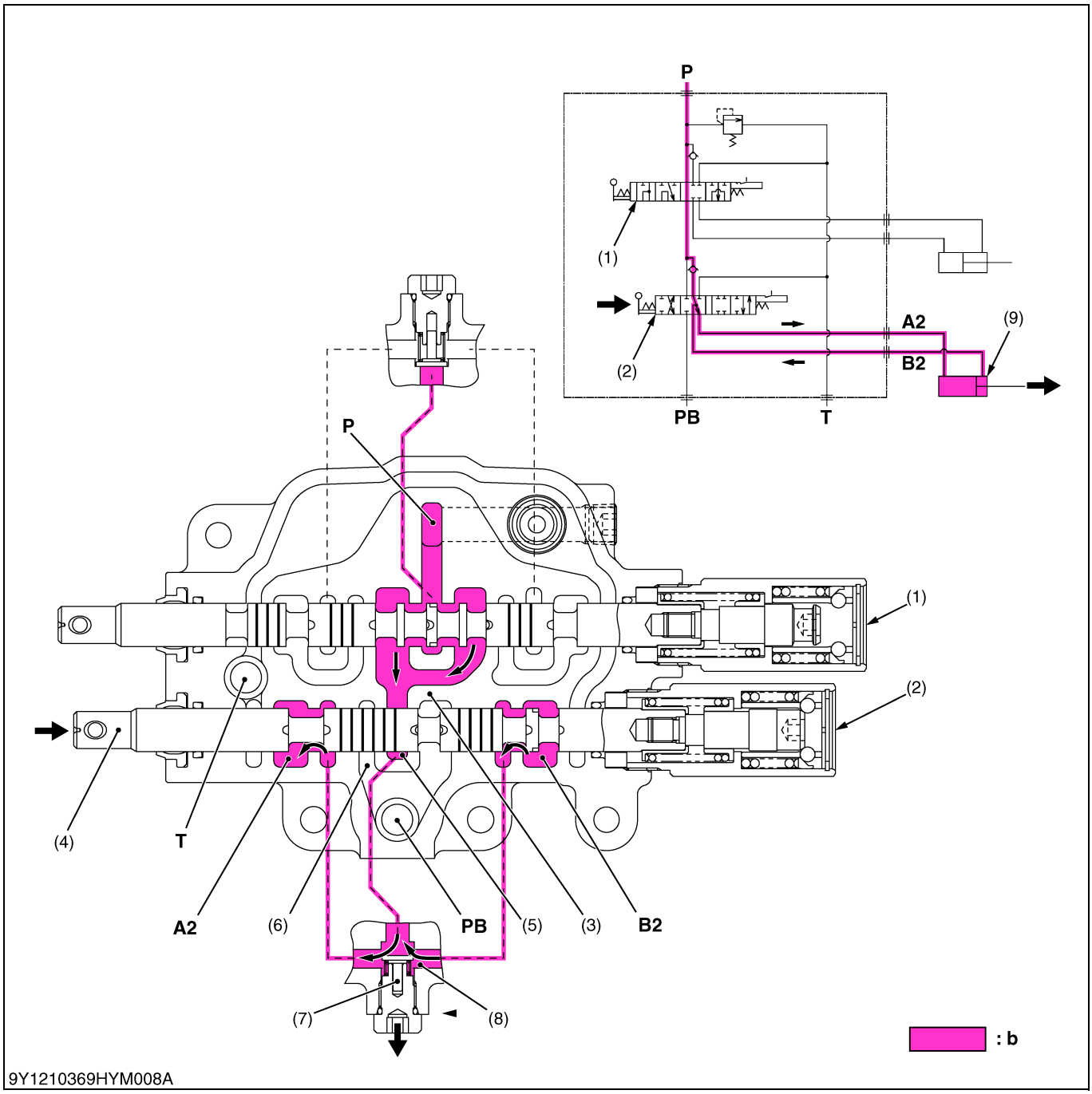
Dump 1



(1) Boom Control Section
(2) Bucket Control Section
(3) **PB** Passage 1
(4) Spool
(5) Neutral Passage 2
(6) **PB** Passage 2
(7) Load Check Valve
(8) Passage 2
(9) Bucket Cylinder

P: Pump Port
T: Tank Port
PB: Power Beyond Port

A2: A2 Port (To Bucket Cylinder)
B2: B2 Port (From Bucket Cylinder)
b: High Pressure

1. When the hydraulic control lever is set to the **"DUMP 1"** position, the spool (4), which forms oil passages among passage 2 (8), **A2** port and **B2** port moves to the right.
2. The pressure-fed oil from the **P** port flows through the boom control valve, opens the load check valve, and flows to the bracket cylinder to extend the cylinder through the notched section of the spool and **A2** port.
3. Return oil from the bucket cylinder (9) flows from the **B2** port to the passage 2 (8), and flows to the **A2** port together with the pressure-fed oil from the **P** port.
   As a result, the dump speed is increased.

(Reference)

- The oil pressure of the **A2** port and **B2** port is identical, but the bucket cylinder extend by the difference of received pressure area (cylinder rod part).

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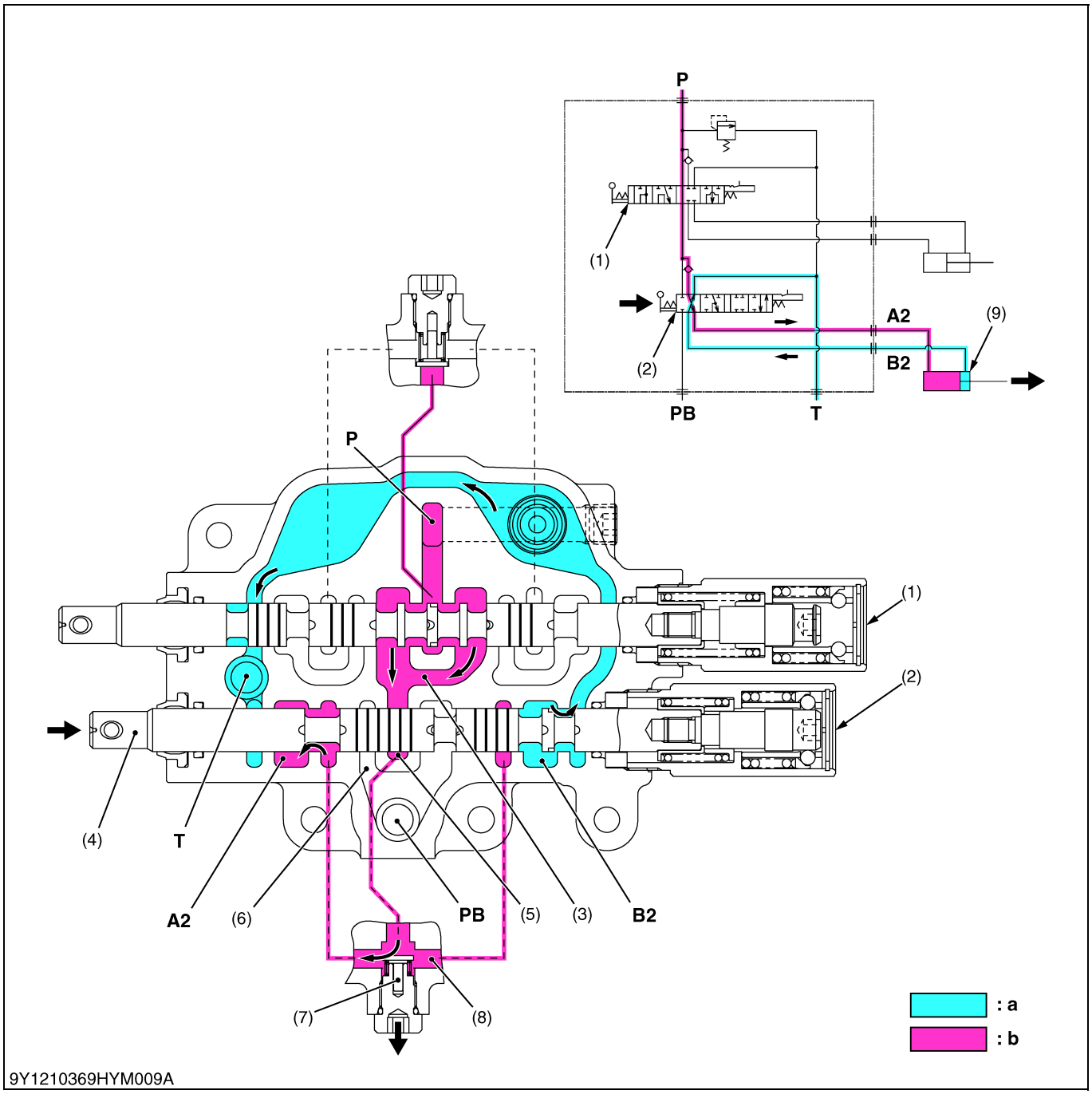
Dump 2



(1) Boom Control Section
(2) Bucket Control Section
(3) **PB** Passage 1
(4) Spool
(5) Neutral Passage 2
(6) **PB** Passage 2
(7) Load Check Valve
(8) Passage 2
(9) Bucket Cylinder

P: Pump Port
T: Tank Port
PB: Power Beyond Port
A2: A2 Port (To Bucket Cylinder)
B2: B2 Port (From Bucket Cylinder)
a: Low Pressure
b: High Pressure

1. When the hydraulic control lever is set to the **"DUMP 2"** position, the spool (4) of the bucket control section (2) moves to the right of the bucket control section (2) moves further to the right from the **"DUMP 1"** position, which forms oil passages between passage 2 (8) and **A2** port, and between **B2** port and **T** port.
2. The pressure-fed oil from the **P** port flows to the neutral passage 2 (5) through the boom control section (1) and **PB** passage 1 (3). As the oil passage from the neutral passage 2 (5) to the **PB** passage 2 (6) is closed by the spool (4), this oil opens the load check valve (7) and flows through the notched section of the spool (4) and **B2** port to extend the bucket cylinder (9).
3. Return oil from the bucket cylinder (9) flows to the transmission case through the **B2** port and **T** port.

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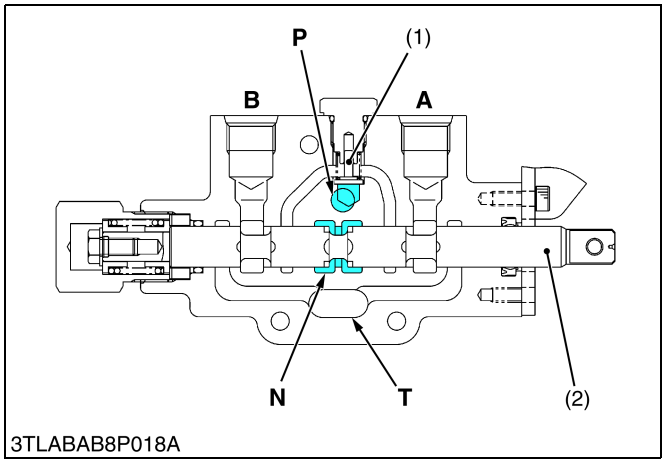
6. AUXILIARY CONTROL VALVE (IF EQUIPPED)

[1] DOUBLE ACTING TYPE



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Neutral

Pressure-fed oil from the hydraulic pump is delivered into the **P** port, and flows to the position control valve via **N** port.

(1) Check Valve
(2) Spool
A: A Port (Implement Cylinder)
B: B Port (Implement Cylinder)
P: Pump Port
N: Neutral Port
T: Tank Port

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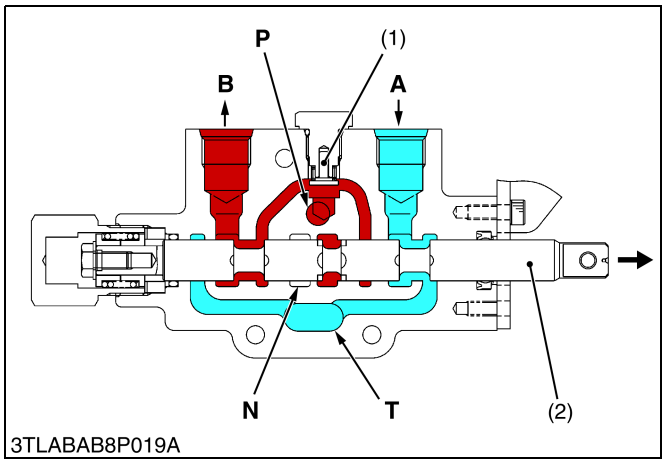

3TLABAB8P019A

Lift

When the spool (2) is moved in the direction of the arrow, the pressure-fed oil in the **P** port opens the check valve (1) and flows to the implement cylinder via **B** port.

Return oil from the implement cylinder flows from the **A** port to the transmission case through **T** port.

(1) Check Valve
(2) Spool
A: A Port (Implement Cylinder)
B: B Port (Implement Cylinder)
P: Pump Port
N: Neutral Port
T: Tank Port

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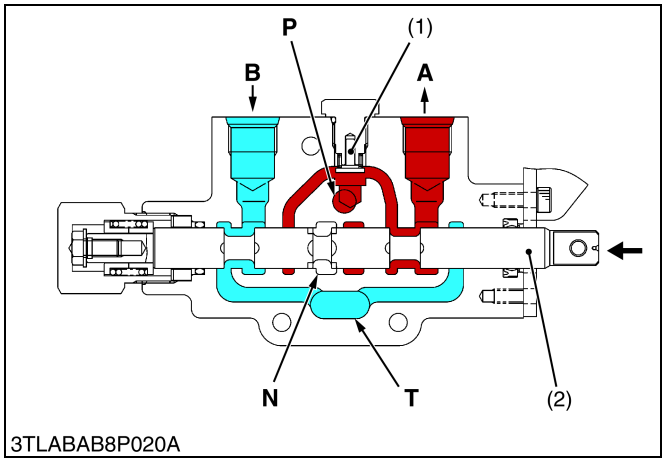

3TLABAB8P020A

Down

When the spool (2) is moved in the direction of the arrow, the pressure-fed oil in the **P** port opens the check valve (1) and flows to the implement cylinder via **A** port.

Return oil from the implement cylinder flows from the **B** port to the transmission case through **T** port.

(1) Check Valve
(2) Spool
A: A Port (Implement Cylinder)
B: B Port (Implement Cylinder)
P: Pump Port
N: Neutral Port
T: Tank Port

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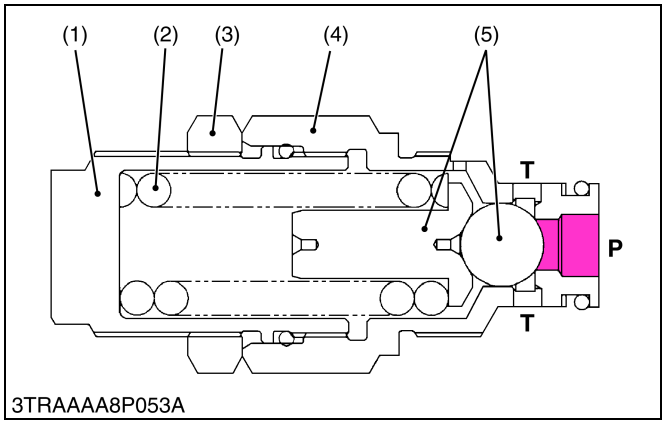
7. OTHER



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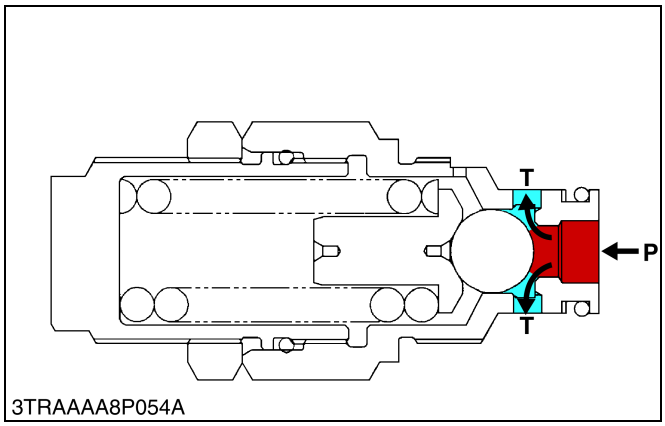

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The cylinder safety valve is located on the hydraulic cylinder of the three point hydraulic system. These tractors use a direct acting relief valve, which is suitable for low volume and less frequent operations.This valve has a fast response, makes it ideal for relieving shock pressure caused by heavy implement bounce and thereby reducing the possibility of damage to three point hydraulic system components.If pressure in the cylinder becomes too great, oil pressure forces the valve (5) off the seat of valve body (4), compressing the springs (2) and allows oil to flow to the transmission case through the **T** port.

(1) Adjusting Plug
(2) Spring
(3) Lock Nut
(4) Valve Body
(5) Valve

P : P Port (From Hydraulic Cylinder)
T : T Port (To Transmission Case)

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SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Implement Does Not Rise (Not Noise)	Control linkage improperly adjusted	Adjust	8-S13
	Control linkage improperly assembled or damaged	Repair or replace	–
	Position control valve malfunctioning	Repair or replace	8-S19
	Relief valve spring weaken or broken	Replace	8-S27
	Hydraulic piston O-ring, cylinder damaged	Replace	8-S22
(Noise)	Transmission fluid improper or insufficient	Change or fill	G-9
	Oil filter clogged	Replace	G-31
	Suction pipe loosen or broken	Repair or replace	–
	Relief valve setting pressure too low	Adjust	8-S11
	Relief valve spring weaken or damaged	Replace	8-S27
	Hydraulic pump malfunctioning	Repair pr replace	8-S14
Implement Does Not Reach Maximum Height	Position control feedback rod improperly adjusted	Adjust	8-S13
	Top link length improperly adjusted	Adjust	–
	Hydraulic arm shaft, lift arm improperly assembled	Adjust	8-S23
	3 point link improperly set	Adjust	–
Implement Does Not Lower	Position control valve malfunctioning		
	• Spool damaged	Replace	8-S20
	• Poppet 2, push rod improperly adjusted	Adjust	8-S20
Implement Drops by Weight	Hydraulic cylinder worn or damaged	Replace	8-S21
	Safety valve damaged	Replace	8-S28
	Hydraulic piston and O-ring worn or damaged	Replace	8-S22
	Lowering speed adjusting valve damaged	Replace	8-S19
	Position control valve malfunctioning		
	• Poppet 2 seat surface damaged	Replace	8-S20
	• Poppet 2 seat sleeve O-ring damaged	Replace	8-S20
Implement Hunts (Moves Up and Down)	Position control valve malfunctioning		
	• Poppet 2 seat surface damaged	Replace	8-S20
	• Poppet 2 seat sleeve O-ring damaged	Replace	8-S20
	Poppet 2, push rod improperly adjusted	Adjust	8-S20
Oil Temperature Increases Rapidly	Relief valve operating		
	• Relief valve malfunctioning	Adjust or replace	8-S11
	• Hydraulic line is clogged	Clean or replace	–
	Hydraulic pump leak or damaged	Repair or replace	8-S14
	Oil leaks from valves	Repair or replace	–

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2. SERVICING SPECIFICATIONS

HYDRAULIC PUMP

Item		Factory Specification	Allowable Limit
Hydraulic Pump for Power Steering **Condition** • Engine Speed Approx. 2700 min^{-1} (rpm) (Manual Transmission and GST) Approx. 2600 min^{-1} (rpm) (HST) • Rated pressure L3560 10.7 to 11.7 MPa (110 to 119 kgf/cm^2, 1560 to 1690 psi) L4060, L4760, L5060, L5460, L6060 12.7 to 13.7 MPa (130 to 139 kgf/cm^2, 1850 to 1980 psi) • Oil Temperature 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure Manual Transmission and GST	Above 18.6 L/min. 4.91 U.S.gals/min. 4.09 Imp.gals/min.	–
	HST	Above 17.9 L/min. 4.73 U.S.gals/min. 3.94 Imp.gals/min.	–
	Delivery at Rated Pressure Manual Transmission and GST	Above 18.2 L/min. 4.81 U.S.gals/min. 4.00 Imp.gals/min.	16.2 L/min. 4.28 U.S.gals/min. 3.56 Imp.gals/min.
	HST	Above 17.5 L/min. 4.62 U.S.gals/min. 3.85 Imp.gals/min.	15.6 L/min. 4.12 U.S.gals/min. 3.43 Imp.gals/min.

Item		Factory Specification	Allowable Limit
Hydraulic Pump for Three Point Hitch **Condition** • Engine Speed Approx. 2700 min^{-1} (rpm) (Manual Transmission and GST) Approx. 2600 min^{-1} (rpm) (HST) • Rated pressure L3560 17.1 to 18.1 MPa (175 to 184 kgf/cm^2, 2480 to 2620 psi) L4060, L4760, L5060, L5460, L6060 18.1 to 19.1 MPa (185 to 194 kgf/cm^2, 2630 to 2770 psi) • Oil Temperature 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure Manual Transmission and GST L3560	Above 31.5 L/min. 8.32 U.S.gals/min. 6.93 Imp.gals/min.	–
	except L3560	Above 37.0 L/min. 9.77 U.S.gals/min. 8.14 Imp.gals/min.	–
	HST L3560	Above 30.4 L/min. 8.03 U.S.gals/min. 6.69 Imp.gals/min.	–
	except L3560	Above 35.6 L/min. 9.40 U.S.gals/min. 7.83 Imp.gals/min.	–
	Delivery at Rated Pressure Manual Transmission and GST L3560	Above 30.9 L/min. 8.16 U.S.gals/min. 6.80 Imp.gals/min.	27.6 L/min. 7.29 U.S.gals/min. 6.07 Imp.gals/min.
	except L3560	Above 36.3 L/min. 9.59 U.S.gals/min. 7.98 Imp.gals/min.	32.4 L/min. 8.56 U.S.gals/min. 7.13 Imp.gals/min.
	HST L3560	Above 29.7 L/min. 7.87 U.S.gals/min. 6.56 Imp.gals/min.	26.6 L/min. 7.03 U.S.gals/min. 5.85 Imp.gals/min.
	except L3560	Above 34.9 L/min. 9.22 U.S.gals/min. 7.68 Imp.gals/min.	31.2 L/min. 8.24 U.S.gals/min. 6.86 Imp.gals/min.
Bushing to Gear Shaft	Clearance	0.020 to 0.081 mm 0.0079 to 0.0031 in.	0.15 mm 0.0059 in.
• Gear Shaft	O.D.	14.970 to 14.980 mm 0.58937 to 0.57976 in.	–
• Bushing	I.D.	15.000 to 15.051 mm 0.59056 to 0.59256 in.	–
Side Plate	Thickness	2.48 to 2.50 mm 0.0977 to 0.0984 in.	2.40 mm 0.0945 in.

RELIEF VALVE

Item		Factory Specification	Allowable Limit
Relief Valve **Condition** • Engine Speed Maximum • Oil Temperature 40 to 60 °C (104 to 140 °F)	Setting Pressure L3560 L4060, L4760, L5060, L5460, L6060	17.1 to 18.1 MPa 175 to 184 kgf/cm^2 2480 to 2620 psi 18.1 to 19.1 MPa 185 to 194 kgf/cm^2 2630 to 2770 psi	– –

REAR HYDRAULIC BLOCK AND VALVES

Item		Factory Specification	Allowable Limit
Lift Arm	Free Play (at Maximum Raising Position)	10 to 15 mm 0.39 to 0.59 in.	–

CYLINDER SAFETY VALVE

Item		Factory Specification	Allowable Limit
Cylinder Safety Valve	Operating Pressure	19.6 to 22.6 MPa 200 to 230 kgf/cm^2 2850 to 3270 psi	–

LIFT ARM SUPPORT AND HYDRAULIC CYLINDER

Item		Factory Specification	Allowable Limit
Hydraulic Cylinder	I.D.	55.000 to 55.074 mm 2.1654 to 2.1682 in.	55.100 mm 2.1693 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

Item	N·m	kgf·m	lbf·ft
Regulator delivery pipe joint bolt	40 to 49	4.0 to 5.0	29 to 36
Main delivery pipe joint bolt	49 to 54	5.0 to 5.6	37 to 40
Relief valve assembly	35 to 39	3.5 to 4.0	26 to 28
Safety valve assembly	40 to 49	4.0 to 5.0	29 to 36
Safety valve lock nut	59 to 78	6.0 to 8.0	44 to 57
Power steering delivery pipe joint bolt	40 to 49	4.0 to 5.0	29 to 36
PTO delivery pipe joint bolt	35 to 39	3.5 to 4.0	26 to 28
Regulating valve mounting screw	18 to 20	1.8 to 2.1	13 to 15
Hydraulic pump assembly mounting screw and nut	24 to 27	2.4 to 2.8	18 to 20
Pump cover mounting screw	40 to 44	4.0 to 4.5	29 to 32
Hydraulic cylinder hose retaining nut	35 to 48	3.5 to 4.9	26 to 35
Delivery pipe joint bolt	49 to 68	5.0 to 7.0	37 to 50
Unload plug	40 to 58	4.0 to 6.0	29 to 43
Plug 2	40 to 58	4.0 to 6.0	29 to 43
Plug 1	40 to 58	4.0 to 6.0	29 to 43
Lift arm pin mounting nut	78 to 90	7.9 to 9.2	58 to 66
Lift arm pin lock nut	63 to 72	6.4 to 7.4	47 to 53
Drawbar frame mounting screw (M14)	167 to 196	17.0 to 20.0	123 to 144
Drawbar frame mounting screw (M12)	78 to 90	7.9 to 9.2	58 to 66
Top link holder mounting screw	78 to 90	7.9 to 9.2	58 to 66
Joint bolt for delivery pipe 1 and 2	118 to 137	12.0 to 14.0	46.8 to 101

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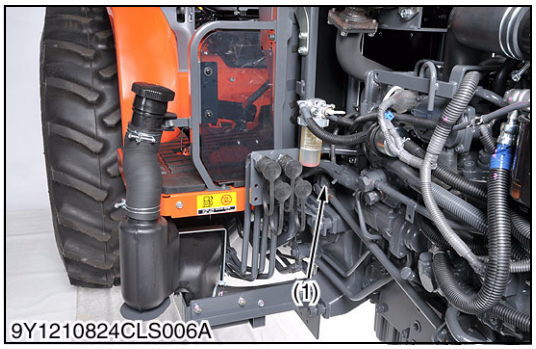
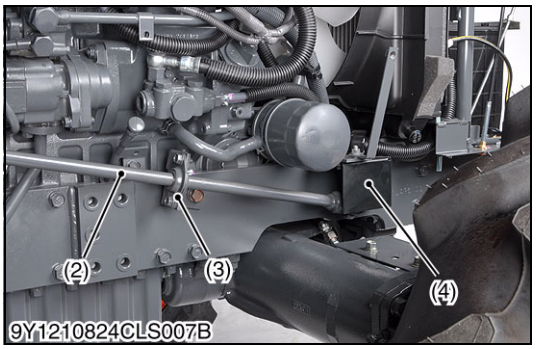
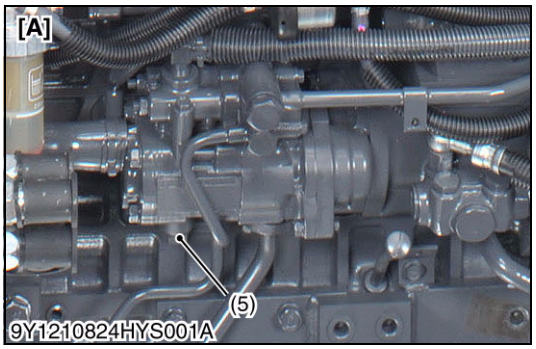
4. CHECKING AND ADJUSTING

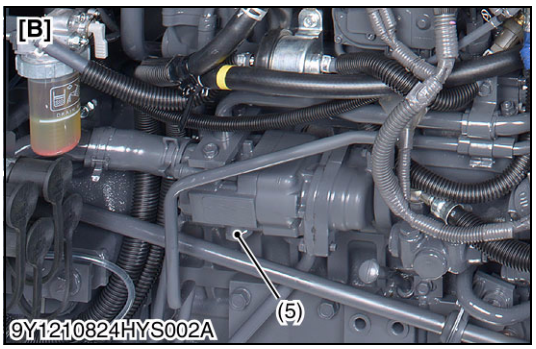
[1] HYDRAULIC PUMP (FOR POWER STEERING)

(1) Pump Test Using Flow-meter









Preparation

1. Pull down the knob and open the bonnet.
2. Remove the side skirt R.H. and front grill.
3. Remove the steering joint screw (1), cover (4), steering joint shaft (2) and steering joint shaft support (3).
4. Remove the regulator delivery pipe (5).

(When reassembling)

- Install the copper washers firmly.
- Tighten the steering joint shaft support mounting screw after adjusting the position of steering joint shaft support (3) for smooth rotation of the steering wheel.

Tightening torque	Regulator delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft

(1) Steering Joint Screw
(2) Steering Joint Shaft
(3) Steering Joint Shaft Support
(4) Cover
(5) Regulator Delivery Pipe

[A] Manual Transmission and GST
[B] HST

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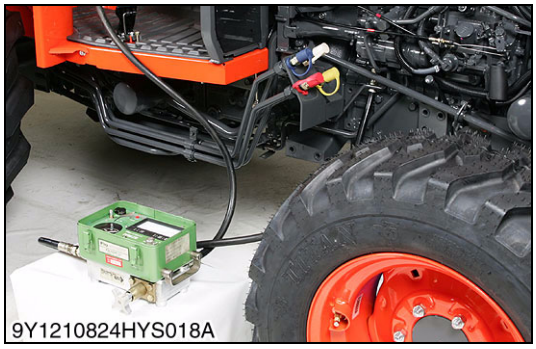

Hydraulic Flow Test (for Power Steering)

■ **IMPORTANT**

- **When using a flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with that flowmeter.**
- **Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.**

1. Loosen the delivery pipe and install the adaptor **52** to the pump discharge port.
2. Connect the hydraulic test hose to the adaptor **52** and flowmeter inlet port.
3. Connect the other hydraulic test hose to the flowmeter outlet port and to transmission fluid filling plug hole.
4. Open the flowmeter loading valve completely. (Turn counterclockwise.)
5. Start the engine and set the engine speed at 2000 to 2200 min^{-1} (rpm).
6. Slowly close the loading valve to generate pressure approx. 9.8 MPa (100 kgf/cm^2, 1422 psi). Hold in this condition until oil temperature reaches approx. 40 °C (104 °F).
7. Open the loading valve completely.
8. Refer to **"Condition"** below to set the engine speed.
9. Read and note the pump delivery at no pressure.
10. Slowly close the loading valve to increase pressure (Rated pressure). As the load is increased, engine speed drops, therefore, reset the engine speed.
11. Read and note the pump delivery at rated pressure.
12. Open the loading valve completely and stop the engine.
13. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

Condition

- Engine Speed
  Approx. 2700 min^{-1} (rpm) (Manual Transmission and GST)
  Approx. 2600 min^{-1} (rpm) (HST)
- Rated pressure
  L3560
  10.7 to 11.7 MPa (110 to 119 kgf/cm^2,1560 to 1690 psi)
  L4060, L4760, L5060, L5460, L6060
  12.7 to 13.7 MPa (130 to 139 kgf/cm^2, 1850 to 1980 psi)
- Oil Temperature
  40 to 60 °C (104 to 140 °F)

(To be continued)

(Continued)

[Manual Transmission and GST]

Hydraulic pump delivery at no pressure	Factory specification	Above 18.6 L/min. 4.91 U.S.gals/min. 4.09 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 18.2 L/min. 4.81 U.S.gals/min. 4.00 Imp.gals/min.
	Allowable limit	16.2 L/min. 4.28 U.S.gals/min. 3.56 Imp.gals/min.

[HST]

Hydraulic pump delivery at no pressure	Factory specification	Above 17.9 L/min. 4.73 U.S.gals/min. 3.94 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 17.5 L/min. 4.62 U.S.gals/min. 3.85 Imp.gals/min.
	Allowable limit	15.6 L/min. 4.12 U.S.gals/min. 3.43 Imp.gals/min.

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[2] HYDRAULIC PUMP (FOR THREE POINT HITCH)

(1) Pump Test Using Flow-meter

Preparation

1. Pull down the knob and open the bonnet.
2. Remove the side skirt R.H..
3. Remove the main delivery pipe (1).

(When reassembling)

- Install the copper washers firmly.

Tightening torque	Main delivery pipe joint bolt	49 to 54 N·m 5.0 to 5.6 kgf·m 37 to 40 lbf·ft

(1) Main Delivery Pipe

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Hydraulic Flow Test

■ **IMPORTANT**

- **When using a flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with that flowmeter.**
- **Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.**

1. Install the pump adaptor (see page G-68) with O-ring to the pump discharge port.
2. Connect the hydraulic test hose to the adaptor and flowmeter inlet port.
3. Connect the other hydraulic test hose to the flowmeter outlet port and to transmission fluid filling plug hole.
4. Open the flowmeter loading valve completely. (Turn counterclockwise.)
5. Start the engine and set the engine speed at 2000 to 2200 min^{-1} (rpm).
6. Slowly close the loading valve to generate pressure approx. 14.7 MPa (150 kgf/cm^2, 2133 psi). Hold in this condition until oil temperature reached approx. 40 °C (104 °F)
7. Open the loading valve completely.
8. Refer to **"Condition"** below to set the engine speed.
9. Read and note the pump delivery at no pressure.
10. Slowly close the loading valve to increase (Rated pressure). As the load is increased, engine speed drops, therefore, reset the engine speed.
11. Read and note the pump delivery at rated pressure.
12. Open the loading valve completely and stop the engine.
13. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

Condition

- Engine Speed
  Approx. 2700 min^{-1} (rpm) (Manual Transmission and GST)
  Approx. 2600 min^{-1} (rpm) (HST)
- Rated pressure
  L3560
  17.1 to 18.1 MPa (175 to 184 kgf/cm^2, 2480 to 2620 psi)
  L4060, L4760, L5060, L5460, L6060
  18.1 to 19.1 MPa (185 to 194 kgf/cm^2, 2630 to 2770 psi)
- Oil Temperature
  40 to 60 °C (104 to 140 °F)

(To be continued)

(Continued)

Manual Transmission and GST [L3560]

Hydraulic pump delivery at no pressure	Factory specification	Above 31.5 L/min. 8.32 U.S.gals/min. 6.93 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 30.9 L/min. 8.16 U.S.gals/min. 6.80 Imp.gals/min.
	Allowable limit	27.6 L/min. 7.29 U.S.gals/min. 6.07 Imp.gals/min.

Manual Transmission and GST [except L3560]

Hydraulic pump delivery at no pressure	Factory specification	Above 37.0 L/min. 9.77 U.S.gals/min. 8.14 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 36.3 L/min. 9.59 U.S.gals/min. 7.98 Imp.gals/min.
	Allowable limit	32.4 L/min. 8.56 U.S.gals/min. 7.13 Imp.gals/min.

HST [L3560]

Hydraulic pump delivery at no pressure	Factory specification	Above 30.4 L/min. 8.03 U.S.gals/min. 6.69 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 29.7 L/min. 7.87 U.S.gals/min. 6.56 Imp.gals/min.
	Allowable limit	26.6 L/min. 7.03 U.S.gals/min. 5.85 Imp.gals/min.

HST [except L3560]

Hydraulic pump delivery at no pressure	Factory specification	Above 35.6 L/min. 9.40 U.S.gals/min. 7.83 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 34.9 L/min. 9.22 U.S.gals/min. 7.68 Imp.gals/min.
	Allowable limit	31.2 L/min. 8.24 U.S.gals/min. 6.86 Imp.gals/min.

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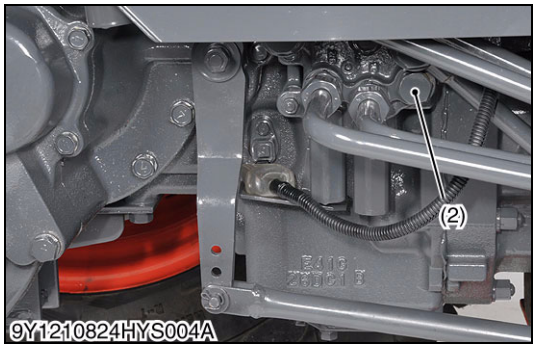
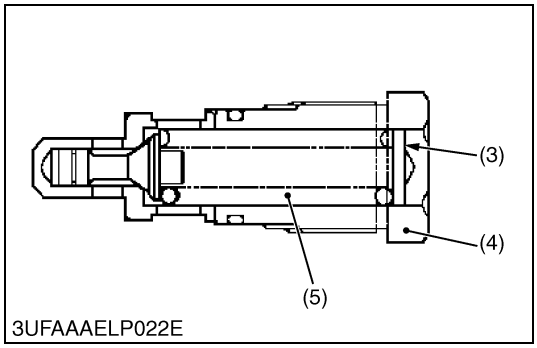
[3] RELIEF VALVE AND SAFETY VALVE





Relief Valve Setting Pressure Test Using Pressure Tester (Coupler)

1. Install the relief valve set pressure adaptor to the quick coupler (1) and then install a pressure gauge (Code No. 07916-50322), cable (Code No. 07916-50331).
2. Start the engine.
3. Refer to **"Condition"** below to set the engine speed.
4. Set the front loader control valve operation lever to the **Left** position and read the pressure gauge when the relief valve is actuated.
5. If the pressure is not within the factory specification, adjust the shim (3).

Condition

- Engine speed
  Approx. 2700 min^{-1} (rpm) (Manual Transmission and GST)
  Approx. 2600 min^{-1} (rpm) (HST)
- Oil temperature
  40 to 60 °C (104 to 140 °F)

(Reference)

- Thickness of shims (3)
  0.1 mm (0.0039 in.)
  0.2 mm (0.0079 in.)
  0.4 mm (0.0157 in.)
- Pressure change per 0.1 mm (0.0039 in.) shim
  Approx. 264.8 kPa (2.7 kgf/cm^2, 38.4 psi)

Tightening torque	Relief valve assembly	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

Relief valve setting pressure	Factory specification	L3560	17.1 to 18.1 MPa 175 to 184 kgf/cm^2 2480 to 2620 psi
		L4060 L4760 L5060 L5460 L6060	18.1 to 19.1 MPa 185 to 194 kgf/cm^2 2630 to 2770 psi

(1) Quick Coupler
(2) Relief Valve
(3) Shim
(4) Plug
(5) Spring

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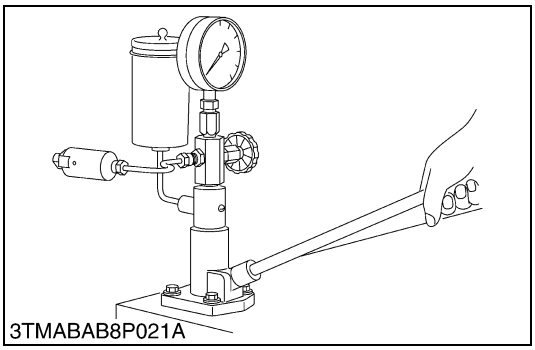

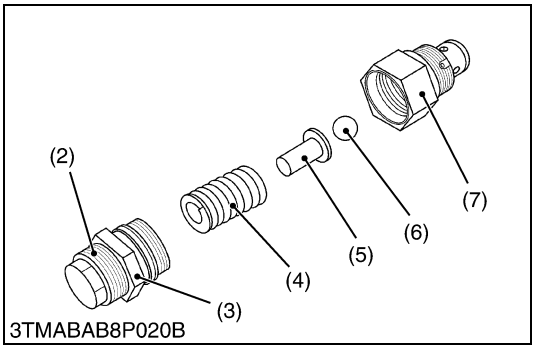

Safety Valve Setting Pressure Test Using Injection Nozzle Tester

1. Remove the safety valve assembly (1).
2. Attach the safety valve assembly (1) to a safety valve tester with a safety valve setting adaptor (see page G-69).
3. Measure the operating pressure of the safety valve.
4. If the operating pressure is not within the factory specifications, adjust by turning the adjusting screw (2).
5. After adjustment, tighten the lock nut (3) firmly.

(When reassembling)

- When installing the safety valve to the rear hydraulic block, be careful not to damage the O-ring and apply transmission fluid.

Tightening torque	Safety valve assembly	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Safety valve lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft

Safety valve operating pressure	Factory specification	19.6 to 22.6 MPa 200 to 230 kgf/cm^2 2850 to 3270 psi

■ **NOTE**

- **Use specified transmission fluid (see page G-9) to test the operating pressure of the cylinder safety valve.**

(1) Safety Valve Assembly
(2) Adjusting Screw
(3) Lock Nut
(4) Spring
(5) Seat
(6) Ball
(7) Housing

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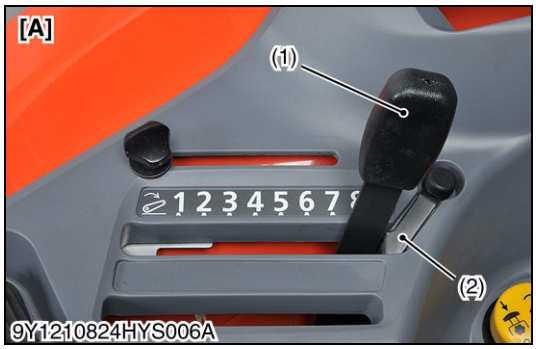
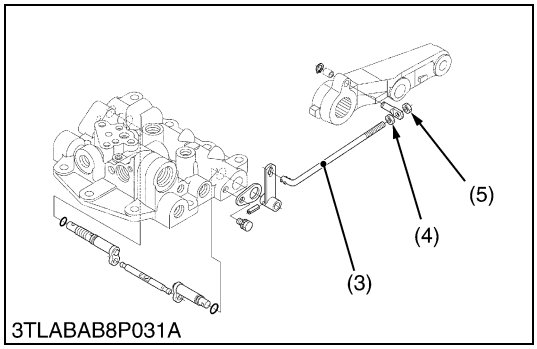
[4] POSITION CONTROL ROD





Adjusting Uppermost Position of Lift Arm

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and after warming-up, set the engine speed at the idling.
3. Move the position control lever (1) to the uppermost position. [Contact to the position control lever stopper (2).]
4. While pulling the feedback rod to the rear, turn the adjusting nut (4) clockwise until the relief valve begins to be operated.
5. From the relief valve operating position, turn back the adjusting nut (4) counterclockwise by 2 turns.
6. Tighten the lock nut (5).
7. Set the engine speed at the maximum.
8. Move the position control lever (1) to the lowest position and uppermost position to check the relief valve does not operate.
9. Set the position control lever (1) to the uppermost position, then move the lift arm to the upper end by hand and measure the free play.
10. If the measurement is not within the factory specifications, adjust the position control feedback rod setting length.
    - To reduce lift arm free play →
      Shorten the position control feedback rod setting length.
    - To increase lift arm free play →
      Lengthen the position control feedback rod setting length.

Lift arm free play at maximum raising position	Factory specification	10 to 15 mm 0.39 to 0.59 in.

(1) Position Control Lever
(2) Stopper
(3) Position Control Feedback Rod
(4) Adjusting Nut
(5) Lock Nut

[A] ROPS Type
[B] CABIN Type

9Y1210824HYS0010US0

5. DISASSEMBLING AND ASSEMBLING

[1] HYDRAULIC PUMP

■ **IMPORTANT**

- **The hydraulic pump is precision machined and assembled: if disassemble once, it may be unable to keep its original performance. Therefore, when the hydraulic pump fails, replacement should be done with the hydraulic pump assembled except when emergency repair is unavoidable.**
- **When repair is required, follow the disassembly and servicing procedures shown below with utmost care.**
- **Be sure to test the hydraulic pump with a flowmeter before disassembling.**
- **After reassembly, be sure to perform break-in operation and ensure that there is nothing abnormal with the hydraulic pump.**

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(1) Removing Hydraulic Pump Assembly

Bonnet and Side Skirt R.H.

1. Pull down the knob (2) and open the bonnet (1).
2. Remove the side skirt R.H. (3).

(1) Bonnet
(2) Knob
(3) Side Skirt R.H.

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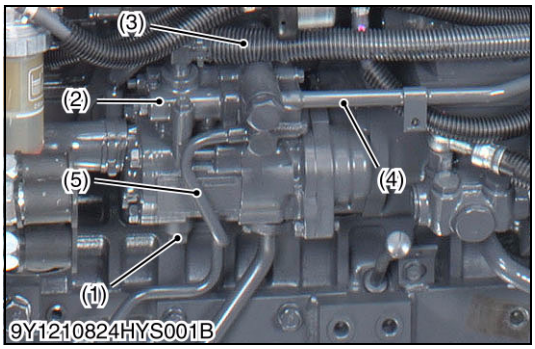

Regulating Valve (Manual Transmission and GST)

1. Disconnect the power steering delivery pipe (4) and return hose (3).
2. Disconnect the PTO delivery pipe (5) and regulator delivery pipe (1).
3. Remove the regulating valve (2).

(When reassembling)

- Apply grease to the O-ring and be careful not to damage it.
- Install the copper washers firmly.

Tightening torque	Power steering delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	PTO delivery pipe joint bolt	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Regulator delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Regulating valve mounting screw	18 to 20 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

(1) Regulator Delivery Pipe
(2) Regulating Valve
(3) Return Hose
(4) Power Steering Delivery Pipe
(5) PTO Delivery Pipe

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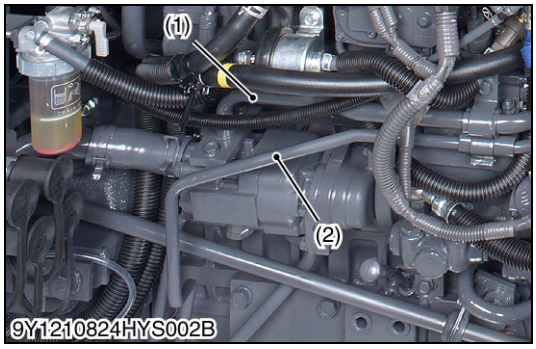

Power Steering Delivery Pipe and Oil Cooler Return Pipe

1. Disconnect the power steering delivery pipe (2) and oil cooler return pipe (1).

(When reassembling)

- Install the copper washers firmly.
- Be careful not to damage the O-ring.

Tightening torque	Power steering delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft

(1) Oil Cooler Return Pipe
(2) Power Steering Delivery Pipe

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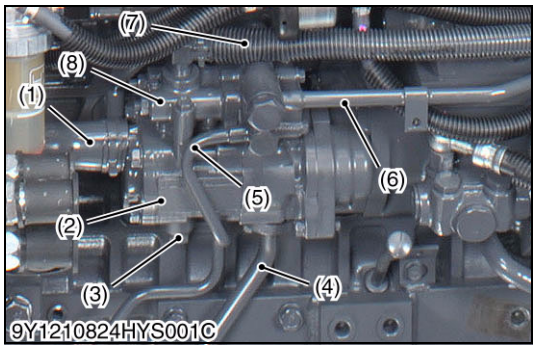

Hydraulic Pump Assembly

1. Disconnect the power steering delivery pipe (6) and return hose (7).
2. Disconnect the PTO delivery pipe (5) and regulator delivery pipe (3).
3. Remove the regulating valve (8).
4. Disconnect the suction hose (1) and main delivery pipe (4).
5. Remove the hydraulic pump assembly (2).

(When reassembling)

- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Suction Hose
(2) Hydraulic Pump Assembly
(3) Regulator Delivery Pipe
(4) Main Delivery Pipe
(5) PTO Delivery PIpe
(6) Power Steering Delivery Pipe
(7) Return Hose
(8) Regulator Valve

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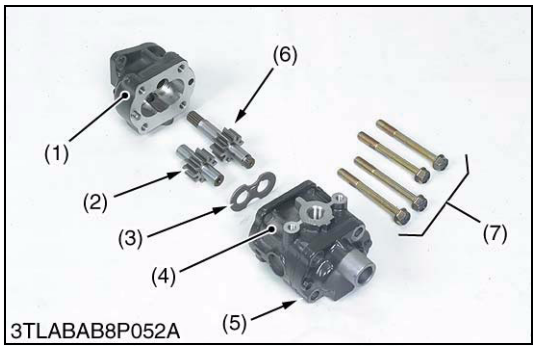
(2) Disassembling Hydraulic Pump



Hydraulic Pump Assembly

1. Remove the pump cover mounting screws (7).
2. Remove the drive gear (6), driven gear (2) and side plate (3) from the casing.

(When reassembling)

- Be careful not to damage the gasket.
- Align the hole of the pump cover (5) and casing 2 (4).
- Install the side plate, noting its location and direction.
- Install the gears, noting its direction.

Tightening torque	Pump cover mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

(1) Casing 1
(2) Driven Gear
(3) Side Plate
(4) Casing 2
(5) Pump Cover
(6) Drive Gear
(7) Screw

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Hydraulic Pump Running-In

After reassembly, perform break-in operation in the following manner, and check the pump for abnormality before use. If the pump temperature should rise noticeably during running-in, recheck should be performed.

1. Install the hydraulic pump to the tractor, and mount the suction pipe and delivery pipe securely.
2. Set the engine speed at 1300 to 1500 min^{-1} (rpm), and operate the hydraulic pump at no load for about 10 minutes.
3. Set the engine speed at 2000 to 2200 min^{-1} (rpm), and with the hydraulic pump applied with 2.94 MPa (30.0 kgf/cm^2, 426 psi) to 4.90 MPa (50.0 kgf/cm^2, 711 psi) pressure, operate it for approx. 15 minutes.
4. With the engine set to maximum speed, fully turn the steering wheel to the left or right, then actuate the relief valve five times for 25 seconds (one time 5 seconds).

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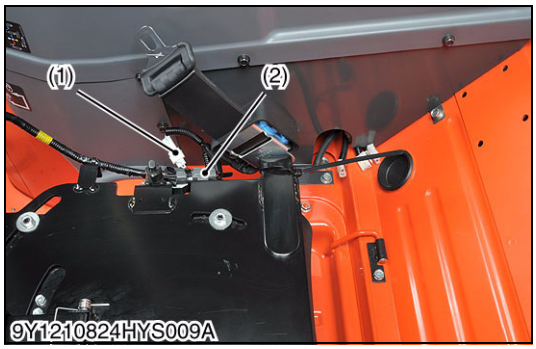
[2] THREE POINT HITCH HYDRAULIC BLOCK ASSEMBLY

(1) Separating Hydraulic Block Assembly



Seat and Seat Bracket

1. Disconnect the seat switch connector (1) and seat tilt switch connector (2).
2. Remove the seat (3).
3. Remove the seat suspension (4) together with seat bracket (5).

(1) Seat Switch Connector
(2) Seat Tilt Switch Connector
(3) Seat
(4) Seat Suspension
(5) Seat Bracket

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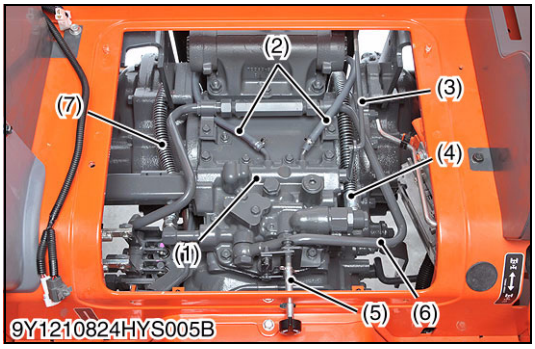

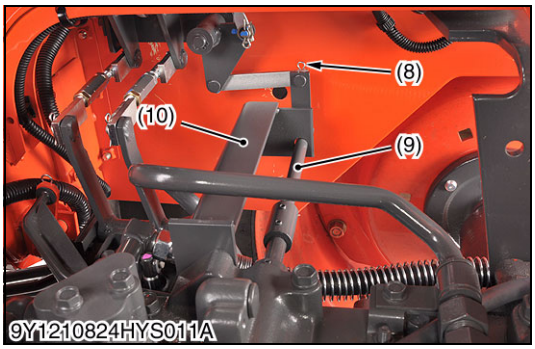

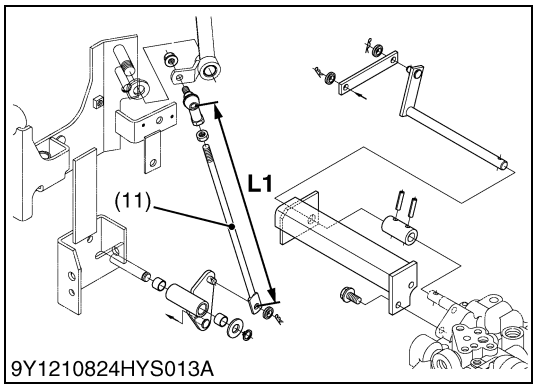

Rear Hydraulic Block

1. Disconnect the position control feedback rod (3) and return hoses (2).
2. Remove the lowering speed adjusting valve joint shaft (5).
3. Disconnect the delivery pipe (6).
4. Disconnect the hydraulic cylinder hose R.H. (7) and hydraulic cylinder hose L.H. (4).
5. Remove the ß pin (8), position lever (9) and position link bracket (10).
6. Remove the rear hydraulic block (1).

(When reassembling)

- Install the copper washers firmly.
- Visually inspect the gasket, if damaged replace with new one.
- After reassembling, be sure to adjust the position control feedback rod length. (See page 8-S13.)

Tightening torque	Hydraulic cylinder hose retaining nut	35 to 48 N·m 3.5 to 4.9 kgf·m 26 to 35 lbf·ft
	Delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

Length **"L1"**	Reference value	323.5 mm 12.74 in.

(1) Rear Hydraulic Block
(2) Return Hose
(3) Position Control Feedback Rod
(4) Hydraulic Cylinder Hose L.H.
(5) Lowering Speed Adjusting Valve Joint Shaft
(6) Delivery Pipe
(7) Hydraulic Cylinder Hose R.H.
(8) ß pin
(9) Position Lever
(10) Position Link Bracket
(11) Position Lever Rod

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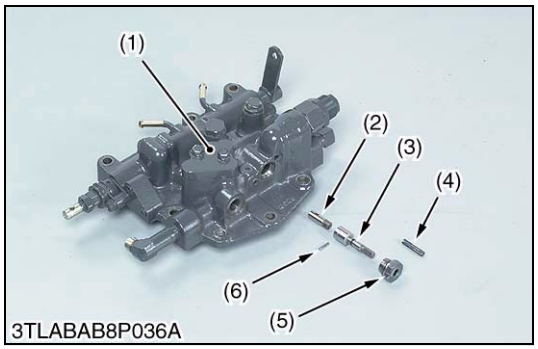
(2) Disassembling Hydraulic Assembly



Lowering Speed Adjusting Valve

1. Draw out the spring pin (4).
2. Remove the holder (5).
3. Draw out the lowering speed adjusting shaft (3), dowel pin (6) and rotor (2).

(When reassembling)

- Be careful not to damage the O-rings.

(1) Rear Hydraulic Block
(2) Rotor
(3) Lowering Speed Adjusting Shaft
(4) Spring Pin
(5) Holder
(6) Dowel Pin

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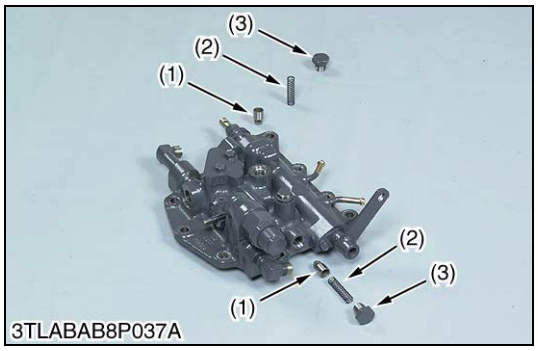

Check Valves

1. Remove the plug (3).
2. Draw out the spring (2) and poppet (1).

(When reassembling)

- Be careful not to damage the O-ring.

(1) Poppet
(2) Spring
(3) Plug

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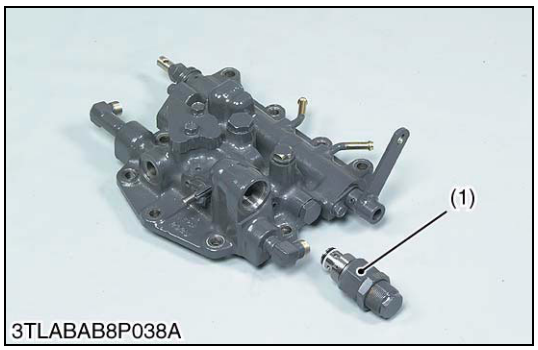


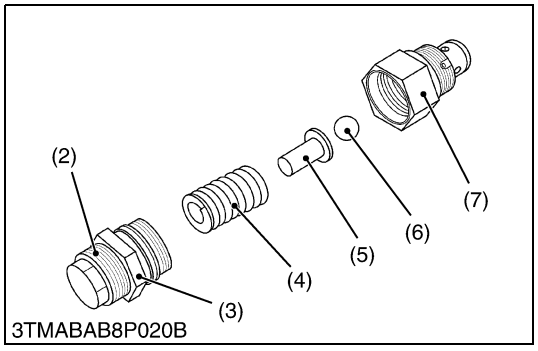
Cylinder Safety Valve

1. Remove the cylinder safety valve assembly (1).
2. Secure the cylinder safety valve assembly in a vise.
3. Loosen the lock nut (3), and remove the adjust screw (2).
4. Draw out the spring (4), seat (5), and ball (6).

(When reassembling)

- Be careful not to damage the O-rings.

Tightening torque	Cylinder safety valve assembly	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Cylinder safety valve lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft



■ **IMPORTANT**

- **After disassembling and assembling the cylinder safety valve assembly, be sure to check the operating pressure.**

(1) Cylinder Safety Valve Assembly
(2) Adjusting Screw
(3) Lock Nut
(4) Spring
(5) Seat
(6) Ball
(7) Housing

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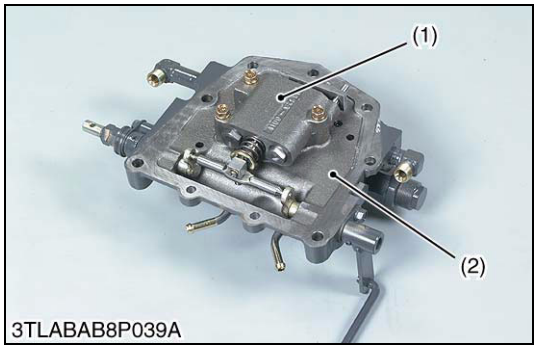

Position Control Valve

1. Remove the position control valve (1) from rear hydraulic block (2).

(When reassembling)

- Be careful not to damage the O-rings.

(1) Position Control Valve
(2) Rear Hydraulic Block

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[3] POSITION CONTROL VALVE

(1) Separating Control Valve

Separating Hydraulic Block Assembly

• See page 8-S19.

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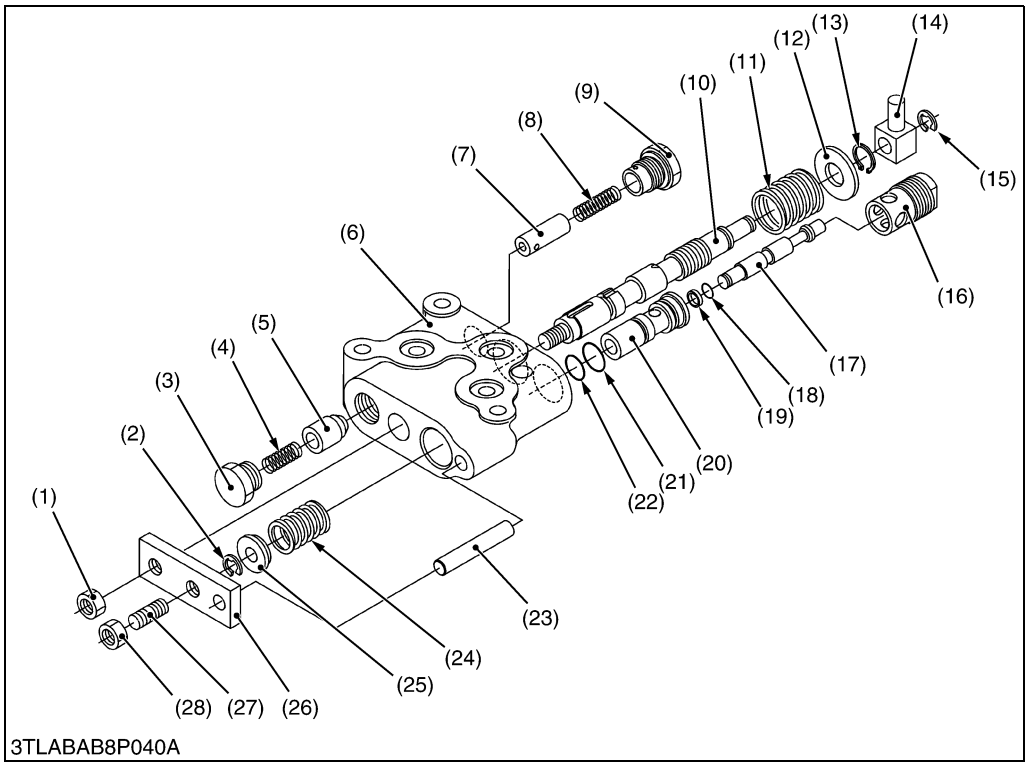
Disassembling Position Control Valve



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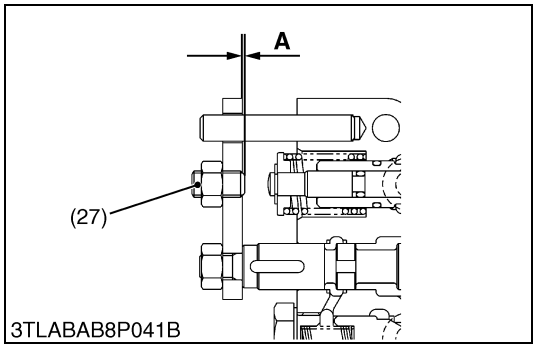
(1) Nut
(2) External Snap Ring
(3) Unload Plug
(4) Spring
(5) Unload Poppet
(6) Valve Body
(7) Unload Poppet 2
(8) Spring
(9) Plug 2
(10) Spool
(11) Spring
(12) Plain Washer
(13) External Snap Ring
(14) Spool Joint
(15) External Snap Ring
(16) Plug 1
(17) Poppet 2
(18) O-ring
(19) Backup Ring
(20) Sleeve
(21) O-ring
(22) O-ring
(23) Dowel Pin
(24) Spring
(25) Spring Seat
(26) Connecting Plate
(27) Adjusting Screw
(28) Nut



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1. Remove the nut (1), and draw out the spool (10).
2. Remove the unload plug (3), and draw out the spring (4), unload poppet (5).
3. Remove the plug 2 (9), and draw out the spring (8), unload poppet 2 (7).
4. Remove the external snap ring (2), spring seat (25) and spring (24).
5. Remove the plug 1 (16), and draw out the poppet 2 (17), sleeve (20).

■ **NOTE**

- **Do not loosen the adjusting screw (27) unless necessary. If disassembled due to unavoidable reasons, be sure to set the dimension "A" to 0.2 mm (0.008 in.).**

(When reassembling)

- Be careful not to damage the backup ring and O-rings.

Tightening torque	Unload plug	40 to 58 N·m 4.0 to 6.0 kgf·m 29 to 43 lbf·ft
	Plug 2	40 to 58 N·m 4.0 to 6.0 kgf·m 29 to 43 lbf·ft
	Plug 1	40 to 58 N·m 4.0 to 6.0 kgf·m 29 to 43 lbf·ft

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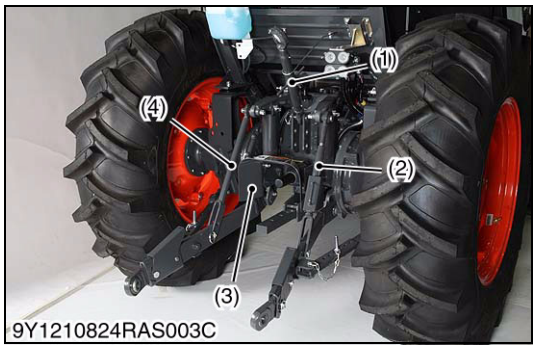
[4] LIFT ARM SUPPORT AND HYDRAULIC CYLINDER

(1) Separating Hydraulic Cylinder



Top Link, Lift Rod and PTO Cover

1. Remove the top link (1), lower links and PTO cover (3).
2. Disconnect the lift rods (2), (4) from lift arm.

(When reassembling)

Tightening torque	Lift arm pin mounting nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Lift arm pin lock nut	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

(1) Top Link
(2) Lift Rod R.H.
(3) PTO Cover
(4) Lift Rod L.H.

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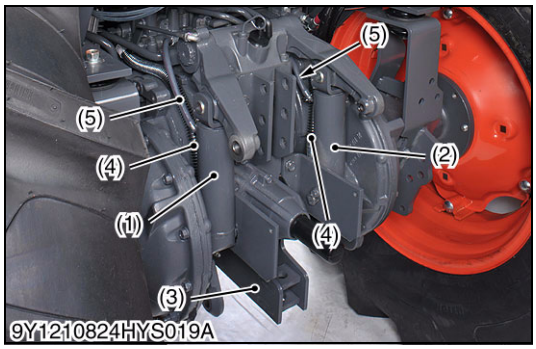

Drawbar Frame and Hydraulic Cylinder

1. Remove the drawbar frame (3).
2. Remove the hydraulic cylinder pins.
3. Disconnect the hydraulic cylinder hoses (4) and return hoses (5), then remove the hydraulic cylinders (1), (2).

(When reassembling)

- Apply grease to the hydraulic cylinder pins.
- Install the cylinder pin (lower) from right hand side.

Tightening torque	Drawbar frame mounting screw (M14)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Drawbar frame mounting screw (M12)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Hydraulic cylinder hose retaining nut	35 to 48 N·m 3.5 to 4.9 kgf·m 26 to 35 lbf·ft

(1) Hydraulic Cylinder L.H.
(2) Hydraulic Cylinder R.H.
(3) Drawbar Frame
(4) Hydraulic Cylinder Hose
(5) Return Hose

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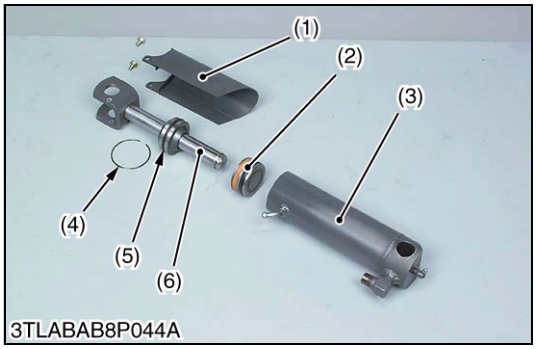
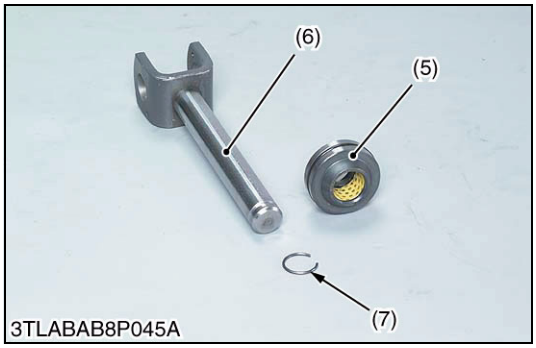
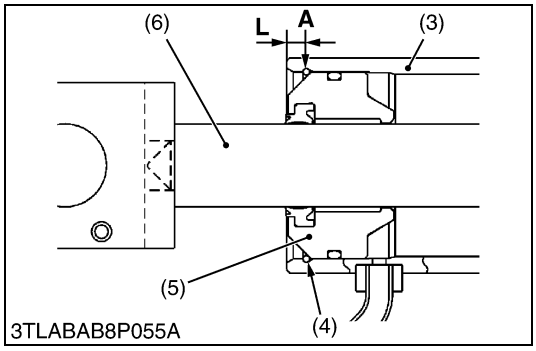
(2) Disassembling Hydraulic Cylinder







Hydraulic Cylinder

1. Remove the cylinder cover (1).
2. Remove the liquid gasket from top of head (5).
3. Slightly tap-in the head (5) to inside, and remove the internal snap ring (4) by using the small screwdriver.
4. If the internal snap ring (4) cannot be removed by above-mentioned method, remove it by the following procedure.
   - Carefully clamp the cylinder tube (3) in a vise.
   - Drill approx. 2.5 mm (0.1 in.) diameter hole on the cylinder tube (position **"A"**) just over the internal snap ring (4) as shown in figure.
   - Use a small screwdriver and remove the internal snap ring (4). Simultaneously support this action by pushing from the outside of the cylinder tube with another small screwdriver or similar tool.
5. Draw out the rod (6) and head (5).
6. Inject the compressed air through the oil inlet port of the cylinder tube (3), and remove the piston (2).
7. Remove the external snap ring (7), and remove the head (5).

(When reassembling)

- Apply transmission fluid to the piston (2), head (5) and cylinder tube (3).
- Be careful not to damage the O-ring, backup ring and seal.
- Apply liquid gasket (Three Bond 1208C or equivalent) to the top of head (5), while pressing the head (5) against internal snap ring (4).
- After reassembling the cylinder, be sure to close the drilled hole by liquid gasket.

(1) Cylinder Cover
(2) Piston
(3) Cylinder Tube
(4) Internal Snap Ring
(5) Head
(6) Rod
(7) External Snap Ring

A: Position for drilling
L: 6.0 mm (0.24 in.)

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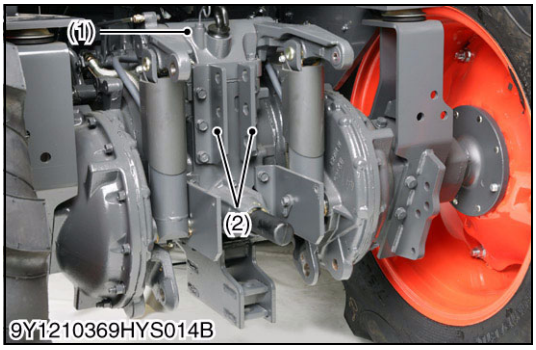
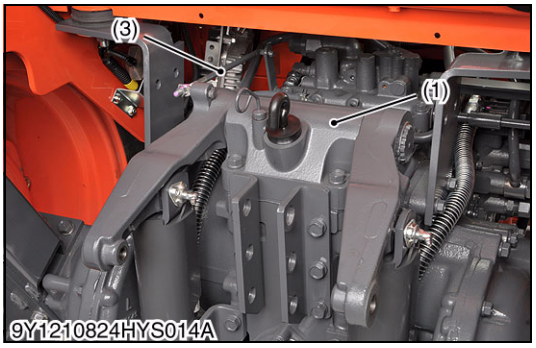
(3) Separating Lift Arm Support





Top Link Holder and Lift Arm Support

1. Disconnect the position control feedback rod (3).
2. Remove the top link holder (2).
3. Remove the lift arm support (1).

(When reassembling)

- Apply liquid gasket (Three Bond 1208C or equivalent) to joint face of the lift arm support and transmission case after eliminate the water, oil and stuck liquid gasket.
- After reassembling, be sure to adjust the position control feedback rod length. (See page 8-S13.)

Tightening torque	Top link holder mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Lift Arm Support
(2) Top Link Holder
(3) Position Control Feedback Rod

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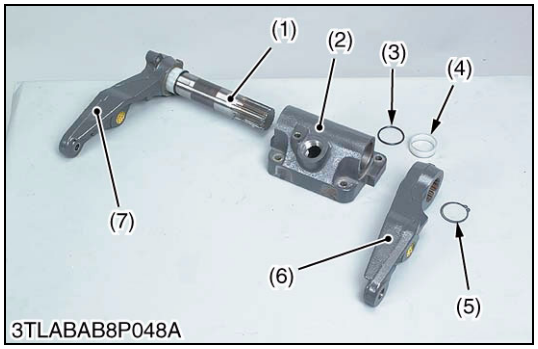
(4) Disassembling Lift Arm Shaft



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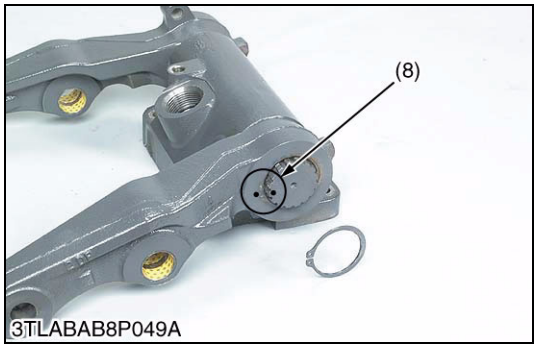

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Lift Arm and Lift Arm Shaft

1. Remove the external snap ring (5).
2. Remove the lift arm R.H. (6).
3. Draw out the lift arm shaft (1) and lift arm L.H. (7) as a unit.
4. Remove the collar (4) and O-ring (3).

(When reassembling)

- Align the alignment marks (8) of the lift arm shaft and lift arms.
- Apply grease to the right and left bushings of lift arm support and O-rings.
- Be careful not to damage the O-rings.

(1) Lift Arm Shaft
(2) Lift Arm Support
(3) O-ring
(4) Collar
(5) External Snap Ring
(6) Lift Arm R.H.
(7) Lift Arm L.H.
(8) Alignment Mark

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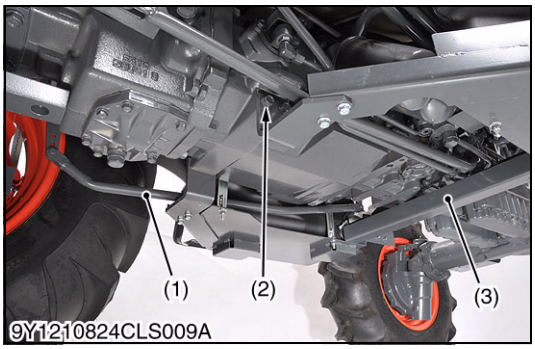
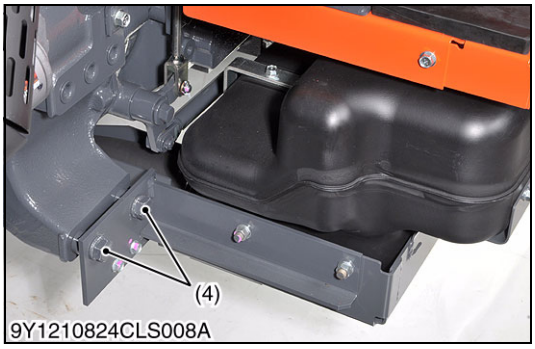
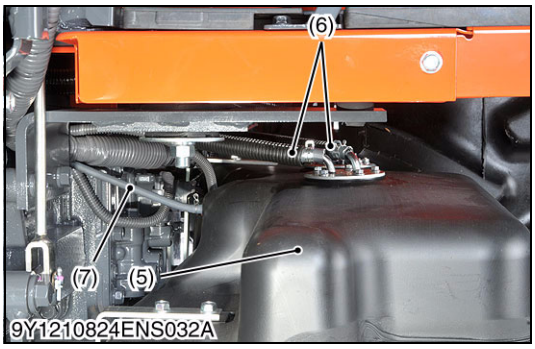
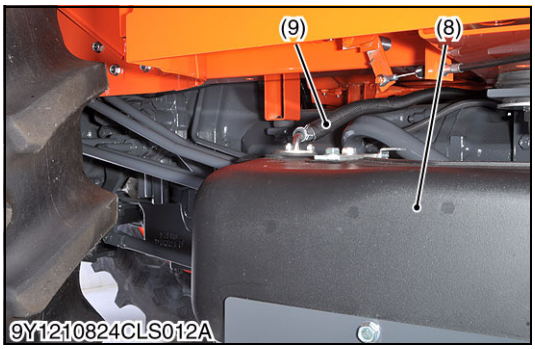
[5] FRONT LOADER CONTROL VALVE AND RELIEF VALVE

(1) Removing Front Loader Control Valve Assembly









Fuel Tanks

1. Remove the left step.
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (1).
4. Place the disassembling stands under the right and left fuel tanks (5), (8).
5. Remove the front (4) and rear support mounting screws (2) of the right and left fuel tanks (5), (8).
6. Lower the fuel tanks (5), (8) together with the disassembling stands.
7. Disconnect the fuel hoses (6), overflow hose (7) and fuel level sensor connector from the fuel tank L.H. (5).
8. Disconnect the fuel hose (9) from the fuel tank R.H. (8).

(1) Brake Rod L.H.
(2) Rear Support Mounting Screw
(3) Fuel Hose Cover
(4) Front Support Mounting Screw
(5) Fuel Tank L.H.
(6) Fuel Hose
(7) Overflow Hose
(8) Fuel Tank R.H.
(9) Fuel Hose

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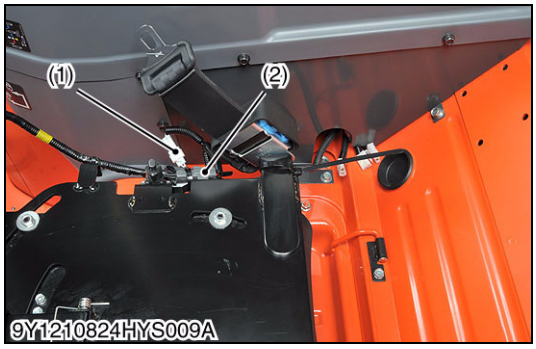

Seat and Seat Bracket

1. Disconnect the seat switch connector (1) and seat tilt switch connector (2).
2. Remove the seat (3).
3. Remove the seat suspension (4) together with seat bracket (5).

(1) Seat Switch Connector
(2) Seat Tilt Switch Connector
(3) Seat
(4) Seat Suspension
(5) Seat Bracket

9Y1210824HYS0018US0

Rear Wheel

1. Place the disassembling stand under the transmission case.
2. Remove the rear wheel mounting screws and nuts.
3. Remove the rear wheel R.H. (1).

(1) Rear Wheel R.H.

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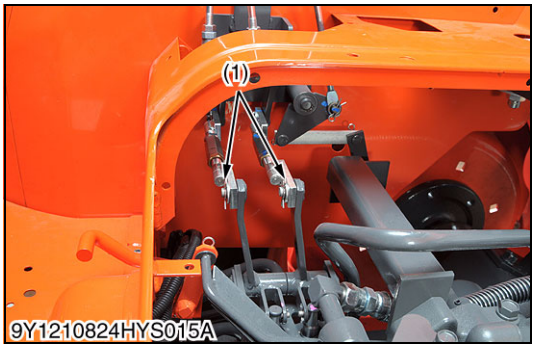

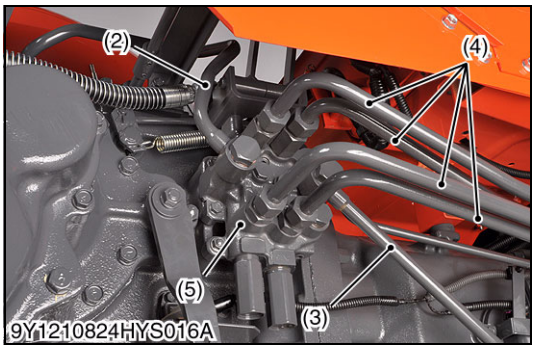

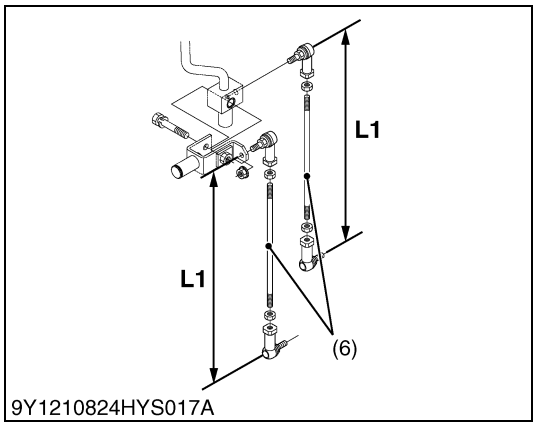

Front Loader Control Valve

1. Remove the ß pin (1).
2. Remove the delivery pipe 2 (2) and delivery pipe 1 (3).
3. Remove the front loader pipes (4).
4. Remove the front loader control valve assembly (5).

(When reassembling)

Tightening torque	Joint bolt for delivery pipe 1 and 2	118 to 137 N·m 12.0 to 14.0 kgf·m 46.8 to 101 lbf·ft

Length **"L1"**	Reference value	283 mm 11.1 in.

(1) ß Pin
(2) Delivery Pipe 2
(3) Delivery Pipe 1
(4) Front Loader Pipe
(5) Front Loader Control Valve Assembly
(6) Front Loader Lever Rod

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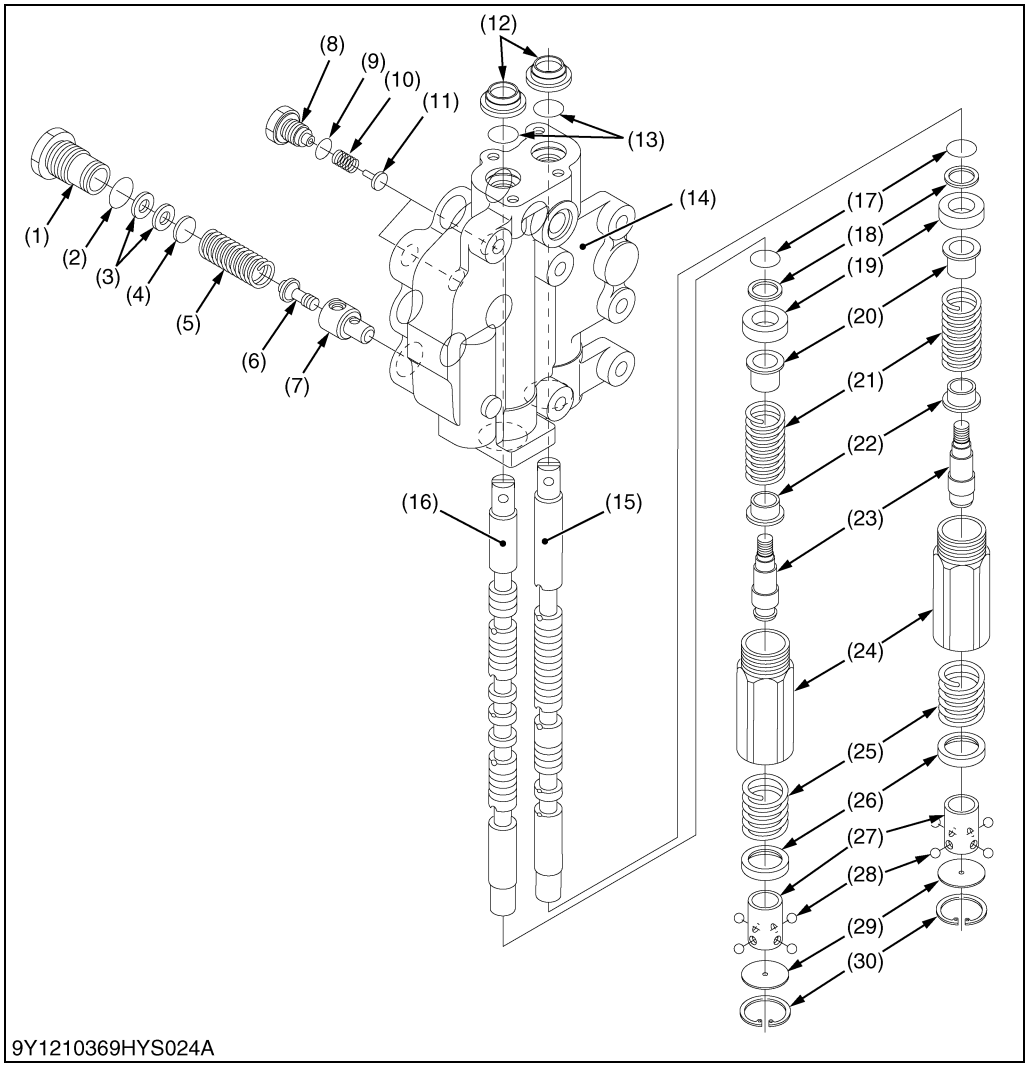
(2) Disassembling Front Loader Control Valve and Relief Valve



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(1) Plug
(2) O-ring
(3) Washer
(4) Shim
(5) Spring
(6) Poppet 2
(7) Poppet 1
(8) Plug
(9) O-ring
(10) Spring
(11) Check Valve
(12) Dust Seal
(13) O-ring
(14) Valve Body
(15) Spool for Boom
(16) Spool for Bucket
(17) O-ring
(18) Backup Ring
(19) Collar
(20) Spring Holder 1
(21) Spring
(22) Spring Holder 2
(23) Detent Bolt 1
(24) Plug
(25) Detent Spring
(26) Detent Ring
(27) Stopper
(28) Ball
(29) Plate
(30) Internal Snap Ring

■ **Boom Control Section and Bucket Control Section**

1. Remove the plug (8), spring (10) and load check valve (11).
2. Remove the plug (24) from valve body (14).
3. Remove the internal snap ring (30), stopper (27), detent spring (25), detent ring (26), and ball (28).
4. Draw out the spool (15), (16) with other component parts from valve body (14).

■ **Relief Valve**

1. Remove the plug (1), spring (5) and poppet (6), (7).

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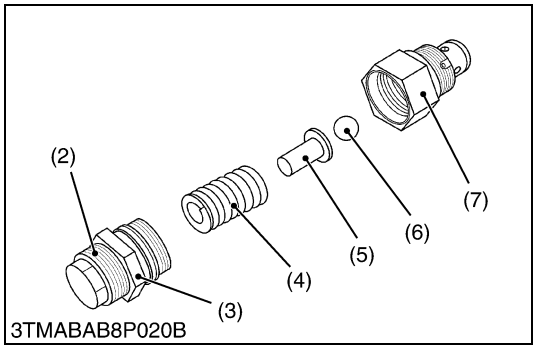
[6] SAFETY VALVE



Disassembling Safety Valve

1. Remove the safety valve assembly (1).
2. Secure the safety valve assembly in a vise.
3. Loosen the lock nut (3), and remove the adjust screw (2).
4. Draw out the spring (4), seat (5) and ball (6).

(When reassembling)

- When installing the safety valve to the hydraulic cylinder block, be careful not to damage the O-ring.

Tightening torque	Safety valve assembly	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Safety valve lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft

(1) Safety Valve Assembly
(2) Adjust Screw
(3) Lock Nut
(4) Spring
(5) Seat
(6) Ball
(7) Housing

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6. SERVICING
[1] LIFT ARM


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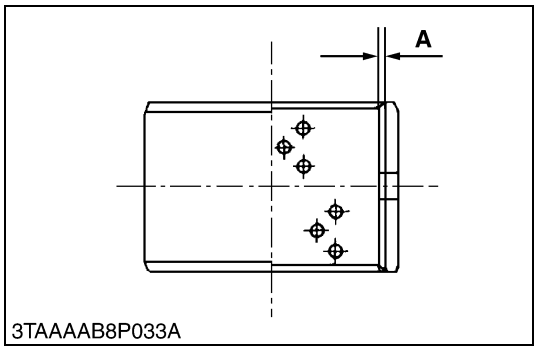

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Lift Arm Support Bushing

1. Visually inspect the DX bushings for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion **"A"**, replace it.

(Reference)

Lift arm support bushing	Alloy thickness **"A"**	0.57 mm 0.022 in.

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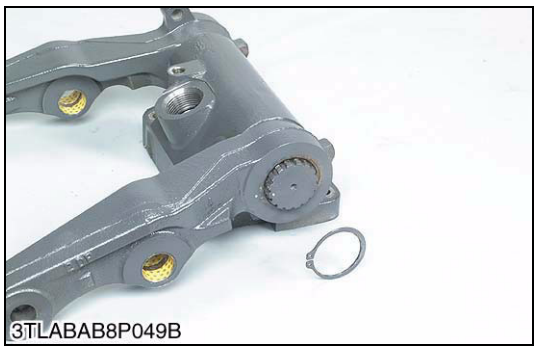
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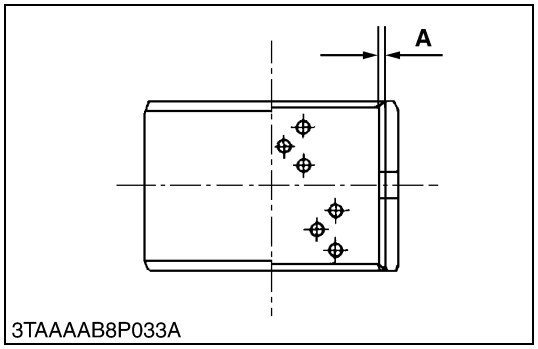

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Lift Arm Bushing

1. Visually inspect the DX bushings for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion **"A"**, replace it.

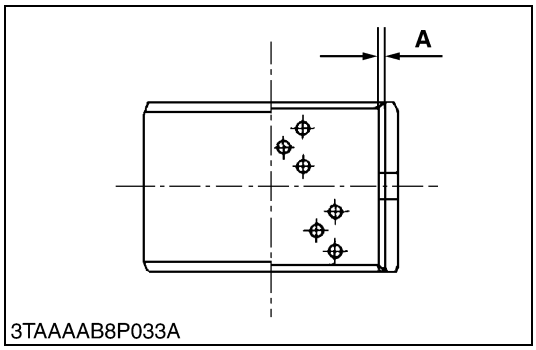
(Reference)

Lift arm bushing	Alloy thickness **"A"**	0.57 mm 0.022 in.

9Y1210824HYS0036US0

[2] HYDRAULIC CYLINDER


3TLABAB8P045B



3TAAAAB8P033A


3TLABAB8P050A

Hydraulic Cylinder Rod Bushing

1. Visually inspect the DX bushings for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion **"A"**, replace it.

(Reference)

Hydraulic cylinder rod bushing	Alloy thickness **"A"**	0.57 mm 0.022 in.

9Y1210824HYS0037US0

Hydraulic Cylinder I.D.

1. Measure the hydraulic cylinder I.D. with a cylinder gauge.
2. If the cylinder I.D. exceed the allowable limit, replace the cylinder tube.

Hydraulic cylinder I.D.	Factory specification	55.000 to 55.074 mm 2.1654 to 2.1682 in.
	Allowable limit	55.100 mm 2.1693 in.

9Y1210824HYS0038US0

[3] HYDRAULIC PUMP

Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with an inside micrometer or cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the gear shaft and the bushings as a unit.

Clearance between bushing and gear shaft	Factory specification	0.020 to 0.081 mm 0.00079 to 0.0031 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory specification	14.970 to 14.980 mm 0.58937 to 0.58976 in.
Bushing I.D.	Factory specification	15.000 to 15.051 mm 0.59056 to 0.59256 in.

9Y1210824HYS0039US0

Side Plate Thickness

1. Measure the side plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Side plate thickness	Factory specification	2.48 to 2.50 mm 0.0977 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

9Y1210824HYS0040US0

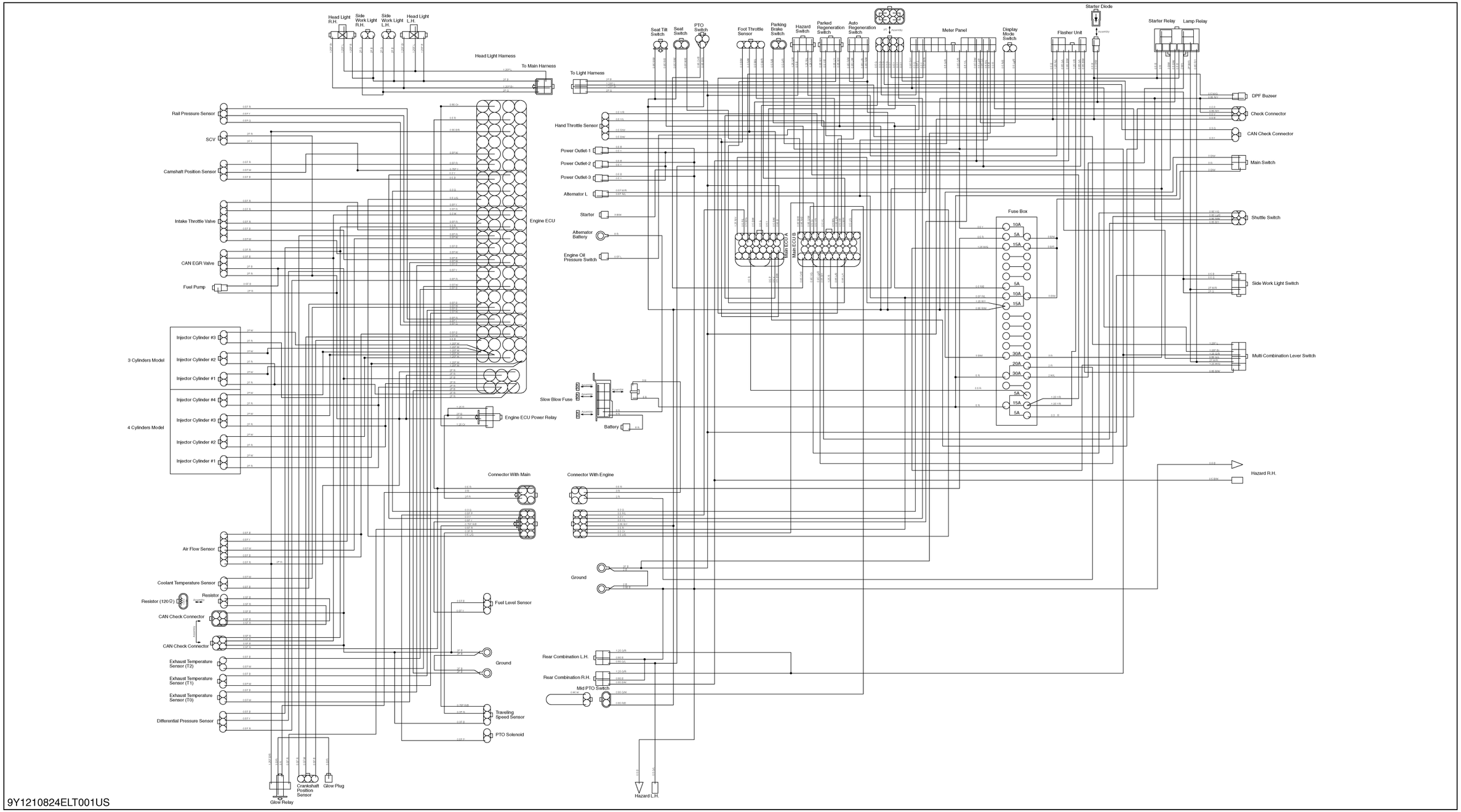
9 ELECTRICAL SYSTEM

MECHANISM

CONTENTS

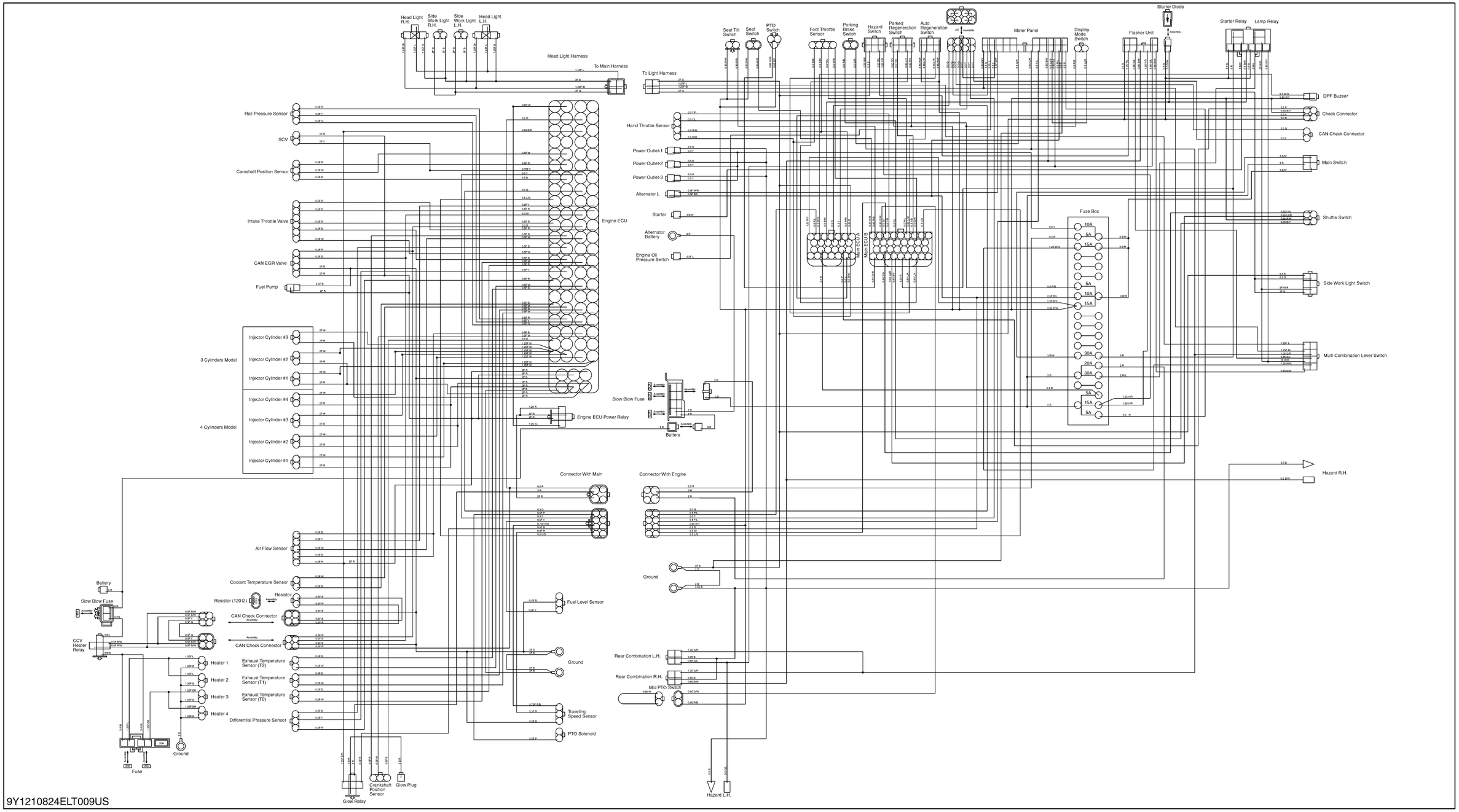
1. WIRING DIAGRAM

[1] MANUAL TRANSMISSION (WITHOUT CCV HEATER)



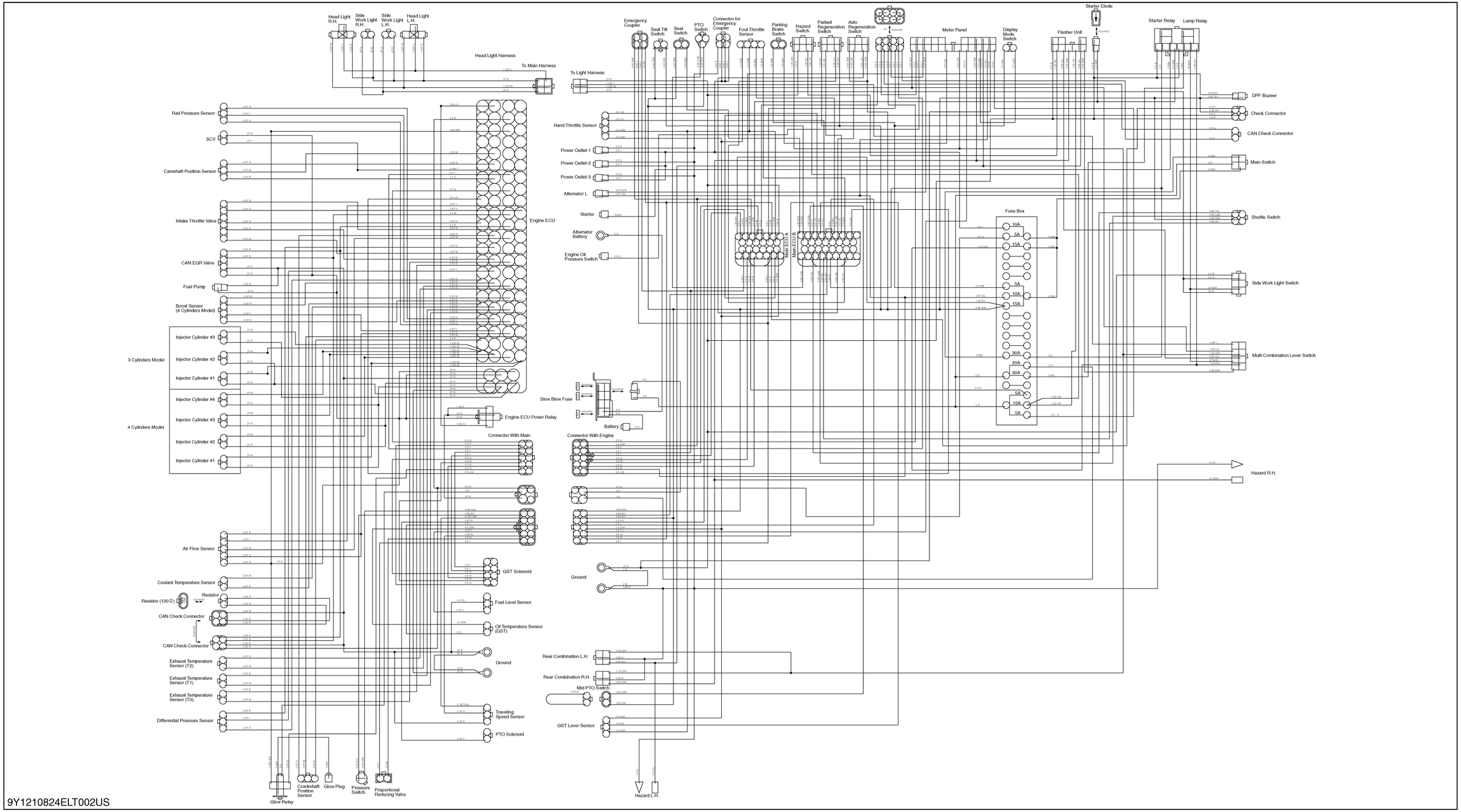
9Y1210824ELT001US

[2] MANUAL TRANSMISSION (WITH CCV HEATER)



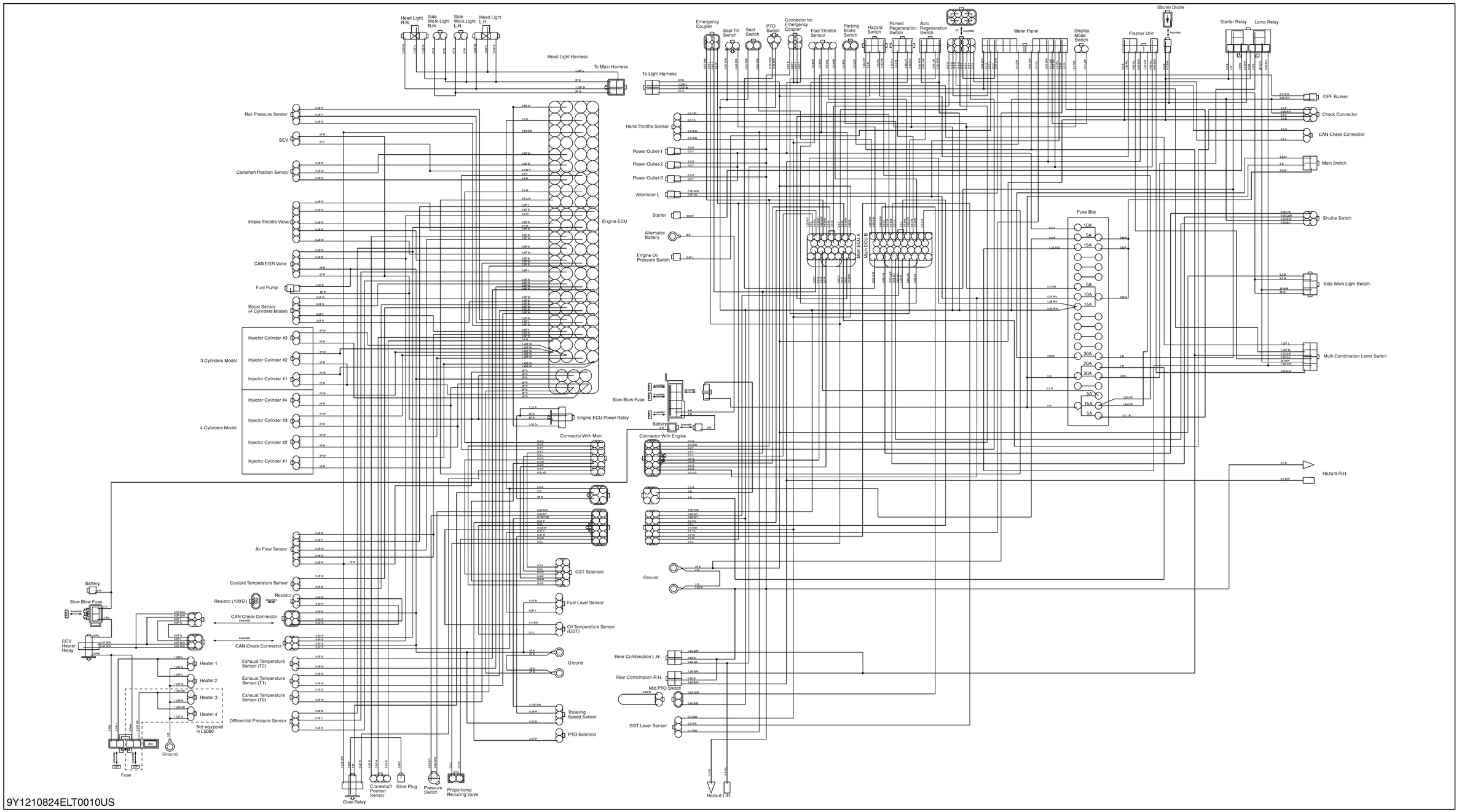
9Y1210824ELT009US

[3] GST (WITHOUT CCV HEATER)

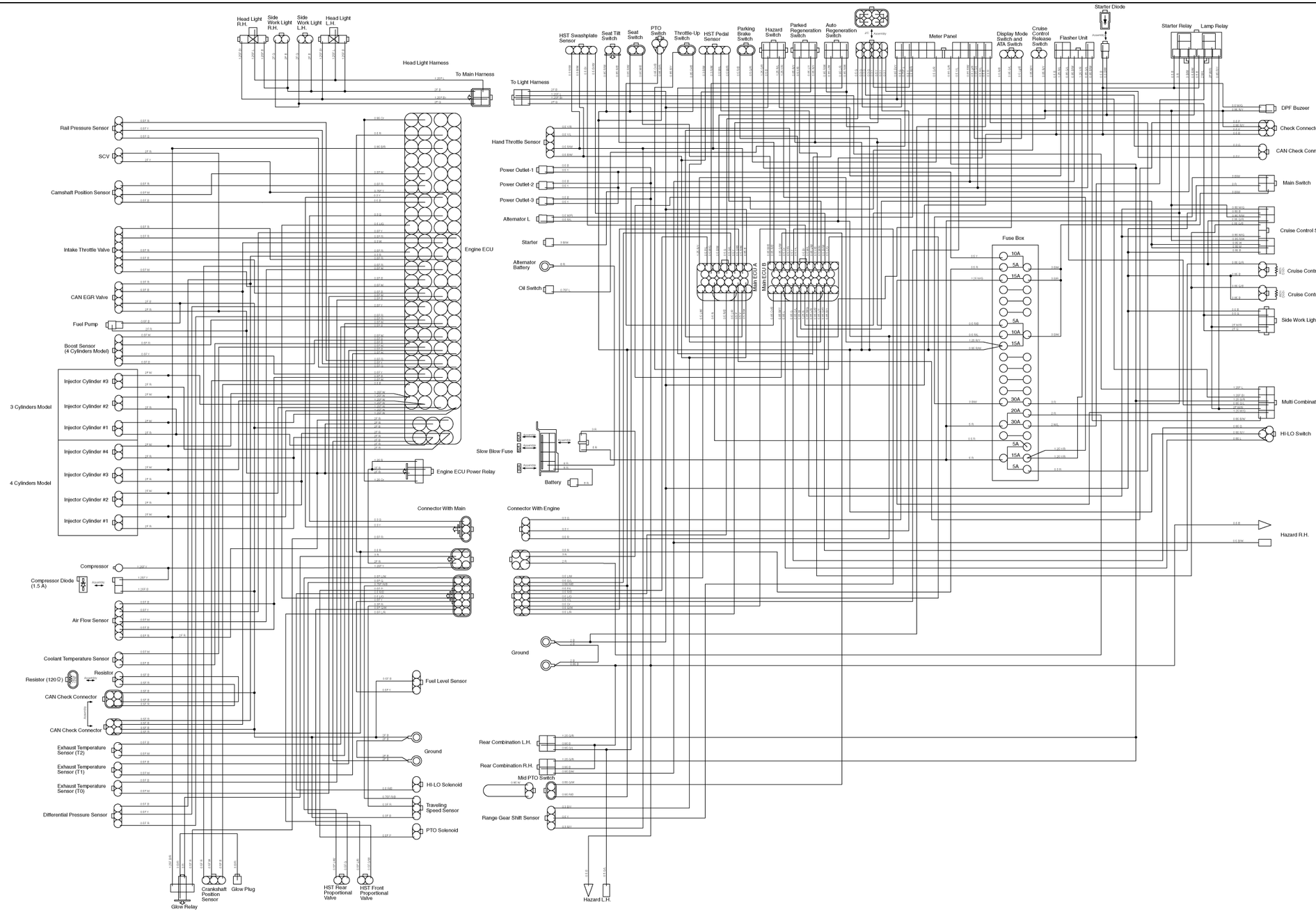


9Y1210824ELT002US

[4] GST (WITH CCV HEATER)

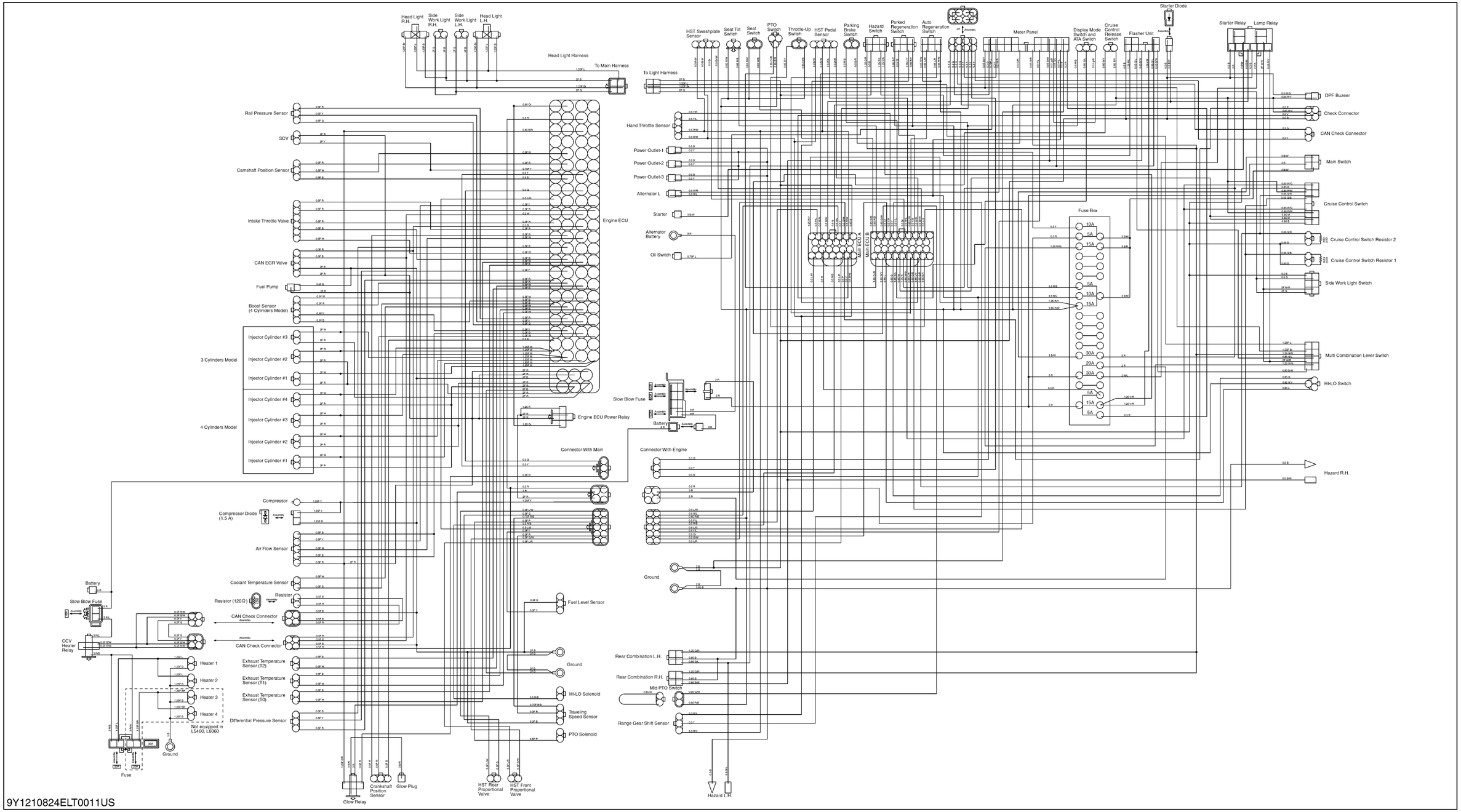


[5] HST ROPS TYPE (WITHOUT CCV HEATER)



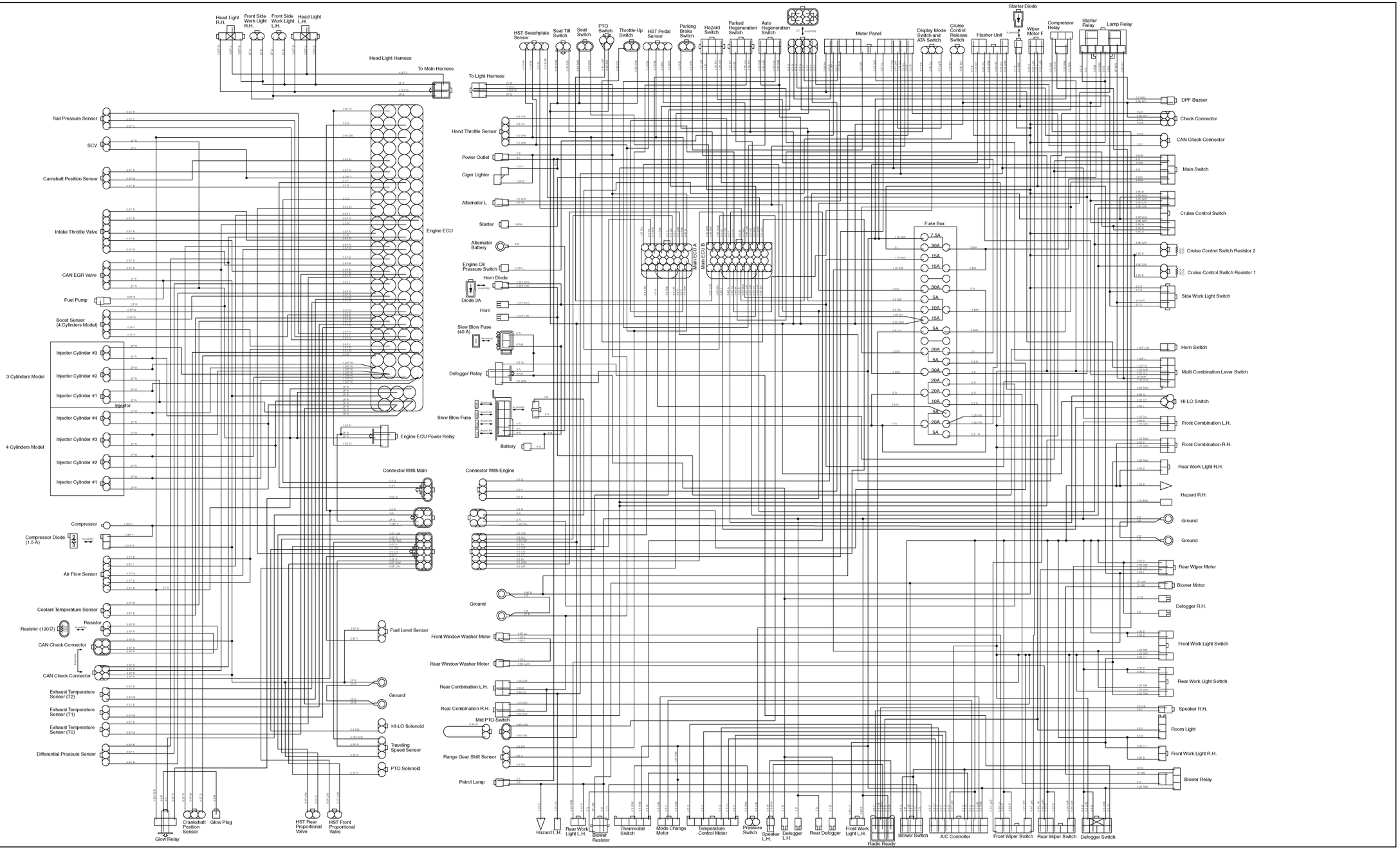
9Y1210824ELT003US

[6] HST ROPS TYPE (WITH CCV HEATER)



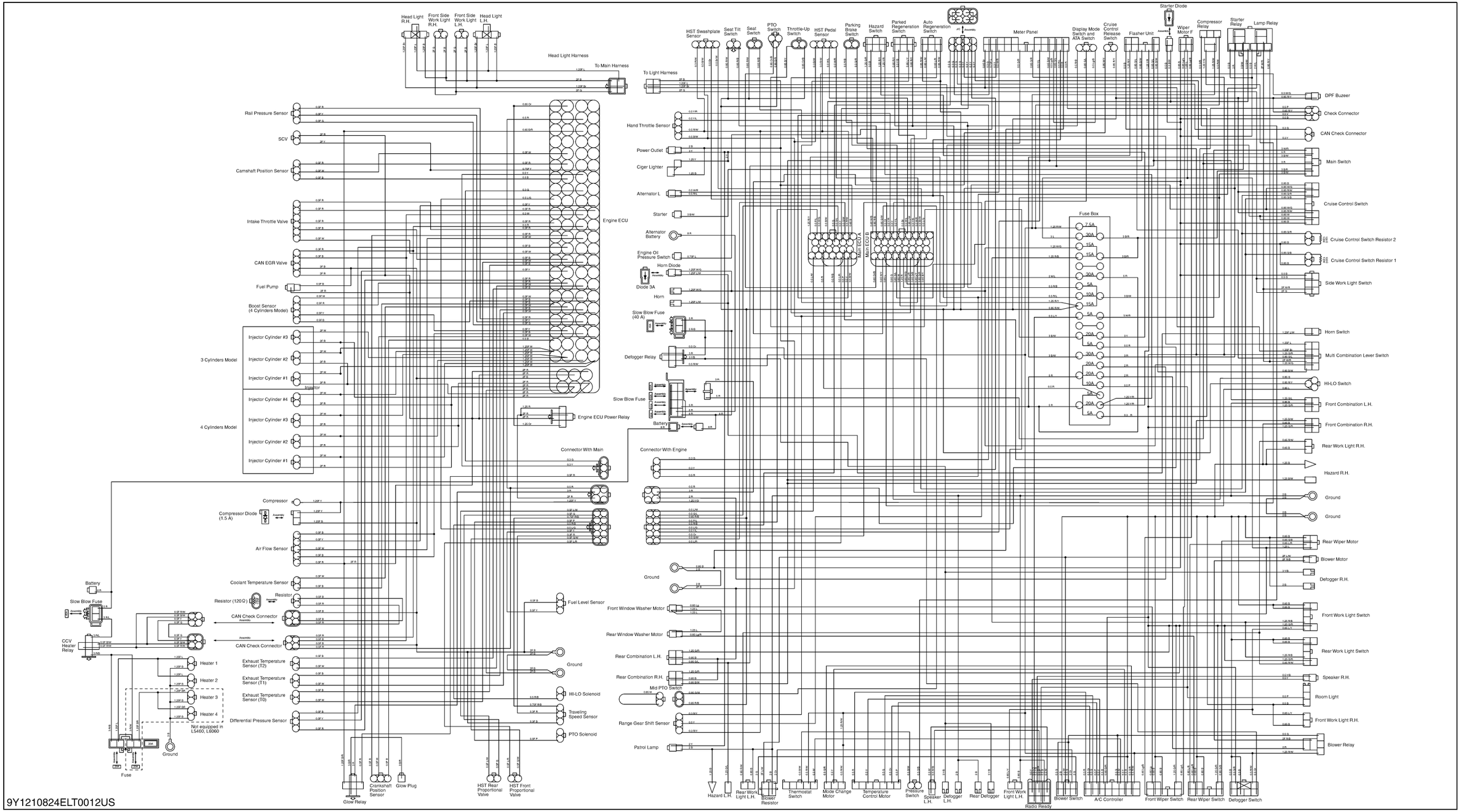
9Y1210824ELT0011US

[7] HST CABIN TYPE (WITHOUT CCV HEATER)



9Y1210824ELT004US

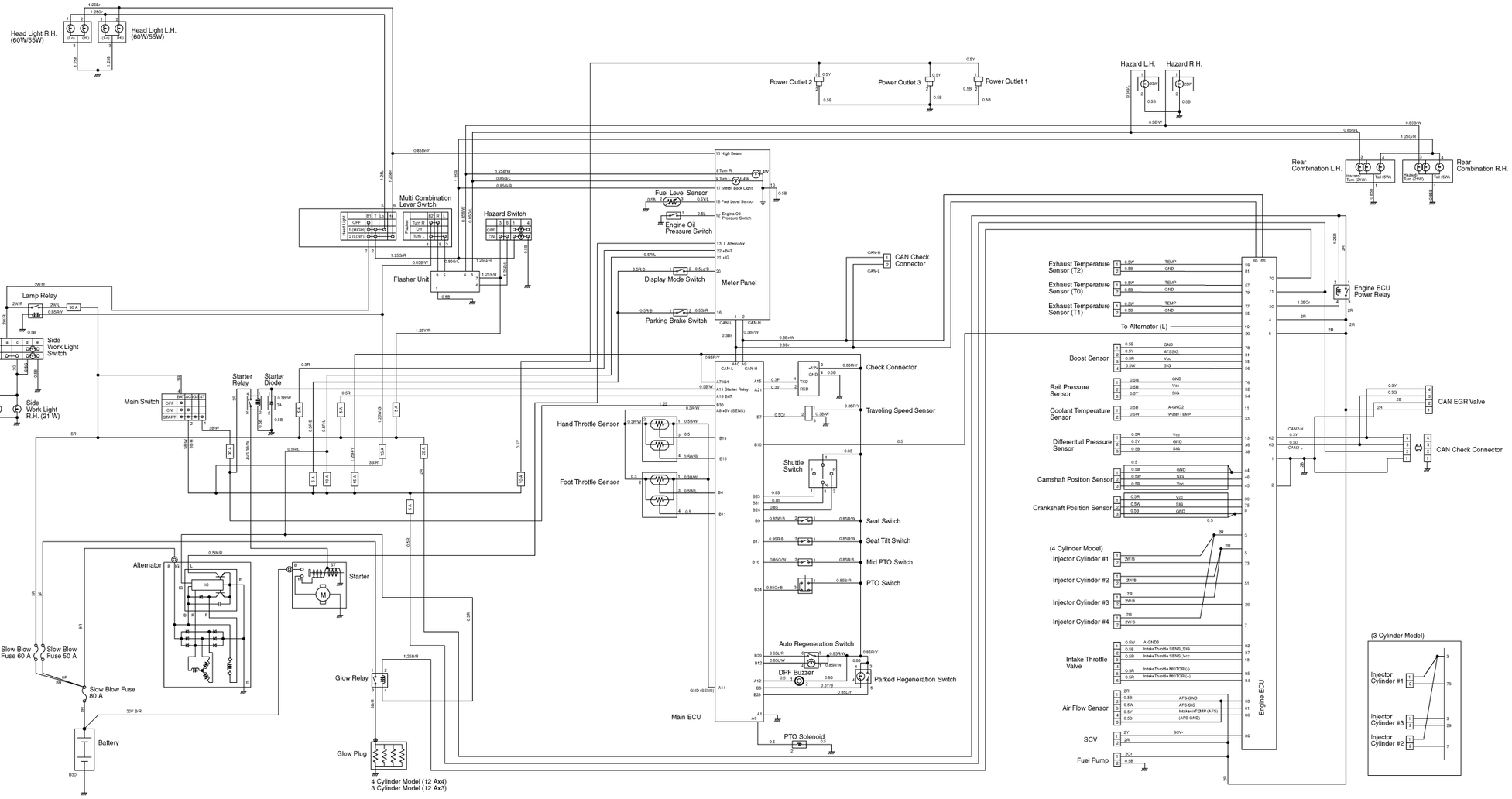
[8] HST CABIN TYPE (WITH CCV HEATER)



9Y1210824ELT0012US

2. ELECTRICAL CIRCUIT

[1] MANUAL TRANSMISSION (WITHOUT CCV HEATER)



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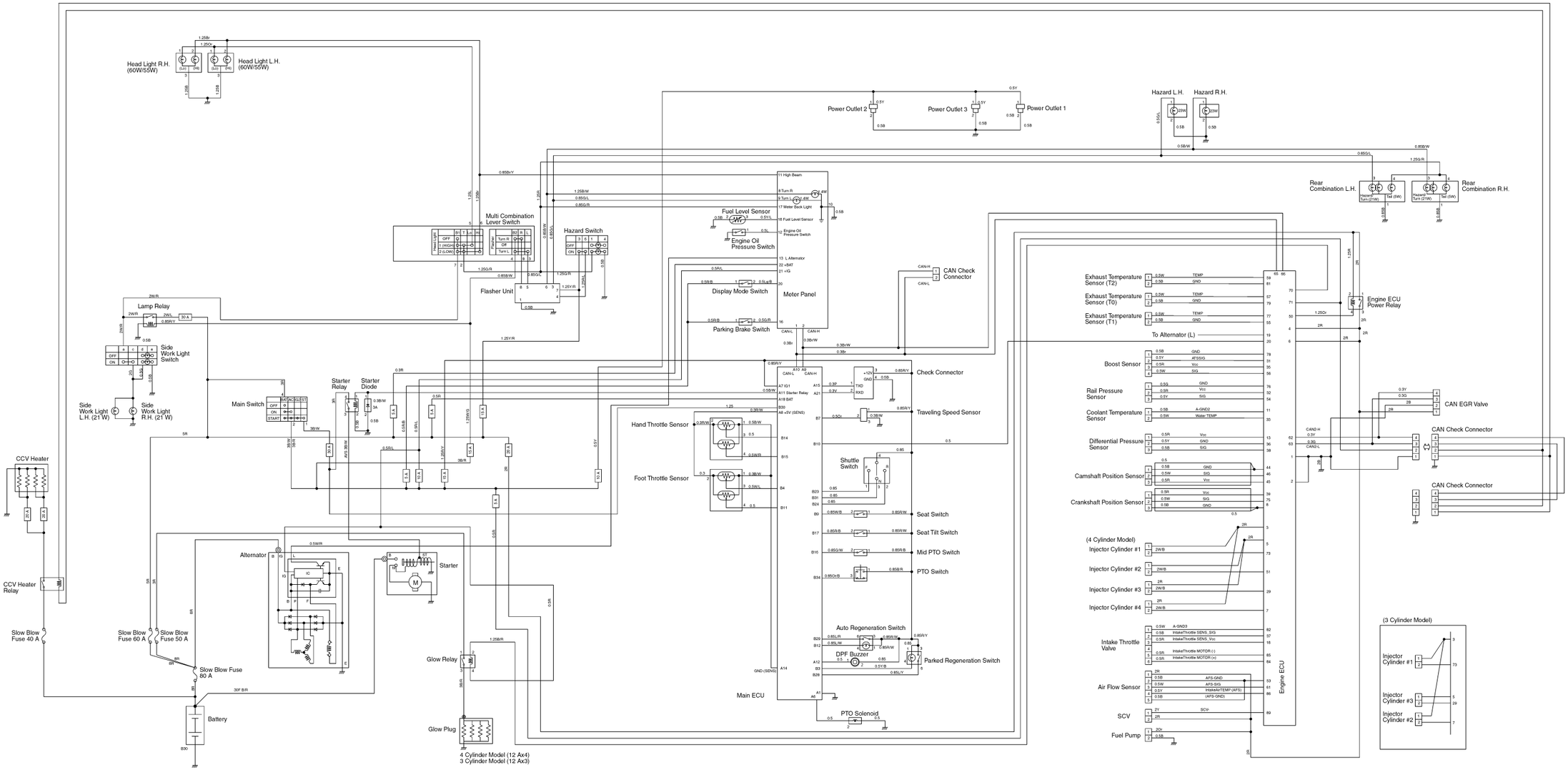
[2] MANUAL TRANSMISSION (WITH CCV HEATER)



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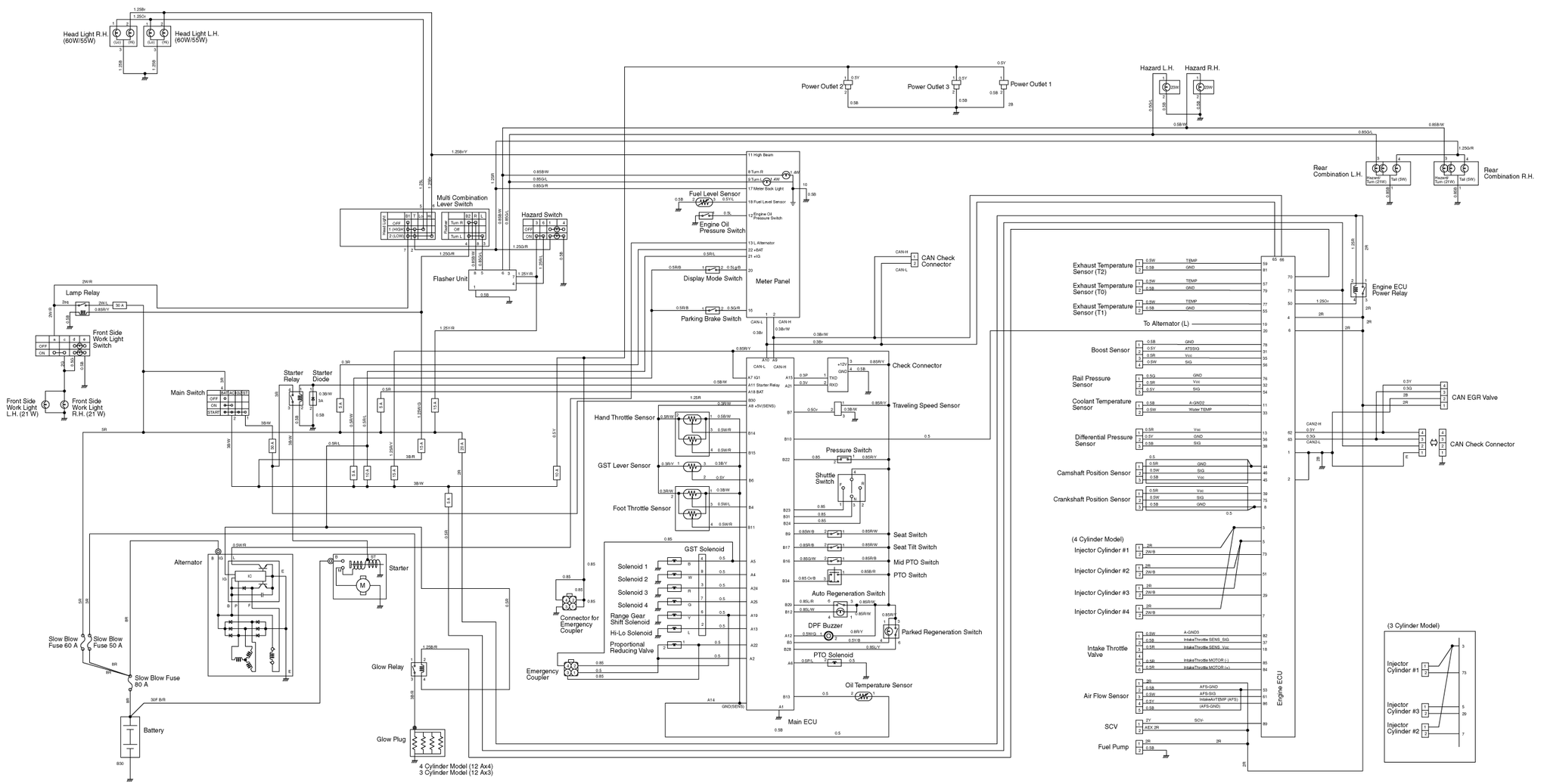
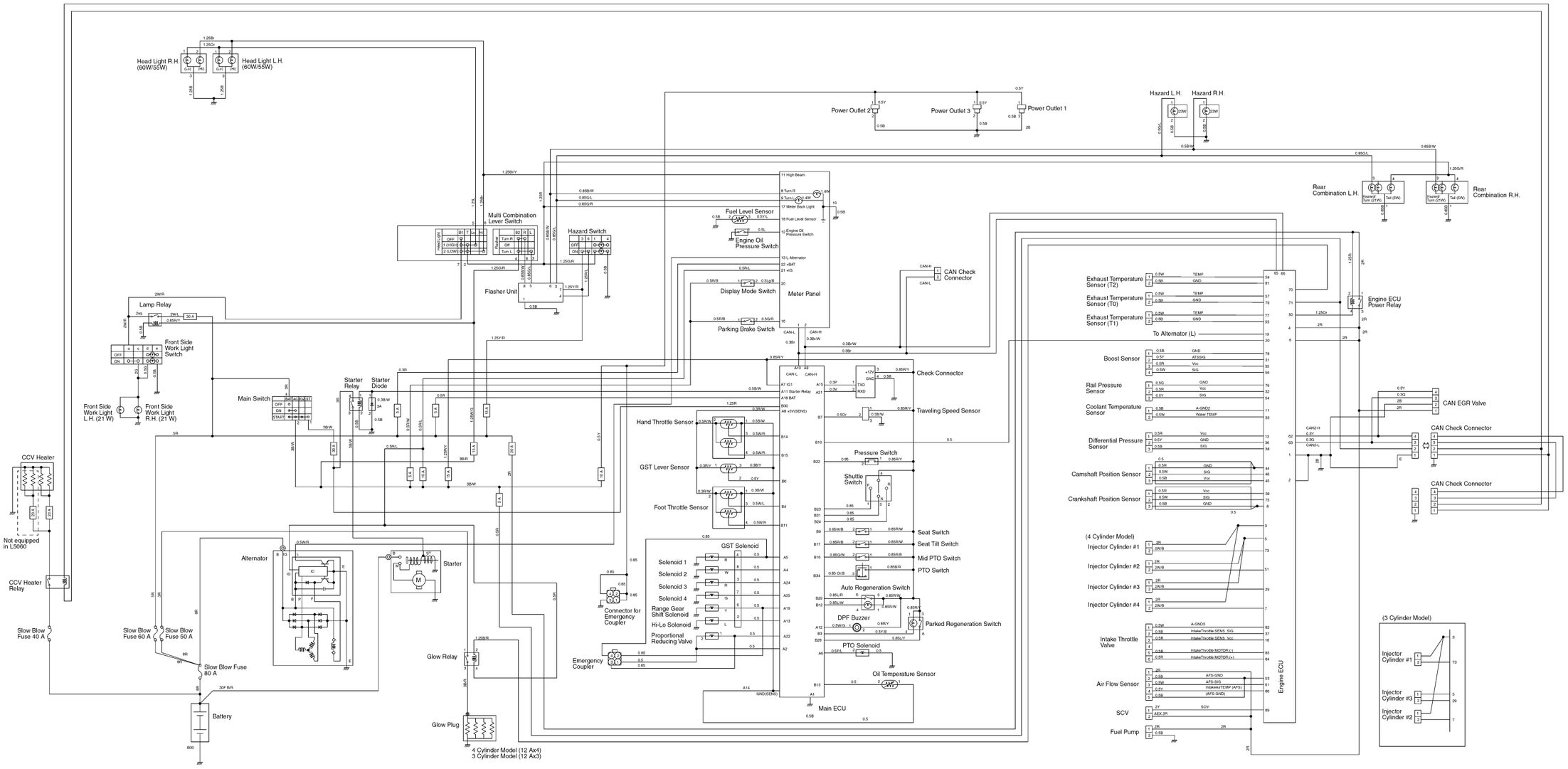


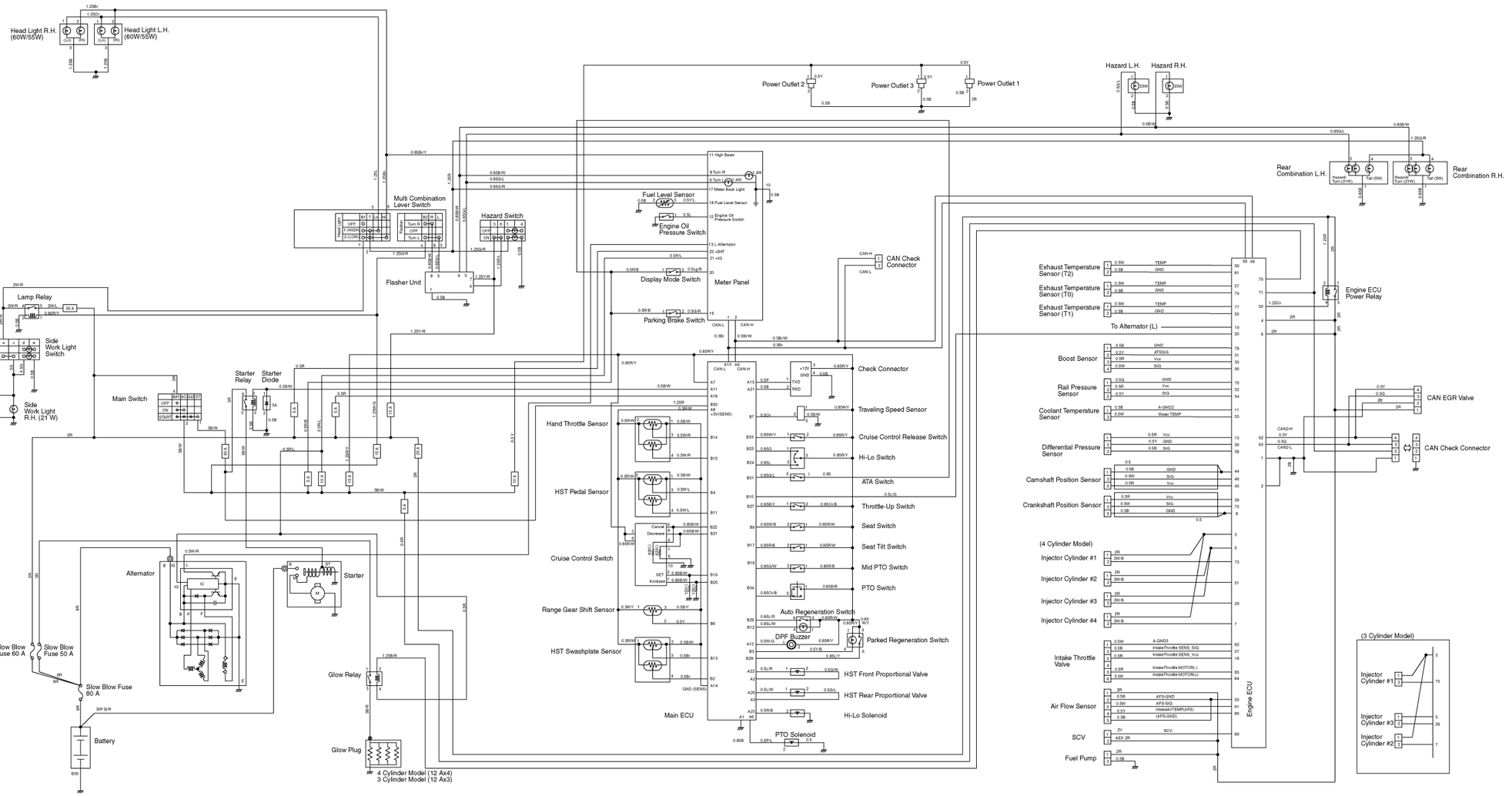
9Y1210824ELT006US

[4] GST (WITH CCV HEATER)



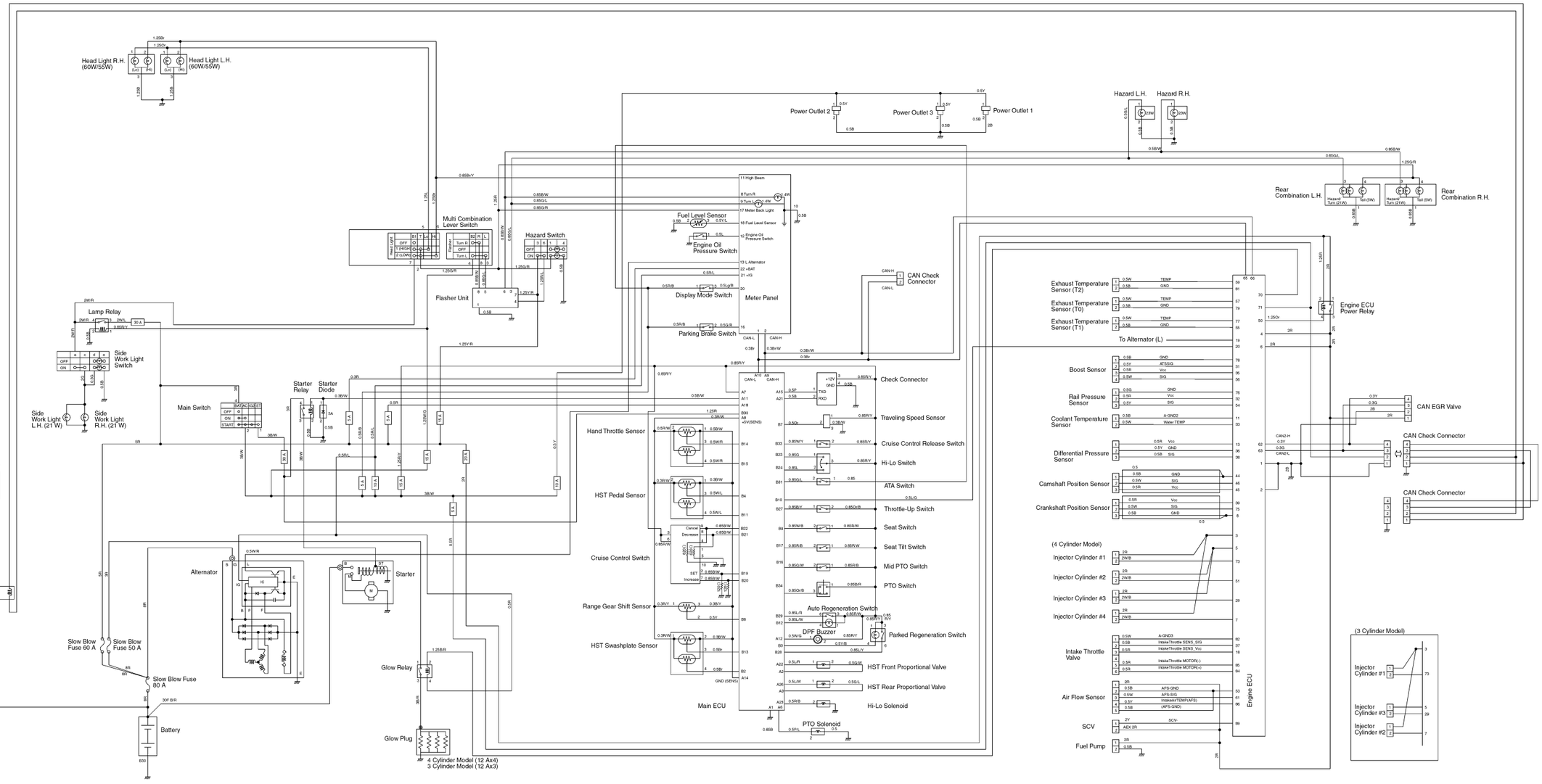
9Y1210824ELT014US

[5] HST ROPS TYPE (WITHOUT CCV HEATER)



9Y1210824ELT007US

[6] HST ROPS TYPE (WITH CCV HEATER)



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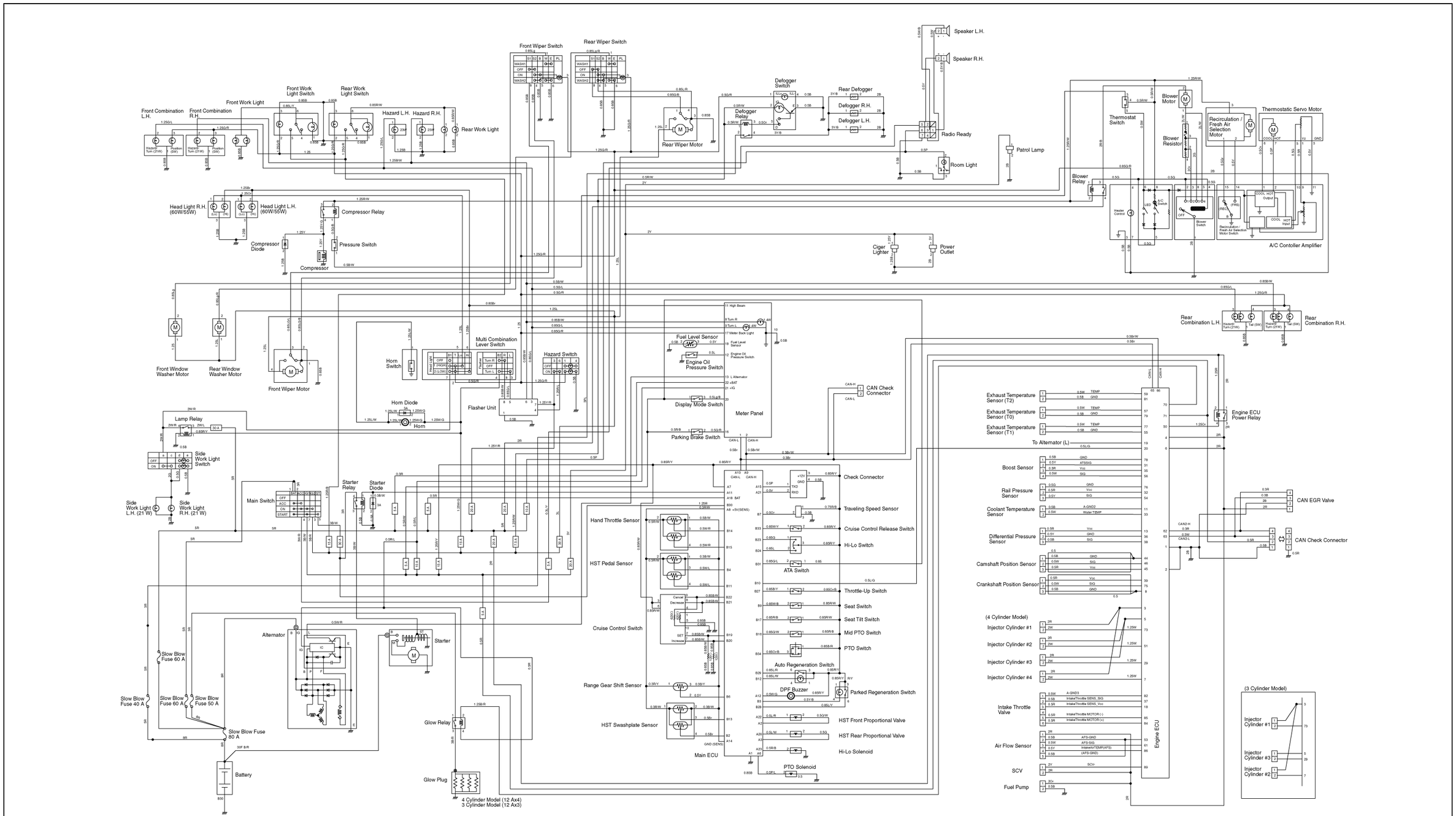
[7] HST CABIN TYPE (WITHOUT CCV HEATER)



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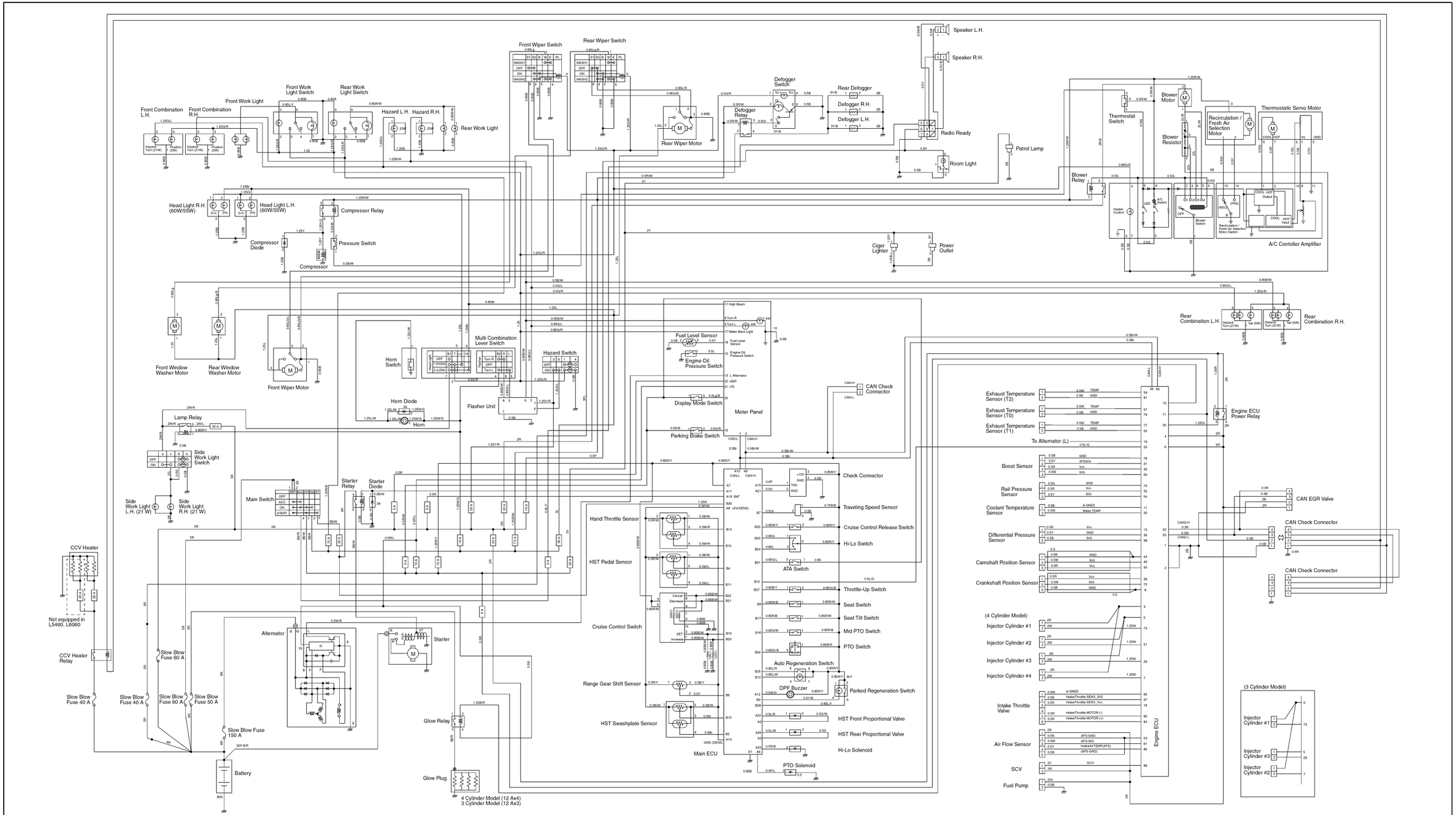
[8] HST CABIN TYPE (WITH CCV HEATER)



9Y1210824ELT016US

3. ELECTRONIC CONTROL PANEL

[1] SYSTEM OUTLINE

(1) Liquid Crystal Display (LCD) (2) Electronic Instrument Panel (Intellipanel)

The CPU does CAN (Control Area Network) communication with main ECU (Electronic Control Unit), engine ECU (Electronic Control Unit), various sensors, switches and other related devices in order to give the functions that accurately and timely provide the operator with various information necessary for tractor operation. The contents include corrective procedure in case of an erroneous operation, precautions, and various alerts. If the tractor gets in trouble, a damaged location, for example, is displayed with a message (sign) on the liquid crystal display or indicated with a monitor lamp.

The electronic instrument panel displays the following items.

■ **Various Information Display Function**

LCD indication receives various data from each sensors:

- Position of range gear shift lever (HST).
- Position of shuttle lever (GST and Manual Transmission).
- Number of main shift lever (GST).
- Clock
- Traveling Speed

■ **Normal Display Mode**

Normal display receives various data from each sensors, and displays. The hour meter, the trip meter, the fuel consumption, the PTO rpm, the HST setting, PM volume status and service inspect, etc. on the LCD which are basic information necessary for the tractor operation.

1. Display 1 : Hour meter / Trip meter mode
2. Display 2 : Fuel consumption mode
3. Display 3 : PTO speed mode
4. Display 4 : HST mode (HST Only)
5. Display 5 : PM buildup mode
6. Display 6 : Service inspect mode

■ **Information message (Attention Display at engine starting)**

- Display the operator's guidance of PTO switch, shuttle lever, HST pedal and OPC at the engine starting on the LCD.

■ **Confirmation Message (Warning Display)**

- Display when the fuel has got shorter than 6 L (1.5 U.S.gals, 1 Imp.qts) or so, the fuel level indicator and the message appears on the LCD
- Display the engine overheat warning on the LCD and panel.

■ **Fail-safe Function**

- It is a function that the entire system operates safely when the part of system gets in trouble.

■ **Error Display**

- Displays the occurrence of DTC (Diagnostic Trouble Code) with the sign on the LCD by the self-diagnosis function.

■ **Indicator Control Function**

- Controls the lighting and blinking of the warning indicator and the monitor indicator for operation.

(To be continued)

(Continued)

- **Self-diagnosis Function**
- **Glow Control Function**
- **Data Input, Fine-adjustment and Test Function**
  - The function such as an input of various data, fine-adjustment and a testing of each sensor, etc. can be done by using LCD and switch operation.

9Y1210824ELM0009US0

[2] CONSTRUCTION AND FUNCTION OF COMPONENTS

(1) Instrument Panel

Electronic Instrument Panel (Intellipanel)

A 16 bit CPU is incorporated into the electronic instrument panel (1), and outputs the status of the tractor to the liquid crystal display, monitor lamp, tachometer, and buzzer. The built-in buzzer begins to function in relation with indication of warning / failure and it permits to check the operational state of each part.

(1) Electronic Instrument Panel (Intellipanel)

9Y1210824ELM0010US0

(2) Electric Control Unit (ECU)

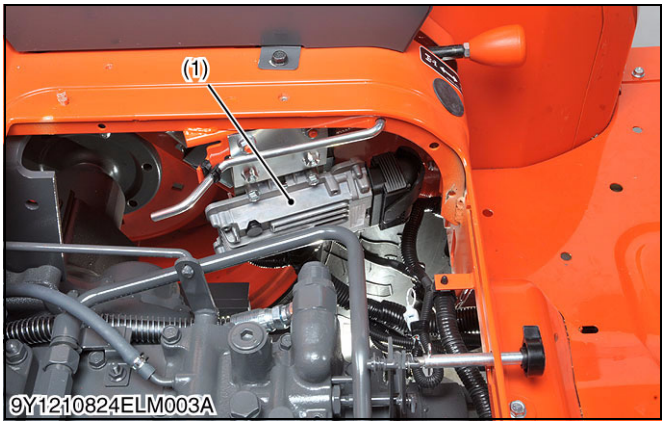
Main Electric Control Unit (ECU)

The ECU (1) functions to operate in accordance with information coming from various sensors.

It has the role of controlling all the components while sharing sensor information necessary for control and control information with the electronic instrument panel.

(1) Main Electric Control Unit (ECU)

9Y1210824ELM0011US0



Engine Electric Control Unit (ECU)

The ECU (1) function to operate in accordance with information coming from various sensors.

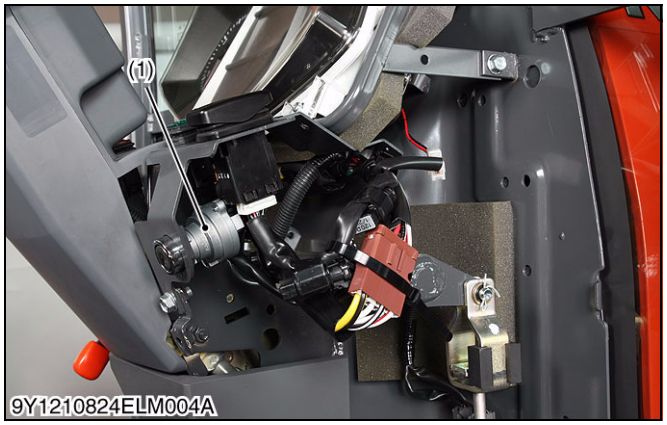
It has the role of controlling all the components while sharing sensor information necessary for control and control information with the electronic instrument panel.

Engine ECU (1) receives signals from the sensors, calculates the proper injection quantity and injection timing for optimal engine operation, and sends the appropriate signals to the actuators. ECU (1) enables the injectors to be actuated at high speeds.

(1) Engine Electric Control Unit (ECU)

9Y1210824ELM0012US0

(3) Switches

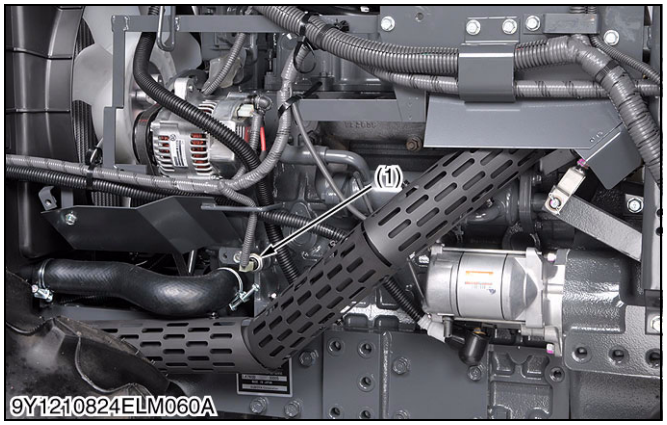


Main Switch

The main switch (1) transmits a main switch **"ON"** signal and an **"ST"** signal at the time of engine start to the electronic instrument panel. When each lever switch and the associated are in the neutral position, the computer in the electronic instrument panel detects the signals and determines whether the engine can be started safety.

(1) Main Switch

9Y1210824ELM0013US0

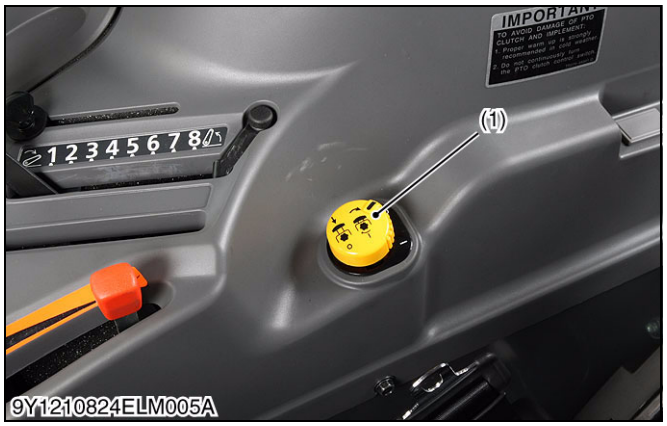


Engine Oil Pressure Switch

This switch (1) is turned on when the main switch is turned on and the engine oil pressure becomes lower than 50 kPa (0.5 kgf/cm^2, 7 psi), and sends a signal to light up the alarm lamp.

(1) Engine Oil Pressure Switch

9Y1210824ELM0014US0



PTO Switch

This switch (1) is mounted on the right cover, sends a 12 V signal to light up the lamp at the electronic instrument panel when PTO is used. It also serves as a safety switch when the engine is started.

(1) PTO Switch

9Y1210824ELM0015US0

Multi Function Combination Lever (Turn Signal and Head Light Switch)

The multi function combination lever is located on the right of the steering handle.

The head light (low beam) is turned on by turning the lever clockwise from the **"OFF"** position.

The head light (high beam) is turned on by turning the lever clockwise from low beam position.

When the lever is pushed up, the left-side light blinks. When the lever is pushed down, the right-side light blinks.

(1) Head Light Switch (2) Turn Signal Switch

9Y1210824ELM0016US0

Hazard Switch

The pilot lamp at the panel lights up by the operation of hazard switch (1), interlocked with the hazard lamp flashing through the hazard unit.

(1) Hazard Switch

9Y1210824ELM0017US0

Parked Regeneration Switch

Press the parked regeneration switch (1) under the specified condition, and the parked regeneration starts.

When an amount of PM more than specified has built up in the DPF, it is possible to do the parked regeneration.

(1) Parked Regeneration Switch

9Y1210824ELM0018US0

Auto Regeneration Switch

Press the auto regeneration switch (1), and the Auto Mode and Inhibit Mode changes alternately. The tractor has been set to Inhibit Mode by default. When the main key switch is turned **ON**, the tractor will be in the Inhibit Mode. By pressing the auto regeneration switch (1), the mode can be switched to the Auto Regeneration Mode.

(1) Auto Regeneration Switch

9Y1210824ELM0019US0

Display Mode Switch (Manual Transmission and GST)

This switch (1) is located at the left side of the electronic instrument panel.

Usually, the display mode switch (1) is used at the switching of display indication, and as well as at data input and fine adjustment.

(1) Display Mode Switch

9Y1210824ELM0020US0

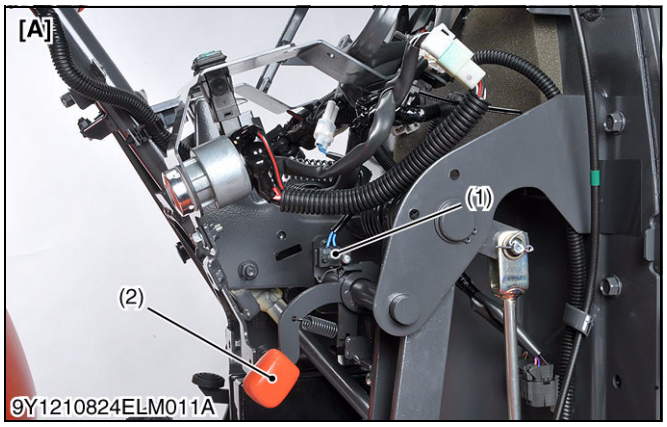
Display Mode Switch and Auto Throttle Advance Switch (HST Only)

These switches (1), (2) are located at the left side of the electronic instrument panel and both are of tact type.

Usually, the display mode switch (1) is used at the switching of display indication, and the auto throttle advance switch (2) is used to switching to the auto throttle advance as well as at data input and fine adjustment.

(1) Display Mode Switch
(2) Auto Throttle Advance

9Y1210824ELM0021US0



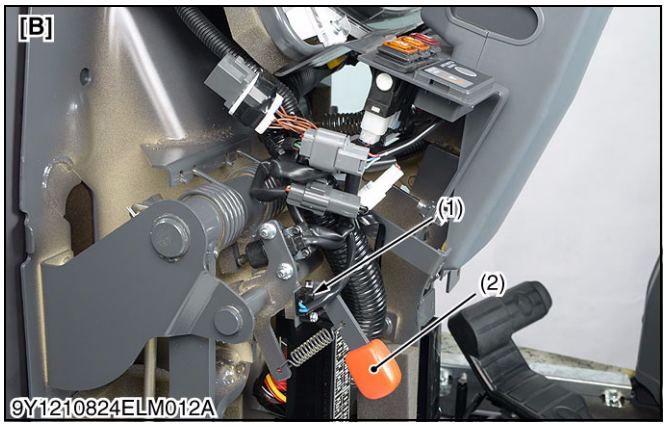
Parking Brake Switch

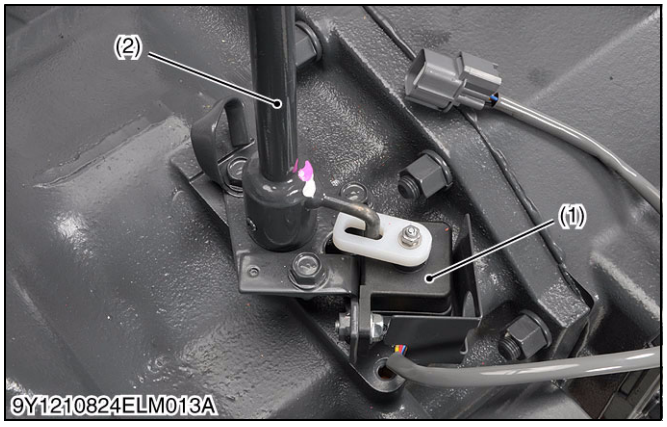
This switch (1) is turned on and off interlocked with the parking brake lever (2). It is switched on when the parking brake is applied, thereby sending a signal to light up the pilot lamp at the electronic instrument panel.

(1) Parking Brake Switch
(2) Parking Brake Lever

[A] Manual Transmission / GST
[B] HST

9Y1210824ELM0023US0





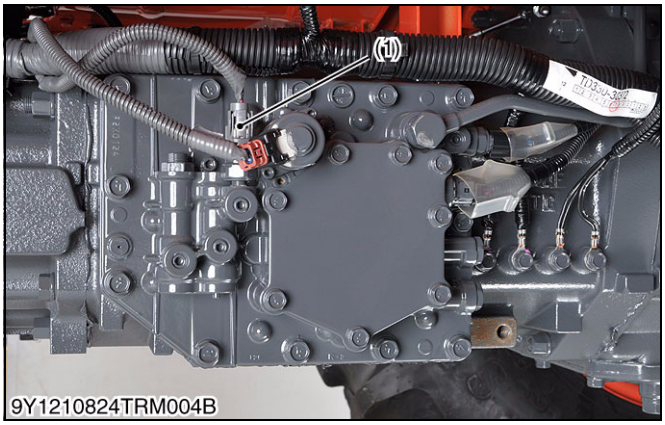
Shuttle Switch: For Manual Transmission and GST

This switch (1) is mounted at the bottom of the shuttle lever shaft (2) and is turned on when the position of **F**, **N**, or **R** is detected through the movement of the sensor lever, thereby outputting a 12 V signal to the electronic instrument panel and ECU.

It also serves as a safety switch when the engine is started.

(1) Shuttle Switch
(2) Shuttle Lever Shaft

9Y1210824ELM0024US0

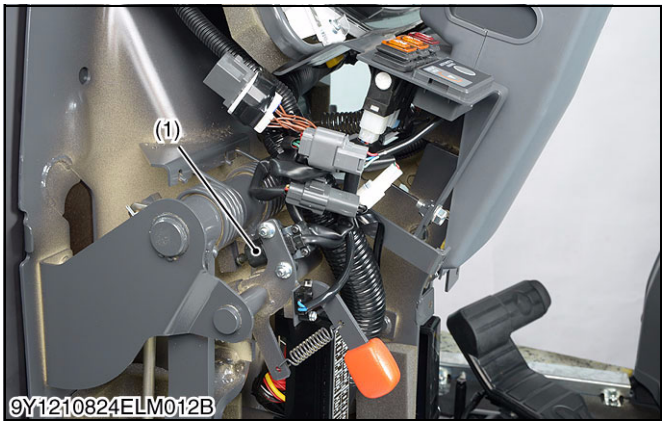


Oil Pressure Switch: For GST

This switch (1) is designed to detect that the gear shift completion of GST and pressurizing of GST clutch pressure, and is mounted at the side of GST valve. It is turned on when the pilot pressure has become higher than 0.49 MPa (5 kgf/cm^2, 71 psi) and is turned off when the pressure has become lower than 0.34 MPa (3.5 kgf/cm^2, 50 psi).

(1) Oil Pressure Switch

9Y1210824ELM0025US0



Cruise Release Switch : For HST

This switch (1) is mounted close to the fulcrum of the brake pedal. This switch (1) is turned on when the brake pedal is depressed.

(1) Cruise Release Switch

9Y1210824ELM0026US0

Cruise Control Switch : For HST

The cruise control switch (1) is located right of the electronic instrument pane.

With this device, you can set or cancel the cruise speed function and can increase or decrease the cruise control speed.

(1) Cruise Control Switch

9Y1210824ELM0027US0

Throttle-Up Switch : For HST

The throttle-up switch (1) is located on the front loader control valve lever (2).

When holding down the throttle-up switch (1), the engine revolution increases to a preset revolution.

(1) Throttle-Up Switch
(2) Front Loader Control Valve Lever

9Y1210824ELM0028US0

H-DS (Hydro Dual Speed) Lever : For HST

The H-DS lever (1) is located on the left of the steering.

When the H-DS lever (1) is operated, signals are sent to the ECU.

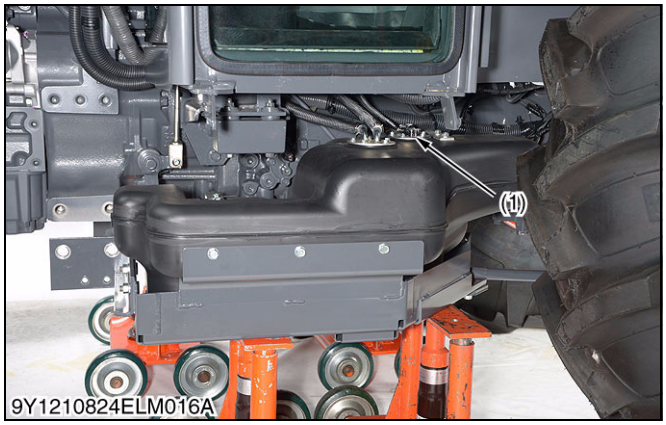
When the H-DS lever (1) is pulled up, the HST motor is changed to the **"Hi"** side.

When the H-DS lever (1) is pushed down, the HST motor is changed to the **"Lo"** side. When the HST motor is set to the **"Lo"** side by means of the H-DS lever (1), it is not automatically changed to the **"Hi"** side even if the HST mode is set to the automatic transmission mode.

(1) H-DS (Hydro Dual Speed) Lever

9Y1210824ELM0029US0

(4) Sensors



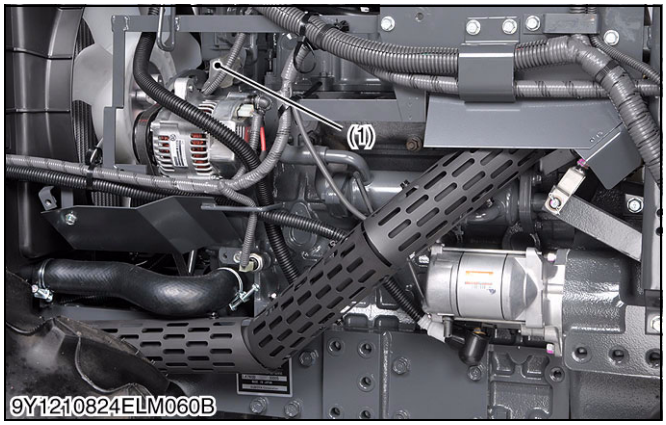
Fuel Level Sensor

This sensor (1) is designed to detect the fuel level in the fuel tank. It detects the position of the float that moves according to the quantity of fuel through the variation in resistance of the variable resistor in order to indicate the fuel level on the electrical instrument panel.

When the fuel has got shorter than approx. 6 L (1.5 U.S.gals) or so, the fuel level indicator and the message appears on the electrical instrument panel.

(1) Fuel Level Sensor

9Y1210824ELM0030US0

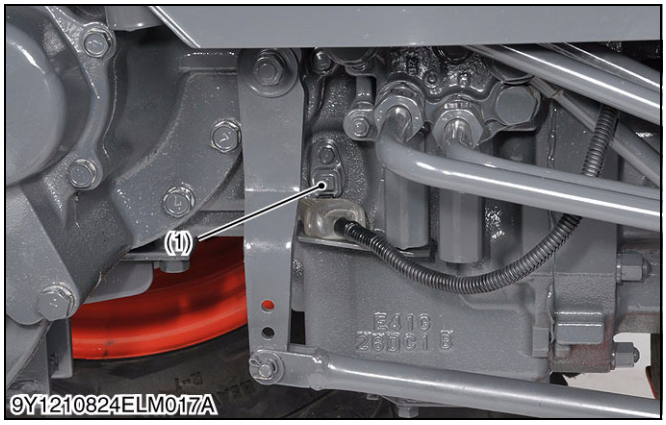


Coolant Temperature Sensor

This sensor (1) is designed to detect the temperature of coolant. It employs a thermistor, and detects the variation in resistance due to a change in temperature to indicate the temperature on the electrical instrument panel. It also sends a signal to light up the alarm lamp in case of overheat, and indicate an alert message.

(1) Coolant Temperature Sensor

9Y1210824ELM0031US0

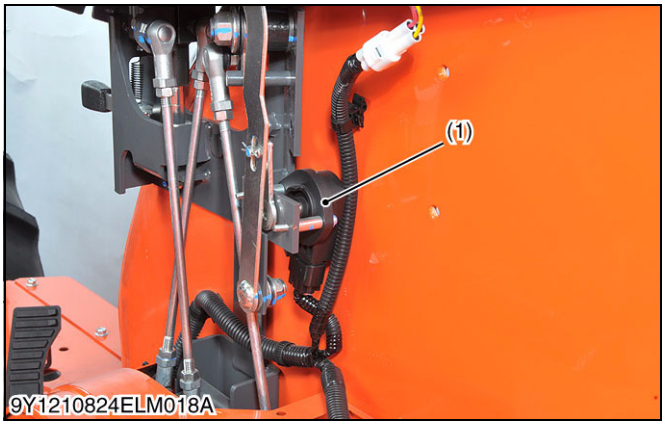


Traveling Speed Sensor

This sensor (1) is mounted at the right bottom of the transmission case, and generates pulses proportional to the rotating speed and the number of teeth of the front-wheel drive gear on the PTO drive shaft. The speed of the tractor is calculated by means of using the frequency of the pulse and the operational coefficient preset for the model and tire size in question.

(1) Traveling Speed Sensor

9Y1210824ELM0032US0

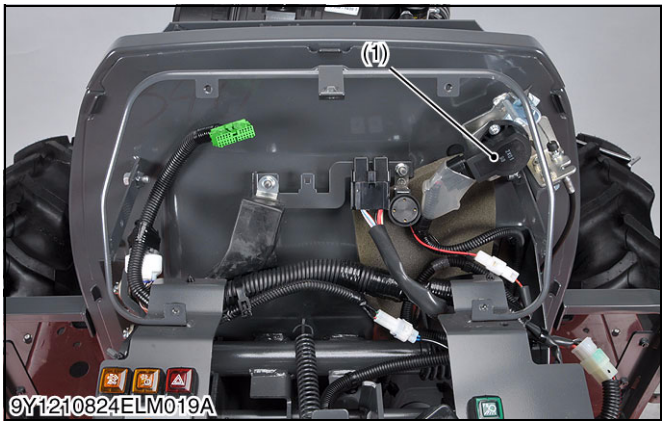


Hand Throttle Lever Sensor

The hand throttle lever sensor detects amount of hand throttle lever operation.

(1) Hand Throttle Lever Sensor

9Y1210824ELM0033US0

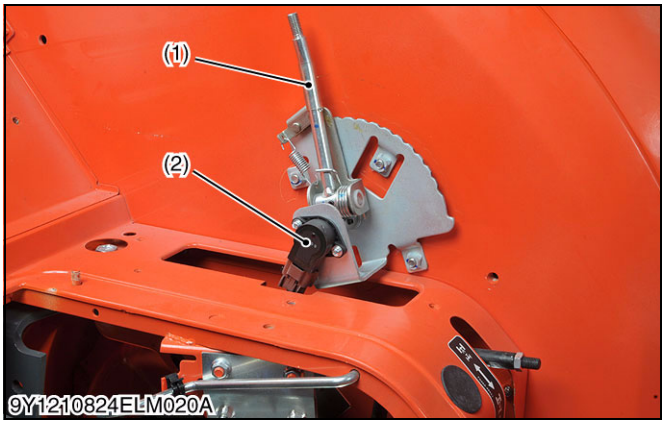


Foot Throttle Sensor : For Manual Transmission and GST

The foot throttle sensor detects the amount of depressing of foot throttle pedal.

(1) Foot Throttle Sensor

9Y1210824ELM0034US0

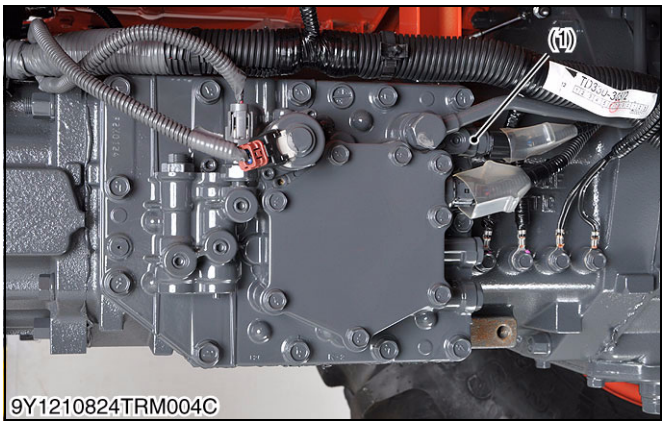


GST Lever Sensor : For GST

This sensor (2) is designed to detect the position at which the GST lever changes speed, and is mounted at the bottom of the GST lever (1). It has the variable resistor of revolution angle type, the maximum resistance value is 2 kΩ, and the electrically effective angle is 140 degrees. It also outputs the position of the lever from N to 12th speed stage in the range of approximately 0.4 to 4.5 V, and then sends a signal to the electronic instrument panel and ECU.

(1) GST Lever (2) GST Lever Sensor

9Y1210824ELM0035US0



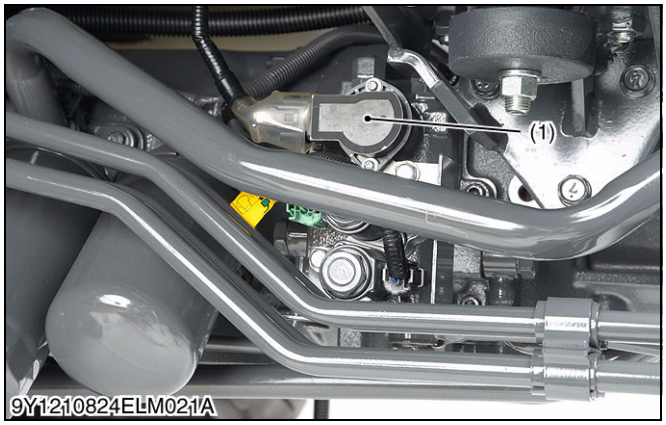
Oil Temperature Sensor : For GST

This sensor (1) is designed to detect the temperature of transmission oil and is mounted at the side of GST valve. It is provided in order to compensate the operating time and electric current of the proportional reducing valve within GST valve, according to the transmission oil temperature.

The sensor employs the thermistor in which a rise in oil temperature causes smaller resistance and a fall in the temperature causes larger one.

(1) Oil Temperature Sensor

9Y1210824ELM0036US0



Swashplate Position Sensor : For HST

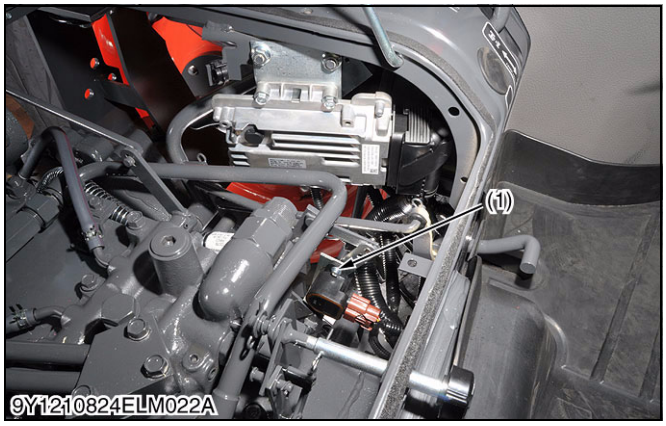
The swashplate position sensor is located above the regulating valve.

The sensor is linked with the servo piston.

If the servo piston moves (if swashplate is inclined), the sensor detects its position and signals are sent to the ECU.

(1) Swashplate Position Sensor

9Y1210824ELM0037US0



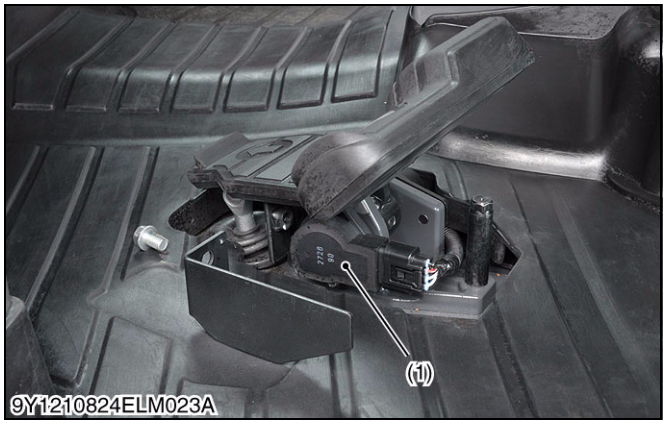
HST Range Gear Shift Lever Sensor: For HST

This sensor (1) is designed to detect the position at which the HST range gear shift lever changes the speed, and is mounted at the bottom of the lever.

It has the variable resistor of revolution angle type, and the maximum resistance value is approximately 5.4 kΩ. It outputs the lever position of **L**, **M**, **N** or **H** in the range of approximately 0.3 to 4.6 V.

(1) HST Range Gear Shift Lever Sensor

9Y1210824ELM0038US0



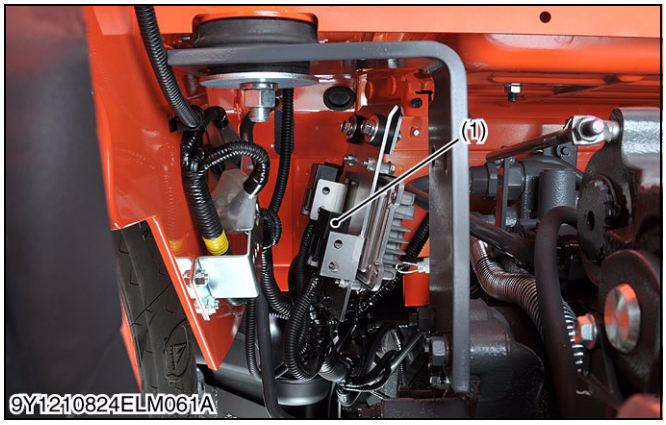
HST Pedal Sensor: For HST

The HST pedal sensor is located on the right of the HST pedal. When the HST pedal is operated, signals are sent to the ECU.

(1) HST Pedal Sensor

9Y1210824ELM0039US0

(5) Others



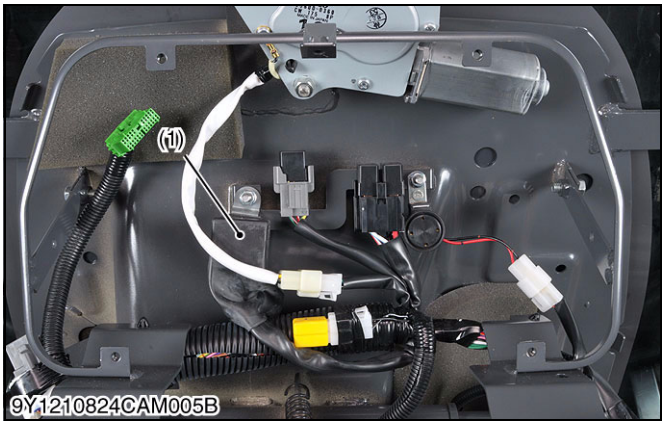
Glow Relay

This tractor has a system in which glow control controls the coil current that starts or stops the preheating circuit.

The time required for preheating is adjusted by means of the coolant temperature sensor.

(1) Glow Relay

9Y1210824ELM0040US0



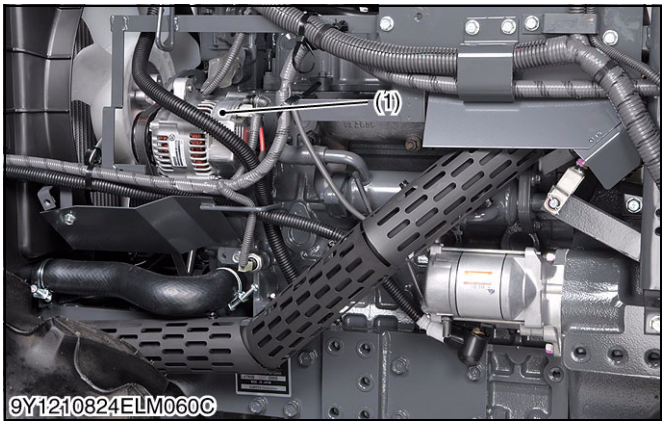
Flusher Unit

Flusher unit controls the blinking frequency as a only one side of lamp blinking of turn signal and both right and left side lamps blinking of hazard signal.

The blinking frequency is 60 to 80 times per minutes.

(1) Flasher Unit

9Y1210824ELM0041US0

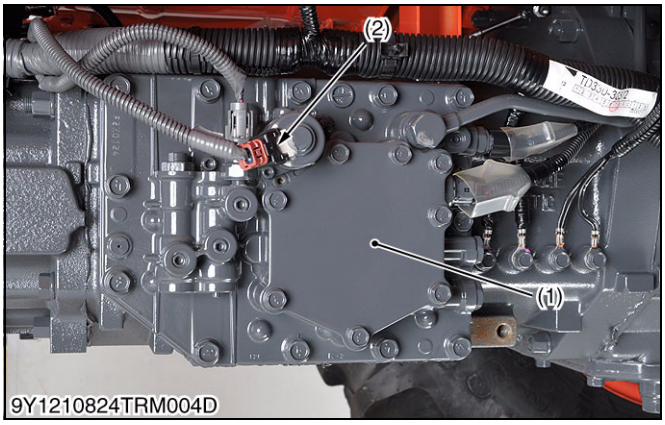


Alternator

The terminal **L** of this alternator detects a signal from the battery charge. The alternator (1) sends a signal for making the alarm lamp at the electronic instrument panel to light up if the electricity charge system becomes abnormal.

(1) Alternator

9Y1210824ELM0042US0

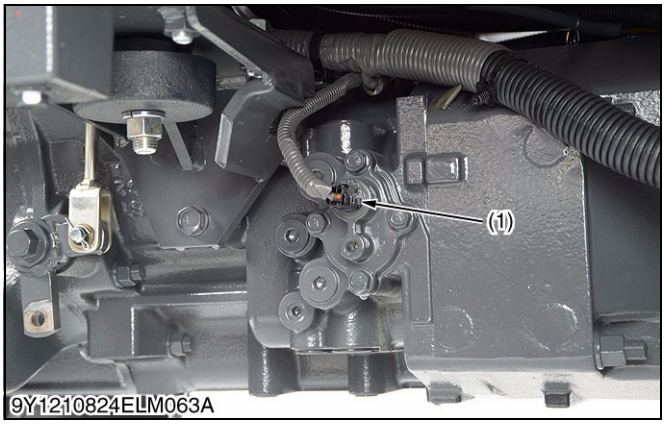


GST Valve (Solenoid Valves and Proportional Reducing Valve): For GST

This valve (1) includes the sensors and switches and the associated necessary for GST control, solenoid that actuates GST, shift pin, proportional reducing valve, and others. It sends information from sensors and the associated to ECU, and then a signal from ECU actuates each solenoid valve.

(1) GST Valve Assembly (2) Proportional Reducing Valve

9Y1210824ELM0043US0



Hi-Lo Solenoid Valve : For HST

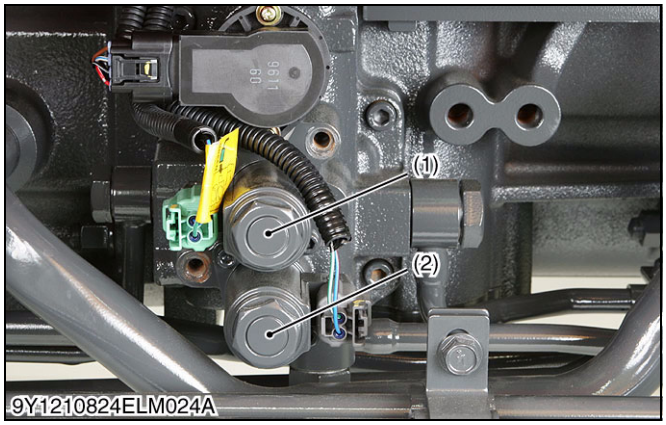
The Hi-Lo solenoid valve (1) is located on the left of the HST.

The Hi-Lo solenoid valve (1) is operated by signals from the ECU.

The HST motor is changed between Hi and Lo sides by switching the valve.

(1) Hi-Lo Solenoid Valve

9Y1210824ELM0044US0



Proportional Valve : For HST

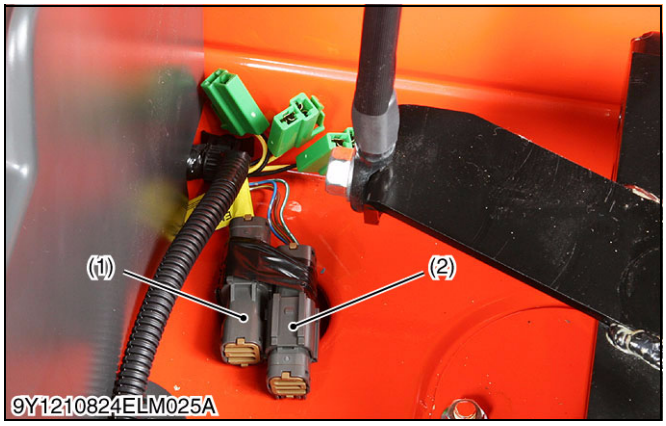
The proportional valves (1), (2) are located on the right of the HST.

There are two proportional valves; one for forward motion and the other for the reverse motion.

The proportional valve is controlled by signals from the ECU and feeds oil sent from the regulating valve to the servo piston.

(1) Reverse Proportional Valve (2) Forward Proportional Valve

9Y1210824ELM0045US0



Emergency Connector: For GST

This is a device which compulsorily operates the shift solenoid when the tractor does not move due to the trouble of the GST system and moves the tractor.

(Situation for necessity of emergency connector)

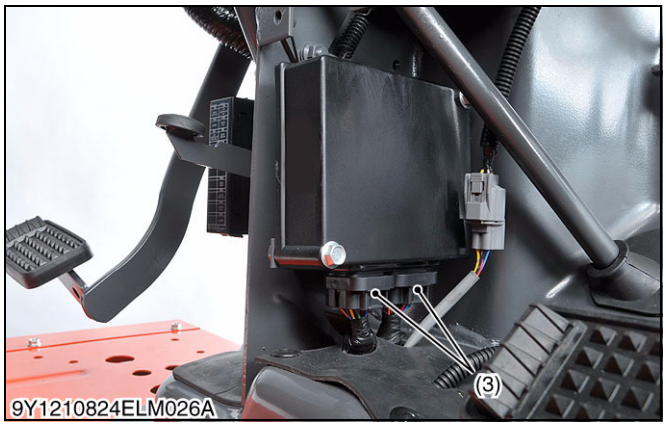
- GST lever sensor is damaged.
- There is no signal between main ECU and proportional reducing valve. (Proportional reducing valve is OK.)

(Use of emergency connector)

1. Stop the engine.
2. Remove the each cap from connectors (1), (2).
3. Connect the connector **A** and **B** (1), (2).
4. Start the engine and move the tractor.

■ **NOTE**

- **When connecting the emergency connectors, the GST valve is set at 1st speed position even if the GST lever is at any position. And the stop and the start of the tractor is operated by shuttle lever.**
- **Be sure to connect the main ECU connectors (3) when using the emergency connectors.**

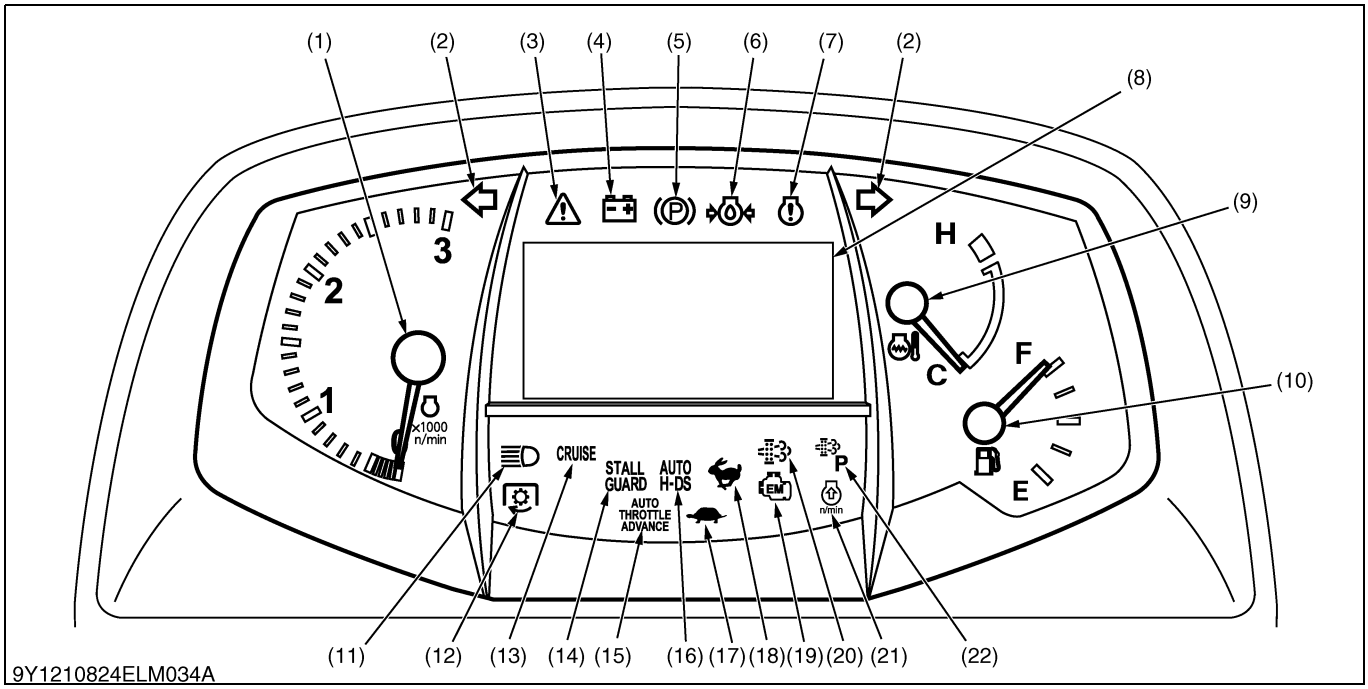


(1) Emergency Connector **A** (3) ECU Connector
(2) Emergency Connector **B**

9Y1210824ELM0046US0

[3] BASIC CONTROL SYSTEM

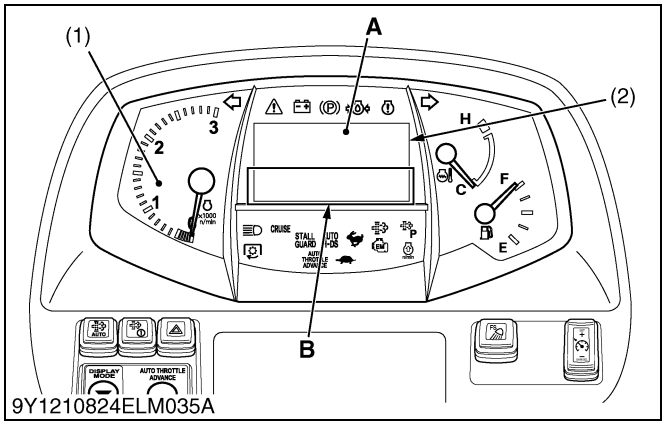
(1) Indication Items of Meter Panel

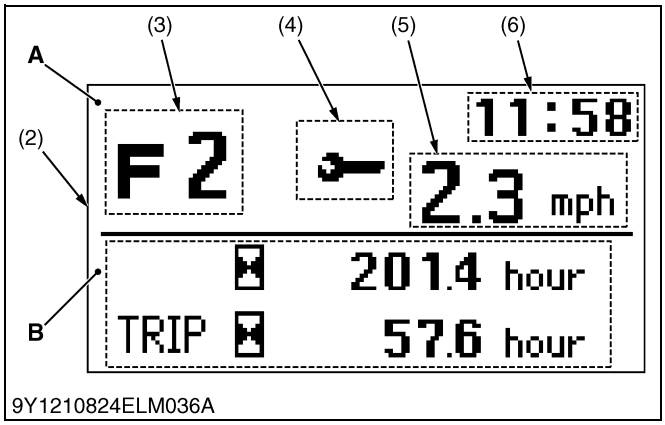


(1) Tachometer
(2) Turn signal / hazard indicator
(3) Master system warning indicator
(4) Electrical charge warning indicator
(5) Parking brake warning indicator
(6) Engine oil pressure warning indicator
(7) Engine warning indicator
(8) IntelliPanel™ display
(9) Coolant temperature gauge
(10) Fuel gauge
(11) High beam indicator
(12) PTO indicator
(13) Cruise control indicator [HST]
(14) Stall guard indicator [HST]
(15) ATA indicator [HST]
(16) Auto H-DS indicator [HST]
(17) H-DS Low speed range indicator [HST]
(18) H-DS High speed range indicator [HST]
(19) Emission indicator
(20) Regeneration indicator
(21) Engine RPM increase indicator
(22) Parked regeneration indicator

9Y1210824ELM0047US0

(2) Electronic Instrument Panel (IntelliPanel™) Display





The electronic instrument panel (IntelliPanel) display provides information as follows. The liquid crystal display (LCD) (2) is split in 2 parts. The upper side **"A"** shows position of the gear shift lever (3), service inspect indicator (4), travel speed (5) and clock (6). The lower side **"B"** shows normal display (7).

(1) Electronic Instrument Panel (IntelliPanel)
(2) Liquid Crystal Display (LCD)
(3) Position of Gear Shift lever
(4) Service Inspect Indicator
(5) Travel Speed
(6) Clock
(7) Normal Display

A: Upper side
B: Lower side

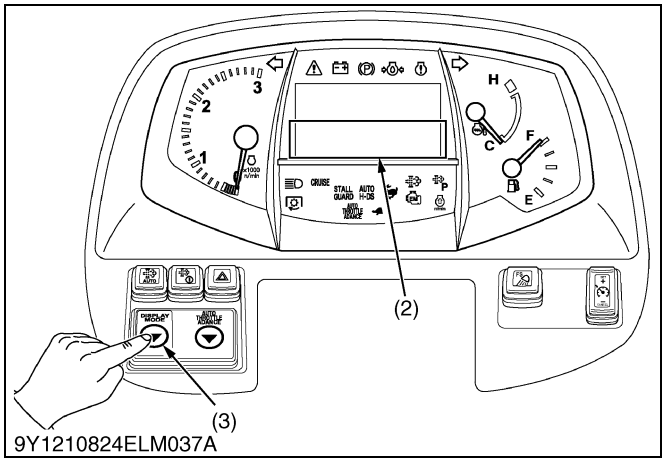
(To be continued)

(Continued)

Display	Model	Message	Description
A	HST	"L", "H", "M" or "N"	Display the position of the range gear shift that was selected with the range gear shift lever.
	GST	"F1" to "F12" or "R1" to "R12" or "N"	"F" is displayed when forward operation is selected with the shuttle lever. "R" is displayed when reverse operation is selected. Displays the number of the gear shift ratios that was selected with the main gear shift lever. "N" is displayed when the lever is in the neutral position.
	Manual Transmission	"F", "R" or "N"	"F" is displayed when forward operation is selected with the shuttle lever. "R" is displayed when reverse operation is selected. "N" is displayed when the lever is in the neutral position.
	All Model	 9Y1210824ELM045A	Appears when the time for an engine oil change has come. Change the engine oil with fresh one.
		 9Y1210824ELM046A	Stays displayed for 3 seconds or so after the engine has got started. Buckle up the seat belt.
		 9Y1210824ELM047A	Stays displayed while the cooling water temperature is too low and the glow plug is being activated. Wait until this symbol disappears and get the engine started.
		 9Y1210824ELM048A	Appears when the fuel has become less than 6 L (1.5 U.S.gals) or so. Refuel as soon as possible. If the fuel tank becomes empty, air will enter the fuel system, thereby requiring a bleeding.
		0.1 to 34	Displays the travel speed. (The actual speed is different from the displayed one if the tires slip in towing or other jobs.)
		0:00 to 11:59	Displays the clock. When (— — : — —) is displayed, make the time setting. Nothing is displayed if this is disabled.
B	All Model	Messages on the right side on the lower side of the IntelliPanel™	The hour meter, trip meter, fuel consumption, PTO rpm, HST setting, PM volume status, time elapsed since the previous engine oil change and other data can be displayed.

9Y1210824ELM0048US0

(3) Normal Display



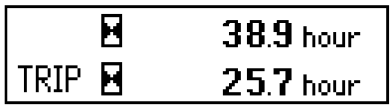
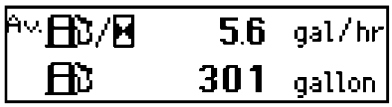
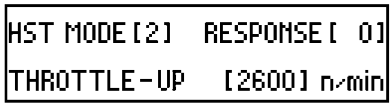
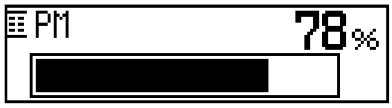
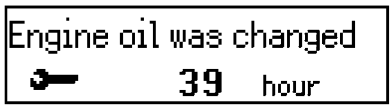
The normal display is a message indicated in the liquid crystal display (LCD) (2) while the main switch is turned **"ON"** or the engine is starting.

By pushing the display mode switch (3), it is switched to five kinds (HST : six kinds) of displays shown in the table below.

(1) Electronic Instrument Panel (Intellipanel)
(2) Liquid Crystal Display (LCD)
(3) Display Mode Switch

(To be continued)

(Continued)

Display 1: Hour meter / Trip meter mode	 9Y1210824ELM049A	• [HOUR meter] Total operating hours are displayed. • [TRIP meter] Total operating hours, counted from the previous resetting, is displayed. • The hour meter indicates in six digits the hours the tractor has been used; the last digit indicates 1/10 of an hour.
Display 2: Fuel consumption mode	 9Y1210824ELM050A	• Average fuel consumption is measured per hour from the previous resetting. • Total fuel consumption is measured from the previous resetting. • Hold down the Display mode button, and the setting is reset to "0".
Display 3: PTO speed mode	 9Y1210824ELM051A	• The PTO speed is displayed when the PTO clutch control switch is in "ON" position. • When the PTO clutch control switch is in "OFF" position, "OFF" is displayed.
Display 4: HST mode	 9Y1210824ELM052A	• [HST only] The HST mode, Response and Throttle-UP settings get displayed.
Display 5: PM buildup mode	 9Y1210824ELM053A	• Displays the PM buildup inside the DPF muffler. • Regeneration is needed when the 100 % level has been reached. • The more the bar is extended to the right, the more PM builds up.
Display 6: Service inspect mode	 9Y1210824ELM054A	• The time elapsed since the previous engine oil change gets displayed.

■ **NOTE**

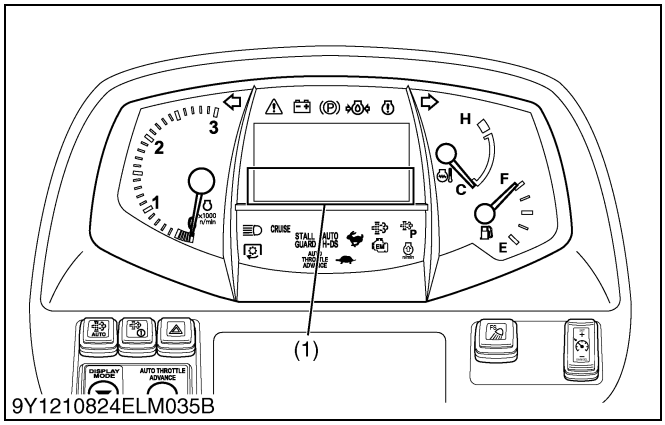
- **Display 1 : The trip meter can be reset to 0.0 h by pushing the display mode switch for about two seconds.**
- **Display 4 : The HST MODE, HST Response and Throttle-Up can be selected by pushing the display mode switch for about two seconds. (HST only)**
- **Display 6 : The maintenance interval can be reset to 0 h by pushing the display mode switch for about two seconds.**

9Y1210824ELM0049US0

(4) Information Display (Attention Display at Engine Starting)

If neither of the levers, switches and pedals are in neutral positions when the main switch is turned to the **"START"** position, the engine can not be started. The LCD displays a message for the operator to correct the situation by placing the appropriate lever or pedal in the neutral position.

9Y1210824ELM0050US0



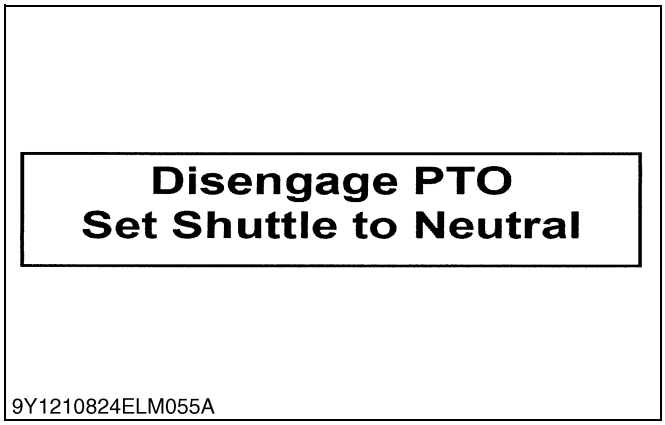
9Y1210824ELM035B

Manual Transmission and GST

The safety switch for engine starting is adopted for the shuttle lever and the PTO switch in these models.

(1) LCD (Liquid Crystal Display)

9Y1210824ELM0051US0

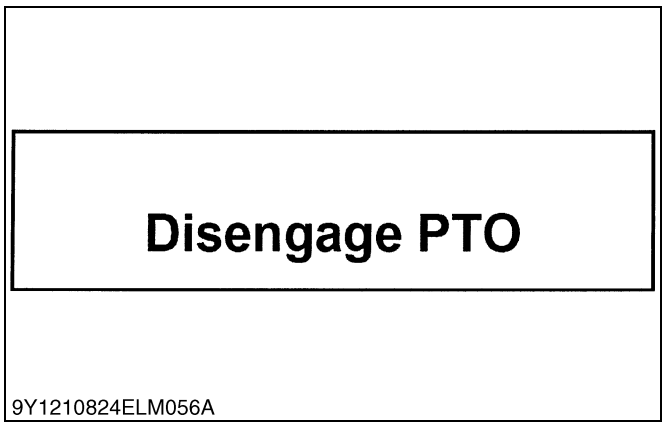


9Y1210824ELM055A

When both the shuttle lever and the PTO switch are not set at a Neutral position

Turn the PTO switch to **"OFF"** and place the shuttle lever in **"Neutral"** position.

9Y1210824ELM0052US0

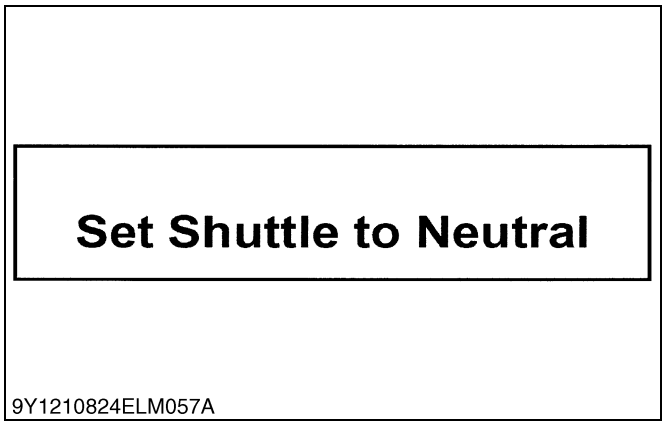


9Y1210824ELM056A

When the PTO switch is not set at Neutral position

Turn the PTO switch to **"OFF"**.

9Y1210824ELM0053US0

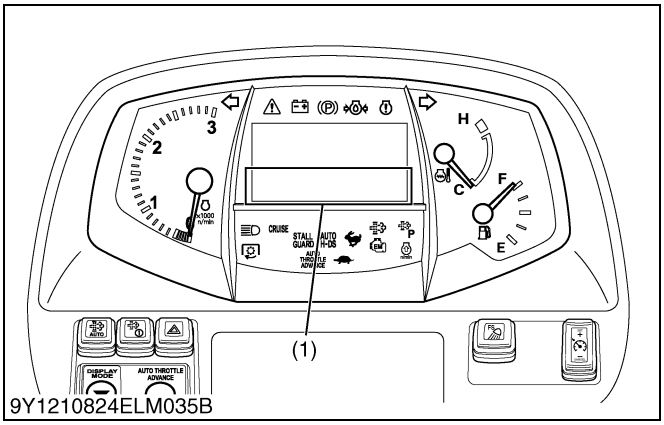


9Y1210824ELM057A

When the shuttle lever is not set at a Neutral position

Shift the shuttle lever to **Neutral** position.

9Y1210824ELM0054US0



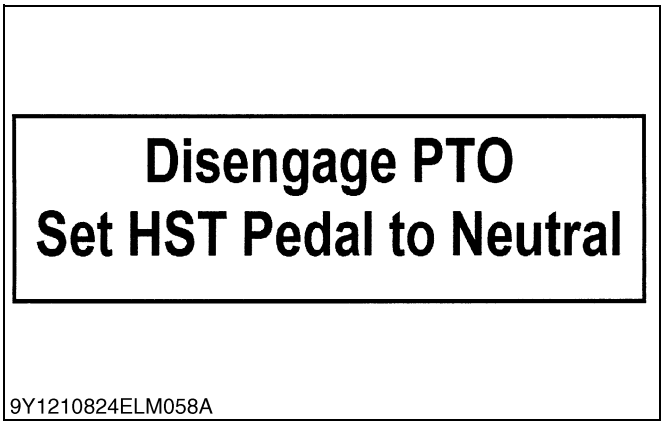
9Y1210824ELM035B

HST

The safety switch for engine starting is adapted for PTO switch and HST pedal in this model.

(1) LCD (Liquid Crystal Display)

9Y1210824ELM0055US0

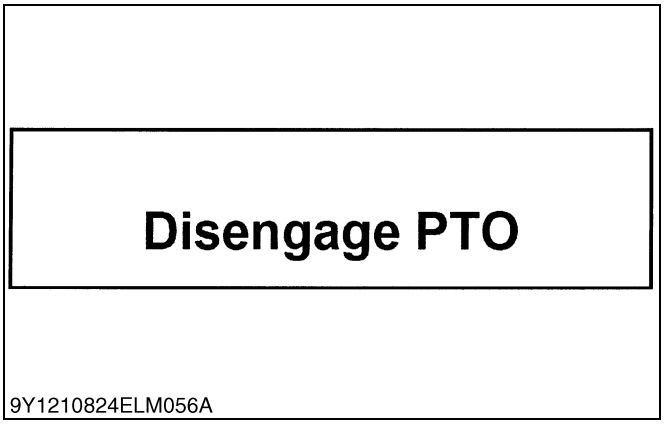


9Y1210824ELM058A

When the HST pedal and PTO switch are not set a Neutral position.

Turn the PTO switch to **"OFF"** and foot off of the HST pedal.

9Y1210824ELM0056US0

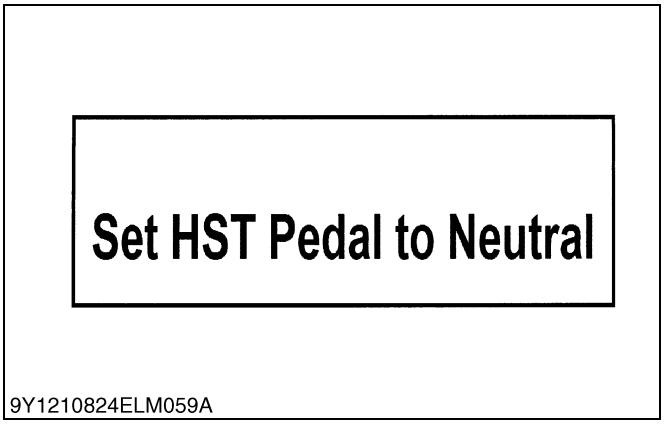


9Y1210824ELM056A

When the PTO switch is not set at a Neutral position

Turn the PTO switch to **"Neutral"** position.

9Y1210824ELM0057US0



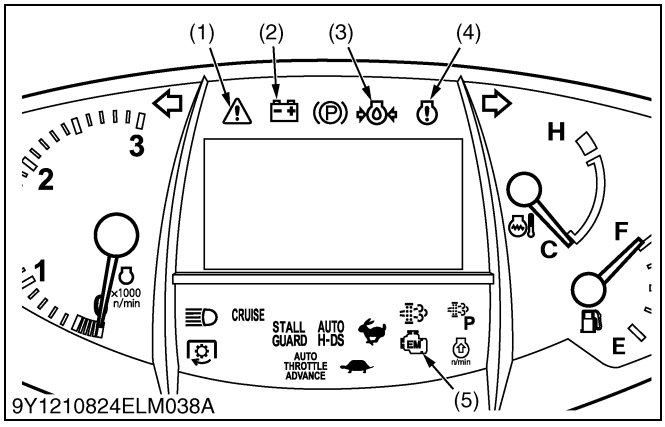
9Y1210824ELM059A

When the HST pedal is not set at a Neutral position

Foot off the HST pedal to set the **Neutral** position.

9Y1210824ELM0058US0

(5) Easy Checker™



If the indicators in the Easy Checker™ come on during operation, immediately stop the engine, and find the cause as shown below.

Never operate the tractor while Easy Checker™ lamp is on.

(1) Master system warning

If trouble should occur at the engine, transmission or other control parts, the indicator flashes as a warning. If the trouble is not corrected by restarting the tractor.

ERROR No. 20	ERROR No. 63	ERROR No. 83
ERROR No. 30	ERROR No. 64	ERROR No. 84
ERROR No. 40	ERROR No. 65	ERROR No. 90
ERROR No. 50	ERROR No. 66	ERROR No. 91
ERROR No. 51	ERROR No. 67	ERROR No. 92
ERROR No. 60	ERROR No. 80	ERROR No. 93
ERROR No. 61	ERROR No. 81	ERROR No. 94
ERROR No. 62	ERROR No. 82	ERROR No. 95

(2) Electrical charge Indicator

If the alternator is not charging the battery, the Easy Checker™ will come on.

If this should happen during operation, check the electrical charging system.

(3) Engine oil pressure Indicator

If the oil pressure in the engine goes below the prescribed level, the warning lamp in the Easy Checker™ will come on.

If this should happen during operation, and it does not go off when the engine is accelerated to more than 1000 rpm, check level of engine oil.

(1) Master System Warning
(2) Electrical Charge
(3) Engine Oil Pressure
(4) Engine Warning
(5) Emission Indicator

(To be continued)

(Continued)

(4) Engine warning

This indicator serves the following two functions. If the indicator lights up, pinpoint the cause and take a proper measure.

1. Error with the engine control system
   If during operation the water temperature gauge reads an acceptable level but the warning lamp in the Easy Checker™ comes on, stop the engine and get it restarted. If the error happens again, check the engine.

■ **IMPORTANT**

- **If the warning indicator lights up, the following phenomena may appear depending on the engine's trouble spot.**
  - **a) The engine stops unexpectedly.**
  - **b) The engine fails to start or gets interrupted just after start.**
  - **c) The engine output is not enough.**
  - **d) The engine output is enough, but the warning indicator stays on.**
- **If the engine output is not enough, immediately interrupt the operation and move the tractor to a safe place and stop the engine.**

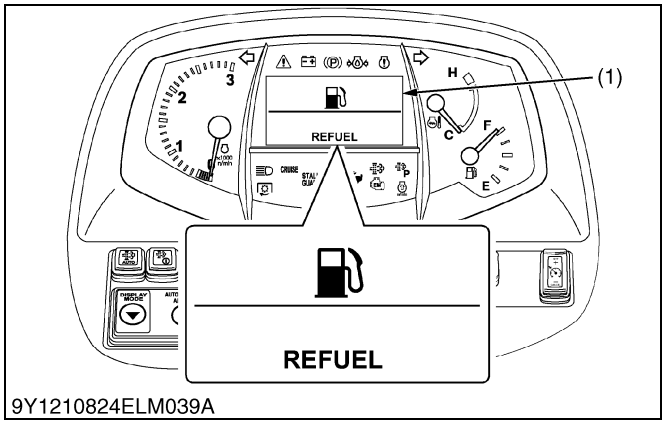
2. Engine overheat
   If the water temperature gauge reads an unusual level and the warning lamp in the Easy Checker™ comes on, the engine may have got overheated. Check the cooling system.

(5) Emission indicator

If emission indicator lights up, take the steps to lower the water temperature. This helps keep the emission clean.

9Y1210824ELM0059US0

(6) Confirmation Display



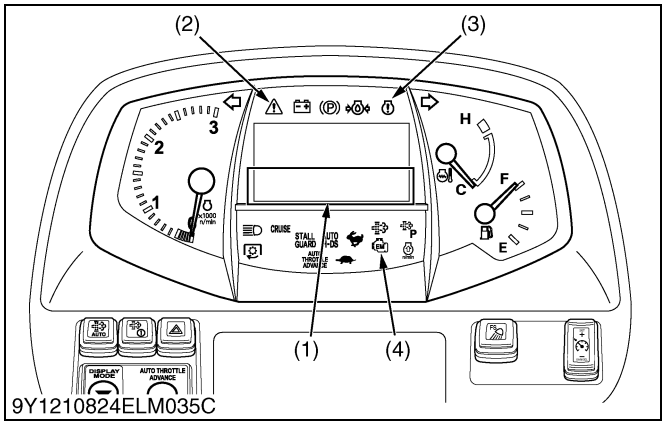
9Y1210824ELM039A

Fuel Level Warning

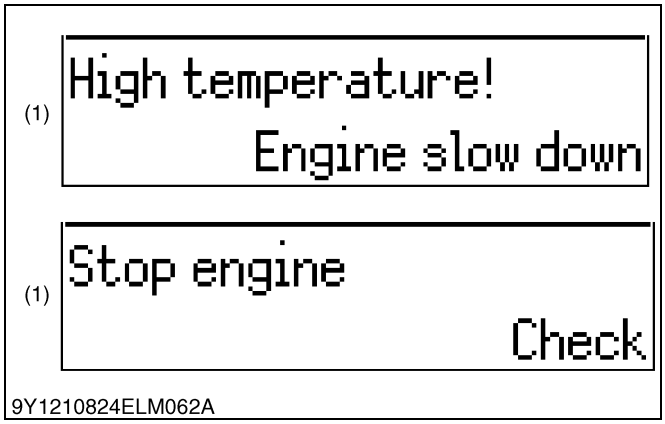
If the fuel in the tank goes below the prescribed level (less than approximate 6 L, 1.5 U.S.gals, 1 Imp.qts), **"REFUEL"** is displayed on the LCD (1) in the panel will come on. If this should happen during operation, refuel as soon as possible.

(1) LCD (Liquid Crystal Display)

9Y1210824ELM0060US0



9Y1210824ELM035C



9Y1210824ELM062A

Overheating Warning

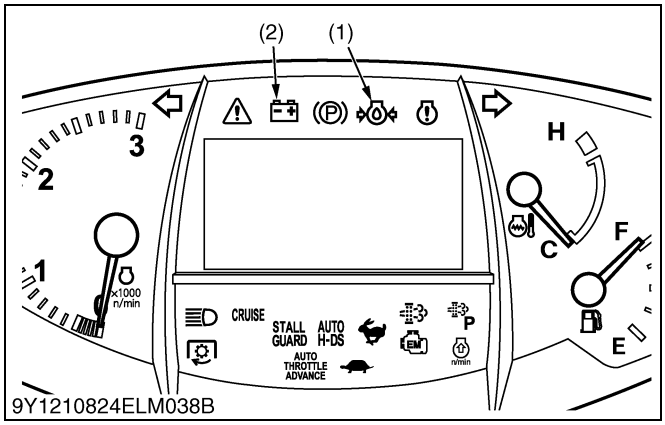
The indicator needle reaches the red zone position, engine coolant is overheated.

The electronic instrument panel informs the rise of coolant temperature, and overheat warning as shown in the table below.

(1) Liquid Crystal Display (LCD)
(2) Master System Warning Indicator
(3) Engine Warning Indicator
(4) Emission Indicator

Coolant Temperature	Electronic Instrument Panel	101 to 109 °C (214 to 228 °F)	110 to 119 °C (230 to 246 °F)	120 °C (248 °F) or more
Normal → High	LCD (1)	–	–	High Temperature ! Engine slow down
	Engine Warning Indicator (3)	–	–	Light Up
	Emission Indicator (4)	–	Light Up	Light Up
	Master System Warning Indicator (2)	–	–	Blink
High → Normal	LCD (1)	Stop engine Check	High Temperature ! Engine slow down	High Temperature ! Engine slow down
	Engine Warning Indicator (3)	Light Up	Light Up	Light Up
	Emission Indicator (4)	Light Up (107 to 109 °C) (225 to 228 °F)	Light Up	Light Up
	Master System Warning Indicator (2)	Blink	Blink	Blink

9Y1210824ELM0061US0



9Y1210824ELM038B

Engine Oil Pressure and Electric Charging Warning

If the engine oil pressure goes below the 50 kPa (0.5 kgf/cm^2, 7 psi), the engine oil pressure warning indicator (1) will come on. If this should happen during operation, and it does not go off when the engine is accelerated to more than 700 min^{-1} (rpm), check level of engine oil.

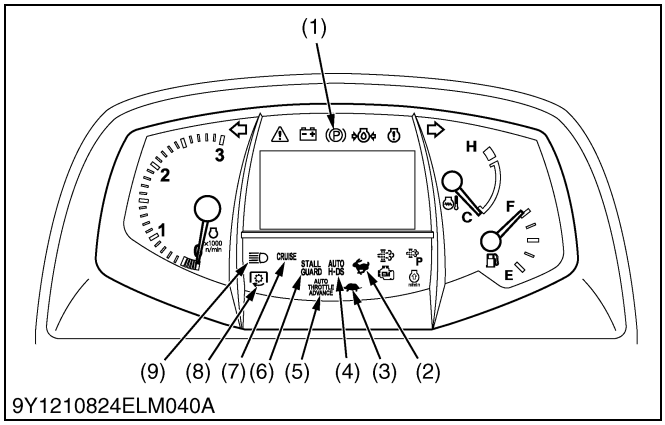
If the alternator is not charging the battery, electrical charge warning indicator (2) will come on. If this should happen during operation, check the charging system.

At above-mentioned the warning indicator's lighting, and it informs warning.

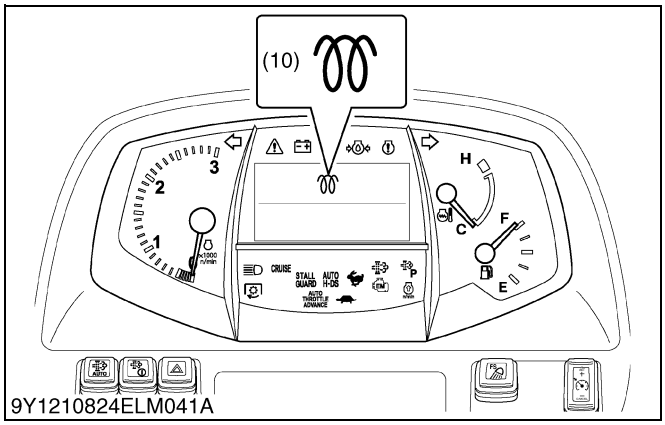
(1) Engine Oil Pressure Warning Indicator
(2) Electric Charge Warning Indicator

9Y1210824ELM0062US0

(7) Indicator Control



9Y1210824ELM040A



9Y1210824ELM041A

In this electronic instrument panel, the control of various monitor lamps shown in figure are equipped in addition to indicators.

(1) Parking Brake Indicator

If the parking brake is applied, parking brake switch is turned on and monitor lamp will come on.

(2) H-DS (Hydro Dual Speed) High Range Speed Indicator

If the H-DS lever is pushed up, the H-DS high speed range indicator will come on.

(3) H-DS (Hydro Dual Speed) Low Range Speed Indicator

If the H-DS lever is pushed down, the H-DS low speed indicator will come on.

(4) Auto H-DS (Hydro Dual Speed) Indicator

If the Auto H-DS is chosen in the HST Mode, the Auto H-DS indicator will come on.

(5) ATA (Auto Throttle Advance) Indicator

If the ATA switch is pushed, ATA indicator come on.

(6) Stall Guard Indicator

If the Stall Guard is chosen in the HST Mode, the Stall Guard indicator will come on.

(7) Cruise Control Indicator

The cruise control indicator stays on while the tractor is running under cruise control.

(8) Rear PTO Indicator

If the PTO system gets engaged (**ON**), the indicator light up.

(9) High Beam Indicator

If the head light switch is turned to High beam position, the indicator lamp comes on.

(10)Glow Indicator

If the main switch is turned to **"ON"** position, the glow indicator lamp comes on, and goes off automatically when preheating is completed.

(1)	Parking Brake Indicator	(5)	ATA (Auto Throttle Advance) Indicator
(2)	H-DS (Hydro Dual Speed) High Range Speed Indicator	(6)	Stall Guard Indicator
(3)	H-DS (Hydro Dual Speed) Row Range Speed Indicator	(7)	Cruise Control Indicator
(4)	Auto H-DS (Hydro Dual Speed) Indicator	(8)	Rear PTO Indicator
		(9)	High Beam Indicator
		(10)	Glow Indicator

9Y1210824ELM0064US0

[4] ASSISTANT CONTROL SYSTEM

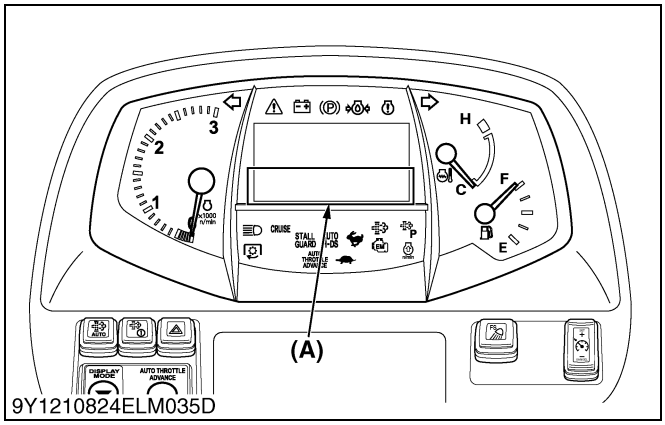
(1) Fail-safe Function

If a sensor or solenoid valve of the system gets in trouble during operation, an error message appears in the LCD screen of the electronic instrument panel. The entire system adjusts itself on the safer side and keeps itself from getting into another trouble.

What's more, if the shift solenoid valve of the GST valve gets in trouble, the system adjusts itself to an accessible shift position or the neutral position no matter which position the shift lever stays in.

9Y1210824ELM0065US0

(2) Self-diagnosis Function



9Y1210824ELM035D

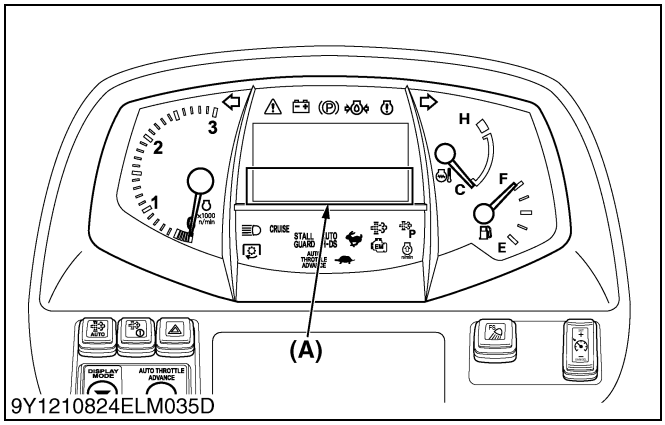
The following troubles are displayed in the panel's LCD screen.

One the repair is finished, the error code will disappear. However, the error information is still remained in the memory device of the electronic instrument panel.

The error information can be deleted out of the error history by operating the Error Information Reset Mode. (See page 9-S22.)

(A) The error message is displayed here.

9Y1210824ELM0066US0



(Error Messages)

Manual Transmission

Display on IntelliPanel™	Trouble Item (Affected Model)
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble
ERROR No. 51 Shuttle SWITCH NG	Shuttle lever switch is in trouble
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble
ERROR No. 94 OPC NG	OPC is in trouble
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble

GST

Display on IntelliPanel™	Trouble Item (Affected Model)
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble
ERROR No. 50 GST Lever SENSOR NG	GST lever sensor is in trouble
ERROR No. 51 Shuttle SWITCH NG	Shuttle lever switch is in trouble
ERROR No. 60 GST SOLENOID NG	Proportional reducing valve is in trouble
ERROR No. 61 1, 7, 8th Speed NG	Solenoid 1 is in trouble (At forward or neutral)
ERROR No. 61 1, 5th Speed NG	Solenoid 1 is in trouble (At reverse)
ERROR No. 61 1st Speed NG	Solenoid 1 is in trouble
ERROR No. 62 2, 9, 10th Speed NG	Solenoid 2 is in trouble (At forward or neutral)
ERROR No. 62 2, 6th Speed NG	Solenoid 2 is in trouble (At reverse)
ERROR No. 62 2nd Speed NG	Solenoid 2 is in trouble
ERROR No. 63 3, 4, 11th Speed NG	Solenoid 3 is in trouble (At forward or neutral)
ERROR No. 63 3, 7th Speed NG	Solenoid 3 is in trouble (At reverse)
ERROR No. 63 3rd Speed NG	Solenoid 3 is in trouble
ERROR No. 64 5, 6, 12th Speed NG	Solenoid 4 is in trouble (At forward or neutral)
ERROR No. 64 4, 8th Speed NG	Solenoid 4 is in trouble (At reverse)
ERROR No. 64 4th Speed NG	Solenoid 4 is in trouble
ERROR No. 65 1-6th Speed NG	Solenoid 5 (Hi-Lo) is in trouble (At forward or neutral)

Display on IntelliPanel™	Trouble Item (Affected Model)
ERROR No. 65 1-4th Speed NG	Solenoid 5 (Hi-Lo) is in trouble (At reverse)
ERROR No. 66 3, 5, 7, 9th Speed NG	Solenoid 6 (H-L) is in trouble
ERROR No. 67 5-8th Speed NG	Solenoid (OD) is in trouble
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble
ERROR No. 94 OPC NG	OPC is in trouble
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble

HST

Display on IntelliPanel™	Trouble Item (Affected Model)
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble
ERROR No. 80 Range Shift SENSOR NG	Sensor for range gear shift lever is in trouble
ERROR No. 81 HST Pedal SENSOR NG	Sensor for speed control pedal is in trouble
ERROR No. 82 Swash Plate SENSOR NG	Sensor for swashplate of HST is in trouble
ERROR No. 83 Cruise SWITCH NG	Cruise control switch is in trouble
ERROR No. 84 Throttle SENSOR NG	Sensor for engine throttle is in trouble
ERROR No. 90 HST-F SOLENOID NG	Proportional valve for forward is in trouble
ERROR No. 91 HST-R SOLENOID NG	Proportional valve for reverse is in trouble
ERROR No. 92 Hi-Lo SOLENOID NG	Hi-Lo solenoid shift is in trouble
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble
ERROR No. 94 OPC NG	OPC is in trouble
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble

A : Error message is displayed at here

9Y1210824ELM0067US0

(3) Testing, Setting and adjusting Function

It can do various settings, adjustments and testing by using the Liquid Crystal Display (LCD) (1).

When the main switch is turned to **"ON"** or **"START"** position while holding down the display mode switch (2), the service inspect display as shown in figure is indicated. And then, a target mode is selected, the data input and the fine adjustment, etc. can be done.

The following table shows the content of each mode display by the alphabet.

(1) Liquid Crystal Display (LCD) (2) Display Mode Switch

Mode	Details of Mode	Transmission Model			Contents
		Manual	GST	HST	
A	Test Mode	☆	☆	☆	For the checking the sensors voltage or engine and PTO revolution exhaust gas temperature is required
B	Traveling Speed Coefficient Input Mode	☆	☆	☆	For Inputting the operation coefficient of traveling speed to Intellipanel.
C	PTO Coefficient Number Input Mode	☆	☆	☆	For Inputting the operation coefficient number of PTO to Intellipanel.
D	Error Information Reset Mode	☆	☆	☆	For deleting the error information.
E	GST Lever Sensor Fine-adjustment Mode		☆		For setting the Neutral position of GST lever sensor (Input the sensor information to ECU)
F	GST Valve Fine-adjustment Mode		☆		For setting the function of proportional reducing valve (Input the valve information to ECU).
G	GST Shift shock Fine-adjustment Mode		☆		For adjusting the clutch engaging interval.
J	Speed Unit Input Mode	☆	☆	☆	For inputting the unit of traveling speeds to Intellipanel.
K	HST Pedal, Range Shift Lever, Fine-adjustment Mode			☆	For setting the each sensors position (Input the sensor information to ECU).
L	Throttle Sensor Fine-adjustment Mode	☆	☆	☆	For setting the throttle sensor (Input the sensor information to ECU).
M	Mode for Factory			☆	Contact your KUBOTA distributor.
N	Tractor Model Select Mode	☆	☆	☆	For inputting the model of tractor ECU.

9Y1210824ELM0068US0

(4) Glow Control

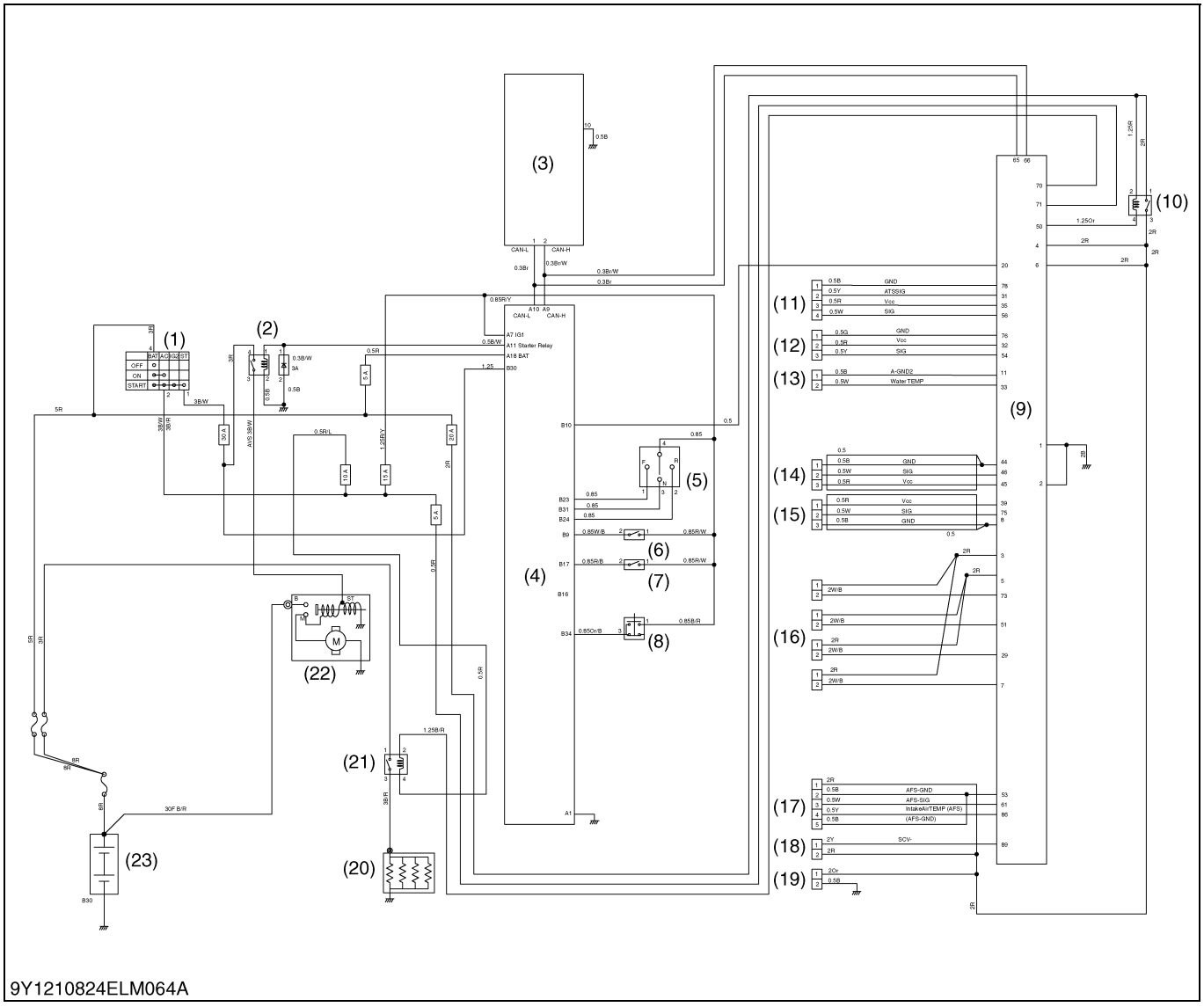
The electronic meter incorporates the glow control which was external single parts so for, and controls it with CPU.

When the main switch is turned **"ON"**, the temperature of the coolant is detected with the coolant temperature sensor, and the time to supply current to the glow plug and the glow indicator lamp is controlled by CPU according to the detected temperature. And the supply current to the glow plug is stopped automatically when the preheating time is completed, and indicator lamp on the electronic meter panel is turned off.

9Y1210824ELM0069US0

4. ENGINE STARTING SYSTEM AND STOPPING SYSTEM

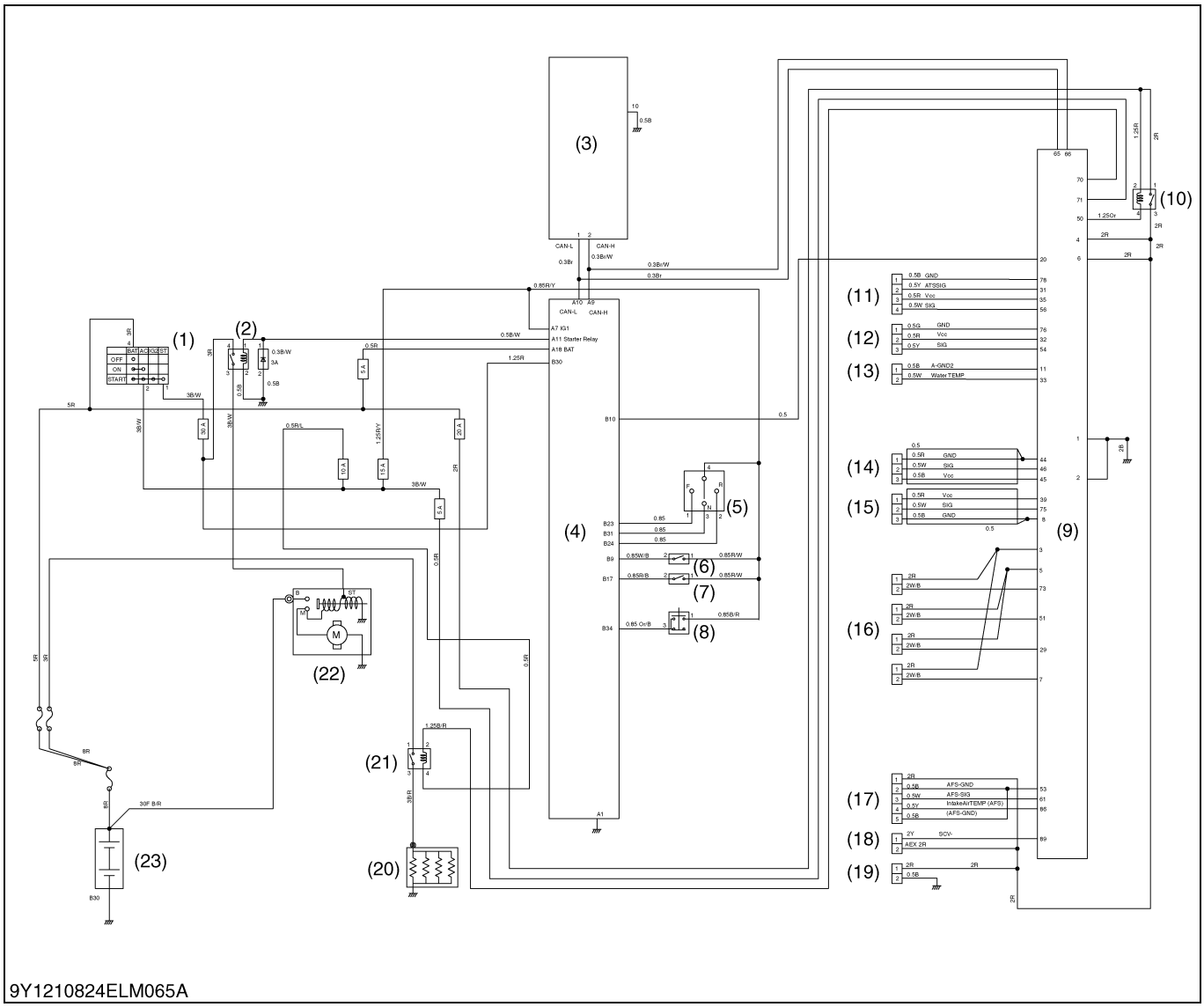
[1] MANUAL TRANSMISSION



(1) Main Switch
(2) Starter Relay
(3) Instrument Panel
(4) Main ECU
(5) Shuttle Switch
(6) Seat Switch
(7) Seat Tilt Switch
(8) PTO Switch
(9) Engine ECU
(10) Engine ECU Power Relay
(11) Boost Sensor
(12) Rail Pressure Sensor
(13) Coolant Temperature Sensor
(14) Camshaft Position Sensor
(15) Crankshaft Position Sensor
(16) Injector
(17) Air Flow Sensor
(18) SCV (Suction Control Valve)
(19) Fuel Pump
(20) Glow Plug
(21) Glow Relay
(22) Starter
(23) Battery

9Y1210824ELM0070US0

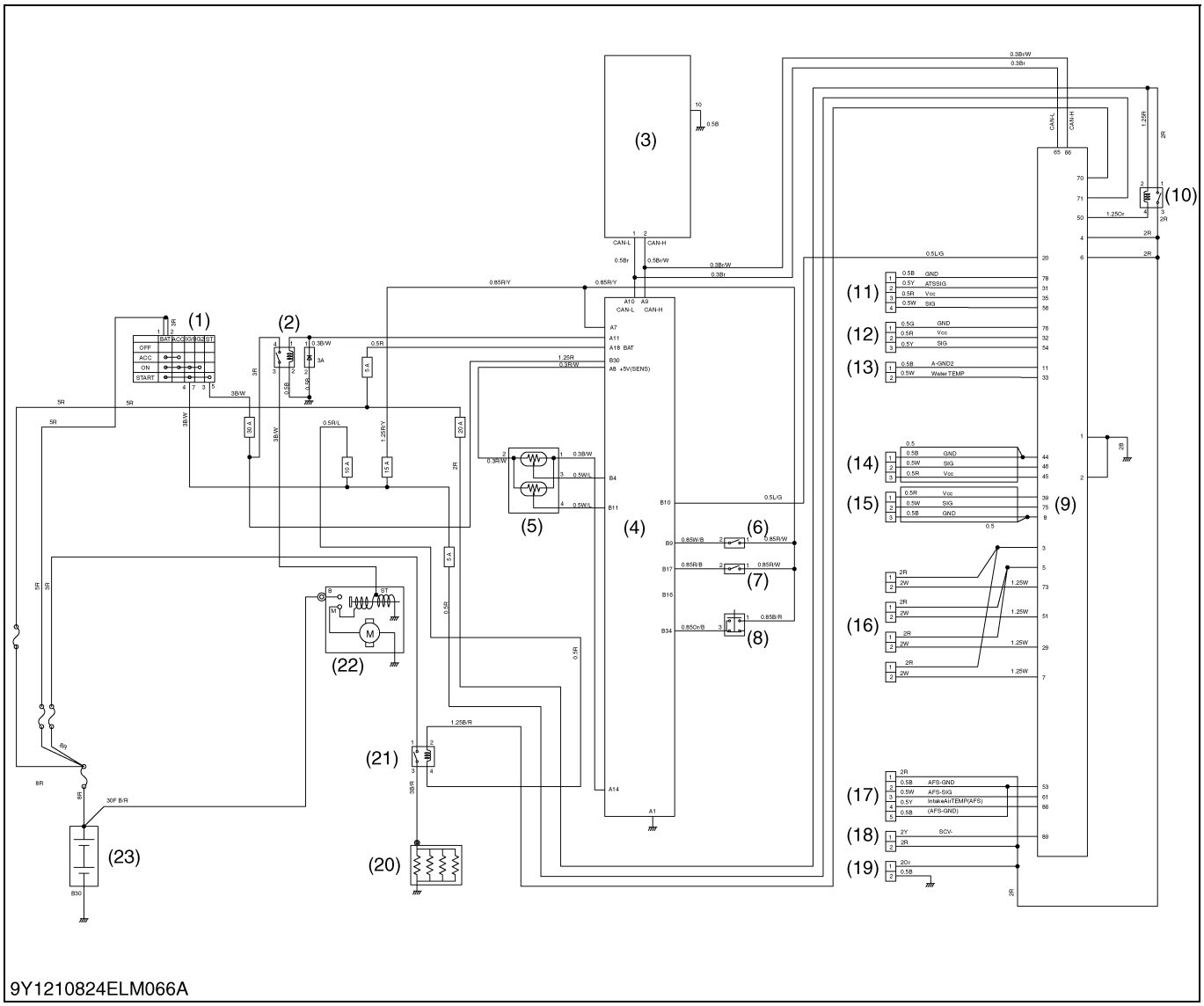
[2] GST



(1) Main Switch
(2) Starter Relay
(3) Instrument Panel
(4) Main ECU
(5) Shuttle Switch
(6) Seat Switch
(7) Seat Tilt Switch
(8) PTO Switch
(9) Engine ECU
(10) Engine ECU Power Relay
(11) Boost Sensor
(12) Rail Pressure Sensor
(13) Coolant Temperature Sensor
(14) Camshaft Position Sensor
(15) Crankshaft Position Sensor
(16) Injector
(17) Air Flow Sensor
(18) SCV (Suction Control Valve)
(19) Fuel Pump
(20) Glow Plug
(21) Glow Relay
(22) Starter
(23) Battery

9Y1210824ELM0071US0

[3] HST

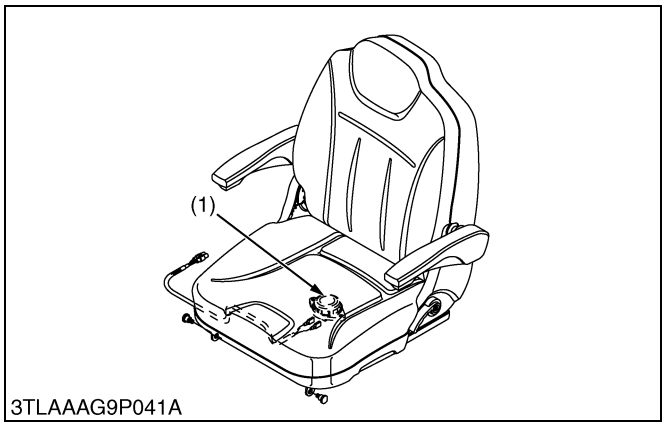


9Y1210824ELM066A

(1) Main Switch
(2) Starter Relay
(3) Instrument Panel
(4) Main ECU
(5) HST Pedal Sensor
(6) Seat Switch
(7) Seat Tilt Switch
(8) PTO Switch
(9) Engine ECU
(10) Engine ECU Power Relay
(11) Boost Sensor
(12) Rail Pressure Sensor
(13) Coolant Temperature Sensor
(14) Camshaft Position Sensor
(15) Crankshaft Position Sensor
(16) Injector
(17) Air Flow Sensor
(18) SCV (Suction Control Valve)
(19) Fuel Pump
(20) Glow Plug
(21) Glow Relay
(22) Starter
(23) Battery

9Y1210824ELM0072US0

[4] RELATED SWITCHES



Seat Switch and Seat Tilt Switch

These switches are located under the seat. When sitting on the seat, the seat switch (1) is pushed in and electrical circuit is closed. When the seat is vacant, this switch is not pushed and electric circuit is opened. Other seat tilt switch (2) is to detect tilting the seat. When tilting these t forward the seat tilt switch (2) is not pushed and electrical circuit is closed.

(1) Seat Switch (2) Seat Tilt Switch

9Y1210824ELM0073US0

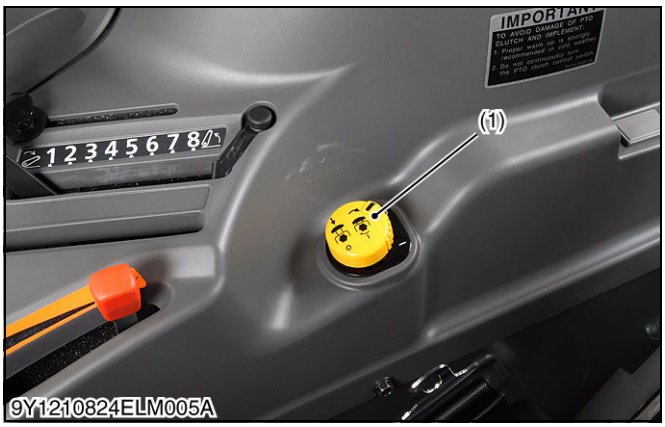
PTO Switch

This switch is located right cover.

When the PTO switch is in **"OFF"** position, this switch is pushed in and electric circuit is closed.

(1) PTO Switch

9Y1210824ELM0074US0



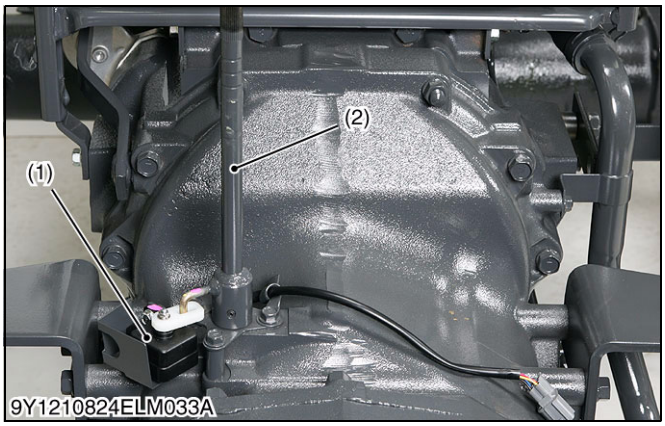
Shuttle Switch (Manual Transmission and GST)

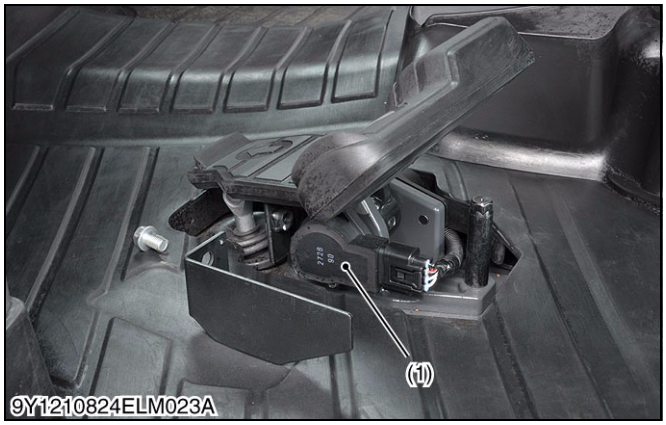
This switch is mounted on the clutch housing case.

When the shuttle lever is in **"Neutral"** position, the electrical circuit is closed.

(1) Shuttle Switch (2) Shuttle Shift Shaft

9Y1210824ELM0075US0





HST Pedal Sensor: for HST

The HST pedal sensor is located on the right of the HST pedal. When the HST pedal is operated, signals are sent to the ECU.

(1) HST Pedal Sensor

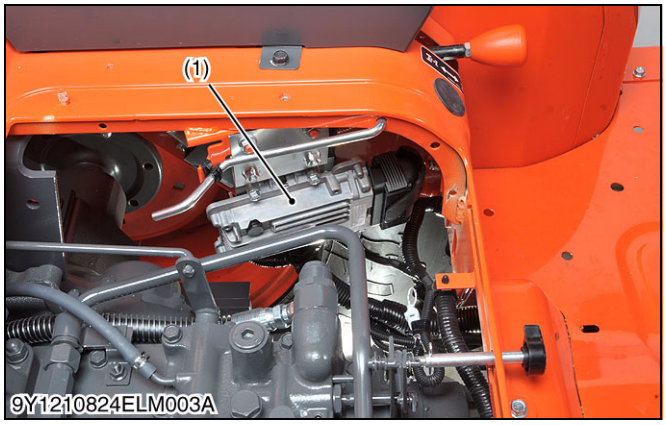
9Y1210824ELM0076US0

Main ECU (Electrical Control Unit)

The main ECU is located inside of steering cover.

(1) Main ECU

9Y1210824ELM0077US0



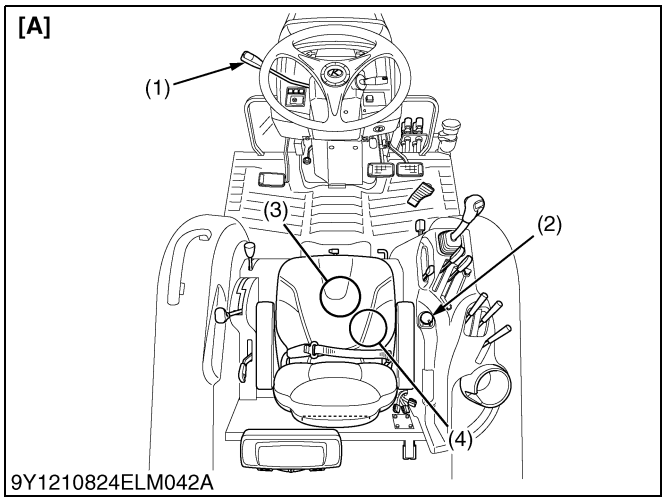
Engine ECU (Electrical Control Unit)

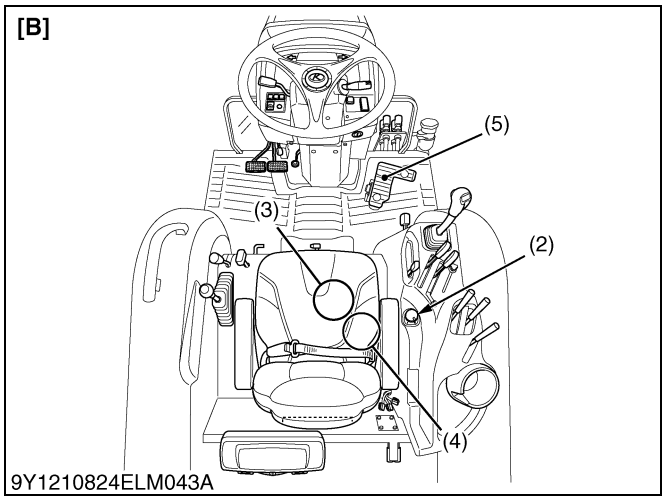
The engine ECU is located under the floor seat.

(1) Engine ECU

9Y1210824ELM0078US0

[5] ENGINE STARTING CONDITIONS





When the following conditions become complete, electric voltage reaches starter **AC** terminal through operator presence controller from main switch **ST** terminal, and the engine can be started.

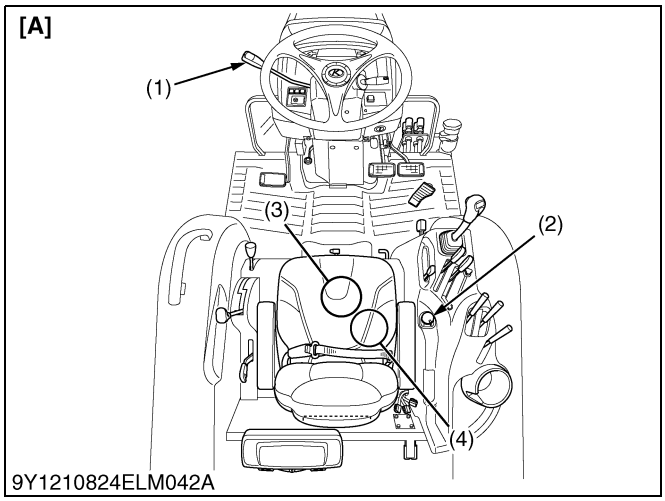
(1) Shuttle Shift Lever
(2) PTO Switch
(3) Seat Switch
(4) Seat Tilt Switch
(5) HST Pedal

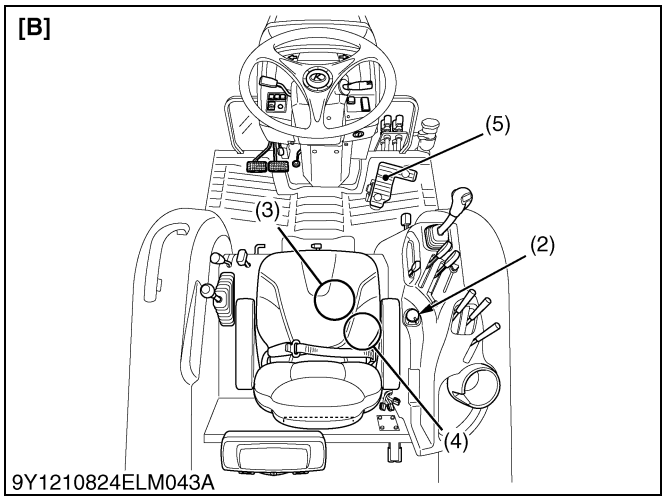
[A] Manual Transmission and GST
[B] HST

	PTO Switch (Neutral: OFF) (Engaged: ON)	**Shuttle Switch** (Neutral: OFF) (Engaged: ON)	**HST Pedal Sensor** (Neutral: OFF) (Engaged: ON)
Manual Transmission and GST	OFF	OFF	–
HST	OFF	–	OFF

9Y1210824ELM0079US0

[6] AUTOMATIC ENGINE STOP





The tractor is equipped with Operator Presence Control (OPC) system. The engine automatically stops when the operator stands from the seat while engaging PTO clutch.

(1) Shuttle Shift Lever
(2) PTO Switch
(3) Seat Switch
(4) Seat Tilt Switch
(5) HST Pedal

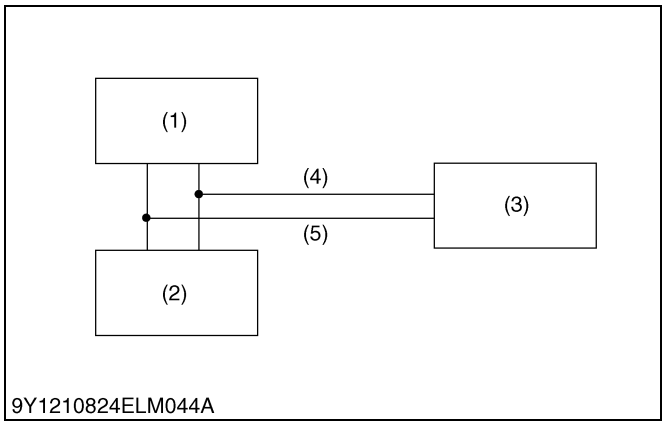
[A] Manual Transmission and GST
[B] HST

	Shuttle Switch or HST Pedal Sensor (Neutral: OFF) (Others: ON)	**PTO Switch** (Neutral: OFF) (Engaged: ON)	**Seat Switch** (Occupied: OFF) (Vacant: ON)	**Seat Tilt Switch** (Tilted: OFF) (Normal: ON)
1	ON	ON / OFF	ON	ON / OFF
2	OFF	OFF	ON	ON / OFF
3	OFF	OFF	ON	ON

■ **NOTE**
- **When the mid PTO is not engaged and the seat is tilted, the engine does not stop even if rear PTO is engaged.**

9Y1210824ELM0080US0

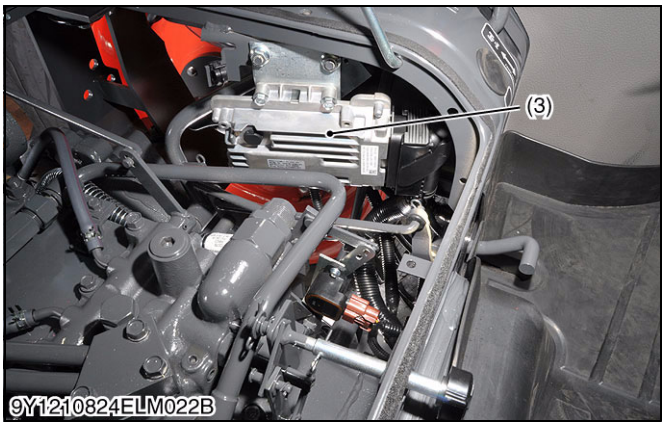
5. CAN (CONTROLLER AREA NETWORK) COMMUNICATION



9Y1210824ELM044A

9Y1210824ELM001B

9Y1210824ELM002B



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The Controller Area Network (CAN) specification defines the Data Link Layer, ISO 11898 defines the Physical Layer.

The CAN bus [CANbus] is a Balanced (differential) 2-wire interface running over a Shielded Twisted Pair (STP), WIRING HARNESS (4) and (5). The Bit Encoding used is Non Return to Zero (NRZ) encoding (with bit-stuffing) for data communication on a differential two wire bus. The use of NRZ encoding ensures compact messages with a minimum number of transitions and high resilience to external disturbance.

A number of data rates is 500 kbps (kilo bits per second).

The CAN Bus interface uses an asynchronous transmission scheme controlled by start and stop bits at the beginning and end of each character. This interface is used, employing serial binary interchange. Information is passed from transmitters to receivers in a data frame.

The first merit of the CANbus is that the wiring harness becomes simplified.

The second merit of the CANbus is that the output signal data of sensors and switches connected with ECU can be shared by each ECU.

(1) Instrument Panel
(2) Main ECU
(3) Engine ECU
(4) Wiring Harness (CAN BUS High)
(5) Wiring Harness (CAN BUS Low)

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SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipment Do Not Operate	Battery discharged or damaged	Recharge or replace	9-S12
	Battery positive cable disconnected or improperly connected	Repair or replace	–
	Battery negative cable disconnected or improperly connected	Repair or replace	–
	Slow blow fuse blown	Replace	9-S34
Fuse Blown Frequently	Short-circuited	Repair or replace	–

BATTERY

Symptom	Probable Cause	Solution	Reference Page
Battery Discharges Too Quickly	Battery damaged	Replace	9-S11
	Alternator damaged	Repair or replace	9-S91
	IC Regulator damaged	Replace	9-S92
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Cooling fan belt slipping	Adjust tension	G-28

STARTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Starter Motor Does Not Operate	Battery discharged or damaged	Recharge or replace	9-S12
	Slow blow fuse blown	Replace	9-S34
	Safety switch improperly adjusted or damaged	Repair or replace	9-S62
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Starter motor damaged	Repair or replace	9-S91
	Main switch damaged	Replace	9-S60, 9-S61
	Starter relay damaged	Replace	9-S66
	PTO switch damaged	Replace	9-S62
Glow Lamp Does Not Light	Coolant temperature sensor damaged	Replace	9-S74
	Main switch damaged	Replace	9-S60, 9-S61
	Glow relay damaged	Repair or replace	–
	Electronic instrument panel damaged	Replace	9-S15

OPC SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Does Not Stop Engine	OPC system electrical part damaged	Inspect or replace safety switch	–

CHARGING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Charging Lamp Does Not Light when Main Switch is Turned ON	Wiring harness disconnected or improperly connected	Repair or replace	–
	Alternator damaged	Repair or replace	9-S91
Charging Lamp Does Not Go Off When Engine is Running	Short circuit between alternator terminal **L** lead and chassis	Repair or replace	–
	Alternator damaged	Repair or replace	9-S91

LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	Fuse blown	Replace	9-S33
	Bulb blown	Replace	G-46
	Wiring harness disconnected or improperly connected	Repair or replace	–
Hazard Light Does Not Light	Fuse blown	Replace	9-S33
	Bulb blown	Replace	G-46
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Flasher unit damaged	Replace	9-S71
	Hazard switch damaged	Replace	9-S70

EASY CHECKER™

Symptom	Probable Cause	Solution	Reference Page
Engine Oil Pressure Lamp Lights Up When Engine Is Running	Engine oil pressure too low	Repair engine	1-S14
	Engine oil insufficient	Fill	G-9
	Engine oil pressure switch damaged	Replace	9-S72
	Short circuit between engine oil pressure switch lead and chassis	Repair	9-S72
	Electrical instrument panel damaged	Replace	9-S15
Engine Oil Pressure Lamp Does Not Light When Main Switch Is Turned ON and Engine Is Not Running	Engine oil pressure switch damaged	Replace	9-S72
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S15

GAUGES

Symptom	Probable Cause	Solution	Reference Page
Fuel Gauge Does Not Function	Fuel level sensor damaged	Replace	9-S74
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S15
Coolant Temperature Gauge Does Not Function	Coolant temperature sensor damaged	Replace	9-S74
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S15

ELECTRONIC INSTRUMENT PANEL (INTELLIPANEL)

Symptom	Probable Cause	Solution	Reference Page
Nothing is Displayed in LCD	Battery discharged or damaged (Battery voltage is below 7 V)	Recharge or replace	9-S12
	Slow blow fuse blown	Replace	9-S34
	Electronic instrument panel connector disconnect	Connect	9-S37
	Electronic instrument panel damaged	Replace	9-S15
Indication on LCD Does Not Change When Pushing the Display Mode Switch	Display mode switch damaged	Replace	9-S38
	Wiring harness disconnected	Repair	–
Traveling Speed is Not Indicating	Wiring harness disconnected	Repair	–
	Traveling speed sensor damaged	Replace	9-S49, 9-S53, 9-S60
PTO Speed in Not Indicating	Wiring harness disconnected	Repair	–
Fuel Gauge is Indicating Always E	Wiring harness (GND) disconnected	Repair or replace	–
	Fuel unit damaged	Replace	9-S74
Fuel Gauge is Indicating Always F	Wiring harness short-circuited	Repair or replace	–
	Fuel unit damaged	Replace	9-S74
Position of Range Gear Shift Lever Is Not Indicated (For HST)	Wiring harness disconnected	Repair or replace	–
	Range gear shift lever sensor damaged	Replace	9-S54
	Mode setting incorrect	Reset Mode N → K → L	9-S27, 9-S29, 9-S30

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Error Display for Manual Transmission

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™	• CANbus wiring is disconnected or short-circuited • No signals from main ECU for longer than 5 seconds (error cleared if signal sent and received later) • Main ECU damaged	Check the communication line	–
			Check the main ECU connector	9-S38
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble	• Main ECU memory device failure	Replace the main ECU	9-S14
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble	• Power source (5 V) from terminal **A8** of main ECU is dropped below 2.6 V for 0.1 second or more • Wiring for sensor is short-circuited	Check the output voltage at main ECU connector	9-S39
			Check the sensor connector	9-S48
			Check the ground cable	9-S35
ERROR No. 51 Shuttle SWITCH NG	Shuttle lever switch is in trouble	• Shuttle switch failure	Check the shuttle switch	9-S63
			Replace the shuttle switch	9-S63
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble	• Starter relay failure • Wiring for starter relay is disconnected or short-circuited	Engine does not start	–
			Replace the starter relay	9-S66
			Check the wiring connector of starter relay	–
ERROR No. 94 OPC NG	OPC is in trouble	• Wiring for OPC is disconnected or short-circuited	Engine is stopped	–
			Check the wiring connector of OPC	9-S62
			Check the communication line between terminal B18 of main ECU and terminal 20 of engine ECU	–
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble	• PTO solenoid valve failure • Wiring for PTO solenoid valve is disconnected or short-circuited • Grounding plate of solenoid is poor contact with chassis	PTO does not rotate	–
			Check the PTO solenoid valve	3-S20
			Replace the PTO solenoid valve	3-S66
			Check the wiring connector of PTO solenoid valve	–

Error Display for GST

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™	• CANbus wiring is disconnected or short-circuited • No signals from main ECU for longer than 5 seconds (error cleared if signal sent and received later) • Main ECU damaged	Check the communication line	–
			Check the main ECU connector	9-S38
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble	• Main ECU memory device failure	Replace the main ECU	9-S14
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble	• Power source (5 V) from terminal **A8** of main ECU is dropped below 2.6 V for 0.1 second or more • Wiring for sensor is short-circuited	Check the output voltage at main ECU connector	9-S41
			Check the sensor connector	9-S49
			Check the ground cable	9-S35
ERROR No. 50 GST Lever SENSOR NG	GST lever sensor is in trouble	• Lever sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Lever sensor failure • Main Sensor Voltage ≤0.2V or ≥4.9V (60 msec in a row)	Check the sensor voltage by test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S49
			Replace the sensor	9-S49
ERROR No. 51 Shuttle SWITCH NG	Shuttle lever switch is in trouble	• Shuttle switch failure	Check the shuttle switch	9-S63
			Replace the shuttle switch	–
ERROR No. 60 GST SOLENOID NG	Proportional reducing valve is in trouble	• Output voltage of proportional reducing valve terminal or return current is out of specification • Wiring for valve is disconnected or short-circuited • Proportional reducing valve damaged	Check the connector of proportional reducing valve	–
			Check the connector of proportional reducing valve resistance at valve or main ECU connector	9-S41
			Check the ground cable	9-S35
			Connect the emergency connector and moves	–

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 61 **1, 7, 8th Speed NG**	Solenoid 1 is in trouble (At forward or neutral)	• Solenoid output terminal's voltage is out of specification • Solenoid broken or short-circuited • Wiring harness broken or short-circuited • Grounding plate of solenoid is poor contact with chassis	Able to travel at speeds other than 1, 7 and 8 (Forward) or 1 and 5 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 61 **1, 5th Speed NG**	Solenoid 1 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S41, 9-S50
			Replace GST valve	3-S79
ERROR No. 62 **2, 9, 10th Speed NG**	Solenoid 2 is in trouble (At forward or neutral)		Able to travel at speeds other than 2, 9 and 10 (Forward) or 2 and 6 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 62 **2, 6th Speed NG**	Solenoid 2 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 63 **3, 4, 11th Speed NG**	Solenoid 3 is in trouble (At forward or neutral)		Able to travel at speeds other than 3, 4 and 11 (Forward) or 3 and 7 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 63 **3, 7th Speed NG**	Solenoid 3 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 64 **5, 6, 12th Speed NG**	Solenoid 4 is in trouble (At forward or neutral)		Able to travel at speeds other than 5, 6 and 12 (Forward) or 4 and 8 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 64 **4, 8th Speed NG**	Solenoid 4 is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 65 **1-6th Speed NG**	Solenoid 5 (Hi-Lo) is in trouble (At forward or neutral)		Able to travel at speeds other than 1 to 6 (Forward) or 1 to 4 (Reverse)	–
			Check the wiring connector of solenoid	–
ERROR No. 65 **1-4th Speed NG**	Solenoid 5 (Hi-Lo) is in trouble (At reverse)		Check the resistance between solenoid and GND	9-S51
			Replace GST valve	3-S79
ERROR No. 66 **3, 5, 7, 9th Speed NG**	Solenoid 6 (H-L) is in trouble		Able to travel at speeds other than 3, 5, 7 and 9 (Forward)	–
			Check the wiring connector of solenoid	–
			Check the resistance between solenoid and GND	9-S51
ERROR No. 93 **Starter RELAY NG**	Starter relay is in trouble	• Starter relay failure • Wiring for starter relay is disconnected or short-circuited	Engine does not start	–
			Replace the starter relay	9-S66
			Check the wiring connector of starter relay	–
ERROR No. 94 **OPC NG**	OPC is in trouble	• Wiring for OPC is disconnected or short-circuited	Engine is stopped	–
			Check the wiring connector of OPC	9-S62
			Check the communication line between terminal B18 of main ECU and terminal 20 of engine ECU	–
ERROR No. 95 **PTO SOLENOID NG**	Solenoid (PTO) is in trouble	• PTO solenoid valve failure • Wiring for PTO solenoid valve is disconnected or short-circuited • Grounding plate of solenoid is poor contact with chassis	PTO does not rotate	–
			Check the PTO solenoid valve	3-S20
			Replace the PTO solenoid valve	3-S85
			Check the wiring connector of PTO solenoid valve	–

Error Display for HST

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 20 CAN NG	Communication error between ECU and IntelliPanel™	• CANbus wiring is disconnected or short-circuited • No signals from main ECU for longer than 5 seconds (error cleared if signal sent and received later) • Main ECU damaged	Check the communication line	–
			Check the main ECU connector	9-S38
ERROR No. 30 ECU Memory DEVICE NG	ECU's memory device is in trouble	• Main ECU memory device failure	Replace the main ECU	9-S14
ERROR No. 40 Input Voltage NG	Input voltage to sensor from ECU is in trouble	• Power source (5 V) from terminal **A8** of main ECU is dropped below 2.6 V for 0.1 second or more • Wiring for sensor is short-circuited	Check the output voltage at main ECU connector	9-S43
			Check the sensor connector	9-S53
			Check the ground cable	9-S35
ERROR No. 80 Range Shift SENSOR NG	Sensor for range gear shift lever is in trouble	• Sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Sensor failure	Check the sensor voltage by test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S54
			Replace the sensor	9-S54
ERROR No. 81 HST Pedal SENSOR NG	Sensor for speed control pedal is in trouble	• Sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Sensor failure • Main sensor voltage ≤0.2 V or ≥4.9 V • Sub sensor voltage ≤0.2 V or ≥4.9 V • Main + Sub ≤3.9 V or ≥6.1 V (60 msec in a row)	The running that uses the pedal is impossible, but running with the cruise control switch is possible	–
			Check the sensor voltage by Test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S55
			Replace the sensor	9-S55
ERROR No. 82 Swash Plate SENSOR NG	Sensor for swashplate of HST is in trouble		Travel motion is possible	–
			Check the sensor voltage by Test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensor resistance	9-S55
			Replace the sensor	9-S55
ERROR No. 83 Cruise SWITCH NG	Cruise control switch is in trouble	• Cruise control switch failure	Check the cruise control switch	9-S57
			Replace the cruise control switch	9-S57
ERROR No. 84 Throttle SENSOR NG	Sensor for engine throttle is in trouble	• Sensor output terminal is out of adjustment • Wiring for sensor is disconnected or short-circuited • Sensor failure • Main sensor voltage ≤0.2 V or ≥4.9 V • Sub sensor voltage ≤0.2 V or ≥4.9 V • Main + Sub ≤3.9 V or ≥6.1 V (60 msec in a row)	Travel motion is possible. The HST electronic control function (Mode 2 and Mode 3) is inoperative condition.	–
			Check the sensor voltage by Test mode (Mode A)	9-S17
			Check the sensor wiring connector or check the sensorresistance	9-S55
			Replace the sensor	9-S55

Display on IntelliPanel	Trouble Item	Probable Cause	Solution	Reference Page
ERROR No. 90 HST-F SOLENOID NG	Proportional valve for forward is in trouble	• Output voltage of proportional valve terminal or return current is out of specification • Wiring for proportional valve is disconnected or short-circuited • Proportional valve failure	Travel motion is possible on the backward side only	–
			Check the connector of proportional	9-S58
			Check the proportional valve by Test mode (Mode A)	9-S17
			Check the proportional valve resistance at valve or main ECU connector	9-S58
			Check the ground cable	9-S35
			Replace the proportional valve	9-S58
ERROR No. 91 HST-R SOLENOID NG	Proportional valve for reverse is in trouble		Travel motion is possible on the forward side only	–
			Check the connector of proportional	9-S58
			Check the proportional valve by Test mode (Mode A)	9-S17
			Check the proportional valve resistance at valve or main ECU connector	9-S58
			Check the ground cable	9-S35
			Replace the proportional valve	9-S58
ERROR No. 92 Hi-Lo SOLENOID NG	Hi-Lo solenoid shift is in trouble	• Hi-Lo solenoid output terminals voltage is out of specification • Hi-Lo solenoid broken or short-circuited • Wiring for Hi-Lo solenoid valve is disconnected or short-circuited	Travel motion is possible. The HST electronic control function (Mode 3) is in the inoperative condition	–
			Check the Hi-Lo solenoid resistance	9-S59
			Replace the Hi-Lo solenoid	9-S59
ERROR No. 93 Starter RELAY NG	Starter relay is in trouble	• Starter relay failure • Wiring for starter relay is disconnected or short-circuited	Engine does not start	–
			Replace the starter relay	9-S66
			Check the wiring connector of starter relay	–
ERROR No. 94 OPC NG	OPC is in trouble	• Wiring for OPC is disconnected or short-circuited	Engine is stopped	–
			Check the wiring connector of OPC	9-S62
			Check the communication line between terminal B18 of main ECU and terminal 20 of engine ECU	–
ERROR No. 95 PTO SOLENOID NG	Solenoid (PTO) is in trouble	• PTO solenoid valve failure • Wiring for PTO solenoid valve is disconnected or short-circuited • Grounding plate of solenoid is poor contact with chassis	PTO does not rotate	–
			Check the PTO solenoid valve	3-S20
			Replace the PTO solenoid valve	3-S113
			Check the wiring connector of PTO solenoid valve	–

9Y1210824ELS0151US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
GST Proportional Reducing Valve	Resistance	Approx. 8 to 9 Ω	–
Shift Solenoid Valve	Resistance	Approx. 11 to 15 Ω	–
Glow Plug	Resistance	Approx. 0.8 Ω	–
Fuel Level Sensor			
• Float at Upper-most Position	Resistance	3.0 to 5.0 Ω	–
• Float at Lower-most Position	Resistance	107.5 to 112.5 Ω	–
Coolant Temperature Sensor			
• at −20 °C (−4 °F)	Resistance	13.54 to 16.63 kΩ	–
• at 20 °C (68 °F)	Resistance	2.28 to 2.63 kΩ	–
• at 80 °C (176 °F)	Resistance	0.30 to 0.33 kΩ	–
• at 100 °C (212 °F)	Resistance	0.1836 kΩ	–
• at 120 °C (248 °F)	Resistance	0.1108 kΩ	–
Starter			
• Commutator	O.D.	30.0 mm 1.18 in.	29.0 mm 1.14 in.
• Mica	Under Cut	0.50 to 0.80 mm 0.020 to 0.031 in.	0.20 mm 0.0079 in.
• Brush	Length	15.0 mm 0.591 in.	11.0 mm 0.433 in.
• Brush Holder and Holder Support	Resistance	Infinity	–
Alternator	No-load voltage	More than 14 V	–
• Stator	Resistance	Less than 1.0 Ω	–
• Rotor	Resistance	2.9 Ω	12.8 mm 0.504 in.
• Slip Ring	O.D.	14.4 mm 0.567 in.	8.4 mm 0.331 in.
• Brush	Length	10.5 mm 0.413 in.	

9Y1210824ELS0164US0

3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

Item	N·m	kgf·m	lbf·ft
Starter terminal nut	5.9 to 11	0.60 to 1.2	4.4 to 8.6
Alternator pulley nut	58.4 to 78.9	5.95 to 8.05	43.1 to 58.2

9Y1210824ELS0165US0

4. CHECKING AND ADJUSTING

⚠ CAUTION
- **To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.**
- **Never remove the battery cap while the engine is running.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately.**
- **Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.**

■ **IMPORTANT**
- **If the machine is to be operated for a short time without battery (using a slave battery for starting), use additional current (lights) while engine is running and insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.**

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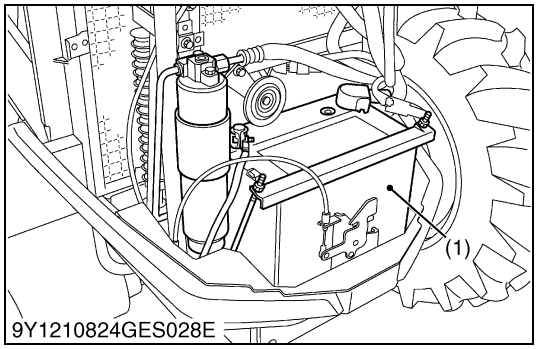
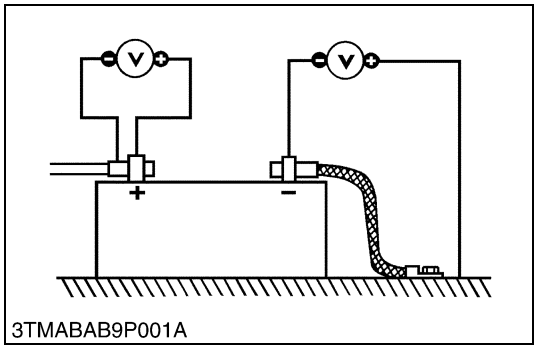
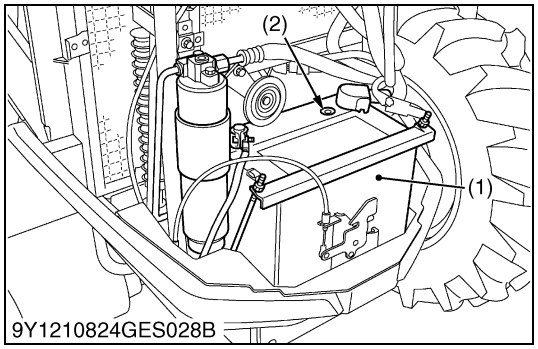
[1] BATTERY







Battery Voltage

1. Stop the engine and turn the main switch off.
2. Connect the COM (−) lead of the voltmeter to the battery's negative terminal post and the (+) lead to the positive terminal post, and measure the battery voltage.
3. If the battery voltage is less than the factory specification, check the battery specific gravity and recharge the battery (1).

Battery voltage	Reference value	More than 12 V

(1) Battery

9Y1210824ELS0001US0

Battery Terminal Connection

1. Turn the main switch on, and turn on the head light.
2. Measure the voltage across the battery's positive terminal post and the cable terminal, the voltage across the battery's negative terminal post and the chassis.
3. If the measurement exceeds the factory specification, clean the battery terminal posts and cable clamps, and tighten them firmly.

Potential difference	Reference value	Less than 0.1 V

9Y1210824ELS0002US0

Battery Condition Indicator

1. Check the battery condition by reading the indicator (2).

State of indicator display	
Green	Specific gravity of electrolyte and quality of electrolyte are both in good condition.
Black	Needs charging battery
White	Needs replacing battery

■ **IMPORTANT**
- **The factory installed battery is of non-refillable type. If the indicator turns white, do not charge the battery but replace it with new one.**

(1) Battery (2) Indicator

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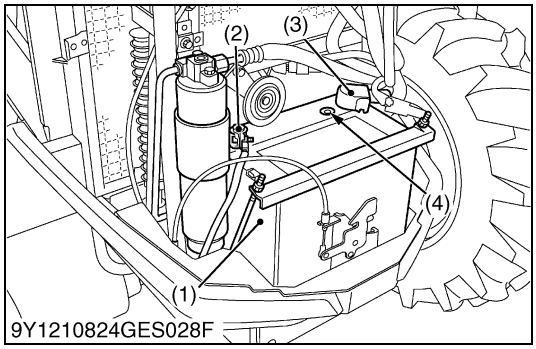

Recharging

CAUTION

- **When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.**
- **When disconnecting the cable from the battery, start with the negative terminal first.**
  When connecting the cable to the battery, start with the positive terminal first.
- **Never check battery charge by placing a metal object across the posts.**
  Use a voltmeter or hydrometer.

1. To slow charge the battery (1), connect the battery positive terminal (3) to the charge positive terminal and the negative (2) to the negative, then recharge in the standard fashion.
2. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time.
   When using a boost-charged battery, it is necessary to recharge the battery as early as possible.
   Failure to do this will shorten the battery's service life.
3. The battery is charge if the indicator display turns green from black.
4. When exchanging an old battery for a new one, use battery of equal specification shown in table.

Table

Battery Type	Volt (V)	Capacity at 5 H.R.	Reserve at (min.)	Cold Cranking Amps	Normal Charging Rate (A)
80D26R	12	55	133	582	6.5

(1) Battery
(2) Negative Terminal
(3) Positive Terminal
(4) Indicator

9Y1210824ELS0004US0

Directions for Storage

1. When shutting down the tractor for long periods of time, remove the battery from the tractor, store the battery in a well ventilated place where it is not exposed to direct sunlight.
2. Since the battery self-discharges by approx. 0.5 % per day even in storage, it must be once every two months in cold season.
3. When storing the battery mounted on the tractor, disconnect the ground cable from the battery's negative terminal post.

(Reference)

- Self-discharge Rate

Temperature	Self-discharge rate
30 °C (86 °F)	Approx. 1.0 % per day
20 °C (68 °F)	Approx. 0.5 % per day
10 °C (50 °F)	Approx. 0.25 % per day

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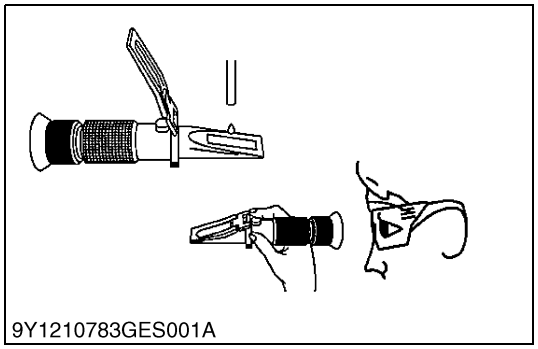
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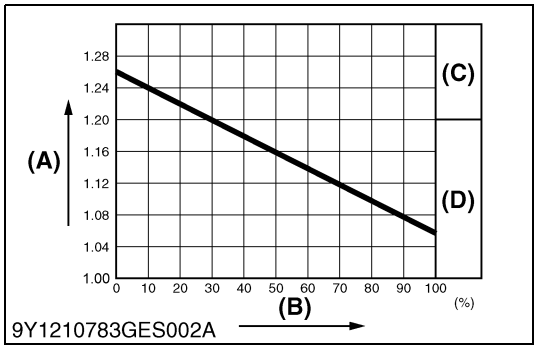


9Y1210783GES002A

Battery Specific Gravity

CAUTION

- **If battery acid (dilute sulfuric acid) gets on you it could cause blindness or burns, or could cause corrosion of machinery and tools so please be careful when handling.**
- **Wear safety glasses and rubber gloves when performing battery maintenance and inspection (measuring specific gravity, filling water, or charging).**
- **If the gas that is generated is ignited by an ignition source, it may explode so be very careful with sparks and fire.**
- **Keep your body and face as far away from the battery as you can when performing maintenance and inspection.**
- **Do not allow people who do not know how to handle a battery or who do not sufficiently understand the danger perform inspection or maintenance.**

(Measurement items)

■ **Zero adjustment**

1. Open the cover and drip water on the prism surface using the included rod.
2. Close the cover.
3. Aim in a direction that is bright, look into the lens, and adjust the focus until the gradations can be seen clearly.
4. If the boundary line is not on the gradation baseline (0 position), turn the adjustment screw until it matches.
5. When zero adjustment is complete, wipe the prism and cover surface with a soft cloth or tissue paper.

■ **Measurement of test fluid**

1. Open the cover and drip test fluid on the prism surface using the included rod.
2. Close the cover.
3. Aim in a direction that is bright, look into the lens and read the gradation of the blue boundary line.
4. When the measurement is complete, wipe the prism and cover surface with a soft cloth or tissue paper.

(Reference)

Electrolyte specific gravity and amount of discharge.
Use the following table as a reference.

■ **NOTE**

Temperature conversion of electrolyte specific gravity

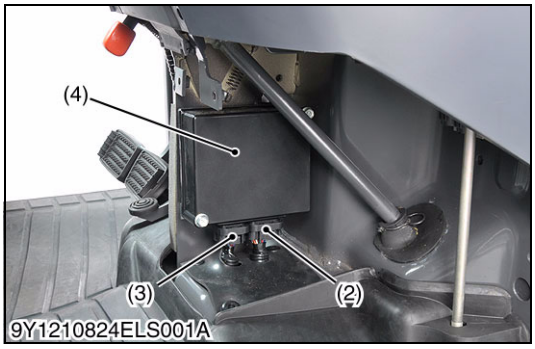
- **Battery electrolyte specific gravity changes based on temperature.**
- **Insert the value identified on a specific gravity meter into the following conversion equation for temperature correction to learn an accurate specific gravity value. (Standard temperature assumed to be 20 °C (68 °F))**
  D_{20} = Dt + 0.0007 (t - 20)
  D_{20} = specific gravity value converted to standard temperature of 20 °C (68 °F)
  D_t = measured specific gravity value at the electrolyte temperature t °C

(A) Electrolyte Specific Gravity
(B) Discharge
(C) Good
(D) Charging is necessary.

9Y1210824ELS0006US0

[2] ECU AND ELECTRONIC INSTRUMENT PANEL (INTELLIPANEL)

(1) Main ECU



Main ECU

1. Remove the cover (1).
2. Disconnect the main ECU connector A (3) and connector B (2).

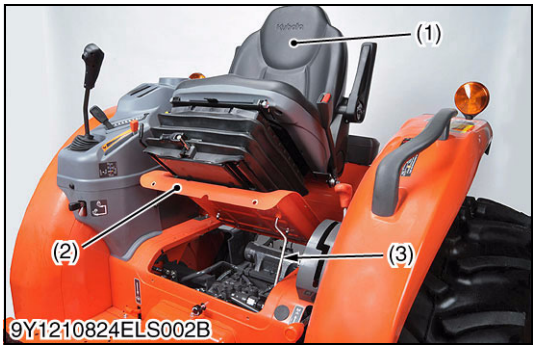
■ **IMPORTANT**

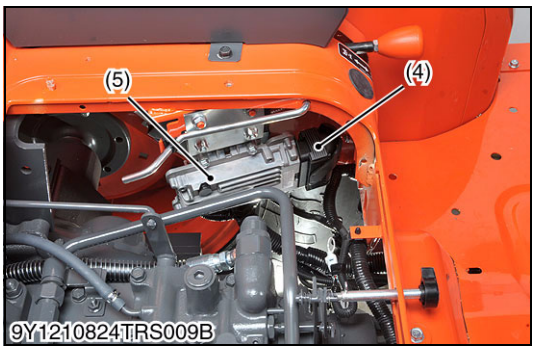
- **[HST]**
  When replacing the main ECU, be sure to adjust the mode "N" first.
  Then adjust the mode "K" and mode "L".
- **[GST]**
  When replacing the main ECU, be sure to adjust the mode "N" first.
  Then adjust the mode "E" and mode "F".

(1) Cover
(2) Connector B (34P)
(3) Connector A (26P)
(4) Main ECU

9Y1210824ELS0007US0

(2) Engine ECU





Engine ECU

1. Open the seat under cover (2) with the seat (1).
2. Make sure that set the floor seat rod (3).
3. Disconnect the engine ECU connector (4).

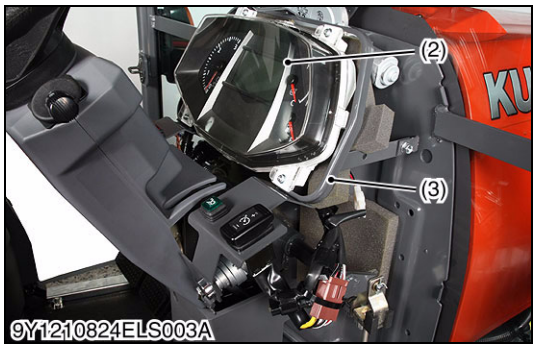
■ **IMPORTANT**

- **When replacing the engine ECU, be sure to do injector correction and input the angular deviation between crankshaft TDC and crankshaft position sensor detected TDC. (See page 1-S71, 1-S72 and "DIAGNOSIS MANUAL" 9Y120-02420.)**

(1) Seat
(2) Seat Under Cover
(3) Floor Seat Rod
(4) Engine ECU Connector
(5) Engine ECU

9Y1210824ELS0008US0

(3) Electronic Instrument Panel



Disconnecting Electronic Instrument Panel Connector

1. Remove the panel cover (1).
2. Remove the electronic instrument panel (2) from panel frame (3).
3. Disconnect the panel connector (4).

■ **NOTE**

- **When replacing the electronic instrument panel, adjust to mode "B", "C" and mode "J"**

(1) Panel Cover
(2) Electronic Instrument Panel (Intellipanel)
(3) Panel Frame
(4) Connector

9Y1210824ELS0009US0

[3] TESTING, SETTING AND ADJUSTING BY ELECTRONIC INSTRUMENT PANEL (INTELLIPANEL)

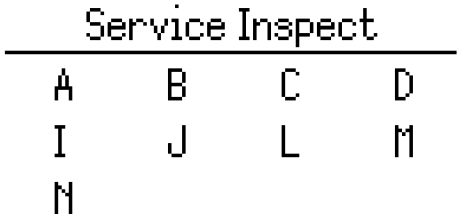
The following setting, adjustments and testing can be done by using the electronic instrument panel.

- Testing: Check a voltage of various sensor or rotation of engine.
- Setting or Adjustment: Input the various data to electronic instrument panel or main ECU.
- Error information: Check or clear the error information.

9Y1210824ELS0010US0

(1) Mode Selection

(A)



9Y1210824ELS071A

(B)

9Y1210824ELS058A

CAUTION

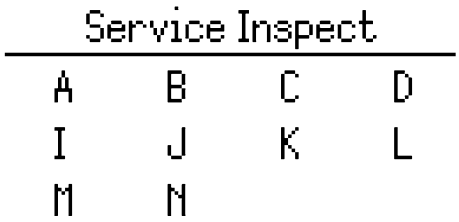
- **To preform the testing of the electronic instrument panel the operator must be seated on the tractor.**
- **Select a corresponded mode by the following procedure, and do the test, the adjustment, the setting, and the confirmation respectively.**

1. While holding down the display mode switch (2), turn the main switch to **"ON"** or **"START"** position.
2. Mode selection display (4) is indicated on the LCD (1).
3. Press the display mode switch (2). The buzzer rings and marked display moved.
4. Hold down the display mode switch (2) for more than 2 seconds, and the buzzer rings and marked display is selected.

NOTE

- **To save entire and review the conditions, usually hold down the display mode switch (2) until the buzzer rings.**
- **When a setting has been saved or an adjustment mode in any mode, be sure to turn off the main switch to end the procedure.**

(C)



9Y1210824ELS059A

(1) Liquid Crystal Display (LCD)
(2) Display Mode Switch
(3) Auto Throttle Advance Switch for HST
(4) Mode Selection Display

(A) Mode Selection Display for Manual Transmission
(B) Mode Selection Display for GST
(C) Mode Selection Display for HST

(To be continued)

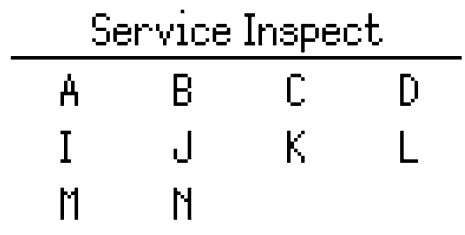
(Continued)

Mode	Details of Mode	Transmission Model			Contents and Necessary Situation
		Manual	GST	HST	
A	Test Mode	☆	☆	☆	For the checking the sensors voltage or engine and PTO revolution or exhaust gas temperature is required.
B	Traveling Speed Coefficient Input Mode	☆	☆	☆	For Inputting the operation coefficient of traveling speed to Intellipanel. When the Intellipanel is replaced or changed. When the tire size is changed.
C	PTO Coefficient Number Input Mode	☆	☆	☆	For Inputting the operation coefficient number of PTO to Intellipanel. When the Intellipanel is replaced or changed.
D	Error Information Reset Mode	☆	☆	☆	For deleting the error information.
E	GST Lever Sensor Fine-adjustment Mode		☆		For setting the Neutral position of GST lever sensor (Input the sensor information to main ECU). When the GST lever sensor is replaced or changed. When the main ECU is replaced or changed.
F	GST Valve Fine-adjustment Mode		☆		For setting the function of proportional reducing valve (Input the valve information to main ECU). When the GST valve is replaced or changed. When the main ECU is replaced or changed.
G	GST Shift shock Fine-adjustment Mode		☆		For adjusting the clutch engaging interval. When the shifting shock is not comfortable.
J	Speed Unit Input Mode	☆	☆	☆	For inputting the unit of traveling speeds to Intellipanel. When the Intellipanel is replaced or changed.
K	HST Pedal, Range Shift Lever, Fine-adjustment Mode			☆	For setting the each sensors position (Input the sensor information to main ECU). When any of main ECU, HST pedal sensor, swashplate position sensor, range gear shift sensor, HST proportional valve is replaced or change.
L	Throttle Sensor Fine-adjustment Mode	☆	☆	☆	For setting the throttle sensor (Input the sensor information to main ECU). When the main ECU or throttle sensor is replaced or changed.
M	Mode for Factory			☆	Contact your KUBOTA distributor.
N	Tractor Model Select Mode	☆	☆	☆	For inputting the model of tractor to main ECU. When the main ECU is replaced or changed.

9Y1210824ELS0011US0

(2) Mode "A" (Test Mode)

(a)



9Y1210824ELS059B

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch. The buzzer rings and the marked display moves.
4. Select the Mode **"A"**.
5. Hold down the display mode switch for more than 2 seconds.
6. Some information is displayed.
7. Each time the display mode switch is pressed, the display item changes, from **"Display 1"** to **"Display 5"** with the buzzer sound as follow.
8. Turn off the main switch.

(a) Mode Selection Display

(To be continued)

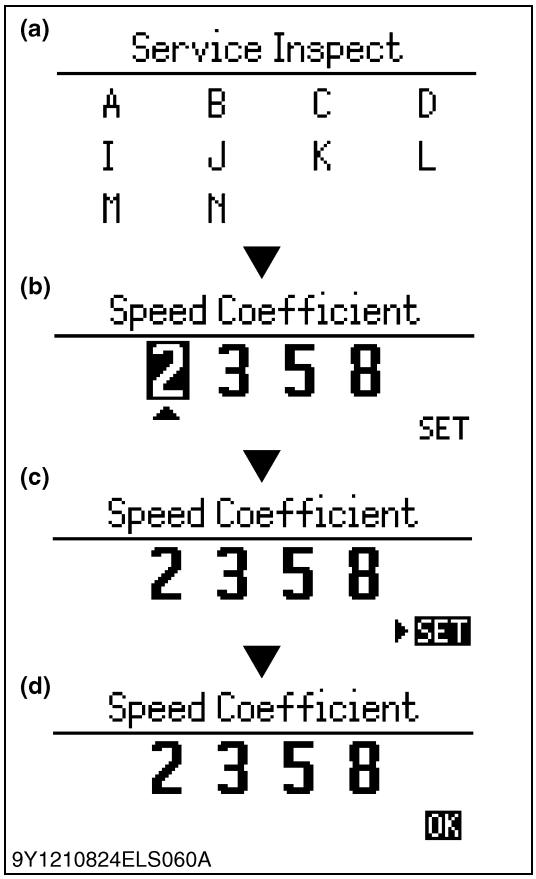
(Continued)

Transmission Model	Display	Contents	Condition	Value (unit)
Manual Transmission	1	Battery Voltage		More than 12 (V)
		Coolant temperature sensor voltage	−30 → 20 → 100 °C (−22 → 68 → 212 °F)	4.73 → 3.13 → 0.89 (V)
		Fuel sensor voltage	F to E	0.31 to 3.24 (V)
	2	Engine revolution	Idling to Max.	800 to Max. (n/min.)
	3	Throttle sensor 1 voltage	Idling → Max.	0.43 to 1.43 → 3.57 to 4.57 (V)
		Throttle sensor 2 voltage	Idling → Max.	3.57 to 4.57 → 0.43 to 1.43 (V)
		Foot accelerator pedal sensor 1 voltage	Idling → Max.	0.50 to 1.50 → 3.50 to 4.50 (V)
		Foot accelerator pedal sensor 2 voltage	Idling → Max.	3.50 to 4.50 → 0.50 to 1.50 (V)
	4	PTO revolution	Idling → Max.	PTO Revolution (n/min)
	5	DOC Inlet TEMP. (Intake 1 Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)
		DPF Inlet TEMP (Intake 2 Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)
		DPF Outlet TEMP (Outlet Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)
GST	1	Battery Voltage		More than 12 (V)
		Coolant temperature sensor voltage	−30 → 20 → 100 °C (−22 → 68 → 212 °F)	4.73 → 3.13 → 0.89 (V)
		Fuel sensor voltage	F to E	0.31 to 3.24 (V)
	2	Engine revolution	Idling to Max.	800 to Max. (n/min.)
		Transmission oil temperature sensor voltage	−20 → 60 → 100 °C (−4 → 140 → 212 °F)	4.46 to 4.57 → 1.71 to 1.91 → 0.34 to 0.38 (V)
		GST shift lever sensor voltage	N → 8th → 12th	0.41 to 1.01 → 2.77 to 3.37 → 3.91 to 4.51 (V)
	3	Throttle sensor 1 voltage	Idling → Max.	0.43 to 1.43 → 3.57 to 4.57 (V)
		Throttle sensor 2 voltage	Idling → Max.	3.57 to 4.57 → 0.43 to 1.43 (V)
		Foot accelerator pedal sensor 1 voltage	Idling → Max.	0.50 to 1.50 → 3.50 to 4.50 (V)
		Foot accelerator pedal sensor 2 voltage	Idling → Max.	3.50 to 4.50 → 0.50 to 1.50 (V)
	4	GST pack solenoid	N → Connection	0 to 0.9 (A)
		PTO revolution	Idling → Max.	PTO Revolution (n/min)
	5	DOC Inlet TEMP. (Intake 1 Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)
		DPF Inlet TEMP (Intake 2 Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)
		DPF Outlet TEMP (Outlet Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)

Transmission Model	Display	Contents	Condition	Value (unit)
HST	1	Battery Voltage		More than 12 (V)
		Coolant temperature sensor voltage	−30 → 20 → 100 °C (−22 → 68 → 212 °F)	4.73 → 3.13 → 0.89 (V)
		Fuel sensor voltage	F to E	0.31 to 3.24 (V)
	2	Engine revolution	Idling to Max.	800 to Max. (n/min.)
		Throttle sensor 1 voltage	Idling → Max.	0.43 to 1.43 → 3.57 to 4.57 (V)
		Throttle sensor 2 voltage	Idling → Max.	3.57 to 4.57 → 0.43 to 1.43 (V)
		HST range gear shift lever sensor voltage	L → N → M → N → H	0.49 to 1.49 → 1.09 to 2.09 → 1.98 to 2.98 → 2.88 to 3.88 → 3.49 to 4.49 (V)
	3	HST Pedal sensor 1 voltage (main)	Reverse → N → Forward	0.61 to 1.61 → 2.0 to 3.0 → 3.39 to 4.39 (V)
		HST Pedal sensor 2 voltage (sub)	Reverse → N → Forward	3.39 to 4.39 → 2.0 to 3.0 → 0.61 to 1.61 (V)
		Swashplate position sensor 1 voltage (main)	Reverse → N → Forward	0.61 to 1.61 → 2.0 to 3.0 → 3.39 to 4.39 (V)
		Swashplate position sensor 2 voltage (sub)	Reverse → N → Forward	3.39 to 4.39 → 2.0 to 3.0 → 0.61 to 1.61 (V)
	4	HST forward solenoid	N → Forward	0 to 1.6 (A)
		HST Reverse solenoid	N → Reverse	0 to 1.6 (A)
		PTO revolution	Idling → Max.	PTO Revolution (n/min)
	5	DOC Inlet TEMP. (Intake 1 Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)
		DPF Inlet TEMP (Intake 2 Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)
		DPF Outlet TEMP (Outlet Temp)	200 → 650 °C (140 → 1202 °F)	3.94 → 0.66 (V)

9Y1210824ELS0012US0

(3) Mode "B" (Traveling Speed Coefficient Input Mode) Input the 4 Digit Tire Code for Correct Travel Speed to the Electronic Instrument Panel Memory Panel



■ **NOTE**

- **When the tire size is changed or electronic instrument panel is replaced, this operation is required.**

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch. The buzzer rings and the marked display moves.
4. Select the Mode **'"B"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **"Speed Coefficient 0000 or 4-digit"** numerical number is displayed **(b)**.
7. To change the 4-digit numerical number, select the operation coefficient according to the tractor model and tire size.

(Numerical Modification)

- Set the desired speed coefficient as follow :
- Each time the display mode switch is pressed, the marked display shifts to the next digit. Shift the marked display to the desired position.

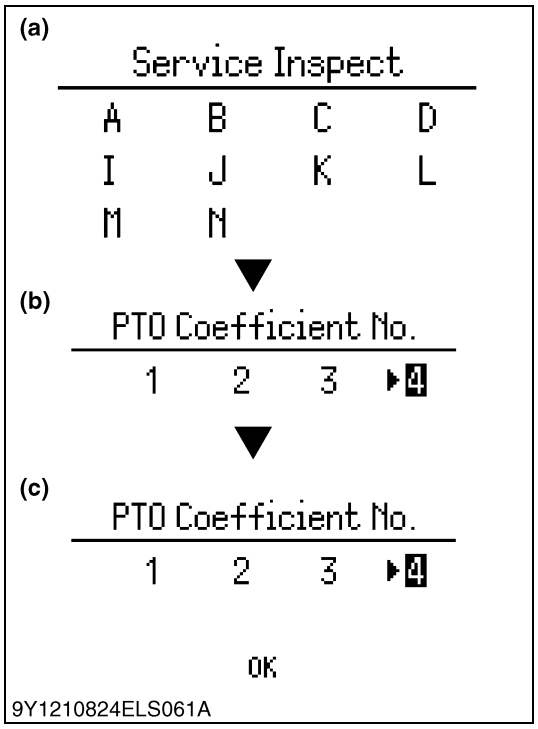
8. Hold down the display mode switch more than 2 seconds
9. Press the display mode switch and the number increases one by one.
10. When the select number comes, hold down the display mode switch more than 2 seconds.
11. Repeat the above steps to input the operation coefficient.
12. When the 4-digit operation coefficient has been input, press the display mode switch to shift the marked arrow key to the **"SET" (c)** position.
13. Hold down the display mode switch for more than 2 seconds to preserve the operation coefficient in the panel's memory.
14. **"OK"** is displayed **(d)**: The operation coefficient has been input correctly.
15. If **"NG"** is displayed: Incorrect input. Repeat the procedure.
16. Turn off the main switch.

Tractor Model	Rear Wheel tire size	Operation Coefficient
L3560	12.4-24 (R1)	2358
L4060	14.9-24 (R1)	2097
L4760		2662
L5060 L5460 L6060	14.9-28 (R1)	2108

(a) Mode Selection Display
(b) Input Display
(c) Correct Preserving Display
(d) Confirmation Display

9Y1210824ELS0013US0

(4) Mode "C" (PTO Coefficient Number Input Mode) Input the Numeric Code Number for PTO Speed into the Electronic Instrument Panel



■ **NOTE**

- **When the electronic instrument panel is replaced, this operation is required.**

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch. The buzzer rings and the marked display moves.
4. Select the Mode **"C"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **PTO Coefficient No."1" "2" "3" "4"** is displayed **(b)**.

(Numerical Modification)

- Set the desired PTO coefficient as follow :
- Each time the display mode switch is pressed, the marked display shifts to the next digit. Shift the marked display to the desired position.

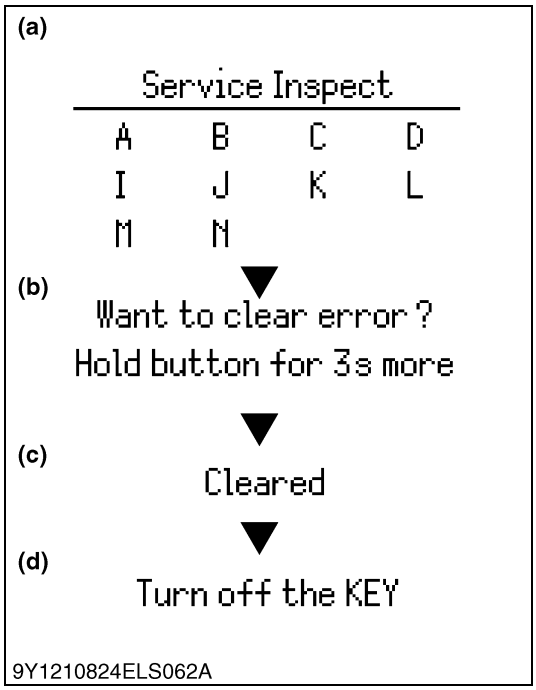
7. Hold down the display mode switch more than 2 seconds.
8. When the PTO coefficient has been input, hold down the display mode switch for more than 2 seconds to preserve the PTO coefficient No. in the panel's memory.
9. **"OK"** is displayed **(d)** : The operation coefficient has been input correctly.
10. If **"NG"** is displayed: Incorrect input. Repeat the procedure.
11. Turn off the main switch.

Operation Coefficient No.	Tractor Model	Transmission Model
1	L3560, L4060, L4760, L5060	Manual transmission GST
	L3560	HST
2	L4060	HST
3	L4760	HST
4	L5460, L6060	HST

(a) Mode Selection Display
(b) Input Display
(c) Confirmation Display

9Y1210824ELS0014US0

(5) Mode "D" (Error Information Reset Mode) Delete the Error Information from the Electronic Instrument Panel



■ **NOTE**

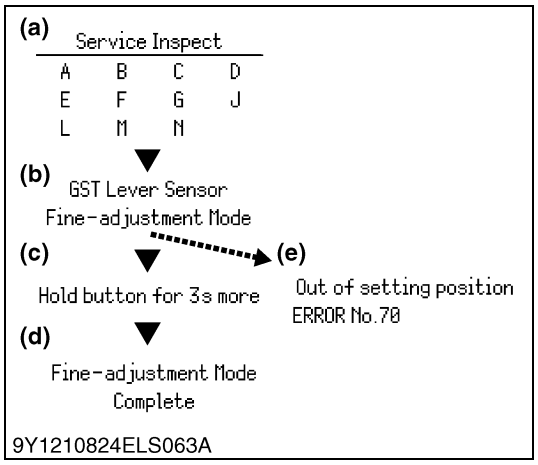
- **When the tire size is changed or electronic instrument panel is replaced, this operation is required.**

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch. The buzzer rings and the marked display moves.
4. Select the Mode **"D"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **"Want to clear error? Hold button for 3s more"** is displayed **(b)**.
7. Hold down the display mode switch for more than 3 seconds to delete the error information.
8. **"Cleared"** is displayed **(c)**.
   The electronic instrument panel memory has been reset correctly.
9. **"Turn off the KEY"** is displayed **(d)**.
   Turn off the main switch.

(a) Mode Selection Display
(b) Resetting Display
(c) Confirmation Display
(d) Correct Preserving Display

9Y1210824ELS0015US0

(6) Mode "E" (GST Lever Sensor Fine-adjustment Mode) Setting the GST Lever's Neutral Position with its Sensor



■ **IMPORTANT**

- **As for the fine-adjustment, make sure to set it correctly to have the standard control thereafter.**

■ **NOTE**

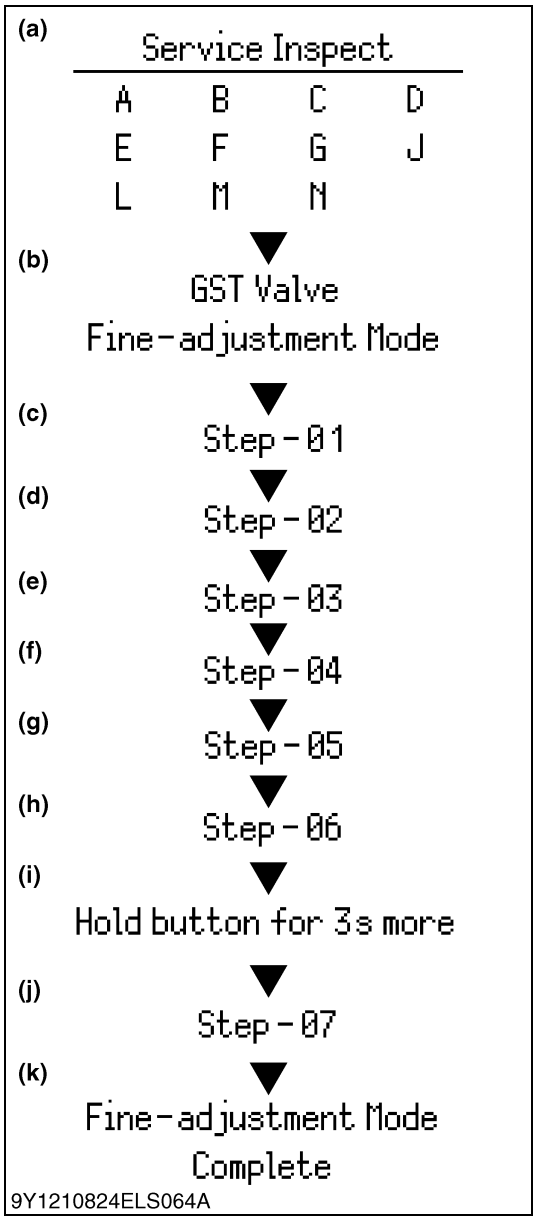
- **When the GST lever sensor, the main ECU or the electronic instrument panel is replaced, this adjustment is required.**

1. Set the GST shift lever to **Neutral** position.
2. While holding down the display mode switch, turn on the main switch.
3. Mode selection display **(a)** is indicated on the LCD.
4. Press the display mode switch. The buzzer rings and the marked display moves.
5. Select the Mode **"E"**.
6. Hold down the display mode switch for more than 2 seconds.
7. When **"GST Lever Sensor Fine-adjustment Mode"** is displayed **(b)**, release the display mode switch.
8. **"Hold button for 3s more"** is displayed **(c)**.
9. Hold down the display mode switch for more than 3 seconds to preserves the adjustment value to the main ECU.
   "Fine-adjustment Mode Complete" is displayed **(d)**.
10. Fine-adjustment preserves to main ECU has been input correctly.
    Turn off the main switch.
11. If **"Out of setting position Error No. 70"** shows up **(e)**, the GST lever sensor voltage is out of specifications.
    - Make sure that GST lever is in the **Neutral** position.
    - Check the GST lever sensor voltage in the Test Mode (Mode **A**). If out of specifications, replace the sensor.
12. If **"Not Complete"** is displayed : Incorrect input. Repeat the procedure.
13. Turn off the main switch.

(a) Mode Selection Display
(b) Information Display
(c) Adjusting Display
(d) Correct Preserving Display
(e) Error Display

9Y1210824ELS0016US0

(7) Mode "F" (GST Valve FIne-adjustment Mode) Setting the Function of Proportional Reducing Valve



CAUTION

- **Use extra caution when setting the Mode "F", because the tractor will move and stop automatically.**

■ **NOTE**

- **When the main ECU or GST valve is replaced, this adjustment is required.**

1. Park the machine on firm and level ground.
2. Set the parking brake.
3. While holding down the display mode switch, start the engine.
4. Mode selection display **(a)** is indicated on the LCD. Press the display mode switch. The buzzer rings and the marked display moves.
5. Select the Mode **"F"**.
6. Hold down the display mode switch for more than 2 seconds.
7. When **"GST Valve Fine-adjustment Mode"** is displayed **(b)**, release the display mode switch.

(a) Mode Selection Display
(b) Information Display
(c) Setting Display-1
(d) Setting Display-2
(e) Setting Display-3
(f) Setting Display-4
(g) Setting Display-5
(h) Setting Display-6
(i) Adjusting Display
(k) Correct Preserving Display

(To be continued)

(Continued)

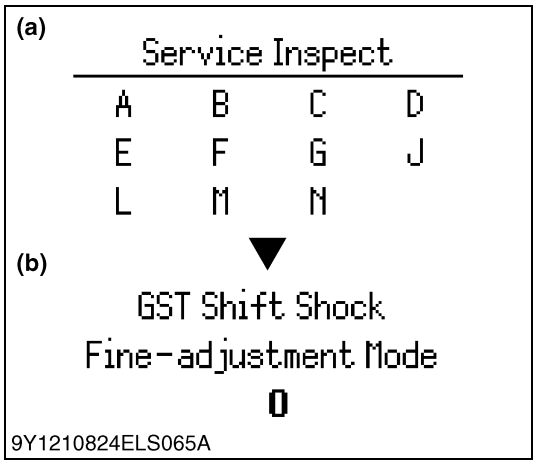
■ **NOTE**

- **To make this adjustment, follow these steps in the exact order described. (Otherwise the switch does not work to go next step can be moved without their settings.)**

8. **"Step-01"** is displayed **(c)**.
   - Release the parking brake.
9. **"Step-02"** is displayed **(d)**.
   - Set the engine speed from 1000 to 1400 min^{-1} (rpm).
10. **"Step-03"** is displayed **(e)**.
    - Set the front tire straight ahead.
    - Press the display mode switch.
11. **"Step-04"** is displayed **(f)**.
    - Disengaged the clutch and shift the GST lever to the desired position (From 1 through 12) several times.
    - Press the display mode switch.
12. **"Step-05"** is displayed **(g)**.
    - Shift the GST lever to **"Neutral"** position and engage the clutch.
    - Press the display mode switch.
13. **"Step-06"** is displayed **(h)**.
    - Set the shuttle lever to **"Forward"** position
    - Press the display mode switch.
14. **"Hold button for 3s more"** is displayed **(i)**.
    - Hold down the display mode switch for more than 3 seconds.
15. **"Step-07"** is displayed **(j)**.
    - After a short delay, the tractor will begin to move slowly and stops automatically.
    - Fine-adjustment is being done.
16. **"Fine-adjustment Mode Complete"** is displayed **(k)**.
    - The setting has been preserved correctly to the main ECU.
17. Turn off the main switch.
18. If **"Not Complete"** is displayed.
    The setting has not been correctly saved in the main ECU.
    Repeat the entire procedure.

9Y1210824ELS0017US0

(8) Mode "G" (GST Shift Shock Fine-adjustment Mode) Adjusting the Clutch Engaging Interval



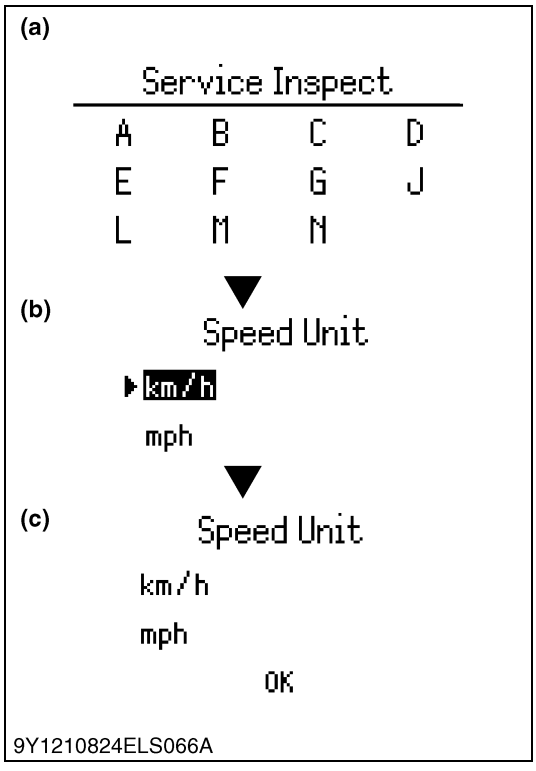
■ **NOTE**
- **Perform Mode G for adjusting the GST shifting shock.**

1. While holding down the display mode switch, start the engine.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch and the buzzer rings and marked display moves.
4. Select the Mode **"G"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **"GST Shift Shock Fine-adjustment Mode 0"** is displayed **(b)**.
   The number **"−9"** through **"+9"** can be displayed.
   This has been factory-adjustment to **"0"**.
7. Each time pressing the display mode switch, the number on the display changes.
8. Setting
   - Select the GST shifting shock feeling number.
   - For higher shifting shock; Press the display mode switch to increase the number.
   - For lighter shifting shock; Press the display mode switch to reduce the number.
9. Move the tractor to make sure the shifting shock feeling.
10. Turn off the main switch.

(a) Mode Selection Display **(b) Setting Display**

9Y1210824ELS0018US0

(9) Mode "J" (Speed Unit Selection Mode) Input the Traveling Speed Unit to the Electronic Instrument Panel



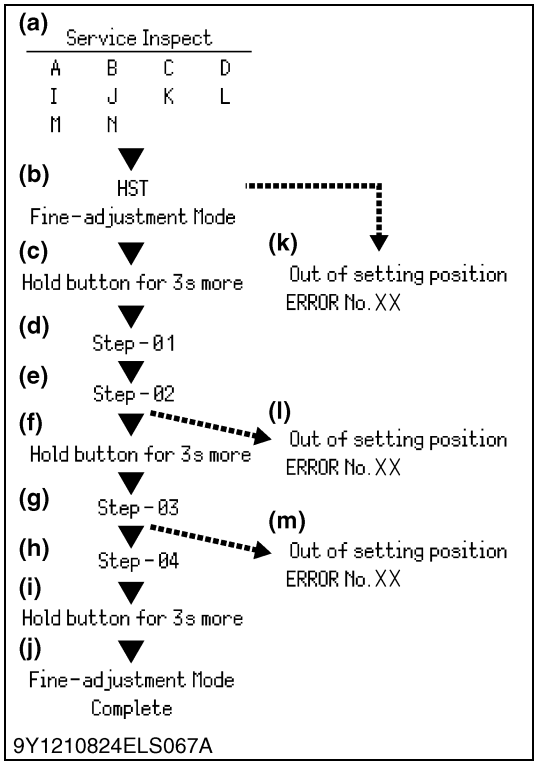
■ **NOTE**
- **When the Intellipanel is replaced, this adjustment is required.**

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch and the buzzer rings and marked display moves.
4. Select the Mode **"J"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **"Speed Unit km/h mph"** is displayed **(b)**.
   To select **km/h** or **mph** unit, press the display mode switch.
7. Hold down the display mode switch for more than 2 seconds at the desired unit.
8. **"OK"** is displayed **(c)**.The speed unit has been input correctly.
9. If **"NG"** is displayed: The speed unit has not been input correctly.
   Repeat the procedure.
10. Turn off the main switch.

(a) Mode Selection Display **(c) Correct Preserving Display**
(b) Setting Display

9Y1210824ELS0019US0

(10) Mode "K" (HST Pedal and Range Shift Lever Fine-adjustment Mode)



■ **NOTE**
- **When one of the followings is replaced, this adjustment is required. (Main ECU, HST pedal sensor, swashplate position sensor, range gear shift sensor, HST proportional valve (Forward and Reverse)).**

(Tractor Condition)
- Hand Throttle Lever : Idling position
- Parking Brake : Engaged position
- HST Pedal : Neutral Position
- Range Gear Shift Lever : Neutral Position (between **L** and **M**)
- Auto Throttle Advance function : **"OFF"**

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Depress the HST pedal **"Fully in forward"** position, then **"Fully in reverse"** position.
4. Start the engine at idling speed.
5. Press the display mode switch and the buzzer rings and marked display moves.
6. Select the Mode **"K"**.
7. Hold down the display mode switch for more than 2 seconds.
8. When **"HST Fine-adjustment Mode"** is displayed **(b)**, release the display mode switch.

■ **NOTE**
- **When the engine is not setting at the idling position or the parking brake is not engaged. "HST Fine-adjustment Mode" display (b) does not change.**
- **When "Out of Setting Position ERROR No. ** (71, 72 or 73)" is displayed (k), refer to the below chart.**

9. **"Hold button for 3s more"** is displayed **(c)**.
   Hold down the display mode switch for more than 3 seconds.
10. **"Step-01"** is displayed **(d)**.
    Keep the HST pedal at the **"Full forward"** position.
11. Wait until **"Step-02"** is displayed **(e)**. Then proceed to the next step.

■ **NOTE**
- **When "Out of Setting Position ERROR No. ** (72 or 73)" is displayed (l), refer to the below chart.**

12. **"Hold button for 3s more"** is displayed **(f)** : Hold down the display mode switch for more than 3 seconds.
13. **"Step-03"** is displayed **(g)** : Follow the procedure as follow.
    Keep the HST pedal at the **"Full reverse"** position.
14. Wait until **"Step-04"** is displayed. Then proceed to the next step.

■ **NOTE**
- **When "Out of Setting Position ERROR No.** (72 or 73)" is displayed, refers to the below**

(a) Mode Selection Display
(b) Information Display
(c) Setting Display-1
(d) Adjusting Display-1
(e) Setting Display-2
(f) Adjusting Display-2
(g) Setting Display-3
(h) Setting Display-4
(i) Adjusting Display-3
(j) Correct Preserving Display
(k) Error Display-1
(l) Error Display-2
(m) Error Display-3

(To be continued)

(Continued)

15. **"Hold button for 3s more"** is displayed **(i)** : Hold down the display mode switch for more than 3 seconds.
16. **"Complete"** is displayed **(j)** : The setting has been preserved correctly to the main ECU.
17. If **"Not Complete"** is displayed, repeat the procedure.
18. Turn off the main switch.

■ **IMPORTANT**

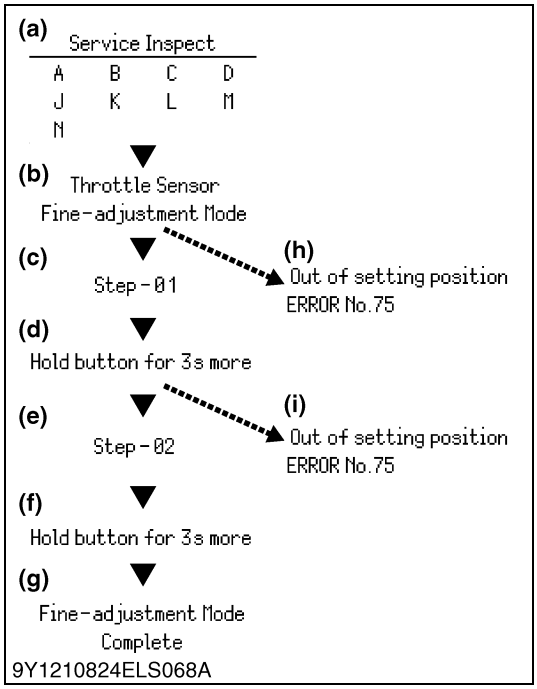
- **After setting the mode "N", reset the mode "K" and "L". The tractor does not move normally without resetting mode "K" and "L". (HST only)**

Error Display	Fine-adjustment
ERROR No.71	Range Gear Shift Lever Sensor
ERROR No.72	HST Pedal Sensor
ERROR No.73	Swashplate Position Sensor
ERROR No.75	Throttle Sensor

(a) Mode Selection Display
(b) Information Display
(c) Setting Display-1
(d) Adjusting Display-1
(e) Setting Display-2
(f) Adjusting Display-2
(g) Setting Display-3
(h) Setting Display-4
(i) Adjusting Display-3
(j) Correct Preserving Display
(k) Error Display-1
(l) Error Display-2
(m) Error Display-3

9Y1210824ELS0020US0

(11) Mode "L" (Throttle Sensor Fine-adjustment Mode)



■ **NOTE**
- **When the main ECU or throttle sensor is replaced, this adjustment is required.**

(Tractor condition)
- Parking Brake: Engaged position
- HST Pedal : Neutral position
- Range Gear Shift Lever : Neutral position
- Hand Throttle Lever : Idling position

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Depress the HST pedal **"Fully in forward"** position, then **"Fully in reverse"** position.
4. Start the engine at idling speed.
5. Press the display mode switch and the buzzer rings and marked display moves.
6. Select the Mode **"L"**.
7. Hold down the display mode switch for more than 2 seconds.
8. **"Throttle Sensor Fine-adjustment Mode"** is displayed **(b)**. Release the display mode switch.

■ **NOTE**
- **"Step-01" is displayed (c) : The engine revolution is not idling revolution.**
  If "Out of Setting Position ERROR No.75" is displayed (h), the hand throttle lever is not at the correct idling position.

9. **"Hold button for 3s more"** is displayed **(d)**.
   Hold down the display mode switch for more than 3 seconds.
10. When **"Step-02"** is displayed **(e)**, release the display mode switch.
11. Set the accelerator lever to **"Maximum speed"** position.

■ **NOTE**
- **If the engine revolution is not maximum revolution, Step-02 does not changed**
  If "Out of Setting Position ERROR No.75" is displayed (i), the hand throttle lever is not at the correct maximum speed position.

12. **"Hold button for 3s more"** is displayed **(f)**.
    Hold down the display mode switch for more than 3 seconds.
    "Fine-adjustment Mode Complete" is displayed **(g)**.
13. If **"Not Complete"** is displayed, repeat the procedure.
14. Turn off the main switch.

(a) Mode Selection Display
(b) Information Display
(c) Error Display-1
(d) Setting Display-1
(e) Adjusting Display-1
(f) Setting Display-2
(g) Correct Preserving Display
(h) Error Display-2
(i) Error Display-3

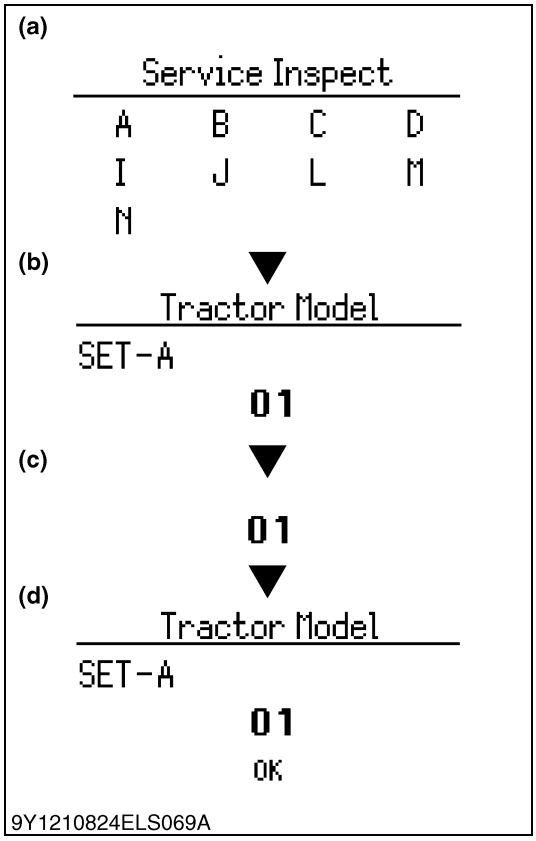
9Y1210824ELS0021US0

(12) Mode "M" (Mode for Factory)

■ **NOTE**
- **Consult your KUBOTA distributor for this mode.**

9Y1210824ELS0022US0

(13) Mode "N" (Tractor Model Select Mode)



9Y1210824ELS069A

SET-A

■ **NOTE**
- **When the main ECU is replaced, this adjustment is required.**

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch and the buzzer rings and marked display moves.
4. Select the Mode **"N"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **"Tractor Model Selection SET-A"** is displayed **(b)**, input the operation coefficient number according to the model (See SET-A table).
   When pressing the display mode switch, the operation coefficient number **(c)** changes one by one as follows.
   "01" → **"02"** → **"03"** → **"04"**→ **"01"**
7. Select the operation coefficient number and hold down the display mode switch for more than 2 seconds.
8. When **"OK"** is displayed **(d)**, the operation coefficient number has been input correctly.
9. If **"NG"** is displayed, repeat the procedure.
10. Turn off the main switch.

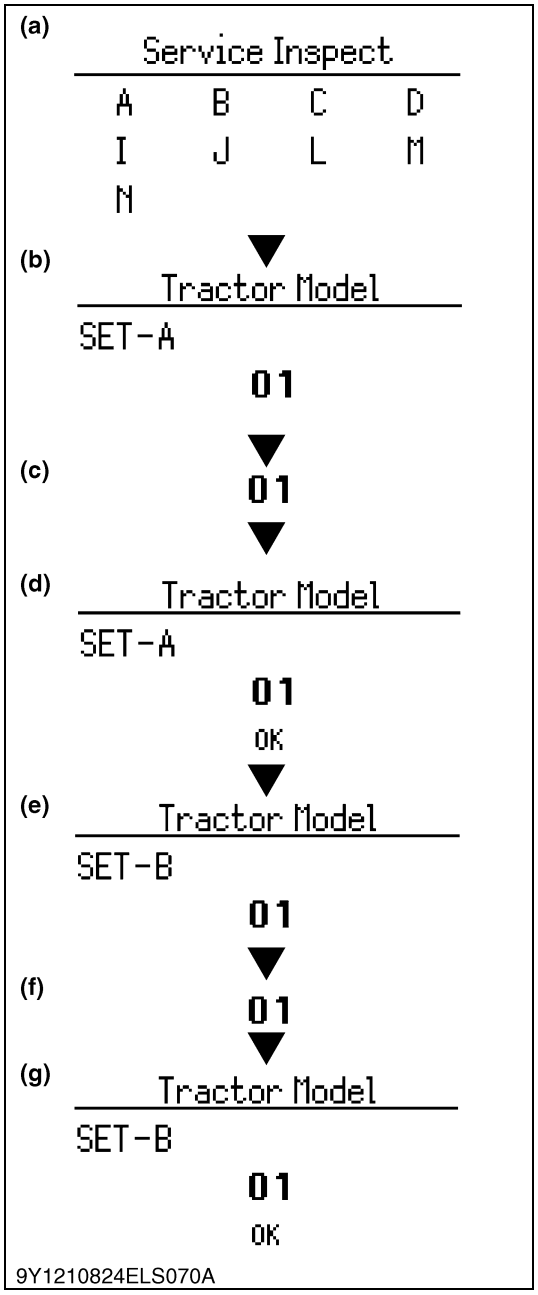
■ **IMPORTANT**
- **After setting mode "N", set the mode "K" and mode "L". The tractor does not move normally without setting mode "K" and mode "L". (HST Only).**
- **After setting mode "N", set the mode "L". Tractor will not function normally without setting mode "L". (GST and DT).**

SET-A

Operation Coefficient No.	Manual Transmission	GST	HST
01	L3560	L3560	L3560
02	L4060	L4060	L4060
03	–	L4760	L4760
04	–	L5060	L5460 L6060

(a) Mode Selection Display
(b) Information Display-1
(c) Input Display-1
(d) Correct Preserving Display-1
(e) Information Display-2
(f) Input Display-2
(g) Correct Preserving Display-2

9Y1210824ELS0023US0



9Y1210824ELS070A

SET-B

■ **NOTE**
- **When the main ECU is replaced, this adjustment is required.**

1. While holding down the display mode switch, turn on the main switch.
2. Mode selection display **(a)** is indicated on the LCD.
3. Press the display mode switch and the buzzer rings and marked display moves.
4. Select the Mode **"N"**.
5. Hold down the display mode switch for more than 2 seconds.
6. **"Tractor Model Selection SET-A01"** is displayed **(b)**, input the operation coefficient number according to the model (See SET-A table).
   When pressing the display mode switch, the operation coefficient number **(c)** changes one by one as follows.
   "01" → **"02"** → **"03"** → **"04"**→ **"01"**
7. Select the operation coefficient number and hold down the display mode switch for more than 2 seconds.
8. **"Tractor Model Selection SET-B"** (GST Only) is displayed **(e)**, input the operation coefficient number according to GST model (See SET-B table).
   When pressing the display mode switch, the operation coefficient number (f) changes one by one as follows.
   "01" → **"02"** → **"01"**
9. Select the operation coefficient number and hold down the display mode switch for more than 2 seconds.
10. When **"OK"** is displayed **(d)**, **(g)**, the operation coefficient number has been input correctly.
11. If **"NG"** is displayed, repeat the procedure.
12. Turn off the main switch.

■ **IMPORTANT**
- **After setting mode "N", set the mode "K" and mode "L". The tractor does not move normally without setting mode "K" and mode "L". (HST Only).**
- **After setting mode "N", set the mode "L". Tractor will not function normally without setting mode "L". (GST and DT).**

SET-A

Operation Coefficient No.	Manual Transmission	GST	HST
01	L3560	L3560	L3560
02	L4060	L4060	L4060
03	–	L4760	L4760
04	–	L5060	L5460 L6060

SET-B (GST Only)

Operation Coefficient No.	GST
01	L3560
02	L4060, L4760, L5060

(a) Mode Selection Display
(b) Information Display-1
(c) Input Display-1
(d) Correct Preserving Display-1
(e) Information Display-2
(f) Input Display-2
(g) Correct Preserving Display-2

9Y1210824ELS0153US0

[4] ELECTRIC CONTROL SYSTEM

CAUTION

- **For checking of electric circuit, use the circuit tester and test function of electronic instrument panel (see page 9-S17).**
- **As for the checking of sensors, switches and solenoid, do the following order; check the battery, fuse and grounding line first, check by the test function of electronic instrument panel next, and check the connectors of panel or electronic control unit. If any problem is found there, check individual sensors, switches or solenoids to see whether the problem exists at the sensor, switch and solenoid side or at the wire harness side.**
- **When the normal function is restored as the result of replacement of the part which is suspected to see that the trouble is regenerated.**

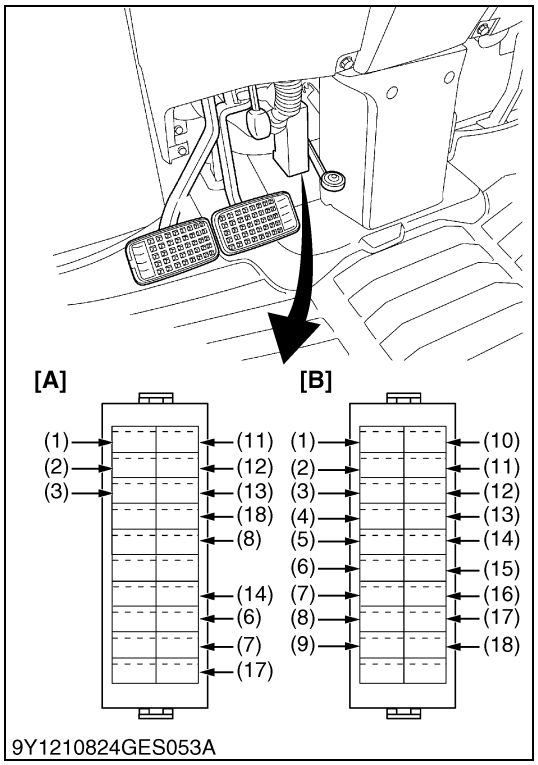
IMPORTANT

- **When connecting or disconnecting the connector for the purpose of checking, be sure to turn OFF the main switch before hand. Moreover, pay attention not to allow the terminal to come in contact with other terminal or chassis while checking.**
- **When applying the test pin of the tester to the connector terminals, be careful not to damage to the connector terminal.**

9Y1210824ELS0024US0

[5] ECU CONTROL SYSTEM

(1) Checking Fuse and Connector



9Y1210824GES053A

Checking Fuse

1. The tractor electrical system is protected from potential damage by fuses.
   A blown fuse indicates that there is an overload or short somewhere in the electrical system.
2. If any of the fuses should blow, replace with a new one of the same capacity.

■ **IMPORTANT**

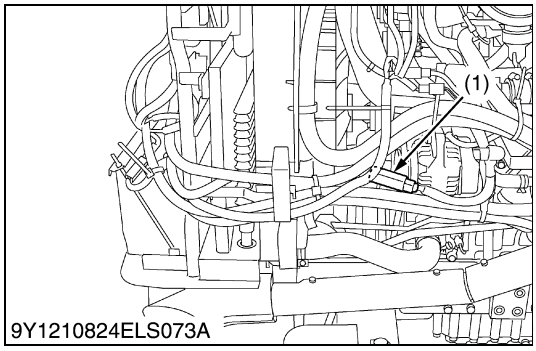
- **Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system.**
  If any of them should blow, replace with a new one of the same capacity.

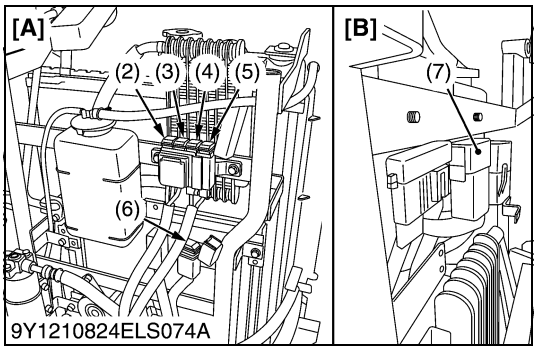
■ **Protected Circuit**

Fuse No.	Capacity (A)	Protected circuit	ROPS	CABIN
1	5	Meter (Battery)	☆	☆
2	15	Hazard	☆	–
	20	Hazard	–	☆
3	5	Transmission controller (Battery)	☆	☆
4	10	Radio (Battery)	–	☆
5	20	Air conditioner blower	–	☆
6	20	Engine ECU (Battery)	☆	☆
7	30	Starter relay	☆	☆
8	5	Engine ECU (IG)	☆	☆
9	20	Cigar lighter	–	☆
10	5	Radio (ACC)	–	☆
11	15	Transmission controller (IG)	☆	☆
12	10	Meter (IG)	☆	☆
13	5	Meter switch	☆	☆
14	30	Head lights	☆	☆
15	7.5	Air conditioner compressor	–	☆
16	30	Wiper	–	☆
17	15	Flasher	–	☆
18	10	Work light	☆	–
	15	Work light	–	☆

[A] ROPS Type **[B] CABIN Type**

9Y1210824ELS0025US0





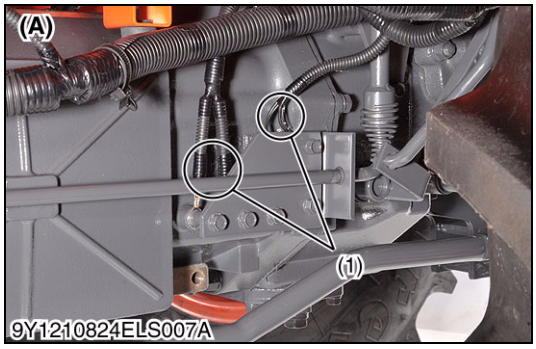
Checking Slow-Blow Fuses

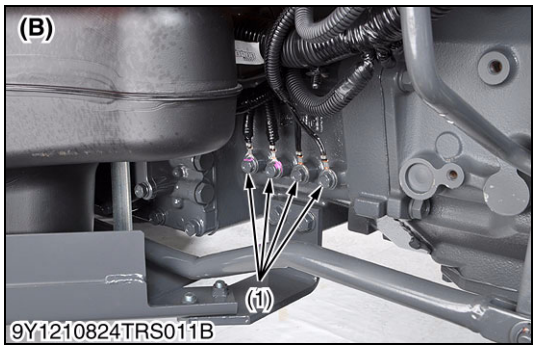
1. The slow-blow fuses are intended to protect the electrical cabling. If any of them has blown out, be sure to pinpoint the cause. Never use any substitute, use only a KUBOTA genuine part.

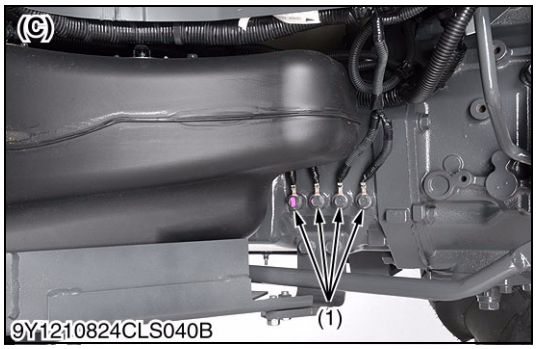
No.	Capacity (A)	Protected circuit
1	150	Alternator
2	100, 80	Main
3	60	Battery (CABIN Model)
4	60	Key Switch
5	50	Glow
6	40	Defogger (CABIN Model)
7	40	Oil Separator

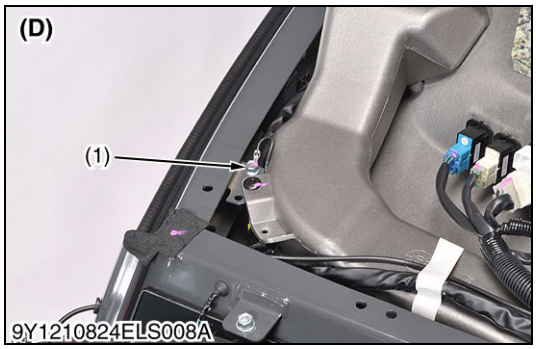
[A] Front Side **[B] Rear Side**

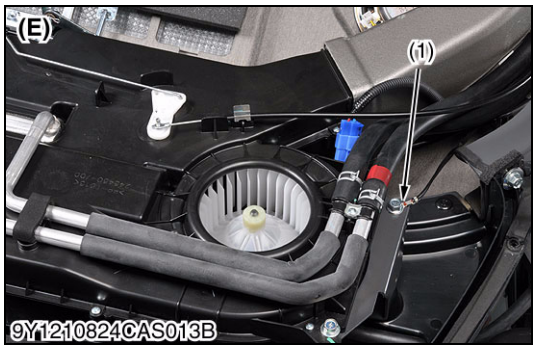
9Y1210824ELS0026US0





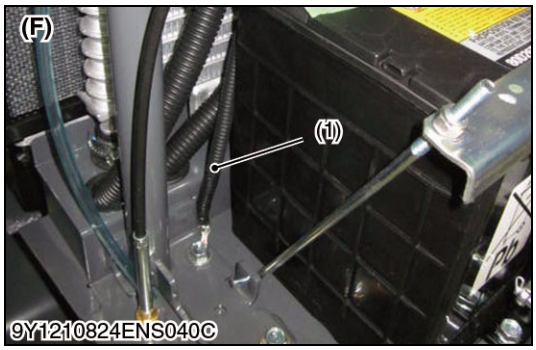






Checking Ground Cable

1. Check the whether the ground cables (1) are connected securely to the tractor chassis.
2. If the ground cables are broken or disconnected, replace it.

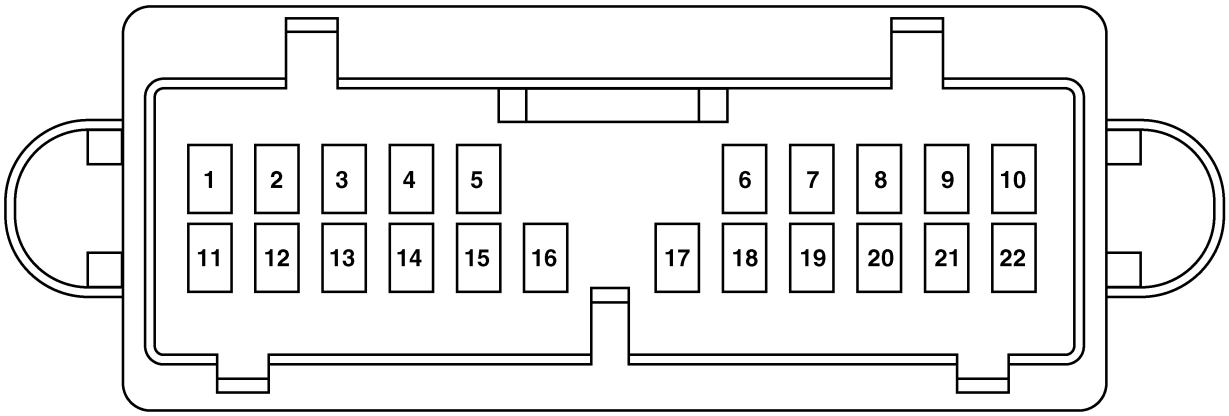


(1) Ground Cable

(A) Located at Left Side of Transmission Case (Manual Transmission)
(B) Located at Left Side of Transmission Case (GST)
(C) Located at Left Side of Transmission Case (HST)
(D) Located at Under the Outer Roof (CABIN Type)
(E) Located at Under the Outer Roof (CABIN Type)
(F) Located at Right Side of Battery (CCV Heater Equipped Type)

9Y1210824ELS0027US0

(2) Checking by Electronic Instrument Panel Connector



9Y1210824ELS033A

Connector of Wire Harness Side

No.	Color of wiring	Terminal Name
1	G	CAN (L)
2	Y	CAN (H)
3	–	–
4	–	–
5	–	–
6	–	–
7	–	–
8	B/W	Turn Signal Switch RH
9	G/L	Turn Signal Switch LH
10	B	GND
11	Br/Y	High-Beam Indicator
12	L	Engine Oil Pressure Switch
13	W/R	Alternator **L** Terminal
14	–	–
15	–	–
16	G/R	Parking Brake Switch
17	G/R	Illumintaion
18	Y/L	Fuel Level Sensor
19	–	–
20	Lg/B	Display Mode Switch
21	R/L	IGN
22	R	+12V (Power Souse from Battery)

9Y1210824ELS0029US0

Disconnecting Instrument Panel Connector

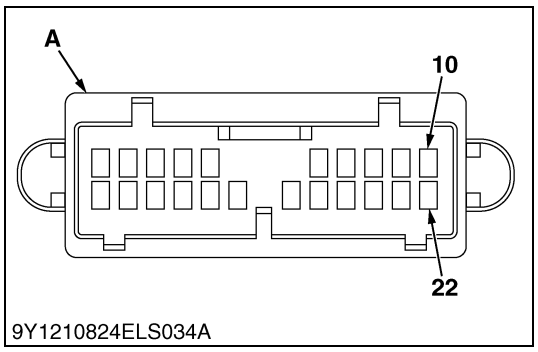
1. Remove the panel cover (1).
2. Remove the electronic instrument panel (2) from panel frame (3).
3. Disconnect the panel connector.

■ **NOTE**

- **When replacing the electronic instrument panel, adjust to mode "B", "C" and mode "J".**

(1) Panel Cover
(2) Instrument Panel (Intellipanel)
(3) Panel Frame

9Y1210824ELS0030US0



Connector Voltage

■ **Main Voltage**

1. Measure the voltage between the terminal **22** (+) and terminal **10** (−).
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness or battery is faulty.

Voltage	Terminal **22** to **10**	Approx. battery voltage

(1) Connector
A: Connector of Wire Harness Side

9Y1210824ELS0031US0

Checking Instrument Panel Connector

1. Disconnect the connector (1) and check their terminals for contamination and deformation.
2. Check to see that cable does not broken or terminals are not shelled off.
3. If any damaged parts are found, repair or replace them.

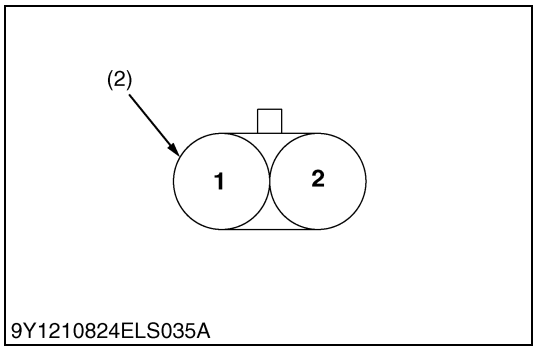
■ **IMPORTANT**

- **Connect connectors surely after checked.**

(1) Connector

9Y1210824ELS0028US0

(3) Unit Checking



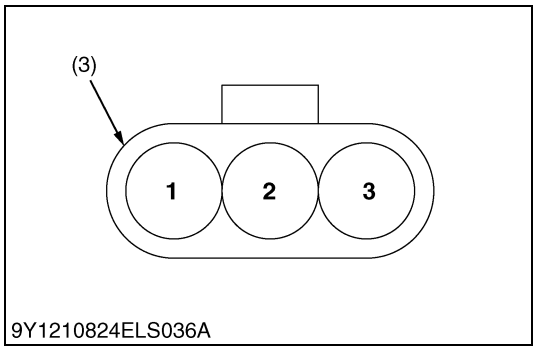
Display Mode Switch: For Manual Transmission and GST

1. Check the resistance between terminal **1** and **2** while pushing the display mode switch (1).
2. It is OK if 0 ohm is indicated.

■ **NOTE**
- **It is not necessary to adjust any kind of mode.**

(1) Display Mode Switch
(2) Connector of Switch Side

9Y1210824ELS0032US0



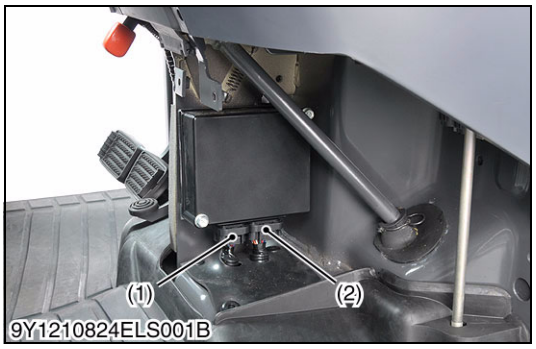
Display Mode Switch and Auto Throttle Advance Switch : For HST

1. Check the resistance between terminal **1** and **3** while pushing the display made switch (1).
2. It is OK if 0 ohm is indicated.
3. Check the resistance between terminal **2** and **3** while pushing the auto throttle advance switch (2).

■ **NOTE**
- **It is not necessary to adjust any kind of mode.**

(1) Display Mode Switch
(2) Auto Throttle Advance Switch
(3) Connector of Switch Side

9Y1210824ELS0033US0



Checking Main ECU Connector

1. Disconnect the connectors (1) (2), and check their terminals for contamination and deformation.
2. Check to see that cable does not broken or terminals are not shelled off.
3. If any damaged parts are found, repair or replace them.

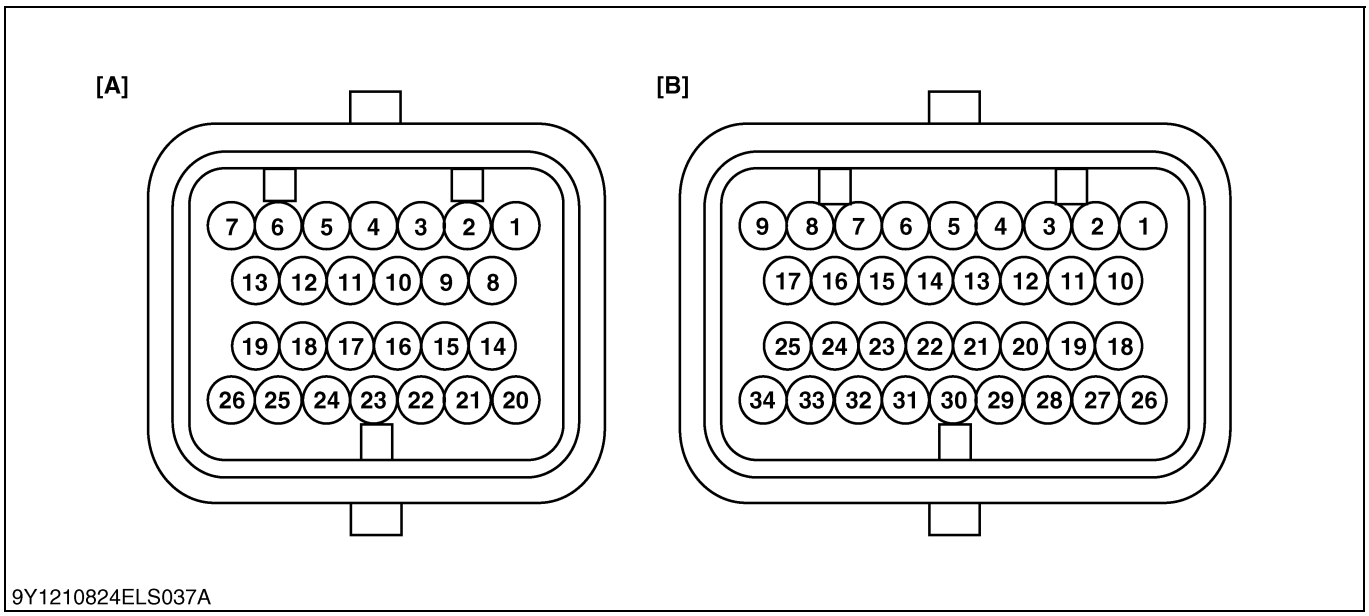
■ **IMPORTANT**
- **Connect connectors surely after checked.**

(1) Main ECU Connector A (**26P**)
(2) Main ECU Connector B (**34P**)

9Y1210824ELS0034US0

(4) Checking by Main Electric Control Unit (Main ECU)

Manual Transmission



9Y1210824ELS037A

Connector A (26P Connector) of Wire Harness Side

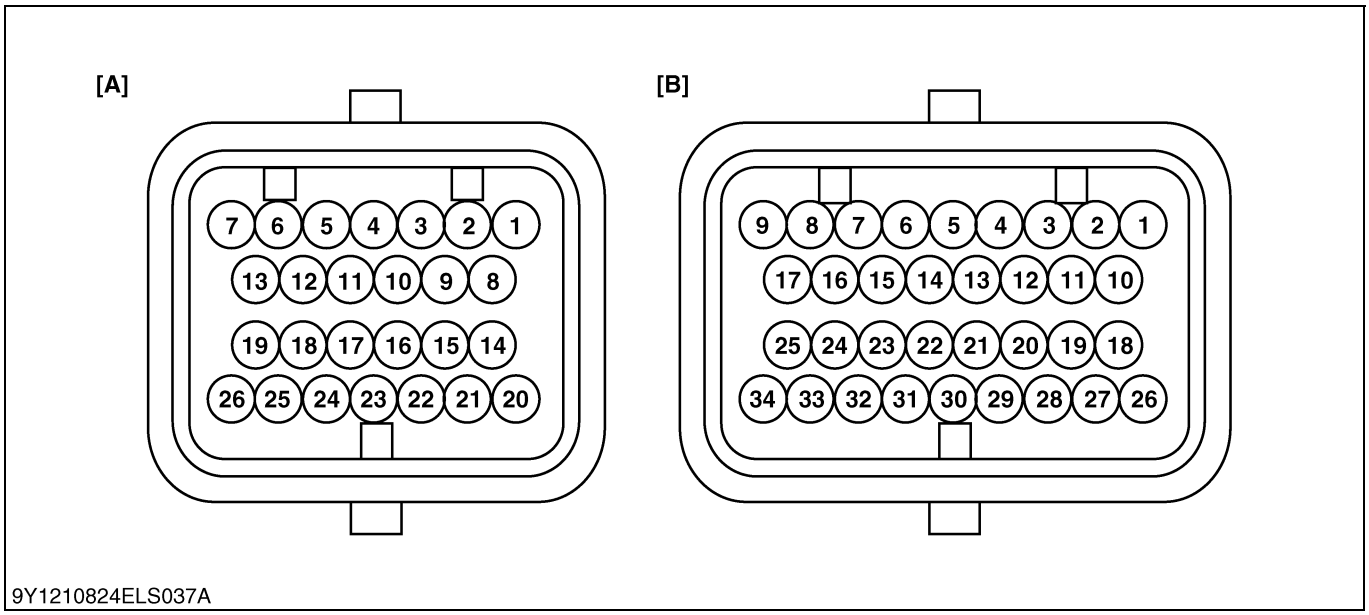
No.	Color of wiring	Terminal Name
1	B	GND (Ground for Circuit Line)
2	–	–
3	–	–
4	–	–
5	–	–
6	P/L	PTO Solenoid
7	R/Y	+12 V (Power Source from Main Switch)
8	R/W	+5 V (Power source for sensor)
9	Y	CAN (H)
10	G	CAN (L)
11	B/W	Starter Relay
12	W/G	DPF Buzzer
13	–	–
14	B/W	GND (Ground for Sensor)
15	P	TXD (For Check)
16	–	–
17	–	–
18	R	+12 V (Power Source from Battery)
19	–	–
20	–	–
21	V	RXD (For Check)

Connector B (34P Connector) of Wire Harness Side

No.	Color of wiring	Terminal Name
1	–	–
2	–	–
3	Y/B	Parked Regeneration Switch Lamp
4	W/L	Foot Throttle Sensor 1
5	–	–
6	–	–
7	Or	Traveling Speed Sensor
8	–	–
9	W/B	Seat Switch
10	L/G	Output Terminal for OPC
11	W/R	Foot Throttle Sensor 2
12	L/W	Auto Regeneration Switch Lamp
13	–	–
14	Y/L	Hand Throttle Sensor 1
15	Y/R	Hand Throttle Sensor 2
16	G/W	Mid PTO Switch
17	R/B	Seat Tilt Switch
18	–	–
19	–	–
20	–	–
21	–	–
22	–	–
23	Lg/B	Shuttle Switch (Forward)
24	Y/G	Shuttle Switch (Reverse)
25	–	–
26	–	–
27	–	–
28	L/Y	Parked Regeneration Switch
29	L/R	Auto Regeneration Switch
30	R	Starter **S** Terminal
31	B/Y	Shuttle Switch (Neutral)
32	–	–
33	–	–
34	Or/B	PTO Switch

9Y1210824ELS0035US0

GST



Connector A (26P Connector) of Wire Harness Side

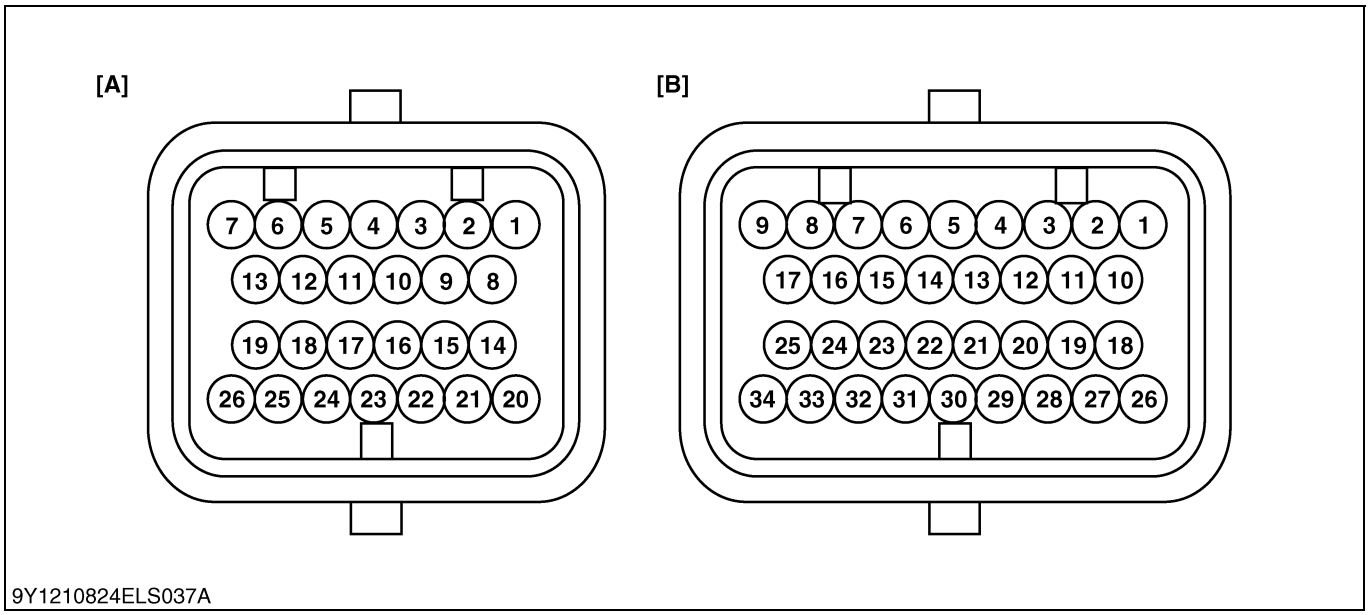
No.	Color of wiring	Terminal Name
1	B	GND (Ground for Circuit Line)
2	W	Return line terminal for proportional reducing valve
3	–	–
4	W	Output terminal for 2nd shift solenoid
5	B/W	Output terminal for 1st shift solenoid
6	P/L	PTO Solenoid
7	R/Y	+12 V (Power Source from Main Switch)
8	R/W	+5 V (Power source for sensor)
9	Y	CAN (H)
10	G	CAN (L)
11	B/W	Starter Relay
12	W/G	DPF Buzzer
13	L	Output terminal for Hi-Lo solenoid
14	B/W	GND (Ground for Sensor)
15	P	TXD (For Check)
16	–	–
17	–	–
18	R	+12 V (Power Source from Battery)
19	Y	Output terminal for range gear shift solenoid
20	–	–
21	V	RXD (For Check)
22	L	Output terminal for proportional reducing valve
23	–	–
24	R	Output terminal for 3rd shift solenoid
25	G	Output terminal for 4th shift solenoid
26	–	–

Connector B (34P Connector) of Wire Harness Side

No.	Color of wiring	Terminal Name
1	–	–
2	–	–
3	Y/B	Parked Regeneration Switch Lamp
4	W/L	Foot Throttle Sensor 1
5	–	–
6	W/L	GST Lever Sensor
7	Or	Traveling Speed Sensor
8	–	–
9	W/B	Seat Switch
10	L/G	Output Terminal for OPC
11	W/R	Foot Throttle Sensor 2
12	L/W	Auto Regeneration Switch Lamp
13	L	Oil Temperature Sensor
14	Y/L	Hand Throttle Sensor 1
15	Y/R	Hand Throttle Sensor 2
16	G/W	Mid PTO Switch
17	R/B	Seat Tilt Switch
18	–	–
19	–	–
20	–	–
21	–	–
22	B/Y	Pressure Switch
23	Lg/B	Shuttle Switch (Forward)
24	Y/G	Shuttle Switch (Reverse)
25	–	–
26	–	–
27	–	–
28	L/Y	Parked Regeneration Switch
29	L/R	Auto Regeneration Switch
30	R	Starter **S** Terminal
31	B/Y	Shuttle Switch (Neutral)
32	–	–
33	–	–
34	Or/B	PTO Switch

9Y1210824ELS0036US0

HST



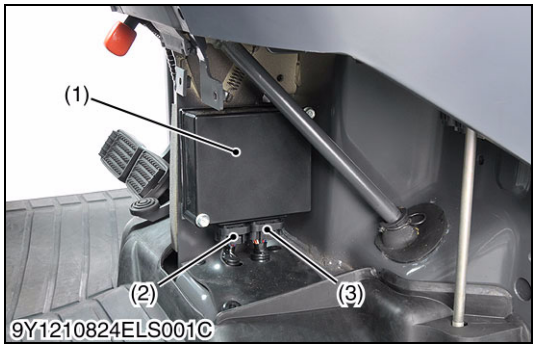
Connector A (26P Connector) of Wire Harness Side

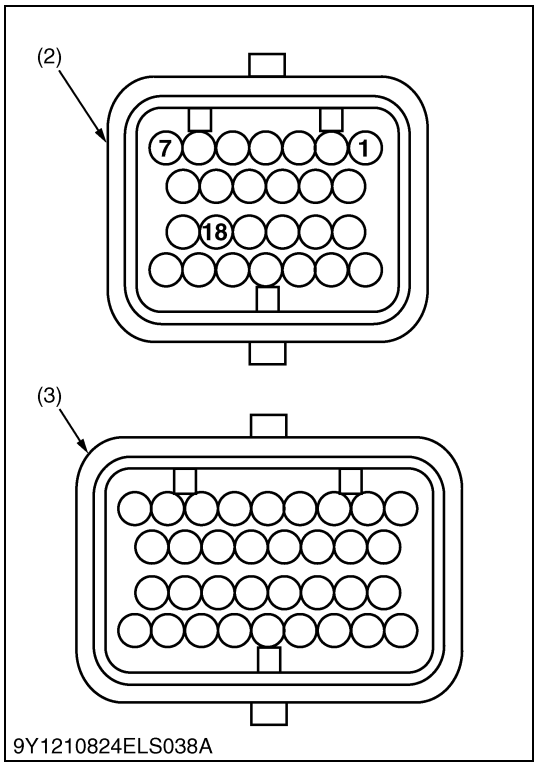
No.	Color of wiring	Terminal Name
1	B	GND (Ground for Circuit Line)
2	G/W	Return line terminal for proportional valve (Forward)
3	G/L	Return line terminal for proportional valve (Reverse)
4	–	–
5	–	–
6	P/L	PTO Solenoid
7	R/Y	+12 V (Power Source from Main Switch)
8	R/W	+5 V (Power source for sensor)
9	Y	CAN (H)
10	G	CAN (L)
11	B/W	Starter Relay
12	W/G	DPF Buzzer
13	–	–
14	B/W	GND (Ground for Sensor)
15	P	TXD (For Check)
16	–	–
17	–	–
18	R	+12 V (Power Source from Battery)
19	–	–
20	–	–
21	V	RXD (For Check)
22	L/R	Output terminal for proportional valve (Forward)
23	R/B	Output terminal for proportional valve (Hi-Lo)
24	–	–
25	–	–
26	L/W	Output terminal for proportional valve (Reverse)

Connector B (34P Connector) of Wire Harness Side

No.	Color of wiring	Terminal Name
1	–	–
2	Br/W	Swashplate Position Sensor 2
3	Y/B	Parked Regeneration Switch Lamp
4	W/L	HST Pedal Sensor 1
5	–	–
6	Y	Range Gear Shift Sensor
7	Or	Traveling Speed Sensor
8	–	–
9	W/B	Seat Switch
10	L/G	Output Terminal for OPC
11	W/R	HST Pedal Sensor 2
12	L/W	Auto Regeneration Switch Lamp
13	Br	Swashplate Position Sensor 1
14	Y/L	Hand Throttle Sensor 1
15	Y/R	Hand Throttle Sensor 2
16	G/W	Mid PTO Switch
17	R/B	Seat Tilt Switch
18	–	–
19	G/R	Cruise Control Switch (SET)
20	G/B	Cruise Control Switch (Increase)
21	W/G	Cruise Control Switch (Decrease)
22	W	Cruise Control Switch (Cancel)
23	G	Hi-Lo Switch (Hi)
24	L	Hi-Lo Switch (Lo)
25	–	–
26	–	–
27	B/Y	Throttle-Up Switch
28	L/Y	Parked Regeneration Switch
29	L/R	Auto Regeneration Switch
30	R	Starter **S** Terminal
31	G/L	Auto Throttle Advance Switch
32	–	–
33	W/L	Cruise Control Release Switch
34	Or/B	PTO Switch

9Y1210824ELS0037US0





Connector Voltage

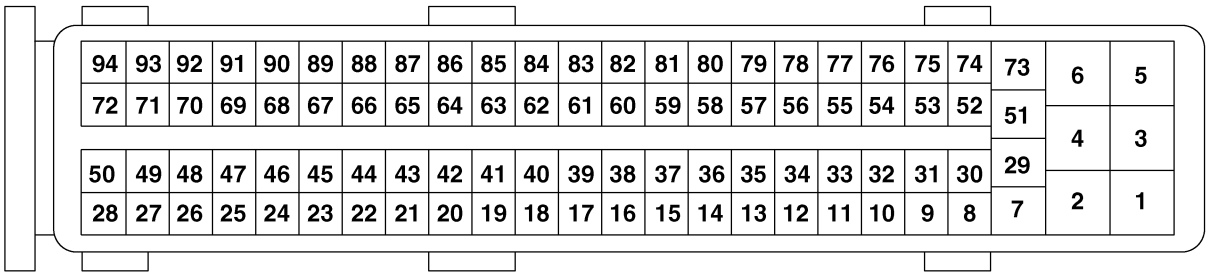
1. Disconnect the connectors (2) (3).
2. Measure the voltage between connector **A** of terminal **18** and chassis.
3. Turn the main switch **ON**.
4. Measure the voltage between connector **A** of terminal **7** and chassis.

Voltage	Connector **A**	Terminal **18** – Chassis	Approx. battery voltage
		Terminal **7** – Chassis	

(1) Main ECU
(2) Connector **A** (**26P**)
(3) Connector **B** (**34P**)

9Y1210824ELS0038US0

(5) Checking by Engine Electric Control Unit (ECU)

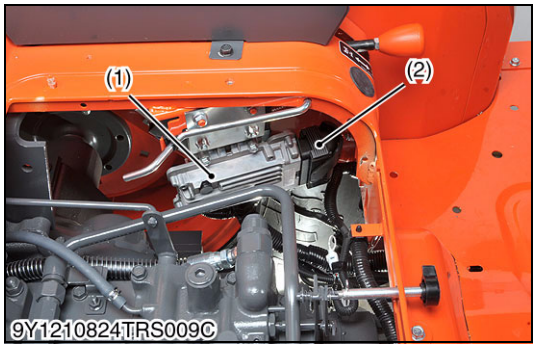


9Y1210824ELS039A

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
1	B	ECU (−)	**48**	–	–
2	B	ECU (−)	**49**	–	–
3	R	Injector #1 and #4 (+)	**50**	Or	Engine ECU Main Relay (Coil Side)
4	R	Engine ECU Main Relay (Switch Side)	**51**	W/B	Injector #2 (−)
5	R	Injector #2 and #3 (+)	**52**	–	–
6	R	Engine ECU Main Relay (Switch Side)	**53**	B	Air Flow Sensor (−)
7	W/B	Injector #4 (−)	**54**	Y	Rail Pressure Sensor (Signal)
8	B	Crankshaft Position Sensor (−)	**55**	B	Exhaust Gas Temperature Sensor T2 (−)
9	–	–	**56**	W	Boost Pressure Sensor (Signal)
10	–	–	**57**	W	Exhaust Gas Temperature Sensor T1
11	B	Coolant Temperature Sensor (−)	**58**	–	–
12	–	–	**59**	W	Exhaust Gas Temperature Sensor T0
13	R	DPF Differential Pressure Sensor (+)	**60**	–	–
14	–	–	**61**	W	Air Flow Sensor (Signal)
15	–	–	**62**	R	CAN2 (H)
16	–	–	**63**	W	CAN2 (L)
17	–	–	**64**	–	–
18	R	Intake Throttle Valve Position Sensor (+)	**65**	G	CAN1 (L)
19	B	To Alternator (L)	**66**	Y	CAN1 (H)
20	L/G	Engine Stop Switch (Input Terminal for OPC)	**67**	–	–
21	–	–	**68**	–	–
22	–	–	**69**	–	–
23	–	–	**70**	B/R	Glow Relay (Coil Side)
24	–	–	**71**	R	Ignition Switch
25	–	–	**72**	–	–
26	–	–	**73**	W/B	Injector #1 (−)
27	–	–	**74**	–	–
28	–	–	**75**	W	Crankshaft Position Sensor (Signal)
29	W/B	Injector #3 (−)	**76**	G	Rail Pressure Sensor (−)
30	–	–	**77**	W	Exhaust Gas Temperature Sensor T2
31	Y	Boost Pressure Temperature Sensor (Signal)	**78**	B	Boost Pressure Sensor (−)
32	R	Rail Pressure Sensor (+)	**79**	B	Exhaust Gas Temperature Sensor T1 (−)
33	W	Coolant Temperature Sensor (Signal)	**80**	–	–
34	–	–	**81**	B	Exhaust Gas Temperature Sensor T0 (−)
35	R	Boost Pressure Temperature Sensor (+)	**82**	W	Intake Throttle Valve Position Sensor (−)
36	Y	DPF Differential Pressure Sensor (−)	**83**	–	–

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
37	B	Intake Throttle Valve Position Sensor (Signal)	**84**	R	Intake Throttle Valve Motor (DC Motor +)
38	B	DPF Differential Pressure Sensor (Signal)	**85**	R	Intake Throttle Valve Motor (DC Motor −)
39	R	Crankshaft Position Sensor (+)	**86**	Y	Intake Air Temperature Sensor (Signal)
40	–	–	**87**	–	–
41	–	–	**88**	–	–
42	–	–	**89**	Y	SCV (−)
43	–	–	**90**	–	–
44	B	Camshaft Position Sensor (−)	**91**	–	–
45	R	Camshaft Position Sensor (+)	**92**	–	–
46	W	Camshaft Position Sensor (Signal)	**93**	–	–
47	–	–	**94**	–	–

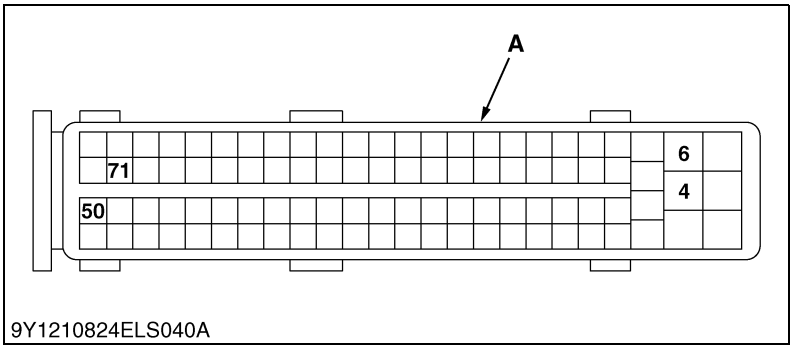
9Y1210824ELS0039US0



Battery Voltage

1. Disconnect the connector (2).
2. Measure the voltage between terminal **50** (+) and chassis.
3. Turn the main switch **ON**.
   Measure the voltage between terminal **4** (+) and chassis.
4. Measure the voltage between terminal **6** (+) and chassis.
5. Measure the voltage between terminal **71** (+) and chassis.
6. If the measurement is not approximately battery voltage, check the relating electric circuit.

Voltage	Terminal **50** – Chassis	Approx. battery voltage
	Terminal **4** – Chassis	
	Terminal **6** – Chassis	
	Terminal **71** – Chassis	

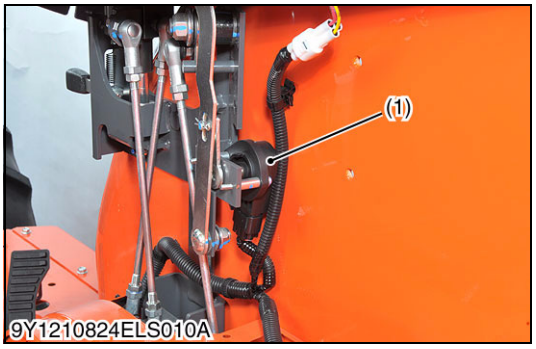


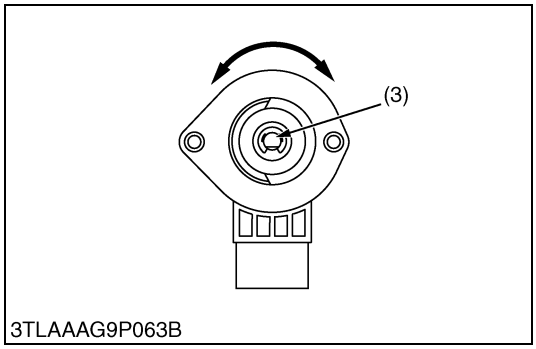
(1) Engine ECU
(2) Connector

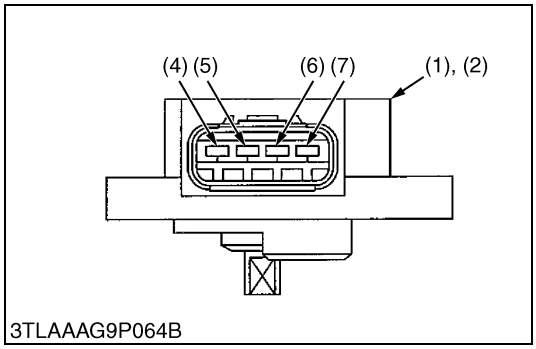
A : Connector of Wire Harness Side

9Y1210824ELS0040US0

(6) Checking Sensor and Switch for Manual Transmission







Hand Throttle Lever Sensor and Foot Throttle Sensor

1. Measure the resistance between terminal **c** (6) and **GND** (7).
2. Measure the resistance between terminal **GND** (7) and **a** while slowly turning the sensor shaft.
3. Measure the resistance terminal **GND** (7) and **b** (5) while slowly turning the sensor shaft.
4. It is OK if the resistance value approximates to the value shown in the table below.

■ **NOTE**

- **When replacing the each sensor be sure to adjust the mode "K".**

(Reference)

- The change of resistance can be checking easily when an analog tester is employed.

Reference	Terminal **c** – Terminal **GND**	Approx. 1 kΩ
	Terminal **GND** – Terminal **a**	Resistance is normal if smoothly changing Approx. 1 kΩ to 0 Ω
	Terminal **GND** – Terminal **b**	Resistance is normal if smoothly changing Approx. 0 Ω to 1 kΩ

(1) Hand Throttle Lever Sensor
(2) Foot Throttle Sensor
(3) Sensor Shaft
(4) Terminal **a**
(5) Terminal **b**
(6) Terminal **c**
(7) Terminal **GND**

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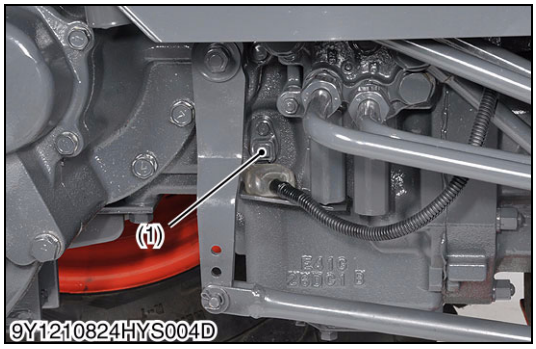
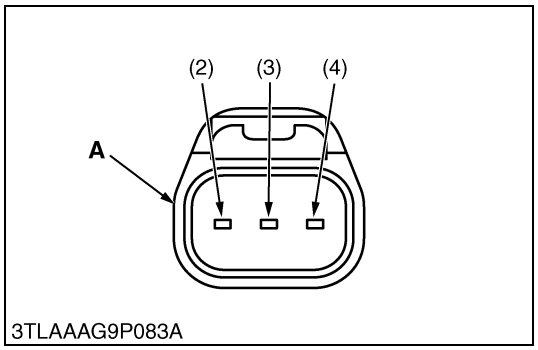
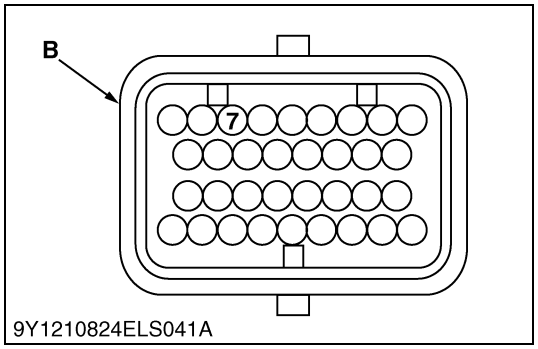






Traveling Speed Sensor

1. Measure the resistance between terminal **7** of main ECU connector **B** and terminal **2** of sensor connector.
2. If 0 ohm is not indicated, the wiring harness is faulty.

■ **NOTE**

- **It is not necessary to adjust any kind of mode.**

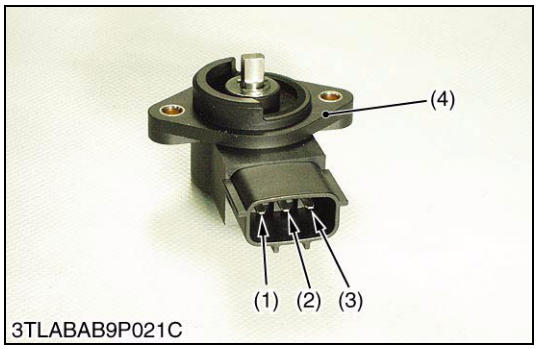
Resistance	Terminal **2** of sensor connector – Terminal **7** of main ECU connector **B**	0 Ω
	Terminal **3** of sensor connector – Chassis	

(1) Traveling Speed Sensor
(2) Terminal **1**
(3) Terminal **2**
(4) Terminal **3**

A : Connector of Wire Harness Side
B : Main ECU Connector B (34P) of Wire Harness Side

9Y1210824ELS0042US0

(7) Checking Sensor and Switch for GST



GST Lever Sensor Resistance

1. Measure the resistance between terminal **a** (1) and **c** (3).
2. Then, check resistance between terminal **a** (1) and **b** (2) while slowly turning the sensor shaft.
3. It is OK if the resistance value approximates to the value shown in the table below.

■ **NOTE**

- **When replacing the sensor, be sure to adjust the mode "E".**

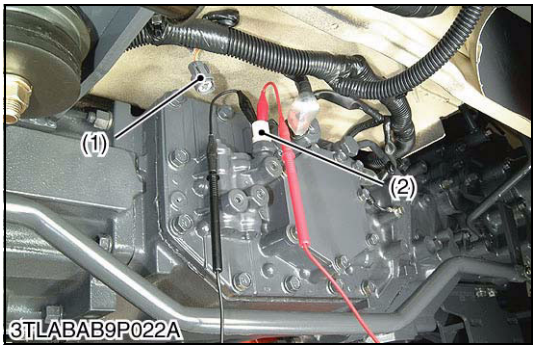
(Reference)

- The change of resistance can be checking easily when an analog tester is employed.

Resistance	Terminal **a** – Terminal **c**	1.6 to 2.4 kΩ
	Terminal **a** – Terminal **b**	Resistance is normal if smoothly changing

(1) Terminal **a**
(2) Terminal **b**
(3) Terminal **c**
(4) GST Lever Sensor

9Y1210824ELS0043US0



Pressure Switch Resistance

1. Disconnect the pressure switch connector (1).
2. Connect the circuit tester pins to each terminal of pressure switch (2).
3. Start the engine and depress the clutch pedal.
4. Check the resistance at time when shuttle lever or GST lever is shifted.
5. It is OK if the resistance comes to have shown in the table below.

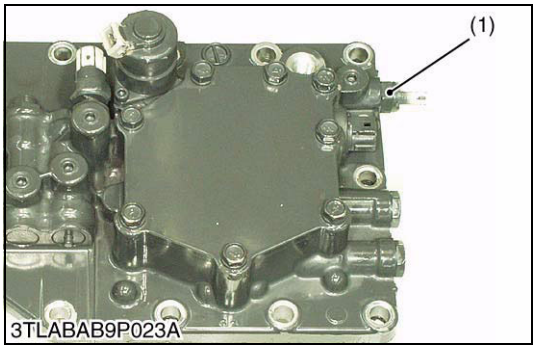
■ **NOTE**
- **It is not necessary to adjust any kind of mode.**

CAUTION
- **Be sure to depress the clutch pedal so that the tractor should not move while shifting each lever.**

Resistance between terminals	When the shuttle lever or GST lever is shifted	Continuity exists
	Both levers are at Neutral	0 Ω

(1) Pressure Switch Connector (2) Pressure Switch

9Y1210824ELS0044US0



Oil Temperature Sensor Resistance

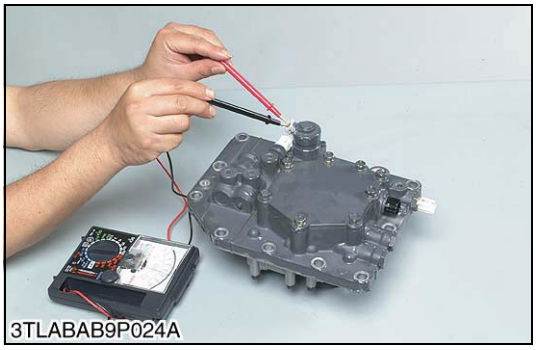
1. Measure the resistance between the sensor terminals.
2. It is OK if the resistance value approximates to the value shown in the table below.
3. If the exists a large difference, replace the sensor.

■ **NOTE**
- **It is not necessary to adjust any kind of mode.**

Resistance	Reference value	16.4 to 21.1 kΩ at −20 °C (−4 °F) 1.04 to 1.23 kΩ at 40 °C (104 °F) 0.15 to 0.16 kΩ at 100 °C (212 °F)

(1) Oil Temperature Sensor

9Y1210824ELS0045US0



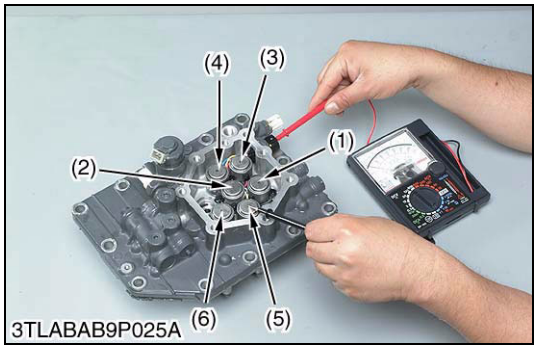
Proportional Reducing Valve Resistance

1. Measure the resistance between the valve terminals.
2. It is OK if the resistance comes to have shown in the table below.

■ **NOTE**
- **When replacing the proportional reducing valve be sure to adjust the mode "F".**

Resistance	Reference value	8 to 9 Ω

9Y1210824ELS0046US0



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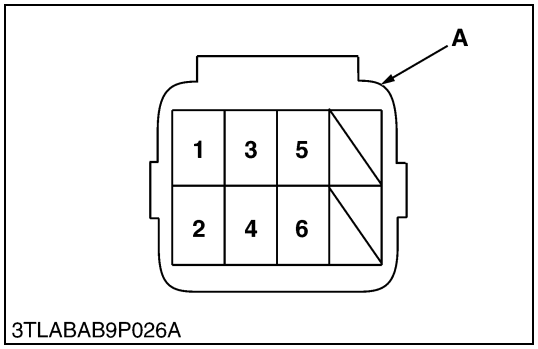

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Shift Solenoid Resistance

1. Measure the resistance between each connector terminal and each valve body.
2. It is OK if the resistance comes to have shown in the table below.

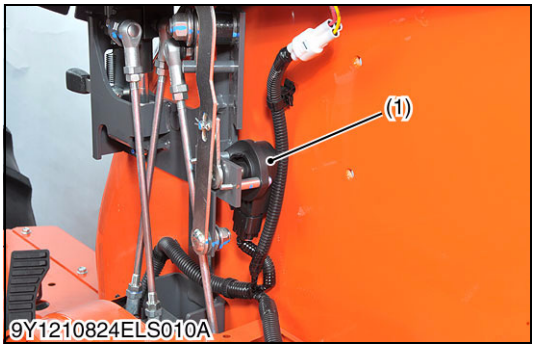
■ **NOTE**

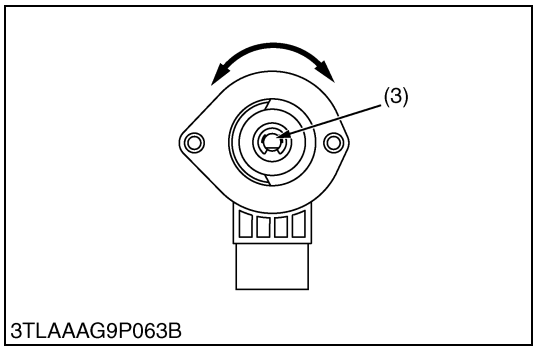
- **It is not necessary to adjust any kind of mode.**

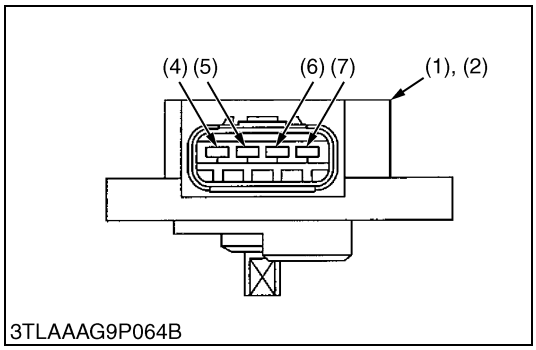
Measuring point		Resistance
Solenoid	**Connector terminal**	
(1) Solenoid 1	**1**	11 to 15 Ω
(2) Solenoid 2	**2**	
(3) Solenoid 3	**3**	
(4) Solenoid 4	**4**	
(5) Solenoid 5 (Sub- range)	**5**	
(6) Solenoid 6 (Main range)	**6**	

A: Connector of Solenoid Side

9Y1210824ELS0047US0







Hand Throttle Lever Sensor and Foot Throttle Sensor

1. Measure the resistance between terminal **c** (6) and **GND** (7).
2. Measure the resistance between terminal **GND** (7) and **a** while slowly turning the sensor shaft.
3. Measure the resistance terminal **GND** (7) and **b** (5) while slowly turning the sensor shaft.
4. It is OK if the resistance value approximates to the value shown in the table below.

■ **NOTE**

- **When replacing the each sensor be sure to adjust the mode "K".**

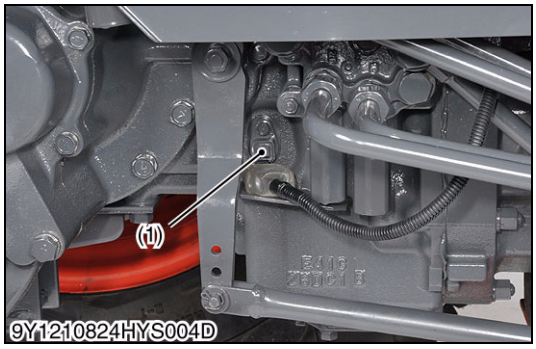
(Reference)

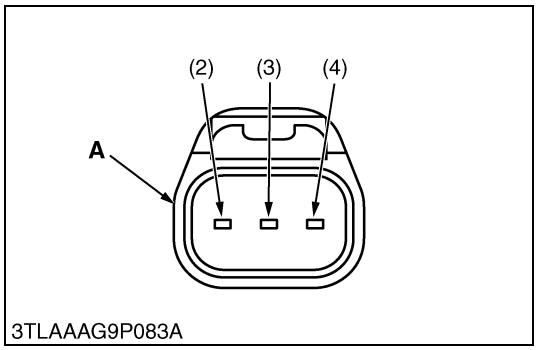
- The change of resistance can be checking easily when an analog tester is employed.

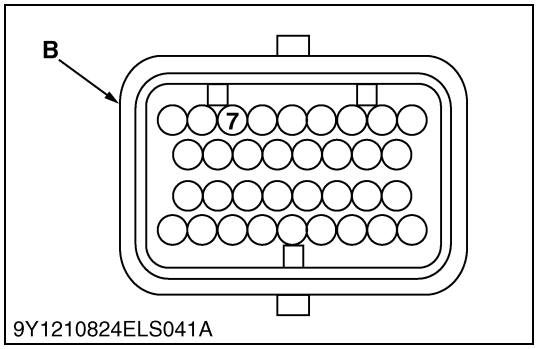
Reference	Terminal **c** – Terminal **GND**	Approx. 1 kΩ
	Terminal **GND** – Terminal **a**	Resistance is normal if smoothly changing Approx. 1 kΩ to 0 Ω
	Terminal **GND** – Terminal **b**	Resistance is normal if smoothly changing Approx. 0 Ω to 1 kΩ

(1) Hand Throttle Lever Sensor
(2) Foot Throttle Sensor
(3) Sensor Shaft
(4) Terminal **a**
(5) Terminal **b**
(6) Terminal **c**
(7) Terminal **GND**

9Y1210824ELS0041US0







Traveling Speed Sensor

1. Measure the resistance between terminal **7** of main ECU connector **B** and terminal **2** of sensor connector.
2. If 0 ohm is not indicated, the wiring harness is faulty.

■ **NOTE**

- **It is not necessary to adjust any kind of mode.**

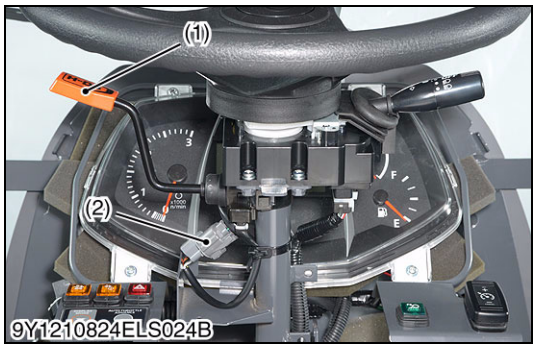
Resistance	Terminal **2** of sensor connector – Terminal **7** of main ECU connector **B**	0 Ω
	Terminal **3** of sensor connector – Chassis	

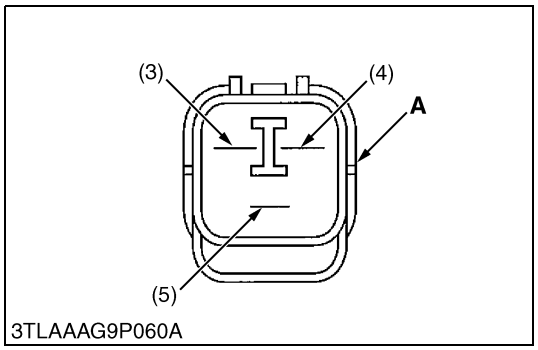
(1) Traveling Speed Sensor
(2) Terminal **1**
(3) Terminal **2**
(4) Terminal **3**

A : Connector of Wire Harness Side
B : Main ECU Connector B (34P) of Wire Harness Side

9Y1210824ELS0042US0

(8) Checking Sensor and Switch for HST





H-DS Lever Continuity

1. Remove the panel cover and steering post cover.
2. Disconnect the connector (2).
3. Measure the resistance between connector terminals, referring to the table below.
4. If the measurement does not between as table, switch is faulty.

■ **NOTE**

- **It is not necessary to adjust any kind of mode.**

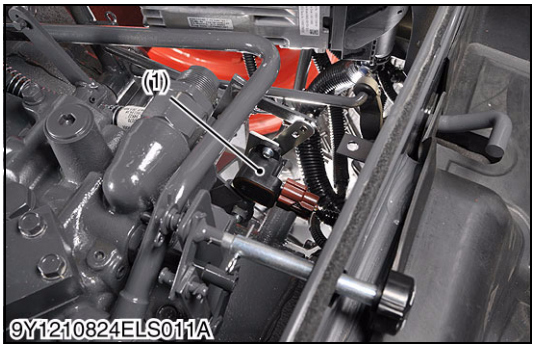
Position	Terminal			Resistance
	a	b	c	
Up	●	●		0 Ω
Neutral				
Down	●		●	

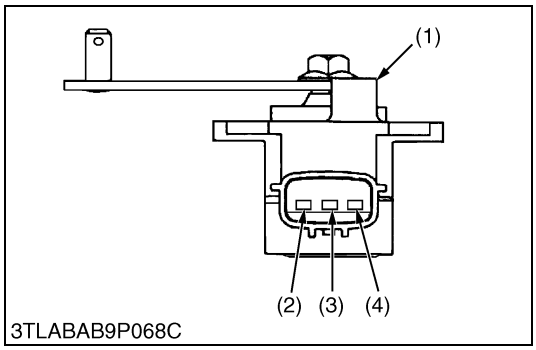
9Y1210824ELS051US

(1) H-DS Lever
(2) H-DS Connector
(3) Terminal **a**
(4) Terminal **b**
(5) Terminal **c**

A: Connector of H-DS Lever Side

9Y1210824ELS0048US0





HST Range Gear Shift Lever Sensor Resistance

1. Measure the resistance between terminal **a** (2) and **b** (3) while shifting the range gear shift lever.
2. It is OK if the resistance is smoothly changing.

■ **NOTE**

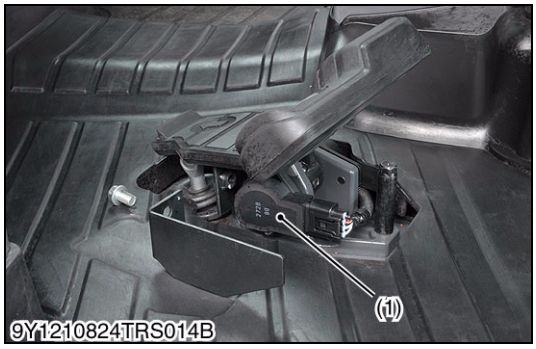
- **When replacing the sensor, be sure to adjust the mode "K".**

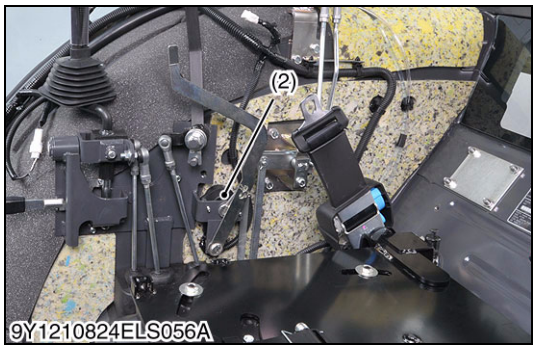
(Reference)

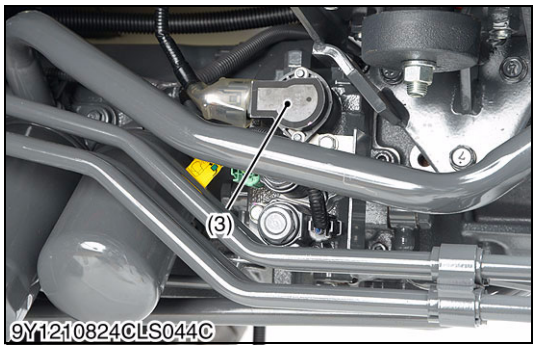
- The maximum resistance value between to terminal **a** (2) and **c** (4) is 4.32 to 6.48 kΩ.

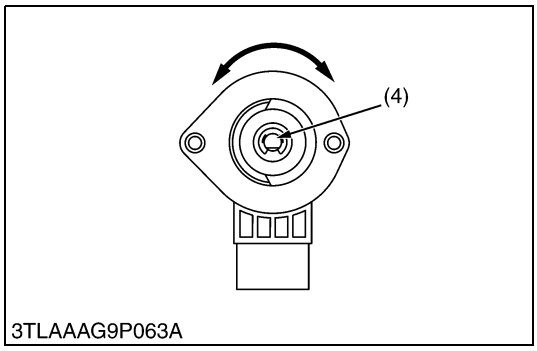
(1) Range Gear Shift Lever Sensor
(2) Terminal **a**
(3) Terminal **b**
(4) Terminal **c**

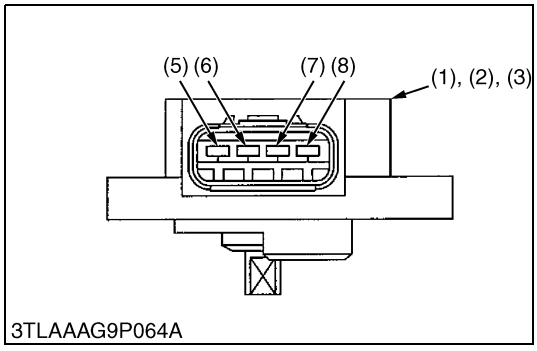
9Y1210824ELS0049US0











HST Pedal Sensor, Hand Throttle Sensor and Swashplate Sensor

1. Measure the resistance between terminal **c** (7) and **GND** (8).
2. Measure the resistance between terminal **GND** (8) and **a** while slowly turning the sensor shaft.
3. Measure the resistance terminal **GND** (8) and **b** (6) while slowly turning the sensor shaft.
4. It is OK if the resistance value approximates to the value shown in the table below.

■ **NOTE**

- **When replacing the each sensor be sure to adjust the mode "K" and "L".**

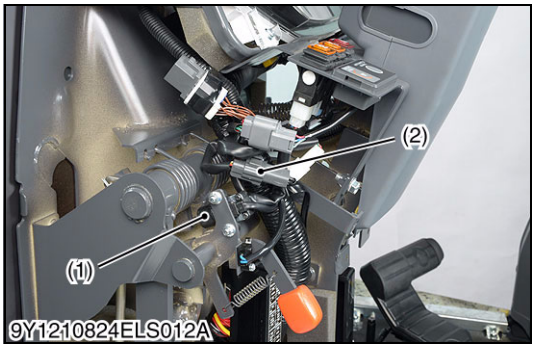
(Reference)

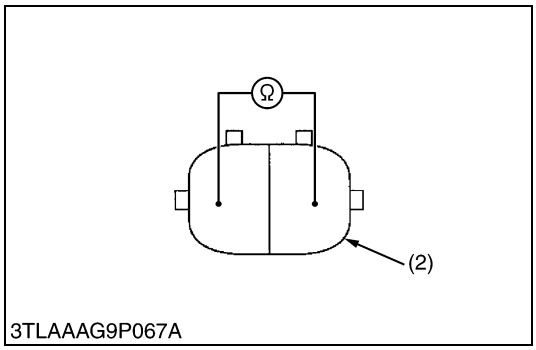
- The change of resistance can be checking easily when an analog tester is employed.

Reference	Terminal **c** – Terminal **GND**	Approx. 1 kΩ
	Terminal **GND** – Terminal **a**	Resistance is normal if smoothly changing Approx. 1 kΩ to 0 Ω
	Terminal **GND** – Terminal **b**	Resistance is normal if smoothly changing Approx. 0 Ω to 1 kΩ

(1) HST Pedal Sensor
(2) Hand Throttle Lever Sensor
(3) Swashplate Position Sensor
(4) Sensor Shaft
(5) Terminal **a**
(6) Terminal **b**
(7) Terminal **c**
(8) Terminal **GND**

9Y1210824ELS0050US0





Cruise Control Release Switch

1. Disconnect the cruise control release switch connector (2).
2. Measure the resistance between connector terminal as shown in the table below.
3. If the switch is damaged, replace it.

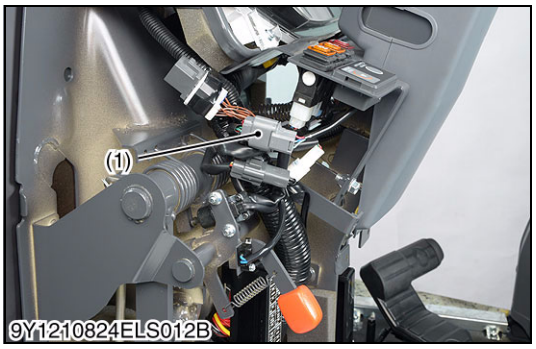
■ **NOTE**

- **It is not necessary to adjust any kind of mode.**

Reference between connector terminal	When switch spring is pushed	0 Ω
	When switch spring is released	Infinity

(1) Cruise Control Release Switch
(2) Connector of Switch Side

9Y1210824ELS0051US0



Display Mode Switch and Auto Throttle Advance Switch

■ **Display Mode Switch**

1. Measure the resistance between terminal **1** and terminal **3** while pushing the display mode switch (2).
2. It is OK if 0 ohm is indicated.

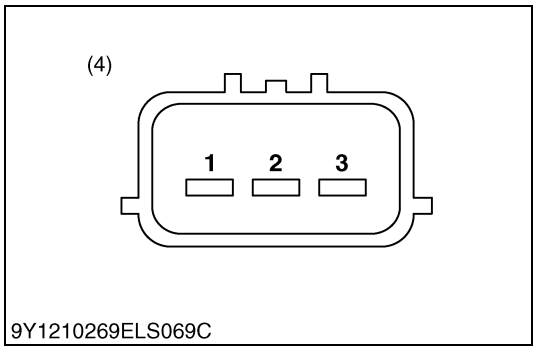
■ **Auto Throttle Advance Switch**

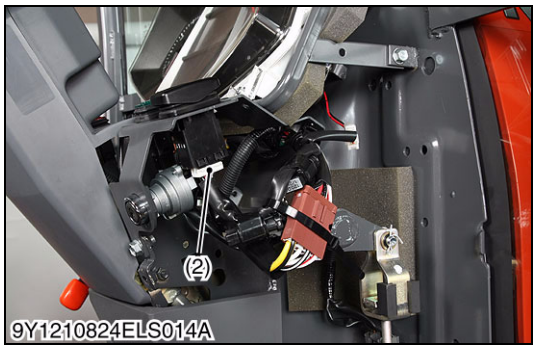
1. Measure the resistance between terminal **2** and terminal **3** while pushing the auto throttle advance switch (3).
2. It is OK if 0 ohm is indicated.

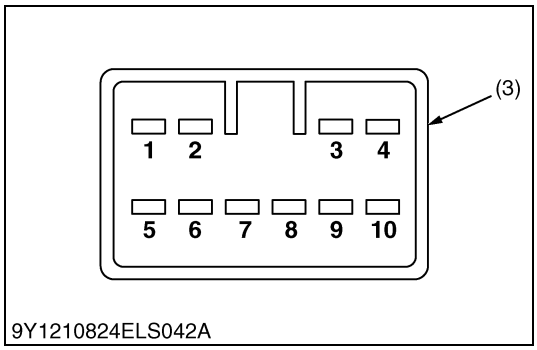
Resistance	Terminal **1** – Terminal **3**	Approx. 1 kΩ
	Terminal **2** – Terminal **3**	Approx. 1 kΩ

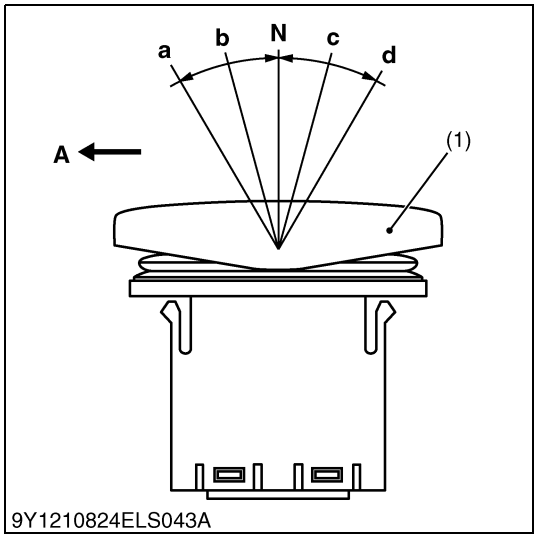
(1) Display Mode Switch Connector
(2) Display Mode Switch
(3) Auto Throttle Advance Switch
(4) Connector of Switch Side

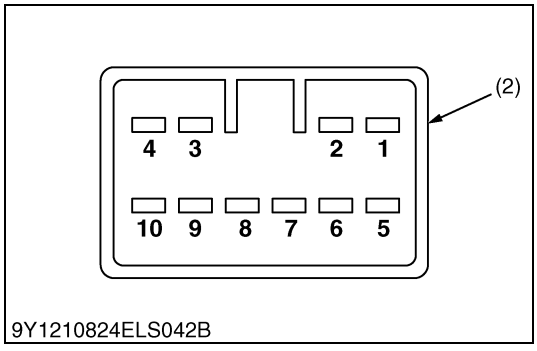
9Y1210824ELS0052US0











Cruise Control Switch

1. Remove the meter panel cover.
2. Disconnect the cruise control switch connector (2).
3. Remove the cruise control switch (1).
4. Perform the following check.

1) Connector Voltage

1. Turn on the main switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value as shown in the table below is not indicated, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **3** – Chassis	Approx. battery voltage
		Terminal **6** – Chassis	

(1) Cruise Control Switch
(2) Cruise Control Switch Connector
(3) Connector of harness side

9Y1210824ELS0053US0

2) Switch Continuity

1. Check the continuity across the terminals shown in the tables below.
2. If the continuity specified below is not indicated, the cruise control switch is faulty.

Cruise Control Switch Position	Terminal									
	1	2	3	4	5	6	7	8	9	10
a (Set)		●	●							
b (Increase)			●	—	—	—	●			
N (Neutral)										
c (Decrease)						●	—	●		
d (Cancel)						●	—	—	●	

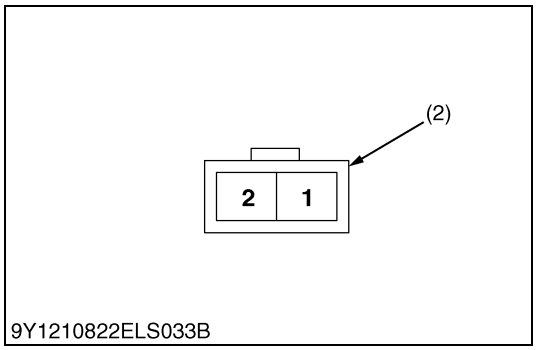
9Y1210824ELS052US

Resistance	Terminal **1** – Terminal **5**	Approx. 620 Ω
	Terminal **4** – Terminal **10**	

(1) Cruise Control Switch
(2) Connector of Switch Side

A : Forward Side
a: Set Position
b: Increase Position
N: Neutral
c: Decrease
d: Chancel

9Y1210824ELS0054US0



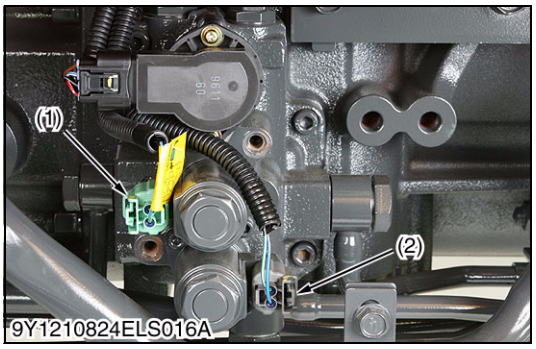
Throttle-Up Switch

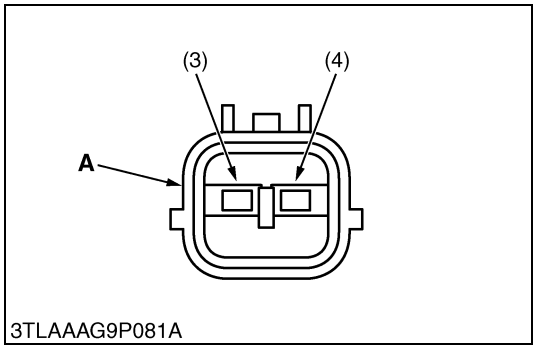
1. Remove the side cover.
2. Disconnect the **2P** connector of throttle-up switch (1).
3. Measure the continuity with an ohmmeter across the switch terminals.
4. If it does not conduct or any value is indicated when the switch is pushed, the switch is faulty.
5. If infinity is not indicated when the switch is released, the switch is faulty.

Resistance (Across switch terminal)	Reference value	When switch is pushed	0 Ω
		When switch is released	Infinity

(1) Throttle-Up Switch
(2) Connector of Switch Side

9Y1210824ELS0055US0





HST Proportional Valve (Forward and Reverse)

1. Remove the cover.
2. Disconnect the **2P** connector of the proportional valve (1), (2).

■ **IMPORTANT**

- **In installing the connector of the proportional valve, pay attention to the color of the connector to ensure correct installation.**

3. Measure the resistance between terminal **1** (3) and **2** (4).
4. It is OK if the resistance comes to have shown in the table below.

■ **NOTE**

- **When replacing the sensor, be sure to adjust the mode "K".**

Resistance	Terminal **1** – Terminal **2**	Approx. 3.1 kΩ

(1) Proportional Valve Connector (Green)
(2) Proportional Valve Connector (Gray)
(3) Terminal **1**
(4) Terminal **2**

A: Connector of Proportional Side

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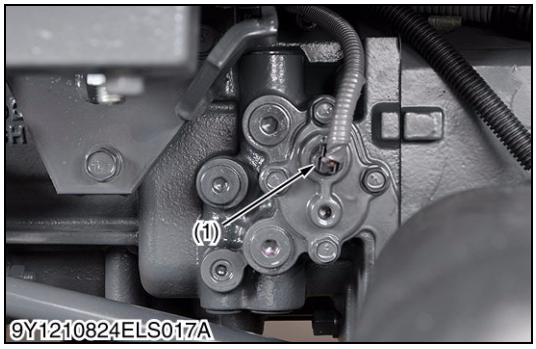
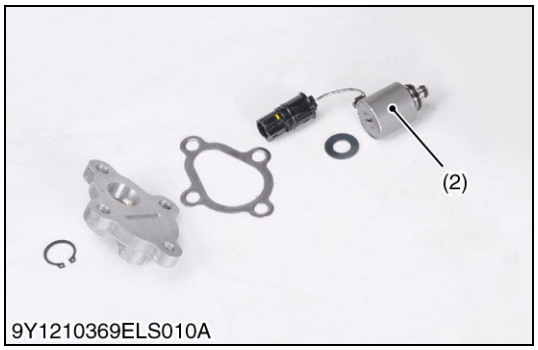
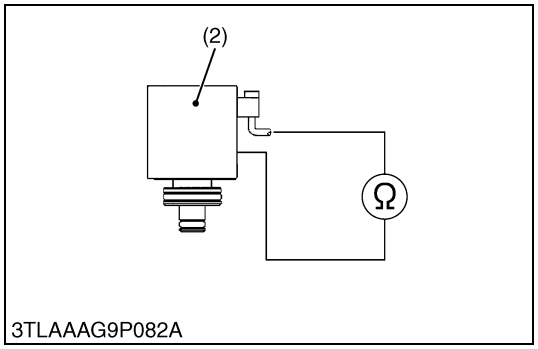






Hi-Lo Solenoid

1. Remove the cover.
2. Disconnect the connector (1).
3. Remove the Hi-Lo solenoid valve assembly.
4. Disassembling the Hi-Lo solenoid valve assembly.
5. Measure the resistance with an ohmmeter across the terminal on the connector and valve body.
6. It is OK if the resistance comes to have shown in the table below.

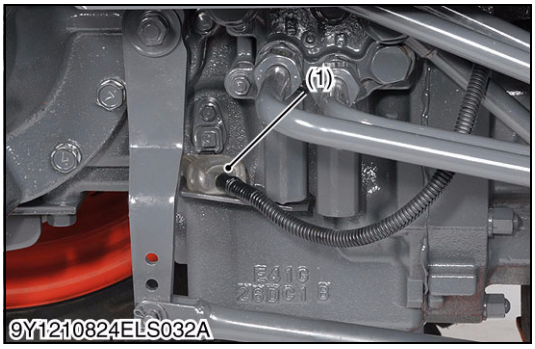
■ **NOTE**

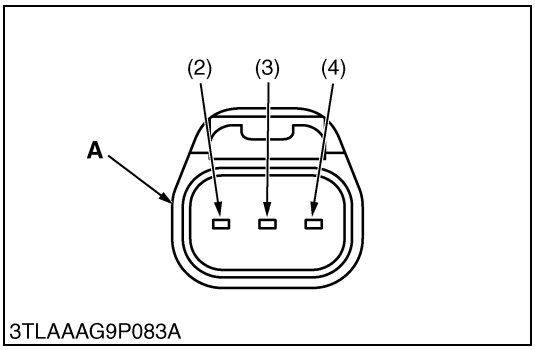
- **It is not necessary to adjust any kind of mode.**

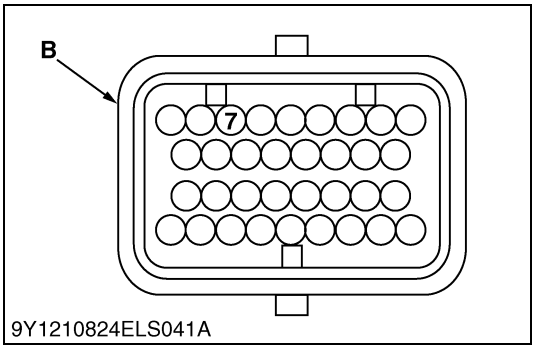
Resistance	Hi-Lo solenoid terminal to valve body	10 to 12 Ω

(1) Connector (2) Hi-Lo Solenoid

9Y1210824ELS0057US0







Traveling Speed Sensor

1. Measure the resistance between terminal **7** of main ECU connector **B** and terminal **2** of sensor connector.
2. If 0 ohm is not indicated, the wiring harness is faulty.

■ **NOTE**

- **It is not necessary to adjust any kind of mode.**

Resistance	Terminal **2** of sensor connector – Terminal **7** of main ECU connector **B**	0 Ω
	Terminal **3** of sensor connector – Chassis	

(1) Traveling Speed Sensor
(2) Terminal **1**
(3) Terminal **2**
(4) Terminal **3**

A : Connector of Wire Harness Side
B : Main ECU Connector B (34P) of Wire Harness Side

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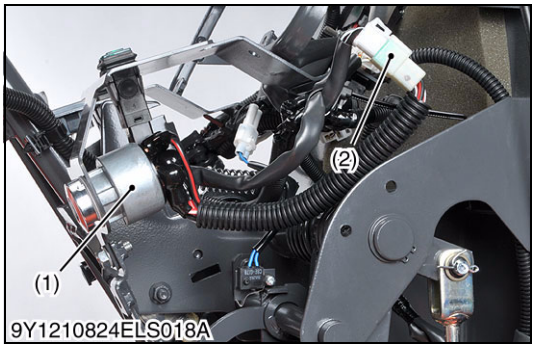
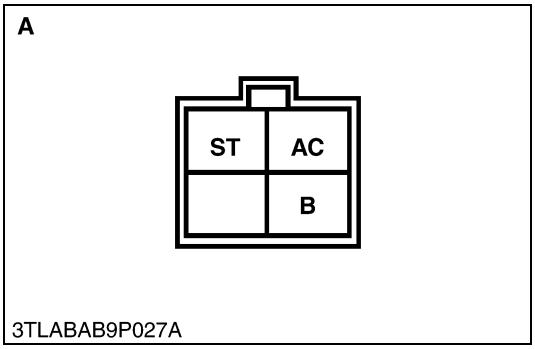
[6] STARTING SYSTEM

(1) Main Switch (ROPS Type)





Main Switch

1. Remove the panel cover.
2. Disconnect the main switch connector (2).
3. Perform the following checking.

(1) Main Switch
(2) Main Switch Connector

9Y1210824ELS0059US0

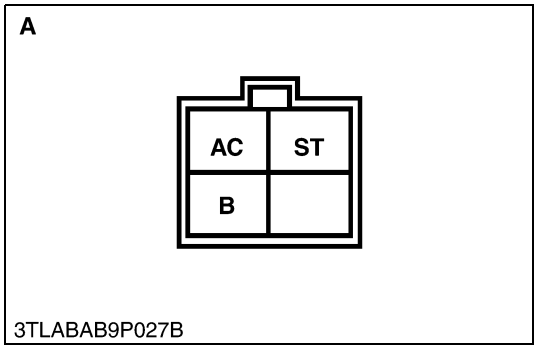
Connector Voltage

1. Measure the voltage across the connector **B** terminal and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector **B** terminal – Chassis	Approx. battery voltage

A: Wire Harness Side Connector 4C

9Y1210824ELS0060US0



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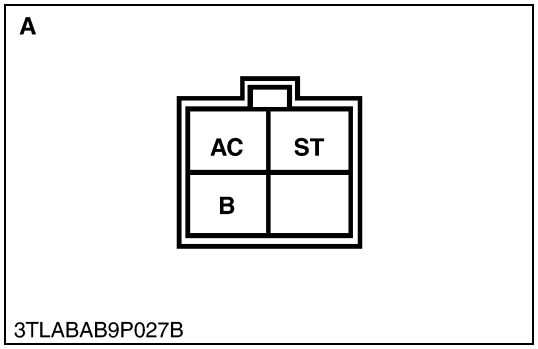
Main Switch at ON Position

1. Turn the main switch **"ON"** position.
2. Measure the resistance across the **B** terminal and the **AC** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	**B** terminal – **AC** terminal	0 Ω

A: Main Switch Side Connector 4C

9Y1210824ELS0061US0



3TLABAB9P027B

Main Switch at START Position

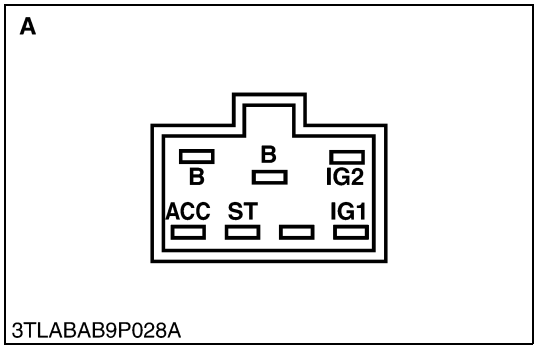
1. Turn and hold the main switch at the **"START"** position.
2. Measure the resistances across the **B** terminal and the **AC** terminal, and across the **B** terminal, and the **ST** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	**B** terminal – **AC** terminal	0 Ω
	B terminal – **ST** terminal	0 Ω

A: Main Switch Side Connector 4C

9Y1210824ELS0062US0

(2) Main Switch (CABIN Type)



3TLABAB9P028A

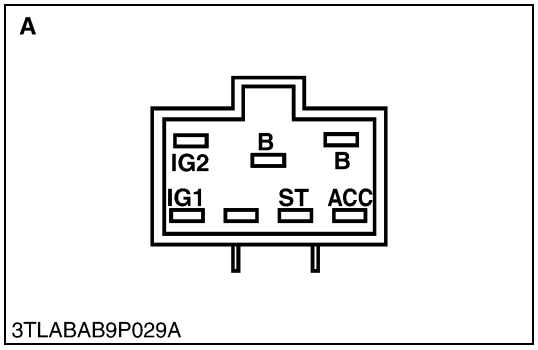
Connector Voltage

1. Measure the voltage across the connector **B** terminal and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector **B** terminal – Chassis	Approx. battery voltage

A: Wire Harness Side Connector 6G

9Y1210824ELS0063US0



3TLABAB9P029A

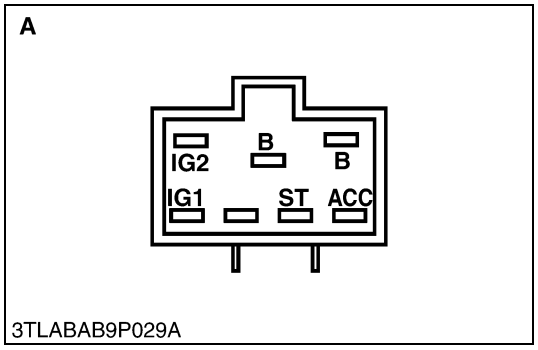
Main Switch at ACC Position

1. Turn the main switch **ACC** position.
2. Measure the resistance across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	**B** terminal – **ACC** terminal	0 Ω

A: Main Switch Side Connector 6G

9Y1210824ELS0064US0



3TLABAB9P029A

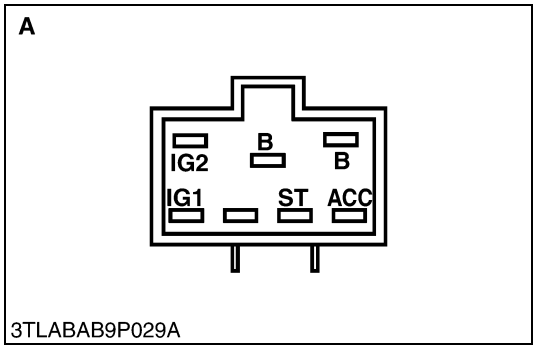
Main Switch at Key ON Position

1. Turn and hold the main switch at the **"ON"** position.
2. Measure the resistances across the **B** terminal and the **ACC** terminal, across **B** terminal and **IG1** terminal and **B** terminal and **IG2** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	**B** terminal – **ACC** terminal	0 Ω
	B terminal – **IG1** terminal	0 Ω
	B terminal – **IG2** terminal	0 Ω

A: Main Switch Side Connector 6G

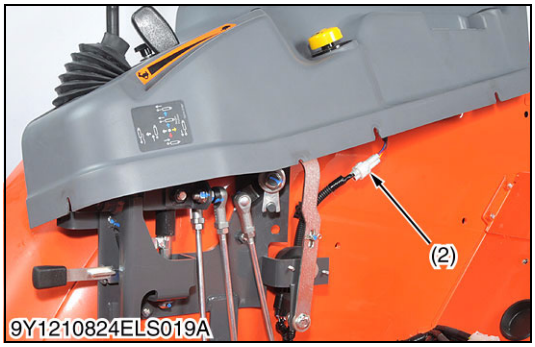
9Y1210824ELS0065US0



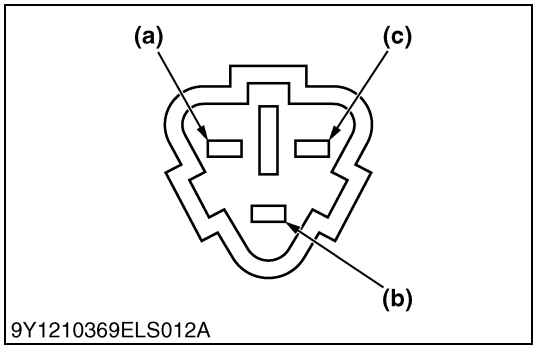
3TLABAB9P029A

(3) Safety Switch

9Y1210824HYS007B



9Y1210824ELS019A



9Y1210369ELS012A

Main Switch at START Position

1. Turn and hold the main switch at the **"START"** position.
2. Measure the resistances across the **B** terminal and the **IG1** terminal, and across the **B** terminal, and the **ST** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	**B** terminal – **IG1** terminal	0 Ω
	B terminal – **ST** terminal	0 Ω

A: Main Switch Side Connector 6G

9Y1210824ELS0066US0

PTO Switch

1) Connector Voltage

1. Remove the PTO switch connector (2).
2. Turn the main switch **"ON"** position.
3. Measure the voltage across terminal **2 (Harness)** and chassis.
4. If the voltage differs from battery voltage, the wiring harness, fuse, or main switch is faulty.

Voltage	Terminal **2** – Chassis	Approx. battery voltage

2) PTO Switch Continuity

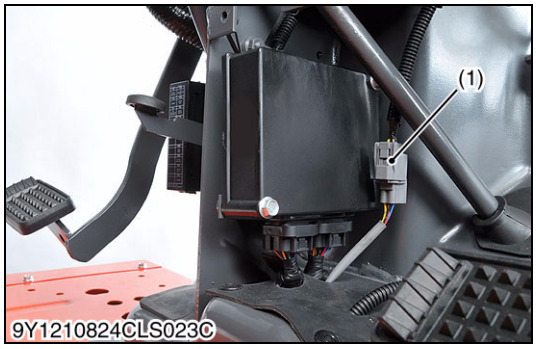
1. Remove the PTO switch connector (1).
2. Check the continuity with an ohmmeter across the terminal **1 (a)** and terminal **2 (b)**, terminal **2 (b)** and terminal **3 (c)**.
3. If connection does not change, PTO switch is faulty.

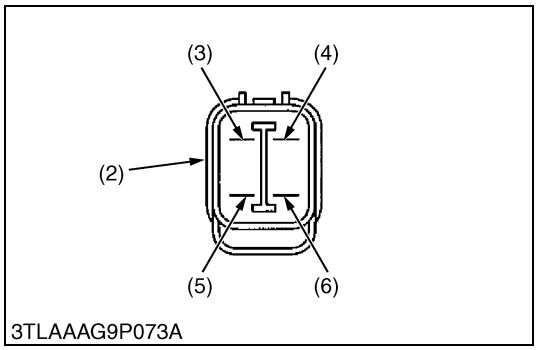
Position	Terminal **1** – terminal **2**	Terminal **2** – terminal **3**
OFF	0 Ω	Infinity
ON	Infinity	0 Ω

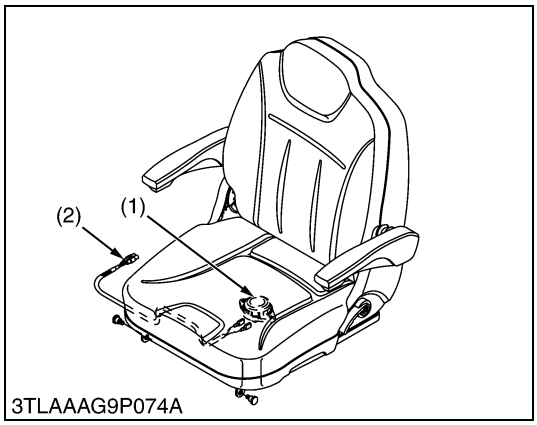
(1) PTO Switch
(2) PTO Switch Connector

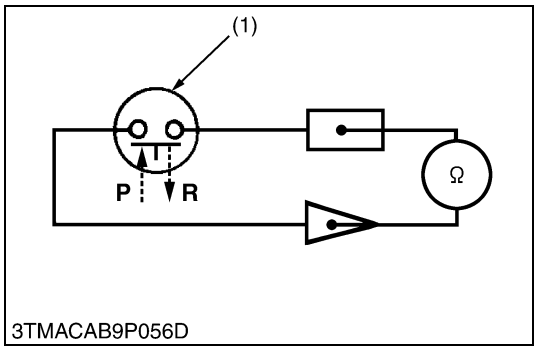
(a) Terminal 1
(b) Terminal 2
(c) Terminal 3

9Y1210824ELS0067US0









Shuttle Switch Continuity (For Manual Transmission and GST)

1. Remove the steering post under cover.
2. Disconnected the shuttle switch connector (1).
3. Measure the resistance across four terminal referring to the table below.

Shuttle lever position	Terminal				Resistance
	b	r	l	y	
Forward	●	●			0 Ω
Neutral	●		●		
Reverse	●			●	

9Y1210824ELS053US

4. If 0 ohm is not indicated, the shuttle switch is faulty.

(1) Shuttle Switch
(2) Connector of Switch Side
(3) Terminal **b**
(4) Terminal **y**
(5) Terminal **l**
(6) Terminal **r**

9Y1210824ELS0068US0

Seat Switch

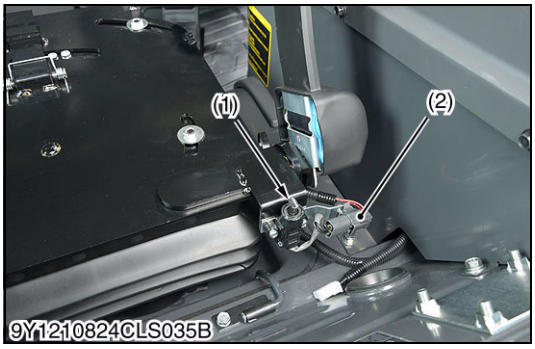
1. Disconnect the seat switch connector (2).
2. Check the continuity with an ohmmeter across the switch terminals.
3. If it does not conduct or any value is indicated when the switch is pushed (**"ON"** seat), the switch is faulty.
4. If infinity is not indicated when the switch is released (**"OFF"** seat), the switch is faulty.

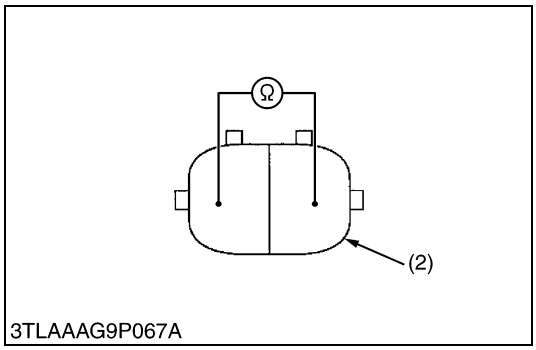
Resistance (Across switch terminals)	Reference value	When switch is pushed **"P"**	0 Ω
		When switch is released **"R"**	Infinity

(1) Seat Switch
(2) Seat Switch Connector

P: Pushed
R: Released

9Y1210824ELS0069US0





Seat Tilt Switch

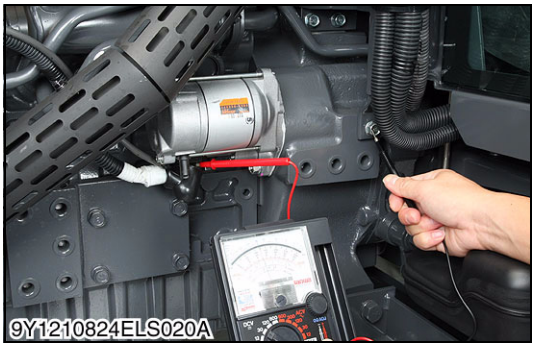
1. Disconnect the seat tilt switch connector (2).
2. Measure the resistance between connector terminal as shown in the table below.
3. If the switch is damaged, replace it.

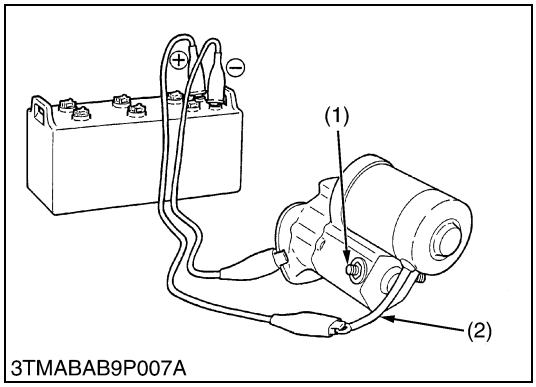
Reference between connector terminal	When switch spring is pushed	Infinity
	When switch spring is released	0 Ω

(1) Seat Tilt Switch
(2) Connector of Switch Side

9Y1210824ELS0070US0

(4) Starter





Starter Motor B Terminal Voltage

1. Measure the voltage across the **B** terminal and chassis.
2. If the voltage differs from the battery voltage, check the battery's cable.

Voltage	Factory specification	Approx. battery voltage

9Y1210824ELS0071US0

Motor Test

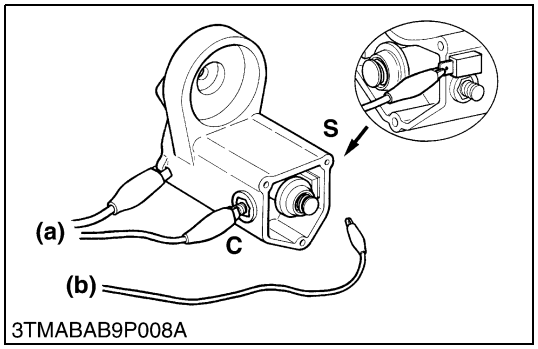
CAUTION

- **Secure the starter to prevent it from jumping up and down while testing the motor.**

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter **C** terminal (1).
5. Connect a jumper lead from the connecting lead (2) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter motor housing and the battery negative terminal post.
7. If the motor does not run, check the motor.

(1) **C** Terminal
(2) Connecting Lead

9Y1210824ELS0072US0



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Magnet Switch Test (Pull-in, Holding Coils)

1. Remove the motor from the starter housing.
2. Prepare a 6 V battery for the test.
3. Connect jumper leads from the battery negative terminal to the housing and the starter **C** terminal.
4. The plunger should be attached and the pinion gear should pop out when a jumper lead is connected from the battery positive terminal to the **S** terminal. It is a correct.
5. Disconnect the jumper lead to the starter **C** terminal. Then the pinion gear should remain popped out. It is a correct.

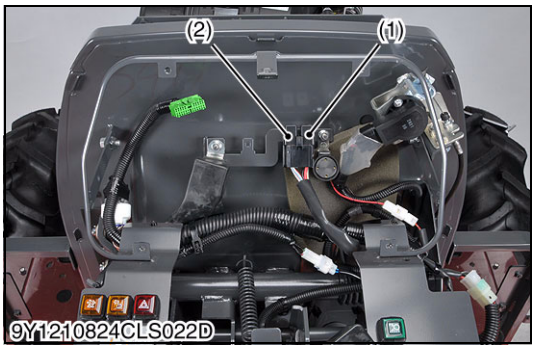
■ **IMPORTANT**

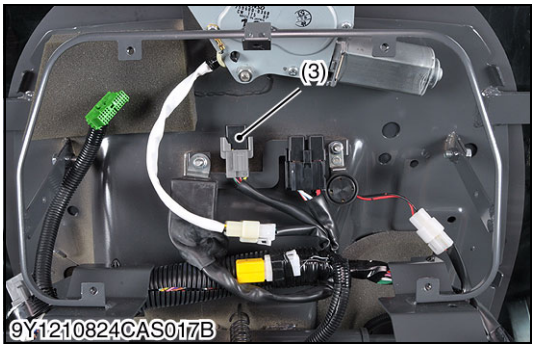
- **Testing time must be 3 to 5 sec..**

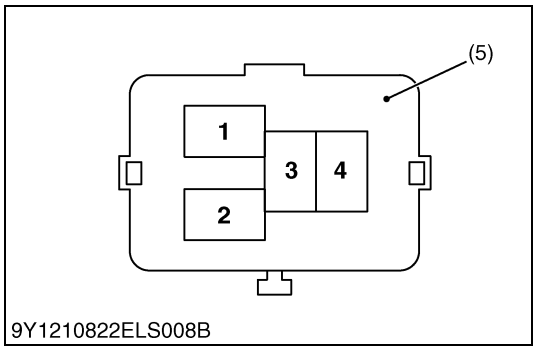
(a) To Negative Terminal **(b) To Positive Terminal**

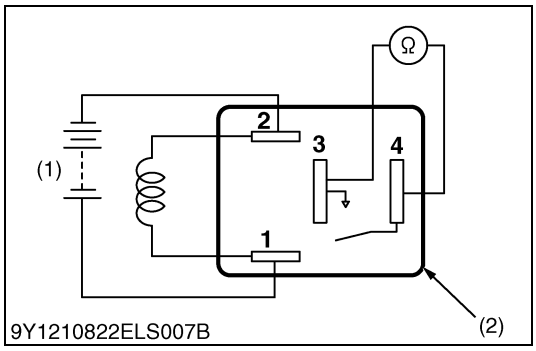
9Y1210824ELS0073US0

(5) Relays









Relays

1) Checking Connector Voltage

1. Remove the panel cover and panel.
2. Remove the relays.
3. Measure the voltage with a voltmeter across the battery terminal and chassis as table below.
4. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Terminal **4** – Chassis	Approx. battery voltage

Resistance	**3** terminal – **4** terminal	Battery voltage is applied across **1** terminal and **2** terminal	0 Ω

(1) Starter Relay
(2) Lamp Relay
(3) Compressor Relay (CABIN Type)
(4) Blower Relay (CABIN Type)
(5) Connector (Wire Harness side)

9Y1210824ELS0075US0

Functional Check

■ **NOTE**

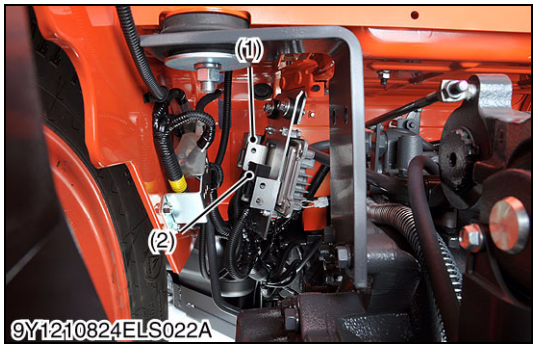
- **The relays described here are used same ones so that these are interchangeable.**

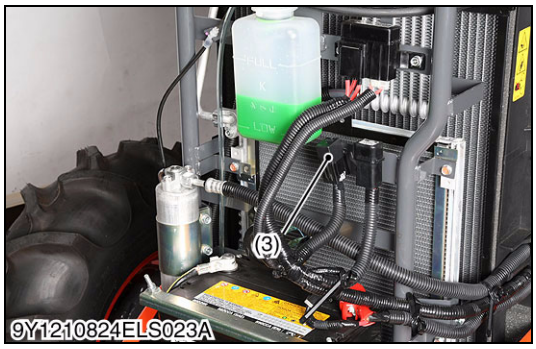
1. Apply the battery voltage across the terminal **1** and **2**, and check for continuity across the terminal **3** and **4**.
2. If continuity is not established across the terminal **3** and **4**, replace it.

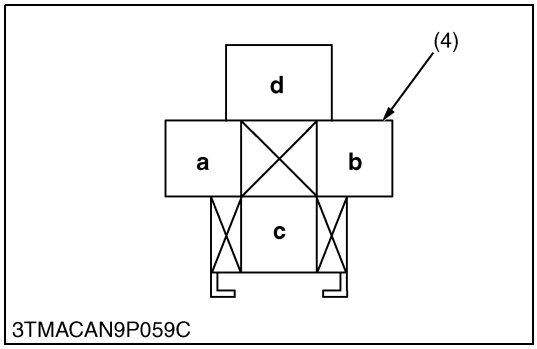
(1) Battery
(2) Connector (Relay)

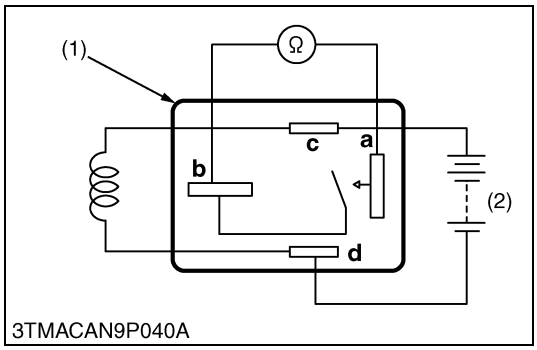
9Y1210824ELS0076US0

(6) Engine ECU Power Relay, Glow Relay and Defogger Relay









Checking Connector Voltage

1. Measure the voltage with a voltmeter across the battery terminal and chassis as table below.
2. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Terminal **d** – Chassis	Approx. battery voltage

(1) Engine ECU Relay
(2) Glow Relay
(3) Defogger Relay (CABIN Type Only)
(4) Connector (Wire Harness side)

9Y1210824ELS0077US0

Functional Check

■ **NOTE**

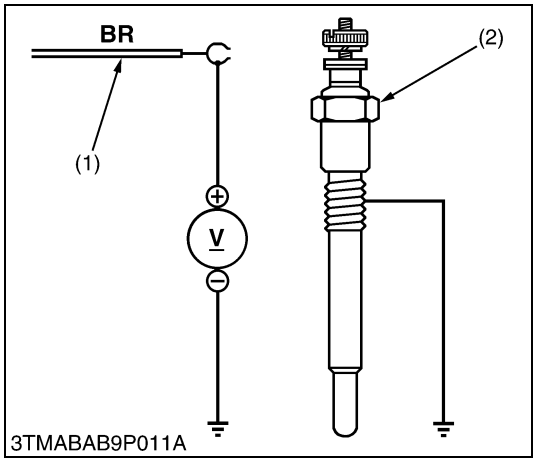
- **The relays described here are used same ones so that these are interchangeable.**

1. Apply battery voltage across the terminals **c** and **d**, and check for continuity across the terminals **a** and **b**.
2. If continuity is not established across the terminals **a** and **b**, replace it.

(1) Connector (Relay)
(2) Battery

9Y1210824ELS0078US0

(7) Glow Control System



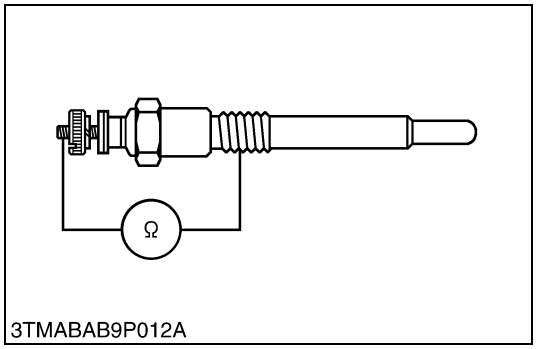
Glow Plug Lead Terminal Voltage

1. Disconnect the wiring lead (1) from the glow plug (2) after turning the main switch off.
2. Turn the main switch key to the **"PREHEAT"** position, and measure the voltage between the lead terminal and the chassis.
3. Turn the main switch key to the **"START"** position, and measure the voltage between the lead terminal and the chassis.
4. If the voltage at either position differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage (Lead terminal – Chassis	Main switch key at **"PREHEAT"**	Approx. battery voltage
	Main switch key at **"START"**	Approx. battery voltage

(1) Wiring Lead (Positive) (2) Glow Plug

9Y1210824ELS0079US0



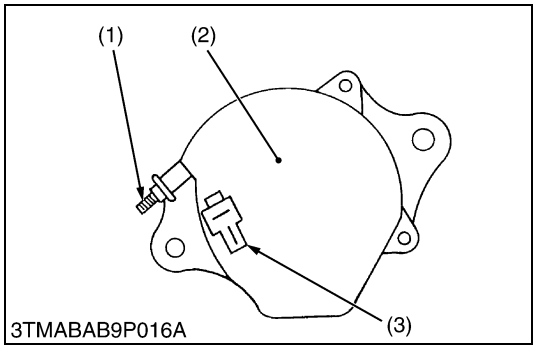
Glow Plug Continuity

1. Disconnect the lead from the glow plugs.
2. Measure the resistance between the glow plug terminal and the chassis.
3. If 0 ohm is indicated, the screw at the tip of the glow plug and the housing are short-circuited.
4. If the factory specification is not indicated, the glow plug is faulty.

Glow plug resistance	Factory specification	Approx. 0.9 Ω

9Y1210824ELS0080US0

[7] CHARGING SYSTEM

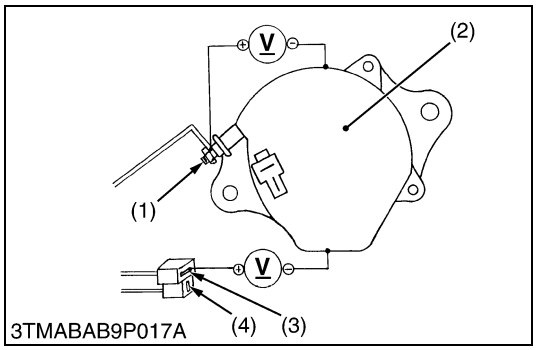


Alternator

1. Disconnect the **2P** connector (3) from alternator after turning the main switch **"OFF"**.
2. Perform the following checkings.

(1) **B** Terminal (3) **2P** Connector
(2) Alternator

9Y1210824ELS0081US0



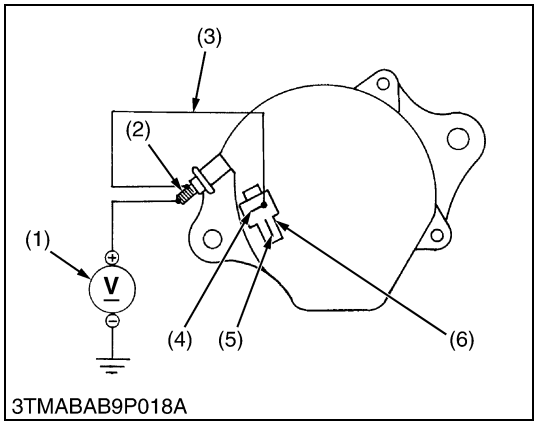
Connector Voltage

1. Turn the main switch **"OFF"**. Measure the voltage between the **B** terminal (1) and the chassis.
2. Turn the main switch **"ON"**. Measure the voltage between the **IG** terminal (3) and the chassis.

Voltage (Main switch at **OFF**)	**B** terminal – Chassis	Approx. battery voltage
Voltage (Main switch at **ON**)	**IG** terminal – Chassis	Approx. battery voltage

(1) **B** Terminal (3) **IG** Terminal
(2) Alternator (4) **L** Terminal

9Y1210824ELS0082US0



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No-Load Test

1. Connect the **2P** connector (6) to previous positions of the alternator after turning the main switch **OFF**.
2. Connect the jumper lead (3) between **IG** terminal (4) and **B** terminal (2).
3. Start the engine and then set at idling speed.
4. Disconnect the negative cable from the battery.
5. Measure the voltage between the **B** terminal (2) and the chassis.
6. If the measurement is less than the factory specifications, disassemble the alternator and check the IC regulator.

Voltage	Factory specification	More than 14 V

(Reference)

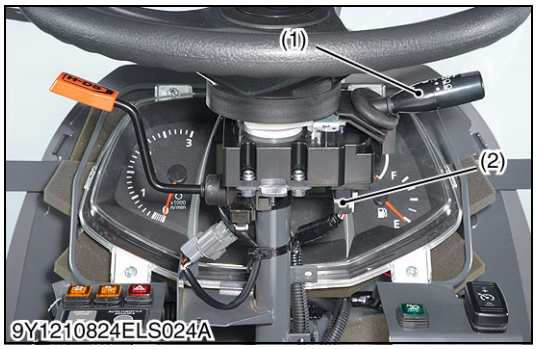
- Once the engine started, the alternator temperature increases quickly up to an ambient temperature of 70 to 90 °C (158 to 194 °F). As the temperature goes higher than 50 °C (122 °F), the alternator voltage slowly decreases; at higher than 100 °C (212 °F), it decreases by about 1 V.

(1) Voltmeter
(2) **B** Terminal
(3) Jumper Lead
(4) **IG** Terminal
(5) **L** Terminal
(6) **2P** Connector

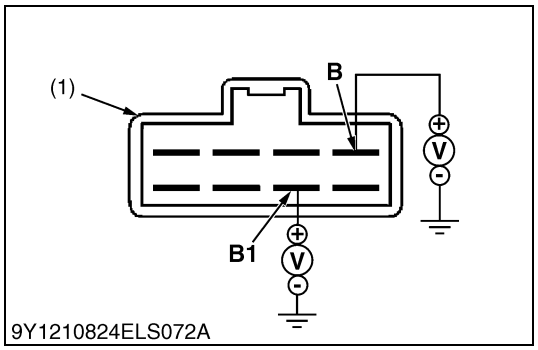
9Y1210824ELS0083US0

[8] LIGHTING SYSTEM

(1) Multi Function Combination Lever (Combination Switch)



9Y1210824ELS024A



9Y1210824ELS072A

Multi Function Combination Lever Switch

1. Remove the steering post cover 1.
2. Disconnect the multi function combination lever switch connector (2).
3. Perform the following checkings.

Voltage	Factory specification	More than 14 V

(1) Multi Function Combination Lever
(2) Multi Function Combination Lever Connector

9Y1210824ELS0084US0

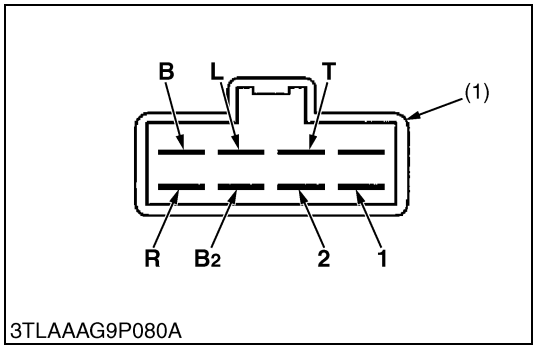
1) Connector Voltage

1. Measure the voltage across the connector **B** terminal to chassis and the **B1** terminal to chassis when the main switch is **"OFF"** position.
2. If the voltage differs from the battery voltage, the wiring harness is faulty.

Voltage	Main switch at **"OFF"** position	**B** terminal–Chassis	Battery voltage
Voltage	Main switch at **"OFF"** position	**B1** terminal–Chassis	

(1) Connector of Wire Harness Side

9Y1210824ELS0085US0



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2) Light Switch and Turn Signal Light Switch Continuity

1. Measure the resistance across seven terminal referring to the table below.

[Light Switch]

Lighting lever position	B1	T	1	2	Resistance
OFF					0 Ω
Lo	●	●	●		
Hi	●	●		●	

9Y1210824ELS054US

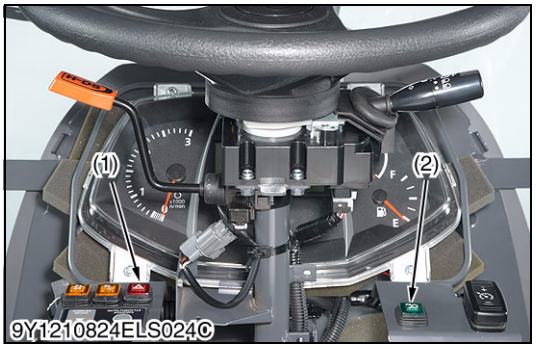
[Turn Signal Switch]

Turn signal lever position	B	L	R	Resistance
Left	●	●		0 Ω
OFF				
Right	●		●	

9Y1210824ELS055US

(1) Multi Combination Lever Switch

9Y1210824ELS0086US0

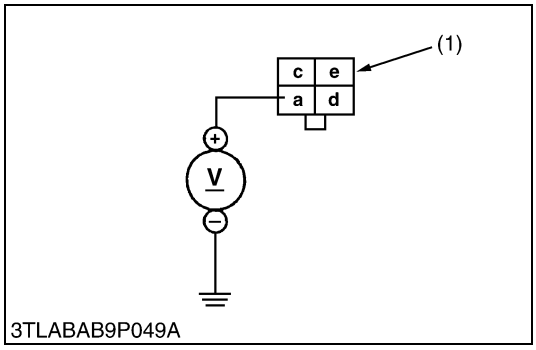


Hazard Switch and Side Work Light Switch

1. Remove the meter panel cover and disconnect the **4P** connector from switch (1) (2) after disconnect the battery negative code.
2. Remove the switch (1) (2).
3. Perform the following checking.

(1) Hazard Switch
(2) Side Work Light Switch

9Y1210824ELS0087US0



3TLABAB9P049A

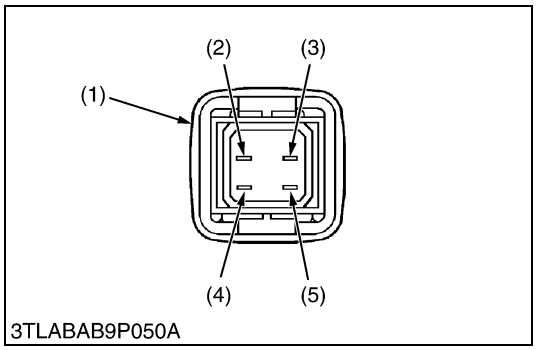
1) Connector Voltage

1. Connect the battery negative code, then measure the voltage across the terminal **a** and chassis.
2. If the voltage differ from the battery voltage, the wiring harness is faulty.

Voltage	Terminal **a** – Chassis	Approx. battery voltage

(1) Connector of Wire Harness Side

9Y1210824ELS0088US0



3TLABAB9P050A

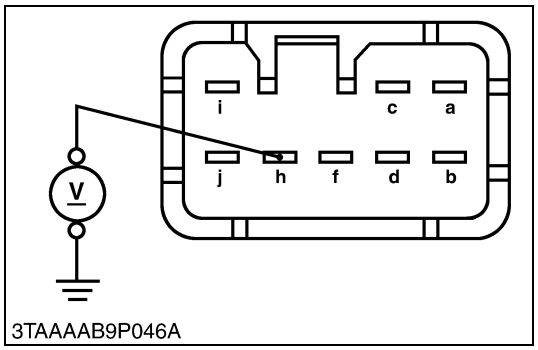
2) Switch Continuity

1. Measure the resistance with ohmmeter across the terminal **a** and terminal **c**, and across the terminal **d** and terminal **e**.
2. If the measurement is not following below, the hazard switch or the bulb are faulty.

Resistance (Switch at **OFF**)	Terminal **a** – Terminal **c**	Infinity
Resistance (Switch at **ON**)	Terminal **a** – Terminal **c**	0 Ω
Resistance (Bulb)	Terminal **d** – Terminal **e**	Approx. 13 Ω

(1) Hazard Switch Connector
(2) Terminal **a**
(3) Terminal **d**
(4) Terminal **c**
(5) Terminal **e**

9Y1210824ELS0089US0



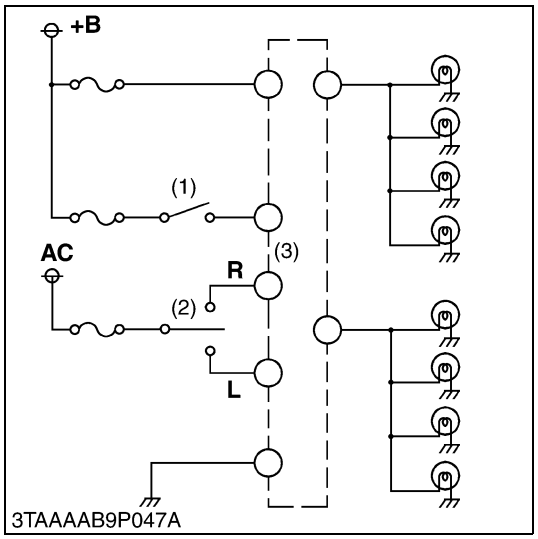
Flasher Unit Connector Voltage

1. Remove the instrument panel.
2. Disconnect the connector from the flasher unit (1).
3. Measure the voltage with a voltmeter across the h terminal and chassis.
4. If the voltage differ from the battery voltage, the wiring harness is faulty.

(1) Flasher Unit

a : Frame Earth
b : Hazard Input
c : Vacant
d : Turn Signal (Left) Input
f : Turn Signal (Right) Output
h : Battery
i : Turn Signal (Left) Output
j : Turn Signal (Right) Input

9Y1210824ELS0090US0



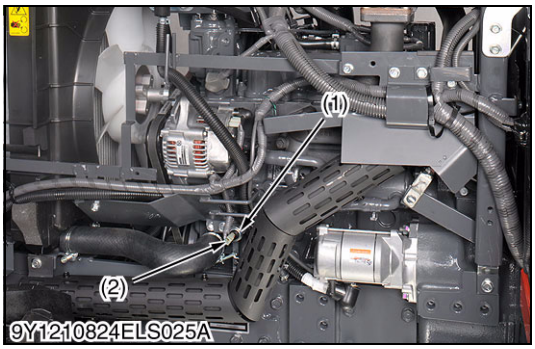
Flasher Unit Actuation Test

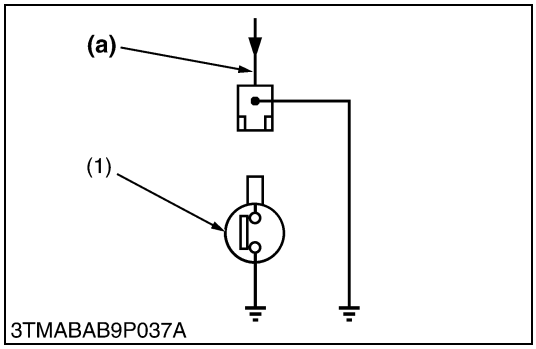
1. Set the hazard switch to the **"ON"** position, and make sure the hazard light gives 60 to 85 flashes for a minute.
2. With the main switch and the hazard switch at the **"ON"** positions, respectively, move the turn signal switch to the left. Make sure that the right-hand light stays on and the left-hand light gives flashes earlier (by about 20 flashes) than when the hazard lamp is activated. Then move the turn signal switch to the right and make sure the corresponding actions take place.
3. Now set the main switch to the **"ON"** position and move the turn signal switch alone. Make sure the same actions as above result.
4. If both the hazard switch and the turn signal switch function but the above actions do not take place, replace the flasher unit with new one.

(1) Hazard Switch
(2) Turn Signal Switch
(3) Flasher Unit

9Y1210824ELS0091US0

[9] WARNING LAMPS



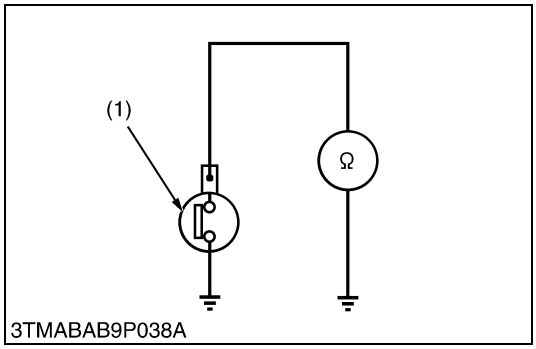


Engine Oil Pressure Switch, Panel Board and Wiring Harness

1. Disconnect the lead (2) from the engine oil pressure switch after turning the main switch **"OFF"**.
2. Turn the main switch **"ON"** and connect a jumper lead from the lead to the chassis.
3. If the engine oil pressure indicator lamp does not light, the panel circuit or the wiring harness is faulty.

(1) Engine Oil Pressure Switch
(2) Switch Lead
(a) From Oil Pressure Lamp

9Y1210824ELS0092US0



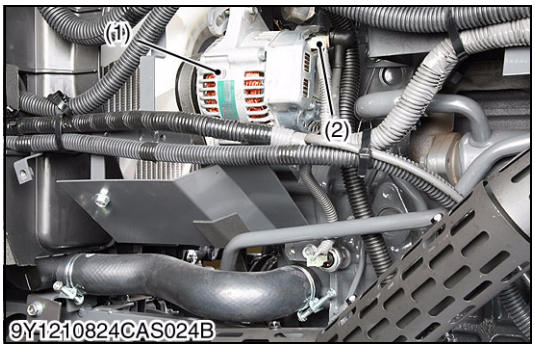
Engine Oil Pressure Switch Continuity

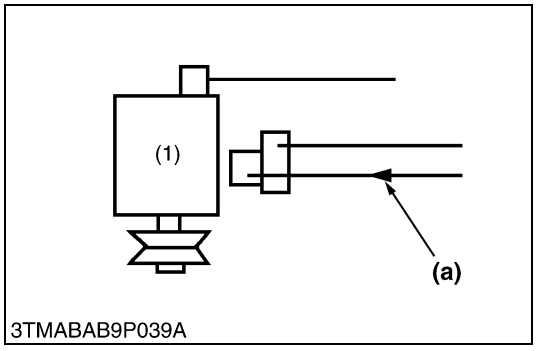
1. Measure the resistance across the switch terminal and the chassis.
2. If 0 ohm is not indicated in the normal state, the switch is faulty.
3. If infinity is not indicated at pressure over 50 kPa (0.5 kgf/cm^2, 7 psi), the switch is faulty.

Resistance (Switch terminal – Chassis)	In normal state	0 Ω
	At pressure over approx. 50 kPa (0.5 kgf/cm^2, 7 psi)	Infinity

(1) Engine Oil Pressure Switch

9Y1210824ELS0093US0





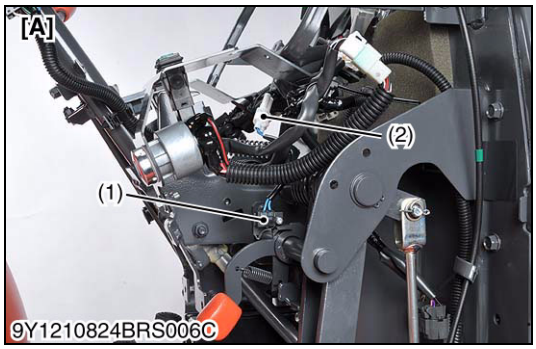
Charging Circuit (Panel Board and Wiring Harness)

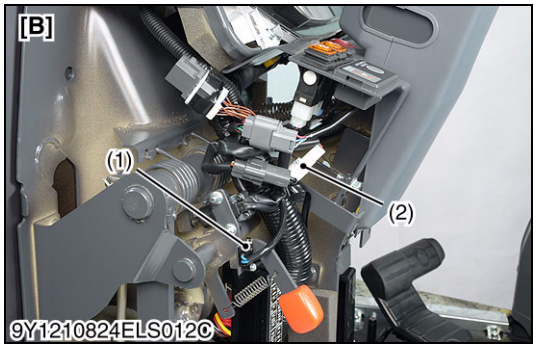
1. Disconnect the **2P** connector (2) from the alternator after turning the main switch **"OFF"**.
2. Turn the main switch **"ON"** and connect a jumper lead from the wiring harness connector terminal (**WR**) to the chassis.
3. If the charge lamp does not light, the panel board circuit, alternator, wiring harness, or fuse is fault.

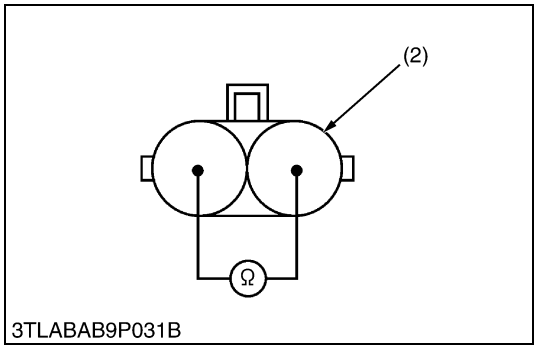
(1) Alternator
(2) **2P** Connector
(a) From Charge Lamp

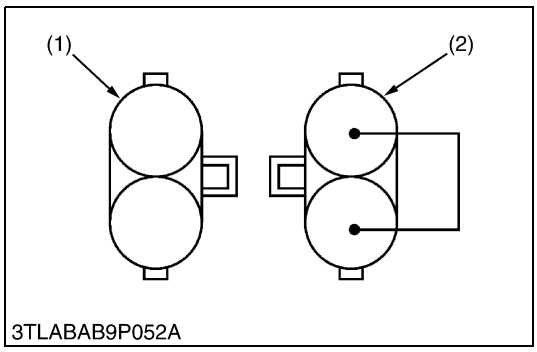
9Y1210824ELS0094US0

[10] MONITOR LAMP









Parking Brake Switch Continuity

1. Disconnect the connector from the parking brake switch (1) after turning the main switch **"OFF"**.
2. Measure the resistance across the two terminals.
3. If infinity is not indicated, the switch is faulty.

Resistance (Across switch terminals)	In normal state	Infinity

(1) Parking Brake Switch
(2) Connector of Parking Brake Switch
[A] Manual Transmission / GST
[B[HST

9Y1210824ELS0095US0

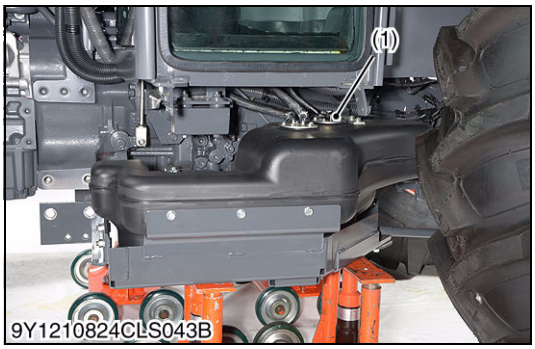
Parking Brake Switch and Wiring Harness

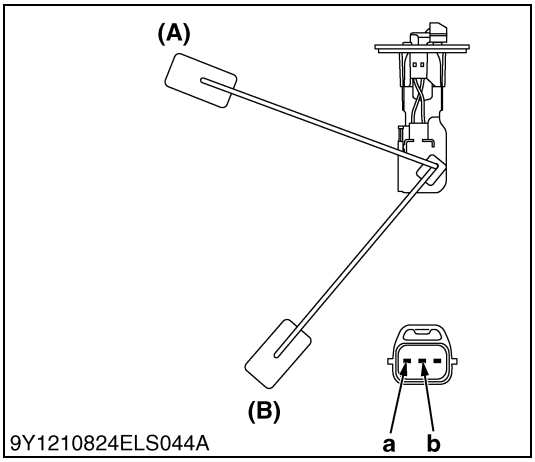
1. Disconnect the connector from the parking brake switch after turning the main switch **"OFF"**.
2. Turn the main switch **"ON"** and connect a jumper lead between the connector terminals of wiring harness.
3. If the parking brake indicator lamp does not light, the panel circuit or wiring harness is faulty.

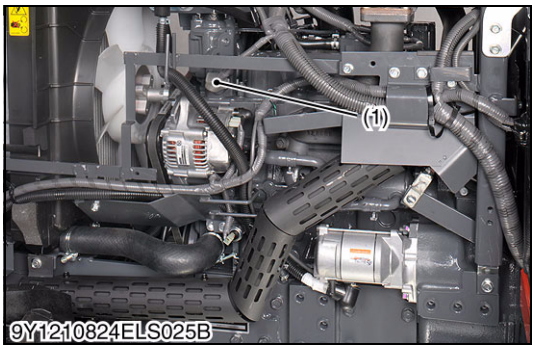
(1) Connector of Parking Brake Switch (2) Connector of Wiring Harness

9Y1210824ELS0096US0

[11] GAUGES







Checking Fuel Level Sensor

1. Remove the fuel level sensor from the fuel tank.
2. Measure the resistance with an ohmmeter across the terminal **a** and terminal **b**.
3. If the measurement is not indicated, the sensor is faulty.

Resistance (Sensor terminal **a** – terminal **b**)	Factory specification	Float at uppermost position	3.0 to 5.0 Ω
		Float at lowermost position	107.5 to 112.5 Ω

(1) Fuel Unit

(A) Float at Uppermost Position
(B) Float at Lowermost Position
a: Terminal 1
b: Terminal 2

9Y1210824ELS0097US0

Coolant Temperature Sensor Continuity

1. Measure the resistance across the sensor terminal and the chassis.
2. If the measurement is not indicated, the sensor is faulty.

		Temperature	Resistance
Resistance (sensor Terminal **1** – Terminal **2**)	Reference value	−20 °C (−4 °F)	13.54 to 16.63 kΩ
		20 °C (68 °F)	2.28 to 2.63 kΩ
		80 °C (176 °F)	0.30 to 0.33 kΩ
		100 °C (212 °F)	0.1836 kΩ
		120 °C (248 °F)	0.1108 kΩ

(1) Coolant Temperature Sensor

9Y1210824ELS0098US0

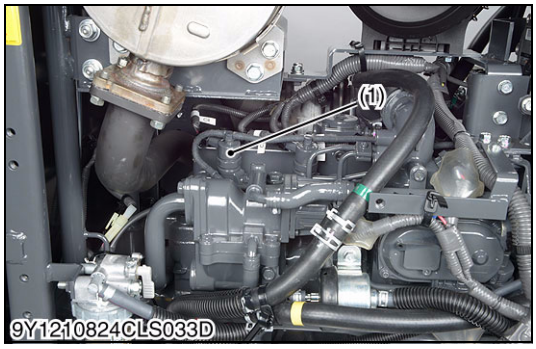
[12] ENGINE CONTROL SYSTEM

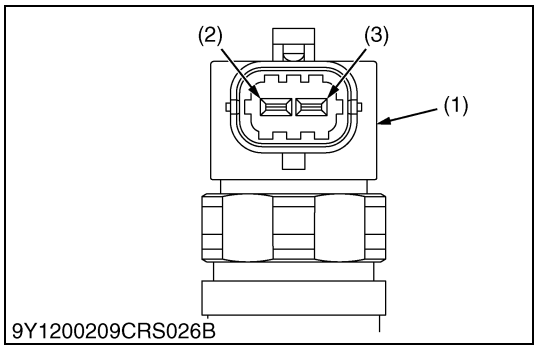
(1) Injector

■ **IMPORTANT**

- **When replacing the engine ECU, be sure to do injector correction. (Refer to the "DIAGNOSIS MANUAL" (9Y120-02420)**

9Y1210824ELS0099US0





Injector Resistance

1. Measure the resistance with an ohmmeter across the terminals shown in the table below.
2. If the reference value is not indicated, the injector wire harness or injector is faulty.

Resistance	Terminal **1** – **2**	0.215 to 0.295 Ω

(1) Injector
(2) Terminal **1**
(3) Terminal **2**

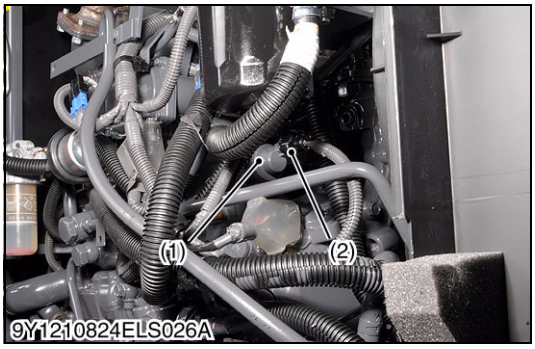
9Y1210824ELS0100US0

(2) SCV (Suction Control Valve)

■ **NOTE**

- **Firstly check the connector voltage, secondly check the other wires continuity, then finally check the SCV resistance.**

9Y1210824ELS0101US0



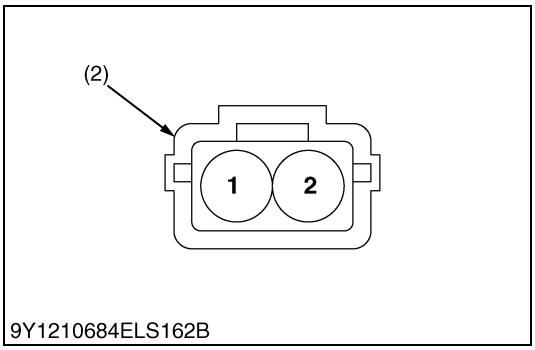
Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **2** – chassis	Approx. battery voltage

(1) SCV (Suction Control Valve) (2) Connector (Harness Side)

9Y1210824ELS0102US0



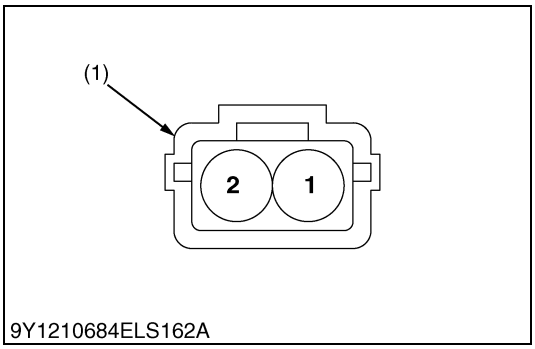
SCV Resistance

1. Measure the resistance with an ohmmeter across the terminals shown in the table below.
2. If the reference value is not indicated, the SCV is faulty.

Resistance	at 20 °C (68 °F)	Terminal **1** – **2**	2.60 to 3.15 Ω

(1) Connector (SCV Side)

9Y1210824ELS0103US0

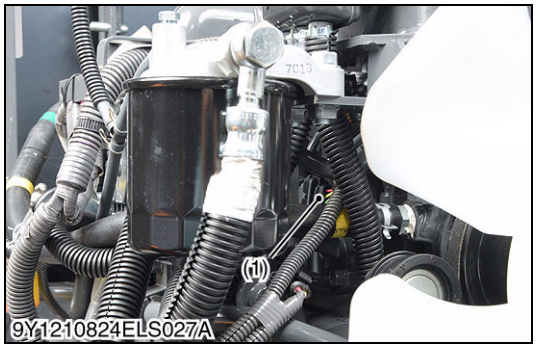


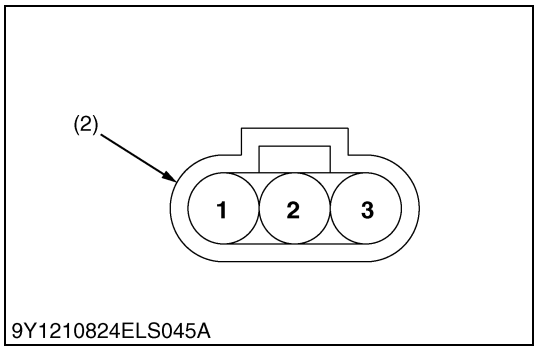
(3) Rail Pressure Sensor

■ **NOTE**

- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0104US0





Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **3** – chassis	Approx. 5 V

(1) Rail Pressure Sensor (2) Connector (Harness Side)

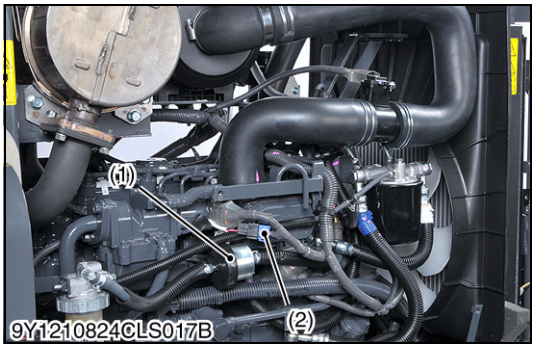
9Y1210824ELS0105US0

(4) Fuel Pump

■ **NOTE**

- **Firstly check the connector voltage, secondly check the other wires continuity, then finally check the pump resistance.**

9Y1210824ELS0106US0



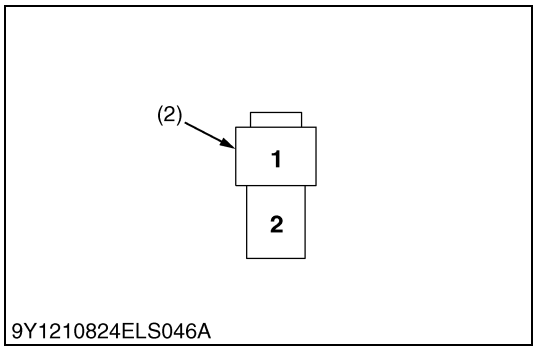
Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. battery voltage

(1) Fuel Pump (2) Connector (Harness Side)

9Y1210824ELS0107US0

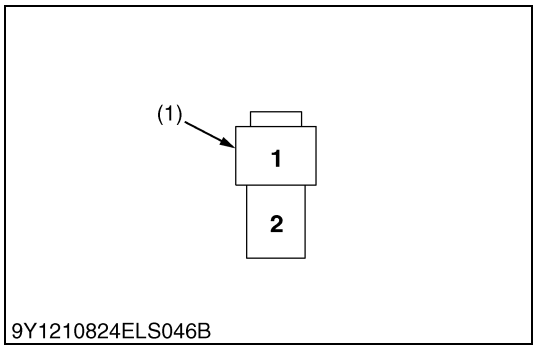


Pump Actuation Test

1. Connect a jumper lead from the terminal **1** to the battery positive terminal post.
2. Connect a jumper lead from the terminal **2** to the battery negative terminal post.
3. If the pump does not work, pump is faulty.

(1) Connector (Pump Side)

9Y1210824ELS0108US0

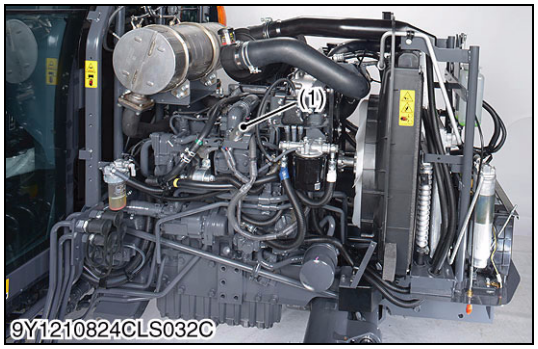


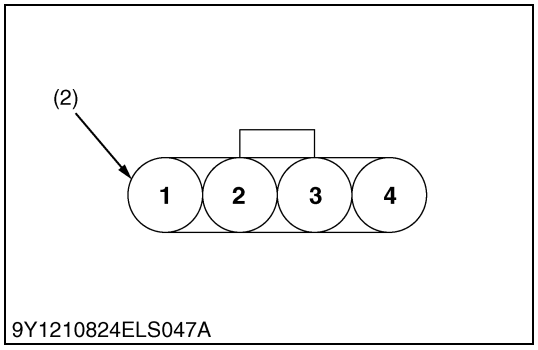
(5) Boost Sensor (If Equipped)

■ **NOTE**

- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0109US0





Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **3** – chassis	Approx. 5 V

(1) Boost Sensor (2) Connector (Harness Side)

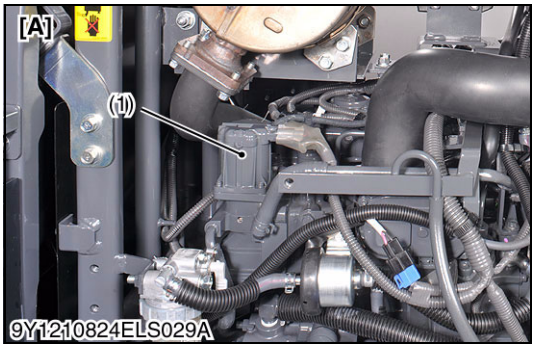
9Y1210824ELS0110US0

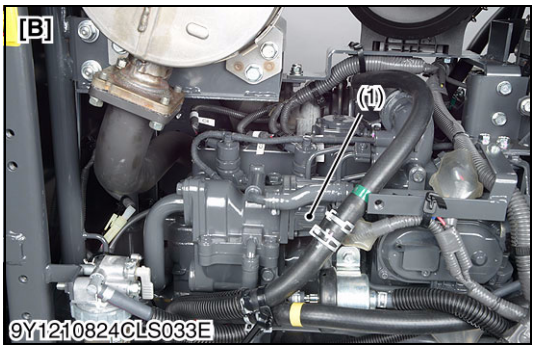
(6) EGR Valve

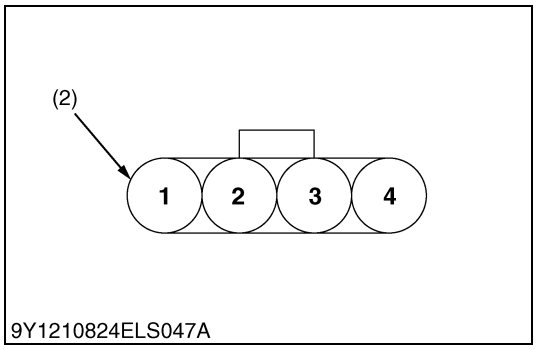
■ **NOTE**

- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0111US0







Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. battery voltage

(1) EGR Valve
(2) Connector (Harness Side)

[A] L3560
[B] except L3560

9Y1210824ELS0112US0

(7) Crankshaft Position Sensor

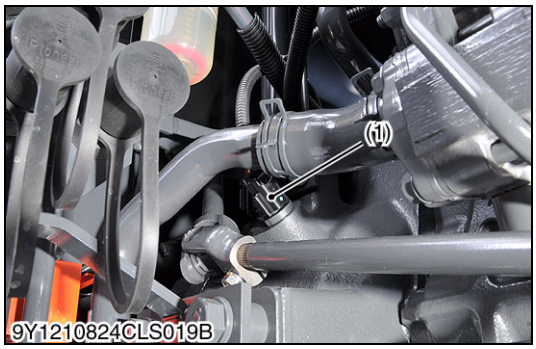
■ **IMPORTANT**

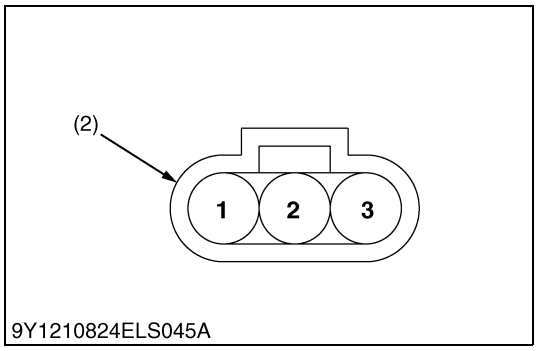
- **When replacing the crankshaft position sensor, be sure to do crankshaft position sensor correction. (See page 1-S71 to 1-S73.)**

■ **NOTE**

- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0113US0





Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. 5 V

(1) Crankshaft Position Sensor (2) Connector (Harness Side)

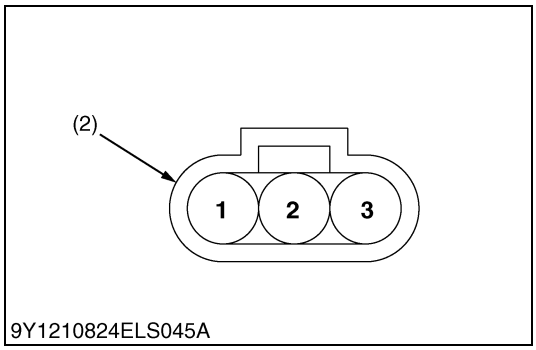
9Y1210824ELS0114US0

(8) Camshaft Position Sensor

■ **NOTE**

- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0115US0



Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **3** – chassis	Approx. battery voltage

(1) Camshaft Position Sensor (2) Connector (Harness Side)

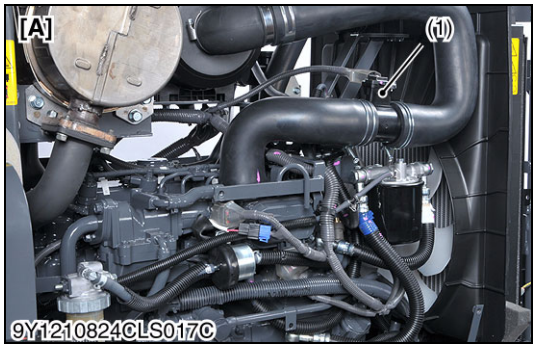
9Y1210824ELS0116US0

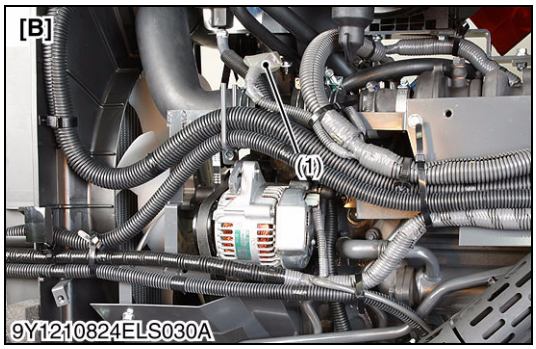
(9) Air Flow Sensor

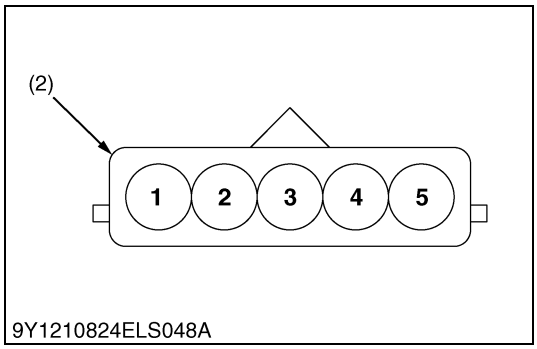
■ **NOTE**

- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0117US0







Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. battery voltage

(1) Air Flow Sensor
(2) Connector (Harness Side)

[A] L3560, L4060 and L4760
[B] L5060, L5460 and L6060

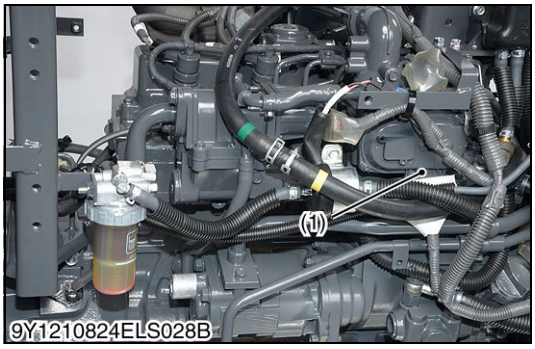
9Y1210824ELS0118US0

(10) Intake Throttle Valve

■ **NOTE**

- **Firstly check the connector voltage, secondly check the other wires continuity, then finally check the sensor resistance.**

9Y1210824ELS0119US0



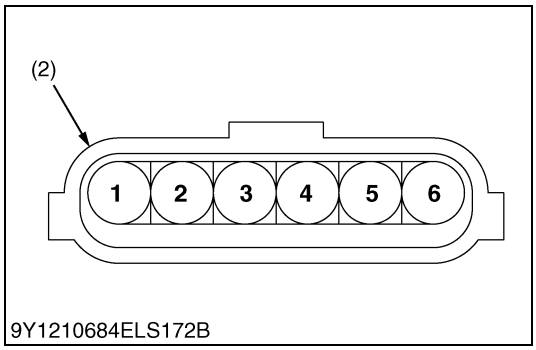
Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **3** – chassis	Approx. battery voltage

(1) Intake Throttle Valve (2) Connector (Harness Side)

9Y1210824ELS0120US0



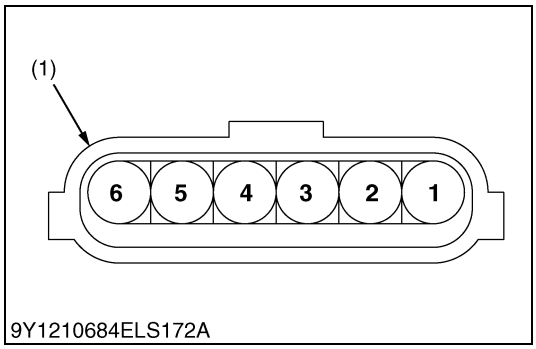
Motor Resistance

1. Disconnect the throttle valve connector.
2. Measure the resistance with an ohmmeter across the terminal **5** and **6**.
3. If the reference value is not indicated as shown in the table below, DC motor is faulty.

Resistance	Terminal **5** – **6**	Approx. 12 Ω

(1) Connector (Sensor Side)

9Y1210824ELS0121US0

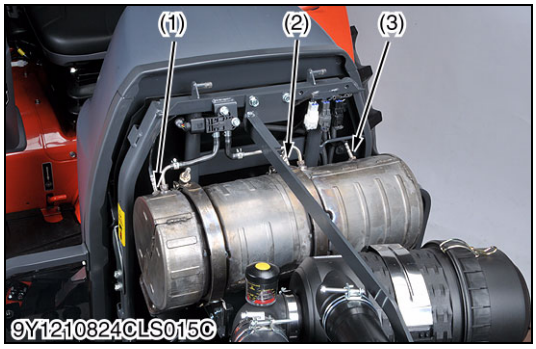


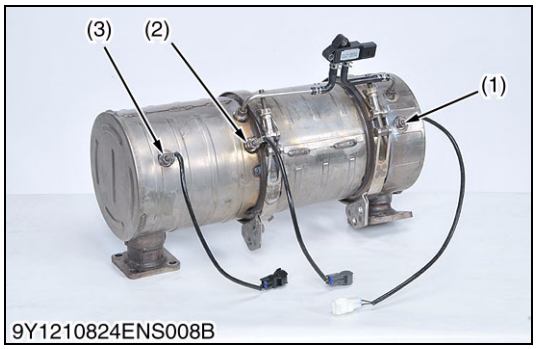
(11) Exhaust Temperature Sensor

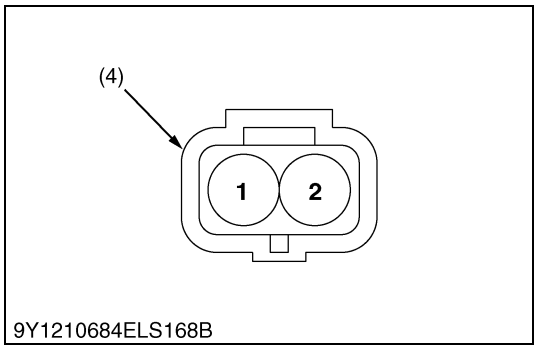
■ **NOTE**

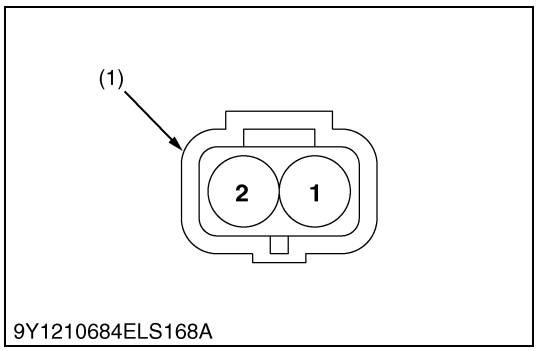
- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0122US0









Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. 5 V

(1) Exhaust Temperature Sensor T0
(2) Exhaust Temperature Sensor T1
(3) Exhaust Temperature Sensor T2
(4) Connector (Harness Side)

9Y1210824ELS0123US0

Sensor Resistance (for Reference)

1. Measure the resistance with an ohmmeter across the terminals shown in the table below.
2. If the reference value is not indicated, the exhaust temperature sensor is faulty.

Resistance	at 100 °C (212 °F)	Approx. 18.3 kΩ
	at 150 °C (302 °F)	Approx. 7.88 kΩ
	at 200 °C (392 °F)	Approx. 4.00 kΩ
	at 250 °C (482 °F)	Approx. 2.30 kΩ
	at 650 °C (1202 °F)	Approx. 0.16 kΩ

(1) Connector (Sensor Side)

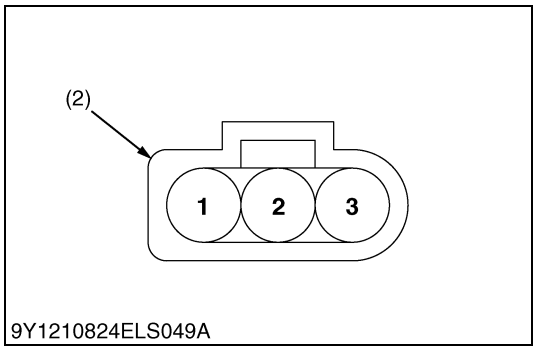
9Y1210824ELS0124US0

(12) Differential Pressure Sensor

■ **NOTE**

- **Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.**

9Y1210824ELS0125US0



Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. 5 V

(1) Differential Pressure Sensor (2) Connector (Harness Side)

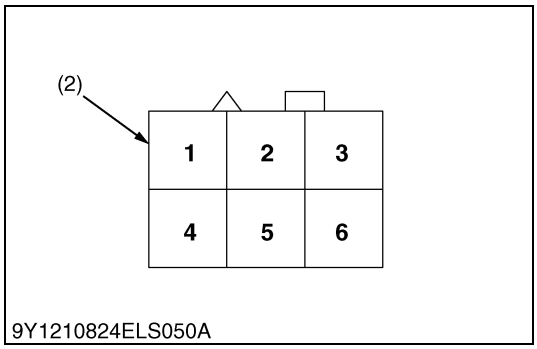
9Y1210824ELS0126US0

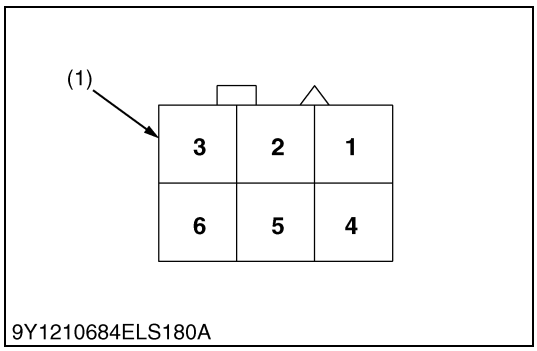
(13) Parked Regeneration Switch

■ **NOTE**

- **Firstly check the connector voltage, secondly check the other wires continuity, then finally check the switch continuity.**

9Y1210824ELS0127US0





Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. battery voltage
		Terminal **3** – chassis	

(1) Parked Regeneration Switch (2) Connector (Harness Side)

9Y1210824ELS0128US0

Switch Continuity

1. Check the continuity across the terminals shown in the table below.
2. If the continuity specified below is not indicated, the parked regeneration switch is faulty.

Continuity Check	Terminal **1** – **4**	Continuity
	Terminal **3** – **6**	

(1) Connector (Switch Side)

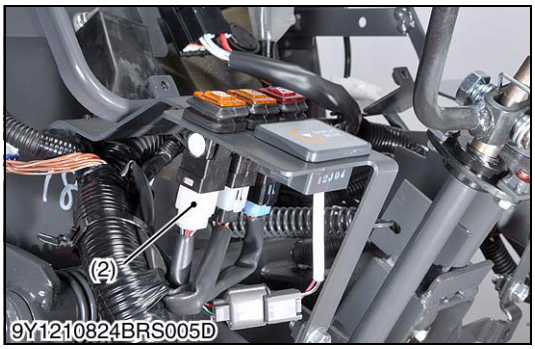
9Y1210824ELS0129US0

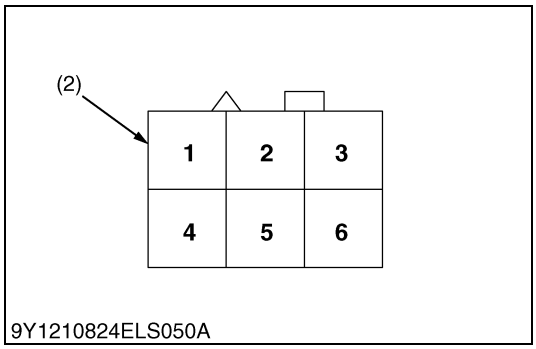
(14) Auto Regeneration Switch

■ **NOTE**

- **Firstly check the connector voltage, secondly check the other wires continuity, then finally check the switch continuity.**

9Y1210824ELS0130US0





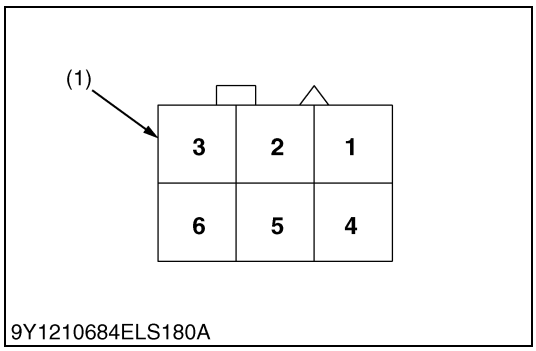
Connector Voltage

1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at **"ON"**	Terminal **1** – chassis	Approx. battery voltage
		Terminal **3** – chassis	

(1) Parked Regeneration Switch (2) Connector (Harness Side)

9Y1210824ELS0131US0



Switch Continuity

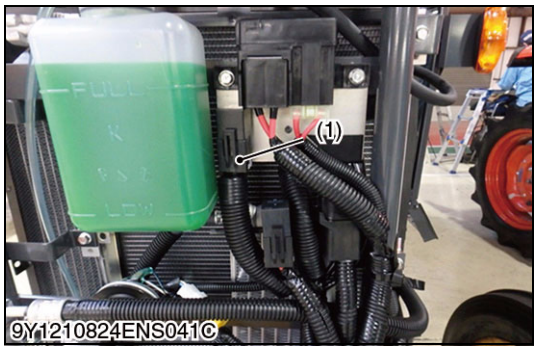
1. Check the continuity across the terminals shown in the table below.
2. If the continuity specified below is not indicated, the auto regeneration switch is faulty.

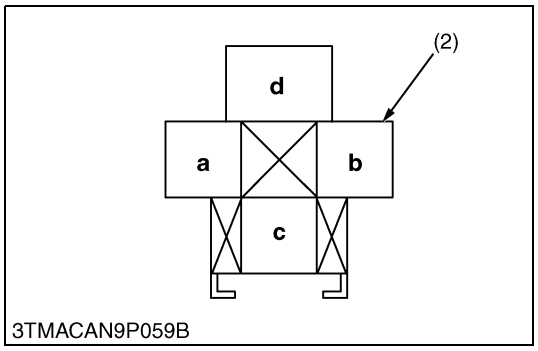
Continuity Check	Terminal **1** – **4**	Continuity
	Terminal **3** – **6**	

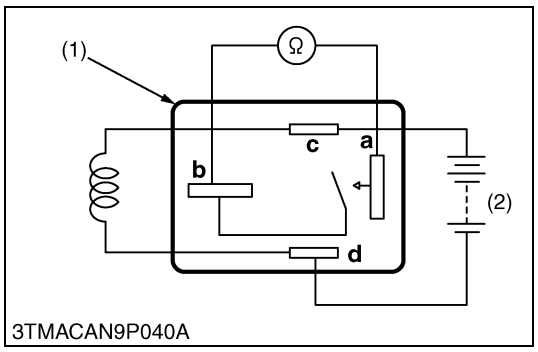
(1) Connector (Switch Side)

9Y1210824ELS0132US0

[13] CCV HEATER
(1) CCV Relay







Checking Connector Voltage

1. Measure the voltage with a voltmeter across the battery terminal and chassis as table below.
2. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Terminal **d** – Chassis	Approx. battery voltage

(1) CCV Relay (2) Connector (Wire Harness side)

9Y1210824ELS0166US0

Functional Check

■ **NOTE**

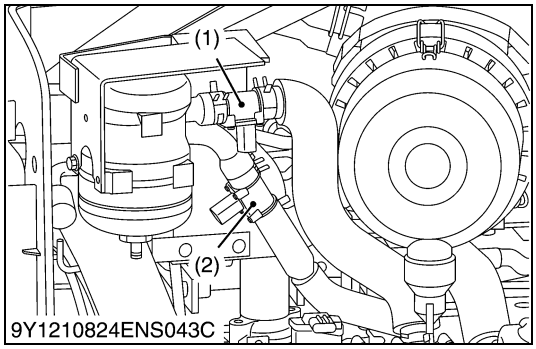
- **The relays described here are used same ones so that these are interchangeable.**

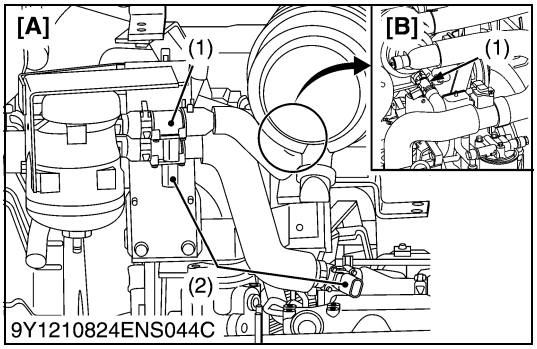
1. Apply battery voltage across the terminals **c** and **d**, and check for continuity across the terminals **a** and **b**.
2. If continuity is not established across the terminals **a** and **b**, replace it.

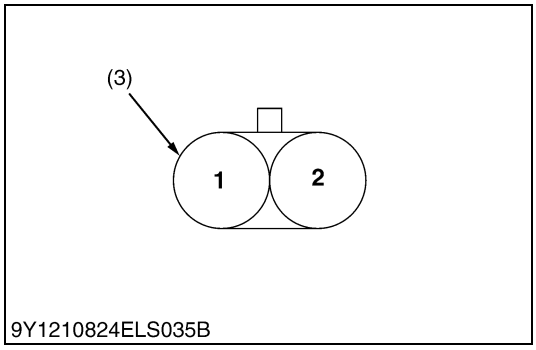
(1) Connector (Relay) (2) Battery

9Y1210824ELS0078US0

(2) CCV Heater







Heater Resistance (for Reference)

1. Check the resistance between terminal **1** and **2**.
2. If the reference value is not indicated, the heater is faulty.

Resistance	at 25 °C (77 °F)	1.8 - 2.5 Ω

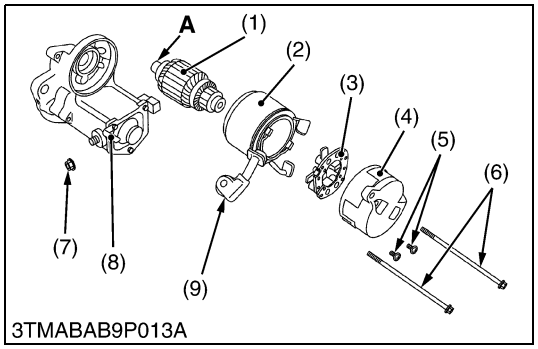
(1) CCV Heater (OUT)
(2) CCV Heater (IN)
(3) Connector of Switch Side

[A] Left Side
[B] Right Side

9Y1210824ELS0167US0

5. DISASSEMBLING AND ASSEMBLING

[1] STARTER



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Disassembling Motor

1. Disconnect the connecting lead (9) from the magnet switch (8).
2. Remove the screws (6), and then separate the end frame (4), yoke (2) and armature (1).
3. Remove the two screws (5).
4. Remove the brush holder (3) from the end frame (4).

(When reassembling)

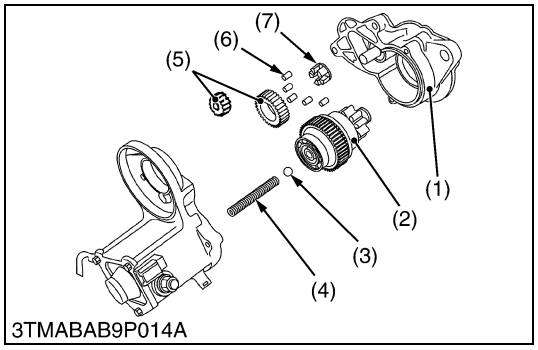
- Apply grease to the spline teeth **"A"** of the armature (1).

Tightening torque	Nut (7)	5.9 to 11 N·m 0.60 to 1.2 kgf·m 4.4 to 8.6 lbf·ft

(1) Armature
(2) Yoke
(3) Brush Holder
(4) End Frame
(5) Screw
(6) Screw
(7) Nut
(8) Magnet Switch
(9) Connecting Lead

A: Spline Teeth

9Y1210824ELS0133US0



3TMABAB9P014A

Disassembling Magnet Switch

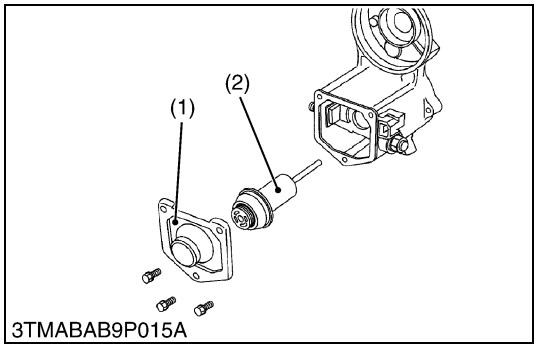
1. Remove the drive end frame (1) mounting screws.
2. Remove the overrunning clutch (2), ball (3), spring (4), gears (5), rollers (6) and retainer (7).

(When reassembling)

- Apply grease to the gear teeth of the gears (5) and overrunning clutch (2), and ball (3).

(1) Drive End Frame
(2) Overrunning Clutch
(3) Ball
(4) Spring
(5) Gear
(6) Roller
(7) Retainer

9Y1210824ELS0134US0



3TMABAB9P015A

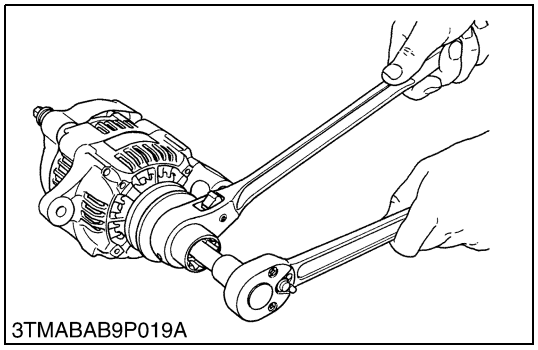
Plunger

1. Remove the end cover (1).
2. Remove the plunger (2).

(1) End Cover
(2) Plunger

9Y1210824ELS0135US0

[2] ALTERNATOR


3TMABAB9P019A

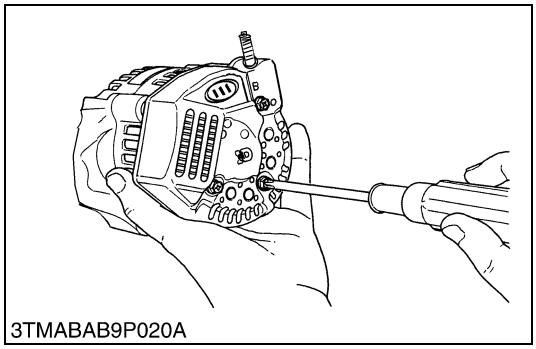
Pulley

1. Secure the hexagonal end of the pulley shaft with a double-ended ratchet wrench as shown in the figure.
2. Loosen the pulley nut with a socket wrench and remove it.

(When reassembling)

Tightening torque	Pulley nut	58.4 to 78.9 N·m 5.95 to 8.05 kgf·m 43.1 to 58.2 lbf·ft

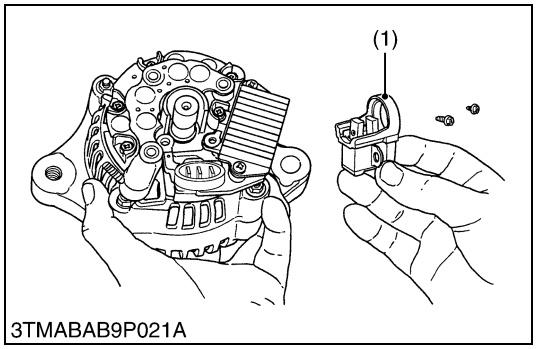
9Y1210824ELS0136US0


3TMABAB9P020A

Rear End Cover

1. Remove the three rear end cover screws and the **B** terminal nut, and remove the rear end cover.

9Y1210824ELS0137US0



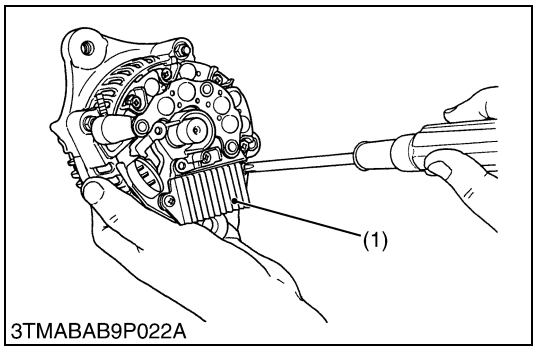
3TMABAB9P021A

Brush Holder

1. Remove the two screws holding the brush holder, and remove the brush holder (1).

(1) Brush Holder

9Y1210824ELS0138US0



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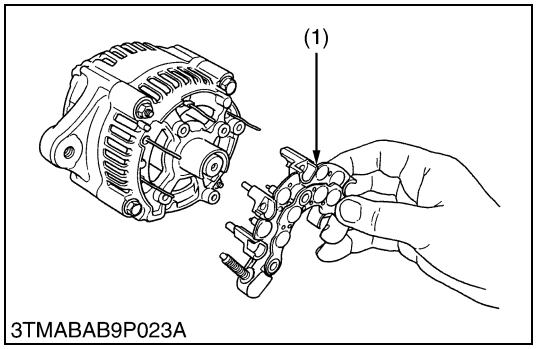
IC Regulator

1. Remove the three screws holding the IC regulator, and remove the IC regulator (1).

(1) IC Regulator

9Y1210824ELS0139US0



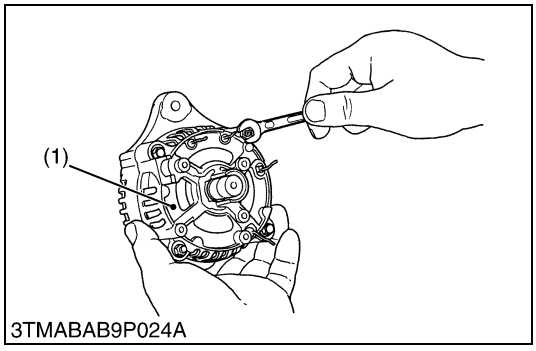
3TMABAB9P023A

Rectifier

1. Remove the four screws holding the rectifier and the stator lead wires.
2. Remove the rectifier (1).

(1) Rectifier

9Y1210824ELS0140US0



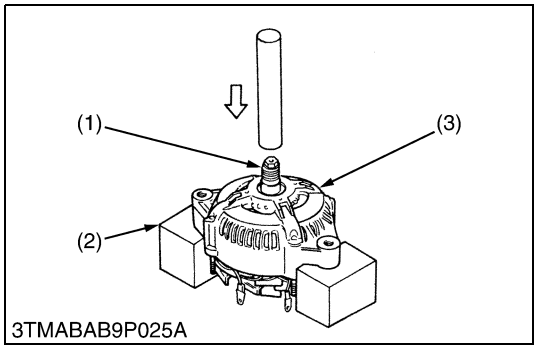
3TMABAB9P024A

Rear End Frame

1. Remove the two nuts and two screws holding the drive end frame and the rear end frame.
2. Remove the rear end frame (1).

(1) Rear End Frame

9Y1210824ELS0141US0



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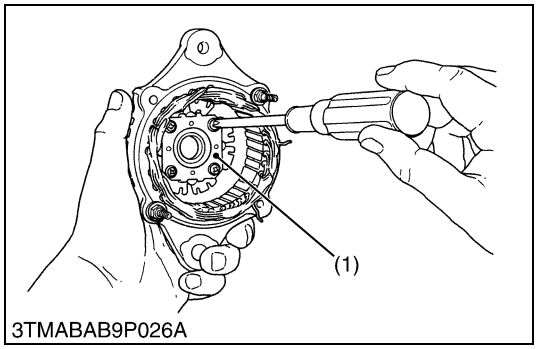
Rotor

1. Press out the rotor (1) from drive end frame (3).

■ **IMPORTANT**
- **Be very careful not to drop the rotor and damage the slip ring or fan, etc..**

(1) Rotor
(2) Block
(3) Drive End Frame

9Y1210824ELS0154US0



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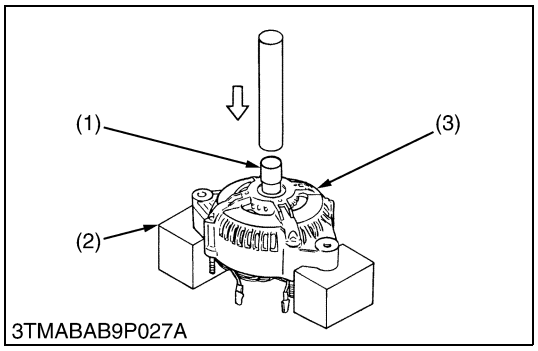
Retainer Plate

1. Remove the four screws holding the retainer plate, and remove the retainer plate (1).

(1) Retainer Plate

9Y1210824ELS0155US0



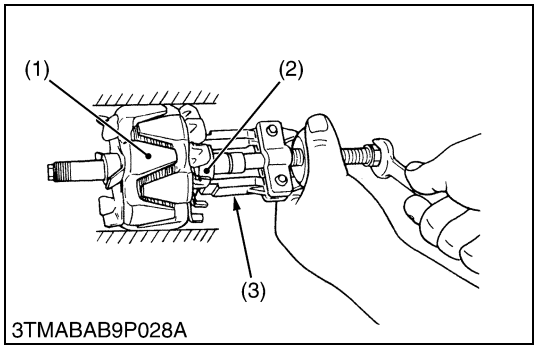
3TMABAB9P027A

Bearing on Drive End Side

1. Press out the bearing from drive end frame (3) with a press and jig (1).

(1) Jig
(2) Block
(3) Drive End Frame

9Y1210824ELS0156US0



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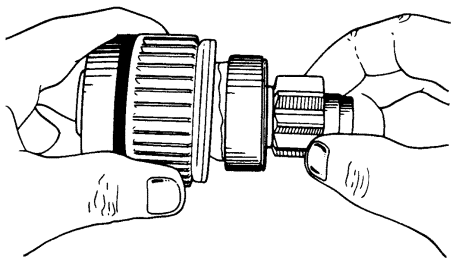
Bearing at Slip Ring Side

1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

(1) Rotor
(2) Bearing
(3) Puller

9Y1210824ELS0157US0

6. SERVICING
[1] STARTER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Overrunning Clutch

1. Inspect the pinion for wear or damage.
2. If there is any problem, replace the overrunning clutch assembly.
3. Check that the pinion turns freely and smoothly in the overrunning direction and does not slip in the cranking direction.
4. If the pinion slips or does not rotate in the both directions, replace the overrunning clutch assembly.

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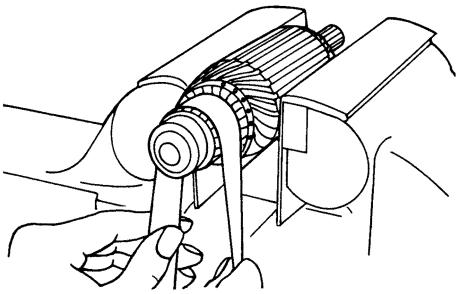
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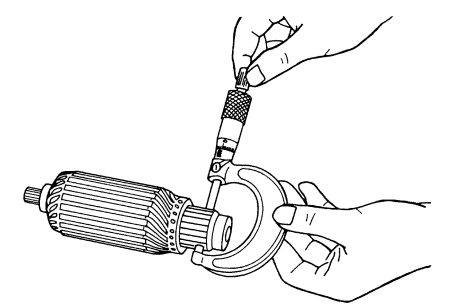
Commutator and Mica

1. Check the contact face of the commutator for wear, and grind the commutator with emery paper if it is slightly worn.
2. Measure the commutator O.D. with an outside micrometer at several points.
3. If the minimum O.D. is less than the allowable limit, replace the armature.
4. If the difference of the O.D.'s exceeds the allowable limit, correct the commutator on a lathe to the factory specification.
5. Measure the mica undercut.
6. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.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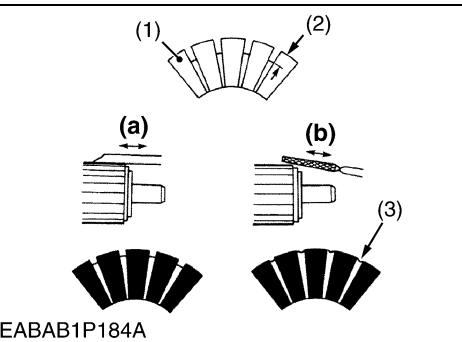
Commutator O.D.	Factory specification	30.0 mm 1.181 in.
	Allowable limit	29.0 mm 1.142 in.

Difference of O.D.'s	Factory specification	Less than 0.02 mm 0.0008 in.
	Allowable limit	0.05 mm 0.0020 in.

Mica undercut	Factory specification	0.50 to 0.80 mm 0.020 to 0.031 in.
	Allowable limit	0.2 mm 0.008 in.



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(1) Segment
(2) Undercut
(3) Mica
(a) Correct
(b) Incorrect

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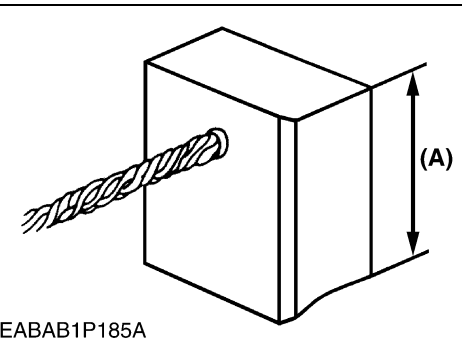

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Brush Wear

1. If the contact face of the brush is dirty or dusty, clean it with emery paper.
2. Measure the brush length **(A)** with vernier calipers.
3. If the length is less than the allowable limit, replace the yoke assembly and brush holder.

Brush length **(A)**	Factory specification	15.0 mm 0.591 in.
	Allowable limit	11.0 mm 0.433 in.

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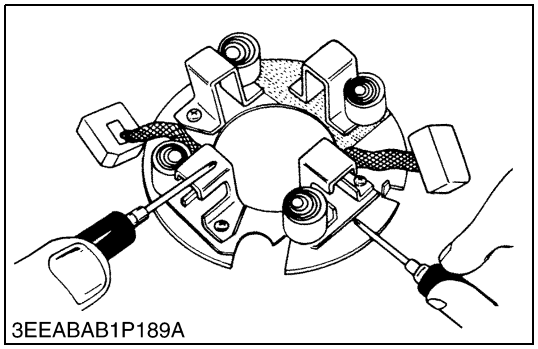
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Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

Resistance	Brush holder – Holder support	Infinity

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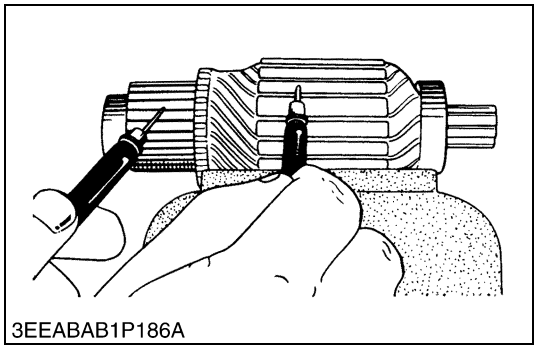
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Armature Coil

1. Check the continuity across the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

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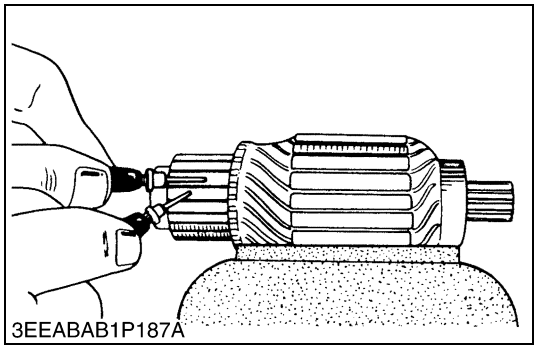
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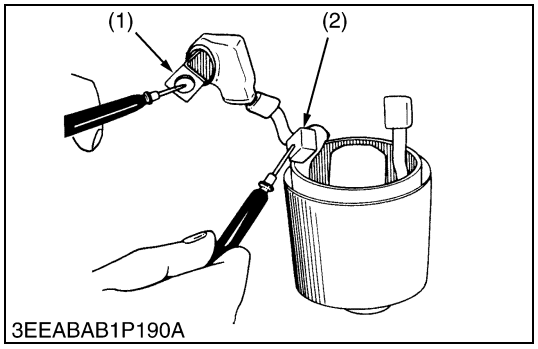

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Field Coil

1. Check the continuity across the lead (1) and brush (2) with an ohmmeter.
2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush (2) and yoke (3) with an ohmmeter.
4. If it conducts, replace the yoke assembly.

(1) Lead
(2) Brush
(3) Yoke

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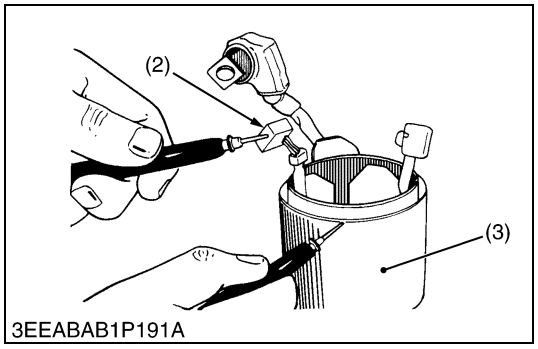

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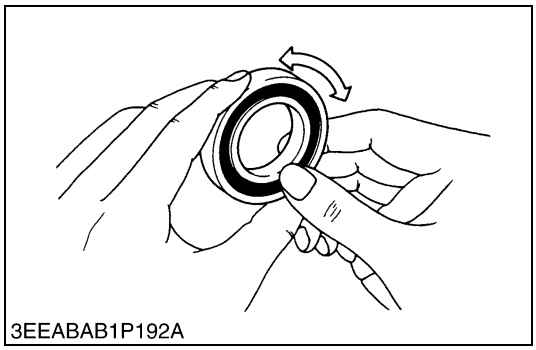
[2] ALTERNATOR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Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

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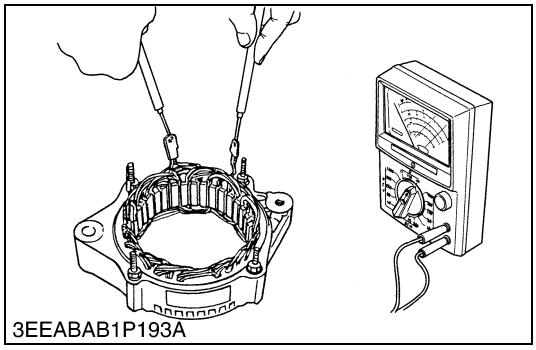
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Stator

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with an ohmmeter.
4. If the measurement is not within the factory specifications, replace it.

Resistance	Factory specification	Less than 1.0 Ω

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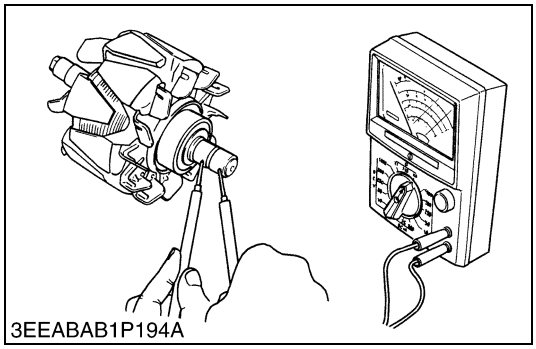
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Rotor

1. Measure the resistance across the slip rings with an ohmmeter.
2. If the resistance is not the factory specification, replace it.
3. Check the continuity across the slip ring and core with an ohmmeter.
4. If the measurement is not within the factory specifications, replace it.

Resistance	Factory specification	2.9 Ω

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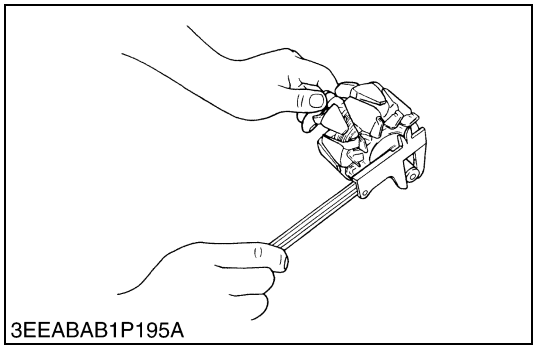
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Slip Ring

1. Check the slip ring for score.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the allowable limit, replace it.

Slip ring O.D.	Factory specification	14.4 mm 0.567 in.
	Allowable limit	14.0 mm 0.551 in.

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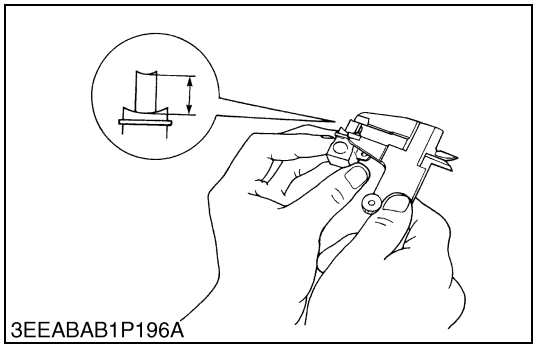
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Brush Wear

1. Measure the brush length with vernier calipers.
2. If the measurement is less than allowable limit, replace it.
3. Make sure that the brush moves smoothly.
4. If the brush is damaged, replace it.

Brush length	Factory specification	10.5 mm 0.413 in.
	Allowable limit	8.4 mm 0.331 in.

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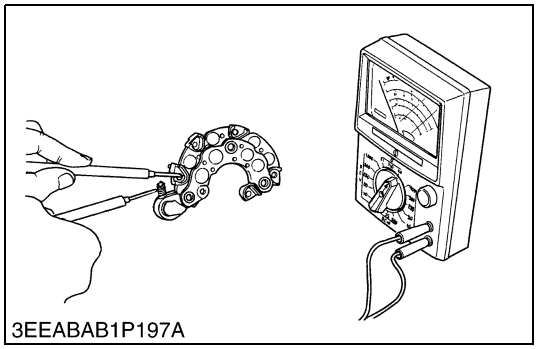
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Rectifier

1. Check the continuity across each diode of rectifier with an analog ohmmeter. Conduct the test in the (R × 1) setting.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

■ **IMPORTANT**

- **Do not use a 500 V megohmmeter for measuring because it will destroy the rectifier.**

■ **NOTE**

- **Do not use an auto digital multimeter. Because it's very hard to check the continuity of rectifier by using it.**

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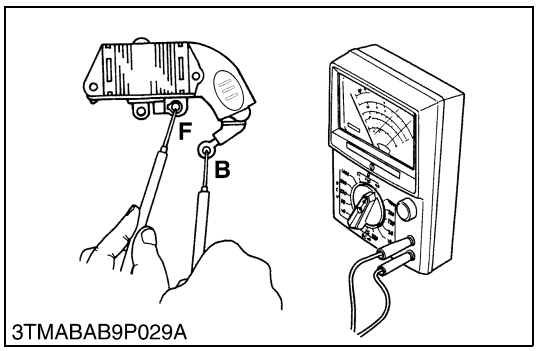

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IC Regulator

1. Check the continuity across the **B** terminal and the **F** terminal of IC regulator with an analog ohmmeter. Conduct the test in the (R × 1) setting.
2. The IC regulator is normal if the IC regulator conducts in one direction and does not conduct in the reverse direction.

■ **IMPORTANT**

- **Do not use a 500 V megohmmeter for measuring because it will destroy the IC regulator.**

■ **NOTE**

- **Do not use an auto digital multimeter. Because it is very hard to check the continuity of IC regulator by using it.**

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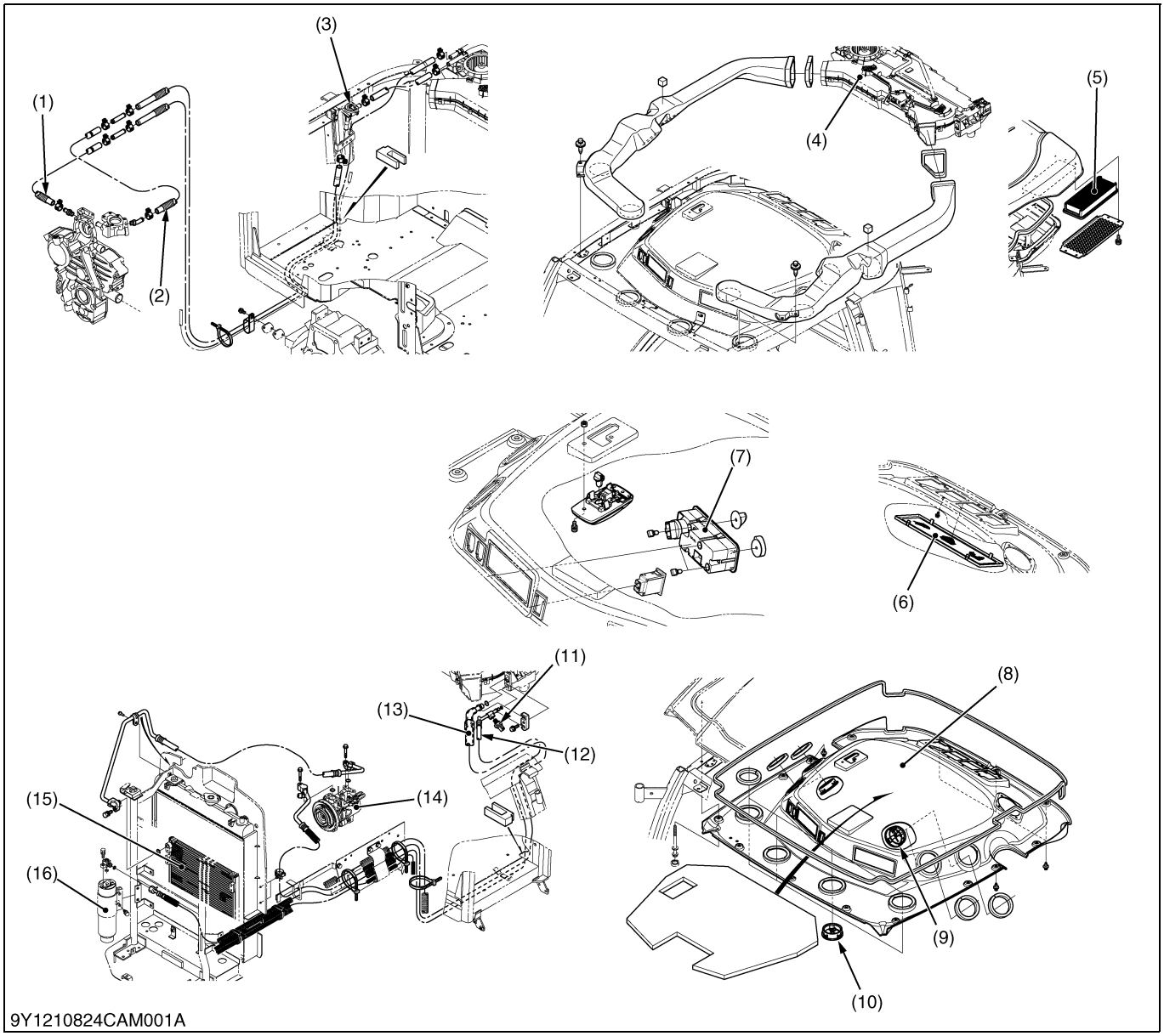
10 CABIN

MECHANISM

CONTENTS

1. AIR CONDITIONER SYSTEM

[1] OUTLINE OF AIR CONDITIONING SYSTEM



(1) Heater Hose (Out Side)
(2) Heater Hose (In Side)
(3) Water Valve
(4) Air Conditioner Unit
(5) Outside Air Filter
(6) Inside Air Filter
(7) Control Panel
(8) Inner Roof
(9) Side Air Outlet
(10) Front Air Outlet
(11) Pressure Switch
(12) High Pressure Pipe
(13) Low Pressure Pipe
(14) Compressor
(15) Condenser
(16) Receiver

The machine is equipped with a thin large-capacity air conditioner with outside air intake. Through the inside air filter (6) as well as the outside air filter (5), the inner roof (8) and reaches the air conditioner unit (15). The air is then cooled and dehumidified by this unit.

The resulting air is heated to a comfortable level. In this way, the air being blown via the blow port can be kept at comfortable temperature and humidity.

The front air outlet (10) can be opened and closed using the center knob of each port. The side air outlet (9) are opened and closed using the mode lever on the control panel (3). With these ports open or closed, you can feel your head cool and your feet warm.

(To be continued)

(Continued)

Capacity (Cooling)	Factory specification		2.9 to 3.5 kW
Capacity (Warming)	Factory specifi-cation	Water	3.9 to 4.3 kW
		LLC* 50 %	3.2 to 4.0 kW
Kinds of refrigerant (Charge amount)	Factory specification		R134a 0.95 to 1.05 kg 2.09 to 2.31 lbs
Pressure sensor (Low)	Factory specification		0.196 MPa 2.00 kgf/cm^2 28.4 psi
Pressure sensor (High)	Factory specification		2.94 MPa 30.0 kgf/cm^2 426 psi

*LLC: Anti-freeze

■ **NOTE**

- **As for the mechanism and function of each component part, refer to Workshop Manual of "MECHANISM".**

■ **Compressor Oil**

The compressor oil dissolves in the refrigerant, circulates through the air-conditioning cycle, and functions to lubricate the compressor. But the conventional compressor oil for R12 doesn't dissolve in R134a, so it doesn't circulate through the cycle, and the lifespan of the compressor is considerably shortened.

It is still essential to ensure that the correct refrigerant oil is used. R12 systems were lubricated with mineral oil, which is totally unsuitable for R134a systems. The letter require PAG oil, which mixes very well with the refrigerant and provides ideal lubrication throughout the system.

Quantity (Total)	Brand Name
50 to 70 cm^3 3.1 to 4.3 cu.in.	ND-OIL 8 <PAG* oil>

*PAG: Polyalkylene glycol (Synthetic oil)

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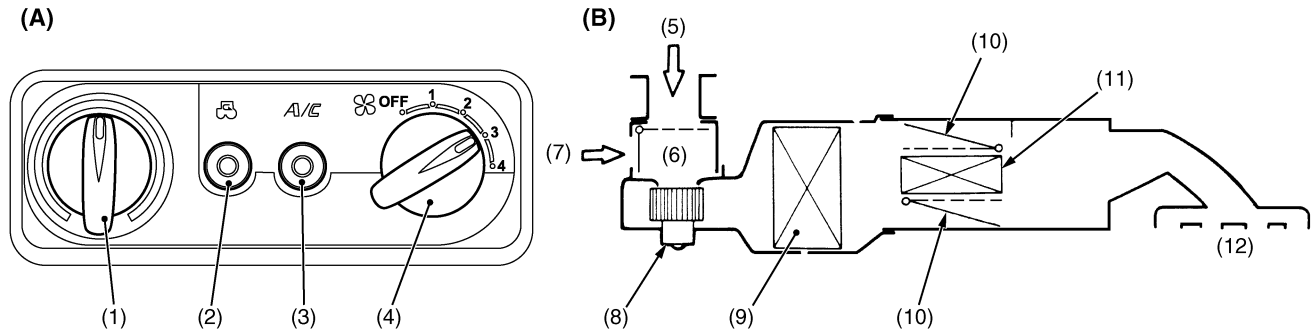
[2] SYSTEM CONTROL



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(1) Temperature Control Dial
(2) Mode Switch
(3) Air Conditioner Switch with Indicator Light
(4) Blow Switch
(5) Fresh Air
(6) Air Intake Door D1
(7) Recirculated Air
(8) Blower
(9) Evaporator
(10) Temperature Door D2 (Air Mixed Door)
(11) Heater
(12) Air Outlet

(A) Control Plate
(B) Block Diagram of Air Flow Passage

1) Selection of recirculated air (7) or fresh air (5) is done with door D1.

Each time the mode switch (2) is pressed, the air flow position changes for **"RECIRCULATION"** or **"FRESH AIR"**. An indicator light will light up when the switch is set to **"RECIRCULATION"** position. And the indicator light will be off when the switch is set to **"FRESH AIR"** position.

■ **RECIRC**

By setting the switch to **"RECIRCULATION"** position, the door D1 (6) shuts the flesh air inlet port. Air inside the cabin is recirculated.

■ **FRESH**

By setting the switch to **"RECIRCULATION"** position, door D1 opens the flesh air inlet port. Outside air comes into cabin.

2) Temperature control of outlet air is done with door D2.

■ **COOL**

By setting the temperature control dial (1) in control panel to **COOL** position, door D2 (10) is moved to close water valve. The air flows to air outlet (12) side without passing the heater core.

■ **WARM**

By moving the temperature lever to **WARM** position door D2 is moved to open water valve. The air flows to door outlet (12) side passing through the heater core.

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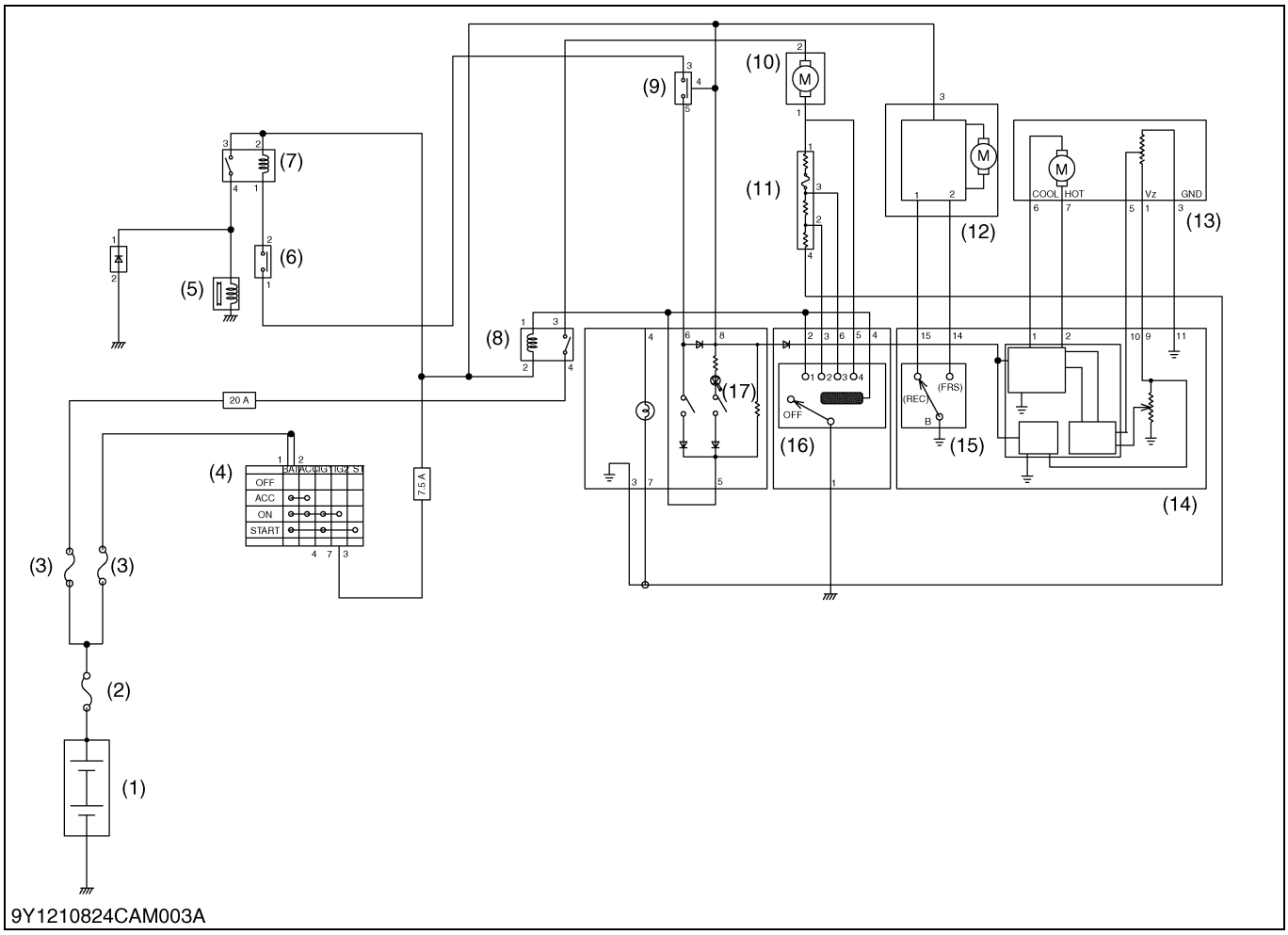
[3] ELECTRICAL SYSTEM

(1) Electrical Circuit



(1) Battery
(2) Slow Blow Fuse (80 A)
(3) Slow Blow Fuse (60 A)
(4) Main Switch
(5) Compressor
(6) Pressure Switch
(7) Compressor Relay
(8) Blower Relay
(9) Thermostat
(10) Blower Motor
(11) Blower Resistor
(12) Mode Motor
(13) Temperature Motor
(14) Control Panel
(15) Mode Switch
(16) Blower Switch
(17) A/C Switch

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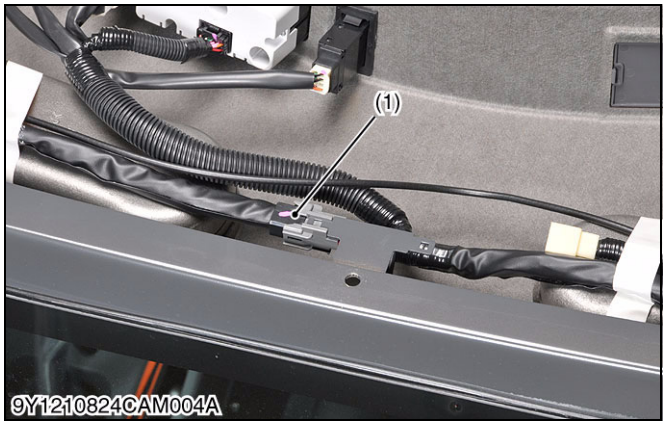
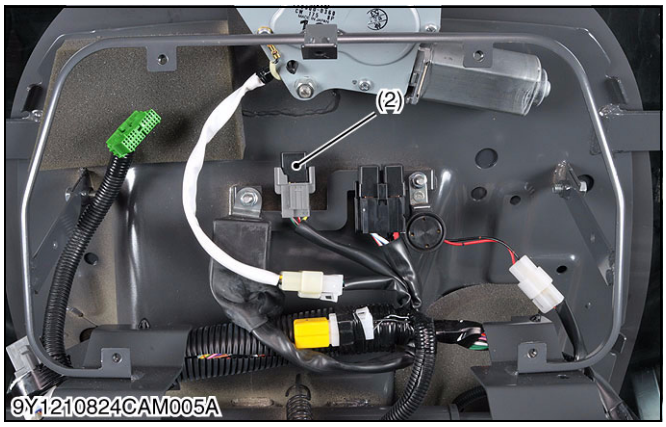
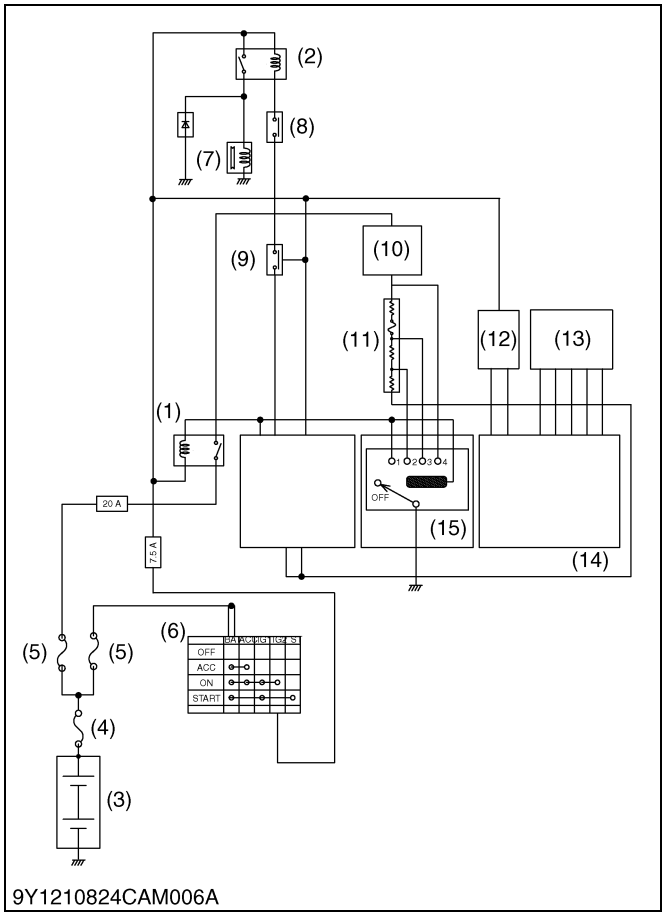
(2) Compressor Relay, Blower Relays and Compressor Relay







Remove the outer roof and the relays are visible at the ceiling rear of the cabin: blower relay (1) and compressor relay (2). When the blower fan is adjusted for the air flow rate, the blower relay (1) is activated by a signal from the fan switch on the control panel.

Among the air conditioner components, current flows to the blower motor (10) and magnetic clutch. If all of these current were to be passed through the main switch (6) and supplied, the current would be too large for the main switch (6) so that there will be danger or burning out the main switch contact. If the current were to be passed directly from the battery (3), forgetting to turn off the blower motor (10) could result in a discharged battery (3).

To protect against such trouble, relays have been provided. These relays have been made so that when current flows through its coil, the contact close to supply the power from the battery (3). By employing these relays, the current flowing through the main switch (6) has been decreased as only a small current is required to actuate the relay. Thus there will be no danger of burning out the switch contact, and when the main switch (6) is opened, the relay contact will open at the same time. This action stops the current flow in the air conditioner circuit so that there will also be no chance of the battery discharging.

(1) Blower Relay
(2) Compressor Relay
(3) Battery
(4) Slow Blow Fuse (80 A)
(5) Slow Blow Fuse (60 A)
(6) Main Switch
(7) Compressor
(8) Pressure Switch
(9) Thermostat
(10) Blower Motor
(11) Blower Resistor
(12) Mode Motor
(13) Temperature Motor
(14) Control Panel
(15) Blower Switch

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SERVICING

CONTENTS

1. TROUBLESHOOTING

COMPRESSOR

Symptom	Probable Cause	Solution	Reference Page
Noisy (Compressor ON)	Bearing of compressor worn or damaged	Replace	10-S45
	Valves in compressor damaged	Replace	10-S45
	Belt slipping	Adjust or replace	G-29
	Compressor bracket mounting screws loosen	Tighten	–
	Piping resonant	Tighten or add clamp	–
Noisy (Compressor OFF)	Blower damaged	Repair or replace	–
	Bearings of magnetic clutch, idle pulley or crank pulley worn or damaged	Replace	10-S45

AIR CONDITIONING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Does Not Cool (No Air Flow)	Fuse blown	Replace	G-45
	A/C compressor relay damaged	Replace	10-S29
	A/C blower motor damaged	Replace	10-S27
	A/C blower switch damaged	Replace	10-S23
	Wiring harness disconnected or improperly connected	Repair	–
Does Not Cool (Compressor Does Not Rotate)	Fuse blown	Replace	G-45
	Magnetic clutch damaged	Repair or replace	10-S22
	A/C switch damaged	Replace	10-S24
	Pressure switch damaged	Replace	10-S30
	Belt slipping	Adjust or replace	G-29
Does Not Cool (Others)	Insufficient refrigerant	Check with manifold gauge	10-S13
	Expansion valve damaged	Replace	–
	Compressor damaged	Replace	10-S45
Insufficient Cooling (Insufficient Air Flow)	Air filter clogged	Clean or replace	G-30
	Evaporator frosted	Clean or replace thermo switch	–
	A/C blower motor damaged	Replace	10-S27
	A/C blower resistor damaged	Replace	10-S26
Insufficient Cooling (Many Bubbles in Sight Glass)	Insufficient refrigerant	Check with manifold gauge	10-S13
	Gas leaking from some place in refrigerating cycle	Repair and charge refrigerant	10-S19
	Air mixed in	Check with manifold gauge	10-S13
Insufficient Cooling (No Bubbles in Sight Glass)	Too much refrigerant	Check with manifold gauge	10-S13

Symptom	Probable Cause	Solution	Reference Page
Insufficient Cooling (Compressor Does Not Rotate Properly)	Belt slipping	Adjust or replace	G-29
	Magnetic clutch damaged	Repair or replace	10-S22
	Compressor damaged	Replace	10-S45
Insufficient Cooling (Others)	Thermostat damaged	Replace	–
	Water valve damaged	Replace	–
	Condenser fin clogged with dust	Clean	G-30
	Expansion valve damaged	Replace	–
Insufficient Heating	Water valve damaged	Replace	–
	Temperature motor damaged	Check and repair	10-S27
	Insufficient coolant	Fill	G-9
Too Low Air Flow Rate (Blower Motor Does Not Run)	Blower switch damaged	Check and repair	10-S23
	A/C compressor relay damaged	Replace	10-S29
	Brush in poor contact	Replace	10-S27
	Fuse blown out	Replace	G-45
	Wrong wiring or loose connections	Check and repair	–
Too Low Air Flow Rate (Flow Rate Does Not Change in 4 Steps)	Blower resistor damaged	Replace	10-S26
	Relay damaged	Replace	10-S28
	Blower switch damaged	Replace	10-S23
Too Low Air Flow Rate (Others)	Blower is not tightened enough	Check and repair	10-S27
	Blower deformed	Replace	10-S27
	Blower in contact with casing	Check and repair	10-S27
	Obstacle at or near suction port	Check and repair	–
	Evaporator frosted	Clean or replace	–
	Filter clogged	Clean or replace	G-30
	Blow duct clogged or missing	Check and repair	–
Insufficient Cooling (Compressor Magnetic Clutch Does Not Work)	Low battery voltage	Charge	G-27
	Rotor in contact with stator	Replace	10-S45
	Wrong wiring loose connections	Check and repair	–
	Relay damaged	Replace	10-S29
	Coil shortage	Replace	10-S45
	Ground malfunction	Check and repair	9-S35
	Coil burst out	Replace	10-S45
Insufficient Cooling (Hi-pressure Level is Too High)	Refrigerant overcharged	Check with manifold gauge	10-S13
	Condenser clogged with dust and dirt	Clean	G-30
	Air mixed	Check with manifold gauge	10-S13
Insufficient Cooling (Hi-pressure Level is Too Low)	Refrigerant too short	Check with manifold gauge	10-S13
	Compressor discharge valve damaged	Replace	–
	Compressor gasket damaged	Replace	–
	Low-pressure pipe in trouble (Cracked or clogged)	Replace	10-S50

Symptom	Probable Cause	Solution	Reference Page
Insufficient Cooling (Low-pressure Level is Too High)	Refrigerant overcharged	Check with manifold gauge	10-S13
	Heat-sensitive tube in poor contact	Check and repair	–
	Expansion valve too open	Replace	–
Insufficient Cooling (Low-pressure Level is Too Low)	Refrigerant too short	Check with manifold gauge	10-S13
	Gas leak at heat-sensitive tube	Replace	–
	Evaporator frosted	Clean or replace	–
	Low-pressure pipe in trouble (Cracked or clogged)	Replace	10-S50
	Expansion valve clogged	Replace	–
Insufficient Cooling (Both Hi-pressure and Low-pressure Level is Too High)	Refrigerant overcharged	Check with manifold gauge	10-S13
Insufficient Cooling (Both Hi-pressure and Low-pressure Level is Too Low)	Refrigerant too short	Check with manifold gauge	10-S13
Temperature Cannot be Controlled (Temperature Motor and / or Temperature Control Dial Malfunction)	Temperature motor damaged	Replace	10-S27
	Temperature control dial damaged	Replace	10-S26
	Wiring harness connector disconnected	Repair or replace	–
Temperature Cannot be Controlled (Water Valve Does Not Open Properly)	Cable wrongly set	Repair	10-S49
	Cable disconnected	Repair	10-S49
Temperature Cannot be Controlled (Mode Motor and / or Mode Switch Malfunction)	Mode motor damaged	Replace	10-S27
	Mode switch damaged	Replace	10-S23
	Wiring harness controller disconnected	Repair or replace	–
Temperature Cannot be Controlled (Heater Hoses Laid is Bad)	Heater hose caught	Repair	10-S51
	Heater hose twisted or bent	Repair or replace	10-S51

WINDSHIELD WIPER

Symptom	Probable Cause	Solution	Reference Page
Windshield Wiper Does Not Operate	Fuse blown (Short-circuit, burnt component inside motor or other part for operation)	Correct cause and replace	G-45
	Wiper motor damaged (Broken armature, worn motor brush or seized motor shaft)	Replace	10-S33
	Wiper switch damaged	Replace	10-S31
	Foreign material interrupts movement of link mechanism	Repair	10-S56
	Wiper arm seized or rusted	Lubricate or replace	10-S56
Windshield Wiper Operating Speed Is Too Low	Wiper motor damaged (Short-circuit of motor armature, worn motor brush or seized motor shaft)	Replace	10-S33
	Low battery voltage	Recharge or replace	G-27
	Humming occurs on motor in arm operating cycle due to seized arm shaft	Lubricate or replace	10-S56
	Wiper switch contact improper	Replace	10-S31
Windshield Wiper Does Not Stop Correctly	Wiper motor damaged (Contaminated auto-return contacts or improper contact due to foreign matter)	Replace	10-S33

9Y1210824CAS0001US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Refrigerating Cycle (Refrigerating Cycle is Normal Operating)	Pressure (**LO** Pressure Side)	0.15 to 0.20 MPa 1.5 to 2.0 kgf/cm^2 21 to 28 psi	–
	Pressure (**HI** Pressure Side)	1.27 to 1.66 MPa 13 to 17 kgf/cm^2 185 to 242 psi	–
Pressure Switch (Dual Type) (When pressure switch is turned **OFF**)	Setting Pressure (**LO** Pressure Side)	Less than approx. 0.196 MPa 2.00 kgf/cm^2 28.4 psi	–
	Setting Pressure (**HI** Pressure Side)	More than approx. 2.94 MPa 30.0 kgf/cm^2 426 psi	–
Air-gap of A/C Compressor Magnet Clutch	Air-gap	0.20 to 0.45 mm 0.0079 to 0.017 in.	–
Air Conditioner Drive Belt	Tension	10 to 12 mm (0.39 to 0.47 in.) deflection at 98 N (10 kgf, 22 lbf) of force	–

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-11.)

Item	N·m	kgf·m	lbf·ft
Outer roof mounting screw	3.5 to 4.0	0.36 to 0.46	2.6 to 2.9
Cabin mounting bolt and nut	124 to 147	12.6 to 15.0	91.2 to 108
High pressure pipe and low pressure pipe mounting screw	7.9 to 11	0.80 to 1.2	5.8 to 8.6
Compressor mounting screws	25 to 29	2.5 to 3.0	18 to 21
Clutch mounting screw	12.3 to 14.1	1.25 to 1.44	9.05 to 10.4
A/C unit mounting screw (M6)	4.0 to 6.8	0.40 to 0.70	2.9 to 5.0
A/C unit mounting screw (M8)	9.81 to 11.6	1.00 to 1.19	7.24 to 8.60
Low pressure pipe (Cooler pipe (suction)) retaining nut	7.90 to 11.8	0.806 to 1.20	5.83 to 8.70
High pressure pipe (Cooler pipe (liquid)) retaining nut	11.8 to 14.7	1.21 to 1.49	8.71 to 10.8
High pressure pipe 1 mounting screw (Compressor side)	7.90 to 11.8	0.806 to 1.20	5.83 to 8.70
High pressure side 1 retaining nut (Condenser side)	4.0 to 6.8	0.41 to 0.69	3.0 to 5.0
High pressure pipe 2 retaining nut (Receiver side)	11.8 to 14.7	1.21 to 1.49	8.71 to 10.8
Low pressure pipe mounting screw (Compressor side)	7.90 to 11.8	0.806 to 1.20	5.83 to 8.70
High pressure pipe 2 retaining nut	11.8 to 14.7	1.21 to 1.49	8.71 to 10.8
Low pressure pipe retaining nut	7.90 to 11.8	0.806 to 1.20	5.83 to 8.70
Wiper motor mounting nut	6.4 to 9.3	0.65 to 0.95	4.7 to 6.8
Rear wiper motor mounting screw	4.9 to 6.9	0.50 to 0.70	2.6 to 5.1

9Y1210824CAS0003US0

4. PRECAUTIONS AT REPAIRING REFRIGERANT CYCLE

When checking or repairing the air conditioning system, the following precautions and rules must be observed. And it is of first importance that no other personnel than a well-trained serviceman should be allow to handle the refrigerant.

⚠ CAUTION

- **Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Always wear goggles to protect your eyes when working around the system.**
- **The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never heat the refrigerant container above 40 °C (104 °F) or drop it from a high height.**
- **Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.**
- **If you improperly connect the hose between the service valve of compressor and gauge manifold, or incorrectly handle the valves, the refrigerant service container or charging hose will explode. When connecting the hose or handling the valve, be sure to check the high pressure side or low pressure side.**
- **In case the refrigerant is charged while the compressor is operated, do not open the high pressure valve of the gauge manifold.**
- **Be careful of the toxicity of the gas. The gas is harmless and nontoxic in its original state, however it produces a toxic substance when it comes in contact with high temperature parts and decomposes.**
- **Do not heat the service can unless necessary. When it has to be heated, use warm water of 40 °C (104 °F) or lower. Do not heat using boiling water.**

■ IMPORTANT

- **If the refrigerant, O-rings, etc. for R12 are used in the R134a air conditioner system, problems such as refrigerant leakage or cloudiness in the sight glass may occur. Therefore, in order to prevent charging of refrigerant or erroneous connections, the shapes of the piping joint as well as the shapes of the service valve and the service tools have been changed.**
- **Always keep the working place clean and dry and free from dirt and dust. Wipe off water from the line fittings with a clean cloth before disconnecting.**
- **Use only for R134a refrigerant service tool.**
- **Use for R134a refrigerant recovery and recycling machine when discharging the refrigerant.**
- **Before attaching the charging hose to the can tap valve of the refrigerant container, check each packing for clogging.**
- **When disconnecting the charging hose from the charging valve of compressor and receiver, remove it as quick as possible so that gas leakage can be minimized.**
- **Be sure to charge the specified amount of refrigerant, but not excessively. Over-charging of the refrigerant in particular may cause insufficient cooling, etc..**
- **Since the charging hose can be connected to can tap valve by hand, do not use a pliers for tightening it.**
- **Keep refrigerant containers in a cool and dark place avoiding such place which are subject to strong sunlight or high temperature.**
- **R134a compressor oil absorbs moisture easily, so that be sure to seal after disconnecting the each parts.**
- **Do not use old-type refrigerant R12 or compressor oil for old-type refrigerant.**
- **When replacing the condenser, evaporator and receiver, etc., fill the compressor with compressor oil according to the table below.**

9Y1210824CAS0017US0

(Refrigerant)

Kinds of refrigerant (Charge amount)	Factory specification	R134a 770 to 870 g 1.70 to 1.91 lbs

(Compressor Oil)

Quantity (Total)	Brand Name
50 to 70 cc 0.053 to 0.073 U.S.qts 0.044 to 0.061 Imp.qts	ND-OIL 8 <PAG* oil>

*PAG: Polyalkyleneglycol (Synthetic oil)

(Reference)

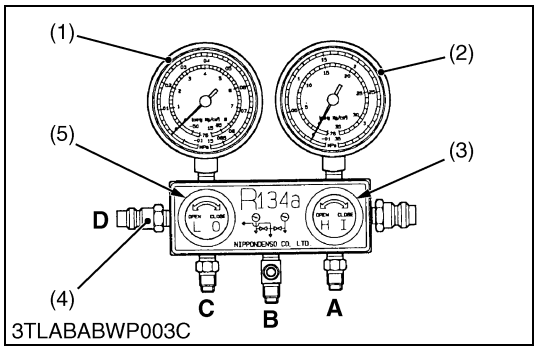
Replacing Parts	Quantity	Brand Name
Condenser	20 cc 0.021 U.S.qts 0.018 Imp.qts	ND-OIL 8 <PAG* oil>
Evaporator	10 cc 0.011 U.S.qts 0.0088 Imp.qts	
Receiver	10 cc 0.011 U.S.qts 0.0088 Imp.qts	
Hose	10 cc 0.011 U.S.qts 0.0088 Imp.qts	

*PAG: Polyalkyleneglycol (Synthetic oil)

9Y1210824CAS0018US0

[1] HANDLING OF SERVICE TOOLS

(1) Manifold Gauge Set



3TLABABWP003C

The hand valves on the manifold gauge set are used to open and close the valve. The hand valve inscribed **LO** is for the low pressure side valve (5) and **HI** is for the high pressure side valve (3). By opening or closing the high and low pressure hand valves, the following circuits are established.

(1) **LO** Pressure Gauge
(2) **HI** Pressure Gauge
(3) **HI** Pressure Side Valve
(4) Schrader Valve
(5) **LO** Pressure Side Valve

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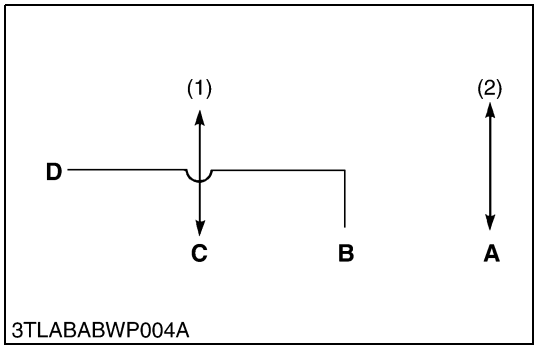

3TLABABWP004A

When LO Pressure Side Valve and HI Pressure Side Valve are Closed

Two circuits are established.
Port (**C**) → **LO** pressure gauge (1)
Port (**A**) → **HI** pressure gauge (2)

■ **NOTE**
- **Schrader valve (D) must be opened.**

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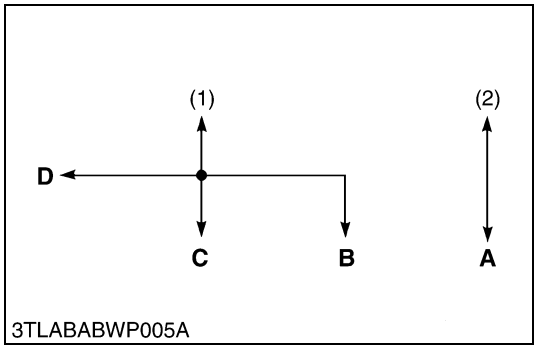

3TLABABWP005A

When LO Valve is Opened and HI Valve is Closed

Two circuits are established.
Port (**C**) → **LO** pressure gauge (1)
Port (**C**) → Port (**B**)
Port (**C**) → Port (**D**)
Port (**A**) → **HI** pressure gauge (2)

■ **NOTE**
- **Schrader valve (D) must be opened.**

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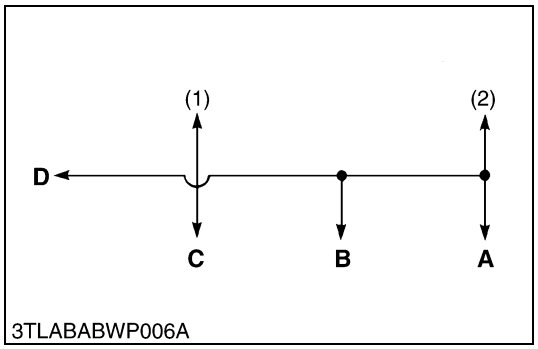

3TLABABWP006A

When LO Valve is Closed and HI Valve is Opened

Two circuits are established.
Port (**C**) → **LO** pressure gauge (1)
Port (**C**) → Port (**B**)
Port (**C**) → Port (**D**) (Schrader valve must be opened)
Port (**A**) → **HI** pressure gauge (2)

■ **NOTE**
- **Schrader valve (D) must be opened.**

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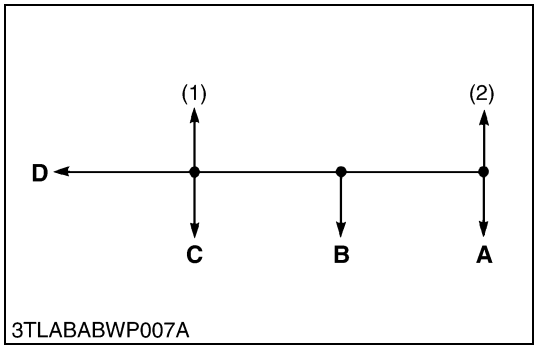

3TLABABWP007A

When LO and HI Valve are Opened

Circuits are established.
Port (**A**) → **HI** pressure gauge (2)
Port (**A**) → **LO** pressure gauge (1)
Port (**A**) → Port (**B**)
Port (**A**) → Port (**C**)
Port (**A**) → Port (**D**) (Schrader valve must be opened)

■ **NOTE**
- **Schrader valve (D) must be opened.**

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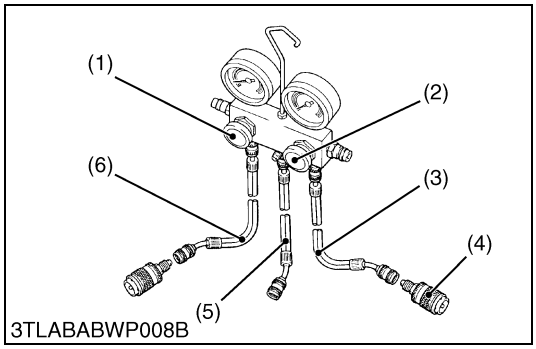
(2) Refrigerant Charging Hose



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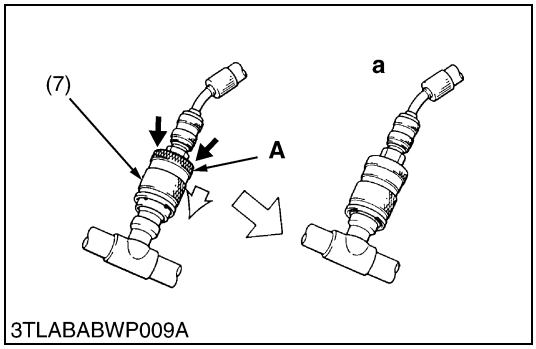

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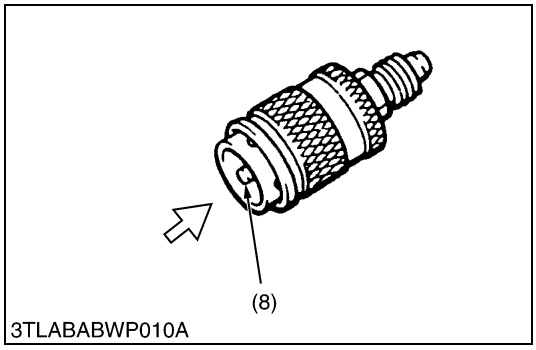

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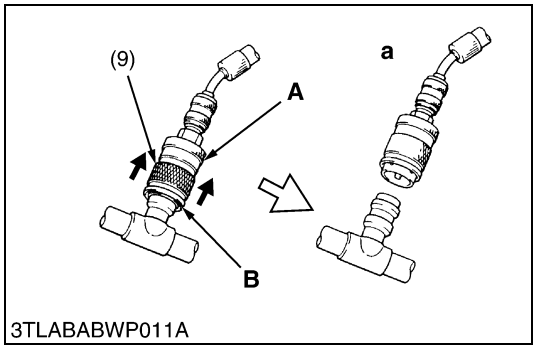


3TLABABWP011A

The charging hoses are classified into three colors. Each charging hose must be handled as follows:

- The air conditioner manufacture recommends that the blue hose (6) is used for the **LO** pressure side (suction side), the green hose (5) for refrigeration side (center connecting port) and the red hose (3) for **HI** pressure side (discharged side).

(When connecting)

- Push the quick disconnect adaptor (4) into the charging valve, and push on part **"A"** until a click is heard.

■ **NOTE**

- **When connecting, push carefully so the pipe does not bend.**
- **When connecting the quick disconnect connector, should the sleeve (7) move before the quick link connector can be connected to the charging valve, move the quick sleeve to its original position and try again.**
- **When some refrigerant remains in the charging hose at the time of connections, it may be difficult to connect the quick link connector. In this case, perform the operation after removing any residual pressure in the hose. (Remove the residual pressure by pushing the pusher (8).)**

(When reassembling)

- While holding on to part **"A"** of the quick disconnect adaptor, slide part **"B"** up.

■ **NOTE**

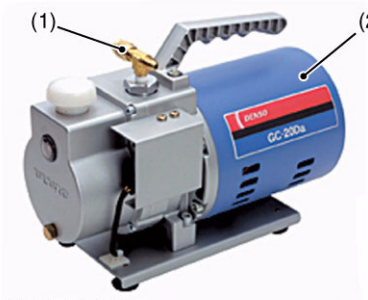
- **After removing the adaptor, ensure to cap the quick disconnect adaptor service valve.**

(1) **LO** Pressure Side Valve
(2) **HI** Pressure Side Valve
(3) Red Hose
(4) Quick Disconnect Adaptor
(5) Green Hose
(6) Blue Hose
(7) Sleeve
(8) Pusher
(9) Sleeve

a: CLICK

9Y1210824CAS0024US0

(3) Vacuum Pump Adaptor



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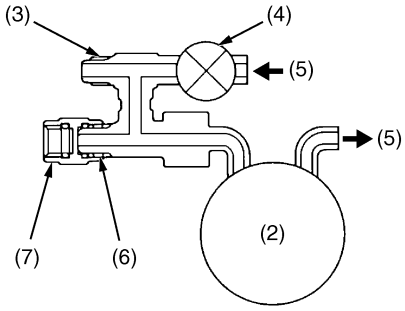

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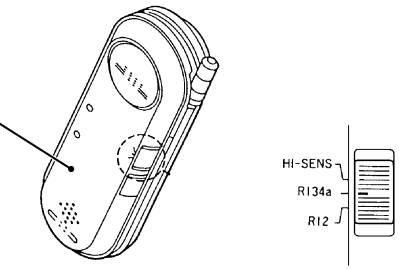
Objective of the Vacuum Pump Adaptor

1. After vacuum has been created in the air conditioning cycle, when the vacuum pump is stopped, since there is vacuum in hoses within the gauge manifold, the vacuum pump oil flows back into the charging hose. If the refrigerant is refilled with the system still in this state, the vacuum pump oil left in the charging hose enters the air conditioner cycle together with the refrigerant. Vacuum pump adaptor with a solenoid valve is used to prevent this back-flow of oil from the vacuum pump. The role of the solenoid valve is that when the current passes through the solenoid valve, the valve closes to keep out the outside air and allow the vacuum to build up, but when the current stops, the valve opens to allow in air and end the vacuum.
2. Attaching this adaptor to the R12 vacuum pump currently being used allows the pump to be used with both R134a and R12.

(1) Vacuum Pump Adaptor
(2) Vacuum Pump
(3) For R134a
(4) Magnetic Valve
(5) Air
(6) For R12
(7) Blind Cap

9Y1210824CAS0025US0

(4) Electric Gas Leak Tester



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The current R12 gas leak tester has poor sensitivity for R134a and cannot be used. Therefore, a new electric gas leak tester with greater sensitivity has been designed and can be used with both R134a and R12.

(Reference)

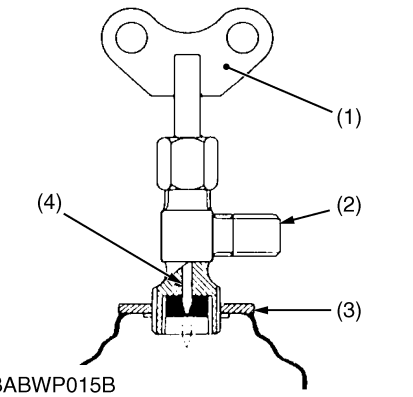
Leak tester with halide torch

- Since the reaction with chlorine within the refrigerant is used to detect gas leaks, R134a, which contains no chlorine, cannot be detected.

(1) Electric Gas Leak Tester

9Y1210824CAS0026US0

(5) Can Tap Valve



3TLABABWP015B

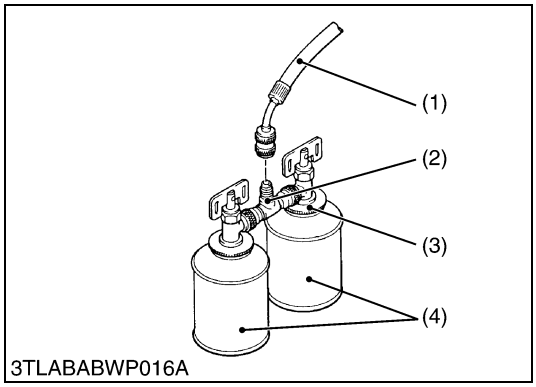
The can tap valve that is used to charge the refrigerant into the air conditioning system, should be used as follows:

1. Before putting the can tap valve on the refrigerant container, turn the handle (1) counterclockwise till the valve needle is fully retracted.
2. Turn the plate nut (disc) (3) counterclockwise till it reaches its highest position, then screw down the can tap valve into the sealed tap.
3. Turn the place nut clockwise fully, and fix the center charging hose to the valve.
4. Tighten the place nut firmly by hand.
5. Turn the handle (1) clockwise, thus making a hole in the sealed tap.
6. To charge the refrigerant into the system, turn the handle (1) counterclockwise. To stop charging, turn it clockwise.

(1) Butterfly Handle
(2) Connection
(3) Disc
(4) Needle

9Y1210824CAS0027US0

(6) T-joint



T-joint (2) is used to increase efficiency of gas charging using two refrigerant containers (4) at a time.

1. Install two refrigerant container service valves to T-joint (2) sides and connect the charging hose (1) to it.

(1) Charging Hose (Green)
(2) T-joint
(3) Can Tap Valve
(4) Refrigerant Container

9Y1210824CAS0028US0

(7) R134a Refrigerant Recovery and Recycling Machine

When there is necessity of discharging the refrigerant on repairing the tractor, it should use recovery and recycling machine. (Do not release the refrigerant into the atmosphere.)

■ **IMPORTANT**

- **Use only R134a refrigerant recovery and recycling machine, eliminate mixing R134a equipment, refrigerant and refrigerant oils with R12 systems to prevent compressor damage.**

9Y1210824CAS0029US0

5. CHECKING AND CHARGING REFRIGERANT CYCLE

[1] CHECKING WITH MANIFOLD GAUGE

■ **IMPORTANT**

- **The gauge indications described in the following testing are those taken under the same condition, so it should be noted that the gauge readings will differs somewhat with the ambient conditions.**

Condition

- Ambient temperature: 30 to 35 °C (86 to 95 °F)
- Engine speed: Approx. 1500 min^{-1} (rpm)
- Temperature control lever: Maximum cooling position
- Air-Conditioner switch: **ON**
- Blower switch: **HI** position

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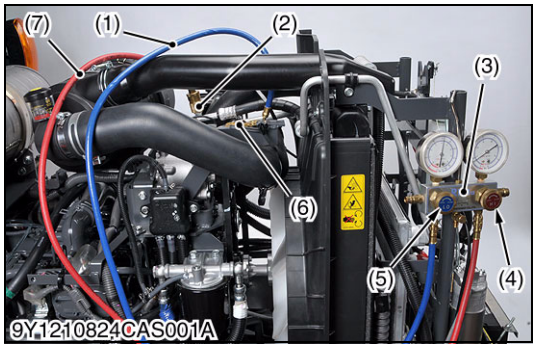

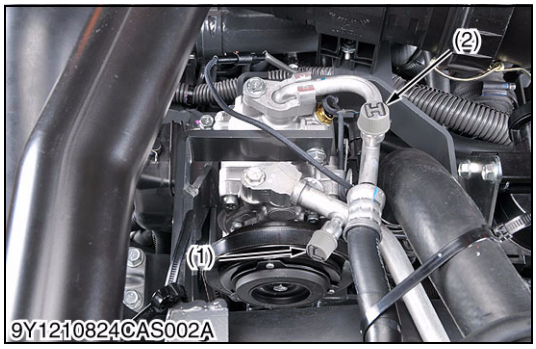

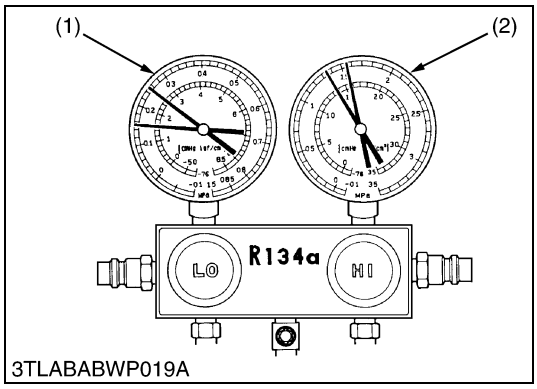

Manifold Gauge Connecting and Test Preparation

1. Close the manifold gauge **HI** and **LO** pressure side valve (4), (5) tightly.
2. Connect the charging hose (7) (red) to the **HI** pressure side charging valve (2) and connect the charging hose (1) (blue) to the **LO** pressure side charging valve (6).

■ **NOTE**

- **Be sure to drive out the air in the charging hoses at the manifold gauge connection end by using the refrigerant pressure in the refrigerating cycle.**

3. Start the engine and set at approx. 1500 min^{-1} (rpm).
4. Turn on the A/C switch and set the temperature control lever to **maximum cooling** position.
5. Set the blower switch to **HI** position.

(1) Charging Hose (Blue)
(2) **HI** Pressure Side Charging Valve
(3) Manifold Gauge
(4) **HI** Pressure Side Valve
(5) **LO** Pressure Side Valve
(6) **LO** Pressure Side Charging Valve
(7) Charging Hose (Red)

9Y1210824CAS0031US0

Normal Operating

If the refrigerating cycle is operating normally, the reading at the **LO** pressure side (1) should be generally by around 0.15 to 0.2 MPa (1.5 to 2.0 kgf/cm^2, 21 to 28 psi) and that at the **HI** pressure side (2) around 1.27 to 1.66 MPa (13 to 17 kgf/cm^2, 185 to 242 psi).

Gas pressure	Factory specification	Low pressure side	0.15 to 0.20 MPa 1.5 to 2.0 kgf/cm^2 21 to 28 psi
		High pressure side	1.27 to 1.66 MPa 13 to 17 kgf/cm^2 185 to 242 psi

(1) **LO** Pressure Side
(2) **HI** Pressure Side

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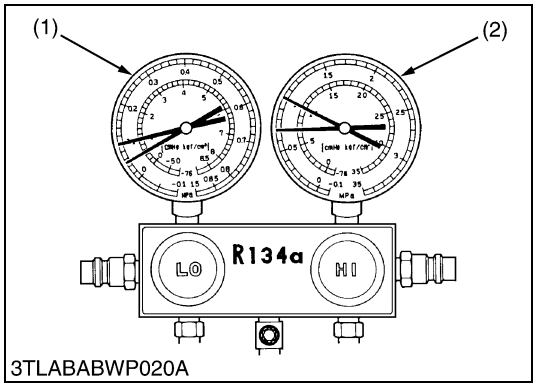

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Insufficient Refrigerant

1. Symptoms seen in refrigerating cycle
   - Both **LO** and **HI** pressure side (1), (2) pressures too low.
     LO pressure side (1)
     0.05 to 0.10 MPa (0.5 to 1.0 kgf/cm^2, 7.1 to 14.2 psi)
     HI pressure side (2)
     0.69 to 0.98 MPa (7 to 10 kgf/cm^2, 99.6 to 142.2 psi)
   - Bubbles seen in sight glass.
   - Air discharged from air conditioner sightly cold.
2. Probable cause
   - Gas leaking from some place in refrigerant cycle.
3. Solution
   - Check for leakage with electric gas leak tester (see page G-70) and repair.
   - Recharge refrigerant to the proper level. (See page 10-S21.)

(1) **LO** Pressure Side (2) **HI** Pressure Side

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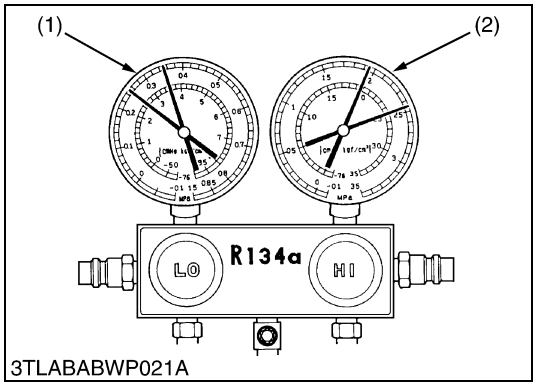

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Excessive Refrigerant or Insufficient Condenser Cooling

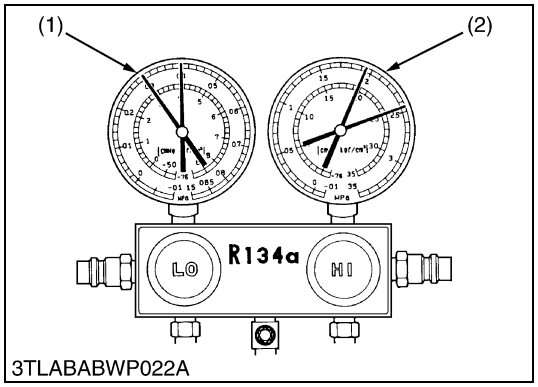
1. Symptoms seen in refrigerating cycle
   - Both **LO** and **HI** pressure side (1), (2) pressures too high.
     LO pressure side (1)
     0.20 to 0.35 MPa (2.0 to 3.5 kgf/cm^2, 28.4 to 49.8 psi)
     HI pressure side (2)
     1.96 to 2.45 MPa (20 to 25 kgf/cm^2, 284.5 to 355.6 psi)
2. Probable cause
   - Overcharging refrigerant into cycle.
   - Condenser cooling faulty.
3. Solution
   - Clean condenser. (See page G-30.)
   - Adjust air conditioner belt to proper tension. (See page G-29.)
   - If the above two items are in normal condition, check refrigerant quantity. (See page 10-S21.)

■ **NOTE**

- **If excessive refrigerant is to be discharged, loosen manifold gauge LO pressure side valve and vent out slowly.**

(1) **LO** Pressure Side (2) **HI** Pressure Side

9Y1210824CAS0034US0



3TLABABWP022A

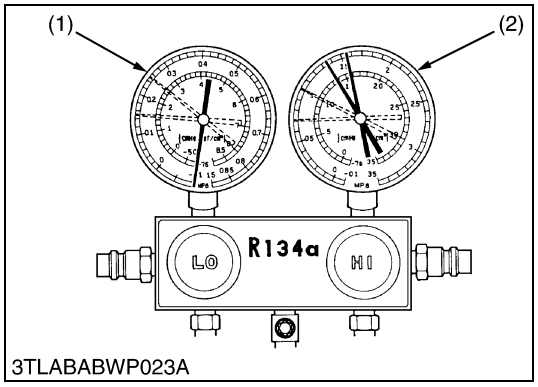
Air Entered in the Cycle

1. Symptoms seen in refrigerating cycle
   - Both **LO** and **HI** pressure side (1), (2) pressures too high.
     LO pressure side (1)
     0.20 to 0.35 MPa (2.0 to 3.5 kgf/cm^2, 28.4 to 49.8 psi)
     HI pressure side (2)
     1.96 to 2.45 MPa (20 to 25 kgf/cm^2, 284.5 to 355.6 psi)
   - **LO** pressure side (1) piping not cold when touched.
2. Probable cause
   - Air entered in refrigerating cycle.
3. Solution
   - Replace receiver.
   - Check compressor oil contamination and quantity.
   - Evacuate and recharge new refrigerant. (See page 10-S19.)

■ **NOTE**
- **The above cycle can be seen when the cycle is charged without evacuation.**

(1) **LO** Pressure Side (2) **HI** Pressure Side

9Y1210824CAS0035US0



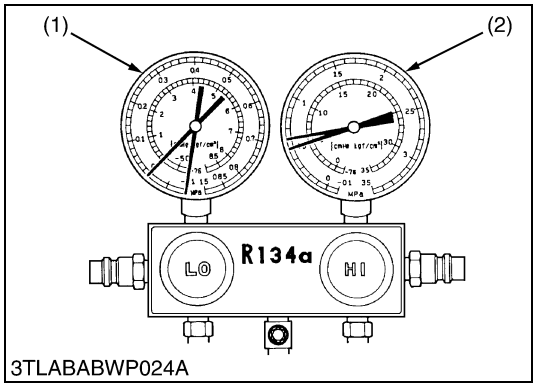
3TLABABWP023A

Moisture Entered in the Cycle

1. Symptoms seen in refrigerating cycle
   - The air conditioner operates normally at the beginning, but over time, **LO** pressure side (1) pressure is **vacuum** and **HI** pressure side (2) is low pressure.
     LO pressure side (1)
     Vacuum
     HI pressure side (2)
     0.69 to 0.98 MPa (7 to 10 kgf/cm^2, 99.6 to 142.2 psi)
2. Probable cause
   - The moisture in the refrigerating cycle freezes in the expansion valve orifice and causes temporary blocking. After a time, the ice melts and condition returns to normal.
3. Solution
   - Replace receiver.
   - Remove moisture in cycle by means of repeated evacuation.
   - Recharge new refrigerant to the proper level. (See page 10-S19.)

(1) **LO** Pressure Side (2) **HI** Pressure Side

9Y1210824CAS0036US0



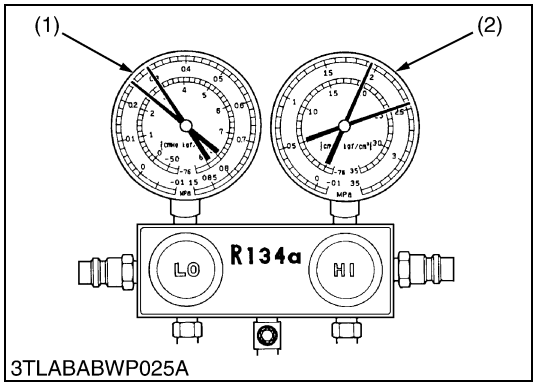
3TLABABWP024A

Refrigerant Fails to Circulate

1. Symptoms seen in refrigerating cycle
   - **LO** pressure side (1) pressure is vacuum and, **HI** pressure side (2) is low pressure.
     LO pressure side (1)
     Vacuum
     HI pressure side (2)
     0.49 to 0.59 MPa (5 to 6 kgf/cm^2, 71.2 to 85.3 psi)
2. Probable cause
   - Refrigerant flow obstructed by moisture or dirt in the refrigerating cycle freezing or sticking on the expansion valve orifice.
3. Solution
   Allow to stand for same time and then resume operation to decide whether the plugging is due to moisture or dirt.
   - If caused by moisture, correct by referring to instructions in previous.
   - If caused by dirt, remove the expansion valve and blow out the dirt with compressed air.
   - If unable to remove the dirt, replace the expansion valve. Replace the receiver. Evacuate and charge in proper amount of new refrigerant. (See page 10-S19.)
   - If caused by gas leakage in heat sensitizing tube, replace the expansion valve.

(1) **LO** Pressure Side (2) **HI** Pressure Side

9Y1210824CAS0037US0



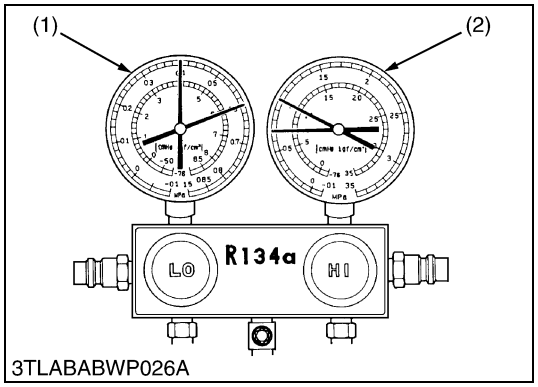
3TLABABWP025A

Expansion Valve Opens Too Far or Improper Installation of Heat Sensitizing Tube

1. Symptoms seen in refrigerating cycle
   - Both **LO** and **HI** pressure side (1), (2) pressures too high.
     LO pressure side (1)
     0.29 to 0.39 MPa (3 to 4 kgf/cm^2, 42.7 to 56.9 psi)
     HI pressure side (2)
     1.96 to 2.45 MPa (20 to 25 kgf/cm^2, 284.5 to 355.6 psi)
   - Frost or heavy dew on low pressure side piping.
2. Probable cause
   - Expansion valve trouble or heat sensitizing tube improperly installed.
   - Flow adjustment not properly done.
3. Solution
   - Check installed condition of heat sensitizing tube.
   - If installation of heat sensitizing tube is correct, replace the expansion valve.

(1) **LO** Pressure Side (2) **HI** Pressure Side

9Y1210824CAS0038US0



3TLABABWP026A

Faulty Compression of Compressor

1. Symptoms seen in refrigerating cycle
   - **LO** pressure side (1)
     0.39 to 0.59 MPa (4 to 6 kgf/cm^2, 56.9 to 85.3 psi)
   - **HI** pressure side (2)
     0.69 to 0.98 MPa (7 to 10 kgf/cm^2, 99.6 to 142.2 psi)
2. Probable cause
   - Leak in compressor.
3. Solution
   - Replace compressor. (See page 10-S45.)

■ **NOTE**
- **Manifold gauge indications (left side figure) at faulty compressing by compressor.**

(1) **LO** Pressure Side (2) **HI** Pressure Side

9Y1210824CAS0039US0

[2] DISCHARGING, EVACUATING AND CHARGING

■ **IMPORTANT**
- **When discharging, evacuating or charging the refrigerating system, be sure to observe the "4. PRECAUTIONS AT REPAIRING REFRIGERANT CYCLE" on page 10-S7.**

9Y1210824CAS0040US0

(1) Discharging the Refrigerant

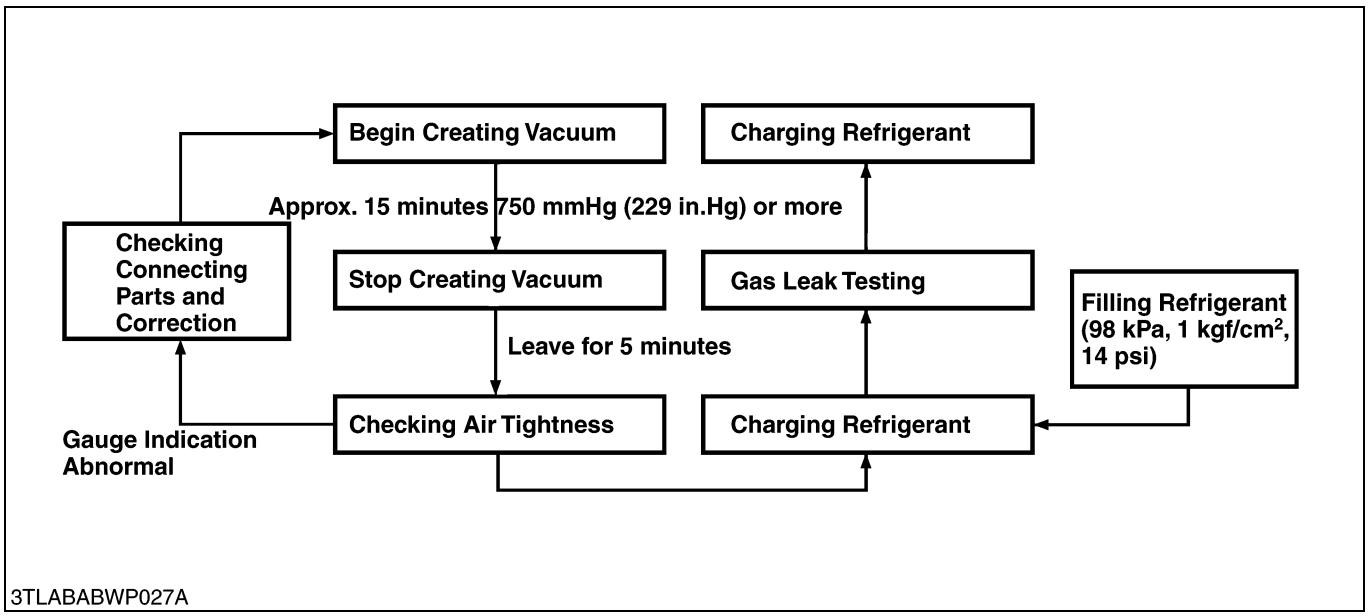
Discharge the Refrigerant

1. Discharge the refrigerant to the recovery and recycle machine, follow to the manufacturer's instructions.

CAUTION
- **Wear the safety equipment follow to the manufacturer's instructions.**

9Y1210824CAS0041US0

(2) Evacuating the System



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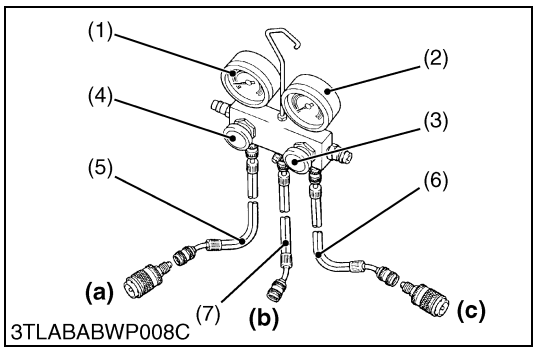


Evacuating the System

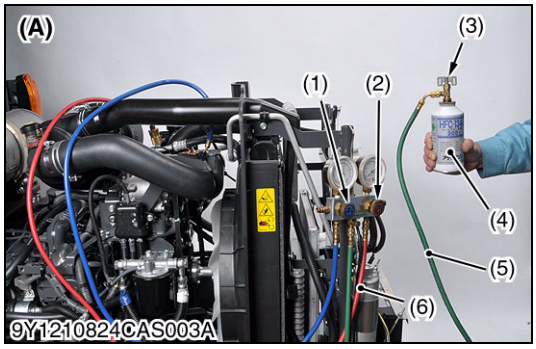
1. Discharge refrigerant from the system by R134a refrigerant recovery and recycling machine.
2. Connect the charging hose (6) (red) to the **HI** pressure side charging valve and connect the charging hose (5) (blue) to the **LO** pressure side charging valve.
3. Connect the center charging hose (7) (green) to a vacuum pump inlet.
4. Open both valves (3), (4) of manifold gauge fully. Then run the vacuum pump to evacuate the refrigerant cycle. (For approx. 15 minutes.).
5. When **LO** pressure gauge (1) reading is more than 750 mmHg (299 in.Hg), stop the vacuum pump and close both valves (3), (4) of manifold gauge fully.
6. Wait for over 5 minutes with the **HI** and **LO** pressure side valves (3), (4) of gauge manifold closed, and then check that gauge indicator does not return to 0.
7. If the gauge indicator is going to approach to 0, check whether there is a leaking point and repair if it is, and then evacuate it again.

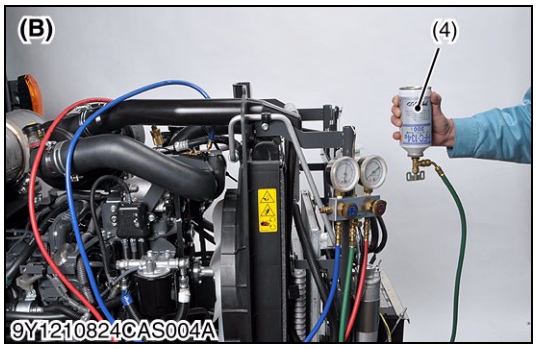
(1) **LO** Pressure Gauge
(2) **HI** Pressure Gauge
(3) **HI** Pressure Side Valve
(4) **LO** Pressure Side Valve
(5) Blue Hose
(6) Red Hose
(7) Center Charging Hose (Green)

(a) To LO Pressure Side Charging Valve
(b) To Vacuum Pump
(c) To HI Pressure Side Charging Valve

9Y1210824CAS0043US0

(3) Charging the Refrigerant





Charging an Empty System (Liquid)

This procedure is for charging an empty system through the **HI** pressure side with the refrigerant in the liquid state.

CAUTION

- **Never run the engine when charging the system through the HI pressure side.**
- **Do not open the LO pressure valve when refrigerant R134a is being charged in the liquid state (refrigerant container is set upside-down).**

IMPORTANT

- **After charging the refrigerant in the liquid state with approx. 500 g (1.1 lbs) through the HI pressure side, be sure to recharge the refrigerant in the vapor state to specified amount through the LO pressure side.**

1. Close the **HI** and **LO** pressure side valves (1) and (2) of manifold gauge after the system is evacuated completely.
2. Connect the center charging hose (green) (5) to the can tap valve (3) fitting, and then loosen the center charging hose (green) (5) at the center fitting of manifold gauge until hiss can be heard.
   Allow the air to escape for few seconds and tighten the nut.
3. Open the **HI** pressure side valve (2) fully, and keep the container upside-down to charge the refrigerant in the liquid state from the **HI** pressure side.
4. Charge the refrigerant in the liquid state with approx. 500 g (1.1 lbs) from the **HI** pressure side.

NOTE

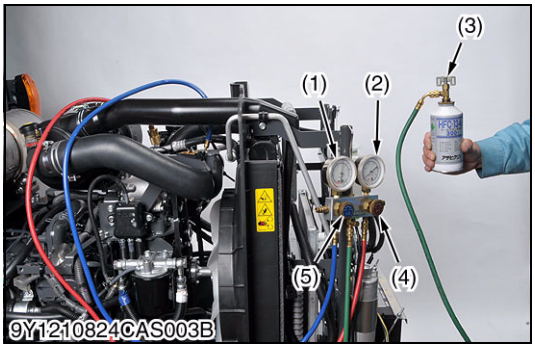
- **If LO pressure gauge does not show a reading, the system is clogged and must be repaired.**

5. Close the **HI** pressure side valve (2) of manifold gauge and can tap valve of refrigerant container.

(1) **LO** Pressure Side Valve
(2) **HI** Pressure Side Valve
(3) Can Tap Valve
(4) Refrigerant Container (R134a)
(5) Charging Hose (Green)
(6) Charging Hose (Red)
(7) Charging Hose (Blue)

(A) Refrigerant Container "Upside"
(B) Refrigerant Container "Down Side"

9Y1210824CAS0044US0



Charging an Empty or Partially Charged System (Vapor)

This procedure is to charge the system through the **LO** pressure side with refrigerant in the vapor state. When the refrigerant container is set right side up, refrigerant will enter the system as a vapor.

CAUTION

- **Never open the HI pressure side valve of manifold gauge while the engine is running.**

NOTE

- **Do not turn the refrigerant container upside-down when charging the system by running the engine.**
- **Put refrigerant container into a pan of warm water (maximum temperature 40 °C (104 °F)) to keep the vapor pressure in the container slightly higher than vapor pressure in the system.**

1. Check that the **HI** pressure side valve (4) is closed.
2. Start the engine and set an approx. 1500 min^{-1} (rpm).
3. Turn on the A/C switch.
   Set the temperature control lever to **maximum cooling** position and the blower switch to **HI** position.
4. Open the **LO** pressure side valve (5) of manifold gauge and the can tap valve (3) on refrigerant container and charge the refrigerant until air bubbles in the sight glass of the receiver vanish.
5. After charging the specified amount of refrigerant into the system, close the **LO** pressure side valve (5) of manifold gauge and can tap valve (3), then stop the engine.
6. Check for gas leak with an electric gas leak tester. (See page G-70.)

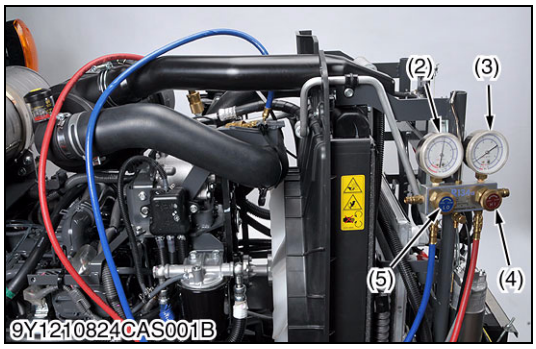
(Reference)

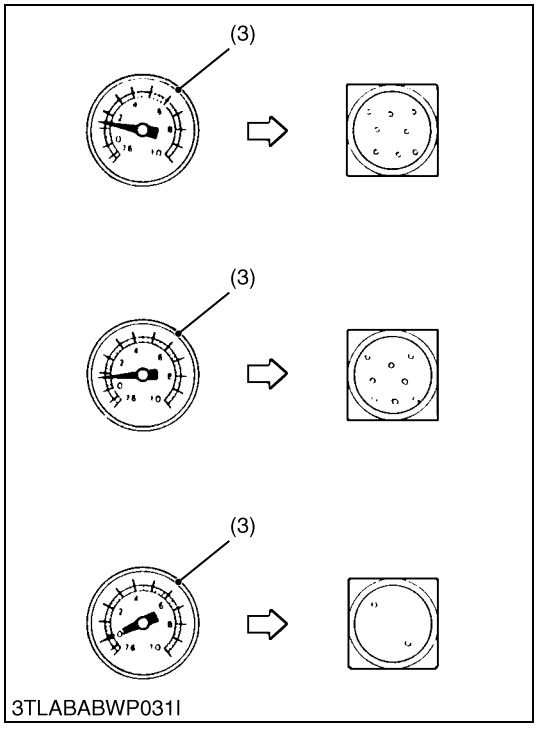
- Specified amount of refrigerant (total)
  770 to 870 g (1.70 to 1.90 lbs) [Refrigerant R134a]
- Manifold gauge indication at fully charged system (at ambient temperature: 30 °C (86 °F))
  HI pressure side
  1.27 to 1.66 MPa (13 to 17 kgf/cm^2, 185 to 242 psi)
  LO pressure side
  0.15 to 0.20 MPa (1.5 to 2.0 kgf/cm^2, 21 to 28 psi)

(1) **LO** Pressure Gauge
(2) **HI** Pressure Gauge
(3) Can Tap Valve
(4) **HI** Pressure Side Valve
(5) **LO** Pressure Side Valve

9Y1210824CAS0045US0

(4) Checking Charge Refrigerant Amount





After charging the refrigerant, check for amount of charging refrigerant as follows.

■ **NOTE**

- **The pressure on the following checking are the gauge indications at ambient temperature 30 °C (86 °F), so it should be noted that the pressure will differ some what with the ambient temperature.**

1. Disconnect the **1P** connector (1) of magnetic clutch.
2. Start the engine and set a approx. 1500 min^{-1} (rpm).
3. Connect the **1P** connector (1) of magnetic clutch to battery directly, and then set the blower switch to **HI** position.
4. Leave the system for approx. 5 minutes until the refrigerant cycle becomes stable, keeping pressure on the **HI** pressure side from 1.27 to 1.66 MPa (13 to 17 kgf/cm^2, 185 to 242 psi).
5. When the refrigerant cycle is stabilizer, turn off the blower switch and let the compressor alone to run. Then pressure on the **LO** pressure side gradually drops. At this time, if pressure on the **HI** pressure side is kept from 1.27 to 1.66 MPa (13 to 17 kgf/cm^2, 185 to 242 psi), air bubbles which pass through the sight glass becomes as stated below depending on refrigerant charged amount.

A: Insufficient refrigerant charge

Air bubbles pass continuously the sight glass when pressure on the **LO** pressure side is over 99.0 kPa (1.01 kgf/cm^2, 14.4 psi). In this case, charge the refrigerant from the **LO** pressure side.

B: Properly refrigerant charge

Air bubbles pass through the sight glass continuously when pressure on the **LO** pressure side is within 59 to 98 kPa (0.6 to 1.0 kgf/cm^2, 9 to 14 psi).

If the charge refrigerant amount is proper, no air bubble is observed on the sight glass at pressure on the **LO** pressure side over 99.0 kPa (1.01 kgf/cm^2, 14.4 psi) when the blower switch is turned on. When the blower switch is turned off, bubbles pass through the sight glass in case pressure on the **LO** pressure side is within 59 to 98 kPa (0.6 to 1.0 kgf/cm^2, 9 to 14 psi).

C: Excessive refrigerant charge

Air bubbles pass through the sight glass time to time or no air bubble is observed when pressure on the **LO** pressure side is under 59 kPa (0.6 kgf/cm^2, 9 psi).

In this case, discharge excessive refrigerant gradually from the **LO** pressure side.

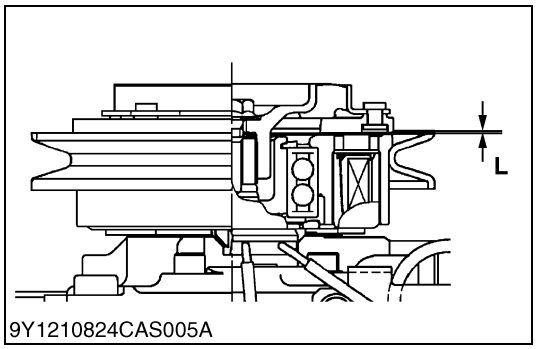
(1) **1P** Connector
(2) **LO** Pressure Gauge
(3) **HI** Pressure Gauge
(4) **HI** Pressure Valve (Close)
(5) **LO** Pressure Valve (Close)

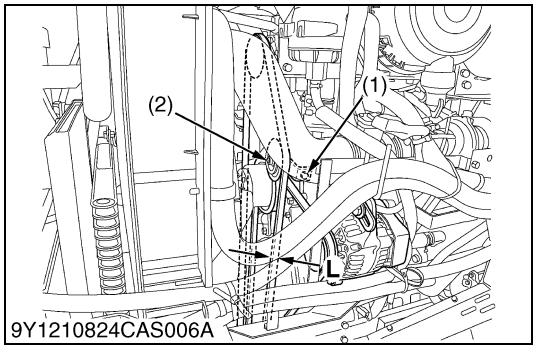
9Y1210824CAS0046US0

6. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Compressor





Operation of Magnetic Clutch

1. Turn off the A/C switch after starting the engine.
2. Check whether abrasion or abnormal noise is heard when only the magnetic clutch pulley is running.
3. Check that the magnetic clutch (1) does not slip when the A/C switch and blower switch are turned **"ON"** (when the air conditioner is in operation).
4. If anything abnormal is found, repair or replace.

(1) Magnetic Clutch

9Y1210824CAS0047US0

Stator Coil

1. Measure the resistance of the stator coil with an ohmmeter across the **1P** connector (1) of magnetic clutch and compressor body.
2. If the measurement is not within the factory specifications, replace the stator coil.

Stator coil resistance	Factory specification	3.0 to 4.0 Ω

(1) **1P** Connector

9Y1210824CAS0048US0

Air Gap

1. Check the air gap with feeler gauge.
2. If the measurement is not within the factory specifications, adjust it. (See page 10-S57.)

Air gap **"L"**	Factory specification	0.30 to 0.65 mm 0.012 to 0.025 in.

L: Air Gap

9Y1210824CAS0049US0

Adjusting Air Conditioner Belt Tension

CAUTION

- **Be sure to stop the engine before checking air conditioner belt tension.**

1. Stop the engine and remove the key.
2. Apply 98 N (10 kgf, 22 lbf) pressure to the belt between the pulleys.
3. If tension is incorrect, adjust the belt tension.
4. If belt is damaged, replace it.

Air conditioner belt tension	Factory specification	A deflection of between 10 to 12 mm (0.39 to 0.47 in.) when the belt is pressed in the middle of the span

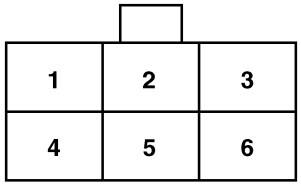
(1) Adjusting Bolt
(2) Nut
L: Deflection

9Y1210824CAS0050US0

(2) Control Panel (Blower Switch, A/C Switch, Mode Control Dial and Temperature Control Dial)

9Y1210824CAS007A

(A)



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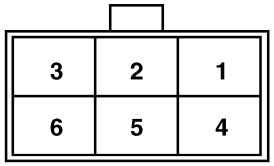
(A)



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Blower Switch Connector Voltage

1. Disconnect the **6P** connector (2) from blower switch.
2. Turn the main switch to **"ON"** position.
3. Measure the voltage with a voltmeter across the connector terminal **1** and terminal **4**.
4. If the voltage differs from the battery voltage, the wiring harness, A/C relay, fuse or main switch is faulty.

Voltage	Terminal **1** – Terminal **4**	Approx. battery voltage

(1) Control Panel
(2) **6P** Connector

(A) 6P Connector (Wire Harness Side)

9Y1210824CAS0051US0

Blower Switch Test

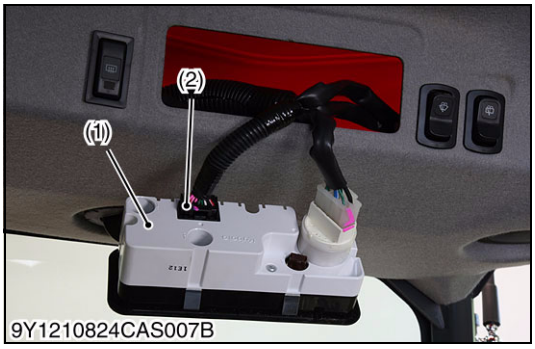
1. Check the continuity through the switch with an ohmmeter.
2. If the continuity specified below are not indicated, the switch is faulty.

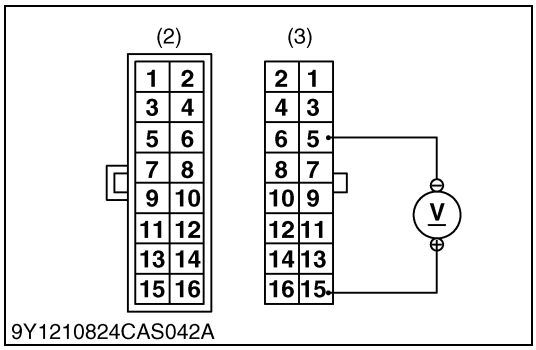
Position		Terminal					
		1	2	3	4	5	6
A/C blower switch	OFF						
	1 (Low)	●	●	●			
	2 (Medium Low)	●	●		●		
	3 (Medium High)	●	●			●	
	4 (High)	●	●				●

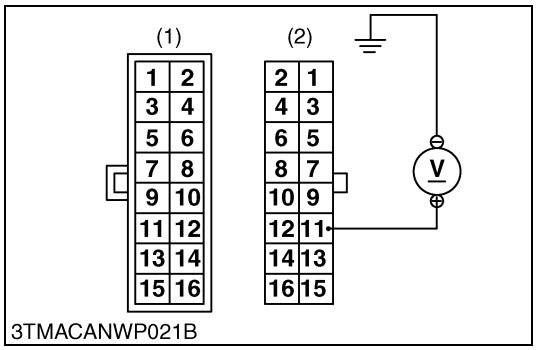
9Y1210824CAS043US

(A) 6P Connector (Blower Switch Side)

9Y1210824CAS0052US0







Connector Voltage

1. Disconnect the **16P** connector (2) from control panel switch.
2. Turn the main switch to **"ON"** position.
3. Measure the voltage with a voltmeter across the terminal **15** and terminal **5**.
4. If the voltage differs from the battery voltage, the wiring harness, A/C relay or fuse is faulty.

Voltage	Terminal **15** – Terminal **5**	Approx. battery voltage

(1) Control Panel
(2) **16P** Connector (Switch Side)
(3) **16P** Connector (Wire Harness Side)

9Y1210824CAS0053US0

A/C Switch Checking

1. Measure the voltage with a voltmeter across the terminal **11** and chassis.
2. Turn the main switch to **"ON"** position.
3. Turn the blower switch to **"ON"** position.
4. Press the air conditioner switch to set it to **"OFF"** position (indicator: OFF), and then measure a voltage using a circuit tester.
5. Press the air conditioner switch to set it at **"ON"** position (indicator: ON), and then measure a voltage using a circuit tester.
6. If a measured voltage does not comply with the values in the table below, the control panel, wiring harness or fuse is faulty.

Voltage	Terminal **11** – Chassis	A/C switch at **ON**	Approx. battery voltage
		A/C switch at **OFF**	Approx. 1 V

(1) **16P** Connector (Switch Side)
(2) **16P** Connector (Wire Harness Side)

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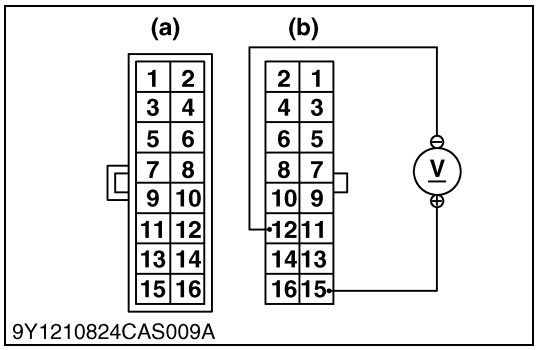
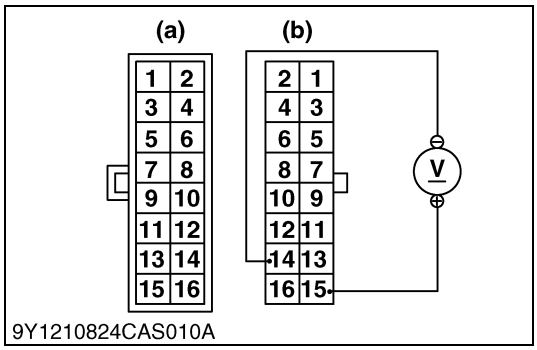
9Y1210824CAS007C

9Y1210824CAS008A



9Y1210824CAS009A



9Y1210824CAS010A

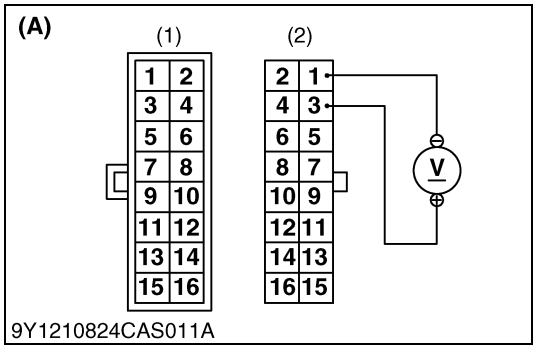
Recirculation / Fresh Air Selection Switch Checking

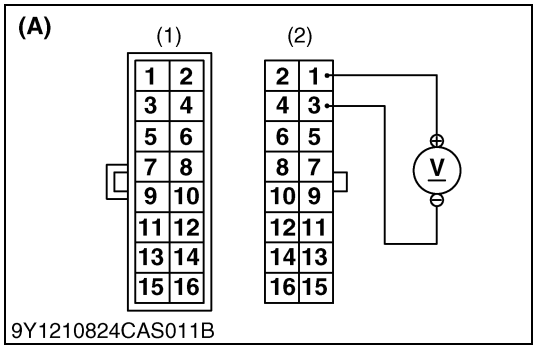
1. Use a circuit tester to check the recirculation / fresh air selection switch.
2. Connect the **16P** connector (1) and the **6P** connector (2).
3. Switch off the recirculation / fresh air selection switch (3). Touch the red (+) probe to the terminal **15** and the black (−) probe to the terminal **12** as shown in the picture.
4. Switch on the main switch. Switch on the recirculation / fresh air selection switch (3). Make sure that the output voltage is the some with the battery voltage.
5. Touch the black (−) probe to the terminal **14**. Switch off the recirculation / fresh air selection switch (3).
6. If the output voltage differs from the battery voltage, the recirculation / fresh air selection is faulty.

(1) **16P** Connector
(2) **6P** Connector
(3) Recirculation / Fresh Air Selection Switch

(a) 16P Connector (Switch Side)
(b) 16P Connector (Wire Harness Side)

9Y1210824CAS0055US0





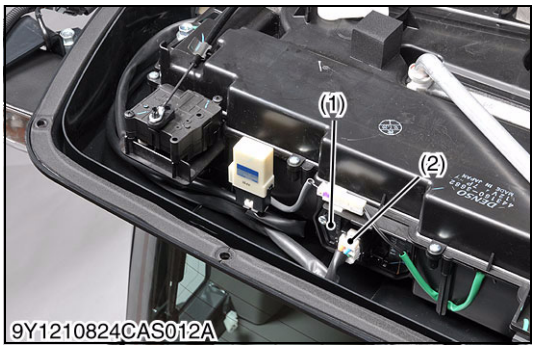
Temperature Control Dial Checking

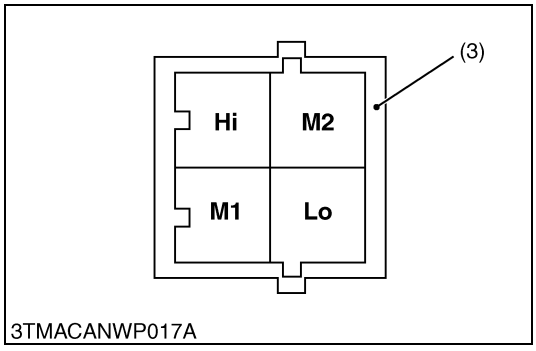
1. Turn the temperature control dial counterclockwise till it stops (at **"COOL"** position).
2. Measure the voltage with a voltmeter across the terminal **1** and terminal **3**. Make the following measurement with the terminals connected.
3. Turn the main switch to **"ON"** position.
4. Check that an output voltage is approximately 10 V when turning the temperature control dial clockwise till it stops (**"WARM"** position).
5. Turn the main switch back to **"OFF"** position.
6. Turn the temperature control dial clockwise till it stops (**"WARM"** position).
7. Measure the voltage with a voltmeter across the terminal **3** and terminal **1**. Make the following measurement with the terminals connected.
8. Turn the main switch to **"ON"** position.
9. Check that an output voltage is approximately 10 V, when turning the temperature control dial counterclockwise till it stops (**"COOL"** position).
10. If an output voltage differs from approximately 10 V, the control panel, wiring harness of fuse is faulty.

(1) **16P** Connector (Switch Side)
(2) **16P** Connector (Wire Harness Side)
(A) "COOL" position to "WARM" position
(B) "WARM" position to "COOL" position

9Y1210824CAS0056US0

(3) Blower Resistor





A/C Blower Resistor

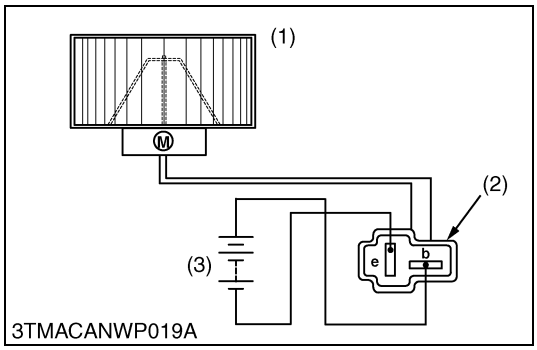
1. Remove the outer roof.
2. Disconnect the **4P** connector (2) for A/C blower resistor (1).
3. Measure the resistance with an ohmmeter across terminal **M2** and terminal **Hi**, and across the terminal **M1** and terminal **Hi**, and across the terminal **Lo** and terminal **Hi**.
4. If the factory specifications are not indicated, A/C blower resistor is faulty.

Resistance	Factory specification	Terminal **Hi** – Terminal **M2**	Approx. 0.22 Ω
		Terminal **Hi** – Terminal **M1**	Approx. 0.69 Ω
		Terminal **Hi** – Terminal **Lo**	Approx. 1.69 Ω

(1) Blower Resistor
(2) **4P** Connector (Wire Harness Side)
(3) **4P** Connector (Blower Resistor Side)

9Y1210824CAS0057US0

(4) Blower Motor



Blower Motor Test

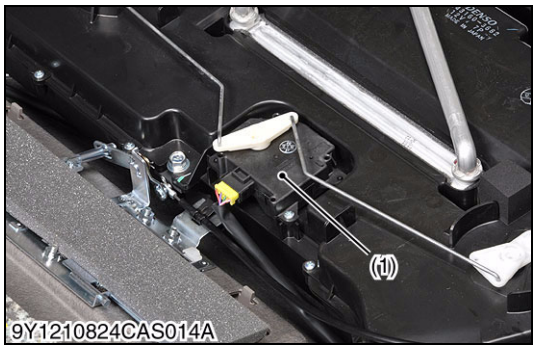
1. Remove the outer roof.
2. Turn the blower motor (1) by hand and check whether it turns smoothly.
3. Disconnect the **2P** connector (2) of blower motor (1).
4. Connect a jumper lead from battery (3) positive terminal to connector terminal **2**.
5. Connect a jumper lead from battery negative terminal to connector terminal **1** momentarily.
6. If the blower motor does not run, check the motor.

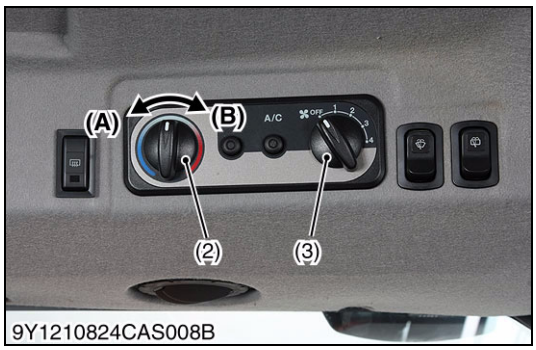
(1) Blower Motor
(2) **2P** Connector (Blower Motor Side)
(3) Battery (12 V)

b: Terminal 2
e: Terminal 1

9Y1210824CAS0058US0

(5) Temperature Motor





Temperature Motor Checking

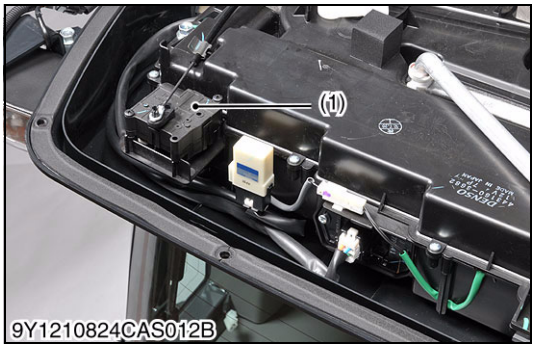
1. Remove the outer roof.
2. Check whether the temperature control dial (2) is damaged. (See page 10-S23.)
3. Turn the main switch to **"ON"** position.
4. Turn the blower switch (3) at **1** position.
5. Turn the temperature control dial from **"COOL"** position **(A)** to **"WARM"** position **(B)**. At the time, make sure the motor is operating.
6. If the motor does not operate, replace it.

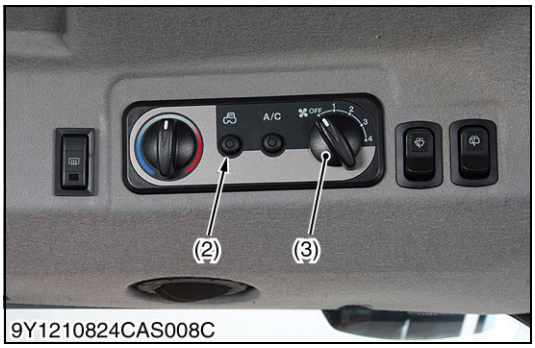
(1) Temperature Motor
(2) Temperature Control Dial
(3) Blower Switch

(A) COOL
(B) WARM

9Y1210824CAS0059US0

(6) Recirculation / Fresh Air Motor Checking





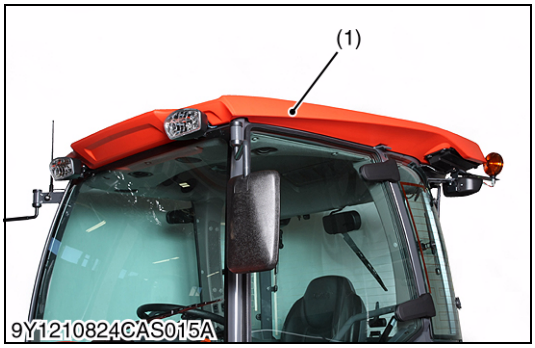
Recirculation / Fresh Air Motor Checking

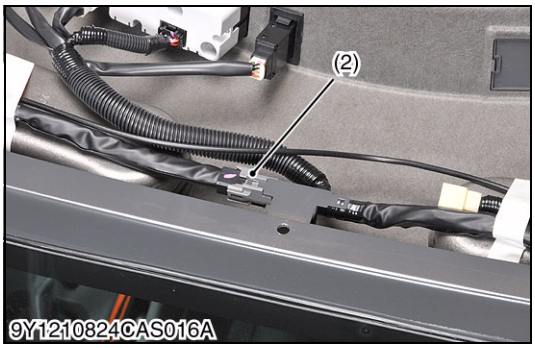
1. Remove the outer roof.
2. Make sure that the recirculation / fresh air selection switch is functioning.
3. Turn the main switch to **"ON"** position.
4. Turn the blower switch (3) to **"1"** position.
5. Push the recirculation / fresh air selection switch (2) and make sure that the switch is at **"Recirculation"** position.
6. If the motor does not run, replace it.

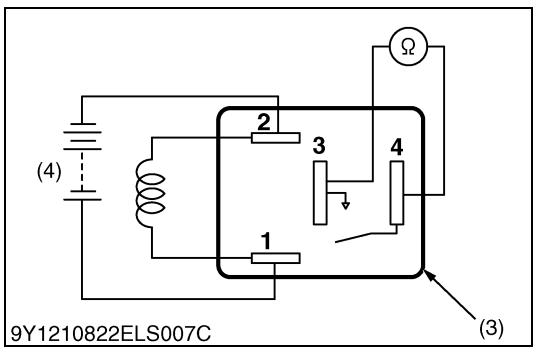
(1) Recirculation / Fresh Air Motor
(2) Recirculation / Fresh Air Selection Switch
(3) Blower Switch

9Y1210824CAS0060US0

(7) Blower Relay







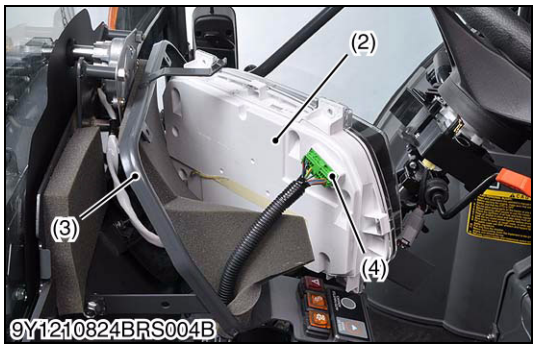
Blower Relay Checking

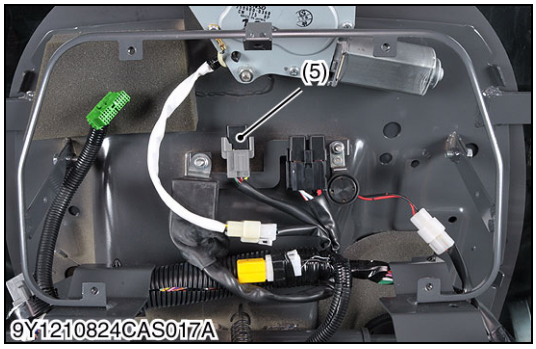
1. Remove the outer roof (1).
2. Remove the blower relay (2).
3. Apply battery voltage across terminals **1** and **2**, and check for continuity across terminals **3** and **4**.
4. If continuity is not established, across the terminal **3** and **4**, replace it.

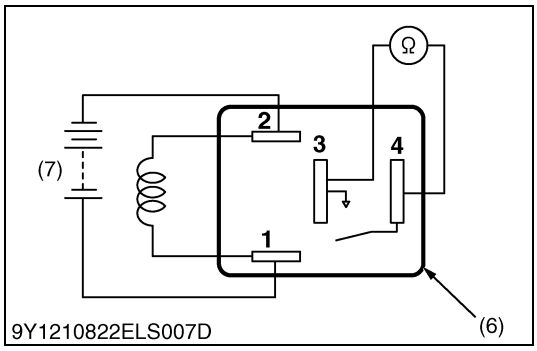
(1) Outer Roof
(2) Blower Relay
(3) Connector (Relay)
(4) Battery

9Y1210824CAS0061US0

(8) Compressor Relay







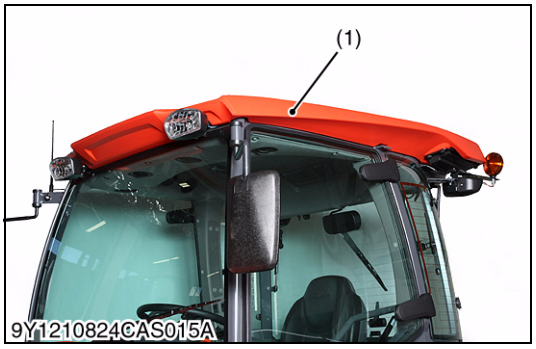
Compressor Relay Checking

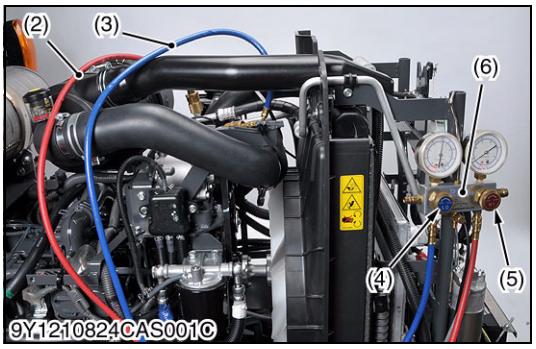
1. Remove the panel cover (1).
2. Remove the electronic instrument panel (2). from panel frame (3).
3. Disconnect the panel connector (4).
4. Remove the compressor relay (5).
5. Apply battery voltage across terminals **1** and **2**, and check for continuity across terminals **3** and **4**.
6. If continuity is not established, across the terminal **3** and **4**, replace it.

(1) Panel Cover
(2) Electronic Instrument Panel
(3) Panel Frame
(4) Panel Connector
(5) Compressor Relay
(6) Connector (Relay)
(7) Battery

9Y1210824CAS0062US0

(9) Pressure Switch





Pressure Switch

1. Remove the outer roof (1).

1) HI Pressure Side

1. Connect the manifold gauge (6) to compressor as following procedure.
   Close the **HI** and **LO** pressure valves (4), (5) of manifold gauge tightly, and connect the charging hoses (3), (2) (red and blue) to the respective compressor service valves. (See page 10-S9.)

■ **NOTE**

- **Be sure to drive out the air in the charging hoses at the manifold gauge connection end by using the refrigerant pressure in the refrigerant cycle.**

2. Start the engine and set at approx. 1500 min^{-1} (rpm). Turn on the A/C switch, then set the blower switch to **HI** position.
3. Raise pressure on the **HI** pressure side of the refrigerant cycle by covering the condenser front with a corrugated carboard, and the pressure switch is activated and the compressor magnetic clutch is turned off. At this time, read the **HI** pressure gauge of the manifold gauge. If this pressure reading differs largely with the setting pressure, replace the pressure switch with a new one.

Setting pressure	Factory specification	Pressure switch **OFF**	More than approx. 2.94 MPa (30.0 kgf/cm^2, 426 psi)

2) LO Pressure Side

1. Disconnect **2P** connector of pressure switch (7).
2. Measure the resistance with an ohmmeter across the connector terminals.
3. If 0 ohm is not indicated at normal condition, there is no refrigerant in the refrigerating cycle because gas leaks or pressure switch is damaged.

(Reference)

Setting pressure	Factory specification	Pressure switch **OFF**	Less than approx. 0.196 MPa (2.00 kgf/cm^2, 28.4 psi)

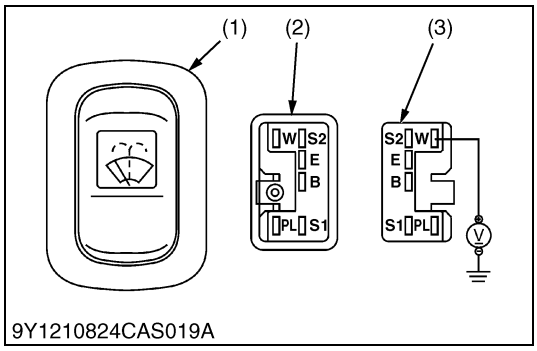
- The resistance of pressure switch is 0 ohm in normal condition, but it becomes infinity if the pressure is out of factory specification. Because the pressure switch starts to work.

(1) Outer Roof
(2) Charging Hose (Blue)
(3) Charging Hose (Red)
(4) **HI** (High Pressure Side) Charging Valve
(5) **LO** (Low Pressure Side) Charging Valve
(6) Manifold Gauge
(7) Pressure Switch

9Y1210824CAS0063US0

(10) Front Wiper Switch

9Y1210824CAS008D



9Y1210824CAS019A

Front Wiper Switch

1. Remove the outer roof, and disconnect the front wiper switch connector (1).
2. Perform the following checkings **1)** and **2)**.

(1) Front Wiper Switch

9Y1210824CAS0064US0

1) Connector Voltage

1. Turn the main switch **"ON"**.
2. Measure the voltage with a voltmeter across the connector **W** terminal and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	**W** terminal – Chassis	Approx. battery voltage

2) Front Wiper Switch

1. Check the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated, the switch is faulty.

Position		Terminal					
		S1	S2	B	W	E	PL
Front wiper switch	WASH I				●	●	●
	OFF	●	●				
	ON		●	●			●
	WASH II		●	●	●	●	●

9Y1210824CAS044US

(Reference)

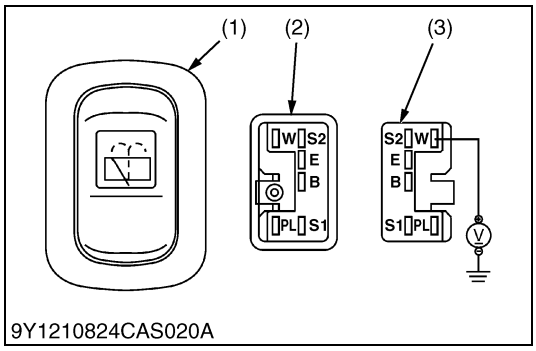
- **WASH I**: **"OFF"** side of the wiper switch remains pushed in.
- **WASH II**: **"ON"** side remains pushed in after the wiper switch is switched **"ON"** and remains switched **"ON"**.

(1) Front Wiper Switch
(2) Front Wiper Switch Connector (Switch Side)
(3) Front Wiper Switch Connector (Wiring Harness Side)
a: From Main Switch AC Terminal

9Y1210824CAS0065US0

(11) Rear Wiper Switch (If Equipped)

9Y1210824CAS008E



9Y1210824CAS020A

Rear Wiper Switch

1. Remove the outer roof, and disconnect the rear wiper switch connector (1).
2. Perform the following checkings **1)** and **2)**.

(1) Rear Wiper Switch

9Y1210824CAS0066US0

1) Connector Voltage

1. Turn the main switch **"ON"**.
2. Measure the voltage with a voltmeter across the connector **W** terminal and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	**W** terminal – Chassis	Approx. battery voltage

2) Rear Wiper Switch

1. Check the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated, the switch is faulty.

Position		Terminal					
		S1	S2	B	W	E	PL
Rear wiper switch	WASH I				●	●	●
	OFF	●	●				
	ON		●	●			●
	WASH II		●	●	●	●	●

9Y1210824CAS045US

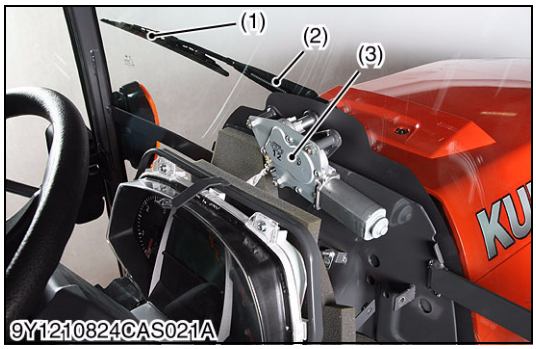
(Reference)

- **WASH I**: **"OFF"** side of the wiper switch remains pushed in.
- **WASH II**: **"ON"** side remains pushed in after the wiper switch is switched **"ON"** and remains switched **"ON"**.

(1) Rear Wiper Switch
(2) Rear Wiper Switch Connector (Switch Side)
(3) Rear Wiper Switch Connector (Wiring Harness Side)
a: From Main Switch AC Terminal

9Y1210824CAS0067US0

(12) Front Wiper Motor



Front Wiper Motor

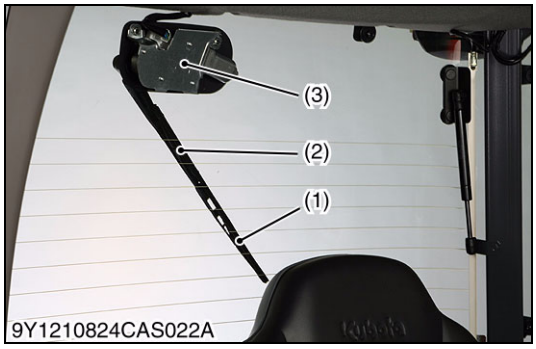
1. Raise up the front wiper arm (2).
2. Turn the main switch to **"ON"** position.
3. Push the front wiper switch to **"ON"** position.
4. Count the number of wiper arm rocking per minutes.
5. If the number differs from the factory specifications, replace the wiper motor assembly.

No. of wiper arm swing frequency at no load	Factory specification	33 to 43 times/min.

(1) Wiper Blade
(2) Wiper Arm
(3) Wiper Motor

9Y1210824CAS0068US0

(13) Rear Wiper Motor (If Equipped)



Rear Wiper Motor

1. Raise up the rear wiper arm (2).
2. Turn the main switch to **"ON"** position.
3. Push the rear wiper switch to **"ON"** position.
4. Count the number of wiper arm rocking per minutes.
5. If the number differs from the factory specifications, replace the wiper motor assembly.

No. of wiper arm swing frequency at no load	Factory specification	33 to 43 times/min.

(1) Wiper Blade
(2) Wiper Arm
(3) Wiper Motor

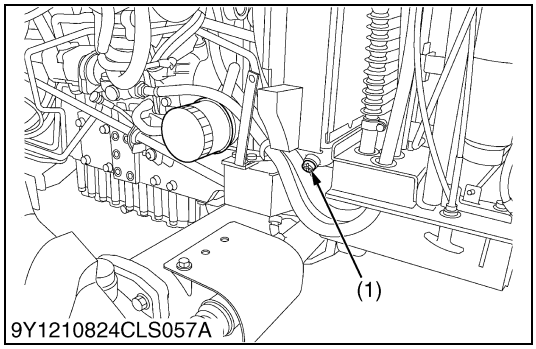
9Y1210824CAS0069US0

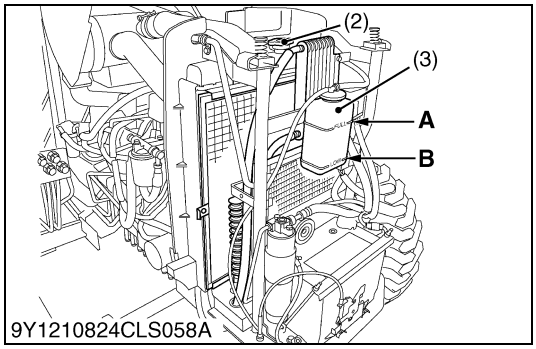
[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Cabin from Tractor

■ **NOTE**
- **Without discharging the refrigerant from system**

9Y1210824CAS0070US0





Draining Coolant

WARNING

To avoid personal injury or death:

- **Do not remove radiator cap while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.**

1. Stop the engine, remove the key and let it cool down.
2. To drain the coolant, open the radiator drain plug and remove radiator cap. The radiator cap must be removed to completely drain the coolant.
3. After all coolant is drained, reinstall the drain plug.

(When refilling)

- Fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap securely.
- Fill with coolant up to **"FULL"** mark on the recovery tank.
- Start and operate the engine for few minutes.
- Stop the engine and let cool. Check coolant level of recovery tank and add coolant if necessary.

IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh soft water and anti-freeze to fill the radiator and recovery tank.**
- **When mixing the anti-freeze with water, the anti-freeze mixing ratio is 50 %.**
- **Securely tighten radiator cap. If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**
- **Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.**

NOTE

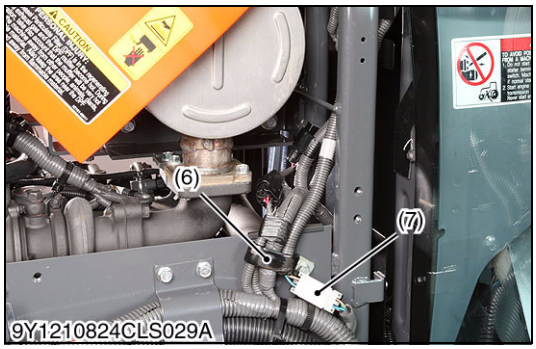
- **On cab type machines, coolant circulates through the heater. This means that one more liter or so of coolant is required.**
  In changing coolant, pour coolant up to the filler port of the recovery tank. Turn ON the heater (shift the temperature control lever toward WARM), and run the engine for a while in order to warm coolant. Then stop the engine.
  When coolant has cooled down, some of the coolant in the recovery tank is sucked. Now the recovery tank is appropriately filled with coolant.

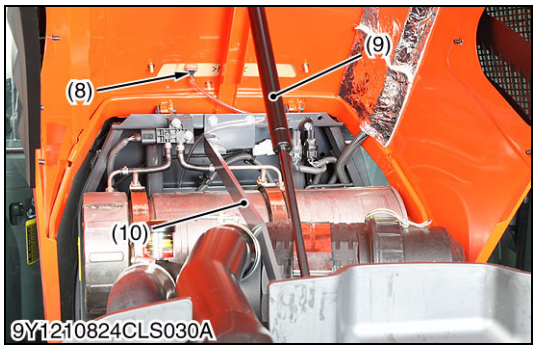
Coolant capacity (without recovery tank)	L3560 L4060	7.5 L 7.9 U.S.qts 6.6 Imp.qts
	L4760 L5060 L5460 L6060	8.2 L 8.7 U.S.qts 7.2 Imp.qts

(1) Drain Plug
(2) Radiator Cap
(3) Recovery Tank

A: FULL
B: LOW

9Y1210824ENS0127US0





Front Grill, Skirts and Bonnet

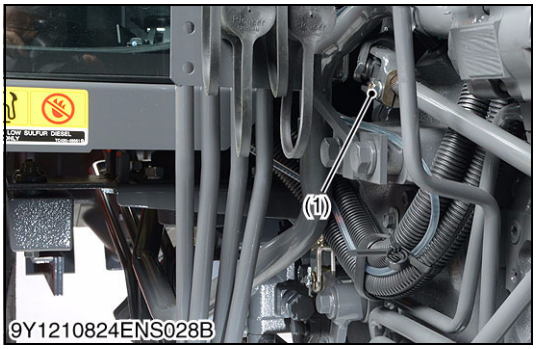
1. Pull down the knob (2) and open the bonnet (1).
2. Disconnect the battery negative cable (3).
3. Remove the front grill (4), left and right side skirts (5).
4. Remove the clamp (6) and disconnect the head light connector (7).
5. Disconnect the window washer hose (8) and remove the damper (9).
6. Remove the plug (11) and the ß pin inside, then the bonnet.
7. Remove the damper support (10).

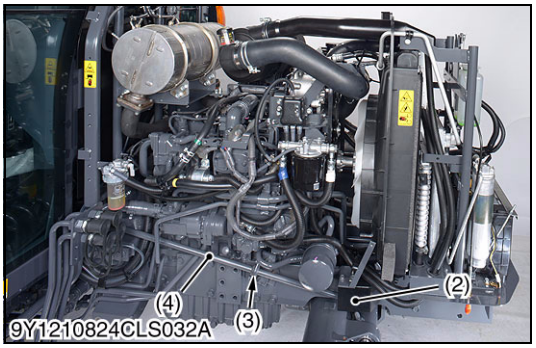
■ **NOTE**

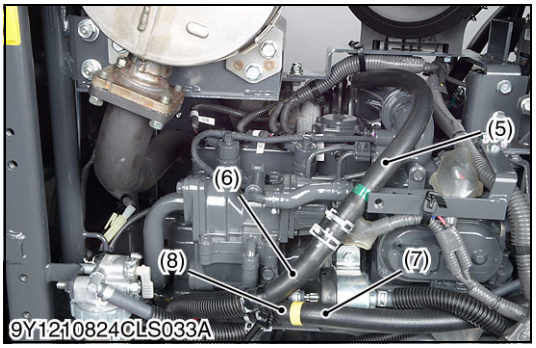
- **When disconnecting the battery cables, disconnect the negative cable first. When connecting the battery cables, connect the positive cable first.**

(1) Bonnet
(2) Knob
(3) Battery Negative Cable
(4) Front Grill
(5) Skirt
(6) Clamp
(7) Head Light Connector
(8) Window Washer Hose
(9) Damper
(10) Damper Support
(11) Plug

9Y1210824CLS0015US0







Steering Joint Shaft

1. Remove the steering joint screw (1).
2. Remove the steering joint cover (2) and the steering joint support (3).
3. Remove the steering joint shaft (4).
4. Disconnect the heater hose (5) from the heater hose (6) and the heater hose (7) from the heater hose (8) inside, then reconnect the heater hose (5), (7) and heater hose (6), (8) to make the loop.

■ **NOTE**

- **Put a mark to each heater hose before disconnecting.**

(1) Steering Joint Screw
(2) Steering Joint Cover
(3) Steering Joint Support
(4) Steering Joint Shaft
(5) Heater Hose
(6) Heater Hose
(7) Heater Hose
(8) Heater Hose

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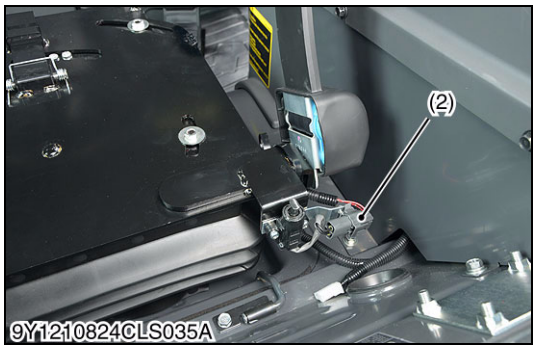

Seat and Seat Bracket

1. Disconnect the seat switch connector (1) and seat tilt switch connector (2).
2. Remove the seat (3).
3. Remove the seat suspension (4) together with seat bracket (5).

(1) Seat Switch Connector
(2) Seat Tilt Switch Connector
(3) Seat
(4) Seat Suspension
(5) Seat Bracket

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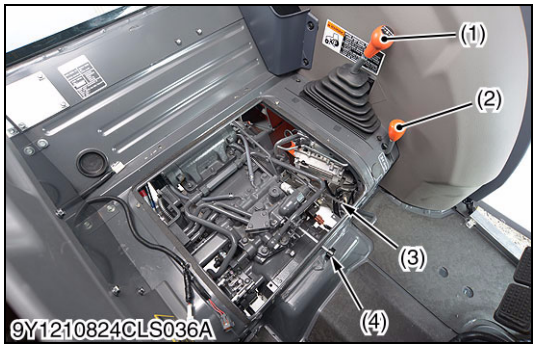

Lever Grips, Differential Lock Rod and Lowering Speed Adjusting Knob

1. Remove the range gear shift lever grip (1) and front wheel drive lever grip (2).
2. Remove the differential lock rod (3) and the lowering speed adjusting knob (4).
3. Remove the range gear shift rod (5).

(1) Range Gear Shift Lever Grip
(2) Front Wheel Drive Lever Grip
(3) Differential Lock Rod
(4) Lowering Speed Adjusting Knob
(5) Range Gear Shift Rod

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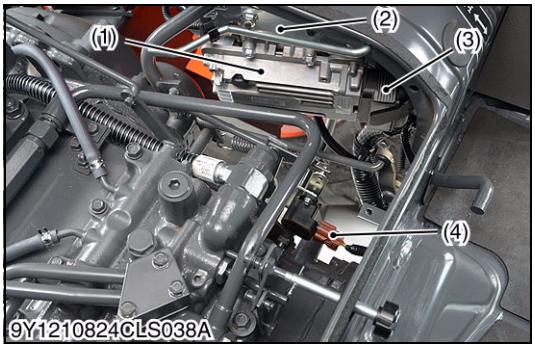

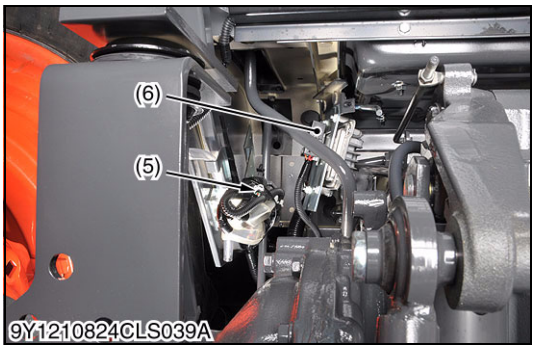

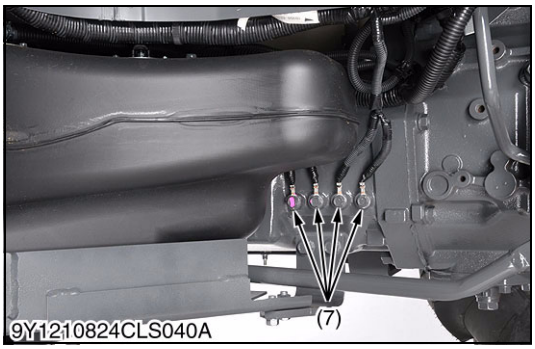

Rear Wiring Harness

1. Remove the engine ECU support (2).
2. Disconnect the engine ECU connector (3).
3. Disconnect the range gear sensor connector (4).
4. Disconnect the joint connectors (5).
5. Remove the engine ECU power relay and glow relay (6) from the engine ECU support (2).
6. Disconnect the earth cables (7).

(1) Engine ECU
(2) Engine ECU Support
(3) Engine ECU Connector
(4) Range Gear Sensor Connector
(5) Joint Connector
(6) Glow Relay
(7) Earth Cable

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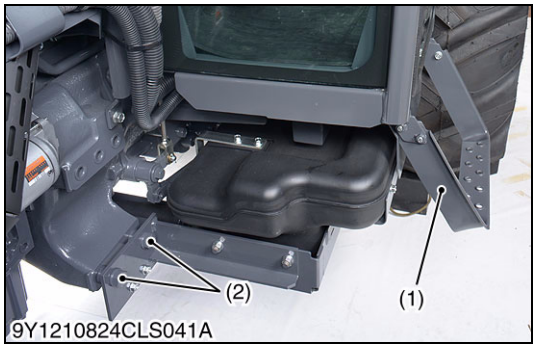

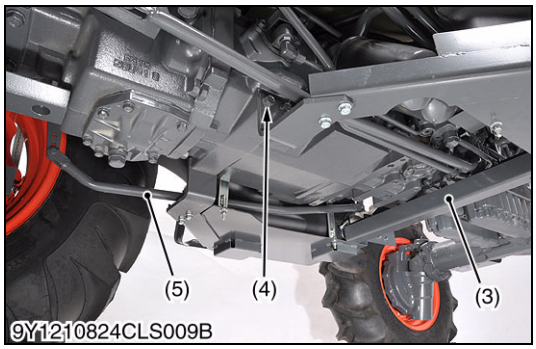

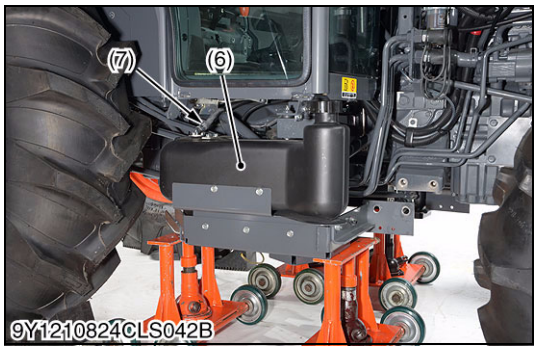

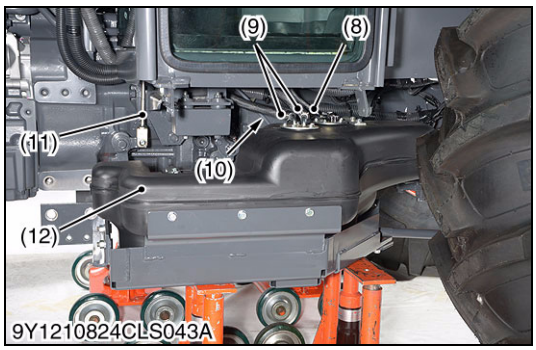

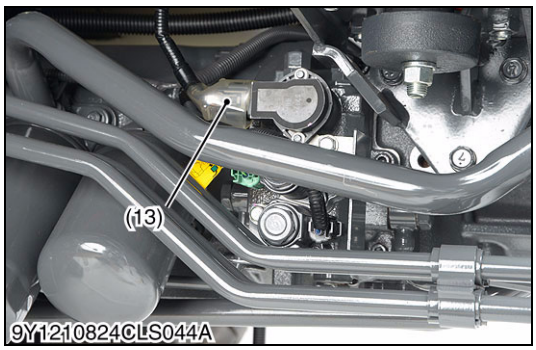

Fuel Tanks

1. Remove the right and left steps (1).
2. Remove the fuel hose cover (3).
3. Remove the brake rod L.H. (5).
4. Place the disassembling stands under the right and left fuel tanks (6), (12).
5. Remove the front (2) and rear support mounting screws (4) of the right and left fuel tanks (6), (12).
6. Lower the fuel tanks (6), (12) together with the disassembling stands.
7. Disconnect the fuel hoses (9), overflow hose (10) and fuel level sensor connector (8) from the fuel tank L.H. (12).
8. Disconnect the fuel hose (7) from the fuel tank R.H. (6).
9. Remove the right and left brake pedal rod (11).
10. Disconnect the swashplate position sensor connector (10).

(1) Step
(2) Front Support Mounting Screw
(3) Fuel Hose Cover
(4) Rear Support Mounting Screw
(5) Brake Rod L.H.
(6) Fuel Tank R.H.
(7) Fuel Hose
(8) Fuel Level Sensor Connector
(9) Fuel Hose
(10) Overflow Hose
(11) Brake Pedal Rod L.H.
(12) Fuel Tank L.H.
(13) Swashplate Position Sensor Connector

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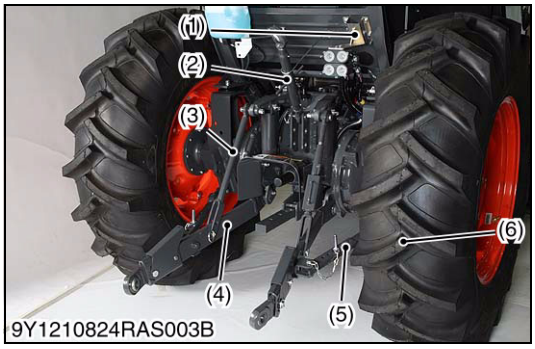

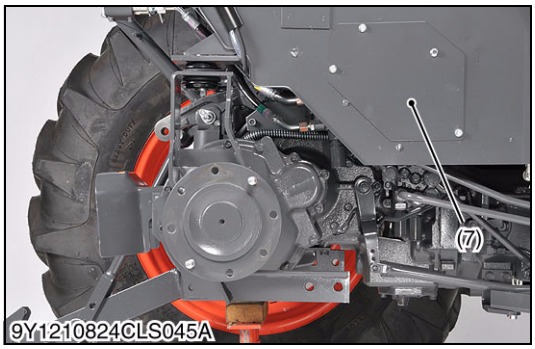

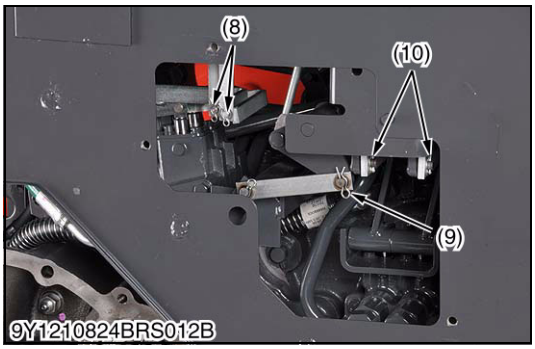

Linkage and Remote Control Valve

1. Remove the remote control valve support (1) together with the couplers. (If equipped.)
2. Remove the top link (2), right and left lift rods (3), lower links (4) and stabilizers (5).
3. Remove the rear tire R.H. (6) and fender plate (7).
4. Disconnect the remote control valve linkage ß pins (8) to release the links. (If equipped.)
5. Disconnect the position lever linkage ß pin (9) to release the link.
6. Disconnect the front loader control linkage ß pins (10) to release the links.

(1) Remote Control Valve
(2) Top Link
(3) Lift Rod
(4) Lower Link
(5) Stabilizer
(6) Rear Tire R.H.
(7) Fender Plate
(8) ß Pin
(9) ß Pin
(10) ß Pin

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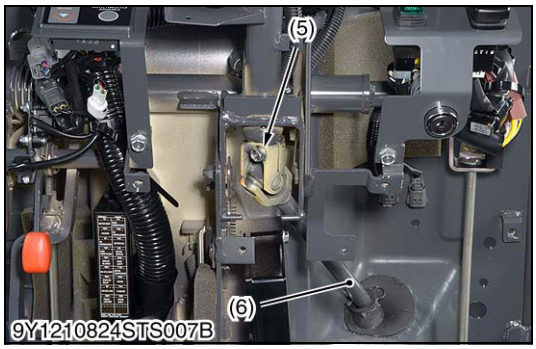

Mat, Panel Cover and Linkage

1. Remove the step mat (1) and sound absorber (2).
2. Remove the steering post cover 1 and 2 (4).
3. Remove the panel cover (3).
4. Remove the universal joint screw (5) and disconnect the steering joint shaft (6).

(1) Step Mat
(2) Sound Absorber
(3) Panel Cover
(4) Steering Post Cover
(5) Universal Joint Screw
(6) Steering Joint Shaft

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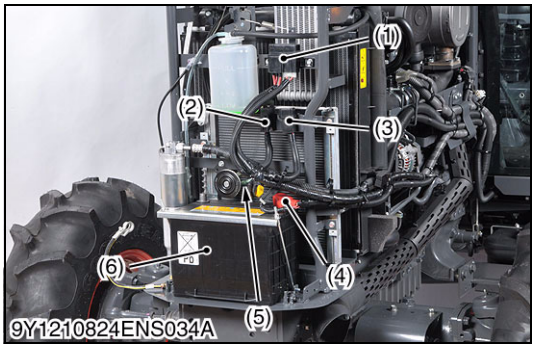
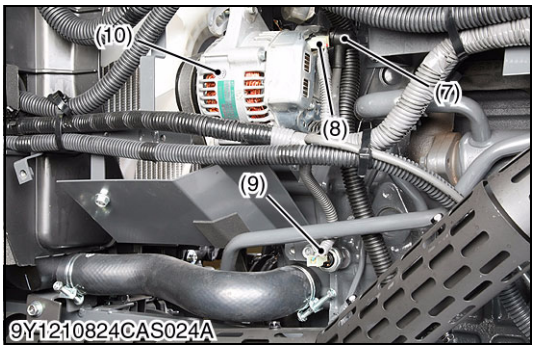
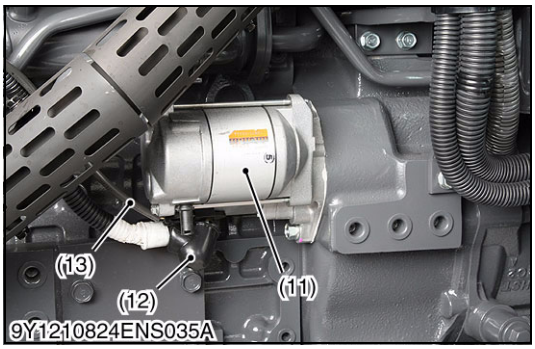
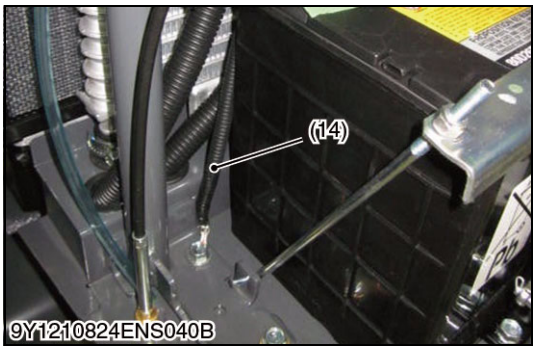
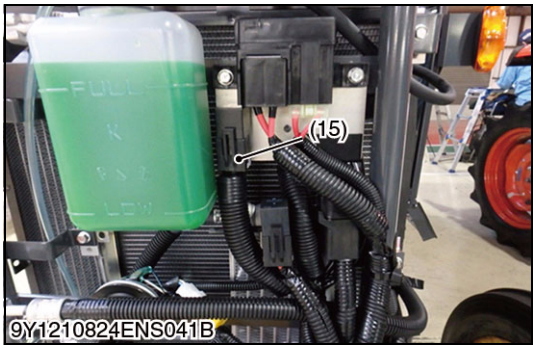








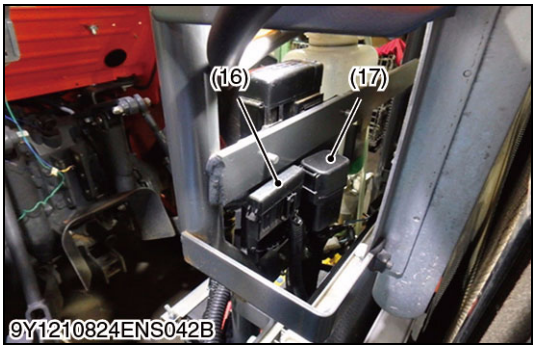


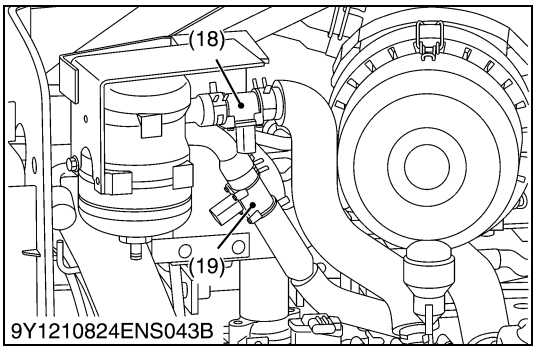
Electric Wiring

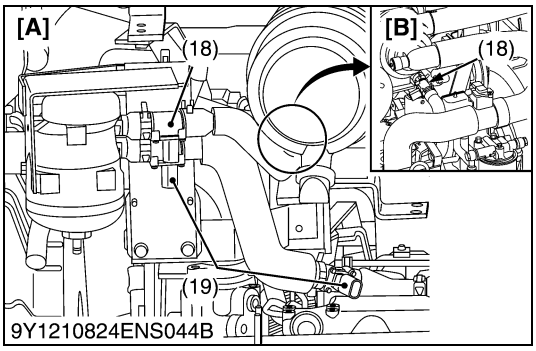
1. Remove the slow blow fuse box (1).
2. Remove the defogger relay (2) and defogger slow blow fuse (3). (If equipped)
3. Disconnect the battery positive cable (4) and battery (6).
4. Disconnect the horn connectors (5).
5. Disconnect the **B** terminal (7), **IG** terminal (8) from the alternator (10) and the oil pressure switch (9).
6. Disconnect the **ST** terminal (13) and the **B** terminal (12) from the starter motor (11).
7. Disconnect CCV GND wiring harness (14), CCV relay (15), CCV heater fuse (16), CCV SB fuse (17) and CCV heater (18) (19). (If equipped)

■ **NOTE**

- **When disconnecting the battery cords, disconnect the negative cord first, when connecting, positive cord first.**







(1) Slow Blow Fuse Box
(2) Defogger Relay
(3) Defogger Slow Blow Fuse
(4) Positive Cable
(5) Horn Connector
(6) Battery
(7) **B** Terminal
(8) **IG** Terminal
(9) Oil Pressure Switch
(10) Alternator
(11) Starter Motor
(12) **B** Terminal
(13) **ST** Terminal
(14) CCV GND Wiring Harness
(15) CCV Relay
(16) CCV Heater Fuse
(17) CCV SB Fuse
(18) CCV Heater (OUT)
(19) CCV Heater (IN)

[A] Left Side
[B] Right Side

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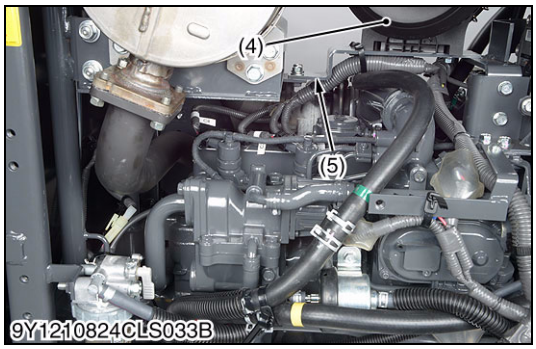
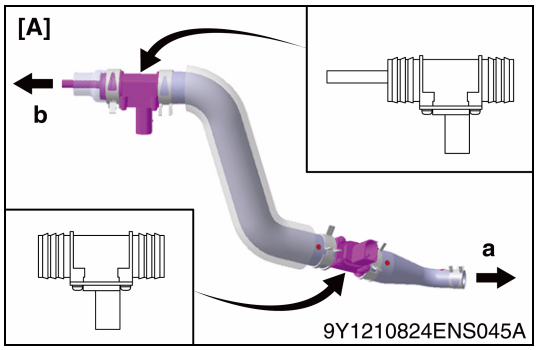
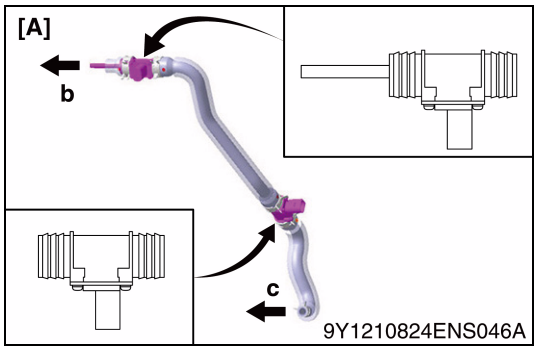




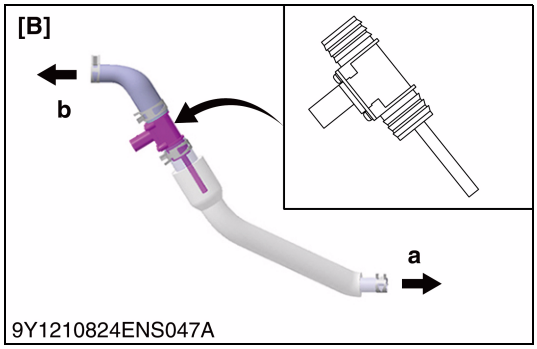


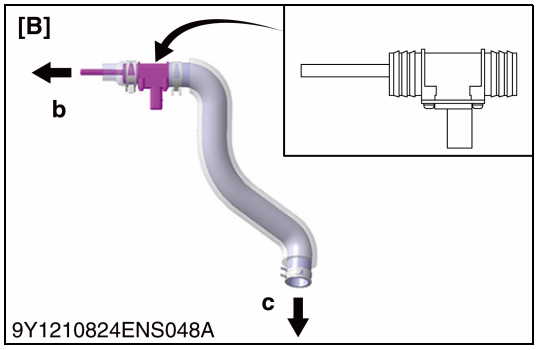
Air Cleaner and Radiator Hose

1. Remove the cramps and hoses of oil separator (3), then remove the oil separator (3).
2. Remove the intake hose (1).
3. Remove the air cleaner bracket (5) together with air cleaner (4).
4. Remove the radiator upper hose (2) and lower hose.

(When reassembling)

- If CCV Heater is equipped, Be careful not to assemble in the wrong direction. Refer the images shown here.





(1) Intake Hose
(2) Radiator Upper Hose
(3) Oil Separator
(4) Air Cleaner
(5) Air Cleaner Bracket

a: To Engine Breather
b: To CCV Inlet
c: To Engine Inlet

[A] L3560, L4060, L4760
[B] L5060, L5460, L6060

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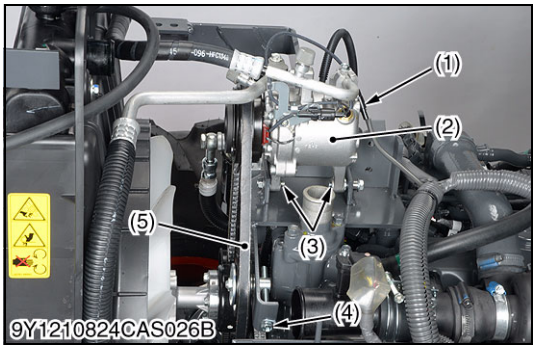

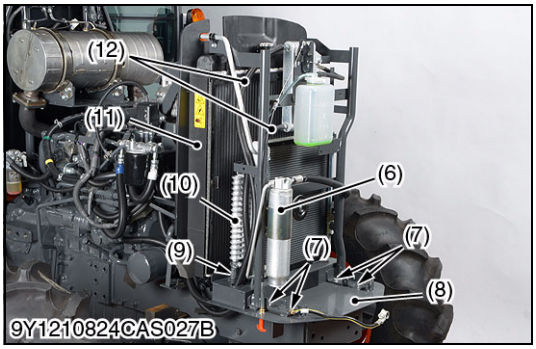

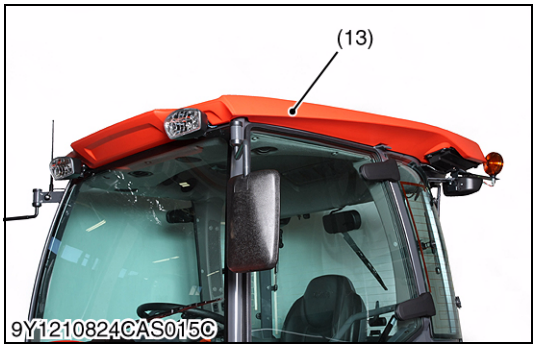

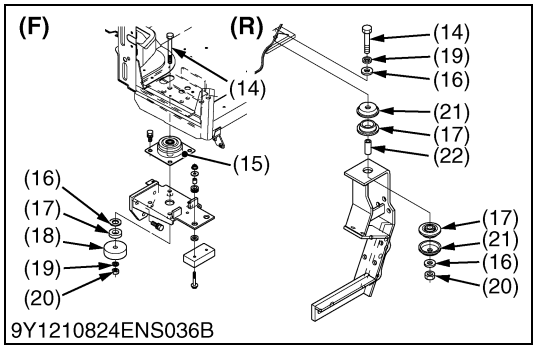

Air Conditioner Parts and Cabin Assembly

1. Disconnect the **1P** connector (1) from compressor (2).
2. Loosen the tension pulley mounting nut, the adjusting bolt (4) and remove the air conditioner belt (5).
3. Remove the compressor mounting bolts (3).
4. Remove the front support mounting bolts (7).
5. Disconnect the oil cooler hoses (9) and fuel cooler hoses (12).
6. Remove the compressor (2), radiator (11), oil cooler (10), and receiver (5), together with front support (8) as a unit.
7. Remove the outer roof (13) of cabin.
8. Support the cabin with nylon straps and hoists.
9. Remove the cabin mounting bolts and nuts.
10. Dismounting the cabin from tractor body.

■ **NOTE**

- **Lift the cabin while making sure it does not catch on anything.**

(When reassembling)

- Be sure to install the washers and mount rubbers, etc. in their original positions as shown in figure.

Tightening torque	Outer roof mounting screw	3.5 to 4.0 N·m 0.36 to 0.40 kgf·m 2.6 to 2.9 lbf·ft
	Cabin mounting bolt and nut	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft

(1) **1P** Connector
(2) Compressor
(3) Compressor Mounting Bolt
(4) Adjusting Bolt
(5) Air Conditioner Belt
(6) Receiver
(7) Front Support Mounting Bolt
(8) Front Support
(9) Oil Cooler Hoses
(10) Oil Cooler
(11) Radiator
(12) Fuel Cooler Hose
(13) Outer Roof
(14) Bolt
(15) Cabin Rubber
(16) Washer
(17) Rubber
(18) Damper
(19) Spring Washer
(20) Nut
(21) Cup
(22) Collar

(F) Front Side
(R) Rear Side

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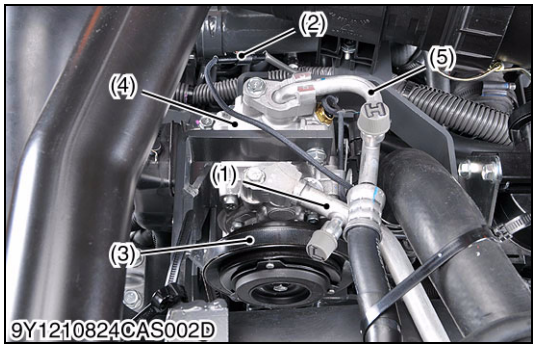
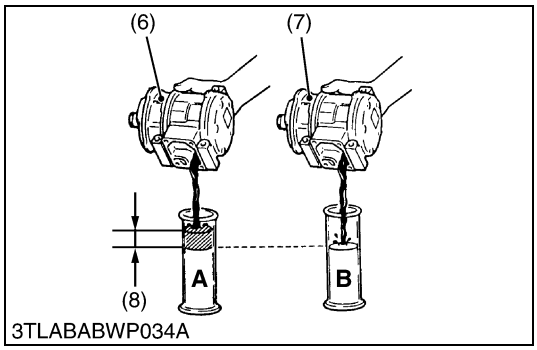
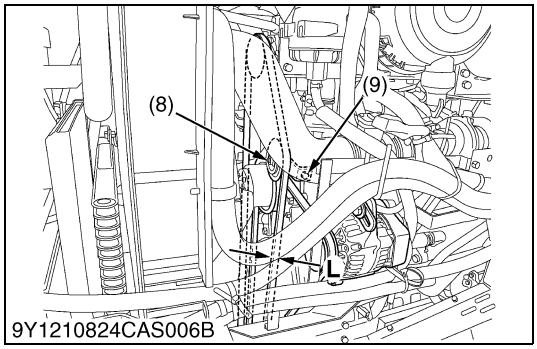
(2) Removing Compressor Assembly







Compressor Assembly

1. Discharge the refrigerant from the system. (See page 10-S17.)
2. Disconnect the low pressure pipe (suction) (1) and high pressure pipe (discharge) (5) from the compressor, then cap the open fitting immediately to keep moisture out of the system.
3. Disconnect the **1P** connector (2) of magnetic clutch.
4. Remove the air conditioner belt (3) and remove the compressor (4) with stay.

(When reassembling)

- After reassembling the compressor, be sure to adjust the air conditioner belt tension and recharge the refrigerant to the system. (See page G-29, 10-S17.)
- Apply compressor oil (DENSO CO. ND-OIL8 or equivalent) to the O-rings and be careful not to damage them.
- **"S"** letter is marked on the compressor for connecting the low pressure pipe (suction side).
- **"D"** letter is marked on the compressor for connecting the high pressure pipe (discharge side).
- When replacing the compressor with a new one, meet the oil amount with old one.
- Push on the belt between the pulleys with a finger. Deflection **"L"** of 10 to 12 mm (0.40 to 0.48 in.) under a 98 N (10 kgf, 22 lbs) load is appropriate.

Tightening torque	High pressure pipe and low pressure pipe mounting screw	7.9 to 11 N·m 0.80 to 1.2 kgf·m 5.8 to 8.6 lbf·ft
	Compressor mounting screws	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

(1) Low Pressure Pipe
(2) **1P** Connector (Magnetic Clutch)
(3) Air Conditioner Belt
(4) Compressor
(5) High Pressure Pipe 1
(6) New Compressor
(7) Old Compressor
(8) Remove the Excess Oil (**A**-**B**)
(9) Adjusting Bolt

A: Oil Flow New Compressor
B: Oil Flow Replace Compressor
L: Deflection (10 to 12 mm (0.40 to 0.48 in.))

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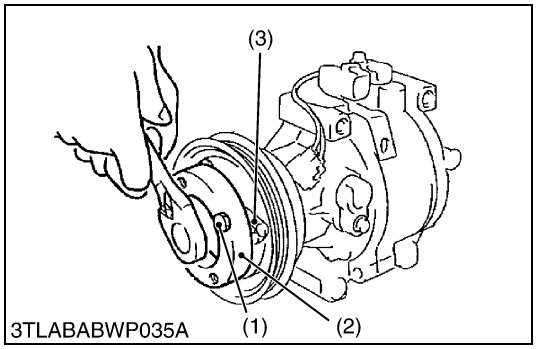

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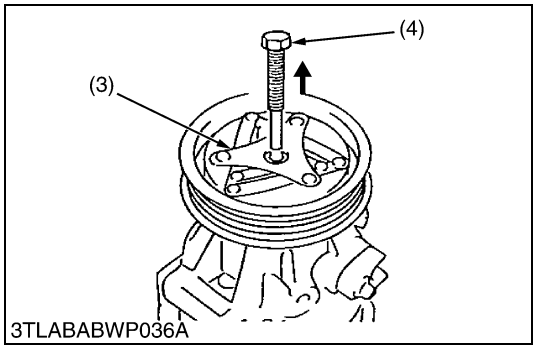

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Hub Plate

1. Three stopper bolts (1) are set in stopper magnet clutch (2) at the position corresponding to the shape of compressor. (See page G-72.)
2. The stopper magnet clutch (2) is hung on hub plate (3) and it is fixed that the compressor rotates.
3. Remove the magnet clutch mounting screw.
4. Remove the hub plate (3).
5. Remove the shims.

(When reassembling)

- Do not apply grease or oil on the hub plate facing.
- Do not use the magnetic clutch mounting screw again.
- Make sure to turn rotor by hand after assembling and the stator does not contact with the hub plate.
- Check and adjust the air gap before tight the magnet clutch mounting screw or nut to the specified torque. (See page 10-S57.)

Tightening torque	Clutch mounting screw	12.3 to 14.1 N·m 1.25 to 1.44 kgf·m 9.05 to 10.4 lbf·ft

(1) Stopper Bolt
(2) Stopper Magnet Clutch
(3) Hub Plate
(4) Remover Magnet Clutch

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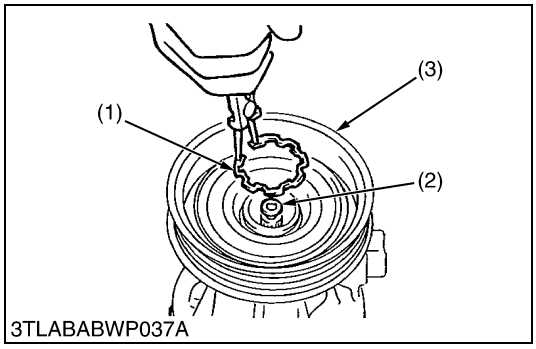

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Rotor

1. Remove the circlip (1).
2. Remove the rotor (3).

(When reassembling)

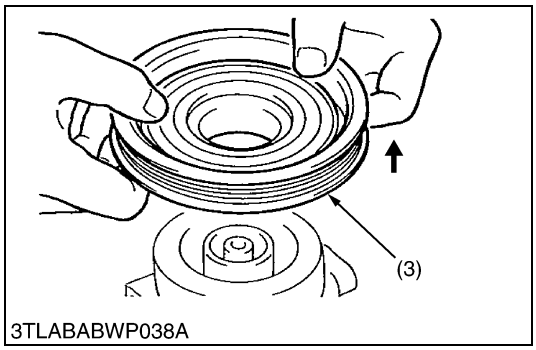
- Do not use the circlip again.
- Assemble the circlip for the tapered side to become outside of rotor.
- The width of expanding of circlip is set in boss of shaft as a minimum.

(Reference)

Type of compressor	Code No. for circlip
Scroll type	T1065-87450

(1) Circlip
(2) Shim
(3) Rotor

9Y1210824CAS0076US0



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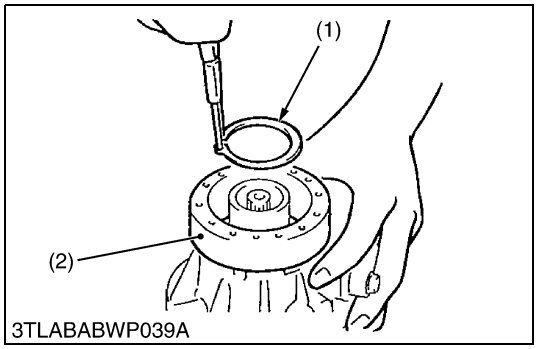

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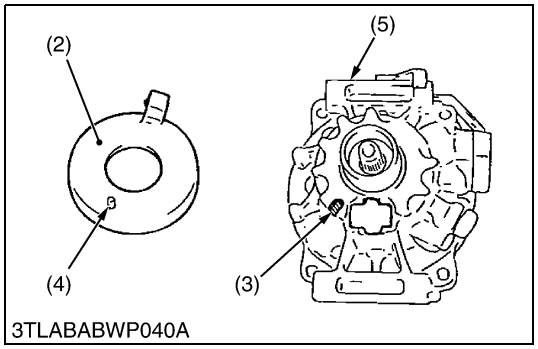


3TLABABWP040A

Stator

1. Remove the lead wire from compressor body.
2. Remove the external circlip (1).
3. Remove the stator (2).

(When reassembling)

- Do not use the circlip again.
- Assemble the circlip for the tapered side to become outside of front housing.
- The width of expanding of circlip is set is boss of shaft as a minimum.
- Match and assemble the concave part (3) of the front housing (5) and the pin (4) of stator.

(1) External Circlip
(2) Stator
(3) Concave Part
(4) Pin
(5) Front Housing

9Y1210824CAS0077US0

(3) Removing Air Conditioner Unit

Draining Coolant

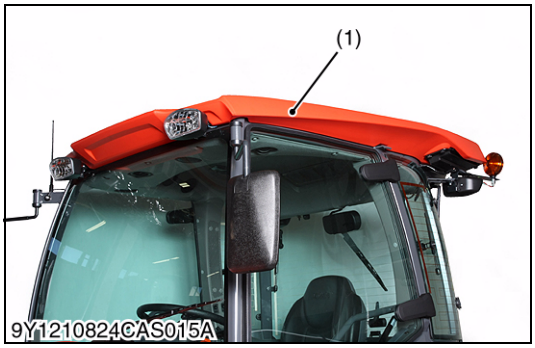
- See page 10-S34.

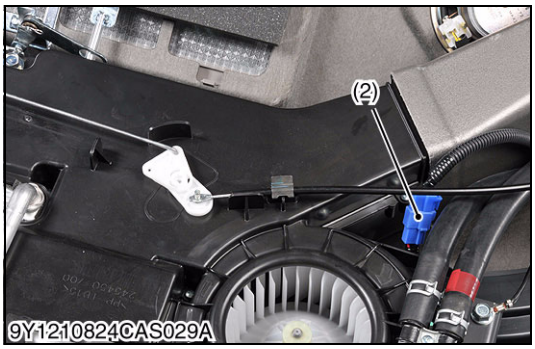
9Y1210824CAS0078US0

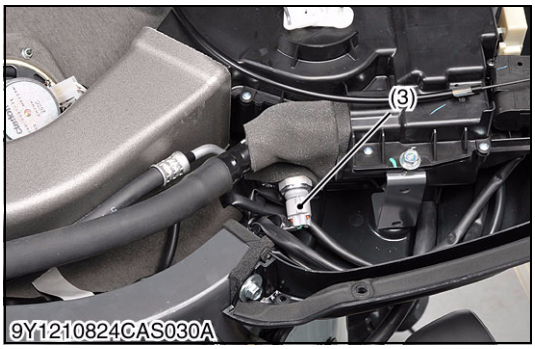
Discharging Refrigerant Gas

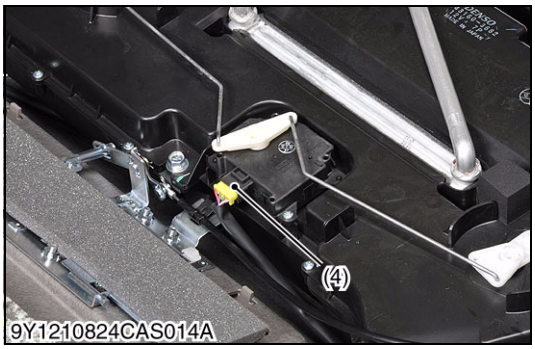
- See page 10-S17.

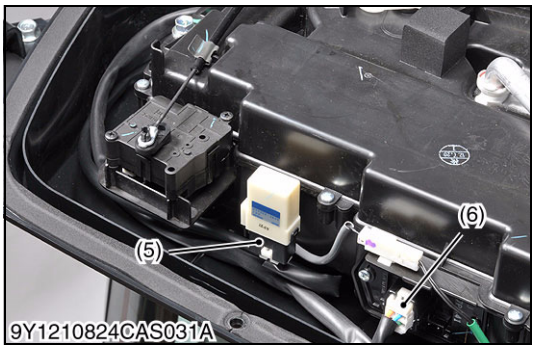
9Y1210824CAS0079US0









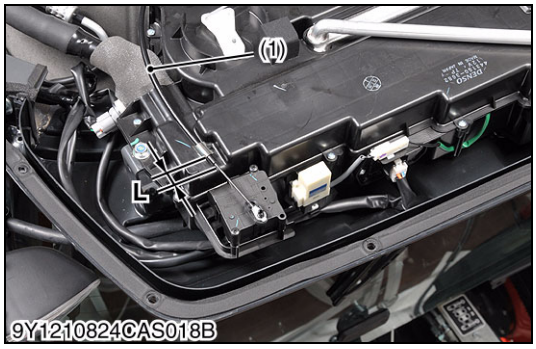


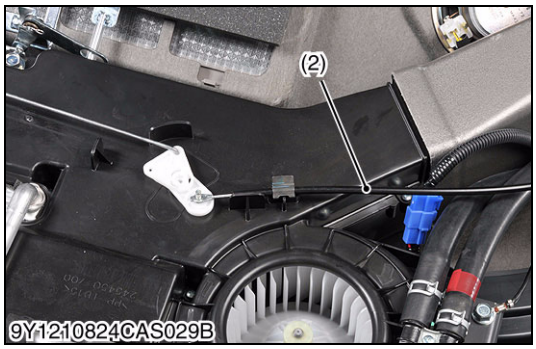
Outer Roof and Wiring Harness

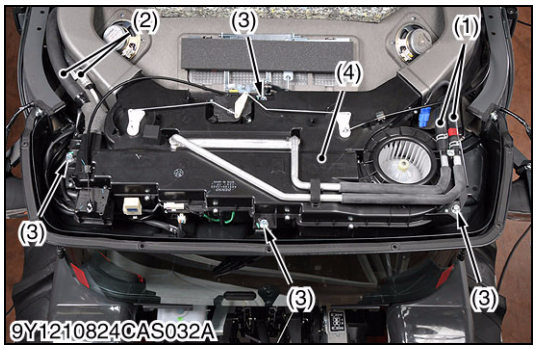
1. Remove the outer roof (1).
2. Disconnect the blower motor connector (2) and pressure switch connector (3).
3. Disconnect the temperature motor connector (4).
4. Disconnect the blower resistor connector (6) and thermostat connector (5).

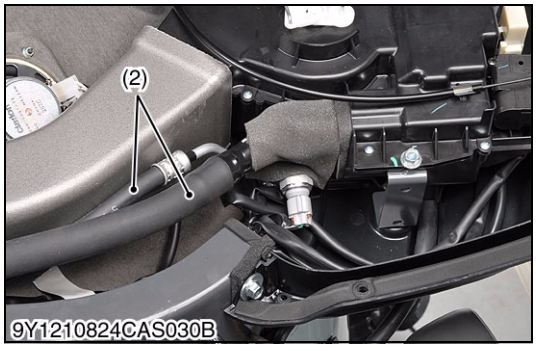
(1) Outer Roof
(2) Blower Motor Connector
(3) Pressure Switch Connector
(4) Temperature Motor Connector
(5) Thermostat Connector
(6) Blower Resistor Connector

9Y1210824CAS0080US0









Recirculation / Fresh Air Motor Cable and Temperature Motor Cable

1. Disconnect the recirculation / fresh air motor cable (1).
2. Disconnect the temperature motor cable (2).

(1) Recirculation / Fresh Air Motor Cable
(2) Temperature Motor Cable

L : 3.0 to 15 mm (0.12 to 0.59 in.)

9Y1210824CAS0081US0

Air Conditioning Unit

1. Disconnect the heater hoses (1).
2. Disconnect the air conditioner pipes (2).
3. Remove the screws (3), then the air conditioning unit (4).
4. Remove the duct hoses.

(When reassembling)

- When reconnecting the cooler pipes with the unit, apply compressor oil (DENSO OIL8 or equivalent) to O-rings.
- When remounting the unit, tighten five screws by hand and finally retighten them after aligning the inner roof duct with the unit duct.
- When connecting the heater hose with A/C unit, hose should be put into the A/C unit pipe more than 30 mm (1.2 in.)

Tightening torque	A/C unit mounting screw (M6)	4.0 to 6.8 N·m 0.40 to 0.70 kgf·m 2.9 to 5.0 lbf·ft
	A/C unit mounting screw (M8)	9.81 to 11.6 N·m 1.00 to 1.19 kgf·m 7.24 to 8.60 lbf·ft
	Low pressure pipe (Cooler pipe (suction)) retaining nut	7.90 to 11.8 N·m 0.806 to 1.20 kgf·m 5.83 to 8.70 lbf·ft
	High pressure pipe (Cooler pipe (liquid)) retaining nut	11.8 to 14.7 N·m 1.21 to 1.49 kgf·m 8.71 to 10.8 lbf·ft

(1) Heater Hose
(2) Air Conditioner Pipe
(3) Screw
(4) Air Conditioner Unit

9Y1210824CAS0082US0

(4) Removing Air Conditioner Pipes

Discharging Refrigerant Gas

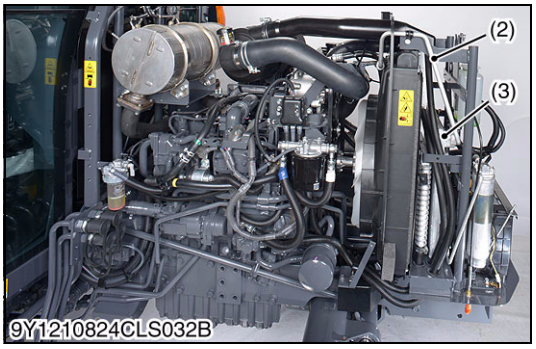
• See page 10-S17.

9Y1210824CAS0079US0

Battery, Front Grill, Skirt and Bonnet

• See page 10-S35.

9Y1210824CAS0083US0



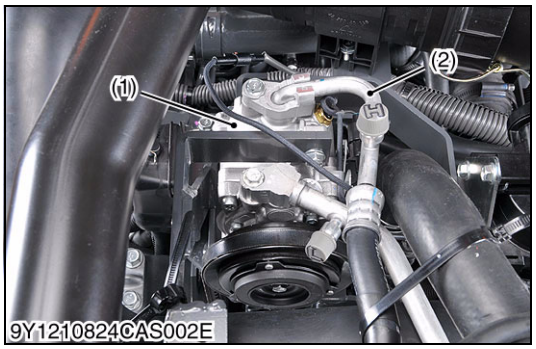
High Pressure Pipe 1

1. Disconnect the high pressure pipe 1 (2) from the compressor (1) and condenser (3), then cap the open fittings immediately to keep moisture out of the system.

(When reassembling)

• Apply compressor oil (DENSO ND-OIL 8 or equivalent) to the O-rings and be careful not to damage them.

Tightening torque	High pressure pipe 1 mounting screw (Compressor side)	7.90 to 11.8 N·m 0.806 to 1.20 kgf·m 5.83 to 8.70 lbf·ft
	High pressure side 1 retaining nut (Condenser side)	4.0 to 6.8 N·m 0.41 to 0.69 kgf·m 3.0 to 5.0 lbf·ft



(1) Compressor
(2) High Pressure Pipe 1
(3) Condenser

9Y1210824CAS0084US0

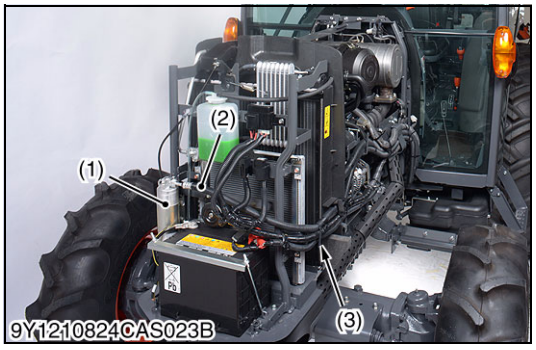
Hose Clamp

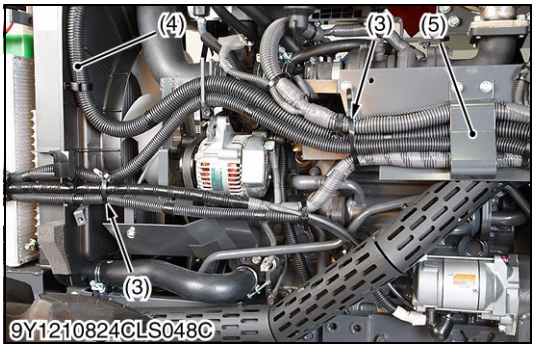
1. Remove the hose clamps (3) and harness cover (5).
2. Disconnect the high pressure pipe 2 (2) from the receiver (1) and low pressure pipe (4) from the compressor, then cap the open fittings immediately to keep moisture out of the system.

(When reassembling)

• Apply compressor oil (DENSO ND-OIL 8 or equivalent) to the O-rings and be careful not to damage them.

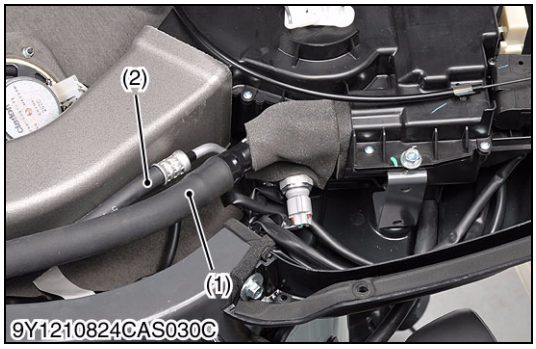
Tightening torque	High pressure pipe 2 retaining nut (Receiver side)	11.8 to 14.7 N·m 1.21 to 1.49 kgf·m 8.71 to 10.8 lbf·ft
	Low pressure pipe mounting screw (Compressor side)	7.90 to 11.8 N·m 0.806 to 1.20 kgf·m 5.83 to 8.70 lbf·ft





(1) Receiver
(2) High Pressure Pipe 2
(3) Hose Clamp
(4) Low Pressure Pipe
(5) Harness Cover

9Y1210824CAS0085US0



(5) Removing Heater Hoses

High Pressure and Low Pressure Pipes

1. Remove the outer roof.
2. Disconnect the high pressure pipe 2 (2), then cap the open fitting immediately to keep moisture out of the system.
3. Remove the rubber and disconnect the low pressure pipe (1), then cap the open fittings immediately to keep moisture out of the system.
4. Remove the inner covers (3).

(When reassembling)

- Replace the rubber with a new one.
- Apply compressor oil (DENSO ND-OIL 8 or equivalent) to the O-rings and be careful not to damage them.

Tightening torque	High pressure pipe 2 retaining nut	11.8 to 14.7 N·m 1.21 to 1.49 kgf·m 8.71 to 10.8 lbf·ft
	Low pressure pipe retaining nut	7.90 to 11.8 N·m 0.806 to 1.20 kgf·m 5.83 to 8.70 lbf·ft

(1) Low Pressure Pipe
(2) High Pressure Pipe 2
(3) Inner Cover

9Y1210824CAS0086US0

Front Grill, Skirt and Bonnet

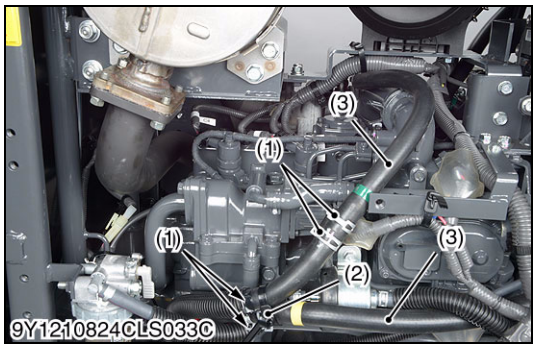
- See page 10-S35.

9Y1210824CAS0087US0

Draining Coolant

- See page 10-S34.

9Y1210824CAS0078US0



Hose Clamp

1. Remove the hose bands (1).
2. Remove the hose clamp (2).

■ **NOTE**

- **Before disconnecting the heater hoses (3), put the parting marks on the hoses for making proper reconnecting.**

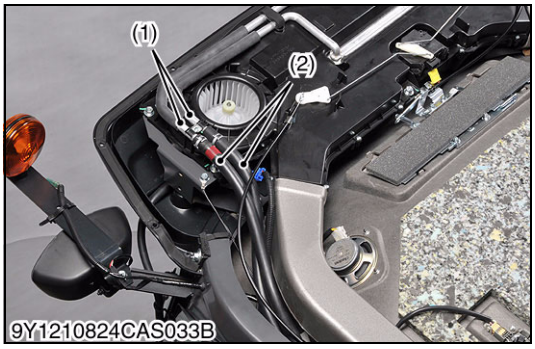
3. Disconnect the heater hoses (3), then remove them from under the cabin.

(When reassembling)

- Connecting the heater hoses at their original position.

(1) Hose Band
(2) Hose Clamps
(3) Heater Hoses

9Y1210824CAS0088US0



Heater Hoses

1. Remove the outer roof.

■ **NOTE**

- **Before disconnecting the heater hoses (2), put the parting marks on the hoses for marking proper reconnecting.**

2. Disconnect the heater hoses (2) from the hose pipes (1).
3. Remove the inner covers (3).
4. Pull out the heater hoses (2) from the bottom of the cabin.
5. Remove the heater hoses (2).

(When reassembling)

- Connect the heater hoses at their original positions.
- In assembling the heater hose (2) to the pipe (1), connect the heater hose with identification mark (white paint) to upper side of the hose pipe.
- When connecting the heater hose with A/C unit, hose should be put into the A/C unit pipe more than 30 mm (1.2 in.).

(1) Heater Pipe
(2) Heater Hose
(3) Inner Cover

9Y1210824CAS0089US0

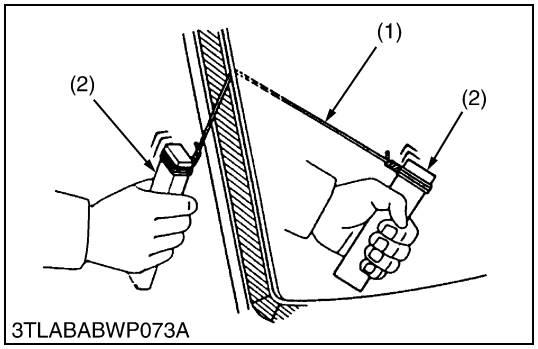
(6) Cabin Windshields

Preparation

1. Prepare the followings.
   - Cutter knife
     1 piece
   - Scraper
     1 piece
   - Gun for coating
     1 piece
   - Sika Tack-Ultrafast or equivalent
   - Gummed tape
   - Sika-Activator
   - Sika primer 209
   - Shin Etsu silicon KE420
   - Sika-cleaner 205

■ **NOTE**
- **Sika product are made by Sika Corporation.**
- **Shin Etsu silicon KE420 is made by Shin Etsu Polymer Corporation.**
- **These materials can't be provided by Kubota Corporation.**
- **Therefore, please find the local made equivalent materials in your country and use them when you need.**

9Y1210824CAS0090US0



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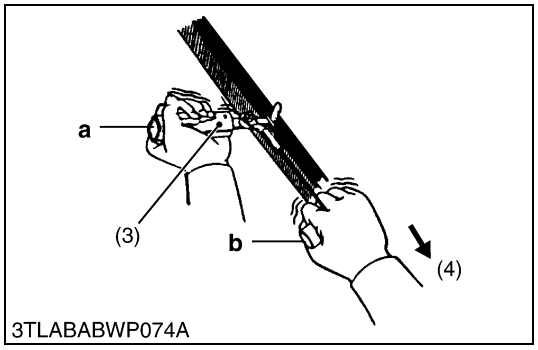

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Before Replacing Windshields (1)

[In case of using piano wire (When glass is clacked)]
1. Thread the piano wire from the inside of cabin. Tie its both ends to a wooden blocks or the like. (See the left figure.)
2. Pull the piano wire inward/outward alternately to cut the adhered part.

■ **NOTE**
- **Do not let the piano wire make sliding contact with the edge of glass plate forcibly.**

[In case of using cutter knife (When glass is totally crushed finely)]
1. Insert the knife (3) into the adhered part.
2. Keep the edge of knife blade square to the glass edge at the part **"a"**. Slide the knife blade along the glass surface and the edge. Pull the part **"b"** in the direction parallel to the glass edge to cut them off.

■ **NOTE**
- **Find a wider gap between the glass and body.**
- **Be careful of handling the cutter knife not to damage your hand.**

(1) Piano Wire
(2) Wood Peace
(3) Cutter Knife
(4) Pulling

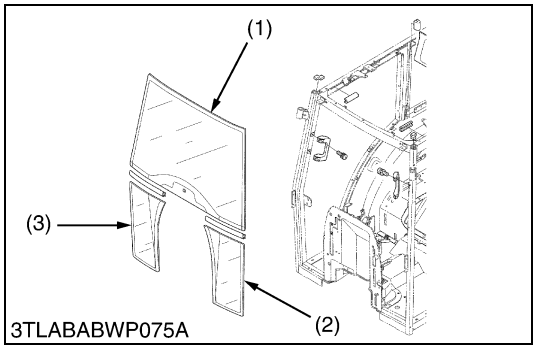
9Y1210824CAS0091US0

Before Replacing Windshields (2)

1. When the Sika Tack-Ultrafast or equivalent attached to the cabin frame and the glass are reused, remove the bond clearly.
2. Clean the frame surface with Sika-Activator.

■ **NOTE**
- **Remove the bond completely.**

9Y1210824CAS0092US0



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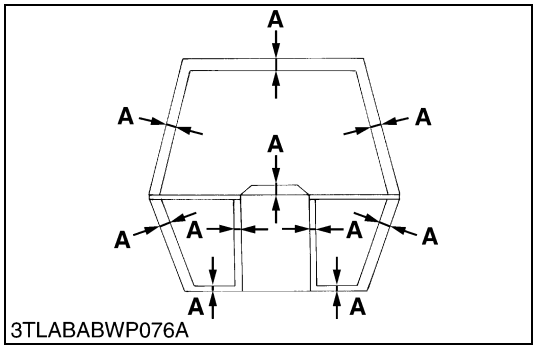

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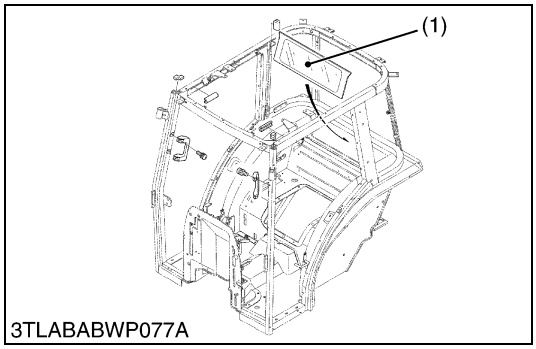

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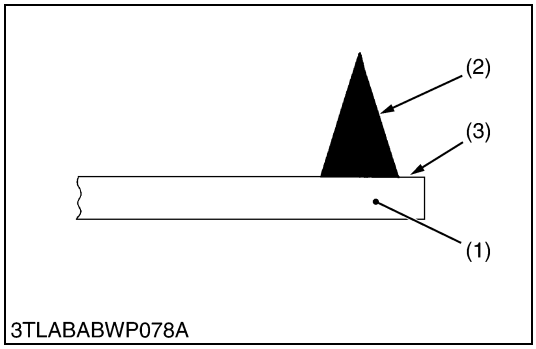

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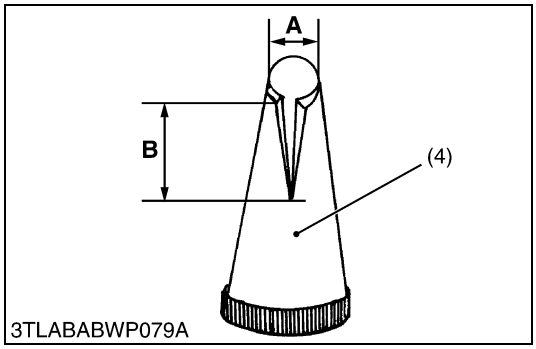

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Before Replacing Windshields (3)

1. Check that the glasses are not damaged and cracked.
2. Turn over the glass and clean this surface of the glass by Sika-Activator.
3. The cleaning area of the rear surface is indicated **"A"** in the figure left.

■ **NOTE**

- **If not cleaning the glass, it may result in adhesive failure.**

(1) Upper Windshield
(2) Lower Windshield (Left)
(3) Lower Windshield (Right)

A: 18 to 22 mm (0.71 to 0.87 in.)

9Y1210824CAS0093US0

Rear Windshield

1. Apply a Sika primer 209 on the cabin frame.
2. Apply a Sika-Activator (3) on the rear windshield shown in figure.
3. Apply a Sika Tack-Ultrafast (2) (or equivalent) on the rear windshield (1) as shown in figure.
4. Install the rear windshield (1) to the cabin and fix tit with a gummed tape.
5. Leave it for one hour.

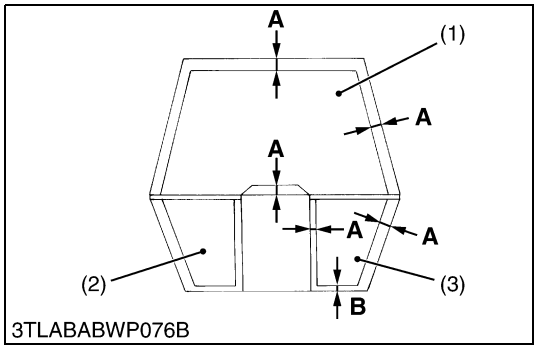
■ **NOTE**

- **Apply the Sika Tack-Ultrafast (or equivalent) with the jig having the specified tip shape as shown in the figure left.**
- **Apply it with a uniform speed to minimize unevenness.**
- **Follow the instruction manual of Sika Tack-Ultrafast.**
- **When the gummed tape is removed, the rear windshield may be displaced. In this case fix it again.**
- **Remove the gummed tape (adhesive tape) little by little to check the bonding condition.**

(1) Rear Windshield
(2) Sika Tack-Ultrafast
(3) Sika-Activator
(4) Jig

A: 8 mm dia. (0.31 in. dia.)
B: 12 mm (0.47 in.)

9Y1210824CAS0094US0



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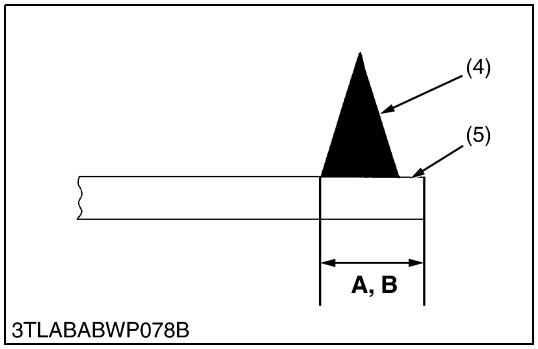

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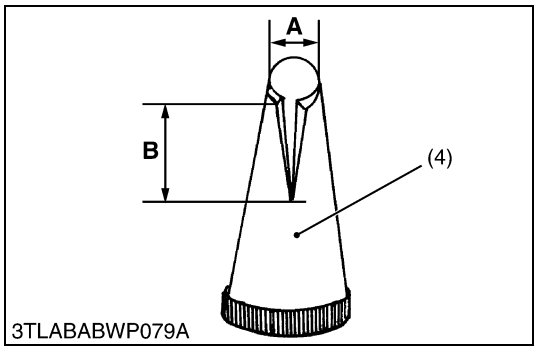

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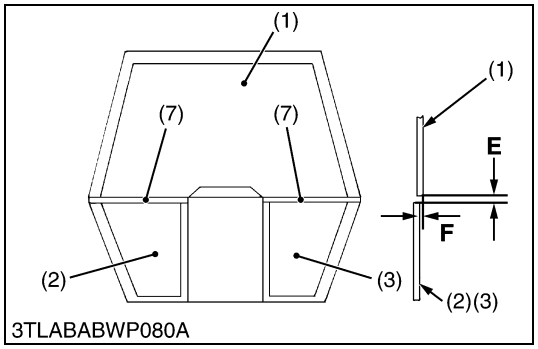

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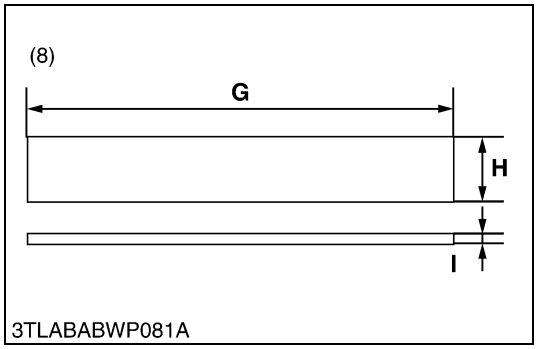

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Front Windshield

■ **NOTE**
- **Apply the Sika Tack-Ultrafast (or equivalent) with the jig having the specified tip shape as shown in the figure left.**
- **Apply it with a uniform speed to minimize unevenness.**
- **Follow the instruction manual of Sika Tack-Ultrafast.**

1. Apply the Sika Primer 209 on the cabin frame **"A"** and **"B"** in the figure.
2. Apply the Sika-Activator (5) on the windshield **"A"** and **"B"** in the figure.
3. Apply the Sika Tack-Ultrafast (4) on the windshield **"A"** and **"B"** in the figure.
4. Install the lower (left or right) windshield to the cabin and fix it with a gummed tape.
5. Set the upper windshield to the cabin and fix it with a gummed tape.

■ **NOTE**
- **Use a jig (8) shown in the figure to create even clearance "E" [approx. 5 mm (0.2 in.)] between the lower and upper windshield.**
- **The level unevenness between the upper and lower windshields should be −1 to +1 mm (−0.04 to +0.04 in.) or less at the windshield surface.**

6. Leave it for one hour.
7. Remove the jig (8).
8. Install the H rubber (7) between the lower and upper windshield (2), (3).
9. Apply the Shin Etsu silicon KE420 in H rubber (7).
10. Apply the Shin Etsu silicon KE420 on the edge of H rubber (7).

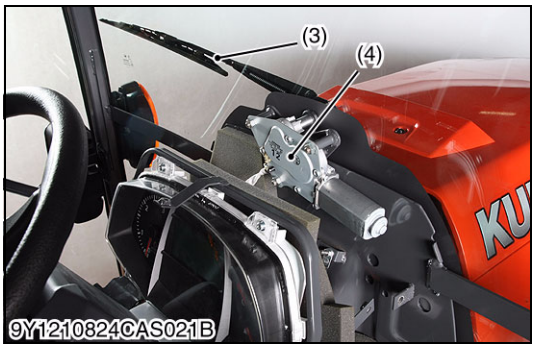
■ **NOTE**
- **When the gummed tape is removed, the glass may be displaced. In this case fix it again.**
- **Remove the gummed tape (adhesive tape) little by little to check the bonding condition.**

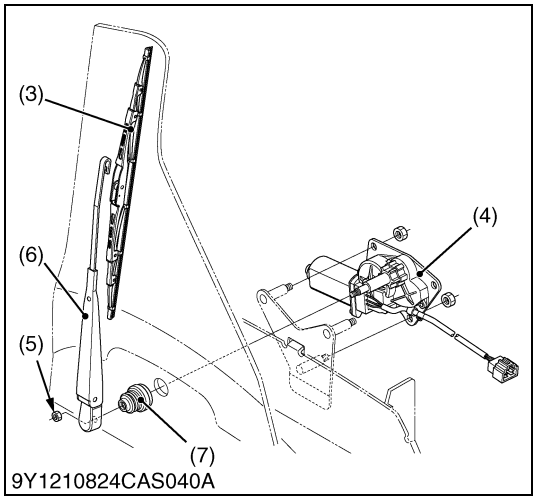
(1) Upper Windshield
(2) Lower Windshield (Right)
(3) Lower Windshield (Left)
(4) Sika Tack-Ultrafast
(5) Sika Activator
(6) Jig
(7) H Rubber
(8) Jig

A: 10 mm (0.39 in.)
B: 12 mm (0.47 in.)
C: 8 mm dia. (0.31 in. dia.)
D: 12 mm (0.47 in.)
E: 5 mm (0.2 in.)
F: −1.0 to +1.0 mm (−0.04 to +0.04 in.)
G: 360 mm (14.2 in.)
H: 20 mm (0.8 in.)
I: 5 mm (0.2 in.)

9Y1210824CAS0095US0

(7) Wiper Motor





Front Wiper Motor

1. Remove the steering post covers (2) and steering post under cover.
2. Remove the meter panel (1).
3. Disconnect the front wiper motor **4P** connector.
4. Remove the wiper arm mounting nut (5) and wiper arm (6).
5. Remove the wiper link cap (7).
6. Remove the front wiper motor (4).

(When reassembling)

- When attaching the wiper arm (6) to the wiper motor (4), assemble so that the wiper wipes symmetrically on the left and right (bilateral symmetry).

Tightening torque	Wiper arm mounting nut	6.4 to 9.3 N·m 0.65 to 0.95 kgf·m 4.7 to 6.8 lbf·ft

(1) Meter Panel
(2) Steering Post Cover
(3) Wiper Blade
(4) Front Wiper Motor
(5) Nut
(6) Wiper Arm
(7) Wiper Link Cap

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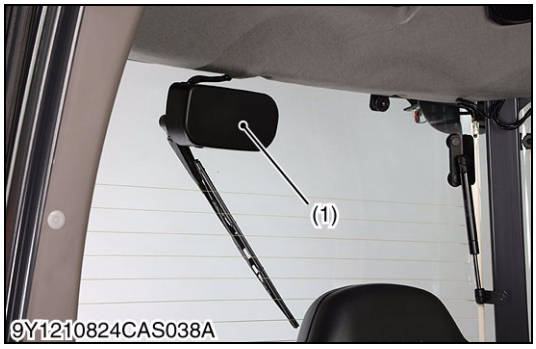

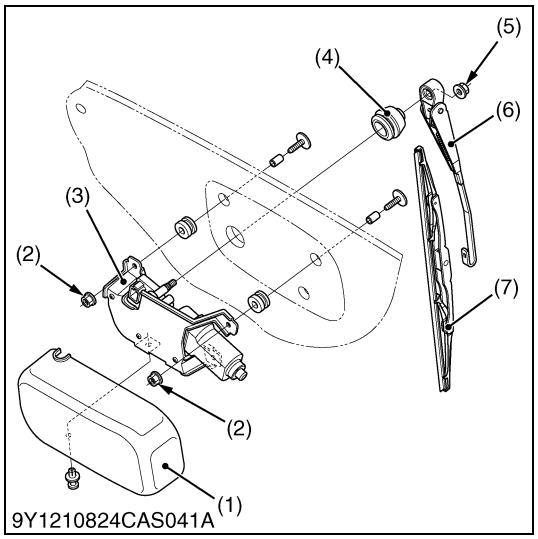

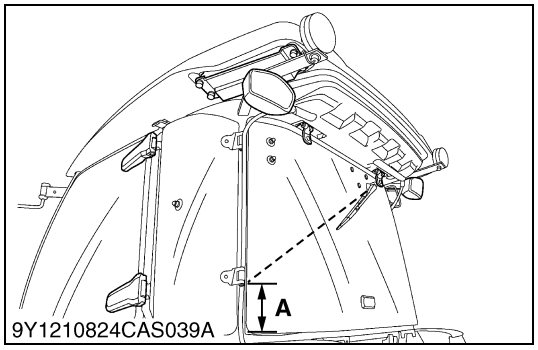

Rear Wiper Motor

1. Remove the cover (1).
2. Disconnect the rear wiper motor **4P** connector.
3. Remove the wiper arm mounting nut (5) and wiper arm (6).
4. Remove the wiper link cap (4).
5. Remove the rear wiper motor mounting screws (2).
6. Remove the rear wiper motor (3).

(When reassembling)

- Attach the wiper arm (6) to the wiper motor (3) so that the dimension **A** is 100 mm (3.94 in.) as shown in the figure.

Tightening torque	Wiper arm mounting nut	6.4 to 9.3 N·m 0.65 to 0.95 kgf·m 4.7 to 6.8 lbf·ft
	Rear wiper motor mounting screw	4.9 to 6.9 N·m 0.50 to 0.70 kgf·m 2.6 to 5.1 lbf·ft

Distance **"A"**	Factory specification	100 mm 3.94 in.

(1) Cover
(2) Wiper Motor Mounting Screw
(3) Rear Wiper Motor
(4) Wiper Link Cap
(5) Nut
(6) Wiper Arm
(7) Wiper Blade

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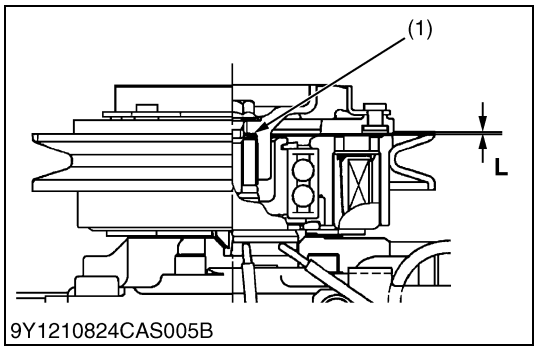
[3] SERVICING



Adjustment of Air Gap

1. Measure the air gap with a feeler gauge.
2. When the measurement value comes off from factory specification, adjustment shim (1) is added or deleted.

Air gap (**L**)	Factory specification	0.20 to 0.45 mm 0.0079 to 0.017 in.

(Reference)

Adjusting Shim Size	Code No.
0.10 mm (0.0039 in.)	T1065-87340
0.15 mm (0.0059 in.)	T1065-87350
0.40 mm (0.016 in.)	T1065-87360
0.60 mm (0.024 in.)	T1065-87370
1.00 mm (0.0394 in.)	T1065-87380

(1) Shim
L: Air Gap

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