

# WSM

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WORKSHOP MANUAL  
**TRACTOR**

**L3301,L3901,L4701**

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**Kubota**

# TO THE READER

This Workshop Manual tells the servicing personnel about the mechanism, servicing and maintenance of the L3301, L3901 and L4701. It contains 4 parts: "**Information**", "**General**", "**Mechanism**" and "**Servicing**".

## ■ Information

This section primarily contains information below.

- Safety First
- Safety Decal
- Specifications
- Dimensions

## ■ General

This section primarily contains information below.

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

## ■ Mechanism

This section contains information on the structure 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 Workshop Manual (Code No. 9Y021-01870 / 9Y021-18200) for the diesel engine / tractor mechanism that this workshop manual does not include.

## ■ Servicing

This section primarily contains information below.

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

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.

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February, 2014

## **Record of Revisions**

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

<b>Last digit of the Code No.</b>	<b>Issue month</b>	<b>Main Revised Point and Corrective Measures {Search word}</b>	<b>Reference Page</b>
<b>1</b>	2016.09	Maintenance interval was introduced.	G-15 to G-77
		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-S16, 1-S29, 1-S31, 1-S36, 2-S8, 2-S10, 2-S15, 2-S17, 3-S28, 3-S30, 3-S63, 9-M1, 9-M2, 9-S16, 9-S17, 9-S55

# **I INFORMATION**



# INFORMATION

## CONTENTS

1. SAFETY FIRST .....	I-1
2. SAFETY DECALS .....	I-4
[1] L3301/L3901 .....	I-4
[2] L4701 .....	I-7
3. SPECIFICATIONS .....	I-10
[1] L3301/L3901 .....	I-10
[2] L4701 .....	I-12
4. TRAVELING SPEEDS .....	I-13
[1] L3301/L3901 .....	I-13
[2] L4701 .....	I-14
5. DIMENSIONS .....	I-15
[1] L3301/L3901 .....	I-15
[2] L4701 .....	I-16

# 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.

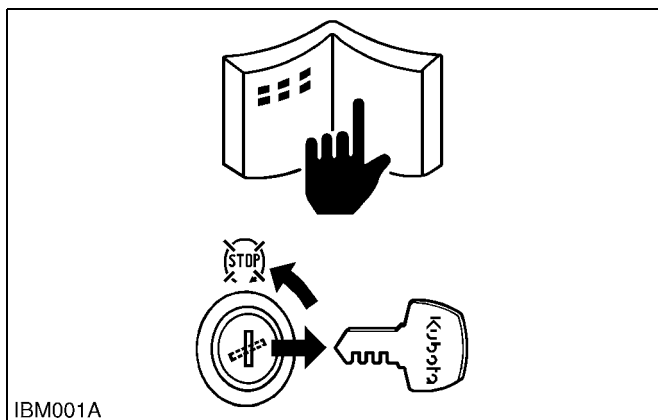
### ■ IMPORTANT

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

### ■ NOTE

- Gives helpful information.

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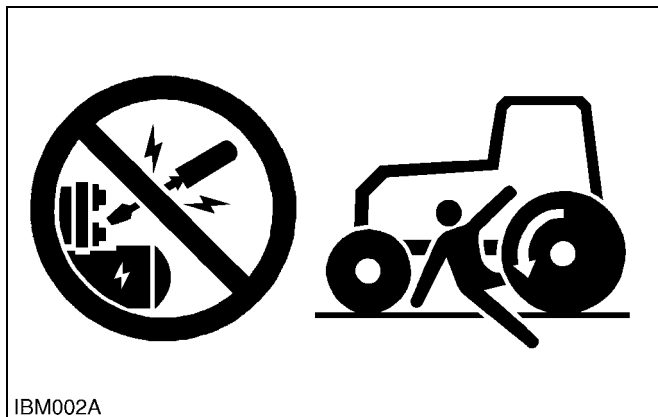


IBM001A

## **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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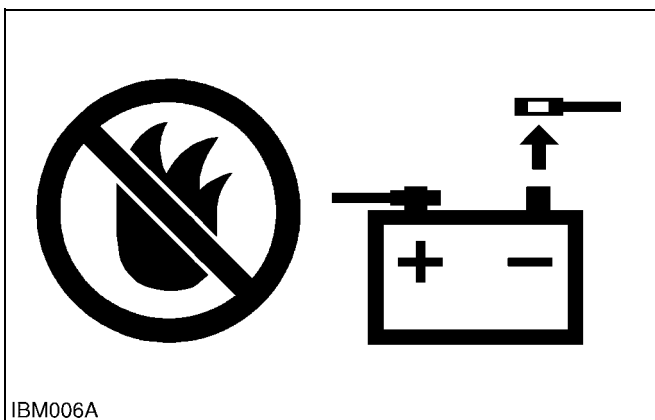
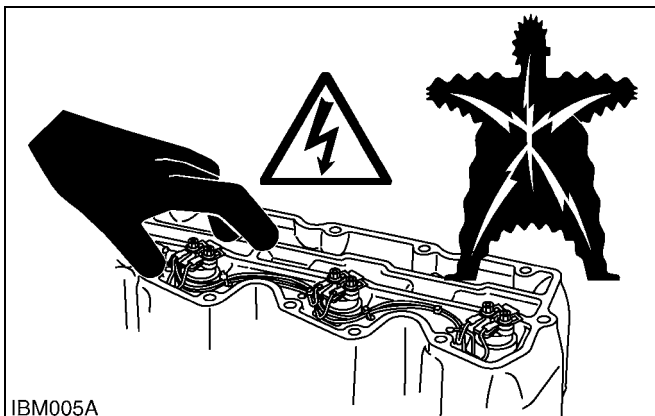
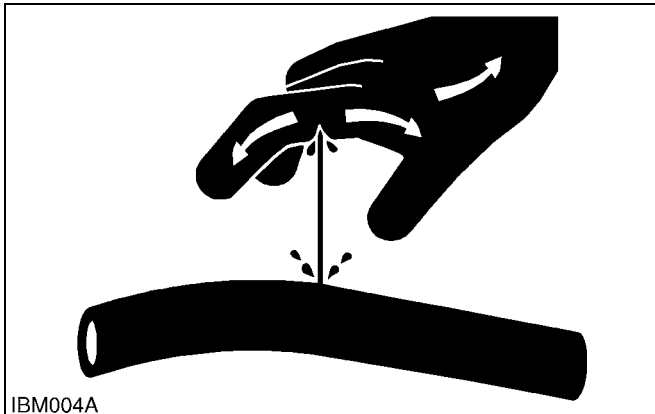
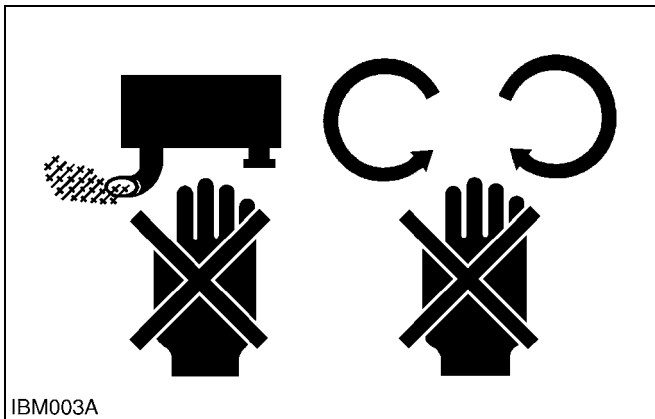


IBM002A

## **START SAFELY**

- Do not do the procedures below when you start the engine.
  - short across starter terminals
  - bypass the safety start switch
- Do not alter 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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## OPERATE SAFELY

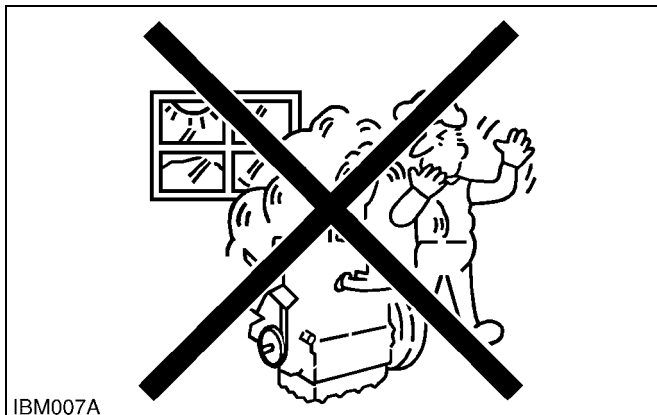
- Do not use the machine after you consume alcohol or medication or when you are tired.
- Put on applicable clothing and safety equipment.
- Use applicable tools only. Do not use alternative tools or parts.
- When 2 or more persons do servicing, make sure that you do it safely.
- Do not operate below 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

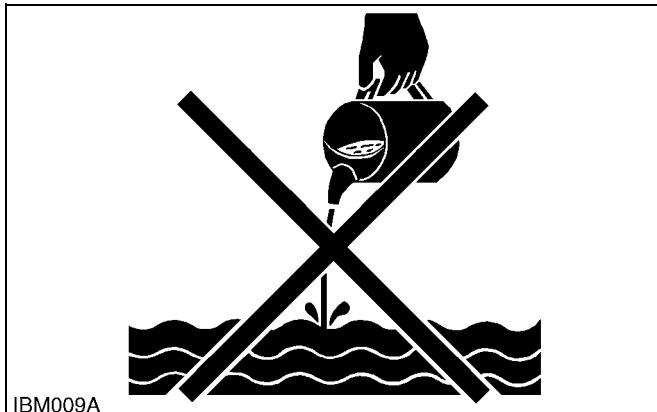
- Fuel is very flammable and explosive under some conditions. Do not smoke or let flames or sparks in your work area.
- To prevent sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- The battery gas can cause an explosion. Keep the sparks 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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**KEEP A GOOD AIRFLOW IN THE WORK AREA**

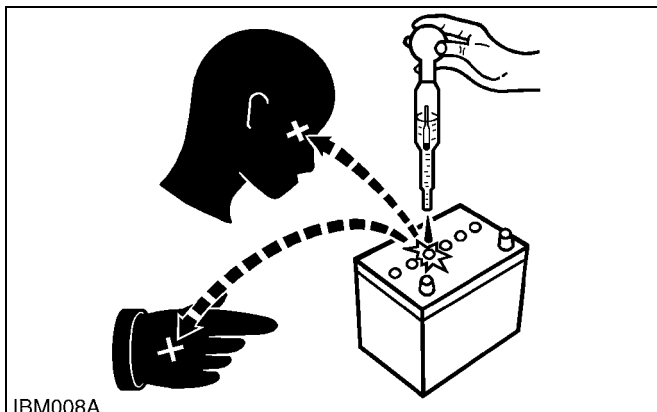
- If the engine is in operation, make sure that the area has good airflow. Do not operate the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.

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**DISCARD FLUIDS CORRECTLY**

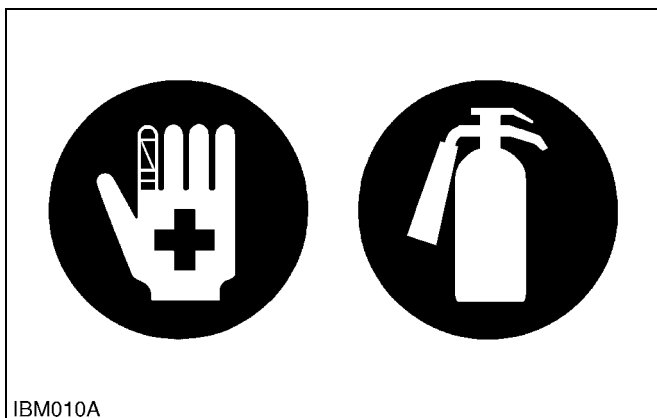
- Do not discard fluids on the ground, down the drain, into a stream, pond, or lake. Obey related environmental protection regulations when you discard oil, fuel, coolant, electrolyte and other dangerous waste.

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**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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**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.

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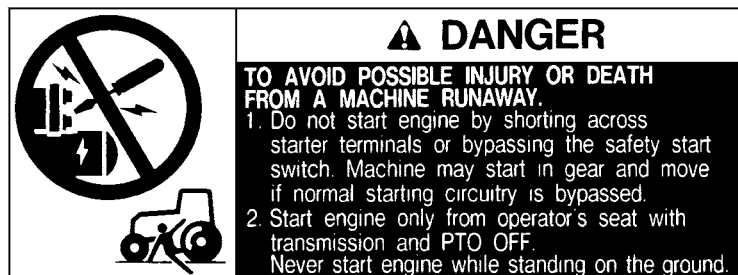
## 2. SAFETY DECALS

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.

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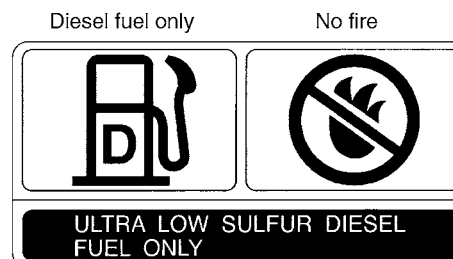
### [1] L3301/L3901

(1) Part No. TC630-4965-1



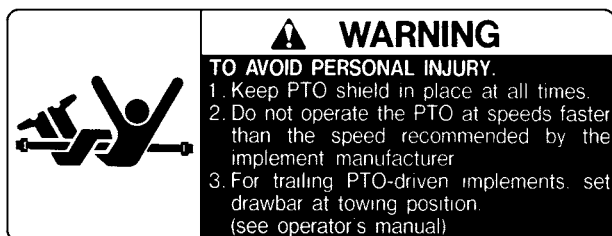
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(4) Part No. TC630-4956-1



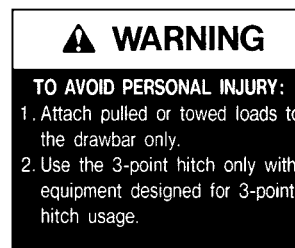
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(2) Part No. TC630-4959-1



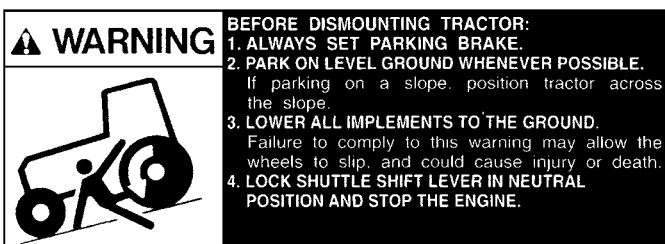
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(5) Part No. TC630-4935-1



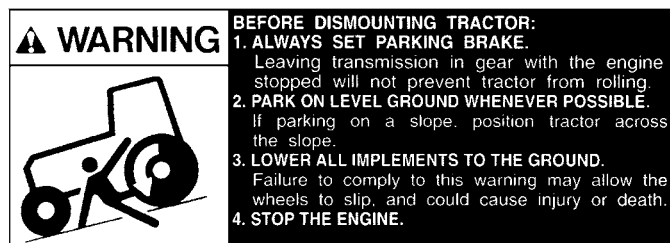
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(3) Part No. TC630-4933-1 [Manual Transmission Type]

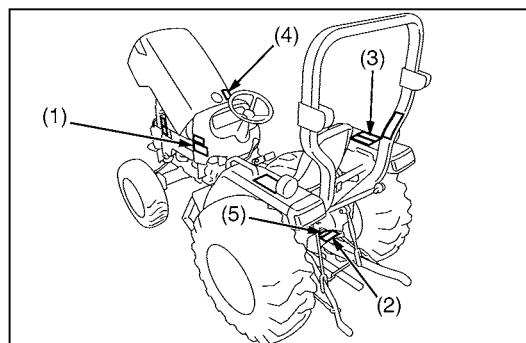


1AGAMAAAP4000

(3) Part No. TC630-5933-1 [HST Type]



1AGAMAAAP3720



9Y1211012ICI001US

9Y1211012INI0001US0

(1) Part No. TC630-4997-1

**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.

1AGAMAAAP2390

(2) Part No. TC630-9554-1

**WARNING**

Never modify or repair a ROPS because welding, grinding, drilling or cutting any portion may weaken the structure.

**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.

1AGAMAAAP2380

(3) Part No. TC630-9848-1

**WARNING****TO AVOID INJURY OR DEATH FROM ROLL-OVER:**

- Keep Roll-Over Protective Structures (ROPS) in the upright and locked position.
- Fasten SEAT BELT before operating.

**THERE IS NO OPERATOR PROTECTION WHEN THE ROPS IS IN THE FOLDED POSITION:**

- Check the operating area and fold the ROPS only when absolutely necessary.
- Do not wear SEAT BELT if ROPS is folded.
- Raise and lock ROPS as soon as vertical clearance allows.
- Read ROPS related instructions and warnings.

1AGAEBMAP071E

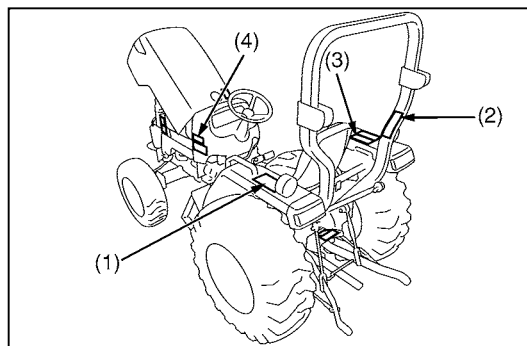
(4) Part No. TC630-9868-1

**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.



1AGAIJNAP149A



9Y1211012ICI002US

9Y1211012INI0002US0

(1) Part No. TC520-3015-1

					
FLAMMABLES	SHIELD EYES	KEEP OUT OF THE REACH OF CHILDREN	CAREFUL OF SULFURIC ACID	READ INSTRUCTION MANUAL CAREFULLY	EXPLOSIVE

**DANGER EXPLOSIVE GASES**  
CIGARETTES, FLAMES OR SPARKS COULD CAUSE BATTERY TO EXPLODE. ALWAYS SHIELD EYES AND FACE FROM BATTERY. DO NOT CHARGE OR USE BOOSTER CABLES OR ADJUST POST CONNECTIONS WITHOUT PROPER INSTRUCTION AND TRAINING.  
CALIFORNIA PROPOSITION 65 WARNING: Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. WASH HANDS AFTER HANDLING.

**POISON CAUSES SEVERE BURNS**  
CONTAINS SULFURIC ACID. AVOID CONTACT WITH SKIN, EYES OR CLOTHING. IN EVENT OF ACCIDENT FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY.  
**KEEP OUT OF REACH OF CHILDREN**  
Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. WASH HANDS AFTER HANDLING.

<b>SMF 75D23R</b>	
PART No. TC520-30151	
NOMINAL VOLTAGE	12V
COLD CRANKING AMPS	580
CRANKING AMPS	710
RESERVE CAPACITY(MINUTES)	110
AMP HOURS(@20 hr Rate)	65

FITTING DATE		YEAR		INDICATOR		MADE IN KOREA	
0	1	2	3	4	5	6	7
1	2	3	4	5	6	7	8
MONTH				OK CHARGE REPLACE			

1AGAPCAAP089A

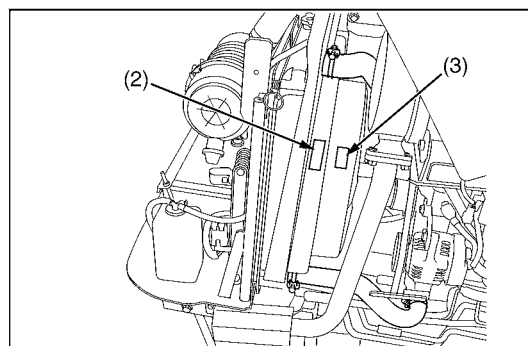
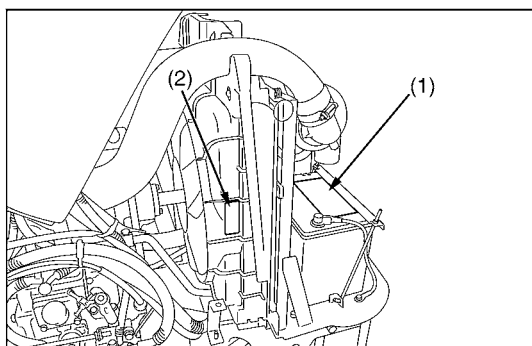
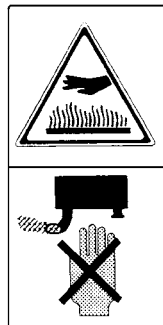
(2) Part No. TC620-4958-1

Do not get your hands close to engine fan and fan belt.



(3) Part No. TC630-4958-1

Do not touch hot surface like muffler, etc.



9Y1211012IC1003US

9Y1211012INI0003US0

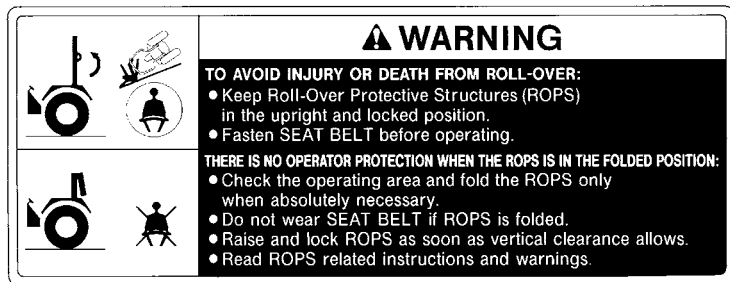
### CARE OF DANGER, WARNING AND CAUTION LABELS

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 replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replace component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

9Y1211012INI0004US0

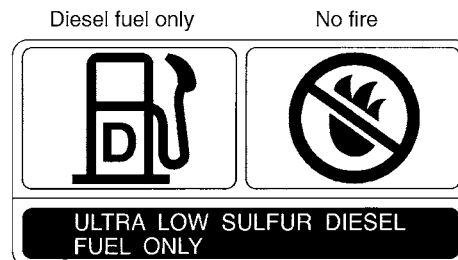
**[2] L4701**

(1) Part No. TC630-9848-1



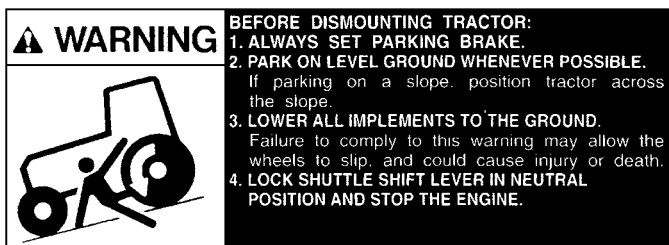
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(3) Part No. TC630-4956-1



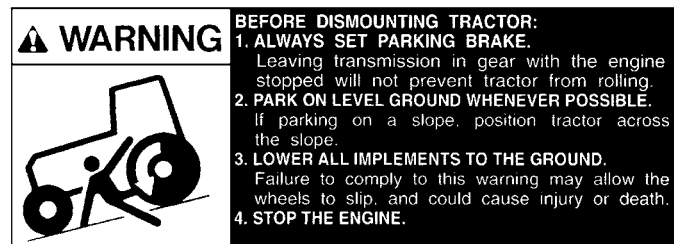
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(2) Part No. TC630-4933-1 [Manual Transmission Type]



1AGAMAAAP4000

(2) Part No. TC630-5933-1 [HST Type]



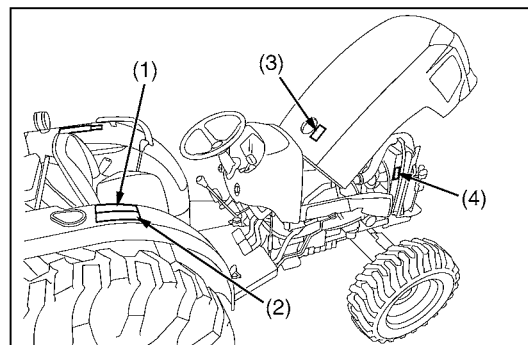
1AGAMAAAP3720

(4) Part No. TC620-4958-1

Do not get your hands close to engine fan and fan belt.



1AGAMAAAP2620



9Y1211012ICI004US

9Y1211012INI0005US0



(1) Part No. TC630-4997-1

**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.

1AGAMAAAP2390

(2) Part No. TC630-9868-1

**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.

1AGAIJNAP149A

(3) Part No. TC630-4965-1



1AGAMAAAP2450

**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.

(4) Part No. TC620-4958-1

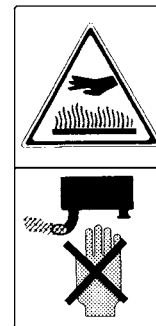
Do not get your hands close to engine fan and fan belt.



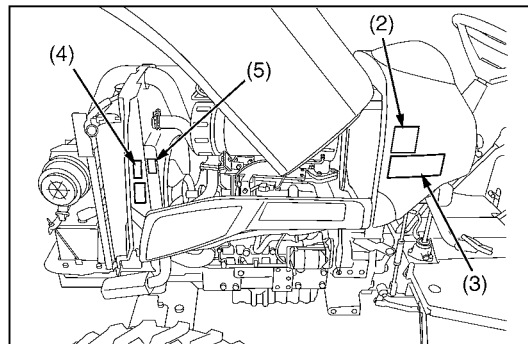
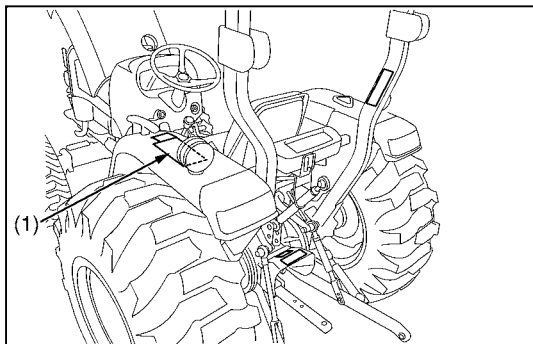
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(5) Part No. TC630-4958-1

Do not touch hot surface like muffler, etc.



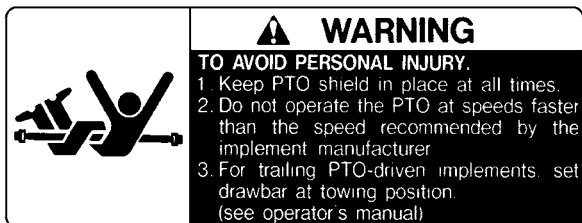
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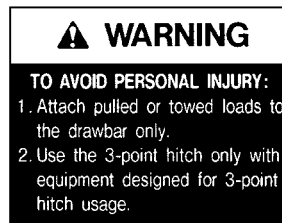
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(1) Part No. TC630-4959-1



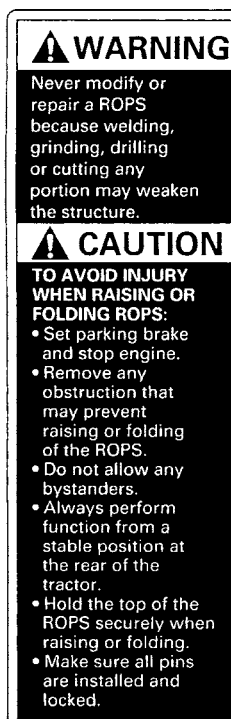
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(2) Part No. TC630-4935-1



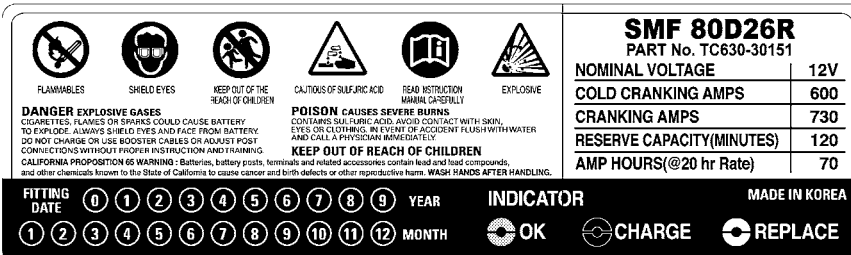
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(3) Part No. TC630-9554-1

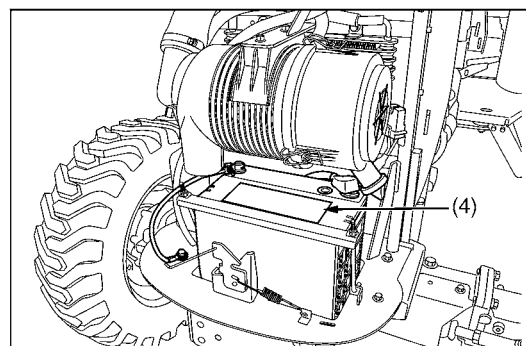
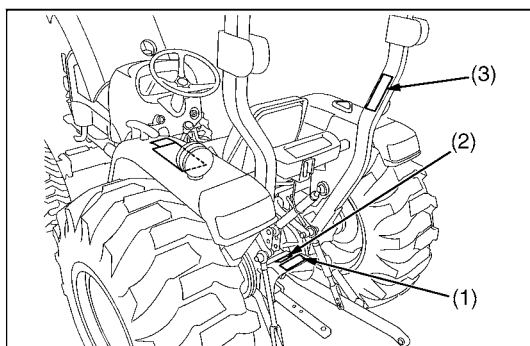


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(4) Part No. TC630-3015-1



1AGAHAKAP050E



9Y1211012ICI006US

9Y1211012INI0007US0

### 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 replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replace component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

9Y1211012INI0004US0

### 3. SPECIFICATIONS

#### [1] L3301/L3901

Model			L3301			L3901		
			Manual Transmission		HST	Manual Transmission		HST
			2WD	4WD	4WD	2WD	4WD	4WD
PTO power*			20.7 kW (27.7 HP)		19.5 kW (26.2 HP)	23.9 kW (32.1 HP)		22.8 kW (30.6 HP)
Engine	Model		D1803-CR-E4					
	Type		Direct injection, vertical, water-cooled, 4-cycle diesel					
	Number of cylinders		3					
	Bore and stroke		87 × 102.4 mm (3.4 × 4.0 in.)					
	Total displacement		1.826 L (111.4 cu.in.)					
	Engine gross power*		24.6 kW (33.0 HP)			28.0 kW (37.5 HP)		
	Engine net power*		23.4 kW (31.4 HP)			27.1 kW (36.3 HP)		
	Rated revolution		45.0 rps (2700 rpm)					
	Low idling revolution		15.0 rps (900 rpm)					
	Maximum torque		101.7 N·m (75.0 lbf-ft)			115.8 N·m (85.4 lbf-ft)		
	Battery		[75D23R] 12 V, RC: 110 min, CCA: 580 A					
Capacities	Fuel tank		42.0 L (11.0 U.S.gals, 9.24 Imp.gals)					
	Engine crankcase (with filter)		6.7 L (7.1 U.S.qts, 5.9 Imp.qts)					
	Engine coolant		6.0 L (6.3 U.S.qts, 5.3Imp.qts)					
	Transmission case		28.0 L (7.4 U.S.gals, 6.16 Imp.gals)	28.5 L (7.5 U.S.gals, 6.27 Imp.gals)	23.5 L (6.2 U.S.gals, 5.17 Imp.gals)	28.0 L (7.4 U.S.gals, 6.16 Imp.gals)	28.5 L (7.5 U.S.gals, 6.27 Imp.gals)	23.5 L (6.2 U.S.gals, 5.17 Imp.gals)
Dimensions	Overall length (without 3p)		2810 mm (110.6 in.)	2740 mm (107.9 in.)		2810 mm (110.6 in.)	2740 mm (107.9 in.)	
	Overall width (min. tread)		1400 mm (55.1 in.)					
	Overall height (with ROPS)		2330 mm (91.7 in.)					
	Overall height (Top of steering wheel)		1475 mm (58.1 in.)					
	Wheel base		1610 mm (63.3 in.)					
	Min. ground clearance		345 mm (13.6 in.)	340 mm (13.4 in.)		345 mm (13.6 in.)	340 mm (13.4 in.)	
	Tread	Front	1050 mm (41.3 in.)	1095 mm (43.1 in.)		1050 mm (41.3 in.)	1095 mm (43.1 in.)	
		Rear	1115 mm (43.8 in.), 1195 mm (47.1 in.), 1290 mm (50.8 in.)					
Weight (with ROPS)			1160 kg (2557 lbs)	1240 kg (2734 lbs)	1260 kg (2778 lbs)	1175 kg (2590 lbs)	1255 kg (2767 lbs)	1260 kg (2778 lbs)
Traveling system	Tire	AG Front	5.00-15	7.2-16		5.00-15	7.2-16	
		AG Rear	11.2-24					
	Industrial (option)	Front	—	27 × 8.50-15		—	27 × 8.50-15	
		Rear	—	15-19.5R4		—	15-19.5R4	
	Clutch		Dry type single stage			Dry type dual stage		Dry type single stage
	Steering		Integral type power steering					
	Transmission		Gear shift, 8 forward and 8 reverse		Hydrostatic transmission, 3 range speed	Gear shift, 8 forward and 8 reverse		Hydrostatic transmission, 3 range speed
	Brake		Wet disk type					
	Min. turning radius (with brake)		2.4 m (7.9 feet)	2.5 m (8.2 feet)		2.4 m (7.9 feet)	2.5 m (8.2 feet)	
	Hydraulic unit	Hydraulic control system		Position control				
Pump capacity (main)		23.9 L/min (6.3 gals/min., 5.26 Imp.gals/min.)						
Pump capacity (PS)		14.5 L/min (3.8 gals/min, 3.19 Imp.gals/min.)						
Three point hitch		Category 1						
Max. lift force		At lift points	906 kg (1998 lbs)					
		24 in. behind lift points	651 kg (1435 lbs)					
System pressure		16.2 MPa (165 kgf/cm <sup>2</sup> , 2349 psi)						

Model			L3301			L3901		
			Manual Transmission		HST	Manual Transmission		HST
			2WD	4WD	4WD	2WD	4WD	4WD
PTO	Rear PTO	PTO shaft size	SAE 1-3/8, 6 splines					
	Rear PTO	Type	Transmission driven with overrunning		Live-continuous running PTO			
	PTO / Engine speed		540 min <sup>-1</sup> (rpm) / 2430 min <sup>-1</sup> (rpm)		540 min <sup>-1</sup> (rpm) / 2580 min <sup>-1</sup> (rpm)	540 min <sup>-1</sup> (rpm) / 2425 min <sup>-1</sup> (rpm)		540 min <sup>-1</sup> (rpm) / 2580 min <sup>-1</sup> (rpm)

■ **NOTE**

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

9Y1211012INI0008US0

**[2] L4701**

Model			L4701		
			Manual Transmission		HST
			2WD	4WD	
Engine	Model		V2403-CR-E4		
	Type		Direct injection, vertical, water-cooled, 4-cycle diesel		
	Number of cylinders		4		
	Total displacement		2.434 L (148.5 cu.in.)		
	Bore and stroke		87 × 102.4 mm (3.4 × 4.0 in.)		
	Rated revolution		2600 min <sup>-1</sup> (rpm)		
	Low idling revolution		800 min <sup>-1</sup> (rpm)		
	Net power*		33.4 kW (44.8 HP) / 2600 min <sup>-1</sup> (rpm)		
	PTO power* (factory observed)		29.3 kW (39.3 HP) / 2600 min <sup>-1</sup> (rpm)	28.2 kW (37.8 HP) / 2600 min <sup>-1</sup> (rpm)	
	Maximum torque: Gross		146.2 N·m (107.8 lbf·ft)		
	Battery capacity		12 V, RC: 120 min, CCA: 600 A		
Capacities	Fuel tank		51 L (13.5 U.S.gals, 11 Imp.gals)		
	Engine crankcase (with filter)		8.2 L (8.7 U.S.qts, 7.2 Imp.qts)		
	Engine coolant		6.5 L (6.9 U.S.qts, 5.7 Imp.qts)		
	Transmission case		40 L (10.6 U.S.gals, 8.8 Imp.gals)		
Dimensions	Overall length (without 3p)		3120 mm (122.8 in.)	3035 mm (119.5 in.)	
	Overall width (min. tread)		1585 mm (62.4 in.)		
	Overall height (with ROPS)		2330 mm (91.7 in.)		
	Wheel base		1850 mm (72.8 in.)	1845 mm (72.6 in.)	
	Min. ground clearance		385 mm (15.2 in.)		
	Tread	Front	1280 mm (50.4 in.), 1380 mm (54.3 in.), 1480 mm (58.3 in.), 1580 mm (62.2 in.)	1155 mm (45.5 in.)	
		Rear	1180 mm (46.5 in.), 1200 mm (47.2 in.), 1300 mm (51.2 in.), 1450 mm (57.1 in.),1545 mm (60.8 in.)		
Weight (with ROPS)			1460 kg (3219 lbs)	1495 kg (3296 lbs)	1500 kg (3307 lbs)
Traveling system	Standard tire size	Front	7.5L-15	8.3-16	
		Rear	14.9-24		
	Clutch		Dry type single stage		—
	Steering		Hydrostatic power steering		
	Transmission		Gear shift, 8 forward and 8 reverse		Hydrostatic transmission 3 range speed
	Braking system		Mechanical, Wet disk type		
	Min. turning radius (with brake)		2.7 m (8.9 feet)	2.6 m (8.5 feet)	
Hydraulic unit	Hydraulic control system		Position control		
	Pump capacity		29.4 L (7.8 U.S.gals, 6.47 Imp.gals) /min.		
	Three point hitch		Category 1		
	Max. lift force	At lift points	1300 kg (2870 lbs)		
		24 in. behind lift points	1053 kg (2320 lbs)		
System pressure		17.7 MPa (180 kgf/cm <sup>2</sup> , 2560 psi)			
PTO	Rear PTO	PTO shaft size	SAE 1-3/8, 6 splines		
	PTO / Engine speed		540 min <sup>-1</sup> (rpm) / 2475 min <sup>-1</sup> (rpm)		540 min <sup>-1</sup> (rpm) / 2640 min <sup>-1</sup> (rpm)

## ■ NOTE

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

9Y1211012INI0009US0

## 4. TRAVELING SPEEDS

### [1] L3301/L3901

[Manual Transmission Type]

(At rated engine rpm)

Model			L3301/L3901
Tire size (Rear)			11.2-24
	Range gear shift lever	Main gear shift lever	km/h (mph)
Forward	Low	1	1.7 (1.1)
		2	2.2 (1.4)
		3	3.8 (2.3)
		4	5.6 (3.5)
	High	1	6.6 (4.1)
		2	8.5 (5.3)
		3	14.4 (8.9)
		4	21.2 (13.2)
Reverse	Low	1	1.7 (1.1)
		2	2.2 (1.4)
		3	3.8 (2.3)
		4	5.6 (3.4)
	High	1	6.5 (4.1)
		2	8.5 (5.3)
		3	14.3 (8.9)
		4	21.1 (13.1)

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

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[HST Type]

(At rated engine rpm)

Model		L3301/L3901
Tire size (Rear)		11.2-24
	Range shift lever	km/h (mph)
Forward	L	6.3 (3.9)
	M	10.9 (6.8)
	H	22.7 (14.1)
Reserve	L	5.6 (3.5)
	M	9.9 (6.1)
	H	20.5 (12.7)

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

9Y1211012INI0011US0

**[2] L4701****[Manual Transmission Type]**

(At rated engine rpm)

<b>Model</b>			<b>L4701</b>
Tire size (Rear)			14.9-24
	Range gear shift lever	Main gear shift lever	km/h (mph)
Forward	Low	1	2.2 (1.4)
		2	2.8 (1.7)
		3	4.6 (2.8)
		4	6.7 (4.2)
	High	1	8.0 (5.0)
		2	10.0 (6.2)
		3	16.3 (10.1)
		4	24.0 (14.9)
Reverse	Low	1	2.1 (1.3)
		2	2.7 (1.7)
		3	4.4 (2.7)
		4	6.4 (4.0)
	High	1	7.7 (4.8)
		2	9.6 (6.0)
		3	15.6 (9.7)
		4	23.0 (14.3)

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

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**[HST Type]**

(At rated engine rpm)

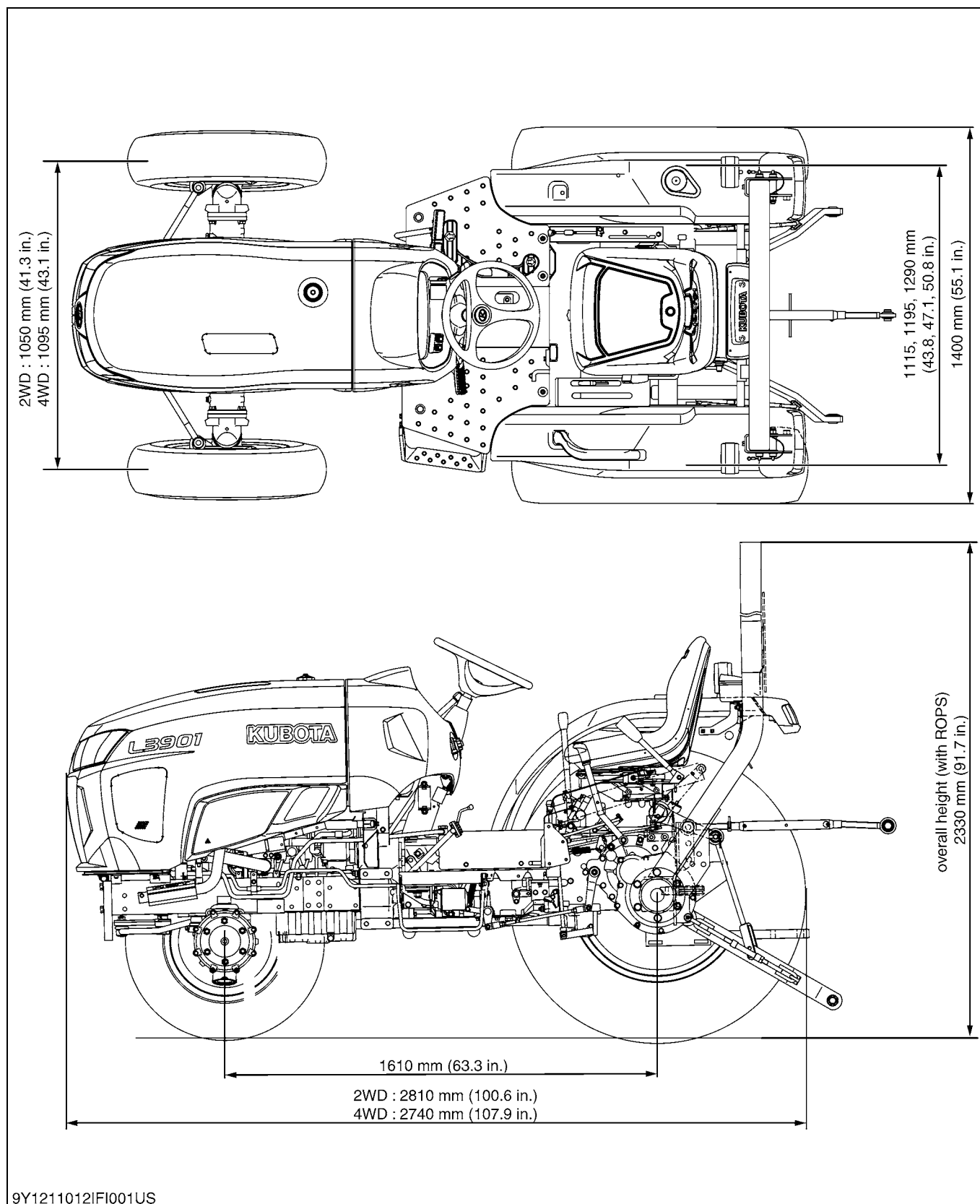
<b>Model</b>		<b>L4701</b>
Tire size (Rear)		14.9-24
	Range shift lever	km/h (mph)
Forward	L	5.9 (3.7)
	M	12.2 (7.6)
	H	25.4 (15.8)
Reverse	L	5.3 (3.3)
	M	11.0 (6.8)
	H	22.9 (14.2)

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

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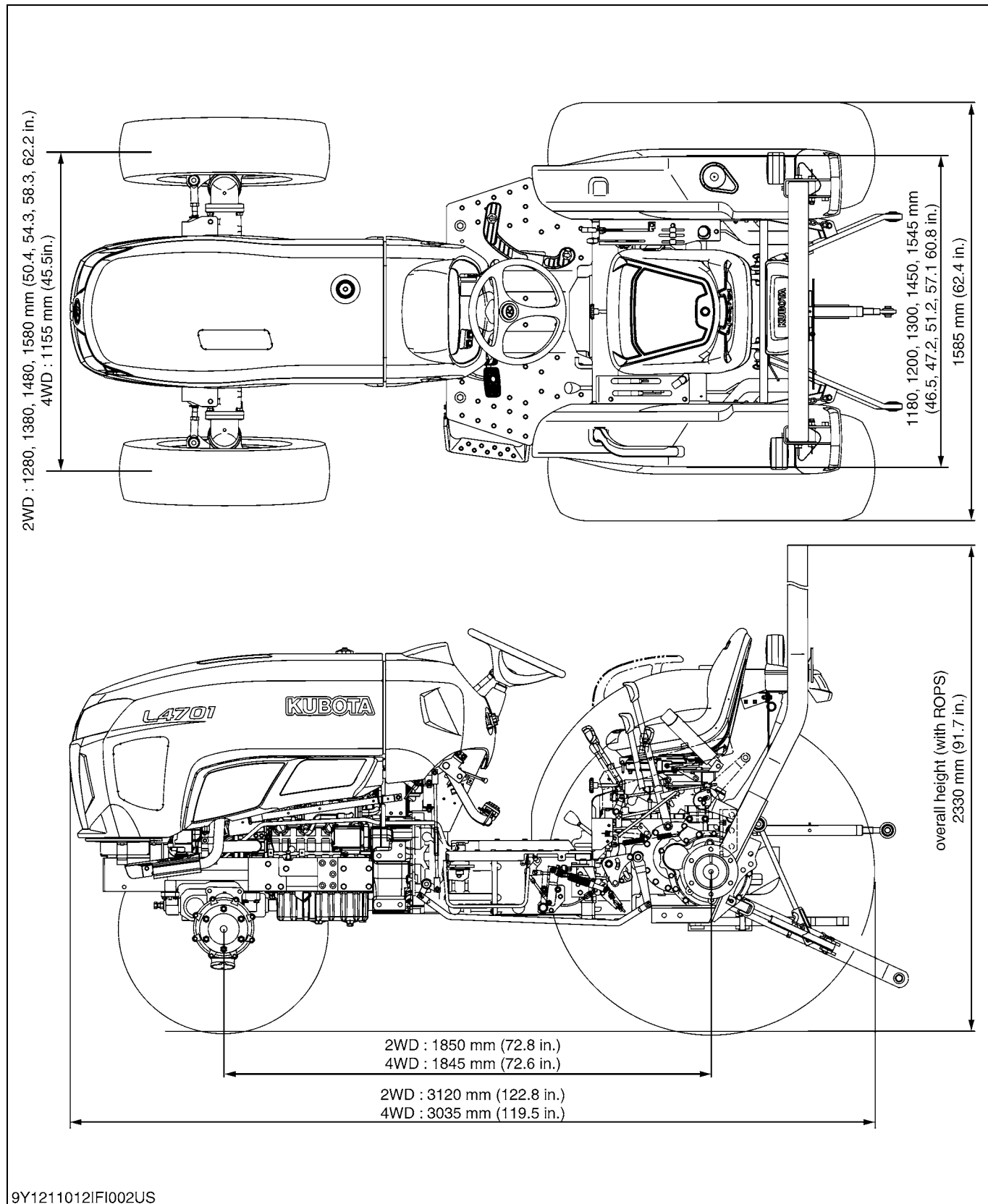
## 5. DIMENSIONS

### [1] L3301/L3901



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**[2] L4701**

**G GENERAL**

# GENERAL

## CONTENTS

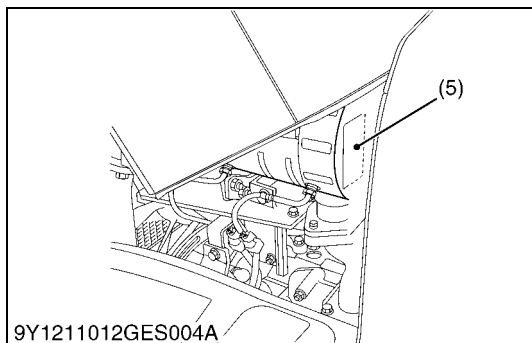
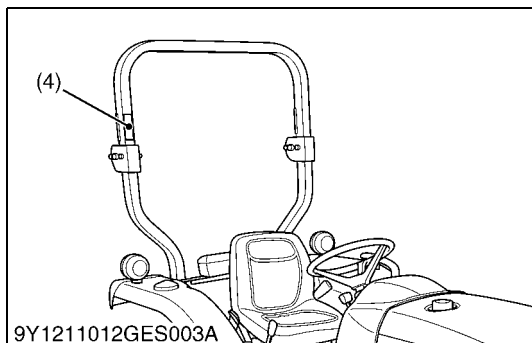
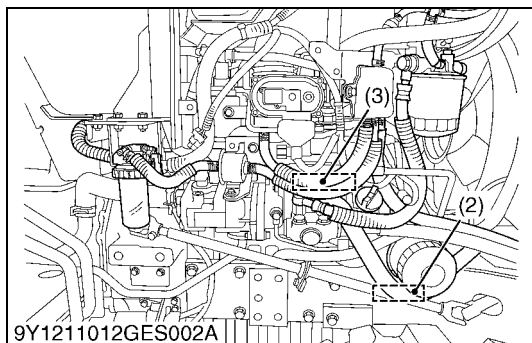
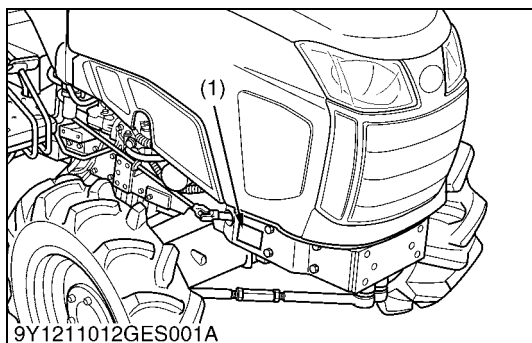
1. TRACTOR IDENTIFICATION .....	G-1
[1] MODEL NAME AND SERIAL NUMBERS .....	G-1
(1) L3301/L3901 .....	G-1
(2) L4701 .....	G-2
[2] E4B ENGINE .....	G-3
[3] CYLINDER NUMBER .....	G-3
2. GENERAL PRECAUTIONS .....	G-4
3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING .....	G-5
[1] WIRING .....	G-5
[2] BATTERY .....	G-7
[3] FUSE .....	G-7
[4] CONNECTOR .....	G-7
[5] CIRCUIT TESTER .....	G-8
[6] COLOR OF WIRING .....	G-9
4. LUBRICANTS, FUEL AND COOLANT .....	G-10
[1] L3301/L3901 .....	G-10
[2] L4701 .....	G-11
5. TIGHTENING TORQUES .....	G-13
[1] GENERAL USE SCREWS, BOLTS AND NUTS .....	G-13
[2] STUD BOLTS .....	G-13
[3] METRIC SCREWS, BOLTS AND NUTS .....	G-14
[4] AMERICAN STANDARD SCREWS, BOLTS AND NUTS WITH UNC OR UNF THREADS .....	G-14
[5] PLUGS .....	G-14
6. MAINTENANCE CHECK LIST .....	G-15
[1] L3301/L3901 .....	G-15
[2] L4701 .....	G-18
7. CHECK AND MAINTENANCE .....	G-21
[1] L3301/L3901 .....	G-21
(1) Daily Check .....	G-21
(2) Check Points of Every 50 Hours .....	G-26
(3) Check Points of Every 100 Hours .....	G-29
(4) Check Points of Every 200 Hours .....	G-34
(5) Check Points of Every 400 Hours .....	G-36
(6) Check Point of Every 600 Hours .....	G-39
(7) Check Point of Every 800 Hours .....	G-40
(8) Check Points of Every 1500 Hours .....	G-40
(9) Check Points of Every 3000 Hours .....	G-41
(10) Check Points of Every 1000 Hours or 1 year .....	G-41
(11) Check Points of Every 1 Year .....	G-41
(12) Check Points of Every 2000 Hours or 2 Years .....	G-43
(13) Check Points of Every 2 Years .....	G-45
(14) Check points of Every 4 Years .....	G-45
(15) Others .....	G-46
[2] L4701 .....	G-50
(1) Daily Check .....	G-50
(2) Check Points of Every 50 Hours .....	G-55
(3) Check Points of Every 100 Hours .....	G-58
(4) Check Points of Every 200 Hours .....	G-62

(5) Check Points of Every 400 Hours.....	G-64
(6) Check Point of Every 600 Hours.....	G-66
(7) Check Point of Every 800 Hours.....	G-67
(8) Check Points of Every 1500 Hours.....	G-67
(9) Check Points of Every 3000 Hours.....	G-68
(10)Check Points of Every 1000 Hours or 1 year .....	G-68
(11)Check Points of Every 1 Year .....	G-68
(12)Check Points of Every 2000 Hours or 2 Years .....	G-71
(13)Check Points of Every 2 Years.....	G-73
(14)Check points of Every 4 Years .....	G-73
(15)Others.....	G-74
8. SPECIAL TOOLS.....	G-78
[1] SPECIAL TOOLS FOR ENGINE .....	G-78
[2] SPECIAL TOOLS FOR TRACTOR .....	G-89
9. TIRES .....	G-99
[1] TIRE PRESSURE .....	G-99
[2] TREADS ADJUSTMENT .....	G-100
(1) L3301/L3901 .....	G-100
(2) L4701 .....	G-102
[3] TIRE LIQUID INJECTION.....	G-106
10. IMPLEMENT LIMITATIONS .....	G-109

# 1. TRACTOR IDENTIFICATION

## [1] MODEL NAME AND SERIAL NUMBERS

### (1) L3301/L3901



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

- |                                  |   |
|----------------------------------|---|
| (1) Tractor Identification Plate | (4) ROPS Identification Plate<br>(ROPS Serial Number) |
| (2) Tractor Serial Number        | (5) Diesel Particulate Filter (DPF) Serial<br>Number  |
| (3) Engine Serial Number         |   |

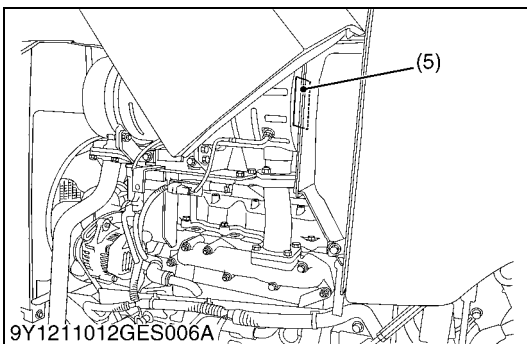
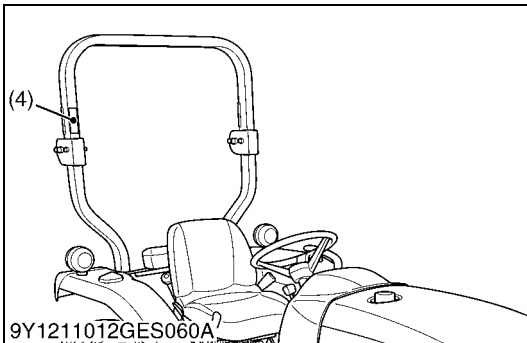
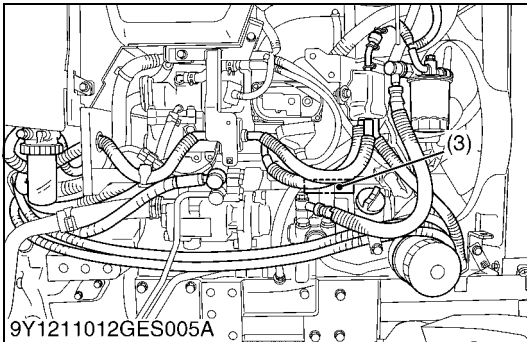
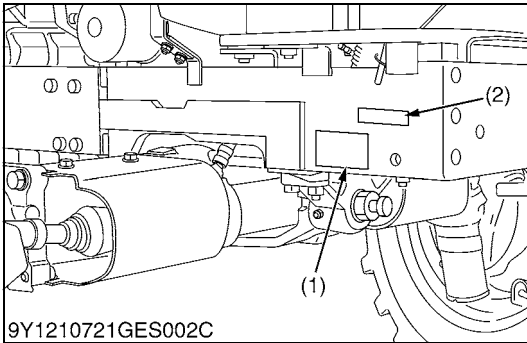
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**(2) L4701**

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

- |                                  |  |
|----------------------------------|--|
| (1) Tractor Identification Plate | (4) ROPS Identification Plate (ROPS Serial Number) |
| (2) Tractor Serial Number        | (5) Diesel Particulate Filter (DPF) Serial Number  |
| (3) Engine Serial Number         |  |

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## [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.

TYPE :	#####
FAMILY :	#####
APPROVAL NUMBER:	#####/#####/#####
 KUBOTA Corporation	
####	

(1) (2)

EMISSION CONTROL INFORMATION	
THIS ENGINE MEETS 2012 ##### EMISSION REGULATIONS FOR U.S. EPA AND CALIFORNIA NONROAD ENGINES.	
 KUBOTA Corporation	
MODEL :	### - EF ##### ENGINE DISP. : ###
FAMILY :	C ###
POWER :	## kW / ## rpm CATEGORY: ## - ## kW
VALVE CLEARANCE (COLD) :	IN ## mm EX ## mm
ECS :	### ###
ULTRA LOW SULFUR DIESEL FUEL ONLY	
DEL. ASSY.	####

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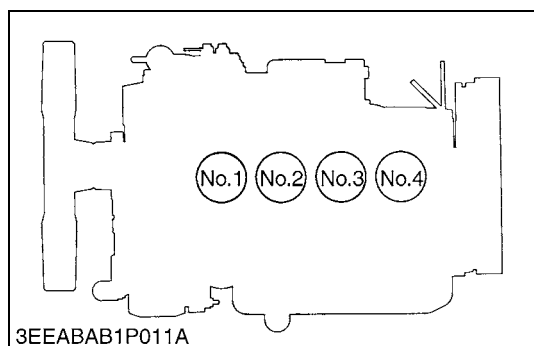
Category (1)	Engine output classification	EU regulation
K	From 19 to 37 kW	STAGE IIIB
P	From 37 to less than 56 kW	STAGE IIIB
N	From 56 to less than 75 kW	STAGE IIIB
M	From 75 to less than 130 kW	STAGE IIIB

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.

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## [3] CYLINDER NUMBER

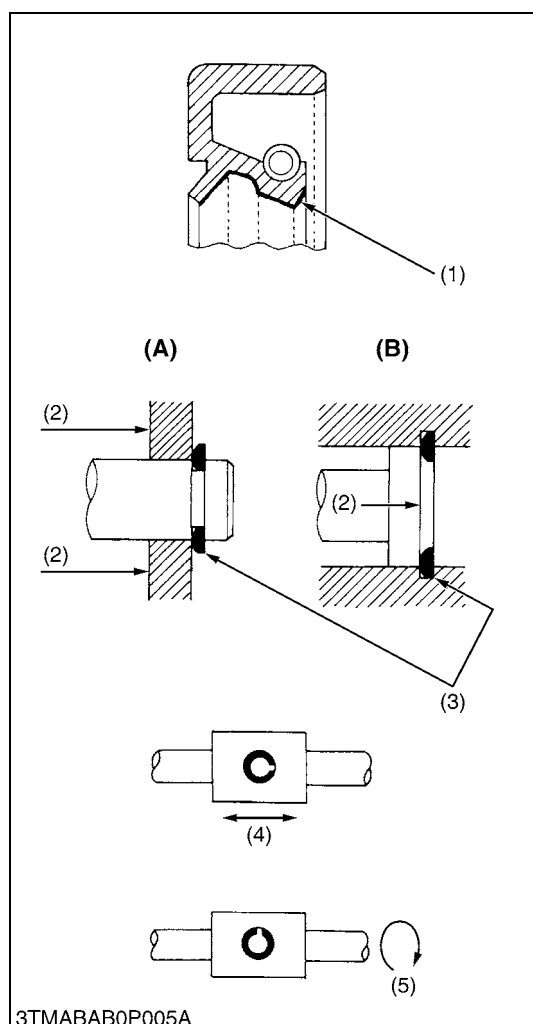


The cylinder numbers of KUBOTA diesel engine are designated as shown in the figure.

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

9Y1211012GEG0004US0

## 2. GENERAL PRECAUTIONS



- 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 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.

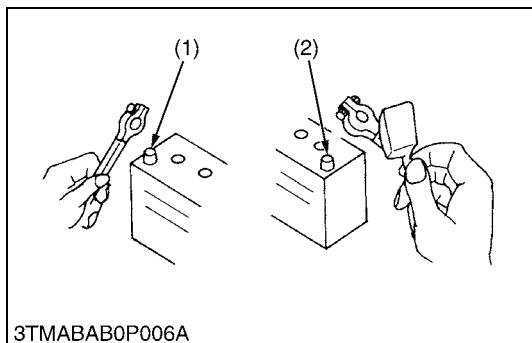
- (1) Grease
- (2) Force
- (3) Sharp Edge
- (4) Axial Force
- (5) Rotating Movement

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

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### 3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



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

#### ■ IMPORTANT

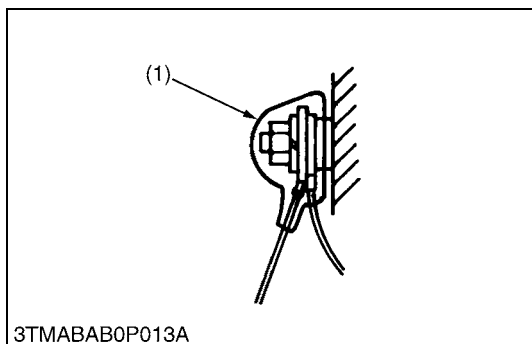
- Check electrical wiring for damage and loosened connection every year. To this end, educate the customer to do his or her own check and at the same time recommend the dealer to perform periodic check for a fee.
- Do not try to modify or remodel any electrical parts and wiring.
- When removing the battery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

(1) Negative Terminal

(2) Positive Terminal

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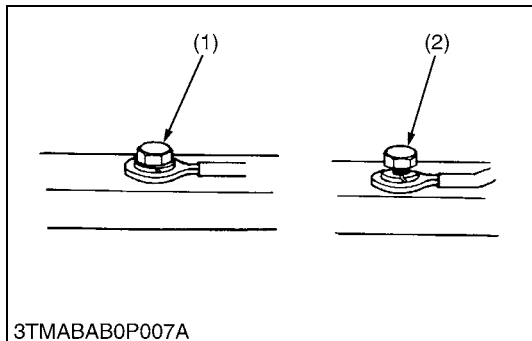
#### [1] WIRING



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

(1) Cover  
(Securely Install Cover)

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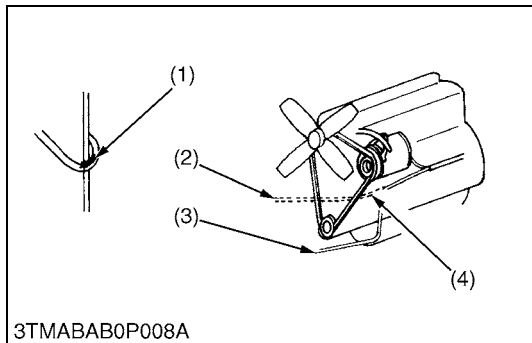


- Securely tighten wiring terminals.

(1) Correct  
(Securely Tighten)

(2) Incorrect  
(Loosening Leads to damaged Contact)

WSM000001GEG0063US0



- Do not let wiring contact dangerous part.

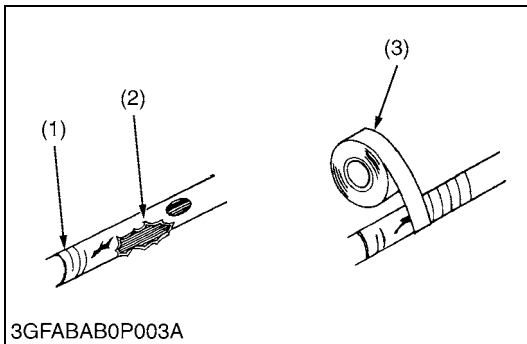
(1) Dangerous Part (Sharp Edge)

(2) Wiring (Incorrect)

(3) Wiring (Correct)

(4) Dangerous Part

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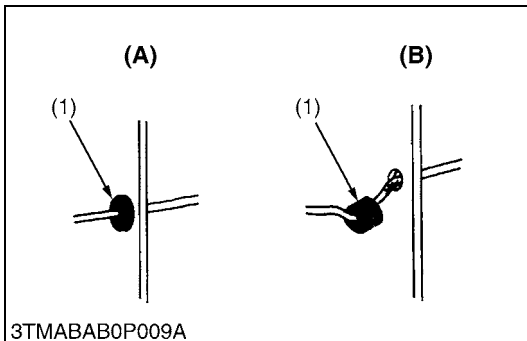


- Repair or change torn or aged wiring immediately.

(1) Aged  
(2) Torn

(3) Insulating Vinyl Tape

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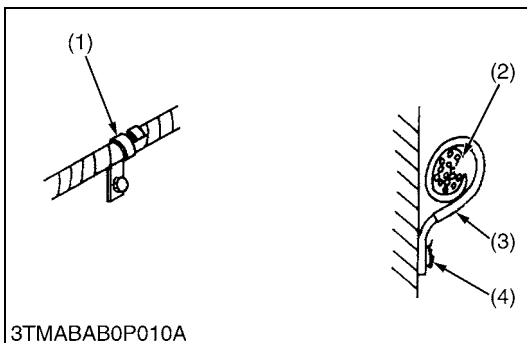


- Securely insert grommet.

(1) Grommet

(A) Correct  
(B) Incorrect

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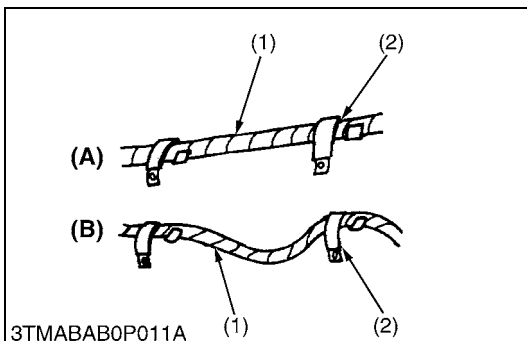


- Securely clamp, being careful not to damage wiring.

(1) Clamp  
(2) Wire Harness  
(Wind Clamp Spirally)

(3) Clamp  
(4) Welding Dent

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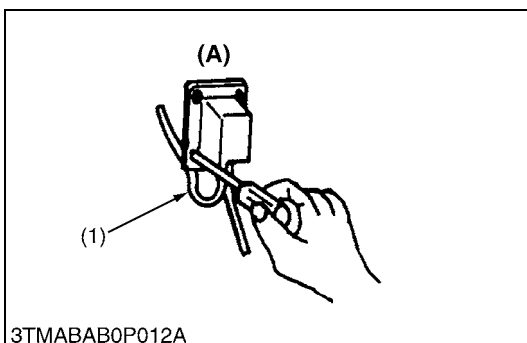


- Clamp wiring so that there is no twist, unnecessary sag, or excessive tension, except for movable part, where sag be required.

(1) Wiring  
(2) Clamp

(A) Correct  
(B) Incorrect

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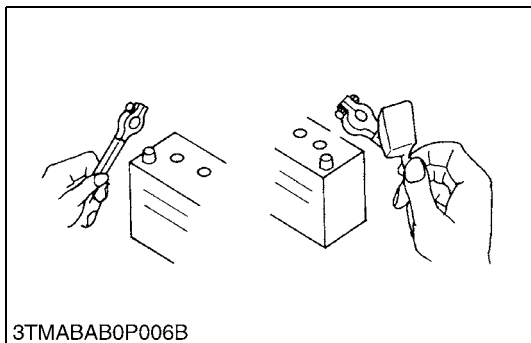
- In installing a part, be careful not to get wiring caught by it.

(1) Wiring

(A) Incorrect

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## [2] BATTERY



- 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.



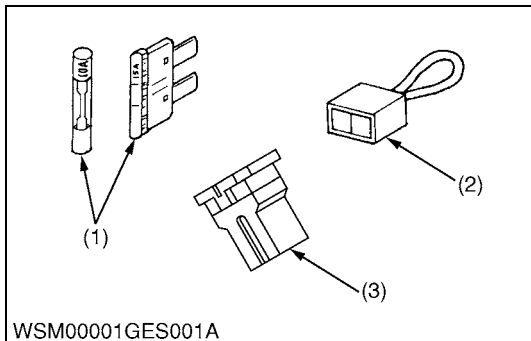
### DANGER

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.

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## [3] FUSE



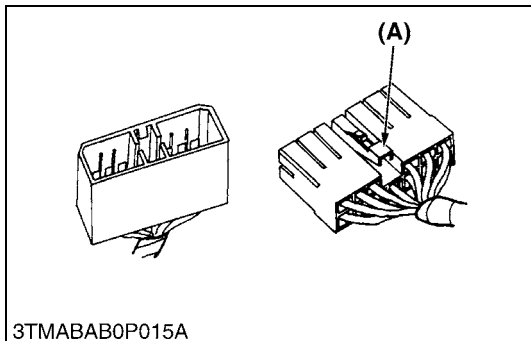
- Use fuses with specified capacity. Neither too large nor small capacity fuse is acceptable.
- Never use steel nor copper wire in place of fuse.
- Do not install working light, radio set, etc. on machine which is not provided with reserve power supply.
- Do not install accessories if fuse capacity of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

(1) Fuse  
(2) Fusible Link

(3) Slow Blow Fuse

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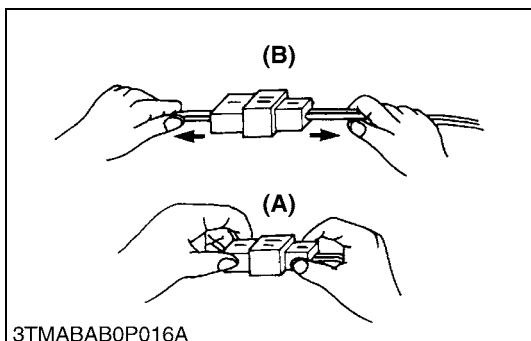
## [4] CONNECTOR



- For connector with lock, push lock to separate.

(A) Push

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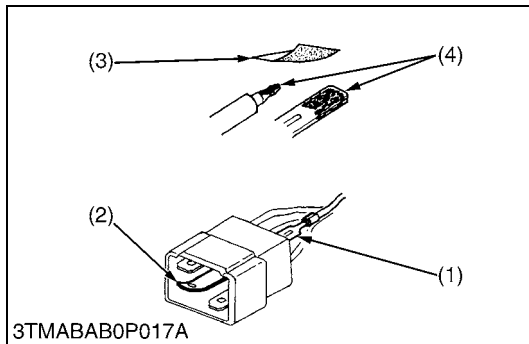


- In separating connectors, do not pull wire harnesses.
- Hold connector bodies to separate.

(A) Correct

(B) Incorrect

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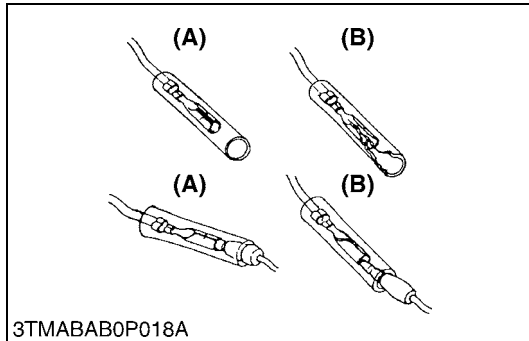


- Use sandpaper to remove rust from terminals.
- Repair deformed terminal. Make sure that there is no terminal being exposed or displaced.

(1) Exposed Terminal  
(2) Deformed Terminal

(3) Sandpaper  
(4) Rust

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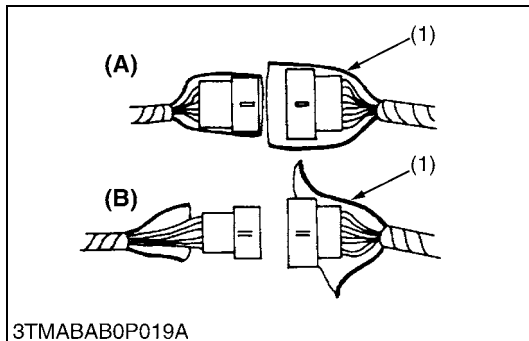


- Make sure that there is no female connector being too open.

(A) Correct

(B) Incorrect

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

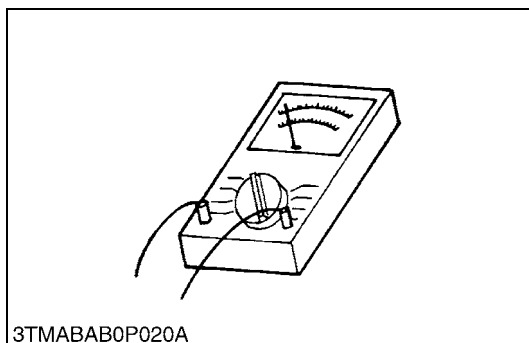
(1) Cover

(A) Correct

(B) Incorrect

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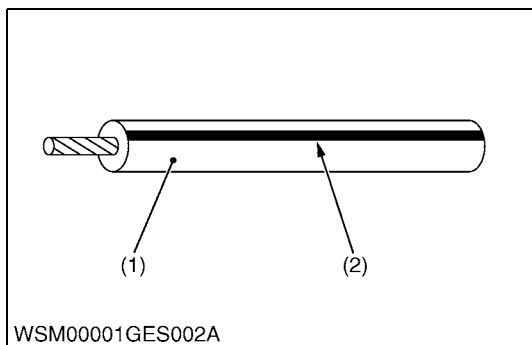
## [5] CIRCUIT TESTER



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

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## [6] COLOR OF WIRING



- 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

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## 4. LUBRICANTS, FUEL AND COOLANT

### [1] L3301/L3901

No.	Place		Capacity		Lubricants, fuel and coolant
			L3301	L3901	
1	Fuel		42.0 L 11.0 U.S.gals 9.24 Imp.gals		<ul style="list-style-type: none"><li>• No. 2-D S15 diesel fuel</li><li>• No. 1-D S15 diesel fuel if temperature is below −10 °C (14 °F)</li></ul>
2	Coolant		6.0 L 6.3 U.S.qts 5.3 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		Engine oil: Refer to G-12. <ul style="list-style-type: none"><li>• Above 25 °C (77 °F) SAE30, SAE10W-30 or 15W-40</li><li>• −10 to 25 °C (14 to 77 °F) SAE20, SAE10W-30 or 15W-40</li><li>• Below −10 °C (14 °F) SAE10W-30</li></ul>
4	Transmission case	Manual Transmission, 2WD	28.0 L 7.4 U.S.gals 6.16 Imp.gals		KUBOTA SUPER UDT-2 fluid
		Manual Transmission, 4WD	28.5 L 7.5 U.S.gals 6.27 Imp.gals		
		HST, 4WD	23.5 L 6.2 U.S.gals 5.17 Imp.gals		
5	Front axle case [4WD]		4.5 L 4.8 U.S.qts 4.0 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 wheel hub	2 [2WD only]	A small amount  Until grease overflows	Bearing grease  Multipurpose type grease NLGI-2 or NLGI-1 (GC-LB)
	Knuckle shaft	2 [2WD only]		
	Front axle support	2 [4WD only]		
	Clutch pedal	1		
	Brake pedal	1		
	Pedal shaft	1		
	Battery terminals	2		
	Lift rod	2		
	Tie rod end	4 [4WD only]		
	Top link	2		

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**[2] L4701**

No.	Place	Capacity	Lubricants, fuel and coolant
		L4701	
1	Fuel	51.0 L 13.5 U.S.gals 11.2 Imp.gals	<ul style="list-style-type: none"> <li>No. 2-D S15 diesel fuel</li> <li>No. 1-D S15 diesel fuel if temperature is below -10 °C (14 °F)</li> </ul>
2	Coolant	6.5 L 6.9 U.S.qts 5.7 Imp.qts	Fresh clean soft water with anti-freeze
3	Engine crankcase (with filter)	8.2 L 8.7 U.S.qts 7.2 Imp.qts	Engine oil: Refer to G-12. <ul style="list-style-type: none"> <li>Above 25 °C (77 °F) SAE30, SAE10W-30 or 15W-40</li> <li>-10 to 25 °C (14 to 77 °F) SAE20, SAE10W-30 or 15W-40</li> <li>Below -10 °C (14 °F) SAE10W-30</li> </ul>
4	Transmission case	40.0 L 10.6 U.S.gals 8.80 Imp.gals	KUBOTA SUPER UDT-2 fluid
5	Front axle case [4WD]	6.5 L 6.9 U.S.qts 5.7 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 wheel hub	2 [2WD only]	A small amount	Bearing grease
	Knuckle shaft	2 [2WD only]	Until grease overflows	Multipurpose type grease NLGI-2 or NLGI-1 (GC-LB)
	Front axle support	2 [4WD only]		
	Tie-rod ends	2 [4WD only]		
	Battery terminals	2		
	Lift rod	2		
	Top link	2		
	Hydraulic arm shaft	2		

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# ■ **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 delivers 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.

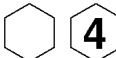







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## 5. TIGHTENING TORQUES

### [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	 <b>4</b> No-grade or 4T						 <b>7</b> 7T						 <b>9</b> 9T		
Indication on top of nut	  No-grade or 4T												   <b>6T</b>		
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
<b>M6</b>	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
<b>M8</b>	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
<b>M10</b>	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
<b>M12</b>	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
<b>M14</b>	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
<b>M16</b>	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
<b>M18</b>	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
<b>M20</b>	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
<b>M8</b>	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
<b>M10</b>	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
<b>M12</b>	30 to 49	3.0 to 5.0	22 to 36	31	3.2	23
<b>M14</b>	62 to 73	6.3 to 7.5	46 to 54	–	–	–
<b>M16</b>	98.1 to 112	10.0 to 11.5	72.4 to 83.1	–	–	–
<b>M18</b>	172 to 201	17.5 to 20.5	127 to 148	–	–	–



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### [3] METRIC SCREWS, BOLTS AND NUTS

Grade	 Property class 8.8			 Property class 10.9		
Unit	N-m	kgf-m	lbf-ft	N-m	kgf-m	lbf-ft
<b>M8</b>	24 to 27	2.4 to 2.8	18 to 20	30 to 34	3.0 to 3.5	22 to 25
<b>M10</b>	48 to 55	4.9 to 5.7	36 to 41	61 to 70	6.2 to 7.2	45 to 52
<b>M12</b>	78 to 90	7.9 to 9.2	58 to 66	103 to 117	10.5 to 12.0	76.0 to 86.7
<b>M14</b>	124 to 147	12.6 to 15.0	91.2 to 108	167 to 196	17.0 to 20.0	123 to 144
<b>M16</b>	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
<b>1/4</b>	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
<b>5/16</b>	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
<b>3/8</b>	48 to 56	4.9 to 5.7	36 to 41	61 to 73	6.3 to 7.4	45 to 53
<b>1/2</b>	110 to 130	11.3 to 13.2	81.2 to 95.8	150 to 178	15.3 to 18.1	111 to 131
<b>9/16</b>	150 to 178	15.3 to 18.1	111 to 131	217 to 260	22.2 to 26.5	160 to 191
<b>5/8</b>	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
<b>Tapered screw</b> 	<b>R1/8</b>	13 to 21	1.3 to 2.2	9.4 to 15	13 to 19	1.3 to 2.0	9.4 to 14
	<b>R1/4</b>	25 to 44	2.5 to 4.5	18 to 32	25 to 34	2.5 to 3.5	18 to 25
	<b>R3/8</b>	49 to 88	5.0 to 9.0	37 to 65	49 to 58	5.0 to 6.0	37 to 43
	<b>R1/2</b>	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
<b>Straight screw</b> 	<b>G1/4</b>	25 to 34	2.5 to 3.5	18 to 25	—	—	—
	<b>G3/8</b>	62 to 82	6.3 to 8.4	46 to 60	—	—	—
	<b>G1/2</b>	49 to 88	5.0 to 9.0	37 to 65	—	—	—

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# 6. MAINTENANCE CHECK LIST

## [1] L3301/L3901

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-27		
2	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-28		
3	Greasing	—	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-26		
4	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-32	*4	
5	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-29		
6	Brake	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-31		
7	Clutch	Adjust	★	☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-30		
8	Air cleaner element	Clean		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-29	*1	@
		Replace															every 1000 Hr or 1 year	G-29	*2	
9	Fuel line	Check															every 1 year	G-41	*5	@
		Replace															every 4 years	G-41	*5	
10	Fuel grommet	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-30		@
		Replace															every 2 years	G-30		
11	Transmission oil filter [HST]	Replace	★			☆				☆				☆			every 200 Hr	G-34		
12	Toe-in	Adjust				☆				☆				☆			every 200 Hr	G-35		
13	Power steering oil line [Manual Transmission]	Check															every 1 year	G-43	*5	
		Replace															every 4 years	G-43	*5	
14	Oil cooler line [HST]	Check															every 1 year	G-42	*5	
		Replace															every 4 years	G-42	*5	
15	Radiator hose and clamp	Check															every 1 year	G-42	*5	
		Replace															every 4 years	G-42	*5	
16	Intake air line	Check															every 1 year	G-42	*5	@
		Replace															every 4 years	G-42	*5	
17	Oil separator hose	Check															every 1 year	G-42	*5	
		Replace															every 4 years	G-42	*5	
18	Engine oil	Change	★							☆							every 400 Hr	G-36		
19	Engine oil filter	Replace	★							☆							every 400 Hr	G-36		
20	Water separator	Clean								☆							every 400 Hr	G-39		

No.	Item		Indication on hour meter														Interval	Reference page	Important	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
21	Fuel filter	Replace								☆							every 400 Hr	G-39		@
22	Hydraulic oil filter	Replace								☆							every 400 Hr	G-37		
23	Transmission fluid	Change								☆							every 400 Hr	G-37		
24	Front axle case oil (4WD)	Change															every 800 Hr	G-40		
25	Greasing (2WD front wheel hub)	—								☆							every 400 Hr	G-39		
26	Front axle pivot	Adjust												☆			every 600 Hr	G-39		
27	Engine valve clearance	Adjust															every 800 Hr	G-40		
28	Fuel injector nozzle tip	Clean															every 1500 Hr	G-40		@
29	Oil separator element	Replace															every 1500 Hr	G-40		@
30	PCV (Positive Crankcase Ventilation) valve (Oil separator)	Check															every 1500 Hr	G-40		@
31	EGR cooler	Check Clean															every 1500 Hr	G-40		@
32	EGR system	Check Clean															every 3000 Hr	G-41		@
33	Supply pump	Check															every 3000 Hr	G-41		
34	DPF muffler	Clean															every 3000 Hr	G-41		@
35	Exhaust manifold	Check															every 1000 Hr or 1 year	G-41	*2	
36	DPF differential pressure sensor pipe	Check															every 1 year	G-41		
37	EGR pipe	Check															every 1 year	G-41		
38	Antifrost heater for oil separator (if equipped)	Check															every 1 year	G-41		
39	DPF differential pressure sensor hose	Replace															every 2 years	G-45		
40	Cooling system	Flush															every 2000 Hr or 2 years	G-43	*3	
41	Coolant	Change															every 2000 Hr or 2 years	G-43	*3	
42	Fuel system	Bleed															Service as required	G-46		
43	Clutch housing	Drain																G-46		
44	Fuse	Replace																G-47		
45	Light bulb	Replace																G-48		
46	Fuel line	Replace																G-48	*5	
47	Radiator hose and clamp	Replace																G-48	*5	
48	Intake air line	Replace																G-48	*5	
49	Power steering oil line	Replace																G-48	*5	
50	Oil cooler line [HST]	Replace																G-48	*5	
51	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 first.
- \*3: Every 2,000 hours or every 2 years, whichever comes first.
- \*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 or 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.

9Y1211012GEG0008US0

**[2] L4701**

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-56		
2	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-57		
3	Greasing	—	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-55		
4	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-60	*4	
5	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-58		
6	Brake	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-59		
7	Clutch [Manual Transmission]	Adjust	★	☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-59		
8	Air cleaner element Primary element	Clean		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-58	*1	@
		Replace															every 1000 Hr or 1 year	G-58	*2	
	Secondary element	Replace															every 1000 Hr or 1 year	G-58	*2	
9	Fuel line	Check															every 1 year	G-68	*5	@
		Replace															every 4 years	G-68	*5	
10	Fuel grommet	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-59		@
		Replace															every 2 years	G-59		
11	Transmission oil filter [HST]	Replace	★			☆				☆				☆			every 200 Hr	G-62		
12	Toe-in	Adjust				☆				☆				☆			every 200 Hr	G-63		
13	Power steering oil line	Check															every 1 year	G-70	*5	
		Replace															every 4 years	G-70	*5	
14	Oil cooler line [HST]	Check															every 1 year	G-69	*5	
		Replace															every 4 years	G-69	*5	
15	Radiator hose and clamp	Check															every 1 year	G-69	*5	
		Replace															every 4 years	G-69	*5	
16	Intake air line	Check															every 1 year	G-69	*5	@
		Replace															every 4 years	G-69	*5	
17	Oil separator hose	Check															every 1 year	G-69	*5	
		Replace															every 4 years	G-69	*5	
18	Engine oil	Change	★							☆							every 400 Hr	G-64		
19	Engine oil filter	Replace	★							☆							every 400 Hr	G-64		

No.	Item		Indication on hour meter													Interval	Reference page	Important	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700			
20	Water separator	Clean								☆							every 400 Hr	G-66	
21	Fuel filter	Replace								☆							every 400 Hr	G-66	@
22	Hydraulic oil filter	Replace								☆							every 400 Hr	G-65	
23	Transmission fluid	Change								☆							every 400 Hr	G-65	
24	Front axle case oil (4WD)	Change															every 800 Hr	G-67	
25	Greasing (2WD front wheel hub)	—								☆							every 400 Hr	G-66	
26	Front axle pivot	Adjust												☆			every 600 Hr	G-66	
27	Engine valve clearance	Adjust															every 800 Hr	G-67	
28	Fuel injector nozzle tip	Clean															every 1500 Hr	G-67	@
29	Oil separator element	Replace															every 1500 Hr	G-67	@
30	PCV (Positive Crankcase Ventilation) valve (Oil separator)	Check															every 1500 Hr	G-67	@
31	EGR cooler	Check Clean															every 1500 Hr	G-67	@
32	EGR system	Check Clean															every 3000 Hr	G-68	@
33	Supply pump	Check															every 3000 Hr	G-68	
34	DPF muffler	Clean															every 3000 Hr	G-68	@
35	Exhaust manifold	Check															every 1000 Hr or 1 year	G-68	*2
36	DPF differential pressure sensor pipe	Check															every 1 year	G-68	
37	EGR pipe	Check															every 1 year	G-68	
38	Antifrost heater for oil separator (if equipped)	Check															every 1 year	G-68	
39	DPF differential pressure sensor hose	Replace															every 2 years	G-68	
40	Cooling system	Flush															every 2000 Hr or 2 years	G-71	*3
41	Coolant	Change															every 2000 Hr or 2 years	G-71	*3
42	Fuel system	Bleed															Service as required	G-74	
43	Clutch housing	Drain																G-74	
44	Fuse	Replace																G-75	
45	Light bulb	Replace																G-76	
46	Fuel line	Replace																G-48	*5
47	Radiator hose and clamp	Replace																G-48	*5
48	Intake air line	Replace																G-48	*5
49	Power steering oil line	Replace																G-48	*5
50	Oil cooler line [HST]	Replace																G-48	*5
51	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 first.
- \*3: Every 2,000 hours or every 2 years, whichever comes first.
- \*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 or 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.

9Y1211012GEG0009US0



## 7. CHECK AND MAINTENANCE

### [1] L3301/L3901



#### 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.

9Y1211012GEG0054US0

### (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.

9Y1211012GEG0055US0

#### 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.

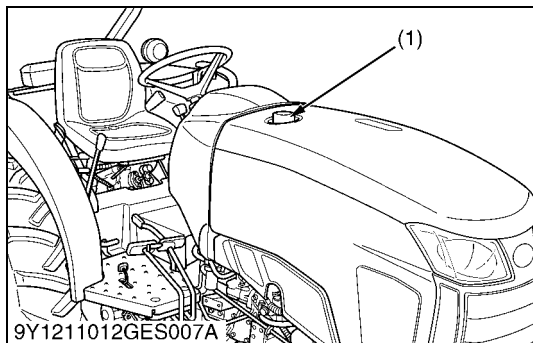
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#### Checking and Refueling



#### 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.



9Y1211012GES007A

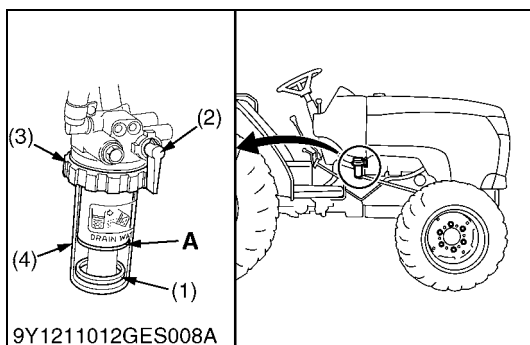
Fuel tank	Capacity	42.0 L 11.0 U.S.gals 9.24 Imp.gals
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#### ■ IMPORTANT

- 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 a spill should occur, 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

9Y1211012GEG0059US0



### 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.

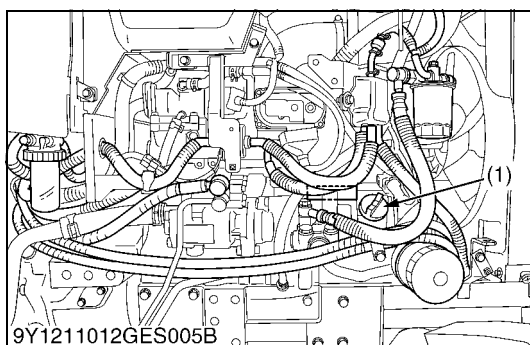
#### ■ IMPORTANT

- 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

9Y1211012GEG0060US0



### Checking Engine Oil Level



#### CAUTION

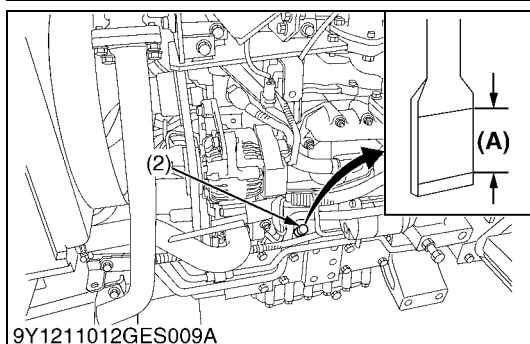
- Be sure to stop the engine before checking the oil level.
1. Park the machine on a flat surface.
  2. Check engine oil before starting the engine or 5 minutes or more after the engine has stopped.
  3. To check the oil level, draw out the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level lies between the 2 notches. If the level is too low, add new oil to the prescribed level at the oil inlet.  
(Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.)

#### ■ 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.

#### ■ NOTE

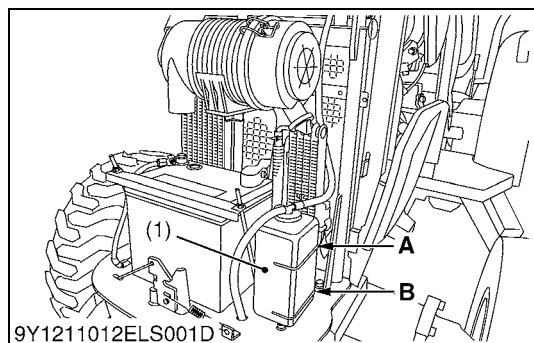
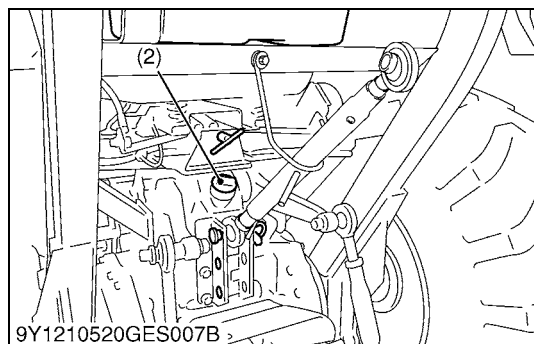
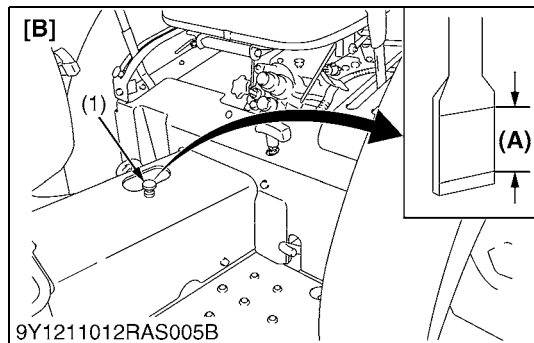
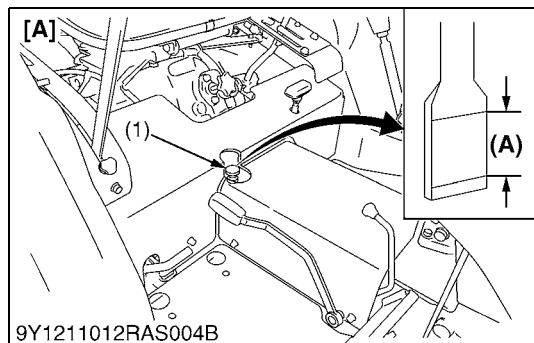
- At times a small amount of fuel, which is used to regenerate the DPF, may get mixed with the engine oil and the engine oil may increase in volume.



- (1) Oil Inlet  
(2) Dipstick

(A) Oil level is acceptable within this range.

9Y1211012GEG0061US0



### 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 2 notches. If the level is too low, add new oil to the prescribed level at the oil inlet.  
(Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.)

#### ■ IMPORTANT

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

- (1) Dipstick  
(2) Oil Inlet

- [A] Manual Transmission Type  
[B] HST Type

- (A) Oil level is acceptable within this range

9Y1211012GEG0062US0

### 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 soft water only up to the full level. In case of leakage, add anti-freeze and soft water in the specified mixing ratio up to the full level.  
(Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.)
3. When the coolant level is lower than "LOW" mark of recovery tank, remove the radiator cap and check to see that the coolant level is just below the port. If level is low, add coolant.

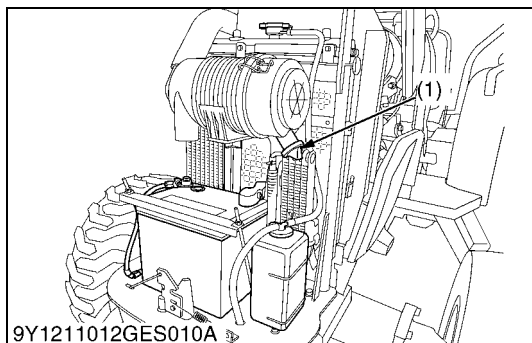
#### ■ IMPORTANT

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

- (1) Recovery Tank

- A: Full  
B: Low

9Y1211012GEG0063US0

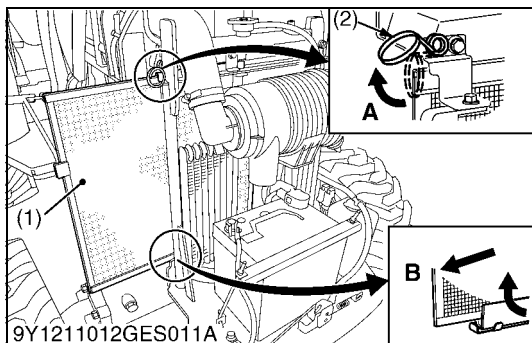


### Cleaning Evacuator Valve

1. Open the evacuator valve to get rid of large particles of dust and dirt.

(1) Evacuator Valve

9Y1211012GEG0064US0



### Cleaning Grill and Radiator Screen

#### **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 screen with the fixed spring being held up and remove all foreign materials and clean the front of radiator completely.

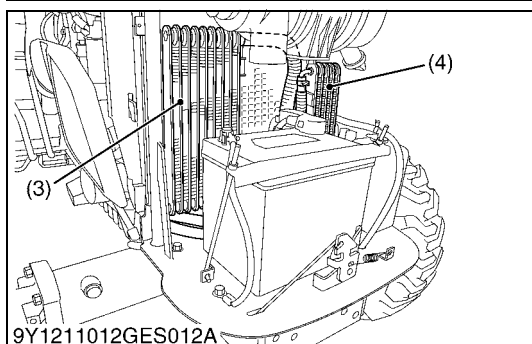
#### **IMPORTANT**

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

- (1) Radiator Screen  
 (2) Fixed Spring  
 (3) Oil Cooler [HST Type]  
 (4) Fuel Cooler

A: Hold Up  
 B: Detach

9Y1211012GEG0065US0



### Checking DPF Muffler

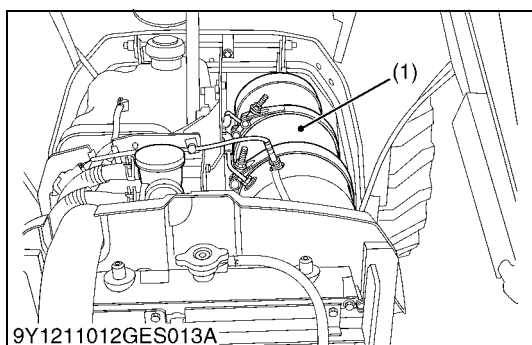
#### **CAUTION**

- 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

9Y1211012GEG0066US0



### Checking Brake Pedals and Clutch Pedal

#### **CAUTION**

- Be sure brake pedals have equal adjustment when using locked together. Incorrect or unequal brake pedal adjustment can cause the tractor to swerve or roll-over.

1. Inspect the brake and clutch pedals for free travel, and smooth operation.
2. Adjust if incorrect measurement is found:  
 (See page "Adjusting Brake Pedal" on page G-31 or "Adjusting Clutch Pedal" on page G-30.)

9Y1211012GEG0067US0

**Checking Gauges, Meter and Easy Checker™**

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

9Y1211012GEG0068US0

**Checking Head Light, Turn Signal / Hazard Light etc.**

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

9Y1211012GEG0069US0

**Checking Seat Belt and ROPS**

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

9Y1211012GEG0070US0

**Checking and Cleaning of Electrical Wiring and Battery Cables****CAUTION**

- A loosened terminal or connector, or damaged wire may affect the performance of electrical components or cause short circuits. Leakage of electricity could result in a fire hazard, a dead battery or damage to electrical components.
- Replace damaged wires or connections promptly.
- If a fuse blows soon after replacement, **DO NOT USE A LARGER THAN RECOMMENDED FUSE OR BYPASS THE FUSE SYSTEM.**
- Many wiring connections are protected by waterproof plugs, plug and unplug these connections carefully and make sure they are sealed correctly after assembly.
- Accumulation of dust, chaff and spilled fuel deposits around the battery, electrical wiring, engine or exhaust system are fire hazards. **CLEAN THESE AREAS BEFORE STARTING WORK.**

To avoid premature electrical malfunctions **DO NOT APPLY** high pressure water directly to battery, wiring, connectors, electrical components or instrument panel.

**Inspect the following regularly:**

1. Check wiring for chafed or cracked insulation.
2. Check wiring harness clamps. Replace if necessary.
3. Check connectors and terminals for looseness, contamination or overheated (discolored) connections.
4. Check instrument panel for correct operation of switches and gauges.

9Y1211012GEG0071US0

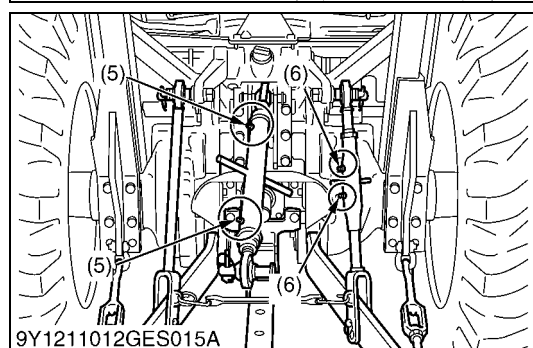
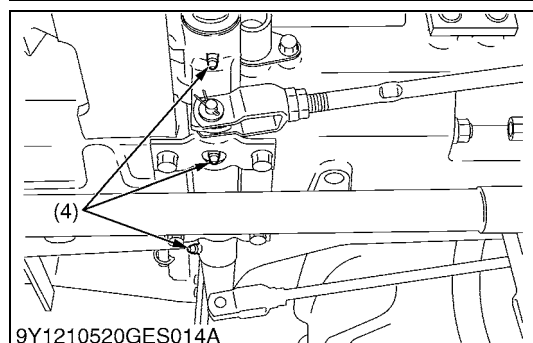
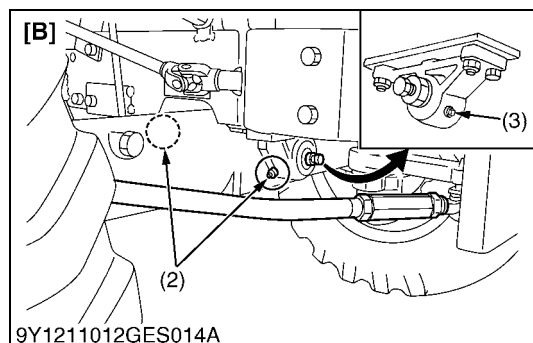
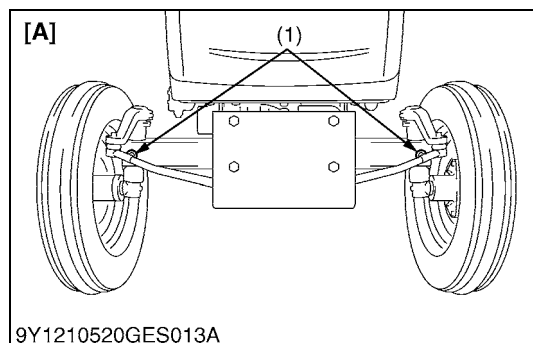
**Checking Movable Parts**

If any of the movable parts, such as levers and pedals, is not smoothly moved because of rust or sticky material, do not attempt to force it into motion.

In the above case, remove the rust or the sticky material, and apply oil or grease on the relevant spot. Otherwise, the machine may get damaged.

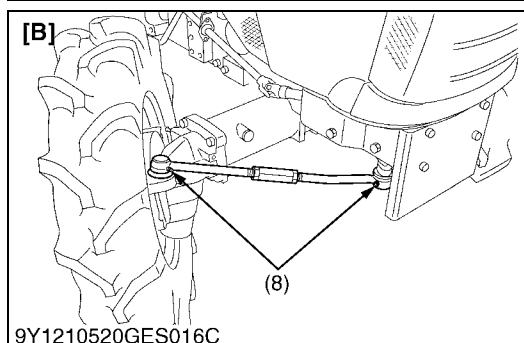
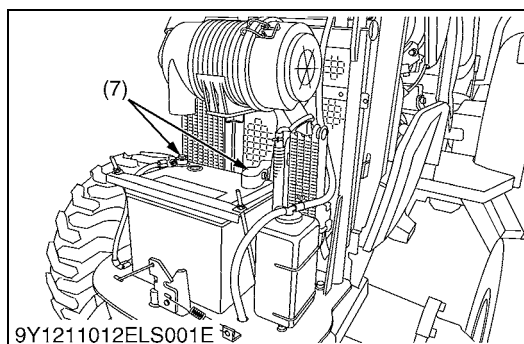
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## (2) Check Points of Every 50 Hours



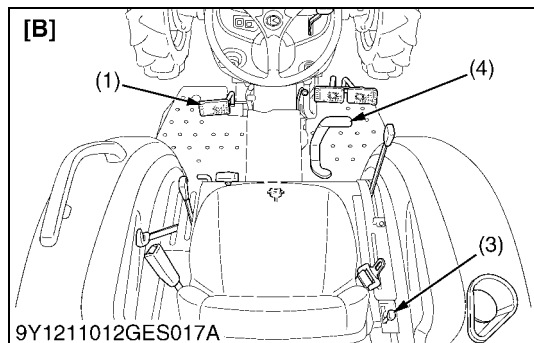
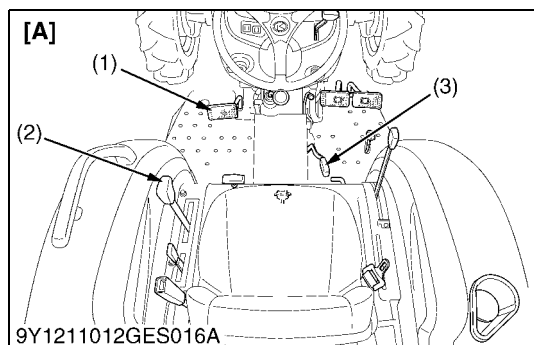
### Lubricating Grease Fittings

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 grease to forward front axle support, remove the breather plug and apply grease until grease overflows from breather plug port. After greasing reinstall the breather plug.



- |  |                                   |
|--|-----------------------------------|
| (1) Grease Fitting<br>(Knuckle Shaft) [RH, LH] | (7) Battery Terminals             |
| (2) Grease Fitting (Front axle support)        | (8) Grease Fitting (Tie-rod Ends) |
| (3) Breather Plug                              | <b>[A] 2WD</b>                    |
| (4) Grease Fitting (Pedal Shaft)               | <b>[B] 4WD</b>                    |
| (5) Grease Fitting (Top Link)                  |                                   |
| (6) Grease Fitting (Lifting Rod) [RH]          |                                   |

9Y1211012GEG0073US0



## Checking Engine Start System

### CAUTION

- 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.

#### [Manual Transmission Type]

##### ■ 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 gear shift lever.
5. Turn the key to "START" position.
6. The engine must not crank.

##### ■ Test: Switch for the PTO gear shift lever.

1. Sit on the operator's seat.
2. Engage the PTO gear shift 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 Type]

##### ■ 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. Depress the clutch pedal fully.
4. Disengage the PTO gear shift lever.
5. Turn the key to "START" position.
6. The engine must not crank.

##### ■ Test: Switch for the PTO gear shift lever.

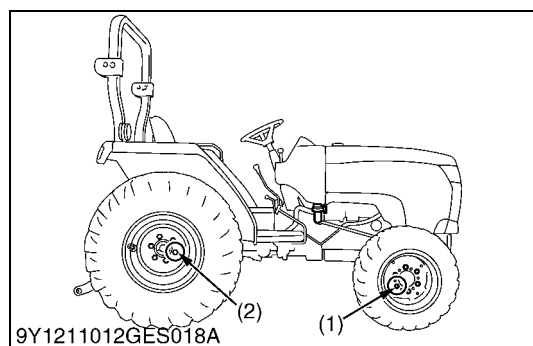
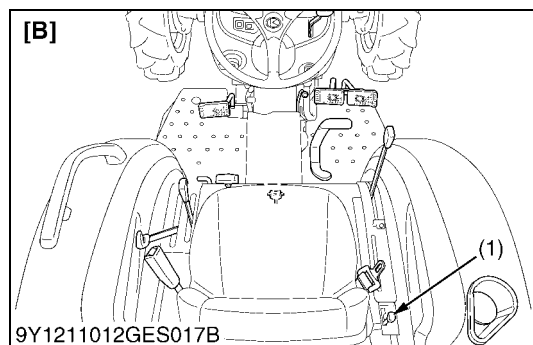
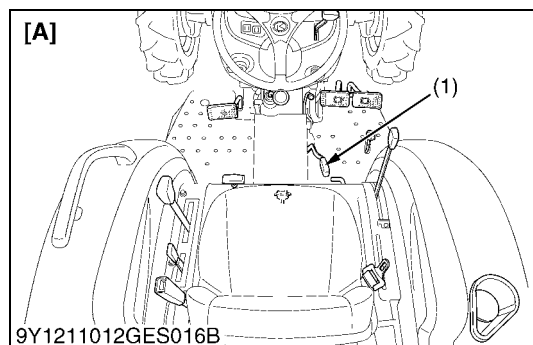
1. Sit on the operator's seat.
2. Engage the PTO gear shift lever.
3. Depress the clutch pedal fully.
4. Place the speed control pedal in neutral position.
5. Turn the key to "START" position.
6. The engine must not crank.

- (1) Clutch Pedal  
(2) Shuttle Shift Lever  
(3) PTO Gear Shift Lever  
(4) Speed Control Pedal

[A] Manual Transmission Type

[B] HST Type

9Y1211012GEG0074US0



### Checking Operator Presence Control



#### CAUTION

- 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 gear shift lever.
4. Stand up. (Do not get off the machine.)
5. The engine must shut off after approximately 1 second.

(1) PTO Gear Shift Lever

[A] Manual Transmission Type

[B] HST Type

9Y1211012GEG0075US0

### Checking Wheel Bolt 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 bolts and nuts regularly especially when new. If they are loose, tighten them as follows.

Tightening torque	Front wheel mounting nut	137 N·m 14 kgf·m 100 lbf·ft
	Rear wheel mounting screw and nut	215 N·m 22 kgf·m 160 lbf·ft

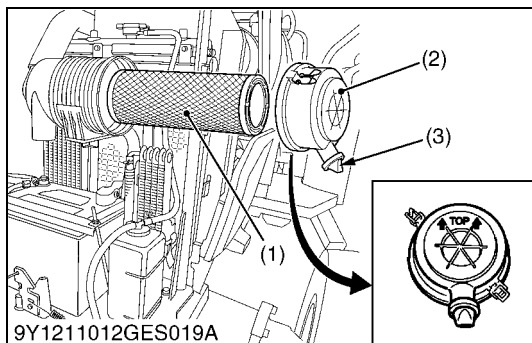
(1) Front Wheel Mounting Nut

(2) Rear Wheel Mounting Screw and Nut

9Y1211012GEG0076US0



### (3) Check Points of Every 100 Hours



#### Cleaning Air Cleaner Element [Single Element Type]

1. Remove the element.
2. Clean the 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<sup>2</sup>, 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. (referring to the instructions on the label attached to the case.)
3. Replace air cleaner element:  
Once yearly or after every sixth 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) upright. If the cover is improperly fitted, dust passed by the baffle and directly adheres to the element.

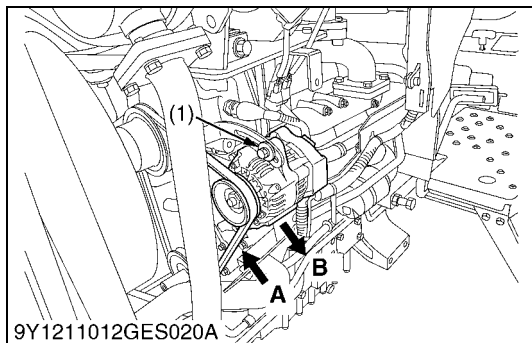
#### ■ Evacuator Valve

Open the evacuator valve 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) Elements  
(2) Cover

(3) Evacuator Valve

9Y1211012GEG0077US0



#### Adjusting Fan Belt Tension

#### ⚠ CAUTION

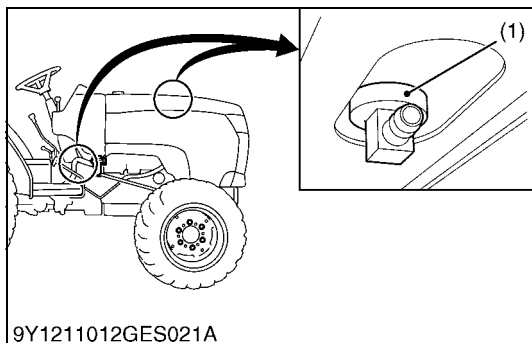
- Be sure to stop the engine before checking belt tension.
1. Stop the engine and remove the key.
  2. Apply moderate thumb pressure to belt between pulleys.
  3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull 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 is 7 to 9 mm (0.28 to 0.35 in.) when the belt is pressed 98 N (10 kgf, 22 lbf) in the middle of the span
------------------	-----------------------	---

(1) Bolt

A: Check the belt tension  
B: To tighten

9Y1211012GEG0078US0

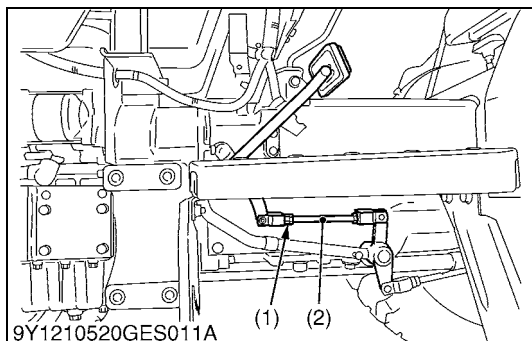


### Checking Fuel Grommet

1. Check the grommets for cracks and fuel leak.
2. If any of such problems is found, replace the grommet(s) with new one(s).

(1) Fuel Grommet

9Y1211012GEG0080US0

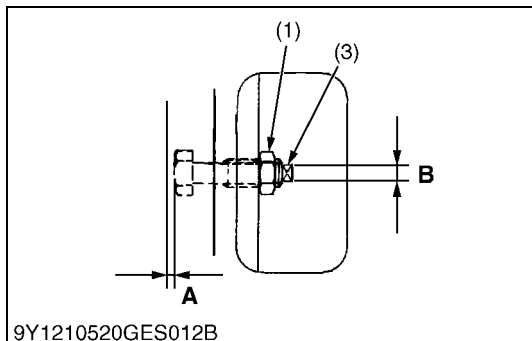


### Adjusting Clutch Pedal

#### ■ Adjusting procedure [with single clutch] [L3301 Manual Transmission Type], [HST Type]

1. Stop the engine and remove the key.
2. Slightly depress the clutch pedal and measure free travel at the top of pedal stroke.
3. If adjustment is needed, loosen the lock nut and turn the clutch rod to adjust the rod length within acceptable limits.
4. Retighten the lock nut.

Brake pedal free travel	Factory specification	20 to 30 mm (0.8 to 1.2 in.) on the pedal
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#### ■ Adjusting procedure [with Dual Clutch] [L3901 Manual Transmission Type]

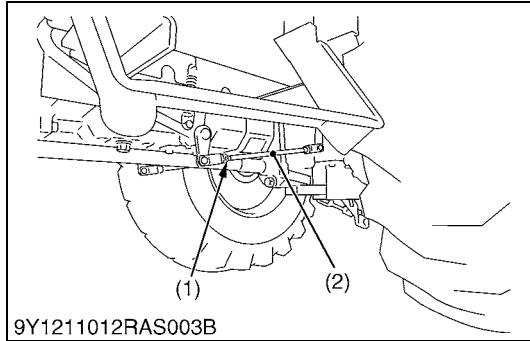
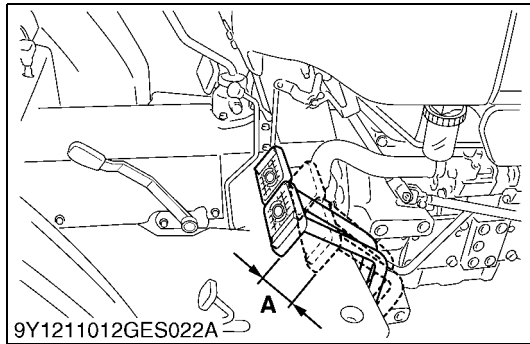
1. At first adjust clutch play, same as with single disc clutch.
2. Remove the cover located on the right side of flywheel housing case.
3. Loosen the lock nut, tighten the adjust bolt by using 7 mm (0.28 in.) spanner until head of the bolt contacts pressure plate slightly. Make 3/4 turn counterclockwise to give 0.9 to 1.0 mm (0.035 to 0.039 in.) clearance.
4. Tighten the lock nut, holding the adjusting bolt.
5. Turn the flywheel to adjust the clearance of other adjusting bolts. (3 bolts).
6. Repeat step (3) and readjust free travel of clutch pedal if necessary.

- (1) Lock Nut  
(2) Clutch Rod  
(3) Adjusting Bolt

A: 7 mm (0.28 in.)

B: 0.9 to 1.0 mm (0.035 to 0.039 in.)

9Y1211012GEG0081US0



### Adjusting Brake Pedal

#### ⚠ CAUTION

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

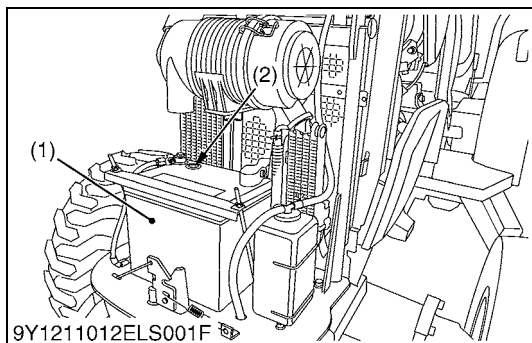
1. Release the parking brake.
2. Slightly depress the brake pedals and measure free travel at top of pedal stroke.
3. If adjustment is needed, loosen the lock nut and turn the brake rod to adjust the rod length within acceptable limits.
4. Retighten the lock nut.

Brake pedal free travel "A"	Factory specification	15 to 20 mm (0.6 to 0.8 in.) on the pedal
		Keep the free travel in the right and left brake pedals equal.

- (1) Lock Nut
- (2) Brake Rod

**A: Free Travel**

9Y1211012GEG0082US0



### 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 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 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.
- Mishandling the battery shortens the service life and adds to maintenance costs.
- The original battery is maintenance free, but needs some servicing.

If the battery is weak, the engine will be difficult to start and the lights will be dim. It is important to check the battery periodically.

#### **■ How to read the indicator**

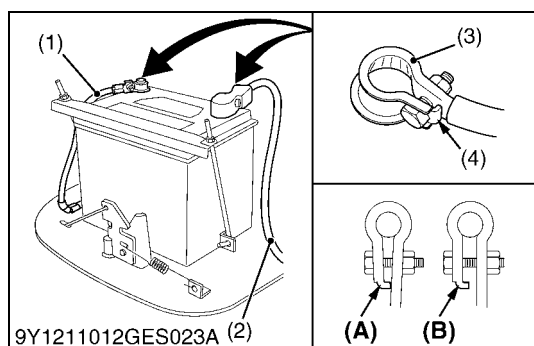
Check the battery condition by reading the indicator.

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

9Y1211012GEG0083US0



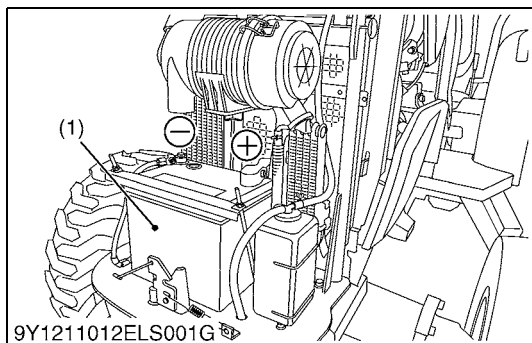
### Battery Cable Connections

1. Be sure to wire the battery cable as shown in the figure.
2. Tighten the terminal until the stopper comes in contact.

- (1) Negative Cable
- (2) Positive Cable
- (3) Terminal
- (4) Stopper

- (A) **Correct**
- (B) **Incorrect**

9Y1211012GEG0057US0



## 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)	Reserve capacity (min.)	Cold Cranking Ampere (SAE) (A)	Normal Charging Rate (A)
75D23R	12	110	580	6.5

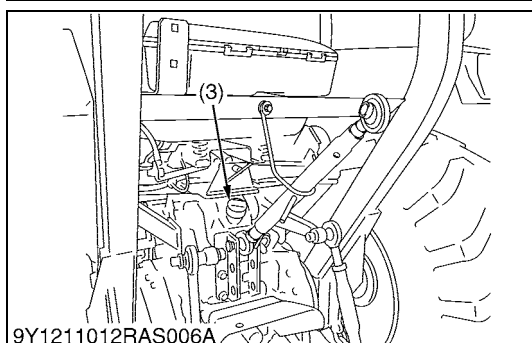
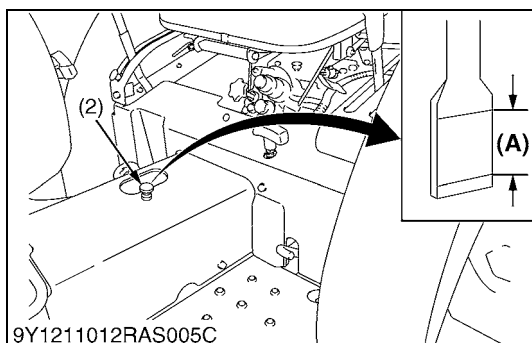
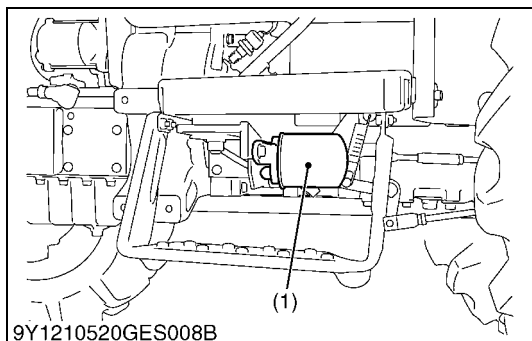
### ■ Direction for Storage

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 3 months in hot seasons and once every 6 months in cold seasons.

(1) Battery

9Y1211012GEG0084US0

## (4) Check Points of Every 200 Hours



### Replacing Transmission Oil Filter [HST Type]

#### ⚠ 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. Place the oil pan underneath the transmission oil filter and remove the filter.  
Do not remove the hydraulic oil filter. Otherwise, the oil comes out.
2. Put a film of clean transmission oil on the rubber seal of the new filter.
3. Quickly tighten the filter until it contacts the mounting surface, then, with a filter wrench, tighten it an additional 1 turn only.
4. After the new filter has been replaced, fill the transmission oil up to the upper notch on the dipstick.
5. After running the engine for a few minutes, stop the engine and check the oil level again, add oil to the prescribed level.
6. Make sure that the transmission fluid doesn't leak past the seal on the filter.

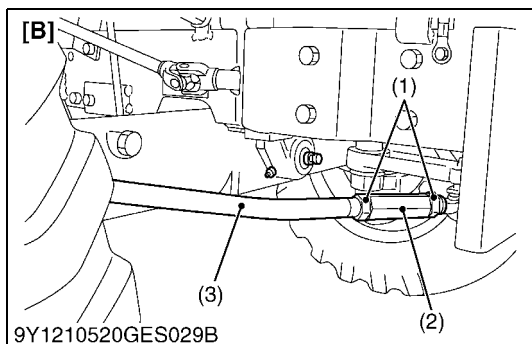
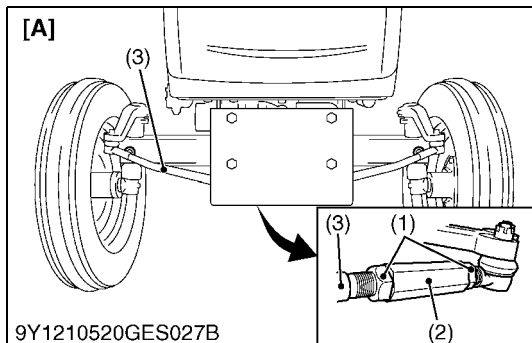
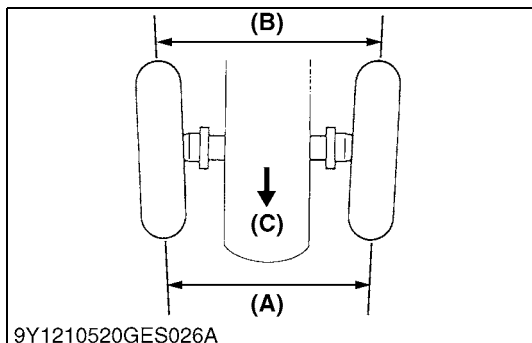
#### ■ IMPORTANT

- 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.

- (1) Transmission Oil Filter [HST Type] (A) Oil level is acceptable within this range.  
 (2) Dipstick  
 (3) Oil Inlet

9Y1211012GEG0085US0



### Adjusting Toe-in

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

Toe-in ((B) - (A))	Factory specification	2 to 8 mm 0.08 to 0.31 in.
--------------------	-----------------------	-------------------------------

### Adjusting procedures

1. Loosen the lock nut and turn the turnbuckle to adjust the rod length until the proper toe-in measurement is obtained.
2. Retighten the lock nut.

Tightening torque	Tie-rod lock nut	112.7 to 122.5 N·m 11.5 to 12.5 kgf·m 83.2 to 90.4 lbf·ft
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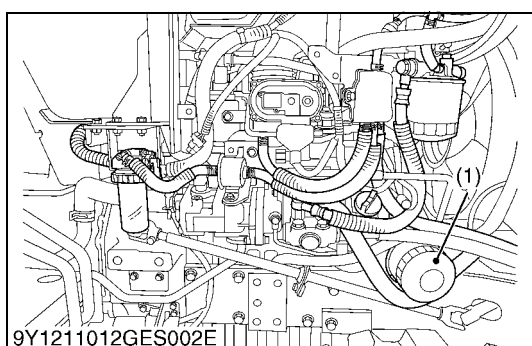
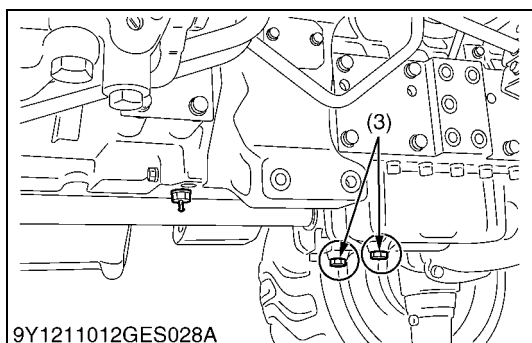
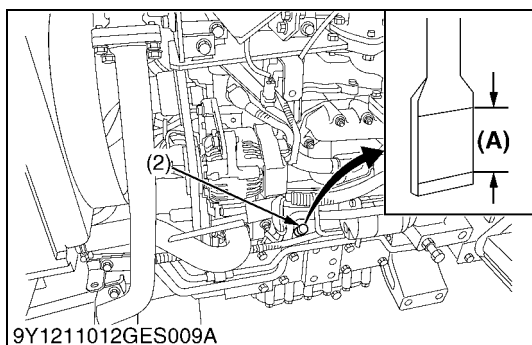
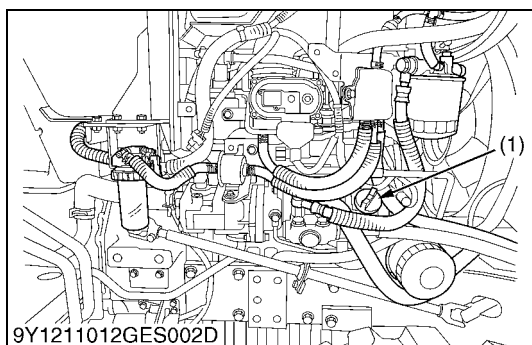
- (1) Lock Nuts  
(2) Turnbuckle  
(3) Tie-rod

- (A) Wheel to wheel distance at front  
(B) Wheel to wheel distance at rear  
(C) Front

- [A] 2WD  
[B] 4WD

9Y1211012GEG0091US0

## (5) Check Points of Every 400 Hours



### 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 "LUBRICANTS, FUEL AND COOLANT" on page G-10.)

Engine oil (with filter)	Capacity	6.7 L 7.1 U.S.qts 5.9 Imp.qts
-----------------------------	----------	-------------------------------------

#### ■ IMPORTANT

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

(1) Oil Inlet

(2) Dipstick

(3) Drain Plug

(A) Oil level is acceptable within this range.

9Y1211012GEG0092US0

### 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.

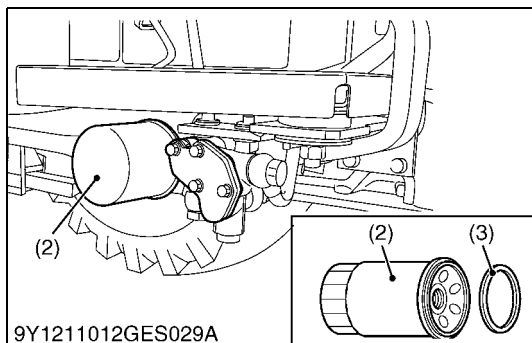
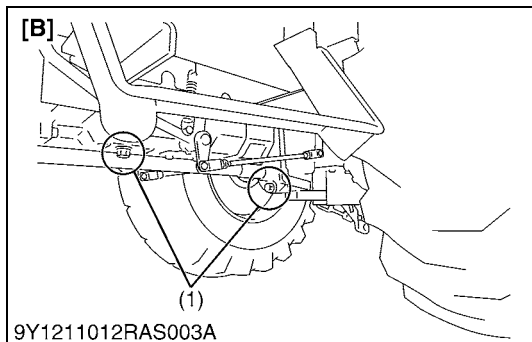
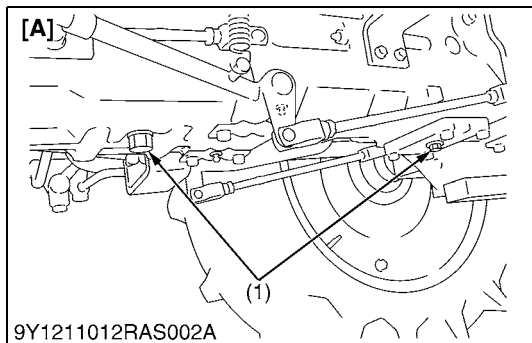
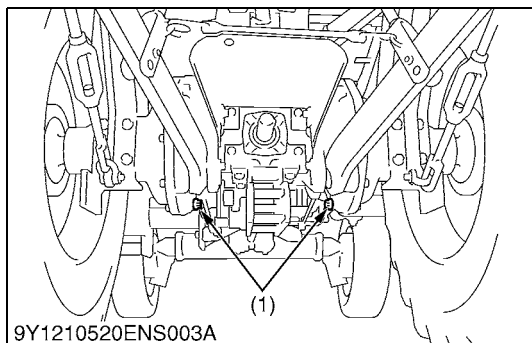
#### ■ IMPORTANT

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

(1) Engine Oil Filter

9Y1211012GEG0093US0





## 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 "LUBRICANTS, FUEL AND COOLANT" on page G-10.)
  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 does not 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.

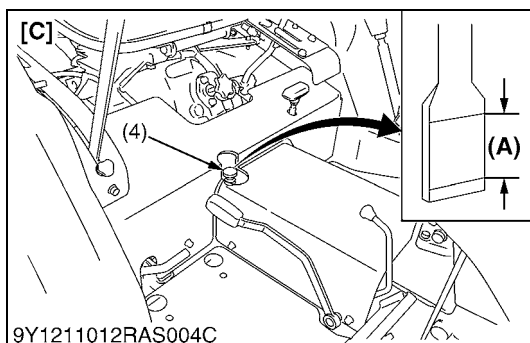
Run the engine at medium speed for a few minutes to prevent damage to the transmission.

Transmission oil capacity	Manual Transmission	2WD	28.0 L 7.4 U.S.gals 6.16 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.27 Imp.gals
	HST	4WD	23.5 L 6.2 U.S.gals 5.17 Imp.gals

- (1) Drain Plug  
 (2) Hydraulic Oil Filter  
 (3) Magnetic Filter  
 (Wipe Off Metal Filings)

[A] 2WD  
 [B] 4WD

(To be continued)

**(Continued)**

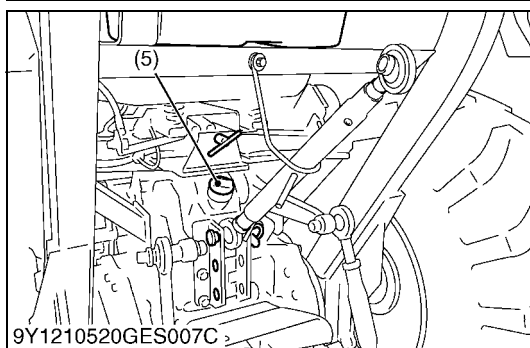
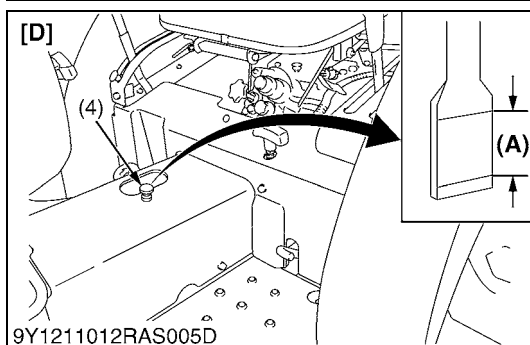
- (4) Dipstick
- (5) Oil Inlet

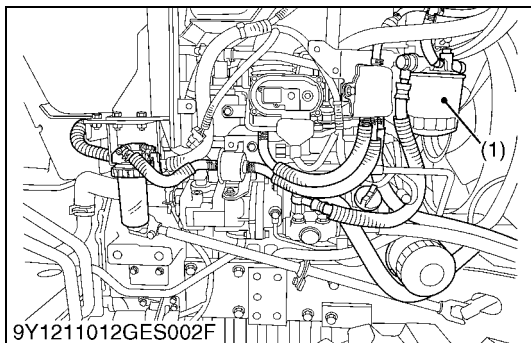
[C] Manual Transmission Type

[D] HST Type

(A) Oil level is acceptable within this range.

9Y1211012GEG0094US0



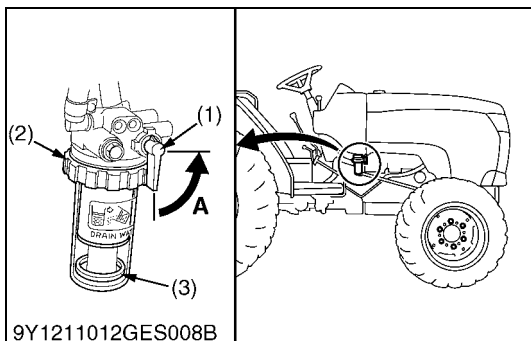


### Replacing Fuel Filter

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 "Bleeding Fuel System" on page G-46.)

(1) Fuel Filter

9Y1211012GEG0096US0



### Cleaning Water Separator

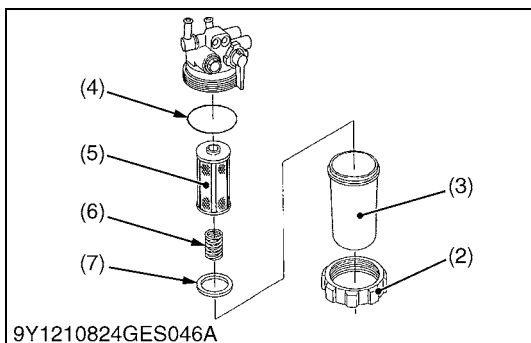
This job should not be done in the field, but in a clean place.

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 "Bleeding Fuel System" on page G-46.)

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

**A: Close**

9Y1211012GEG0097US0

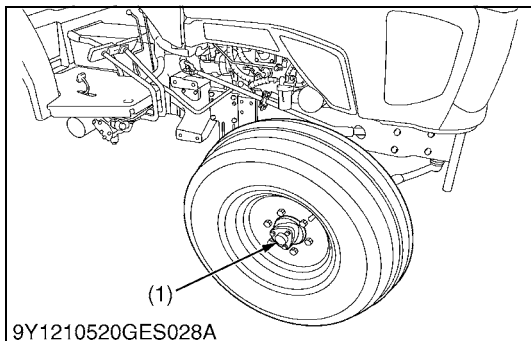


### Lubricating Grease Fitting [2WD Model]

Detach the cover, and apply bearing grease.

- (1) Front Wheel Hub Cover

9Y1211012GEG0098US0



## (6) Check Point of Every 600 Hours

### Adjusting Front Axle Pivot

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

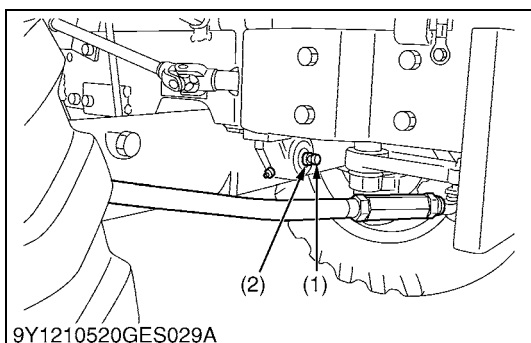
#### ■ Adjusting procedure

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

9Y1211012GEG0099US0

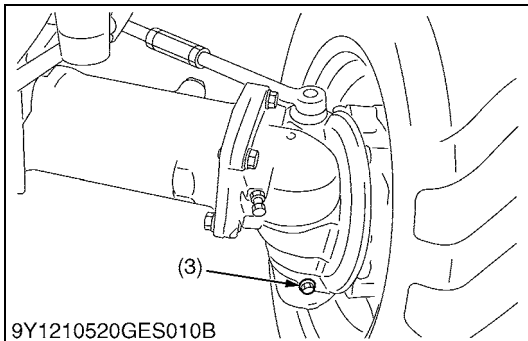
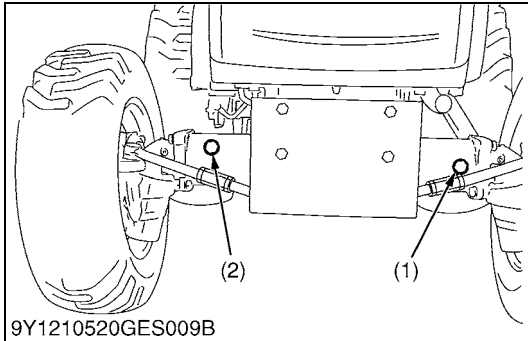


## (7) Check Point of Every 800 Hours

### Adjusting Engine Valve Clearance

- See "Valve Clearance" on page 1-S12.

9Y1211012GEG0100US0



### Changing Front Axle Case Oil

#### [4WD]

- 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.
- After draining, reinstall the drain plugs.
- 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 "LUBRICANTS, FUEL AND COOLANT" on page G-10.)
- After filling, reinstall the filling plug.
- Run the vehicle a few minutes in order for the oil to flow through the front axle case.
- 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.
- Reinstall and tighten the oil level check plug and filling plug.

Front axle case oil	Capacity	4.5 L 4.8 U.S.qts 4.0 Imp.qts
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- (1) Check Plug  
(2) Filling Plug

- (3) Drain Plug

9Y1211012GEG0095US0

## (8) Check Points of Every 1500 Hours

### Cleaning Fuel Injector Nozzle Tip

- See "Overflow Pipe and injectors" on page 1-S44.

9Y1211012GEG0101US0

### Replacing Oil Separator Element



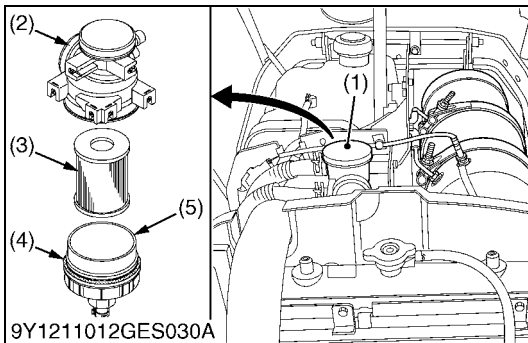
#### CAUTION

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

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

- (1) Oil Separator  
(2) Body  
(3) Oil Separator Element

- (4) Gasket  
(5) Cover



9Y1211012GEG0102US0

### Checking PCV (Positive Crankcase Ventilation) Valve

- See "PCV (Positive Crankcase Ventilation) Valve (Oil Separator)" on page 1-S16.

9Y1211012GEG0103US0

### Checking and Cleaning EGR Cooler

- See "EGR Cooler" on page 1-S16.

9Y1211012GEG0104US0

## (9) Check Points of Every 3000 Hours

### Checking Supply Pump

- See page "Supply Pump" on page 1-S49.

9Y1211012GEG0105US0

### Checking and Cleaning EGR System

- See "EGR Valve" on page 1-S40.

9Y1211012GEG0106US0

### Cleaning DPF Muffler

#### ■ Removal of ash

The longer the DPF operates, the more ash (burnt residue) is collected in the filter. Too much ash build-up adversely affects the DPF performance.

#### ■ IMPORTANT

- The DPF needs cleaning with a specific cleaning device. Do not clean the DPF by disassembling, and attempt by yourself.

9Y1211012GEG0058US0

## (10) Check Points of Every 1000 Hours or 1 year

### Replacing Air Cleaner Element

- See "Cleaning Air Cleaner Element [Single Element Type]" on page G-29.

9Y1211012GEG0107US0

### Checking Exhaust Manifold

- See "EGR Related Parts" on page 1-S40.

9Y1211012GEG0108US0

## (11) Check Points of Every 1 Year

### Checking Antifrost Heater for Oil Separator (if equipped)

- See "Heater Resistance (for Reference)" on page 9-S55.

9Y1211012GEG0198US0

### Checking DPF Differential Pressure Sensor Pipe

- See "DPF Muffler" on page 1-S19.

9Y1211012GEG0109US0

### Checking EGR Pipe

- See "EGR Related Parts" on page 1-S40.

9Y1211012GEG0110US0

### Checking Fuel 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 or repair them at once.

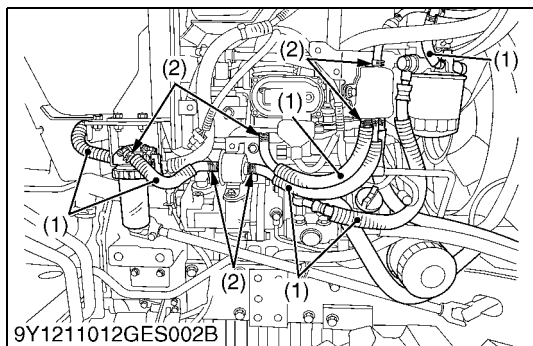
#### ■ NOTE

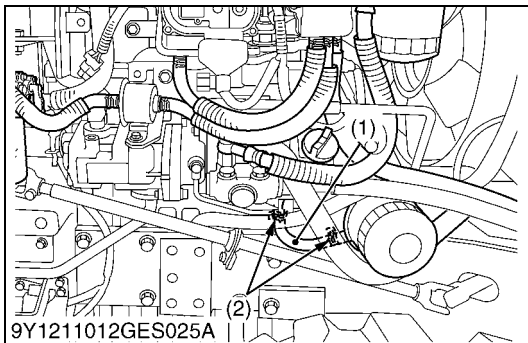
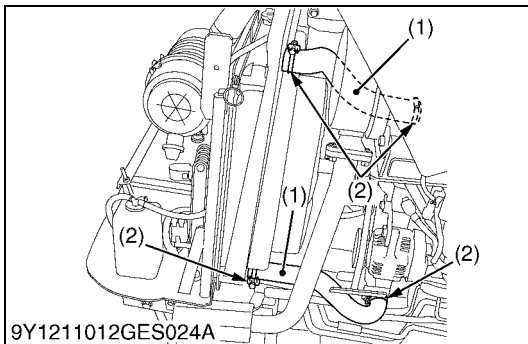
- If the fuel line is removed, be sure to properly bleed the fuel system. (See page G-46.)

(1) Fuel Lines

(2) Clamp Bands

9Y1211012GEG0079US0





### **Checking Radiator Hose and Clamp**

Check to see if radiator hoses are properly fixed every 200 hours of operation or 6 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**

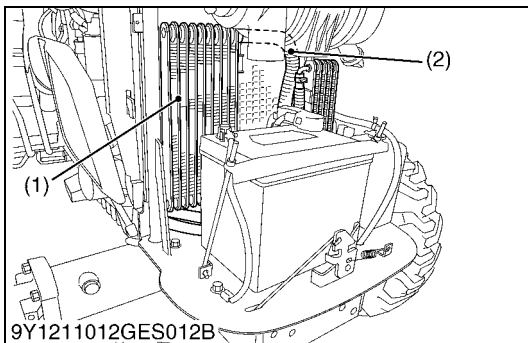
Take the following actions in the event the coolant temperature is nearly or more than the boiling point, what is called "Overheating"

1. Park the tractor in a safe place and keep the engine unloaded idling.
2. Do not 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 blows out.
4. Check that there are no dangers such as burns. Get rid of the causes of overheating according to the manual, see "TROUBLESHOOTING" section, and then, start again the engine.

(1) Radiator Hoses

(2) Clamp Bands

9Y1211012GEG0086US0



### **Checking Oil Cooler Line**

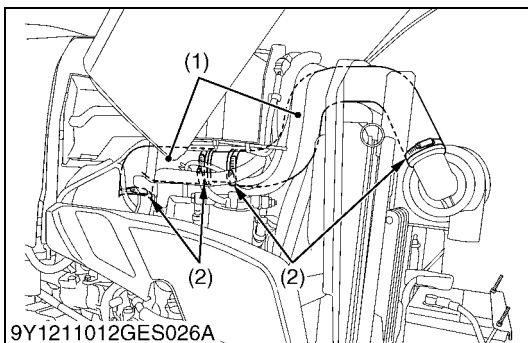
#### **[HST Type]**

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 or repair them at once.

(1) Oil Cooler

(2) Oil Cooler Line

9Y1211012GEG0087US0



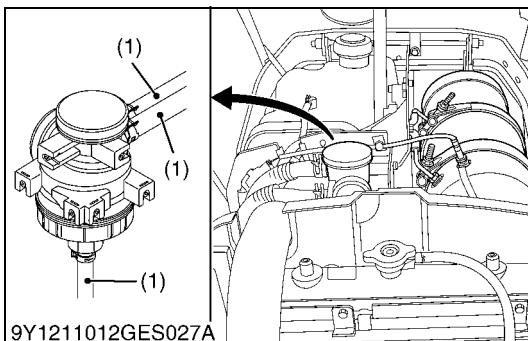
### **Checking Intake Air Line**

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

(1) Hose

(2) Hose Clamps

9Y1211012GEG0088US0

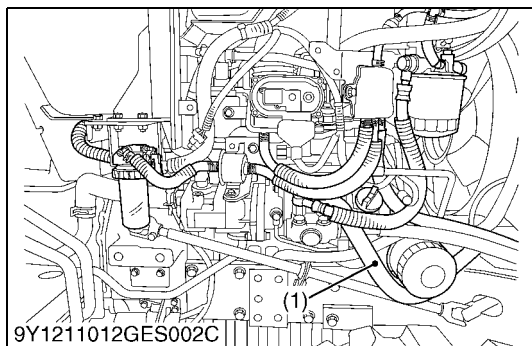


### **Checking Oil Separator Hose**

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

(1) Oil Separator Hoses

9Y1211012GEG0089US0



### Checking Power Steering Line

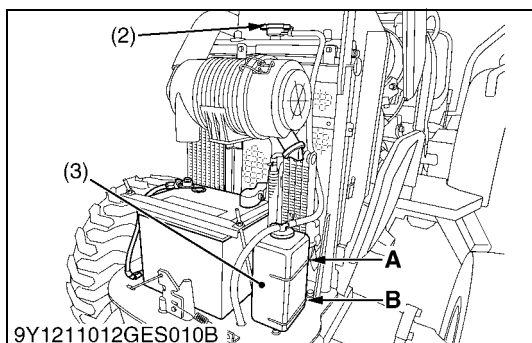
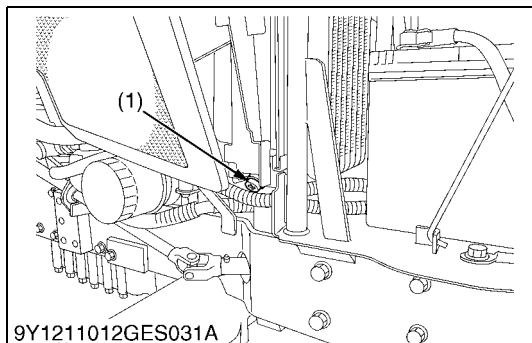
#### [Manual Transmission Type]

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 or repair them at once.

- (1) Power Steering Pressure Hoses

9Y1211012GEG0090US0

## (12) 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, 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.

Radiator coolant	Capacity	6.0 L 6.3 U.S.qts 5.3 Imp.qts
Recovery tank coolant		0.6 L 0.6 U.S.qts 0.5 Imp.qts

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

A: FULL  
B: LOW

9Y1211012GEG0111US0

**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  $1.013 \times 10^5$  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.

9Y1211012GEG0112US0

**(13) Check Points of Every 2 Years****Replacing Fuel Grommet**

- Refer to "Checking Fuel Grommet". (See page G-30.)

9Y1211012GEG0116US0

**Replacing DPF Differential Pressure Sensor Hose**

- Refer to "DPF Muffler". (See page 1-S19.)

9Y1211012GEG0120US0

**(14) Check points of Every 4 Years****Replacing Radiator Hose (Water pipes)**

- Replace the hoses and clamps.  
Refer to "Checking Radiator Hose and Hose Clamp". (See page G-42.)

9Y1211012GEG0113US0

**Replacing Power Steering Hose****[Manual Transmission Type]**

- Replace the hoses and clamps.  
Refer to "Checking Oil Cooler Line". (See page G-42.)

9Y1211012GEG0114US0

**Replacing Fuel Hose**

- Replace the fuel hoses and clamps.  
Refer to "Checking Fuel Line". (See page G-41.)

9Y1211012GEG0115US0

**Replacing Oil Cooler Line****[HST Type]**

- Refer to "Checking Oil Cooler Line". (See page G-42.)

9Y1211012GEG0117US0

**Replacing Intake Air Line**

- Replace the intake hoses and clamps.  
Refer to "Checking Intake Air Line". (See page G-42.)

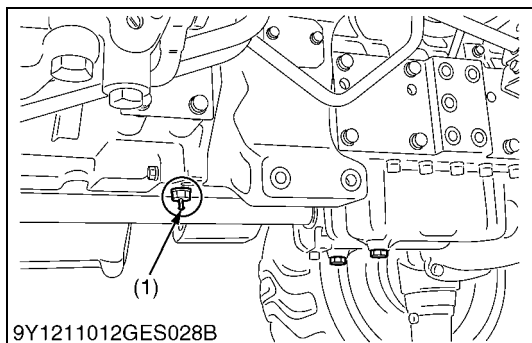
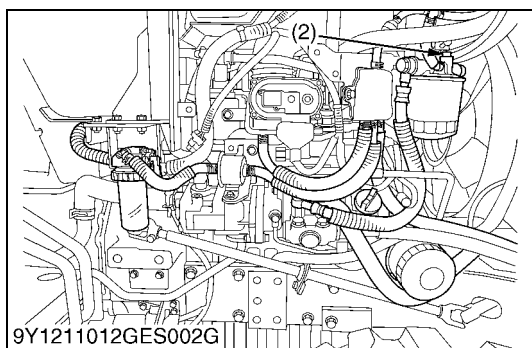
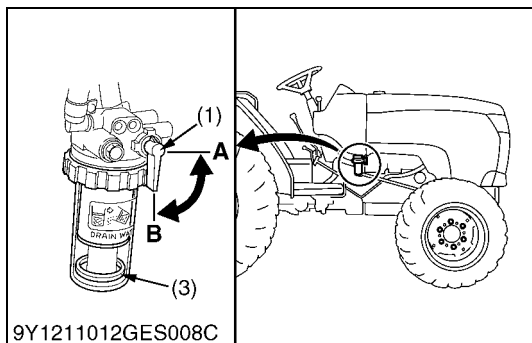
9Y1211012GEG0118US0

**Replacing Oil Separator Hose**

- Refer to "Checking Oil Separator Hose". (See page G-42.)

9Y1211012GEG0119US0

## (15) 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

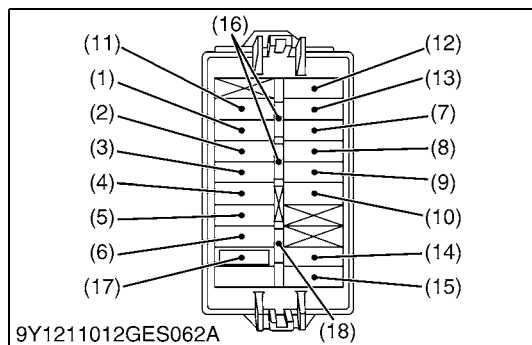
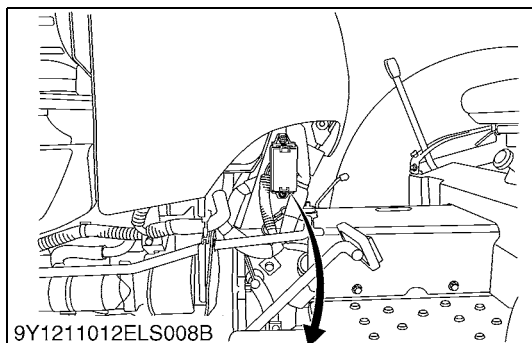
9Y1211012GEG0121US0

### Draining Clutch Housing Water

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

- (1) Split Pin Plug

9Y1211012GEG0122US0



### 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.

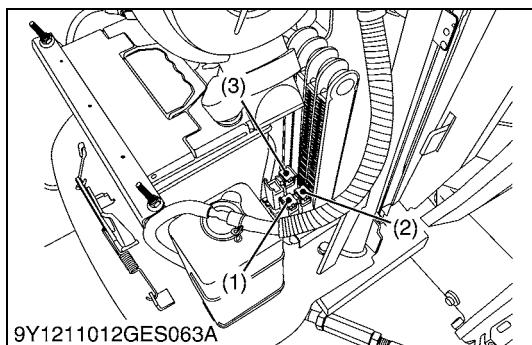
If any of them should blow, replace with a new one of the same capacity.

Fuse No.	Capacity (A)	Protected circuit
(1)	5	Engine ECU (Ignition key)
(2)	5	Main ECU (Ignition key)
(3)	5	Meter panel (Ignition key)
(4)	10	Combination switch
(5)	10	Work light
(6)	5	Starter relay
(7)	20	Engine ECU (Battery)
(8)	5	Main ECU (Battery)
(9)	5	Meter panel (Battery)
(10)	10	Hazard
(11)	5	Heater relay (if equipped)
(12)	10	Heater (Oil separator, IN 1) (if equipped)
(13)	10	Heater (Oil separator, IN 2) (if equipped)
(14)	10	Heater (Oil separator, OUT 1) (if equipped)
(15)	10	Heater (Oil separator, OUT 2) (if equipped)

(16) Spare Fuse  
(17) Fuse Puller

(18) Spare fuse

9Y1211012GEG0123US0



### 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.

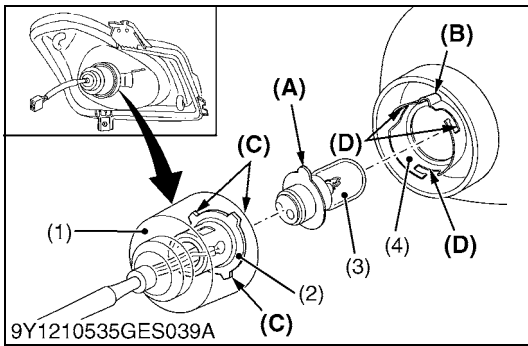
No.	Capacity (A)	Protected circuit
(1)	40	Load
(2)	50	Battery
(3)	40	Heater (Oil separator) (if equipped)

9Y1211012GEG0124US0

### Replacing Light Bulb

Light	Capacity
Head lights	25 W / 25 W
Tail light	5 W
Turn signal / Hazard light (rear)	21 W
Turn signal / Hazard light (front)	23 W

9Y1211012GEG0125US0



## Replacing Head Lamp



### CAUTION

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.
- Before replacing the lamp, be sure to turn off the light and wait until the bulb cools down, otherwise, you may get burned.

### ■ Removing Bulb

1. Remove the rubber boot.
2. Turn the socket counterclockwise while pressing and remove it.
3. Remove the bulb.

### ■ Attaching Bulb

1. Align (A) of the bulb with (B) of the lamp case and attach the bulb.
2. Align (C) of the socket with (D) of the lamp case and attach the socket.
3. Attach the rubber boot.

### ■ 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) Rubber Boot  
(2) Socket  
(3) Bulb  
(4) Lamp Case

- (A) Align to (B)  
(C) Align to (D)

9Y1211012GEG0126US0

## Replacing Radiator Hose (Water pipes)

- Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.  
Refer to "Checking Radiator Hose and Hose Clamp". (See page G-42.)

9Y1211012GEG0199US0

## Replacing Fuel Lines

- Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.  
Refer to "Checking Fuel Line". (See page G-41.)

9Y1211012GEG0200US0

## Replacing Intake Air Line

- Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.  
Refer to "Checking Intake Air Line". (See page G-42.)

9Y1211012GEG0201US0

## Replacing Power Steering Hose

- 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-42.)

9Y1211012GEG0202US0

## Replacing Oil Cooler Line

- 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-42.)

9Y1211012GEG0203US0

**Replacing Oil Separator Hose**

- Replace if any deterioration (crack, hardening, scar or deformation) or damage occurred. (See page G-42.)

9Y1211012GEG0204US0

## [2] L4701

### 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.

9Y1211012GEG0054US0

## (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.

9Y1211012GEG0055US0

### Walk Around Inspection

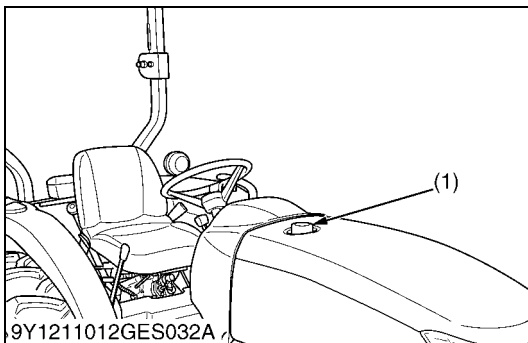
Look around and under the tractor for such items as loose bolts, trash build-up, oil or coolant leaks, broken or worn parts.

9Y1211012GEG0056US0

### 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.



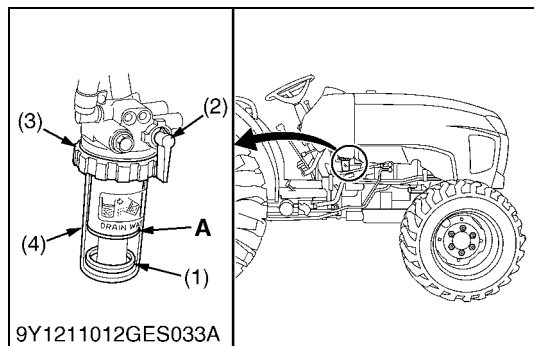
Fuel tank	Capacity	51 L 13.5 U.S.gals 11.2 Imp.gals
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#### ■ IMPORTANT

- 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 a spill should occur, 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

9Y1211012GEG0127US0



### 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.

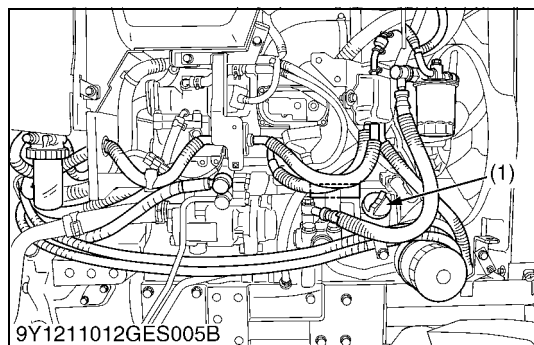
#### ■ IMPORTANT

- 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

9Y1211012GEG0128US0



### 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 2 notches. If the level is too low, add new oil to the prescribed level at the oil inlet.

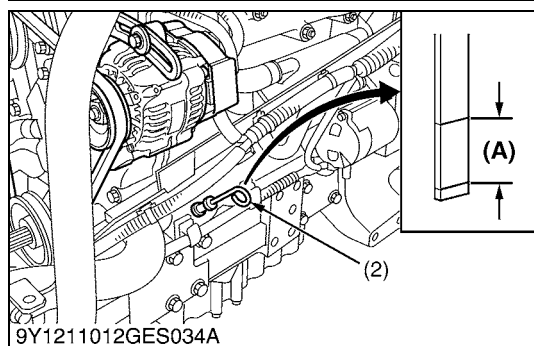
(Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.)

#### ■ 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.

#### ■ NOTE

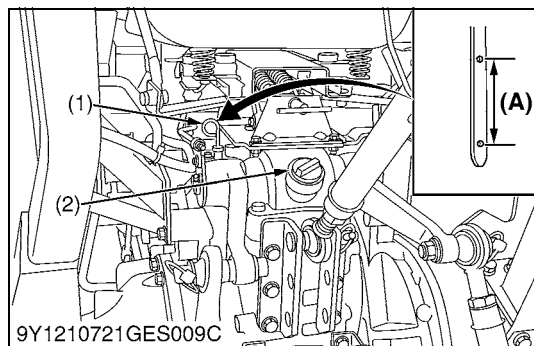
- At times a small amount of fuel, which is used to regenerate the DPF, may get mixed with the engine oil and the engine oil may increase in volume.



- (1) Oil Inlet
- (2) Dipstick

(A) Oil level is acceptable within this range.

9Y1211012GEG0129US0



### 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 2 notches. If the level is too low, add new oil to the prescribed level at the oil inlet.
- (Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.)

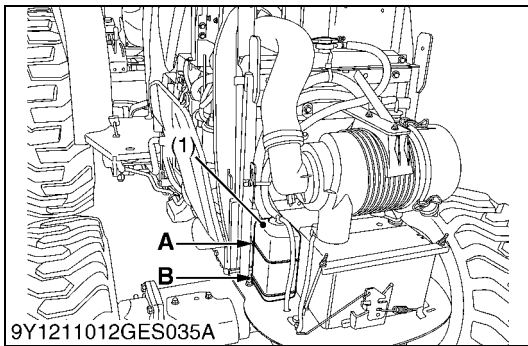
#### ■ IMPORTANT

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

- (1) Dipstick
- (2) Oil Inlet

(A) Oil level is acceptable within this range.

9Y1211012GEG0130US0



### 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.

- Check to see that the coolant level is between the "FULL" and "LOW" marks of recovery tank.
- When the coolant level drops due to evaporation, add soft water only up to the full level. In case of leakage, add anti-freeze and soft water in the specified mixing ratio up to the full level. (Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.)
- When the coolant level is lower than "LOW" mark of recovery tank, remove the radiator cap and check to see that the coolant level is just below the port. If level is low, add coolant.

#### ■ IMPORTANT

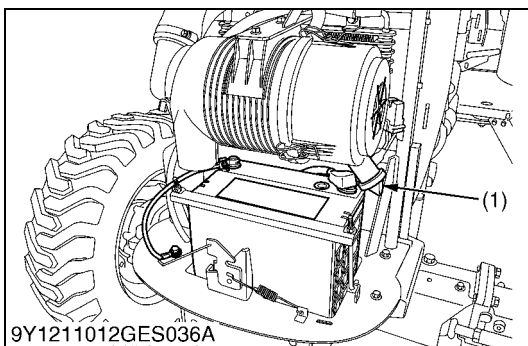
- If the radiator cap has to be removed, follow the caution above and securely retighten the cap.
- Use clean, fresh soft water and anti-freeze to fill the radiator.

(1) Recovery Tank

A: Full

B: Low

9Y1211012GEG0131US0

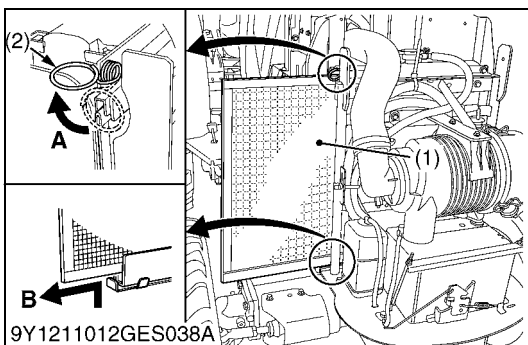


### Cleaning Evacuator Valve

- Open the evacuator valve to get rid of large particles of dust and dirt.

(1) Evacuator Valve

9Y1211012GEG0132US0



### Cleaning Grill and Radiator Screen

#### ⚠ 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.

- Check front grill and side screens to be sure they are clean of debris.
- Detach the screen with the fixed spring being held up and remove all foreign materials and clean the front of radiator completely.

#### ■ 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) Radiator Screen

A: Hold Up

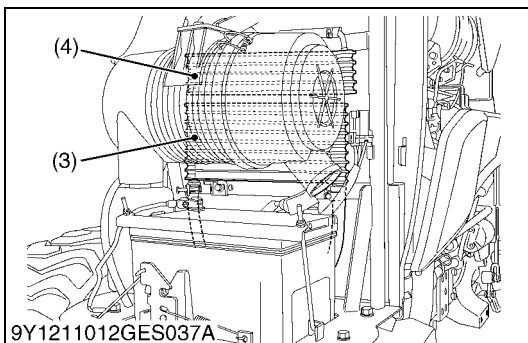
(2) Fixed Spring

B: Detach

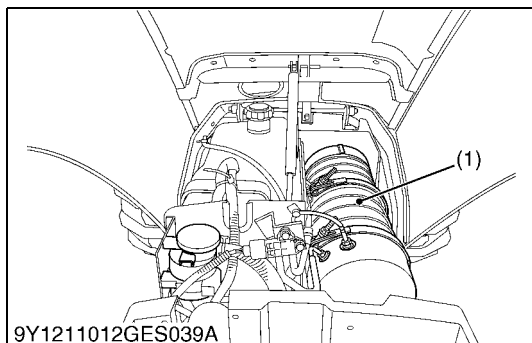
(3) Oil Cooler [HST Type]

(4) Fuel Cooler

9Y1211012GEG0133US0







### 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

9Y1211012GEG0134US0

### Checking Brake Pedal

[HST Type]

#### **⚠ CAUTION**

- Be sure brake pedals have equal adjustment when using locked together. Incorrect or unequal brake pedal adjustment can cause the tractor to swerve or roll-over.
1. Inspect the brake pedals for free travel, and smooth operation.
  2. Adjust if incorrect measurement is found. (See page G-59.)

9Y1211012GEG0135US0

### Checking Brake Pedals and Clutch Pedal

[Manual Transmission Type]

#### **⚠ CAUTION**

- Be sure brake pedals have equal adjustment when using locked together. Incorrect or unequal brake pedal adjustment can cause the tractor to swerve or roll-over.
1. Inspect the brake and clutch pedals for free travel, and smooth operation.
  2. Adjust if incorrect measurement is found. (See "Adjusting Clutch Pedal" on page G-59 or "Adjusting Brake Pedal" on page G-59.)

9Y1211012GEG0136US0

### Checking Gauges, Meter and Easy Checker™

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

9Y1211012GEG0137US0

### Checking Head Light, Turn Signal / Hazard Light etc.

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

9Y1211012GEG0138US0

### Checking Seat Belt and ROPS

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

9Y1211012GEG0139US0

### **Checking and Cleaning of Electrical Wiring and Battery Cables**



#### **CAUTION**

- A loosened terminal or connector, or damaged wire may affect the performance of electrical components or cause short circuits. Leakage of electricity could result in a fire hazard, a dead battery or damage to electrical components.
- Replace damaged wires or connections promptly.
- If a fuse blows soon after replacement, **DO NOT USE A LARGER THAN RECOMMENDED FUSE OR BYPASS THE FUSE SYSTEM.**
- Many wiring connections are protected by waterproof plugs, plug and unplug these connections carefully and make sure they are sealed correctly after assembly.
- Accumulation of dust, chaff and spilled fuel deposits around the battery, electrical wiring, engine or exhaust system are fire hazards. **CLEAN THESE AREAS BEFORE STARTING WORK.**

To avoid premature electrical malfunctions **DO NOT APPLY** high pressure water directly to battery, wiring, connectors, electrical components or instrument panel.

#### **Inspect the following regularly:**

1. Check wiring for chafed or cracked insulation.
2. Check wiring harness clamps. Replace if necessary.
3. Check connectors and terminals for looseness, contamination or overheated (discolored) connections.
4. Check instrument panel for correct operation of switches and gauges.

9Y1211012GEG0140US0

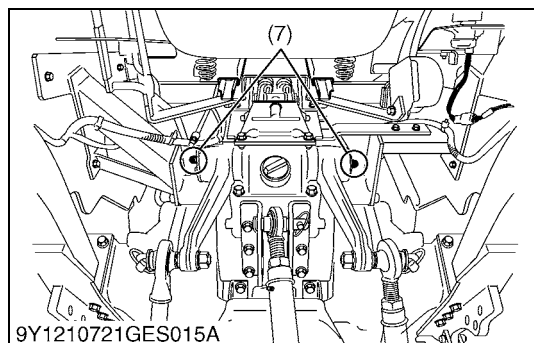
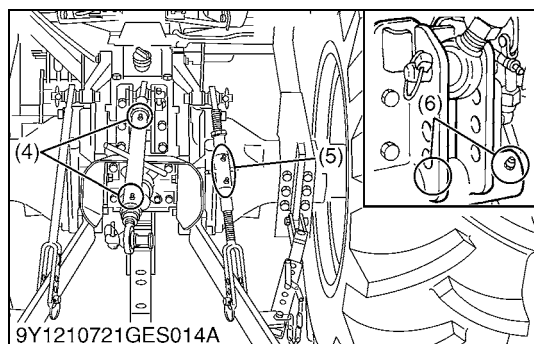
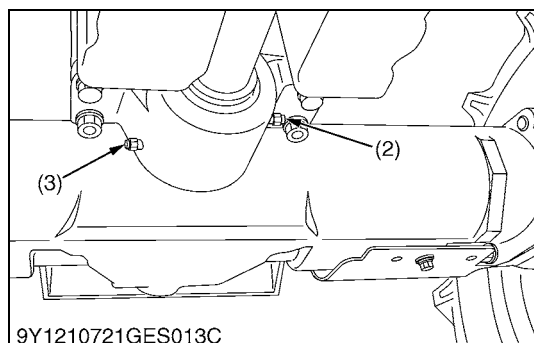
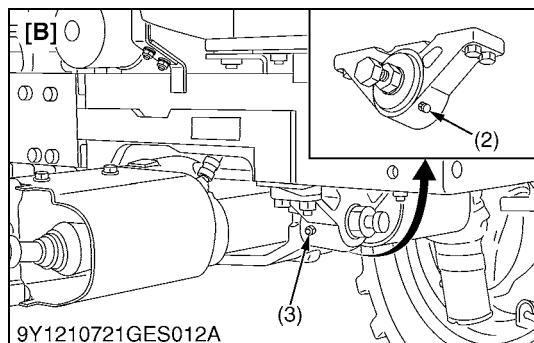
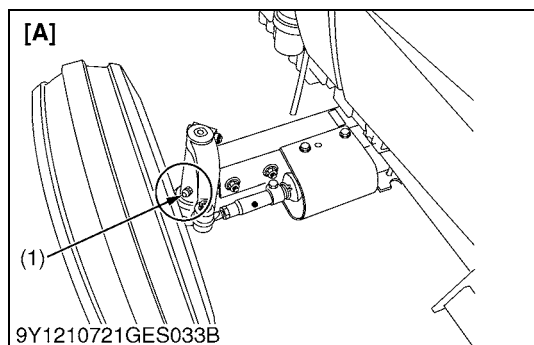
### **Checking Movable Parts**

If any of the movable parts, such as levers and pedals, is not smoothly moved because of rust or sticky material, do not attempt to force it into motion.

In the above case, remove the rust or the sticky material, and apply oil or grease on the relevant spot. Otherwise, the machine may get damaged.

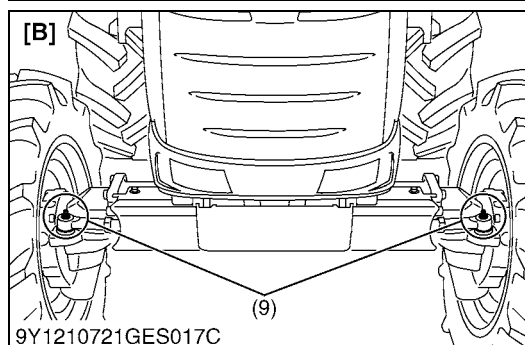
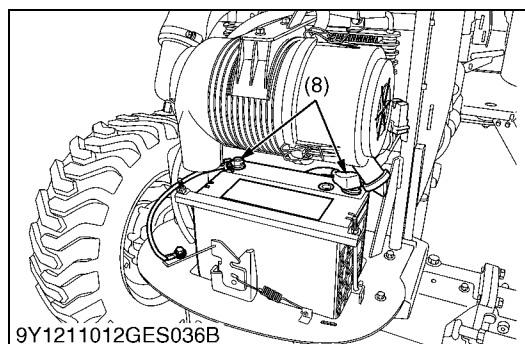
9Y1211012GEG0141US0

## (2) Check Points of Every 50 Hours



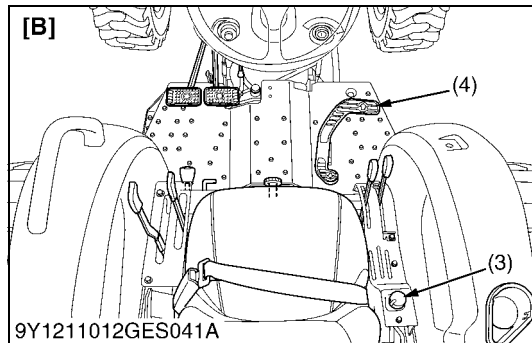
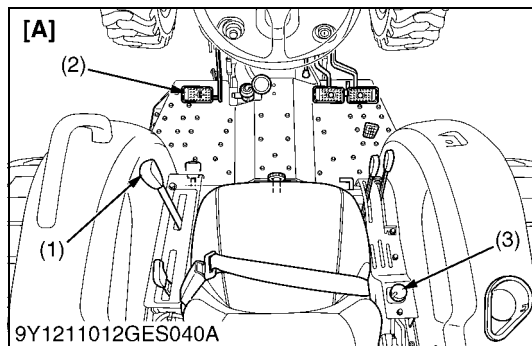
### Lubricating Grease Fittings

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 grease to forward front axle support, remove the breather plug and apply grease until grease overflows from breather plug port.



- |   |   |
|---|---|
| (1) Grease Fitting<br>(Knuckle Shaft) [RH, LH]                              | (7) Grease fitting (Hydraulic arm axle) |
| (2) Grease Fitting<br>(Front axle support)                                  | (8) Battery terminals                   |
| (3) Breather  | (9) Grease fitting (Tie-rod ends)       |
| (4) Grease Fitting (Top Link)   | [A] 2WD                                 |
| (5) Grease Fitting (Lifting Rod) [RH]                                       | [B] 4WD                                 |
| (6) Grease Fitting (Top link bracket)<br>(with draft control) (if equipped) |   |

9Y1211012GEG0142US0



## Checking Engine Start System

### ⚠ CAUTION

- 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.

#### [Manual Transmission Type]

##### ■ 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 Type]

##### ■ 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.

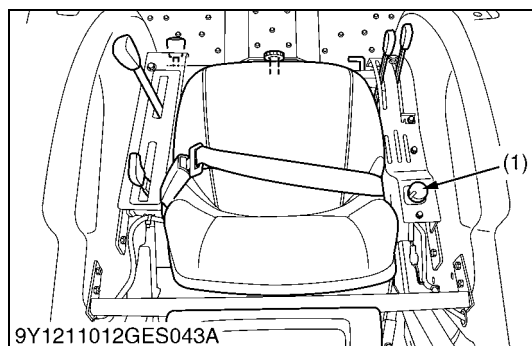
1. Sit on the operator's seat.
2. Engage the PTO clutch control switch or lever.
3. Place the speed control pedal in neutral position.
4. Turn the key to "START" position.
5. The engine must not crank.

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

[A] Manual Transmission Type

[B] HST Type

9Y1211012GEG0143US0



## Checking Operator Presence Control

### ⚠ CAUTION

- 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

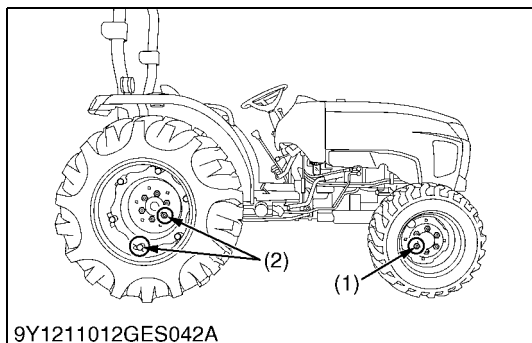
1. Place all control levers in the "NEUTRAL" position.
2. Set the parking brake and stop the engine.

##### ■ 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

9Y1211012GEG0144US0



### Checking Wheel Bolt Torque

#### ⚠ CAUTION

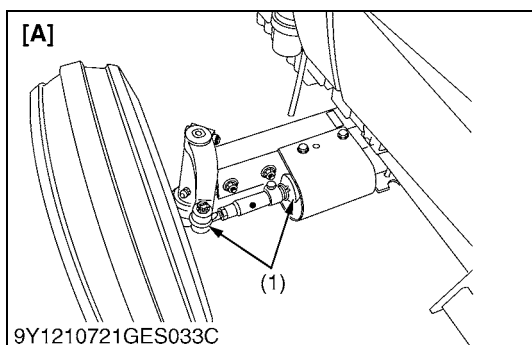
- Never operate tractor with a loose rim, wheel, or axle.
  - Any time bolts and nuts are loosened, retighten to specified torque.
  - Check all bolts and nuts frequently and keep them tight.
1. Check wheel bolts and nuts regularly especially when new. If they are loose, tighten them as follows.

Tightening torque	Front Wheel Mounting Nut	124.0 to 147.0 N·m 12.6 to 15.0 kgf·m 91.5 to 108.4 lbf·ft
	Rear Wheel Mounting Screw and Nut	196.0 to 225.0 N·m 20.0 to 23.0 kgf·m 144.6 to 166.0 lbf·ft

(1) Front Wheel Mounting Nut

(2) Rear Wheel Mounting Screw and Nut

9Y1211012GEG0145US0



### Checking Tie-rod Dust Cover

1. Check to see that dust covers are not damaged.

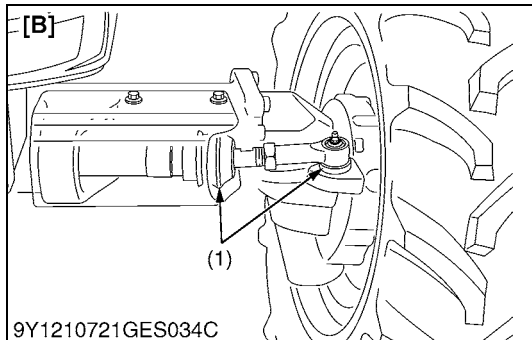
#### ■ IMPORTANT

- If dust covers are cracked, water and dust invade into tie-rod and it will be early wear.

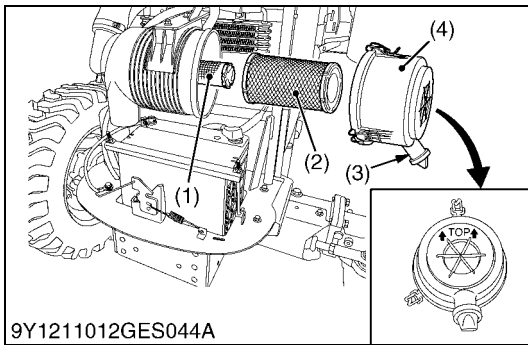
(1) Dust Cover

[A] 2WD  
[B] 4WD

9Y1211012GEG0146US0



### (3) Check Points of Every 100 Hours



#### 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<sup>2</sup>, 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 sixth 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.

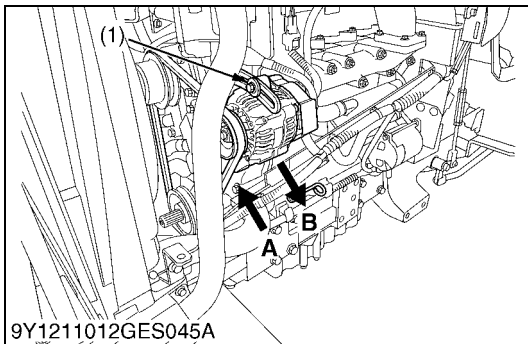
(See "Replacing Air Cleaner Secondary Element" in "Check Points of Every 1 year" on page G-68.)

#### ■ Evacuator Valve

Open the evacuator valve 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 | (3) Evacuator Valve |
| (2) Primary Element            | (4) Cover           |

9Y1211012GEG0147US0



#### Adjusting Fan Belt Tension

#### ⚠ CAUTION

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

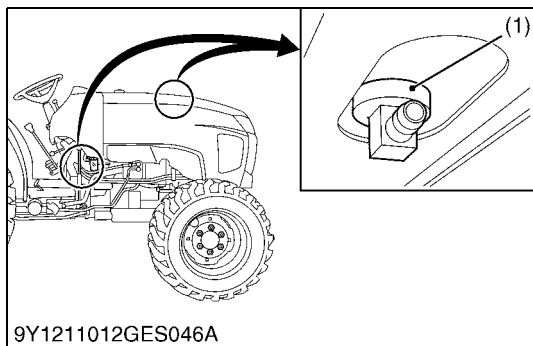
1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within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

Fan belt tension	Factory specification	A deflection is 12 mm (0.48 in.) when the belt is pressed 68.6 N (7 kgf, 15.4 lbf) in the middle of the span.
------------------	-----------------------	--

- (1) Bolt

- A: Check the belt tension  
B: To tighten

9Y1211012GEG0148US0

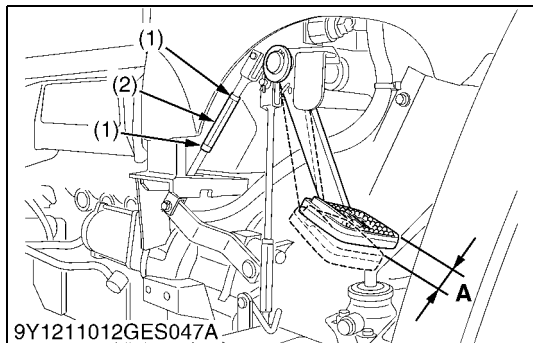


### Checking Fuel Grommet

1. Check the grommets for cracks and fuel leak.
2. If any of such problems is found, replace the grommet(s) with new one(s).

(1) Fuel Grommet

9Y1211012GEG0150US0



### Adjusting Clutch Pedal

#### [Manual Transmission Type]

##### ■ Adjusting procedure

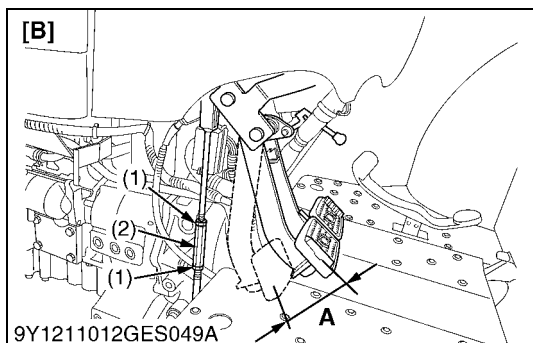
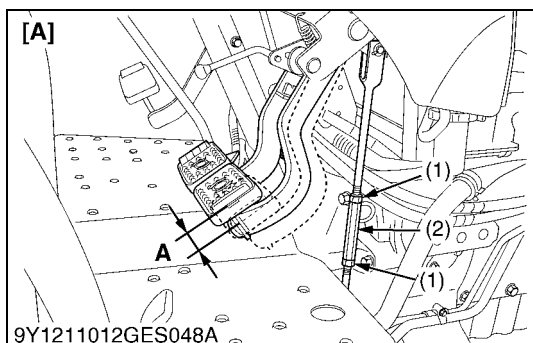
1. Stop the engine and remove the key.
2. Slightly depress the clutch pedal and measure free travel at the top of pedal stroke.
3. If adjustment is needed, loosen the lock nut and turn the turnbuckle to adjust the rod length within acceptable limits.
4. Retighten the lock nut.

Clutch pedal free travel "A"	Factory specification	20 to 30 mm (0.8 to 1.2 in) on the pedal
---------------------------------	-----------------------	---

- (1) Lock Nut  
(2) Turnbuckle

A: Free Travel

9Y1211012GEG0151US0



### Adjusting Brake Pedal



#### CAUTION

- Stop the engine and chock the wheels before checking brake pedal.
1. Release the parking brake.
  2. Slightly depress the brake pedals and measure free travel at top of pedal stroke.
  3. If adjustment is needed, loosen the lock nut and turn the turnbuckle to adjust the rod length within acceptable limits.
  4. Retighten the lock nut.

Brake pedal free travel "A"	Factory specification	15 to 20 mm (0.6 to 0.8 in.) on the pedal
		Keep the free travel in the right and left brake pedals equal.

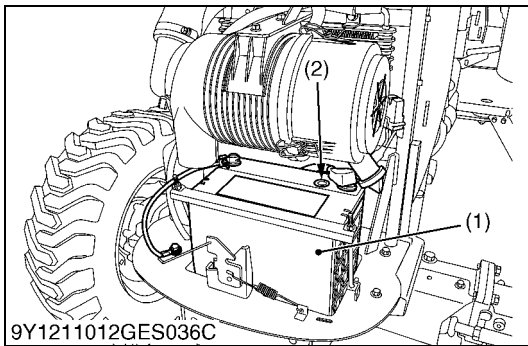
- (1) Lock Nut  
(2) Brake Rod

[A] Manual Transmission Type

[B] HST Type

A: Free Travel

9Y1211012GEG0152US0



### 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 battery cap while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are splattered 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.
- Mishandling the battery shortens the service life and adds to maintenance costs.
- The original battery is maintenance free, but needs some servicing.

If the battery is weak, the engine will be difficult to start and the lights will be dim. It is important to check the battery periodically.

#### How to read the indicator

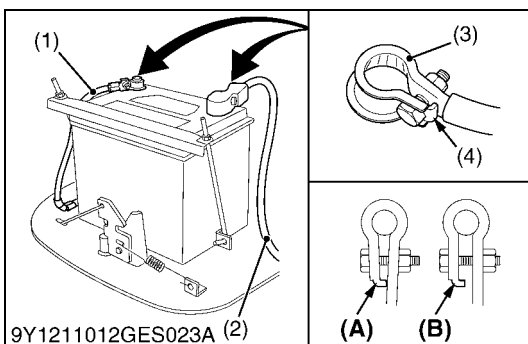
Check the battery condition by reading the indicator.

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

9Y1211012GEG0153US0



### Battery Cable Connections

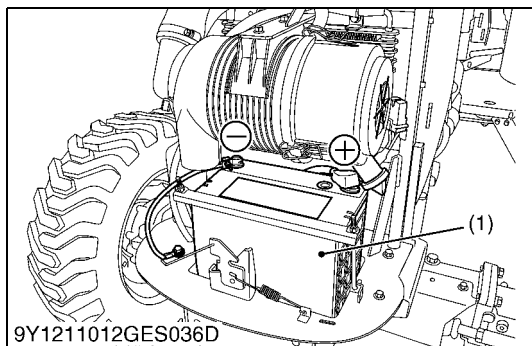
1. Be sure to wire the battery cable as shown in the figure.
2. Tighten the terminal until the stopper comes in contact.

- (1) Negative Cable
- (2) Positive Cable
- (3) Terminal
- (4) Stopper

- (A) Correct
- (B) Incorrect

9Y1211012GEG0057US0





## 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)	Reserve capacity (min.)	Cold Cranking Ampere (SAE) (A)	Normal Charging Rate (A)
80D26R	12	120	600	7.5

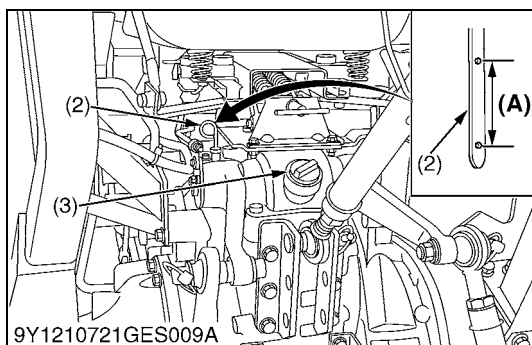
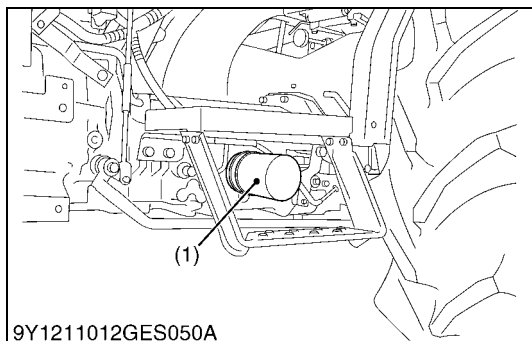
### ■ Direction for Storage

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 3 months in hot seasons and once every 6 months in cold seasons.

(1) Battery

9Y1211012GEG0154US0

## (4) Check Points of Every 200 Hours



### Replacing Transmission Oil Filter [HST Type]

#### ⚠ 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. Place the oil pan underneath the transmission oil filter and remove the filter.  
Do not remove the hydraulic oil filter. Otherwise, the oil comes out.
2. Put a film of clean transmission oil on the rubber seal of the new filter.
3. Quickly tighten the filter until it contacts the mounting surface, then, with a filter wrench, tighten it an additional 1 turn only.
4. After the new filter has been replaced, fill the transmission oil up to the upper notch on the dipstick.
5. After running the engine for a few minutes, stop the engine and check the oil level again, add oil to the prescribed level.
6. Make sure that the transmission fluid does not leak past the seal on the filter.

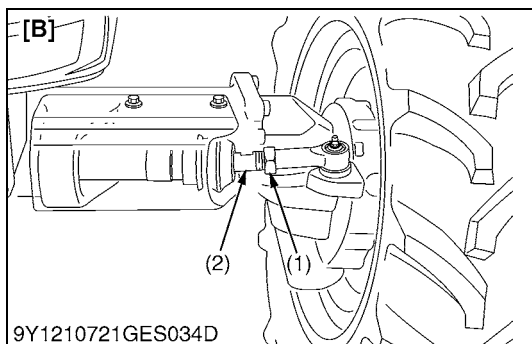
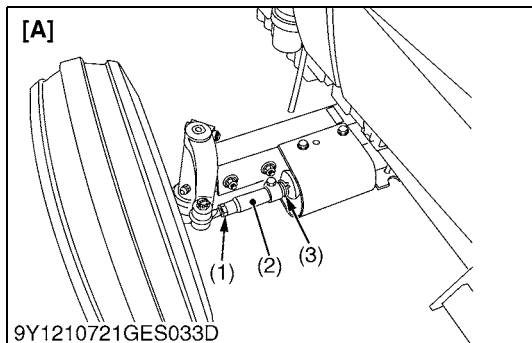
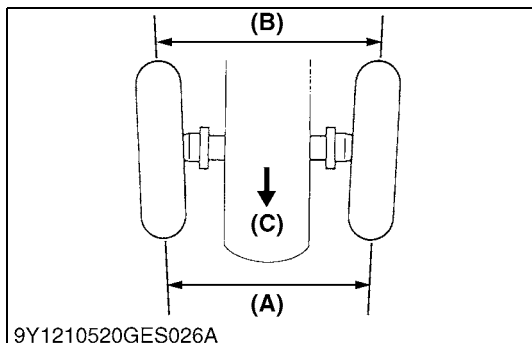
#### ■ IMPORTANT

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

- (1) Transmission Oil Filter [HST Type] (A) Oil level is acceptable within this range.  
 (2) Dipstick  
 (3) Oil Inlet

9Y1211012GEG0155US0



### Adjusting Toe-in

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

Toe-in ((B) - (A))	Factory specification	2 to 8 mm 0.08 to 0.31 in.
--------------------	-----------------------	-------------------------------

### ■ Adjusting procedures [2WD]

1. Detach the snap ring.
2. Loosen the tie-rod nut.
3. Turn the tie-rod joint to adjust the rod length until the proper toe-in measurement is obtained.
4. Retighten the tie-rod nut.
5. Attach the snap ring of the tie-rod joint.

### ■ Adjusting procedures [4WD]

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

Tightening torque	Tie-rod nut	2WD	83.3 to 88.2 N·m 8.5 to 9.0 kgf·m 61.4 to 65 lbf·ft
		4WD	167 to 196 N·m 17 to 20 kgf·m 123.2 to 144.6 lbf·ft

- (1) Tie-rod nut  
(2) Tie-rod joint  
(3) Snap ring

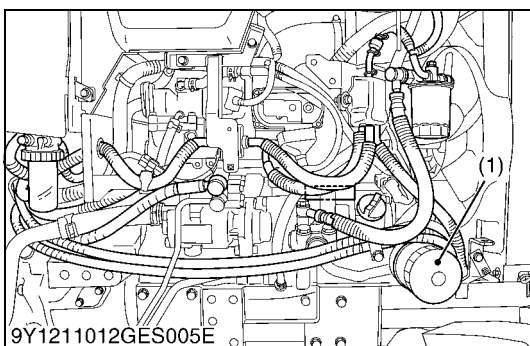
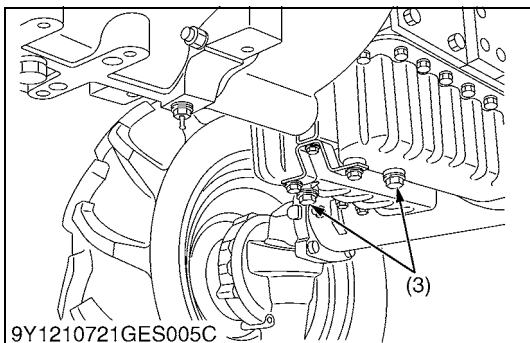
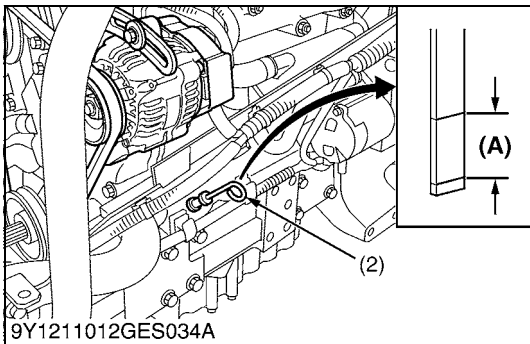
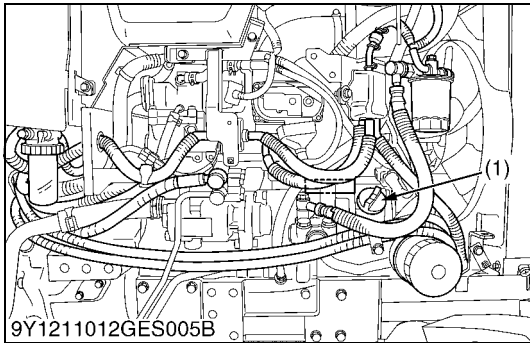
- (A) Wheel to wheel distance at front  
(B) Wheel to wheel distance at rear  
(C) Front

[A] 2WD

[B] 4WD

9Y1211012GEG0161US0

## (5) Check Points of Every 400 Hours



### 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 "LUBRICANTS, FUEL AND COOLANT" on page G-11.)

Engine oil with filter	Capacity	8.2 L 8.7 U.S.qts 7.2 Imp.qts
------------------------	----------	-------------------------------------

#### ■ IMPORTANT

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

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

(A) Oil level is acceptable within this range.

9Y1211012GEG0162US0

### 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.

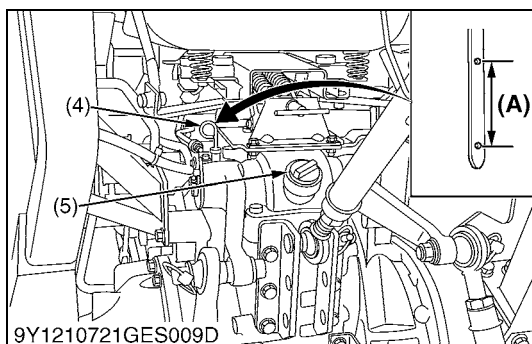
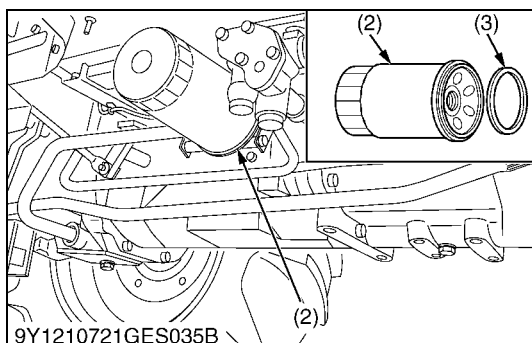
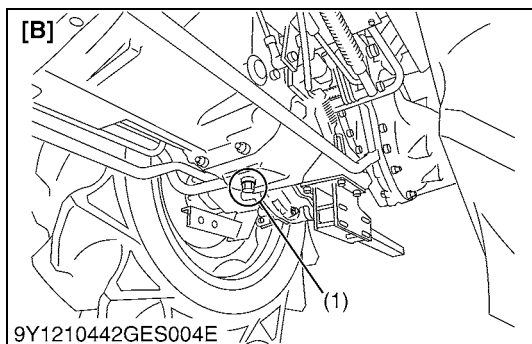
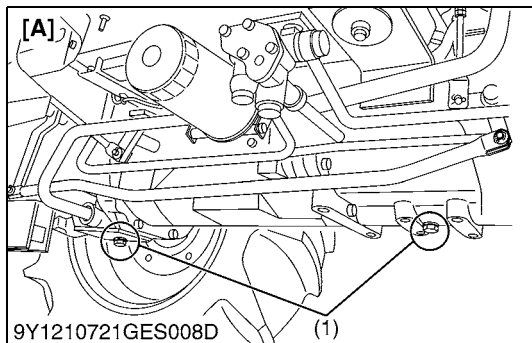
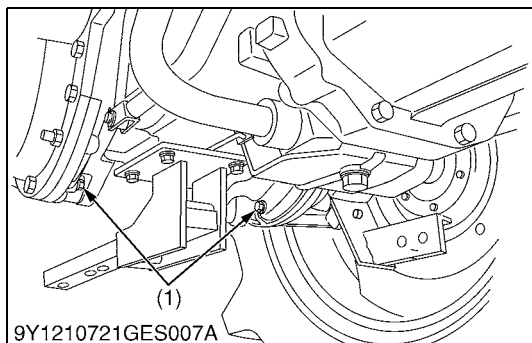
1. Remove the oil filter.
2. Put a film of clean engine oil on the rubber seal of the new filter.
3. Tighten the filter quickly until it contacts the mounting surface.  
Tighten filter by hand an additional 1/2 turn only
4. After the new filter has been replaced, the engine oil normally decreases a little. 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

9Y1211012GEG0163US0



## 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 "LUBRICANTS, FUEL AND COOLANT" on page G-11.)
  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 does not 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	40.0 L 10.6 U.S.gals 8.80 Imp.gals
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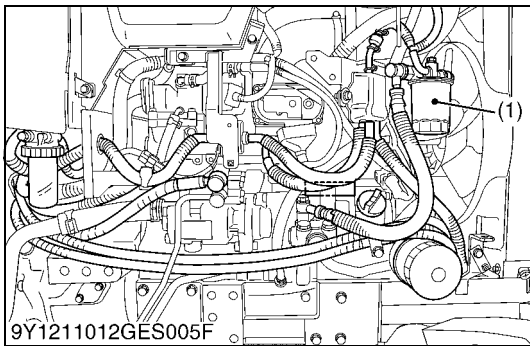
- (1) Drain Plug
- (2) Hydraulic Oil Filter
- (3) Magnetic Filter  
(Wipe Off Metal Filings)
- (4) Dipstick
- (5) Oil Inlet

[A] Manual Transmission Type

[B] HST Type

(A) Oil level is acceptable within this range.

9Y1211012GEG0164US0

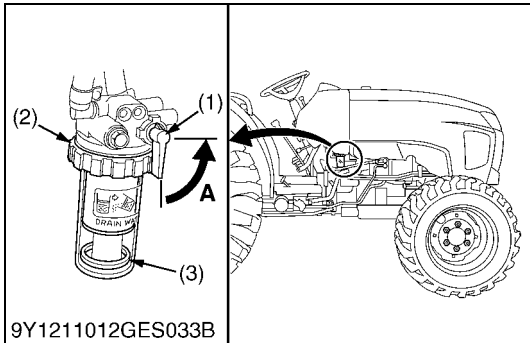


### Replacing Fuel Filter

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 "Bleeding Fuel System" on page G-74.)

(1) Fuel Filter

9Y1211012GEG0166US0



### Cleaning Water Separator

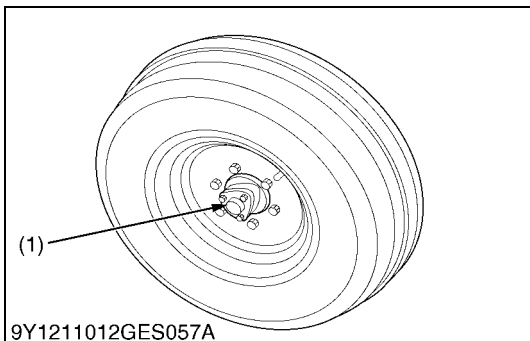
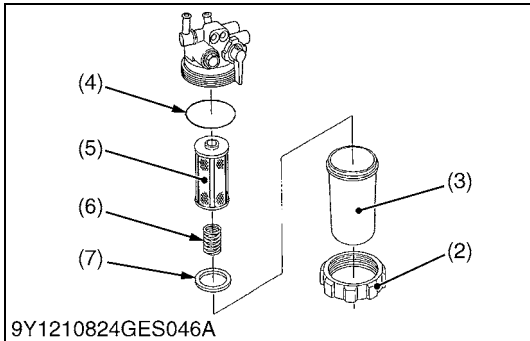
This job should not be done in the field, but in a clean place.

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 "Bleeding Fuel System" on page G-74.)

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

**A: Close**

9Y1211012GEG0167US0



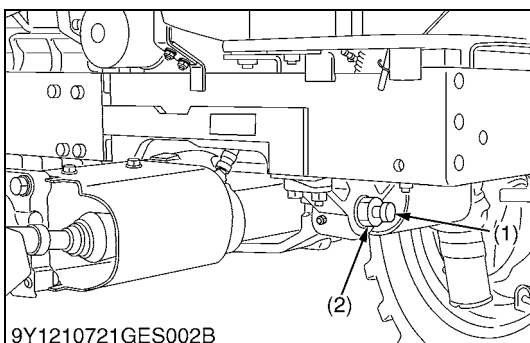
### Lubricating Grease Fitting [2WD Model]

Detach the cover, and apply bearing grease.

(1) Front Wheel Hub Cover

9Y1211012GEG0168US0

## (6) Check Point of Every 600 Hours



### Adjusting 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

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

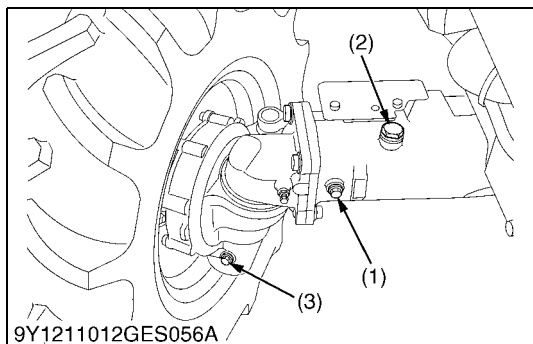
9Y1211012GEG0169US0

## (7) Check Point of Every 800 Hours

### Adjusting Engine Valve Clearance

- See "Valve Clearance" on page 1-S12.

9Y1211012GEG0100US0



### Changing Front Axle Case Oil

#### [4WD]

- To drain the used oil, remove the right and left drain plugs and filling plug at the front axle case and drain the oil completely into the oil pan.
- After draining, reinstall the drain plugs.
- Remove the oil level check plug
- Fill with the new oil up to the check plug port.  
(Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.)
- After filling reinstall the filling plug and check plug.

Front axle case oil	Capacity	6.5 L 6.9 U.S.qts 5.7 Imp.qts
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- (1) Check Plug  
(2) Filling Plug

- (3) Drain Plug

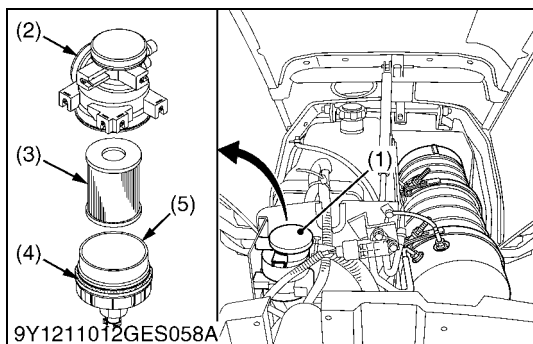
9Y1211012GEG0165US0

## (8) Check Points of Every 1500 Hours

### Cleaning Fuel Injector Nozzle Tip

- See "Overflow Pipe and injectors" on page 1-S44.

9Y1211012GEG0101US0



### Replacing Oil Separator Element

#### **CAUTION**

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

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

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

9Y1211012GEG0172US0

### Checking PCV (Positive Crankcase Ventilation) Valve

- See "PCV (Positive Crankcase Ventilation) Valve (Oil Separator)" on page 1-S16.

9Y1211012GEG0103US0

### Checking and Cleaning EGR Cooler

- See "EGR Cooler" on page 1-S16.

9Y1211012GEG0104US0

## (9) Check Points of Every 3000 Hours

### Checking Supply Pump

- See page "Supply Pump" on page 1-S49.

9Y1211012GEG0105US0

### Checking and Cleaning EGR System

- See "EGR Valve" on page 1-S40.

9Y1211012GEG0106US0

### Cleaning DPF Muffler

#### ■ Removal of ash

The longer the DPF operates, the more ash (burnt residue) is collected in the filter. Too much ash build-up adversely affects the DPF performance.

#### ■ IMPORTANT

- The DPF needs cleaning with a specific cleaning device. Do not clean the DPF by disassembling, and attempt by yourself.

9Y1211012GEG0058US0

## (10) Check Points of Every 1000 Hours or 1 year

### Replacing Air Cleaner Primary Element and Secondary Element

- See "Cleaning Air Cleaner Primary Element" on page G-58.

9Y1211012GEG0177US0

### Checking Exhaust Manifold

- See "EGR Related Parts" on page 1-S40.

9Y1211012GEG0108US0

## (11) Check Points of Every 1 Year

### Checking DPF Differential Pressure Sensor Pipe

- See "DPF Muffler" on page 1-S19.

9Y1211012GEG0109US0

### Checking EGR Pipe

- See "EGR Related Parts" on page 1-S40.

9Y1211012GEG0110US0

### Checking Antifrost Heater for Oil Separator (if equipped)

- See "Heater Resistance (for Reference)" on page 9-S55.

9Y1211012GEG0205US0

### Checking Fuel 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 or repair them at once.

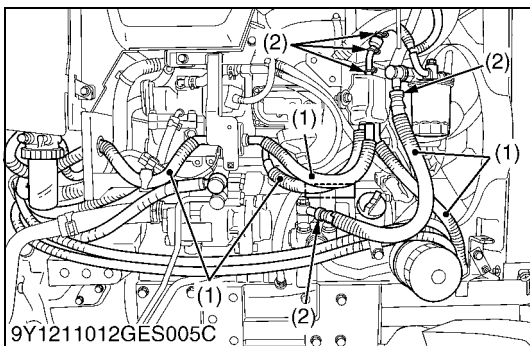
#### ■ NOTE

- If the fuel line is removed, be sure to properly bleed the fuel system. (See page G-74.)

(1) Fuel Lines

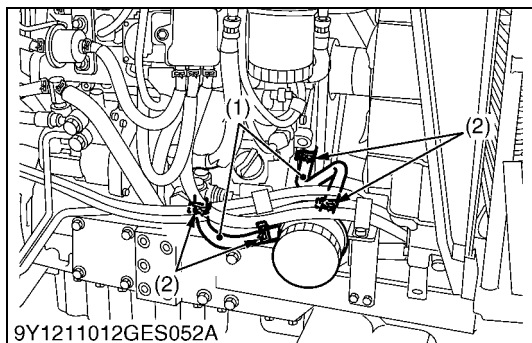
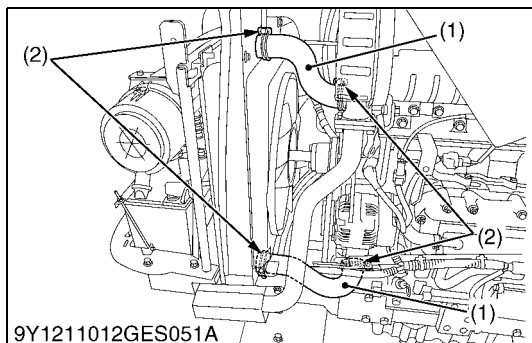
(2) Clamp Bands

9Y1211012GEG0149US0



9Y1211012GES005C





### **Checking Radiator Hose and Clamp**

Check to see if radiator hoses are properly fixed every 200 hours of operation or 6 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**

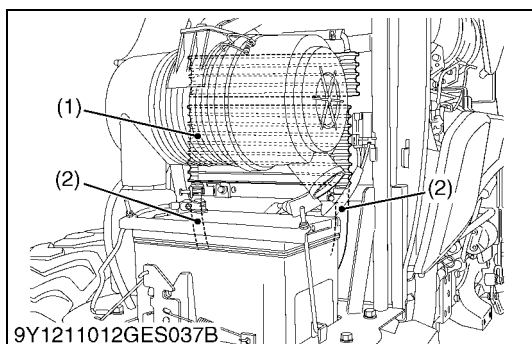
Take the following actions in the event the coolant temperature is nearly or more than the boiling point, what is called "Overheating"

1. Park the tractor in a safe place and keep the engine unloaded idling.
2. Do not 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 blows out.
4. Check that there are no dangers such as burns. Get rid of the causes of overheating according to the manual, refer to "1. TROUBLESHOOTING" on page 1-S1, and then, start again the engine.

(1) Radiator Hoses

(2) Clamp Bands

9Y1211012GEG0156US0



### **Checking Oil Cooler Line**

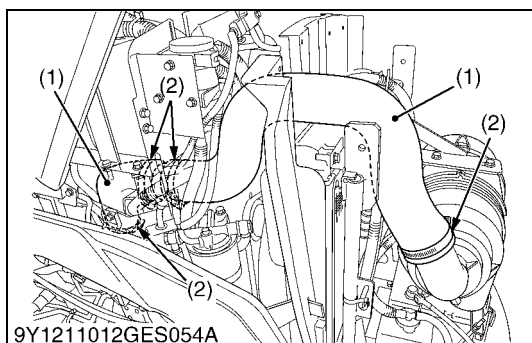
#### **[HST Type]**

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 or repair them at once.

(1) Oil Cooler

(2) Oil Cooler Line

9Y1211012GEG0157US0



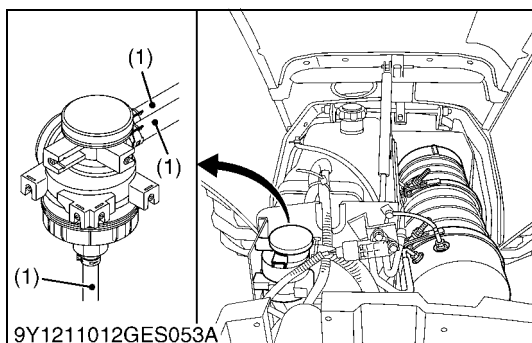
### **Checking Intake Air Line**

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

(1) Hose

(2) Hose Clamps

9Y1211012GEG0158US0

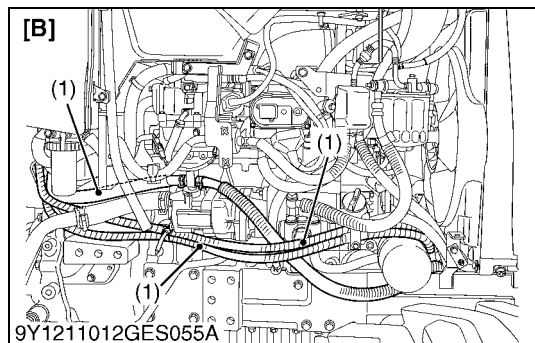
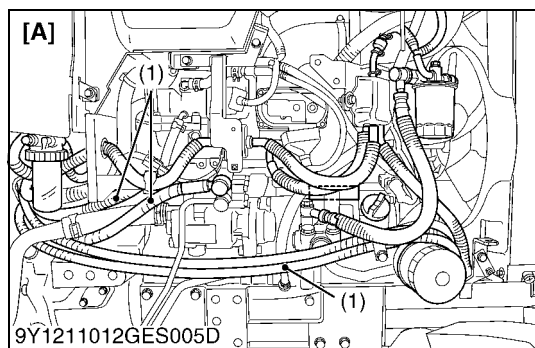


### **Checking Oil Separator Hose**

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

(1) Oil Separator Hoses

9Y1211012GEG0159US0



### **Checking Power Steering 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 or repair them at once.

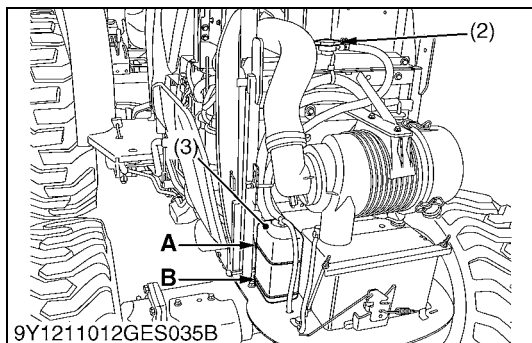
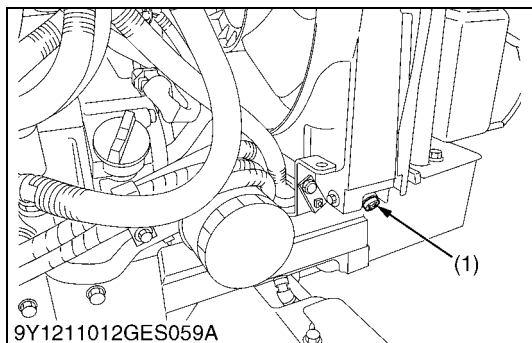
(1) Power Steering Pressure Hoses

[A] Manual Transmission Type

[B] HST Type

9Y1211012GEG0160US0

## (12) 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, 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.

Radiator coolant	Capacity	6.5 L 6.9 U.S.qts 5.7 Imp.qts
Recovery tank coolant		0.6 L 0.6 U.S.qts 0.5 Imp.qts

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

A: FULL  
B: LOW

9Y1211012GEG0181US0

**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  $1.013 \times 10^5$  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.

9Y1211012GEG0182US0

**(13) Check Points of Every 2 Years****Replacing Fuel Grommet**

- Refer to "Checking Fuel Grommet". (See page G-59.)

9Y1211012GEG0186US0

**Replacing DPF Differential Pressure Sensor Hose**

- Refer to "DPF Muffler". (See page 1-S19.)

9Y1211012GEG0120US0

**(14) Check points of Every 4 Years****Replacing Radiator Hose (Water pipes)**

- Replace the hoses and clamps.  
Refer to "Checking Radiator Hose and Hose Clamp". (See page G-69.)

9Y1211012GEG0183US0

**Replacing Power Steering Hose****[Manual Transmission Type]**

- Replace the hoses and clamps.  
Refer to "Checking Power Steering Line". (See page G-70.)

9Y1211012GEG0184US0

**Replacing Fuel Hose**

- Replace the fuel hoses and clamps.  
Refer to "Checking Fuel Line". (See page G-68.)

9Y1211012GEG0185US0

**Replacing Oil Cooler Line****[HST Type]**

- Refer to "Checking Oil Cooler Line". (See page G-69.)

9Y1211012GEG0187US0

**Replacing Intake Air Line**

- Replace the intake hoses and clamps.  
Refer to "Checking Intake Air Line". (See page G-69.)

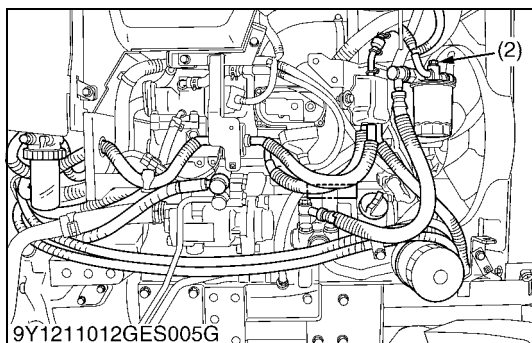
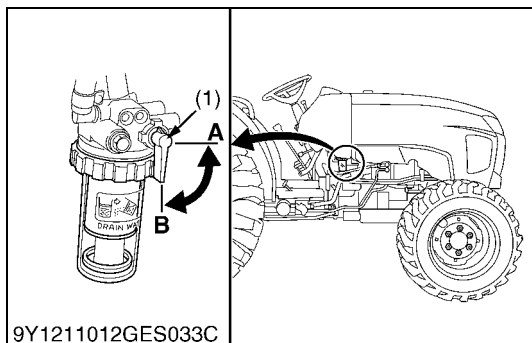
9Y1211012GEG0188US0

**Replacing Oil Separator Hose**

- Refer to "Checking Oil Separator Hose". (See page G-69.)

9Y1211012GEG0189US0

## (15) 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.

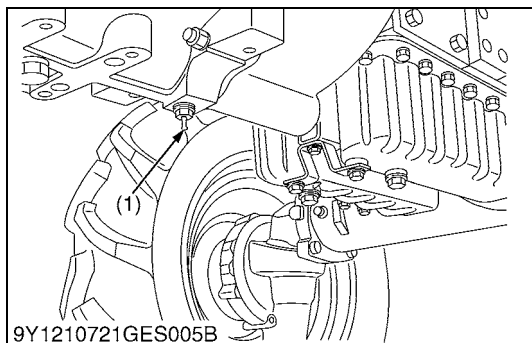
#### ■ IMPORTANT

- 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

9Y1211012GEG0191US0

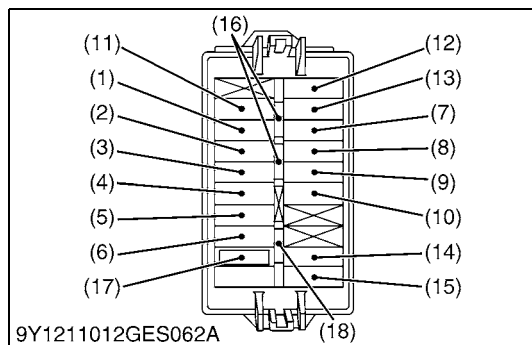
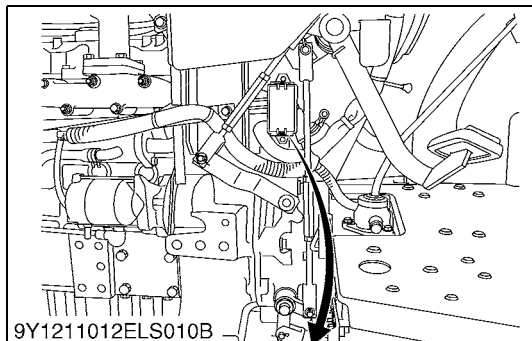


### Draining Clutch Housing Water

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 plug (1).
4. If water has entered into the clutch housing, remove the split pin plug (1) and drain the water, then reinstall the plug again.

- (1) Split Pin Plug

9Y1211012GEG0192US0



### 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.

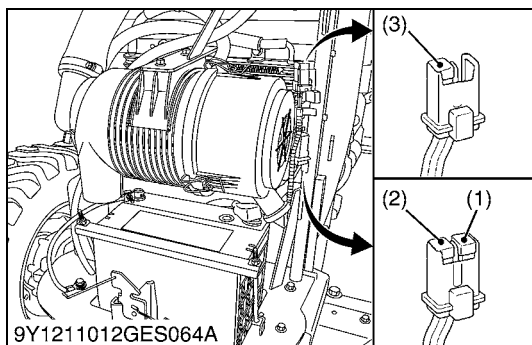
If any of them should blow, replace with a new one of the same capacity.

Fuse No.	Capacity (A)	Protected circuit
(1)	5	Engine ECU (Ignition key)
(2)	5	Main ECU (Ignition key)
(3)	5	Meter panel (Ignition key)
(4)	10	Combination switch
(5)	10	Work light
(6)	5	Starter relay
(7)	20	Engine ECU (Battery)
(8)	5	Main ECU (Battery)
(9)	5	Meter panel (Battery)
(10)	10	Hazard
(11)	5	Heater relay (if equipped)
(12)	10	Heater (Oil separator, IN 1) (if equipped)
(13)	10	Heater (Oil separator, IN 2) (if equipped)
(14)	10	Heater (Oil separator, OUT 1) (if equipped)
(15)	10	Heater (Oil separator, OUT 2) (if equipped)

(16) Spare Fuse  
(17) Fuse Puller

(18) Spare Fuse

9Y1211012GEG0193US0



### 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.

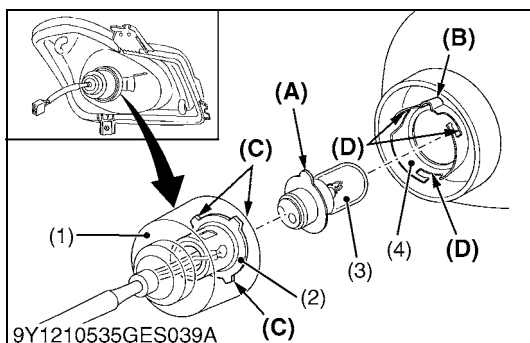
No.	Capacity (A)	Protected circuit
(1)	40	Load
(2)	60	Battery
(3)	40	Heater (Oil separator) (if equipped)

9Y1211012GEG0194US0

### Replacing Light Bulb

Light	Capacity
Head lights	25 W / 25 W
Tail light	5 W
Turn signal / Hazard light (rear)	21 W
Turn signal / Hazard light (front)	23 W

9Y1211012GEG0195US0



## 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.

### ■ Removing Bulb

1. Remove the rubber boot.
2. Turn the socket counterclockwise while pressing and remove it.
3. Remove the bulb.

### ■ Attaching Bulb

1. Align (A) of the bulb with (B) of the lamp case and attach the bulb.
2. Align (C) of the socket with (D) of the lamp case and attach the socket.
3. Attach the rubber boot.

### ■ 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) Rubber Boot | (A) Align to (B) |
| (2) Socket      | (C) Align to (D) |
| (3) Bulb        |                  |
| (4) Lamp Case   |                  |

9Y1211012GEG0196US0

## Replacing Radiator Hose (if equipped)

- Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.  
Refer to "Checking Radiator Hose and Hose Clamp". (See page G-69.)

9Y1211012GEG0206US0

## Replacing Fuel Lines

- Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.  
Refer to "Checking Fuel Line". (See page G-68.)

9Y1211012GEG0207US0

## Replacing Intake Air Line

- Replace if any deterioration (crack, hardening, scar of deformation) or damage occurred.  
Refer to "Checking Intake Air Line". (See page G-69.)

9Y1211012GEG0208US0

## Replacing Power Steering Hose

- 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-70.)

9Y1211012GEG0209US0

## Replacing Oil Cooler Line

- 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-69.)

9Y1211012GEG0210US0



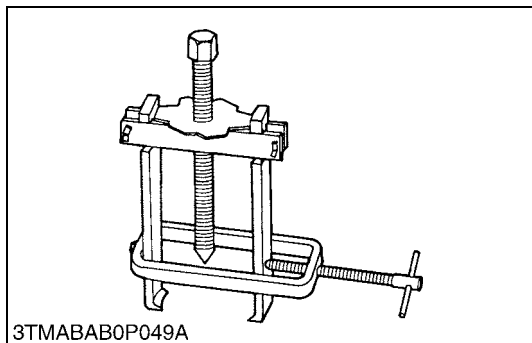
**Replacing Oil Separator Hose**

- Replace if any deterioration (crack, hardening, scar or deformation) or damage occurred. (See page G-69.)

9Y1211012GEG0211US0

## 8. SPECIAL TOOLS

### [1] SPECIAL TOOLS FOR ENGINE



#### Special Use Puller Set

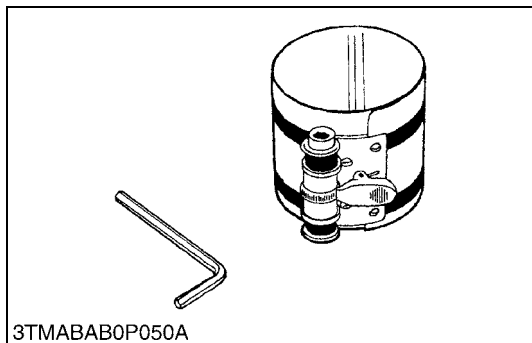
##### Code No.

- 07916-09032

##### Application

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

WSM000001GEG0011US0



#### Piston Ring Compressor

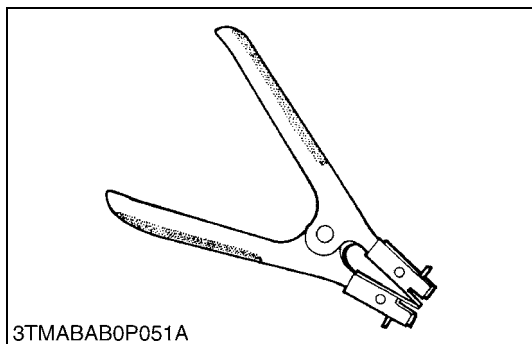
##### Code No.

- 07909-32111

##### Application

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

WSM000001GEG0012US0



#### Piston Ring Tool

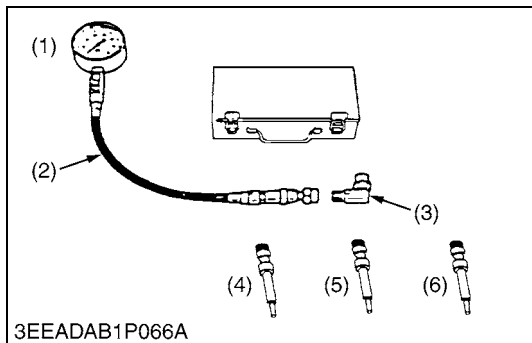
##### Code No.

- 07909-32121

##### Application

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

WSM000001GEG0013US0



#### Diesel Engine Compression Tester (for Glow Plug)

##### Code No.

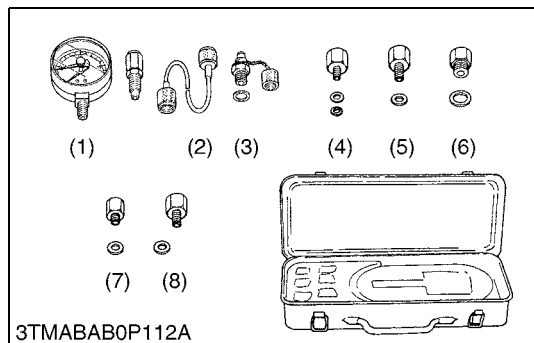
- 07909-39081 (Assembly)
- 07909-31291 (K)
- 07909-31301 (L)
- 07909-31311 (M)

##### Application

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

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

WSM000001GEG0096US0



### Oil Pressure Tester

#### **Code No.**

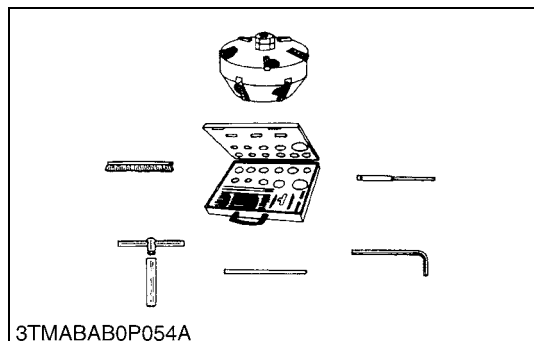
- 07916-32032

#### **Application**

- Use to measure lubricating oil pressure.

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

WSM000001GEG0015US0



### Valve Seat Cutter

#### **Code No.**

- 07909-33102

#### **Application**

- Use to reseal valves.

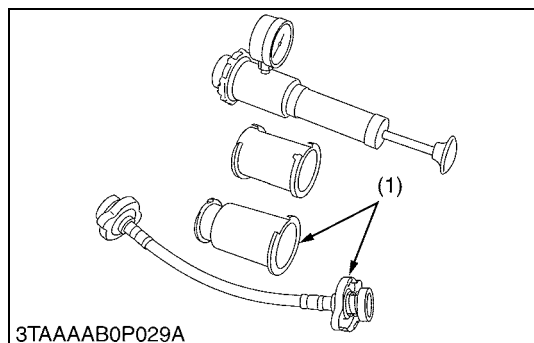
#### **Angle**

- 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**

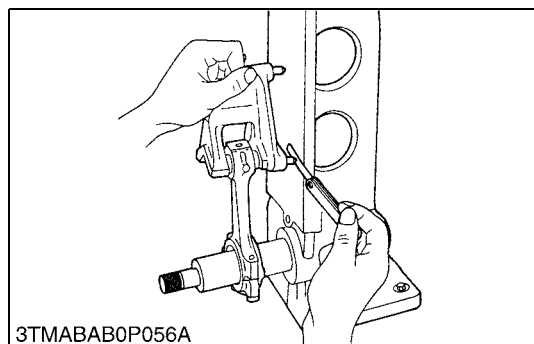
- Use to check of radiator cap pressure, and leaks from cooling system.

#### **Remarks**

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

(1) Adaptor

WSM000001GEG0017US0



### Connecting Rod Alignment Tool

#### **Code No.**

- 07909-31661

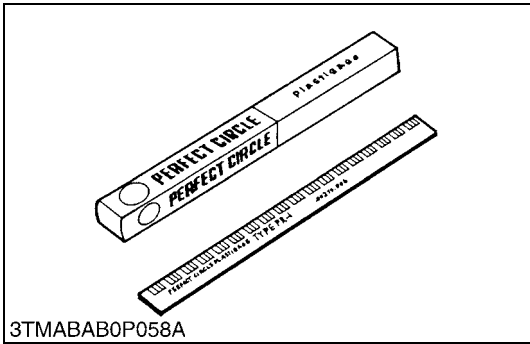
#### **Application**

- 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



**Plastigauge**

**Code No.**

- 07909-30241

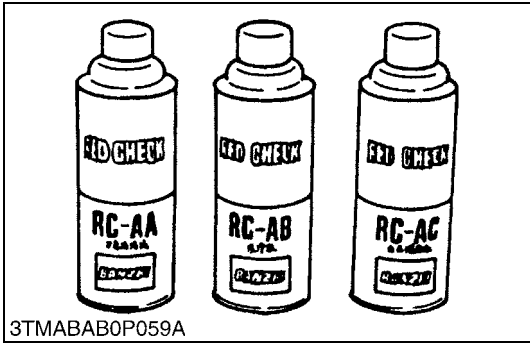
**Application**

- 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



**Red Check**

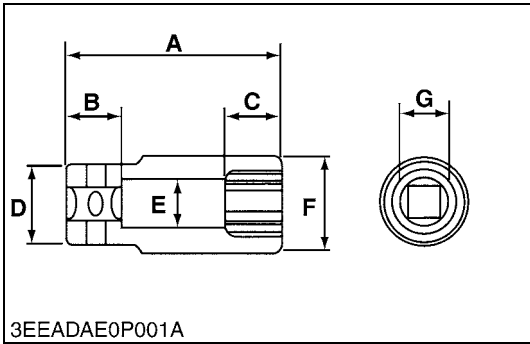
**Code No.**

- 07909-31371

**Application**

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

WSM000001GEG0023US0



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

**Application**

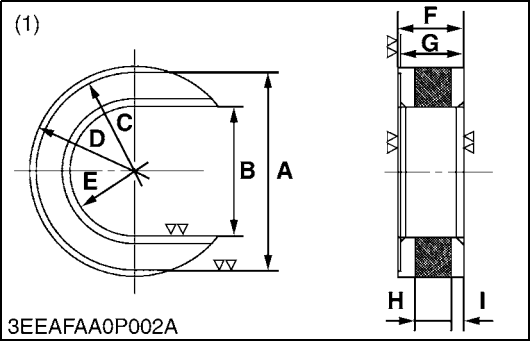
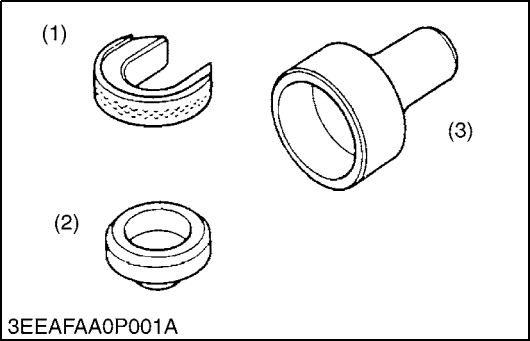
- Use to loosen and tighten the fan drive pulley mounting nut.

**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.)

9Y1211012GEG0010US0



**Auxiliary Socket for Fixing Crankshaft Sleeve**

**Application**

- To fix the crankshaft sleeve of the diesel engine.

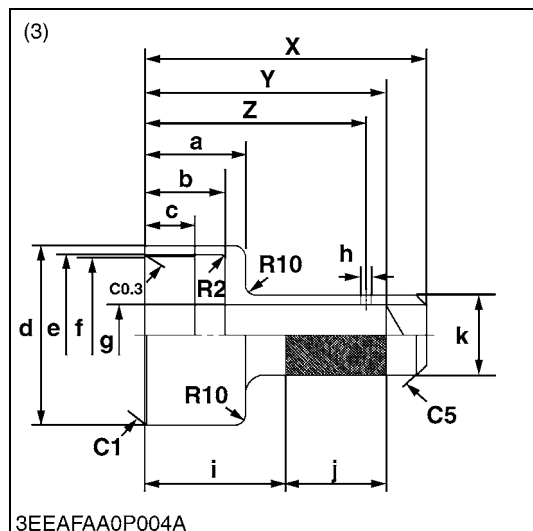
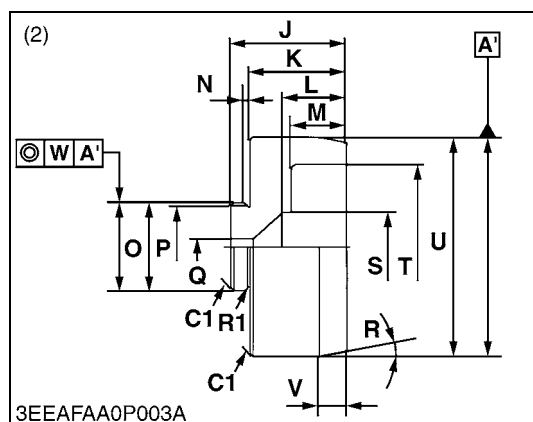
A	80.0 mm (3.15 in.)
B	60.10 to 60.30 mm (2.367 to 2.374 in.)
C	80.0 mm dia. (3.15 in. dia.)
D	85.0 mm dia. (3.35 in. dia.)
E	60.10 to 60.30 mm dia. (2.367 to 2.374 in. dia.)
F	26.30 to 26.40 mm (1.036 to 1.039 in.)
G	25.85 to 25.90 mm (1.018 to 1.019 in.)
H	15.0 mm (0.591 in.)
I	5.0 mm (0.20 in.)

- (1) Stopper  
(2) Sleeve Guide

- (3) Auxiliary Socket for Pushing

**(To be continued)**

## (Continued)



## Application

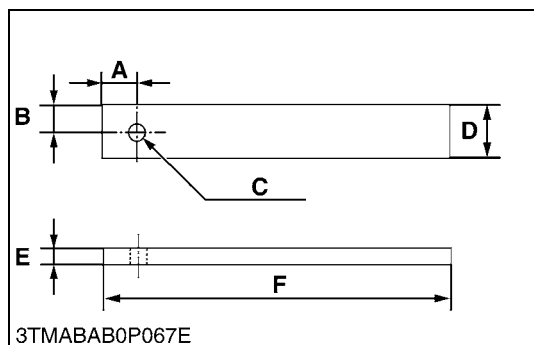
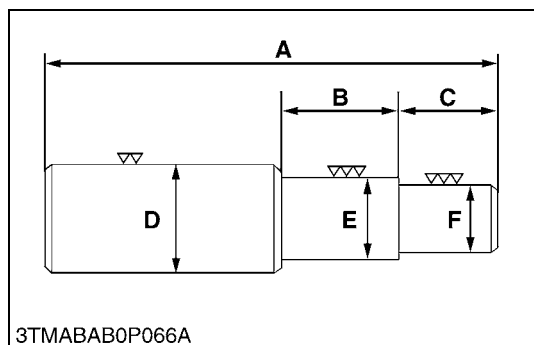
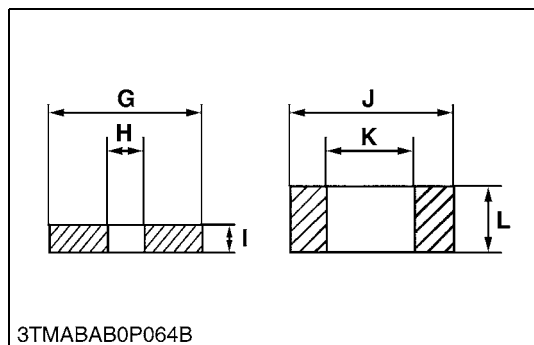
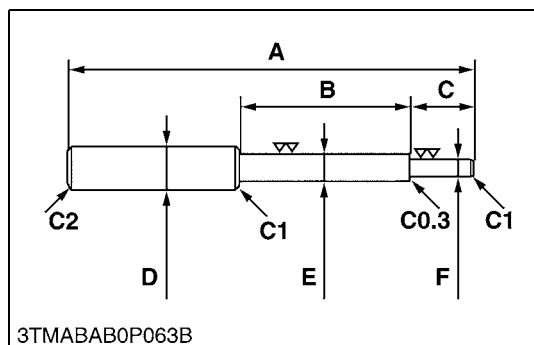
- To fix the crankshaft sleeve of the diesel engine.

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

9Y1211012GEG0011US0



## 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.)

9Y1211012GEG0012US0

## 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.)

9Y1211012GEG0013US0

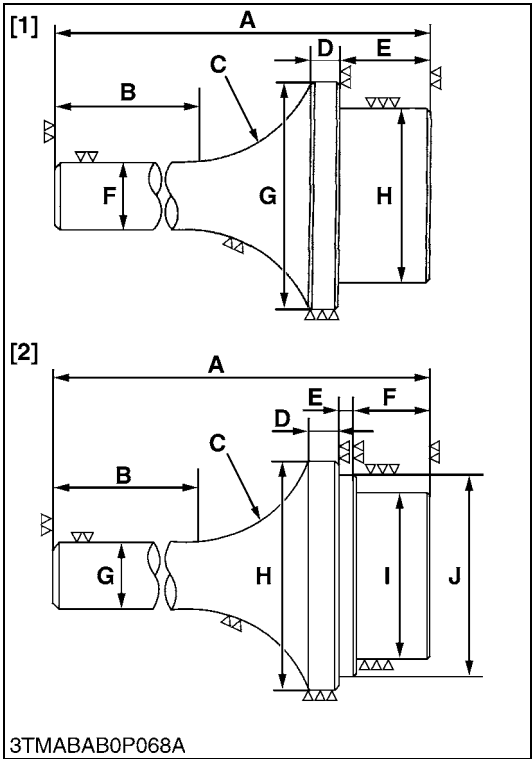
## Flywheel Stopper

### 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.)

9Y1211012GEG0014US0



**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**

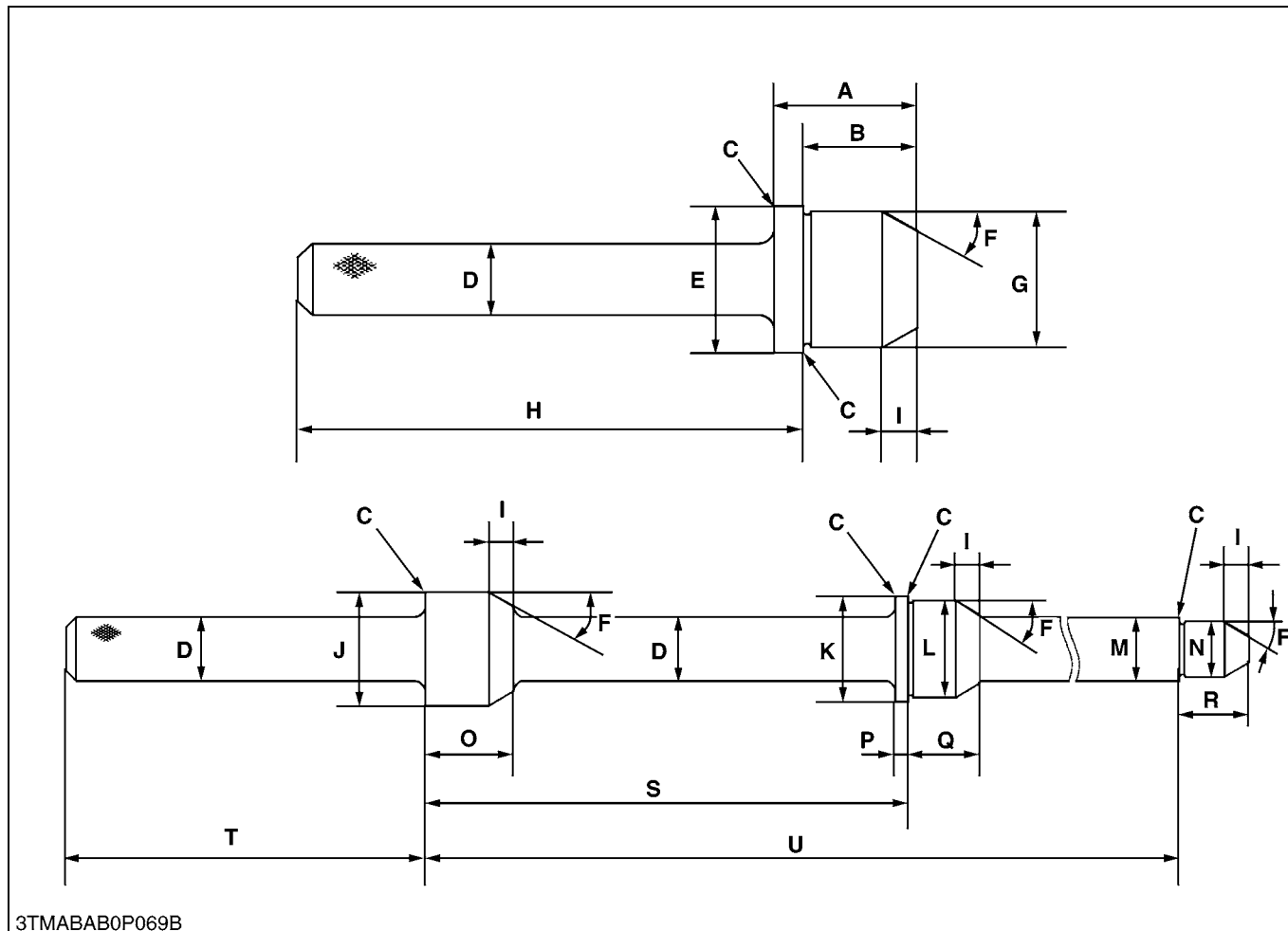
A	130 mm (5.12 in.)
B	72 mm (2.8 in.)
C	40 mm radius (1.6 in. radius)
D	9 mm (0.4 in.)
E	4 mm (0.2 in.)
F	20 mm (0.79 in.)
G	20 mm dia. (0.79 in. dia.)
H	68 mm dia. (2.7 in. dia.)
I	59.80 to 59.90 mm dia. (2.355 to 2.358 in. dia.)
J	64.80 to 64.90 mm dia. (2.552 to 2.555 in. dia.)

9Y1211012GEG0015US0



**Balancer Metal Replacing Tool (for Removing)****Application**

- To remove the metal bearing.



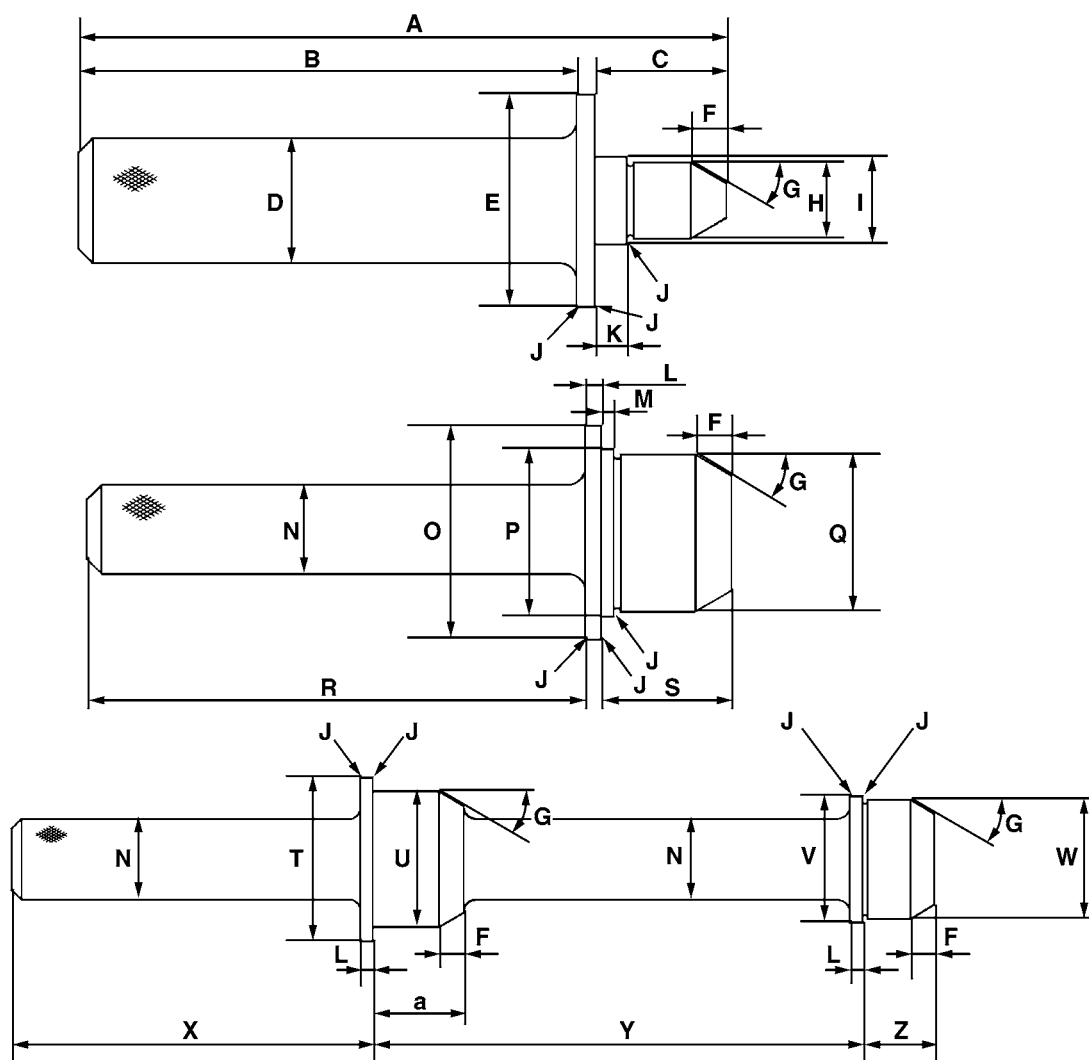
3TMABAB0P069B

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

9Y1211012GEG0016US0

**Balancer Metal Replacing Tool (for Fitting)****Application**

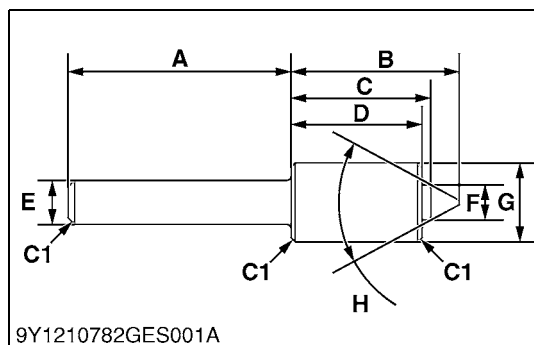
- To press fit the metal bearing.



3TMABAB0P070B

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

9Y1211012GEG0017US0



### Injection Top Correction Jig

#### Application

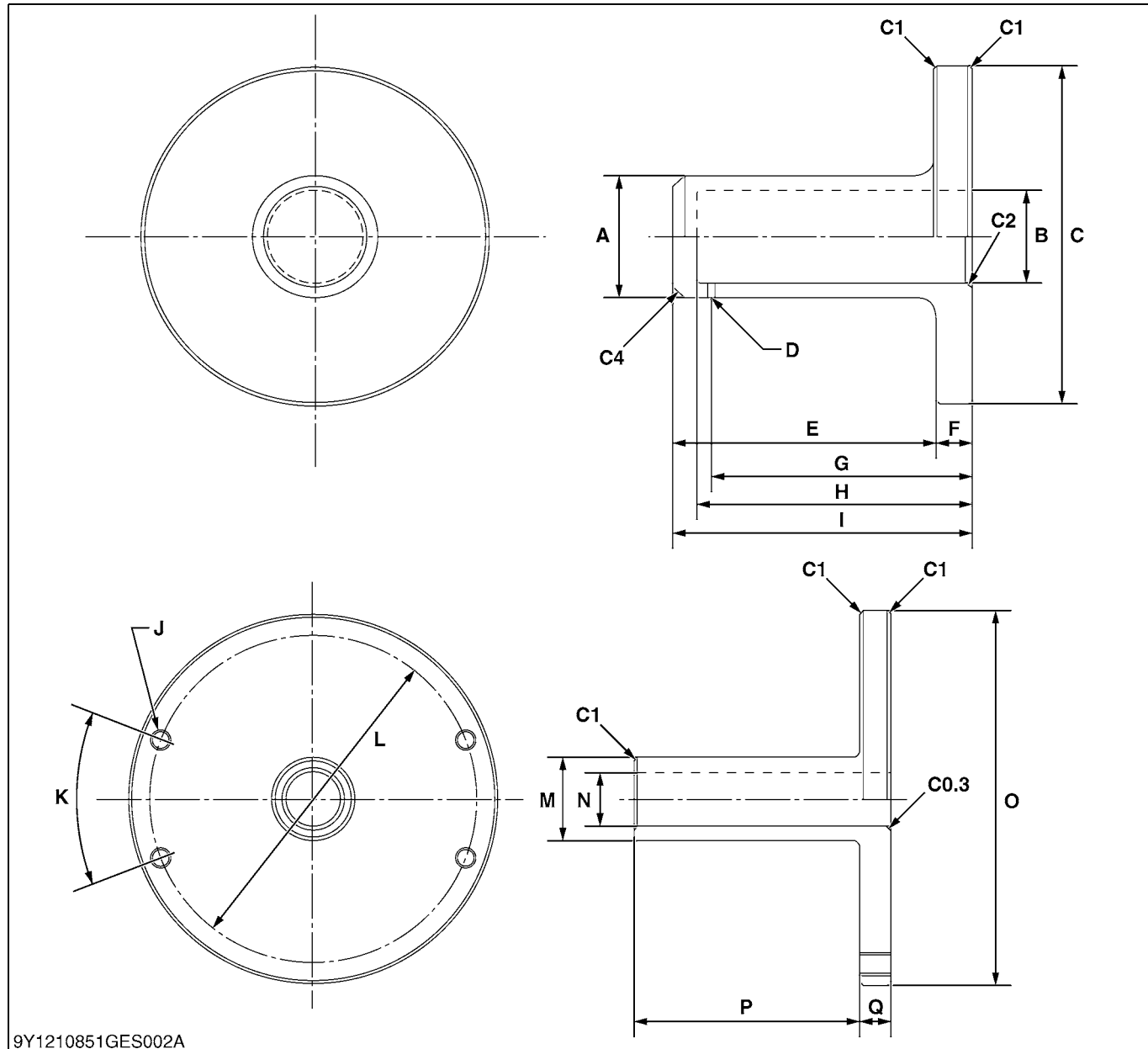
- To detects and position the sensor in top-dead center position.

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

9Y1211012GEG0018US0

**Bearing Case Cover Oil Seal Replacing Tool****Application**

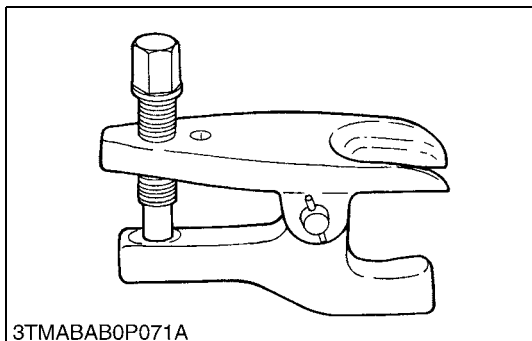
- To install bearing case cover oil seal.



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

9Y1211012GEG0019US0

## [2] SPECIAL TOOLS FOR TRACTOR



3TMABAB0P071A

### Tie-rod End Lifter

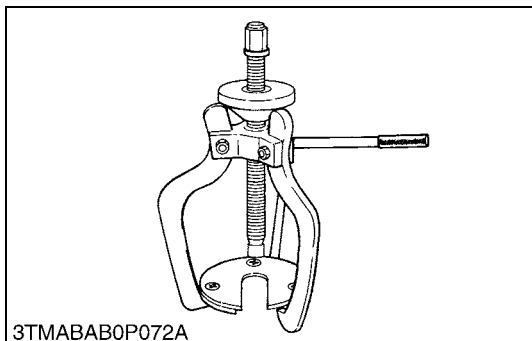
#### Code No.

- 07909-39051

#### Application

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

WSM000001GEG0029US0



3TMABAB0P072A

### Steering Wheel Puller

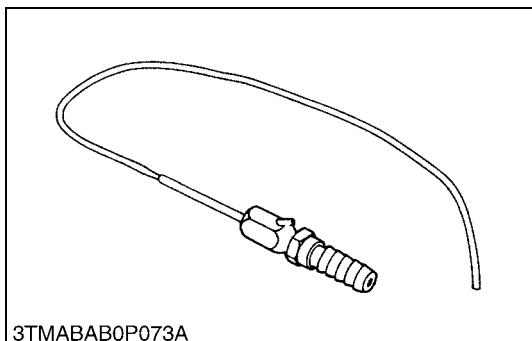
#### Code No.

- 07916-51090

#### Application

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

WSM000001GEG0030US0



3TMABAB0P073A

### Injector CH3

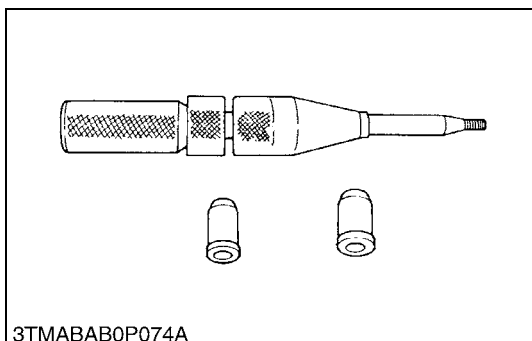
#### Code No.

- 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)

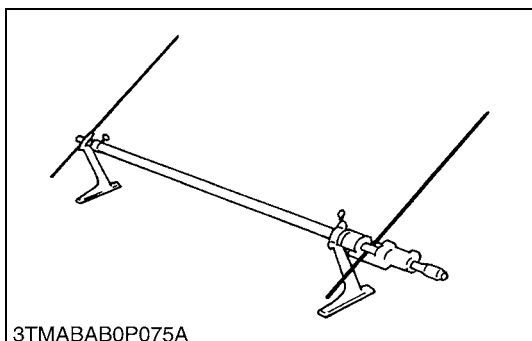
#### Code No.

- 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

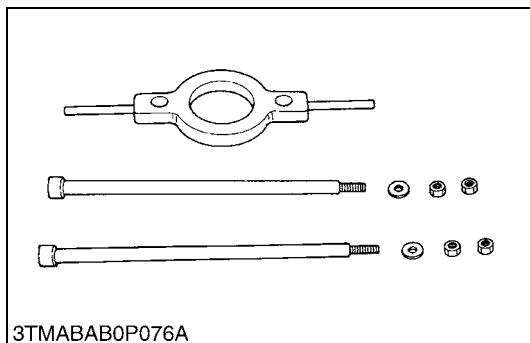
#### Code No.

- 07909-31681

#### Application

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

WSM000001GEG0034US0



### Rear Axle Cover Puller

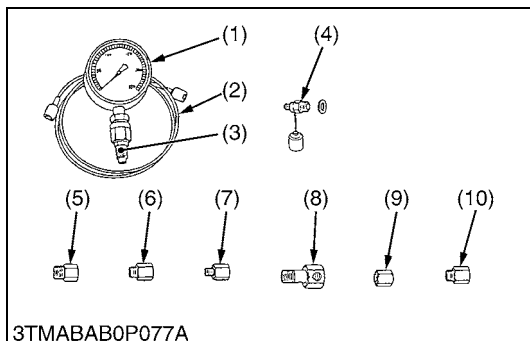
#### Code No.

- 07916-51041

#### Application

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

WSM000001GEG0035US0



### Relief Valve Pressure Tester

#### Code No.

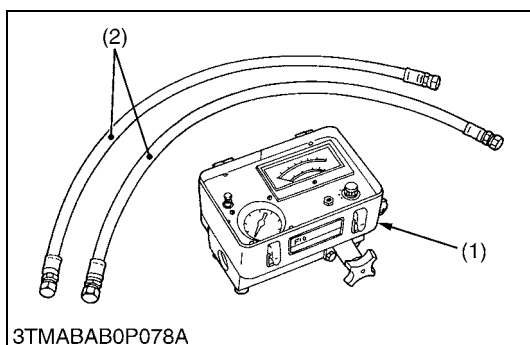
- 07916-50045

#### Application

- This allows easy measurement of relief set pressure.

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

WSM000001GEG0027US0



### Flow Meter

#### Code No.

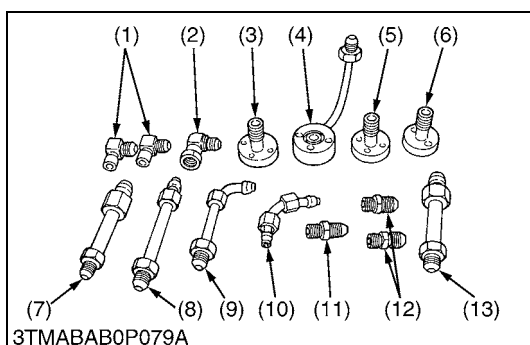
- 07916-52791 (Flow Meter)
- 07916-52651 (Hydraulic Test Hose)

#### Application

- This allows easy testing of hydraulic system.

- |                |                         |
|----------------|-------------------------|
| (1) Flow Meter | (2) Hydraulic Test Hose |
|----------------|-------------------------|

WSM000001GEG0036US0



### Adaptor Set for Flow Meter

#### Code No.

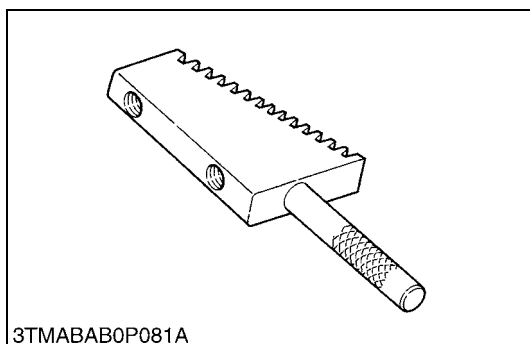
- 07916-54031

#### Application

- Use for test of the hydraulic system.

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

WSM000001GEG0037US0



### Pinion Locking Tool

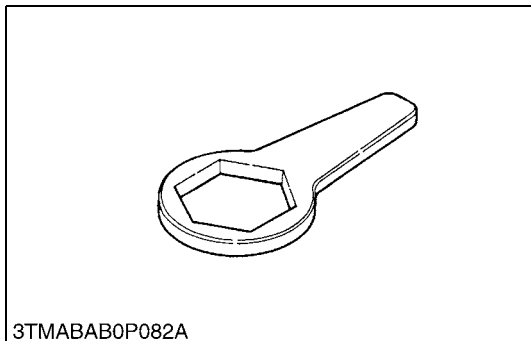
#### Code No.

- 07916-55311

#### Application

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

WSM000001GEG0039US0



### Rear Axle Nut Wrench 71

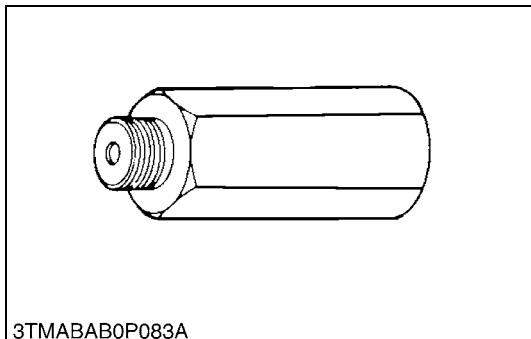
#### Code No.

- 07916-52531

#### Application

- Use to remove and tighten a rear axle nut.

WSM000001GEG0040US0



### Relief Valve Setting Pressure Adaptor G

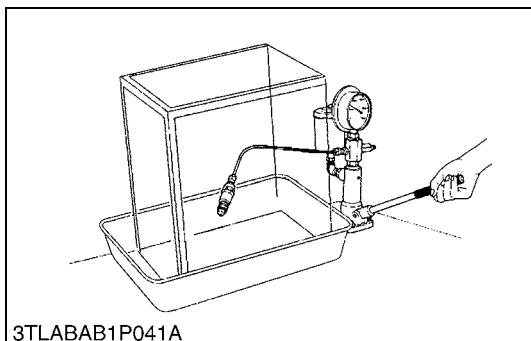
#### Code No.

- 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



### Safety Valve Tester

#### Code No.

- 07909-31361

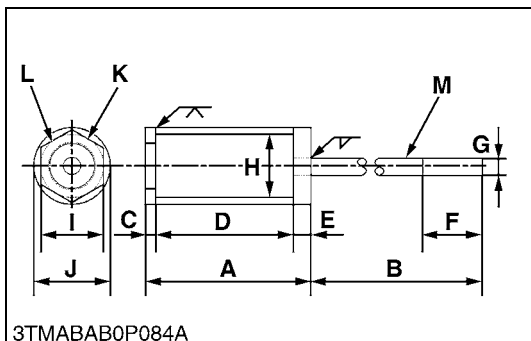
#### Application

- Use to check the safety valve setting pressure.

#### Measuring range

- 0 to 50 MPa (0 to 500 kgf/cm<sup>2</sup>, 0 to 7200 psi)

9Y1210447GEG0092US0



### Pinion Shaft Remover

#### Application

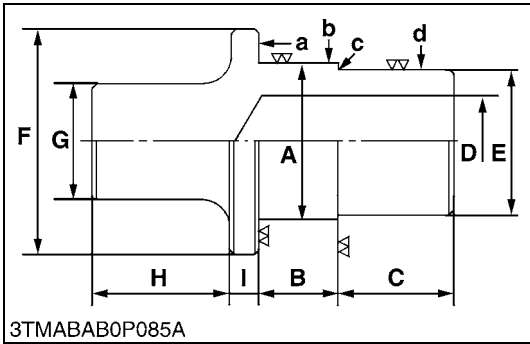
- Use for removing a pinion shaft.

#### 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

9Y1211012GEG0022US0



Hydraulic Arm Shaft Bushing Press-Fitting Tool

Application

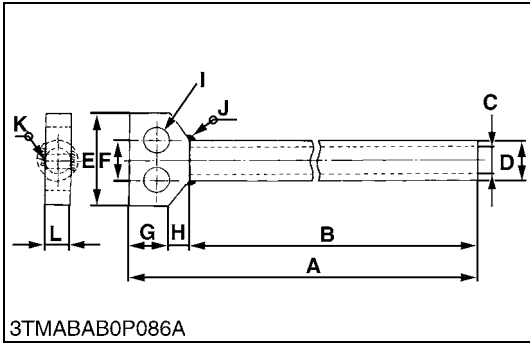
- Use for replacing the hydraulic arm shaft bushings in the hydraulic cylinder body.

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.)	

9Y1211012GEG0023US0



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.)

9Y1211012GEG0024US0



## Pump Adaptor

### Application

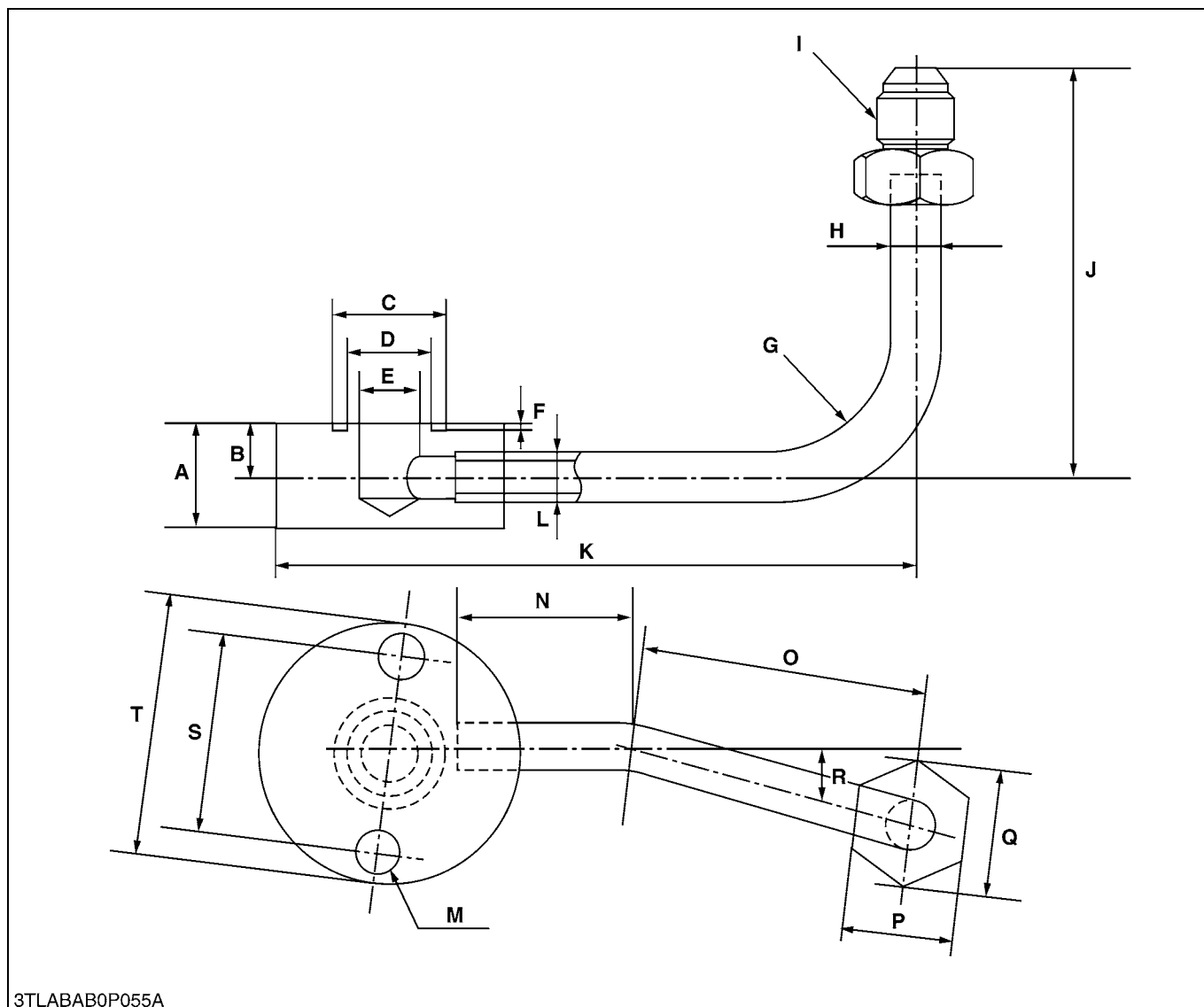
- Use for examining the main hydraulic pump.

### 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-90).
- 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

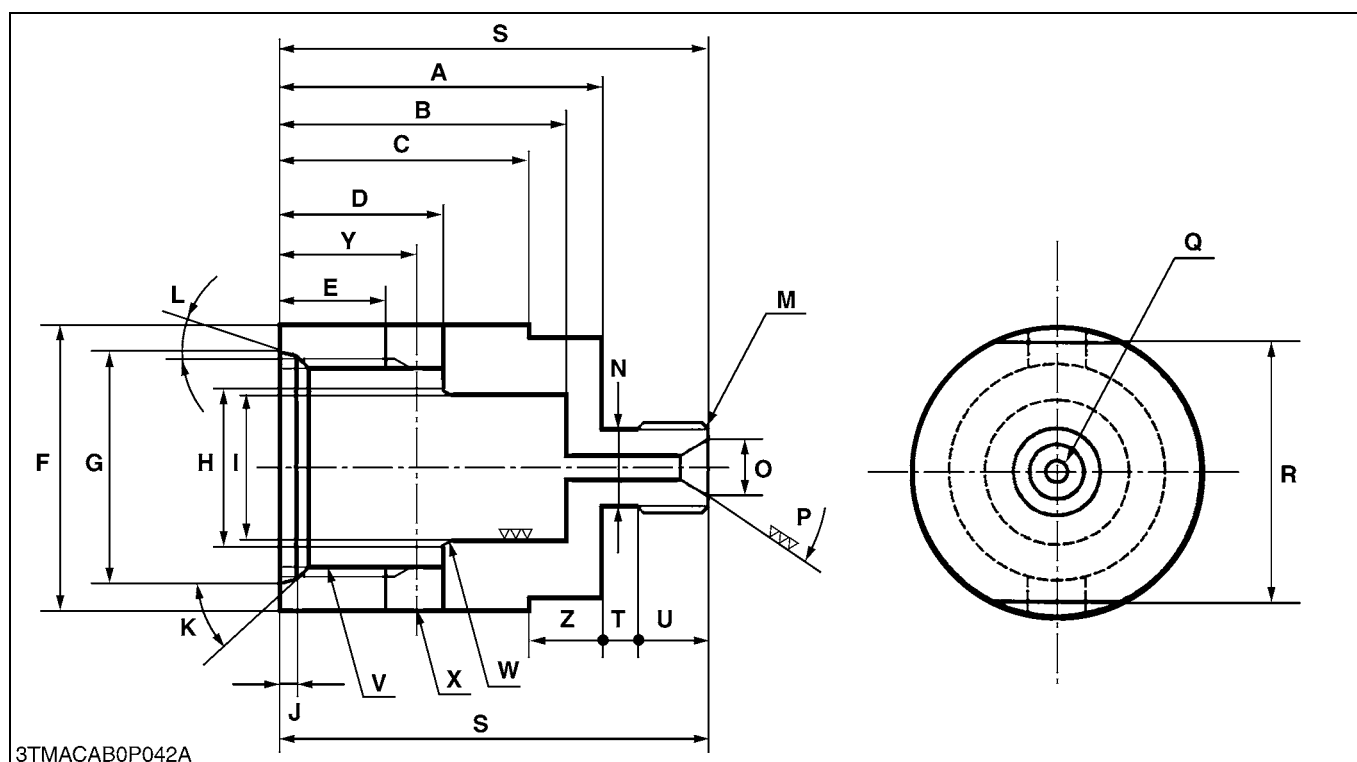
<b>A</b>	22 mm (0.872 in.)	<b>K</b>	135 mm (5.31 in.)
<b>B</b>	11 mm (0.437 in.)	<b>L</b>	7 mm dia. (0.28 in. dia.)
<b>C</b>	24 mm dia. (0.94 in. dia.)	<b>M</b>	8.5 mm dia. (0.33 in. dia.)
<b>D</b>	18 mm dia. (0.71 in. dia.)	<b>N</b>	37 mm (1.46 in.)
<b>E</b>	12 mm dia. (0.47 in. dia.)	<b>O</b>	61.5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

**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.

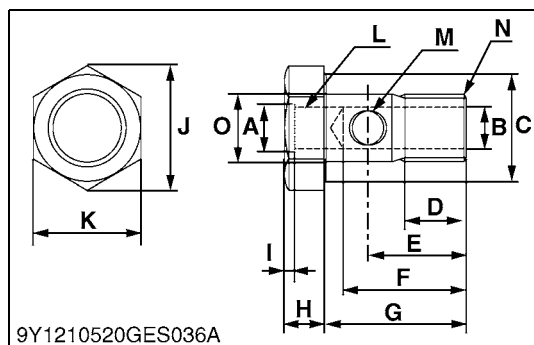
**NOTE**

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



<b>A</b>	45 mm (1.77 in.)	<b>N</b>	10 mm dia. (0.39 in. dia.)
<b>B</b>	40 mm (1.58 in.)	<b>O</b>	7.5 mm dia. (0.3 in. dia.)
<b>C</b>	35 mm (1.38 in.)	<b>P</b>	1.05 rad (60 °)
<b>D</b>	23.0 to 23.3 mm (0.9055 to 0.9713 in.)	<b>Q</b>	3 mm dia. (1.18 in. dia.)
<b>E</b>	16 mm (0.63 in.)	<b>R</b>	36 mm (1.18 in.)
<b>F</b>	40 mm dia. (1.58 in. dia.)	<b>S</b>	60 mm (2.36 in.)
<b>G</b>	32.4 to 32.7 mm dia. (1.2756 to 1.2874 in. dia.)	<b>T</b>	5 mm (0.20 in.)
<b>H</b>	21 mm dia. (0.83 in. dia.)	<b>U</b>	10 mm (0.39 in.)
<b>I</b>	20.00 to 20.05 mm dia. (0.7874 to 0.7894 in. dia.)	<b>V</b>	M30 × P1.5
<b>J</b>	2.50 to 2.59 mm (0.0984 to 0.1097 in.)	<b>W</b>	0.52 rad (30 °)
<b>K</b>	0.79 rad (45 °)	<b>X</b>	8 mm dia. (0.32 in. dia.)
<b>L</b>	0.26 rad (15 °)	<b>Y</b>	19 mm (0.75 in.)
<b>M</b>	M12 × P1.5	<b>Z</b>	10 mm (0.39 in.)

9Y1211012GEG0026US0



### Pump Adaptor 2

#### Application

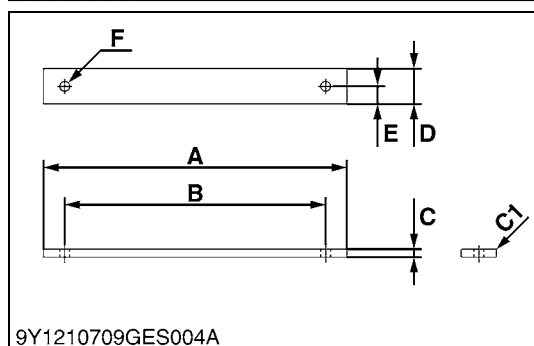
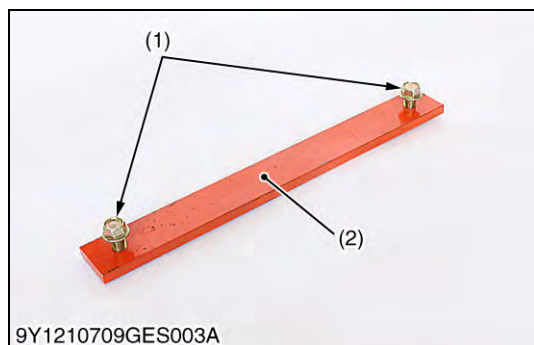
- Use for checking the relief valve of power steering.

#### NOTE

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

A	11 mm dia. (0.43 in. dia.)
B	10 mm dia. (0.39 in. dia.)
C	24 mm dia. (0.94 in. dia.)
D	15 mm (0.59 in.)
E	14 mm (0.55 in.)
F	24 mm (0.94 in.)
G	29 mm (1.1 in.)
H	8.5 mm (0.33 in.)
I	3 mm (0.1 in.)
J	30 mm (1.2 in.)
K	26 mm (1.0 in.)
L	PF 1/8
M	8 mm dia. (0.3 in. dia.)
N	PT 3/8
O	17 mm dia. (0.67 in. dia.)

9Y1211012GEG0027US0



### Front Axle Rocking Plate

#### Application

- Use for restricting front axle rocking.

A	430 mm (16.9 in.)
B	370 mm (14.6 in.)
C	11.5 mm (0.45 in.)
D	50 mm (1.97 in.)
E	25 mm (0.98 in.)
F	M14 × 1.5 (φ12)
C1	Chamfer 1 mm (0.04 in.)

(1) Bolt M14 × 30

(2) Front Axle Rocking Plate

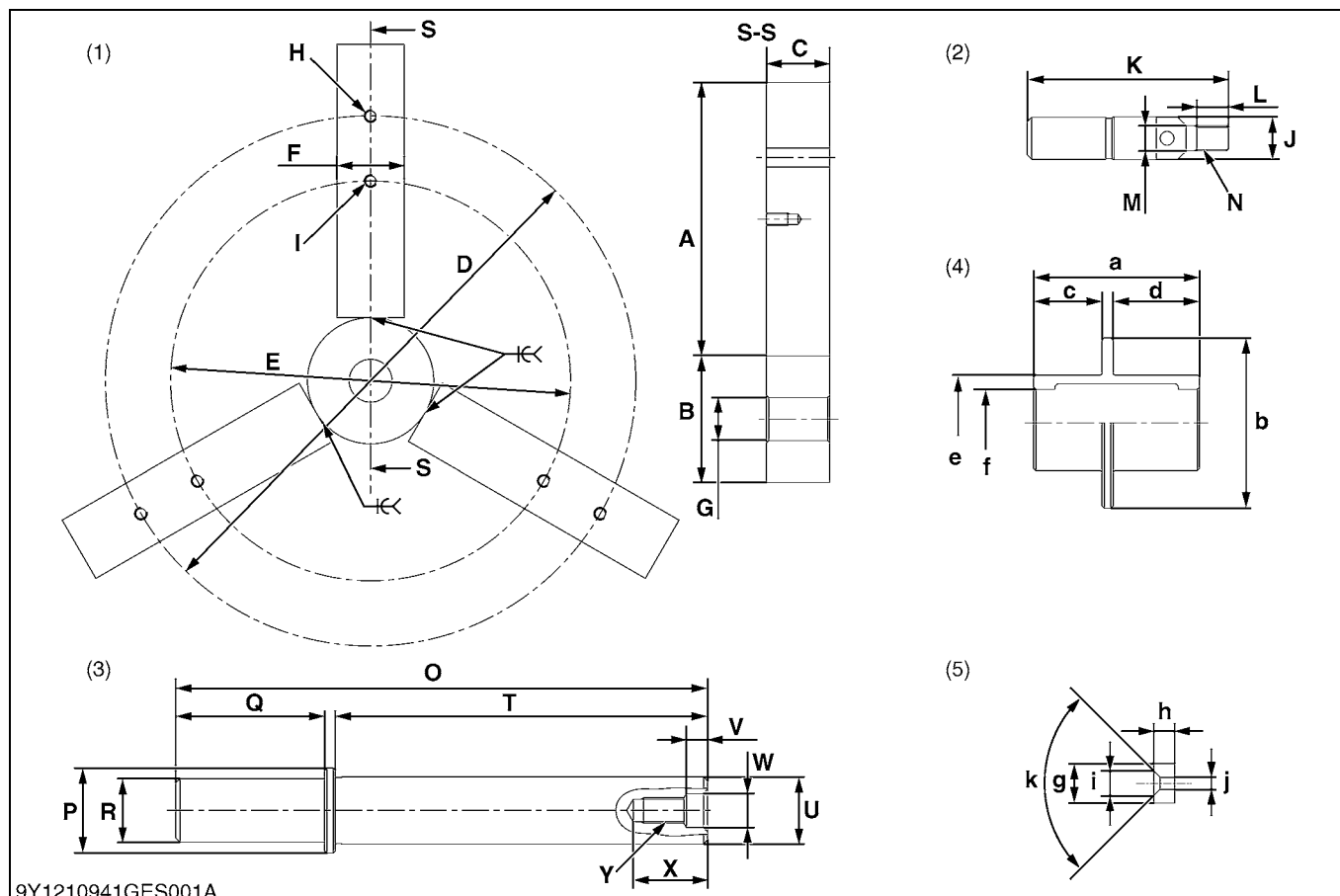
9Y1211012GEG0028US0

**Dual Clutch Assembling Tool****Application**

- Use for disassembling and assembling dual clutch assembly.

**NOTE**

- When using, attach 3 spacers (5) to "I" part of table (1) by using M6 × 1.0 flat head screw.



9Y1210941GES001A

<b>A</b>	130 mm (5.12 in.)	<b>T</b>	175 mm (6.89 in.)
<b>B</b>	60 mm dia. (2.4 in. dia.)	<b>U</b>	31.6 mm dia. (1.24 in. dia.)
<b>C</b>	30 mm (1.2 in.)	<b>V</b>	10 mm (0.39 in.)
<b>D</b>	252 mm dia. (9.92 in. dia.)	<b>W</b>	16 mm dia. (0.63 in. dia.)
<b>E</b>	190 mm dia. (7.48 in. dia.)	<b>X</b>	35 mm (1.4 in.)
<b>F</b>	32 mm (1.3 in.)	<b>Y</b>	M12 × 1.25
<b>G</b>	20.4 mm dia. (0.803 in. dia.)	<b>a</b>	78 mm (3.1 in.)
<b>H</b>	M8 × 1.25	<b>b</b>	80 mm dia. (3.1 in. dia.)
<b>I</b>	M 6 × 1.0 × 10 / 5 mm dia. (0.2 in. dia.) × 15 mm (0.59 in.)	<b>c</b>	32.2 mm (1.27 in.)
<b>J</b>	20 mm dia. (0.79 in. dia.)	<b>d</b>	40.7 mm (1.60 in.)
<b>K</b>	95 mm (3.7 in.)	<b>e</b>	45 mm dia. (1.8 in. dia.)
<b>L</b>	15 mm (0.59 in.)	<b>f</b>	31.6 mm dia. (1.24 in. dia.)
<b>M</b>	12 mm dia. (0.47 in. dia.)	<b>g</b>	19 mm dia. (0.75 in. dia.)
<b>N</b>	M12 × 1.25	<b>h</b>	10 mm (0.39 in.)
<b>O</b>	250 mm (9.84 in.)	<b>i</b>	12 mm dia. (0.47 in. dia.)
<b>P</b>	40 mm dia. (1.6 in. dia.)	<b>j</b>	6 mm dia. (0.2 in. dia.)
<b>Q</b>	70 mm (2.8 in.)	<b>k</b>	90 ° (1.6 rad)
<b>R</b>	30 mm dia. (1.2 in. dia.)		

(1) Table

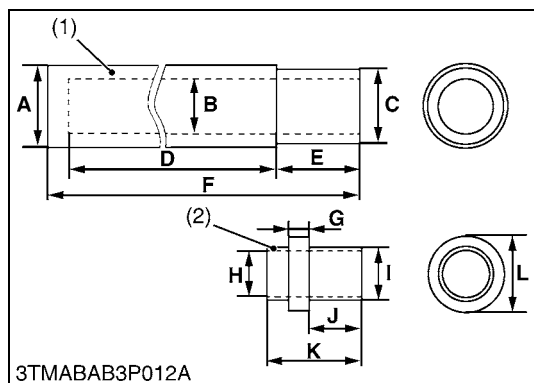
(2) Tip Guide

(3) Center Bar

(4) Gauge Ring

(5) Spacer

9Y1211012GEG0029US0



### Rear Propeller Shaft Tool

#### Application

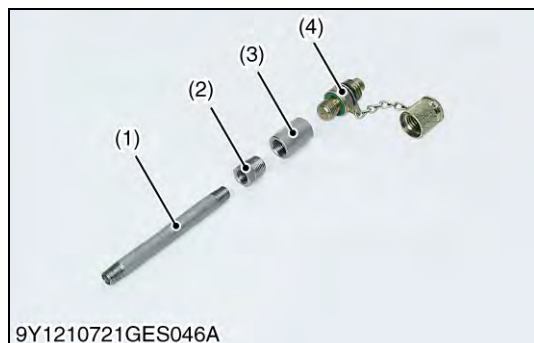
- For installing bearing, oil seals and sleeves on rear propeller shaft.

Bearing and oil seal:(1)

Sleeves: (1) and (2)

A	40 mm dia. (1.57 in. dia.)
B	26 mm dia. (1.02 in. dia.)
C	36 mm dia. (1.42 in. dia.)
D	200 mm (7.87 in.)
E	40 mm (1.57 in.)
F	250 mm (9.84 in.)
G	10 mm (0.39 in.)
H	22 mm dia. (0.87 in. dia.)
I	25 mm dia. (0.98 in. dia.)
J	25 mm (0.98 in.)
K	45 mm (1.77 in.)
L	36 mm dia. (1.42 in. dia.)

9Y1211012GEG0030US0



### PTO Adaptor and Cable

#### Application

- Use for measuring PTO clutch operating pressure.

#### 1) Adaptor Assembly

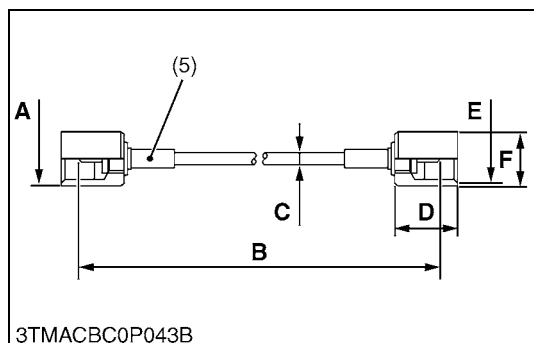
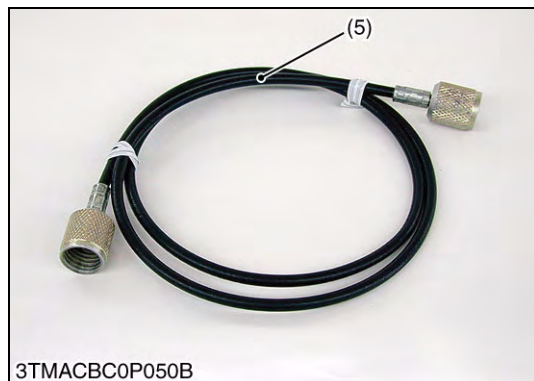
(1)	Pipe	R1/8 × 150 mm
(2)	Adaptor	G1/4 × G1/8
(3)	Socket	G1/4 × 25 mm
(4)	Threaded Joint (07916-50341)	PS1/4 – M16 × 1.5

#### 2) Code No.: 07916-50330

A	M16 × 1.5
B	1000 mm (39.37 in.)
C	4.5 mm dia. (0.18 in. dia.)
D	21 mm (0.83 in.)
E	M16 × 1.5
F	18 mm dia. (0.71 in. dia.)

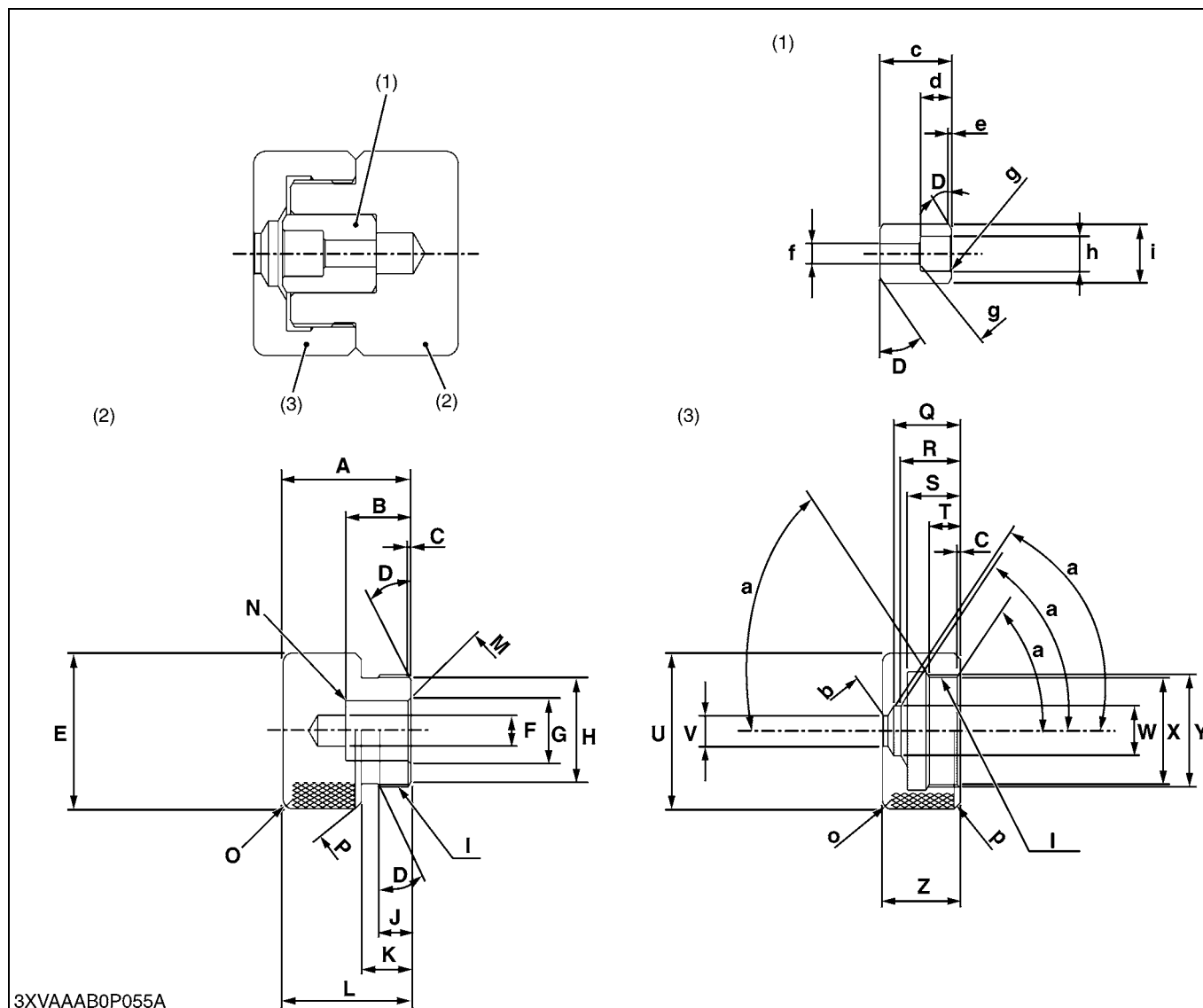
(5) Cable

9Y1211012GEG0031US0



**Check and High Pressure Relief Valve Assembly Tool****Application**

- Use for readjusting relief valve pressure.



<b>A</b>	30 mm (1.2 in.)	<b>N</b>	Chamfer 0.4 mm (0.02 in.)	<b>a</b>	0.17 rad (10 °)
<b>B</b>	21 mm (0.83 in.)	<b>O</b>	Chamfer 3 mm (0.1 in.)	<b>b</b>	Chamfer 0.3 mm (0.01 in.)
<b>C</b>	1 mm (0.04 in.)	<b>P</b>	Chamfer 2 mm (0.08 in.)	<b>c</b>	23 mm (0.91 in.)
<b>D</b>	0.52 rad (30 °)	<b>Q</b>	21.4 mm (0.843 in.)	<b>d</b>	10 mm (0.39 in.)
<b>E</b>	50 mm dia. (2.0 in. dia.)	<b>R</b>	19 mm (0.75 in.)	<b>e</b>	1 mm (0.04 in.)
<b>F</b>	10 mm dia. (0.39 in. dia.)	<b>S</b>	17 mm (0.67 in.)	<b>f</b>	6.5 mm (0.26 in.)
<b>G</b>	9.10 to 9.30 mm dia. (0.359 to 0.366 in. dia.)	<b>T</b>	10 mm (0.39 in.)	<b>g</b>	Chamfer 0.5 mm (0.02 in.)
<b>H</b>	34 mm dia. (1.3 in. dia.)	<b>U</b>	50 mm dia. (2.0 in. dia.)	<b>h</b>	11.1 to 11.3 mm (0.437 to 0.444 in.)
<b>I</b>	M36 × 1.5 mm Pitch	<b>V</b>	9.8 mm dia. (0.39 in. dia.)	<b>j</b>	18.8 to 19.0 mm (0.741 to 0.748 in.)
<b>J</b>	10 mm (0.39 in.)	<b>W</b>	16 mm dia. (0.63 in. dia.)		
<b>K</b>	16 mm (0.63 in.)	<b>X</b>	34.5 mm dia. (1.36 in. dia.)	(1)	Spacer
<b>L</b>	41 mm (1.6 in.)	<b>Y</b>	38 mm dia. (1.5 in. dia.)	(2)	Block
<b>M</b>	Chamfer 1 mm (0.04 in.)	<b>Z</b>	25 mm (0.98 in.)	(3)	Cap

9Y1211012GEG0197US0

## 9. TIRES

### [1] TIRE PRESSURE



#### WARNING

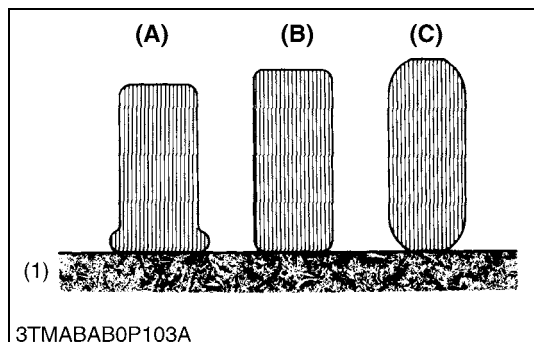
To avoid personal injury:

- 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.

9Y1211012GEG0032US0



#### 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.

#### L3301/L3901

	Tire Sizes	Inflation Pressure
Rear	11.2-24, 4PR	100 kPa (1.0 kgf/cm <sup>2</sup> , 14 psi)
	13.6-16, 4PR	100 kPa (1.0 kgf/cm <sup>2</sup> , 14 psi)
	15-19.5, 6PR	210 kPa (2.1 kgf/cm <sup>2</sup> , 30 psi)
Front	5.00-15, 4PR	220 kPa (2.2 kgf/cm <sup>2</sup> , 32 psi)
	7-16, 6PR	180 kPa (1.8 kgf/cm <sup>2</sup> , 26 psi)
	23 × 8.50-12, 4PR	160 kPa (1.6 kgf/cm <sup>2</sup> , 23 psi)
	25 × 8.50-14, 6PR	160 kPa (1.6 kgf/cm <sup>2</sup> , 23 psi)
	27 × 8.50-15, 6PR	210 kPa (2.1 kgf/cm <sup>2</sup> , 30 psi)

#### L4701

	Tire Sizes	Inflation Pressure
Rear	14.9-24, 6PR	140 kPa (1.4 kgf/cm <sup>2</sup> , 20 psi)
	44 × 18-20, 4PR	140 kPa (1.4 kgf/cm <sup>2</sup> , 20 psi)
	17.5L-24, 6PR	140 kPa (1.4 kgf/cm <sup>2</sup> , 20 psi)
Front	6.00-16, 4PR	220 kPa (2.2 kgf/cm <sup>2</sup> , 32 psi)
	8.3-16, 6PR	150 kPa (1.5 kgf/cm <sup>2</sup> , 22 psi)
	27 × 8.50-15, 4PR	80 kPa (0.8 kgf/cm <sup>2</sup> , 11 psi)
	10-16.5, 6PR	140 kPa (1.4 kgf/cm <sup>2</sup> , 20 psi)
	7.5L-15, 6PR	220 kPa (2.2 kgf/cm <sup>2</sup> , 32 psi)
	27-10.50LL15, 4PR	80 kPa (0.8 kgf/cm <sup>2</sup> , 11 psi)
	305R343	140 kPa (1.4 kgf/cm <sup>2</sup> , 20 psi)

(1) Ground

(A) Insufficient  
(B) Standard  
(C) Excessive

9Y1211012GEG0033US0

#### Dual Tires

Dual tires are not approved.

9Y1211012GEG0034US0

## [2] TREADS ADJUSTMENT



### CAUTION

To avoid personal injury:

- When working on slopes or working with trailer, set the wheel tread as wide as practice for the job 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.

9Y1211012GEG0035US0

### (1) L3301/L3901

#### [A] Front Wheels

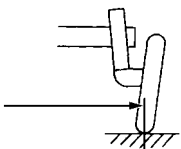
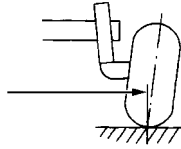
Front tread can not be adjusted.

#### ■ 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-15.)

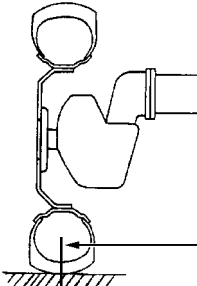
9Y1211012GEG0039US0

#### 2WD Front Wheel

5 - 15 Farm	23 × 8.5 - 12 Turf
	
3TLAAAB0P037A	3TLAAAB0P038A
1050 mm (41.3 in.)	1175 mm (46.3 in.)

9Y1211012GEG0037US0

#### 4WD Front Wheel

	Tire	7.2-16 Farm	25 × 8.5-14 Turf	27 × 8.5-15 Industrial
	Tread	1095 mm (43.1 in.)	1105 mm (43.5 in.)	1115 mm (43.9 in.)

9Y1211012GEG0038US0



**[B] Rear Wheels**

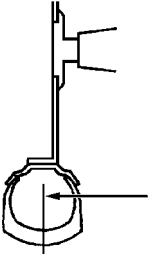
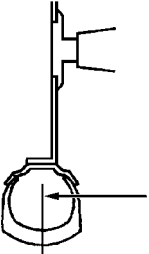
Rear tread width can be adjusted with the tires listed below.

**To change the tread width**

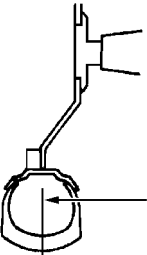
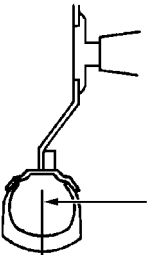
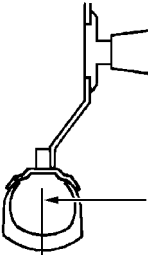
1. Remove the wheel rim and / or disk mounting bolts.
2. Change the position of the rim and / or disk (right and left) to the desired position, and tighten the bolts.

**■ 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-15.)**

15-19.5 Industry		13.6-16 Turf	
			
3TMABAB0P101A		3TMABAB0P101A	
1145 mm (45.1 in.)		1115 mm (43.9 in.)	


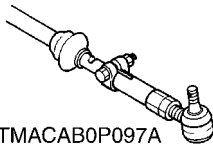
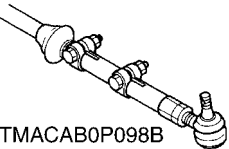
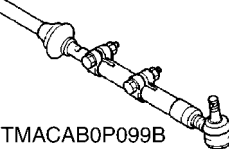
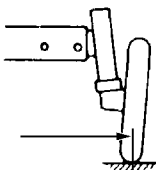
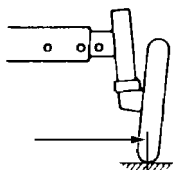
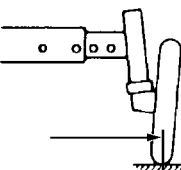
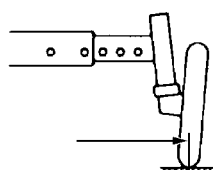
  

11.2-24 Farm		
		
3TMABAB0P098A	3TMABAB0P099A	3TMABAB0P100A
1115 mm (43.8 in.)	1195 mm (47.1 in.)	1290 mm (50.8 in.)

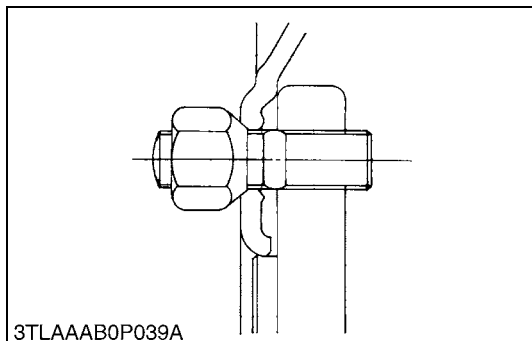
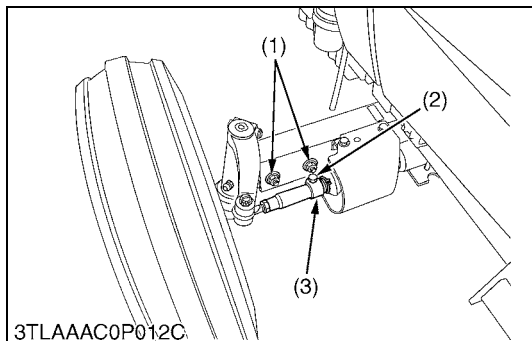
9Y1211012GEG0040US0

**(2) L4701****[A] Front Wheels****Front Wheels (2WD Model)**

Front tread can be adjusted in 4 steps.

Models		 3TMACAB0P096A	 3TMACAB0P097A	 3TMACAB0P098B	 3TMACAB0P099B
		 3TMABAB0P091A	 3TMABAB0P092A	 3TMABAB0P093A	 3TMABAB0P094A
Farm	6.00-16	1210 mm (47.6 in.)	1310 mm (51.6 in.)	1410 mm (55.5 in.)	1510 mm (59.4 in.)
	7.5L-15	1280 mm (50.4 in.)	1380 mm (54.3 in.)	1480 mm (58.3 in.)	1580 mm (62.2 in.)
Turf	27 x 8.5-15	1235 mm (48.6 in.)	1335 mm (52.6 in.)	1435 mm (56.5 in.)	1535 mm (60.4 in.)

9Y1211012GEG0041US0



To adjust the tread.

1. Lift the front of the tractor with a jack.
2. Remove the front axle mounting bolts (1) and the tie-rod mounting bolts (2).
3. Move the front axles (right and left) to the desired position, and tighten the bolts.

Front axle mounting bolt	Factory specification	124 to 147 N·m 12.6 to 15.0 kgf·m 91.5 to 108.4 lbf·ft
Tie-rod mounting bolt		61 to 71 N·m 6.2 to 7.2 kgf·m 44.8 to 52.1 lbf·ft

#### ■ IMPORTANT

- After adjusting the tread, adjust toe-in.  
Toe-in: 2 to 8 mm (0.08 to 0.31 in.)
- The front width for the front loader application on 2WD model should not be greater than 1280 mm (50.4 in.).

#### ■ NOTE

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

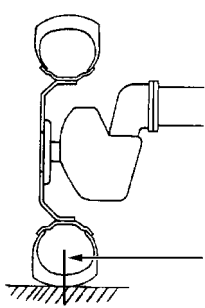
- (1) Front Axle Mounting Bolt  
(2) Tie-rod Mounting Bolt

- (3) Tie-rod Clamp

9Y1211012GEG0042US0

**Front Wheels (4WD Model)**

Front tread can not be adjusted.

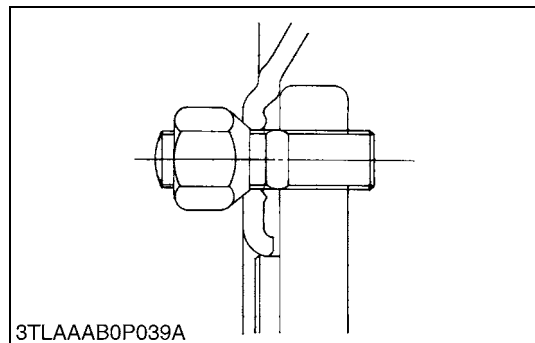
 3TMABAB0P095A	Tire	8.3-16 Farm	27 x 8.50-15 Turf	27 x 10.50LL15 Turf	10-16.5 Industrial	305R343 Turf
	Tread	1155 mm (45.5 in.)	1200 mm (47.2 in.)	1180 mm (46.5 in.)	1195 mm (47.0 in.)	1305 mm (51.4 in.)

■ **IMPORTANT**

- Do not turn front discs to obtain wider tread.

■ **NOTE**

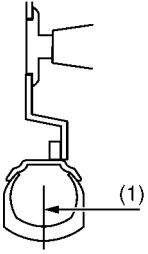
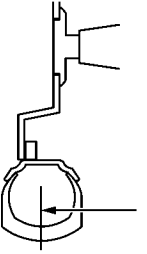
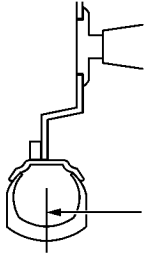
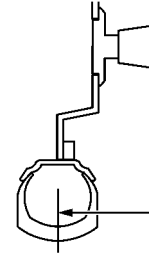
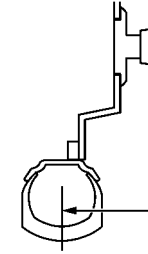
- Wheels with beveled or tapered holes: Use the tapered side of lug nut.

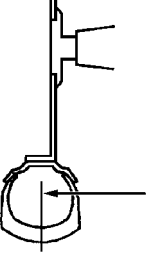


9Y1211012GEG0043US0

**[B] Rear Wheels**

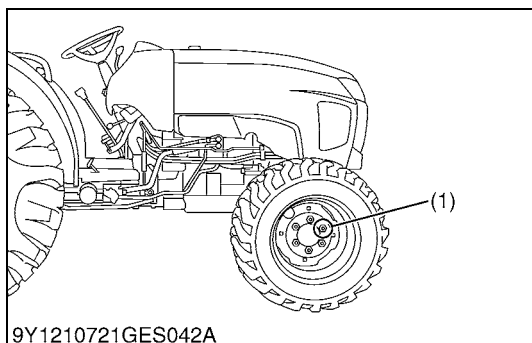
Rear tread can be adjusted in 6 steps.

Models					
14.9-24 Farm	1180 mm (46.5 in.)	1200 mm (47.2 in.)	1300 mm (51.2 in.)	1450 mm (57.1 in.)	1545 mm (60.8 in.)
17.5L-24 Industrial	—	1250 mm (49.2 in.)	1360 mm (53.5 in.)	1390 mm (54.7 in.)	1500 mm (59.1 in.)

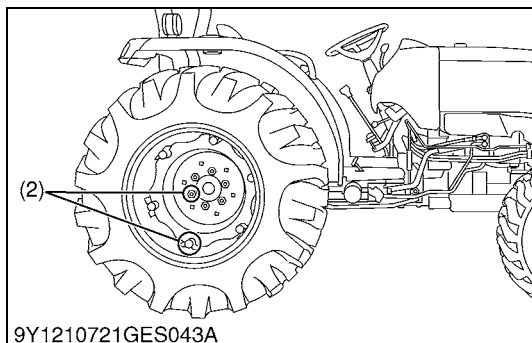
Models	
44 x 18-20 Turf	1430 mm (56.3 in.)

(1) Tread

9Y1211012GEG0044US0



9Y1210721GES042A



9Y1210721GES043A

To adjust the tread

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

■ **IMPORTANT**

- 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 thereafter according to service interval.

Tightening torque	Front wheel mounting screw and nut or lug nut	124.0 to 147.0 N·m 12.6 to 15.0 kgf·m 91.5 to 108.4 lbf·ft
	Rear wheel mounting screw and nut	196.0 to 225.0 N·m 20.0 to 23.0 kgf·m 144.6 to 166.0 lbf·ft

- (1) Front Wheel Mounting Screw and Nut or Lug Nut      (2) Rear Wheel Mounting Screw and Nut

9Y1211012GEG0045US0

### [3] TIRE LIQUID INJECTION

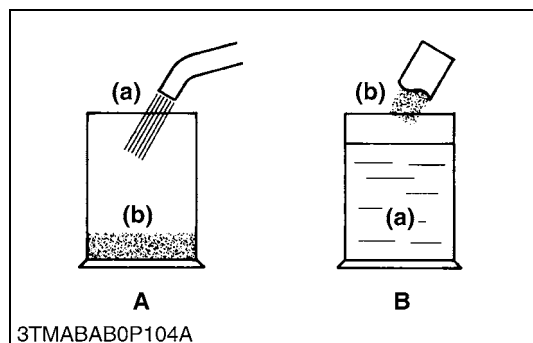
Auxiliary weights can be used to increase traction force for plowing in fields or clayey ground.

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.

9Y1211012GEG0046US0



#### Preparation of Calcium Chloride Solution

#### ⚠ CAUTION

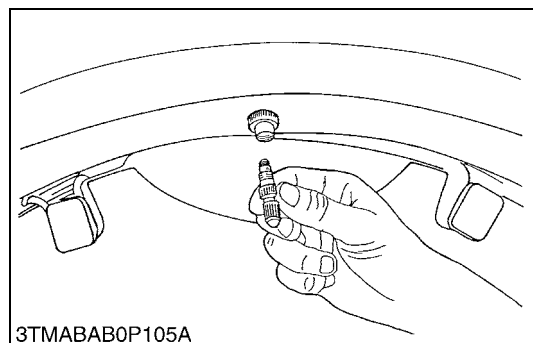
- When making a calcium chloride solution, do not pour water over calcium chloride since this results in chemical reaction which will cause high temperature. Instead add a small amount of calcium chloride to the water at a time until the desired solution is achieved.

Freezing temperature	Weight of CaCl <sub>2</sub> 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<sub>2</sub> (Calcium Chloride)

- A: Bad  
B: Good

9Y1211012GEG0047US0



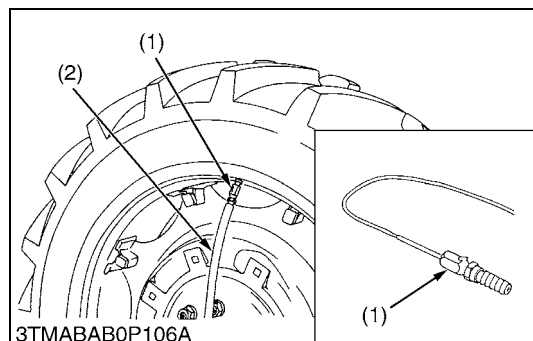
#### Attaching Injector

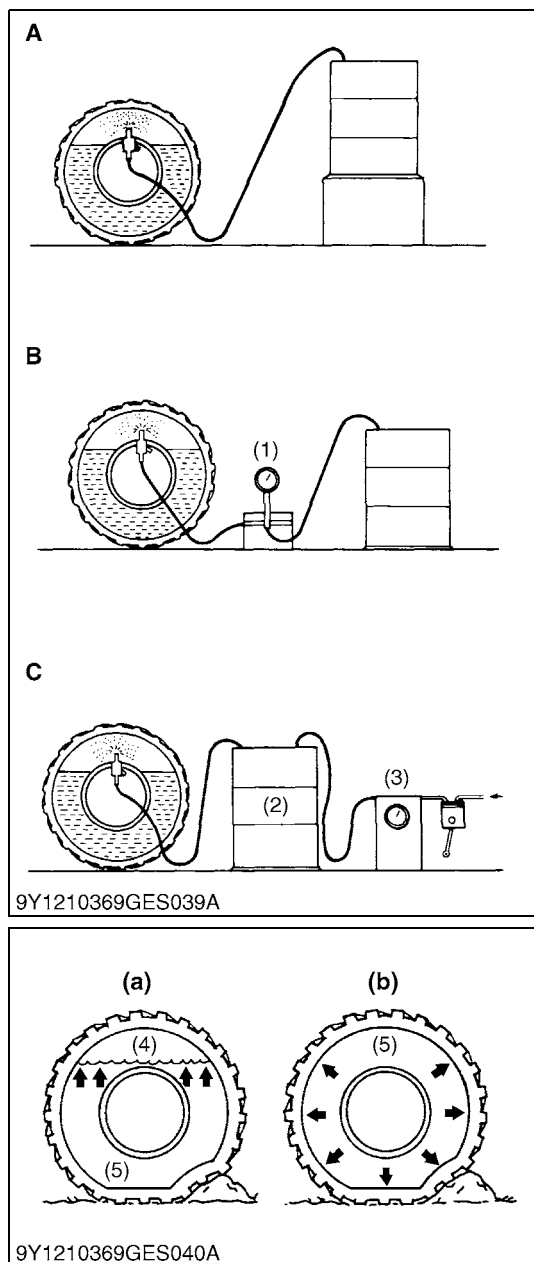
1. Lift the rear tires off the ground.
2. Turn the tire so that the air valve is at the top.
3. Remove the air valve, and attach the injector.  
(Code No. 07916-52501)

(1) Injector

(2) Hose

9Y1211012GEG0048US0





## 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.

#### L3301/L3901

Tire sizes	11.2-24	15-19.5
Slush free at -10 °C (14 °F) Solid at -30 °C (-22 °F) [Approx. 1 kg (2 lbs) CaCl <sub>2</sub> per 4 L (1 gal) of water]	105 kg (230 lbs)	140 kg (309 lbs)
Slush free at -24 °C (-11 °F) Solid at -47 °C (-52 °F) [Approx. 1.5 kg (3.5 lbs) CaCl <sub>2</sub> per 4 L (1 gal) of water]	110 kg (240 lbs)	150 kg (331 lbs)
Slush free at -47 °C (-52 °F) Solid at -52 °C (-62 °F) [Approx. 2.25 kg (5 lbs) CaCl <sub>2</sub> per 4 L (1 gal) of water]	115 kg (253 lbs)	160 kg (353 lbs)

#### L4701

Tire sizes	14.9-24	17.5L-24
Slush free at -10 °C (14 °F) Solid at -30 °C (-22 °F) [Approx. 1 kg (2 lbs) CaCl <sub>2</sub> per 4 L (1 gal) of water]	205 kg (450 lbs)	235 kg (515 lbs)
Slush free at -24 °C (-11 °F) Solid at -47 °C (-52 °F) [Approx. 1.5 kg (3.5 lbs) CaCl <sub>2</sub> per 4 L (1 gal) of water]	215 kg (475 lbs)	250 kg (550 lbs)
Slush free at -47 °C (-52 °F) Solid at -52 °C (-62 °F) [Approx. 2.25 kg (5 lbs) CaCl <sub>2</sub> per 4 L (1 gal) of water]	225 kg (495 lbs)	265 kg (585 lbs)

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

**A: Gravity Injection**

**B: Pump Injection**

**C: Pressure Tank Injection**

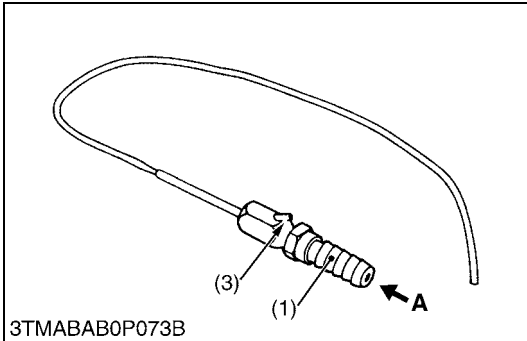
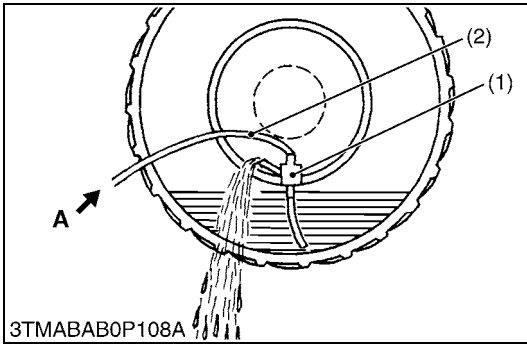
**(a) Correct: 75 %**

**Air Compresses Like A Cushion**

**(b) Incorrect: 100 % Full**

**Water Can Not Be Compressed**

9Y1211012GEG0049US0



### 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**

9Y1211012GEG0050US0



## 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 <b>W0</b>
	Front		Rear	
L3301 L3901	1050 mm (41.3 in.)	1095 mm (43.1 in.)	1290 mm (50.8 in.)	900 kg (1985 lbs)
L4701	1580 mm (62.2 in.)	1155 mm (45.5 in.)	1545 mm (60.8 in.)	1300 kg (2870 lbs)

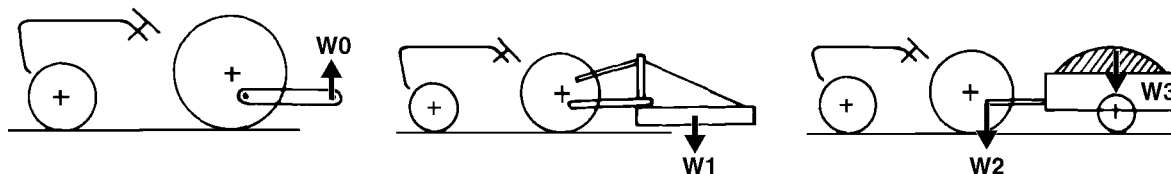
	Actual figures		
	Implement weight <b>W1</b> and / or size	Max. Drawbar Load <b>W2</b>	Trailer loading weight <b>W3</b> Max. capacity
L3301 L3901	As in the following list (Shown on the next page)	330 kg (730 lbs)	1000 kg (2200 lbs)
L4701		650 kg (1430 lbs)	3000 kg (6600 lbs)

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**



3TMABAB0P109A

### ■ NOTE

- Implement size may vary depending on soil operating conditions.

9Y1211012GEG0051US0

No.	Implement		Remarks	L3301	L3901	L4701
1	Trailer		Max. Load Capacity	1000 kg (2200 lbs)		3000 kg (6600 lbs)
			Max. Drawbar Load	330 kg (730 lbs)		650 kg (1430 lbs)
2	Mower	Rotary-cutter	Max. Cutting Width	1829 mm (72 in.)		1829 mm (72 in.)
			Max. Weight	350 kg (770 lbs)		400 kg (880 lbs)
		Flail Mower	Max. Cutting Width	1270 mm (50 in.)		1524 mm (60 in.)
			Max. Weight	350 kg (770 lbs)		400 kg (880 lbs)
		Sickle Bar	Max. Cutting Width	1829 mm (72 in.)		2133 mm (84 in.)
			Max. Weight	400 kg (880 lbs)		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	800 L (210 U.S.gals, 176 Imp.gals)		1200 L (317 U.S.gals, 264 Imp.gals)
4	Rotary Tiller		Max. Tilling Width	1370 mm (54 in.)		1520 mm (60 in.)
5	Bottom Plow		Max. Size	12 in. x 2, 16 in. x 1		14 in. x 2
6	Disc-harrow: Pull Type		Max. Harrowing Width	1524 mm (60 in.)		1981 mm (78 in.)
			Max. Weight	300 kg (660 lbs)		400 kg (880 lbs)
7	Chisel Plow		Max. Width	1829 mm (72 in.)		1829 mm (72 in.)
			Max. Weight	350 kg (770 lbs)		350 kg (770 lbs)
8	Broad Caster		Max. Tank-capacity	200 L (53 U.S.gals, 44 Imp.gals)		300 L (80 U.S.gals, 66 Imp.gals)
			Max. Weight	100 kg (220 lbs)		100 kg (220 lbs)
9	Manure Spreader		Max. Capacity	1000 kg (2200 lbs)		2000 kg (4400 lbs)
10	Cultivator		Max. Width	1524 mm (60 in.)		2134 mm (84 in.)
			Number of Rows	1		2
			Max. Weight	250 kg (550 lbs)		440 kg (880 lbs)
11	Front Blade		Max. Cutting Width	1829 mm (72 in.)		1829 mm (72 in.)
			Max. Oil Pressure	15.9 MPa (162 kgf/cm <sup>2</sup> , 2311 psi)		17.2 MPa (175 kgf/cm <sup>2</sup> , 2490 psi)
			Sub Frame	Necessary		Necessary
12	Rear Blade		Max. Cutting Width	1829 mm (72 in.)		1829 mm (72 in.)
			Max. Oil Pressure	15.9 MPa (162 kgf/cm <sup>2</sup> , 2311 psi)		17.2 MPa (175 kgf/cm <sup>2</sup> , 2490 psi)

No.	Implement	Remarks	L3301	L3901	L4701
13	Front-end Loader	Max. Lifting Capacity	460 kg (1014 lbs)		700 kg (1545 lbs)
		Max. Oil Pressure	15.9 MPa (162 kgf/cm <sup>2</sup> , 2311 psi)		18.0 MPa (184 kgf/cm <sup>2</sup> , 2560 psi)
		Sub Frame	Necessary		Necessary
14	Box Blade	Max. Cutting Width	1321 mm (52 in.)		1651 mm (65 in.)
		Max. Weight	315 kg (694 lbs)		420 kg (925 lbs)
15	Back Hoe	Max. Digging Depth	2288 mm (90 in.)		2288 mm (90 in.)
		Max. Weight	420 kg (926 lbs)		450 kg (990 lbs)
		Sub Frame	Necessary		Necessary
16	Snow Blade	Max. Width	1524 mm (60 in.)		1829 mm (72 in.)
		Max. Weight	300 kg (660 lbs)		350 kg (770 lbs)
17	Snow Blower	Max. Working Width	1524 mm (60 in.)		1676 mm (66 in.)
		Max. Weight	250 kg (550 lbs)		280 kg (620 lbs)

■ **NOTE**

- Implement size may vary depending on soil operating conditions.

9Y1211012GEG0052US0

# 1 ENGINE

# MECHANISM

## CONTENTS

1. FEATURES.....	1-M1
2. ENGINE BODY .....	1-M2
[1] PISTON .....	1-M2
[2] HALF-FLOATING HEAD COVER .....	1-M2
3. LUBRICATING SYSTEM.....	1-M3
[1] OIL COOLER.....	1-M3
4. COOLING SYSTEM .....	1-M4
[1] THERMOSTAT .....	1-M4
[2] BOTTOM BYPASS SYSTEM .....	1-M5
5. FUEL SYSTEM.....	1-M6
[1] OVERVIEW OF COMMON RAIL SYSTEM.....	1-M6
[2] SUPPLY PUMP .....	1-M8
[3] RAIL.....	1-M11
[4] INJECTOR.....	1-M12
[5] ENGINE CONTROL SYSTEM .....	1-M16
(1) Engine ECU.....	1-M17
(2) Sensor .....	1-M17
6. EGR SYSTEM .....	1-M19
[1] OVERVIEW .....	1-M19
[2] EGR COOLER.....	1-M20
[3] EGR VALVE .....	1-M20
7. AFTER TREATMENT SYSTEM .....	1-M21
[1] AFTER TREATMENT DEVICES .....	1-M21

# 1. FEATURES



The diesel engines have the features of low cost and high efficiency. On the other hand, it is said that an amount of the nitrogen oxide (NOx) and particulate matter (PM) contained in their exhaust gas is relatively large, and the emission regulation by the EPA (Environmental Protection Agency) have been gradually strengthened in North America recently.

KUBOTA, which has been positively engaging in the strict emission regulations of the world, has developed the new engine by adopting the CRS (Common Rail System), the EGR (Exhaust Gas Recirculation) and the DPF (Diesel Particulate Filter) in the course of pursuing more clean exhaust gas.

The common rail system uses a type of accumulation chamber called "a common rail" to store pressurized fuel, and injectors that contain electronically controlled solenoid valves to inject the pressurized fuel into the cylinders.

Because the engine ECU (Electronic Control Unit) controls the injection system (including the injection pressure, injection rate and injection timing), the injection system is independent and thus unaffected by the engine speed or load. Because the engine ECU can control injection quantity and timing to a high level of precision, even multi-injection (multiple fuel injections in one injection stroke) is possible also. This ensures a stable injection pressure at all times, even in the low engine speed range, and dramatically decreases the amount of black smoke ordinarily emitted by a diesel engine during start-up and acceleration.

The DPF is a device designed to remove diesel particulate matter and soot from the exhaust gas of diesel engine. This DPF is designed to burn off the accumulated PM either passively through the heat from the high-loaded engine operation or actively through the heat generated by the chemical reaction between the DOC (Diesel Oxidation Catalyst) and post injection fuel.

As a result, exhaust gas emissions are cleaner and reduced.

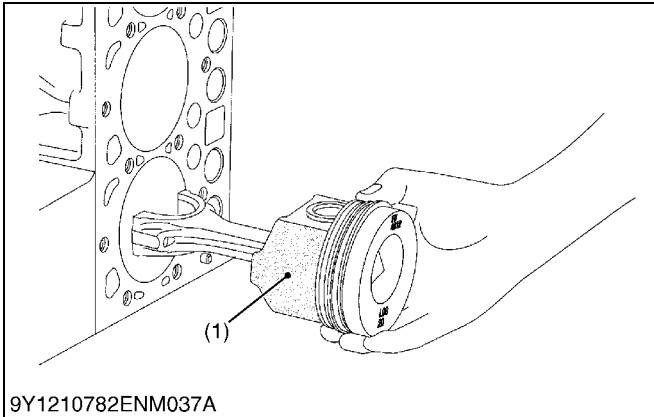
The engine models shown in the table below are adopted for this model.

Tractor Model	Engine Model
L3301	D1803-CR-E4
L3901	D1803-CR-E4
L4701	V2403-CR-E4

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## 2. ENGINE BODY

### [1] PISTON



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

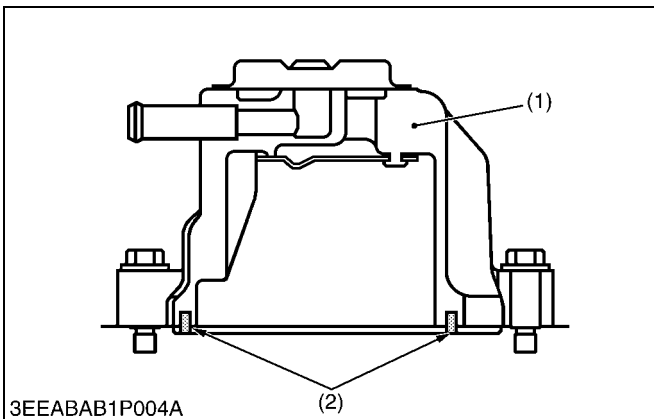
★ Molybdenum disulfide ( $\text{MoS}_2$ )

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

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### [2] HALF-FLOATING HEAD COVER



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.

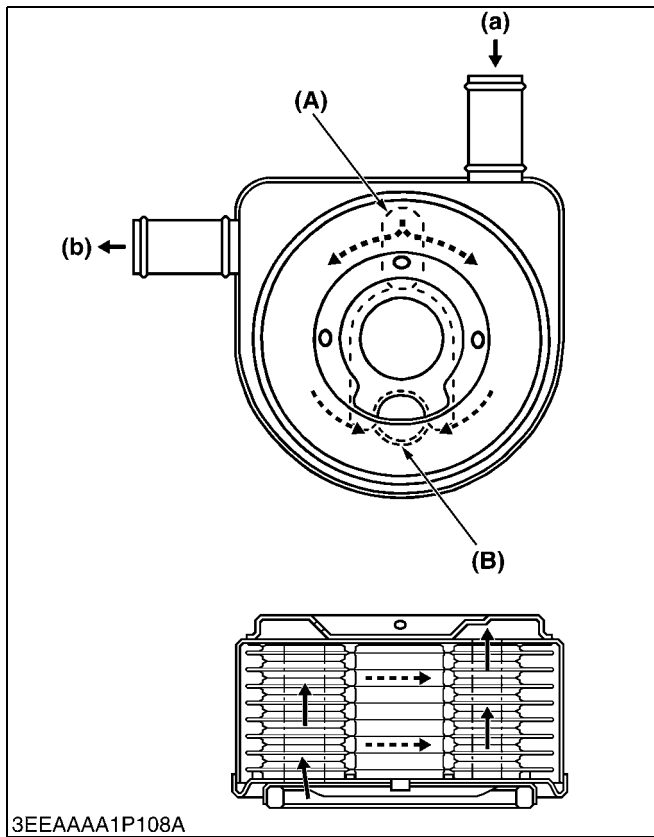
(1) Cylinder Head Cover

(2) Rubber Packing

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### 3. LUBRICATING SYSTEM

#### [1] OIL COOLER



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

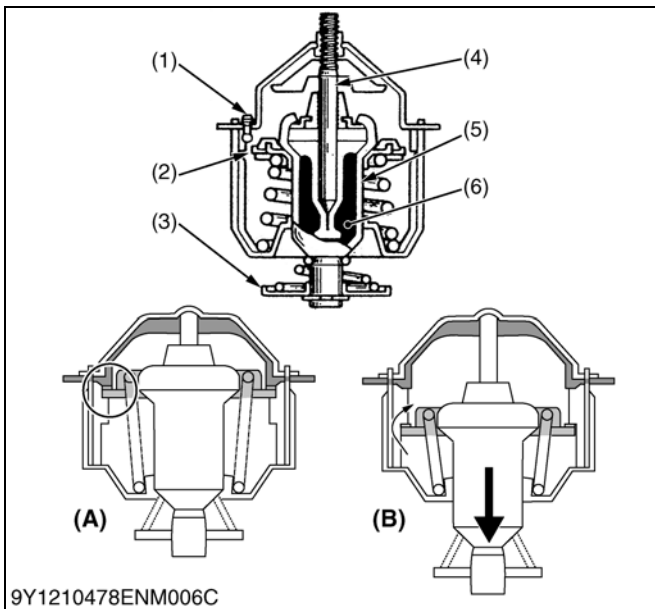
(a) Coolant Inlet  
(b) Coolant Outlet

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## 4. COOLING SYSTEM

### [1] THERMOSTAT



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

The volume starts to expand in this process. As spindle is fixed, pellet goes down and valve goes down.

There is a jiggle valve 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.

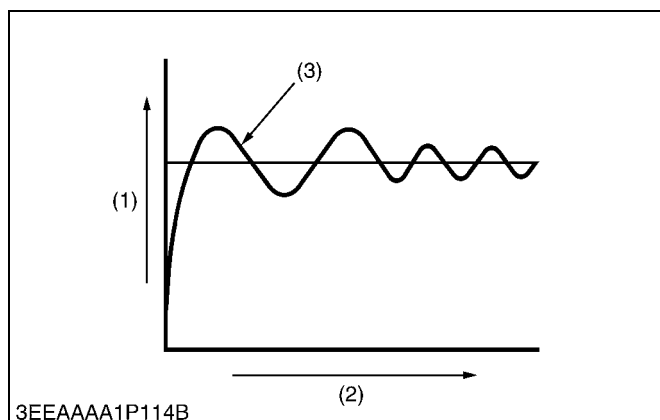
The jiggle valve helps to remove air from this hole, and then coolant can go in easily.

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

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

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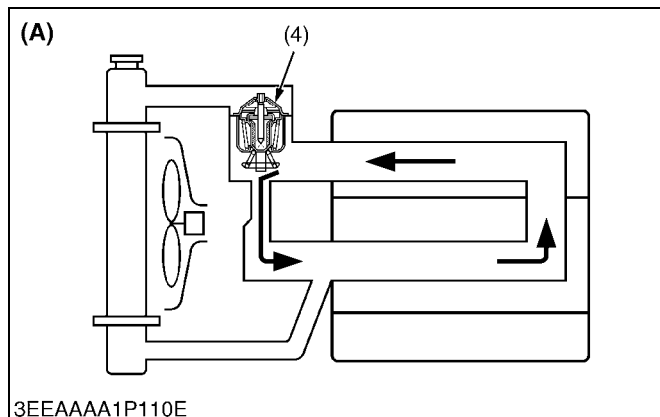
## [2] BOTTOM BYPASS SYSTEM



In addition to improving the cooling performance of the radiator by using 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.

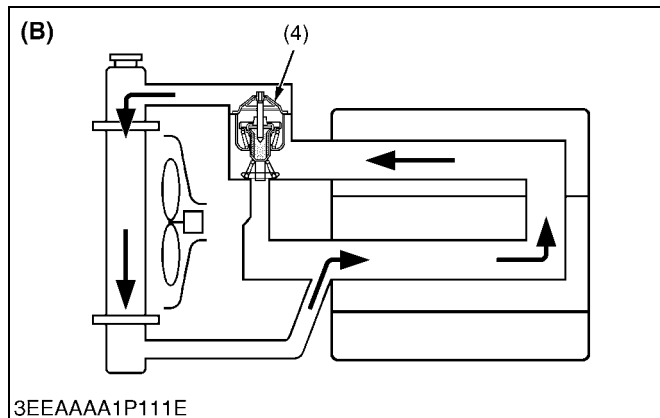
When the temperature of the coolant exceeds the opening temperature of the thermostat (4), the thermostat opens in three stages, sending the now hot coolant to the radiator. Further, when the thermostat is fully open, it is structured so the hot coolant does not flow into the engine via the bypass circuit,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



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

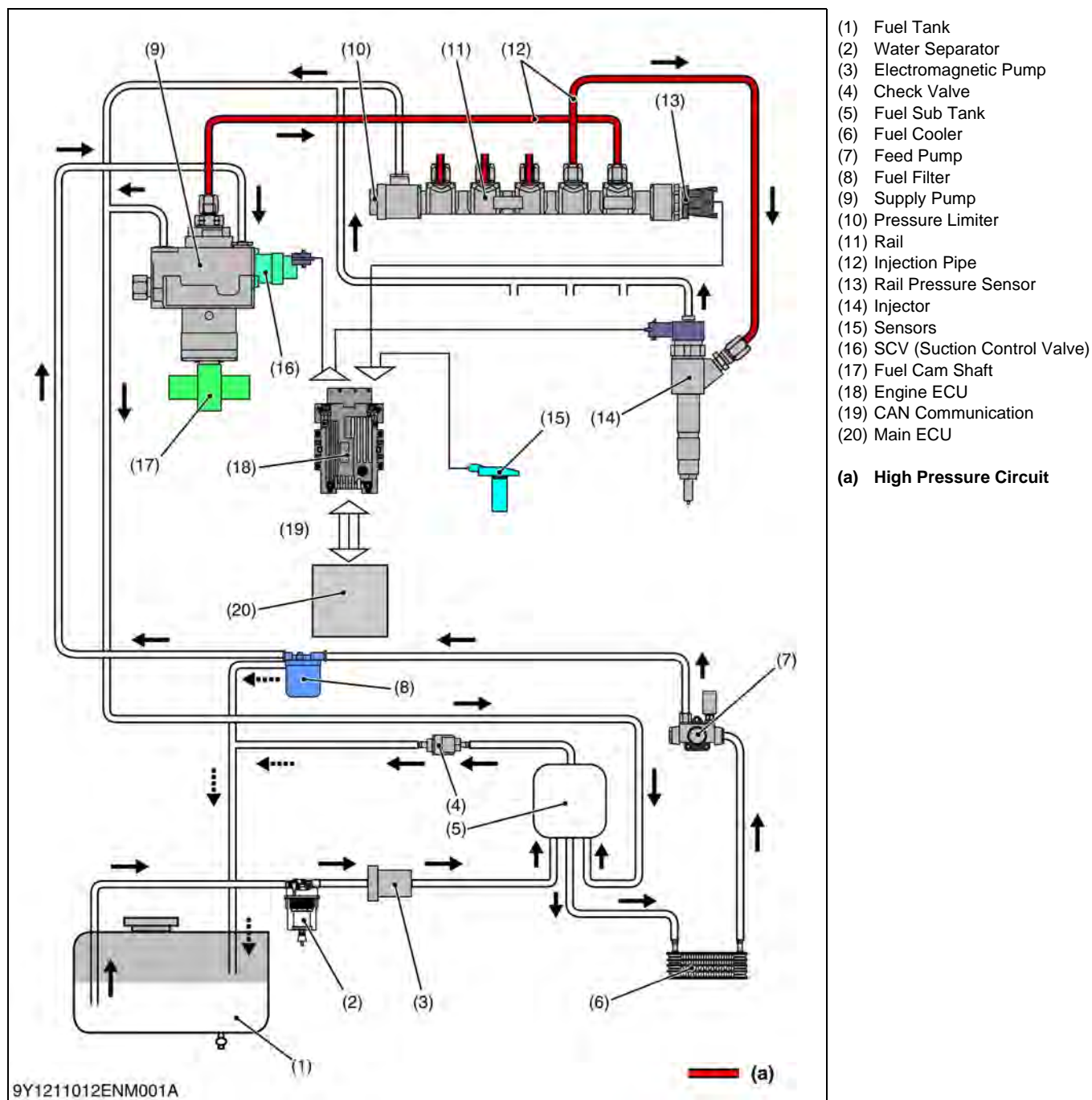
- (A) Bypass Opened
- (B) Bypass Closed

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## 5. FUEL SYSTEM

### [1] OVERVIEW OF COMMON RAIL SYSTEM

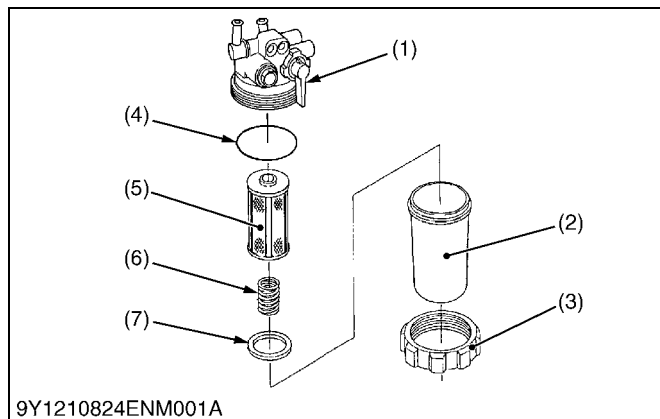


The common rail system is an electronically controlled fuel injection device, with a supply pump (9) that pressurizes the fuel, a rail (11) that stores the high-pressure fuel, injectors (14) that inject the fuel under high-pressure based on solenoid operation into each cylinder and an engine ECU that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

The injection amount and injection timing of the injectors (14) and pressure of fuel stored in the rail are controlled by the engine ECU (18) based on signals from each sensors (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. This enables to suppress generation of black smoke on start up and under acceleration and to achieve reduction of exhaust gas and higher output power.

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### **Separator**

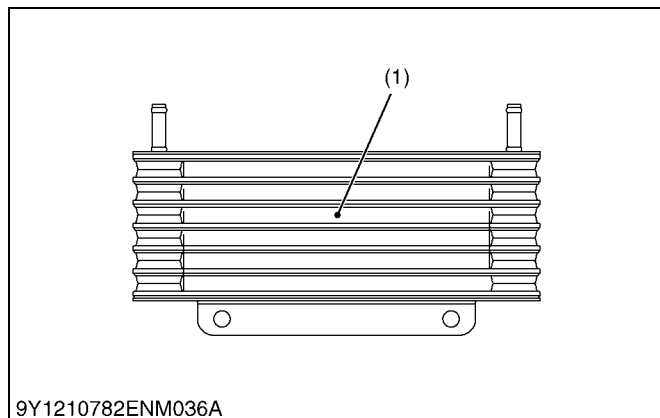
The separator has a function of separating fuel and water through difference in specific gravity. There is a read float (7) with a specific weight of 0.9 made of a polypropylene material inside that has properties in that it is heavier than diesel and lighter than water.

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

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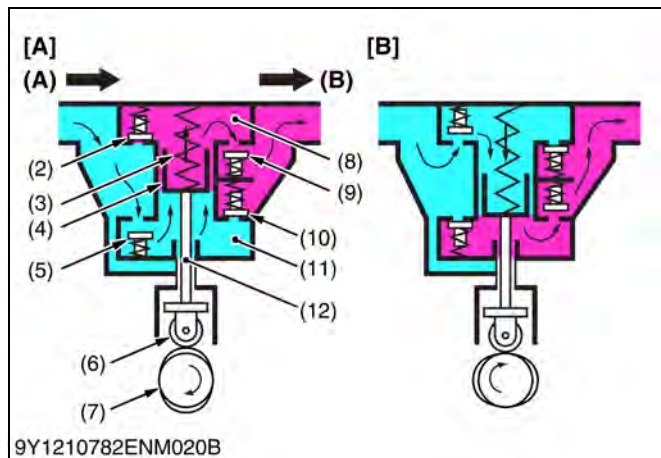
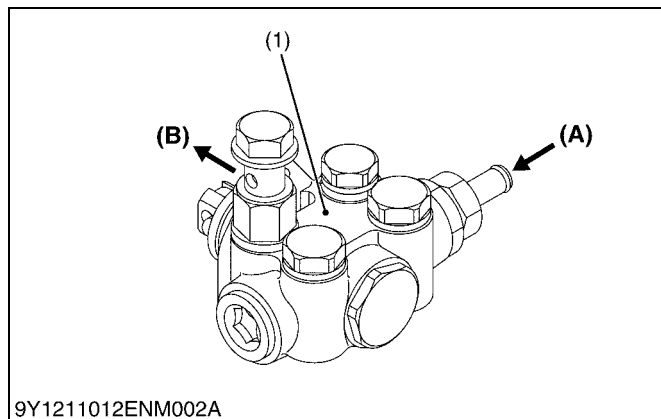
### **Fuel Cooler**

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

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### Feed Pump

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

#### Operating

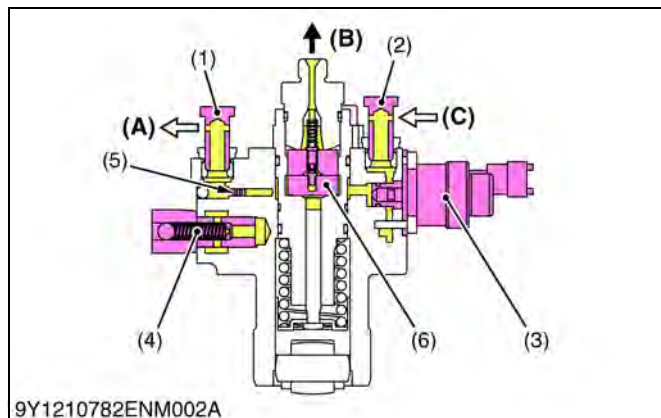
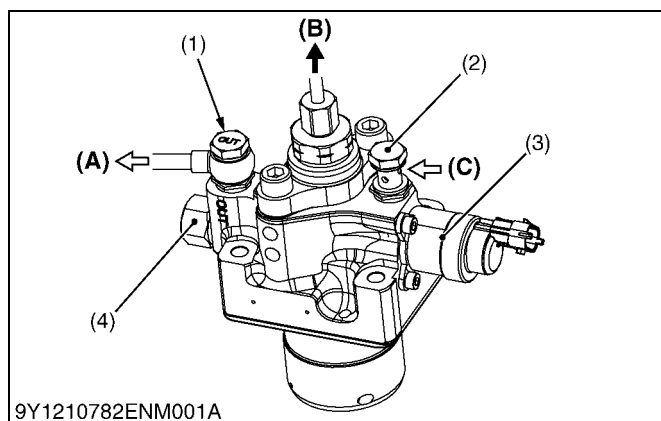
During the up stroke, the piston (4) is pushed up by the fuel cam (7) via the tappet (6) and push rod (12). As a result, the pressure in the inner chamber (8) rises, the suction side check valve (2) closes and the discharge side check valve (9) opens. On the other hand, the pressure in the outer chamber (11) is lowered so the suction side check valve (5) opens and discharge side check valve (10) closes.

During the down stroke, the piston is lowered by a piston spring (3) and the pressure in the inner chamber is lowered so the suction side check valve (2) opens and discharge side check valve (9) closes. On the other hand, the pressure in the outer chamber rises so the suction side check valve (5) closes and discharge side check valve (10) opens.

- |                              |                                 |
|------------------------------|---------------------------------|
| (1) Feed Pump                | (9) Discharge Side Check Valve  |
| (2) Suction Side Check Valve | (10) Discharge Side Check Valve |
| (3) Piston Spring            | (11) Outer Chamber              |
| (4) Piston                   | (12) Push Rod                   |
| (5) Suction Side Check Valve |                                 |
| (6) Tappet                   |                                 |
| (7) Fuel Cam                 |                                 |
| (8) Inner Chamber            |                                 |
- (A) Suction Side  
(B) Discharge Side  
[A] Up Stroke  
[B] Down Stroke

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## [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).

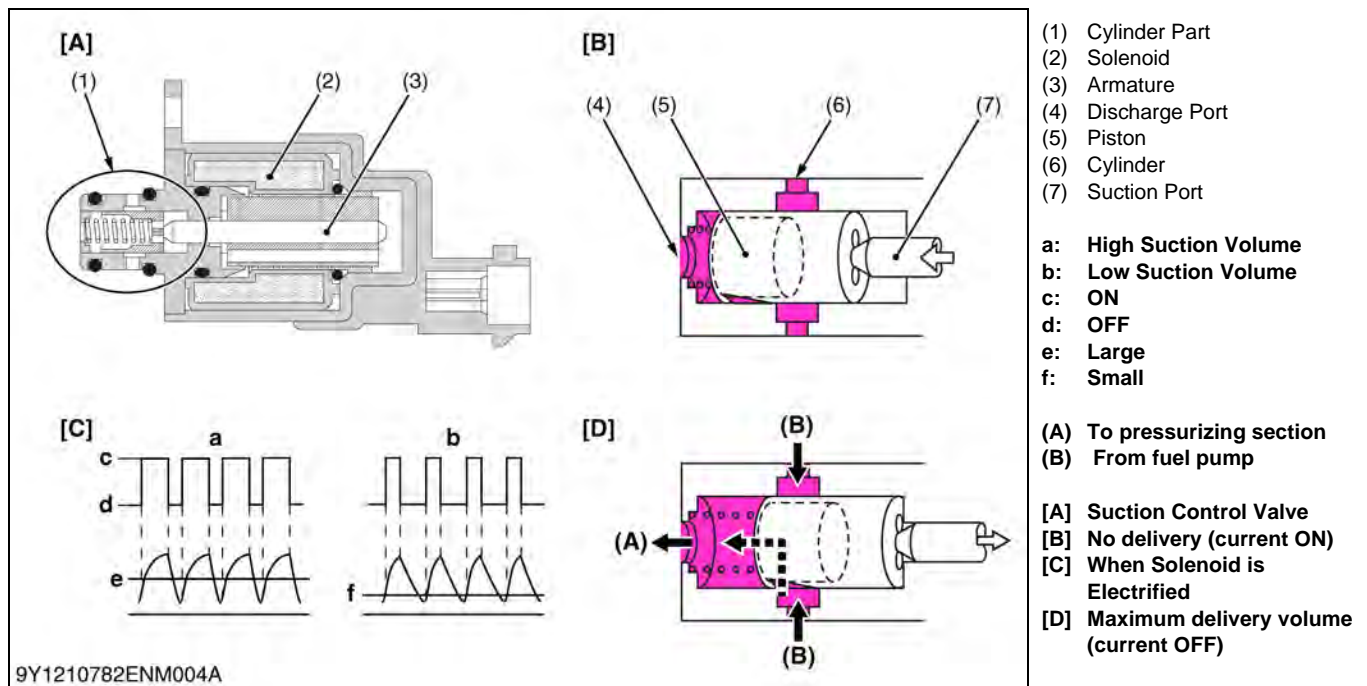
#### NOTE

- Rail pressure changes based on engine conditions.

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

- |                                 |                      |
|---------------------------------|----------------------|
| (1) Eye Bolt (out)              | (A) To fuel tank     |
| (2) Eye Bolt (in)               | (B) To rail          |
| (3) Suction Control Valve (SCV) | (C) From fuel filter |
| (4) Overflow Valve              |                      |
| (5) Zero Delivery Drain         |                      |
| (6) IO Valve                    |                      |

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**Suction Control Valve (SCV)**

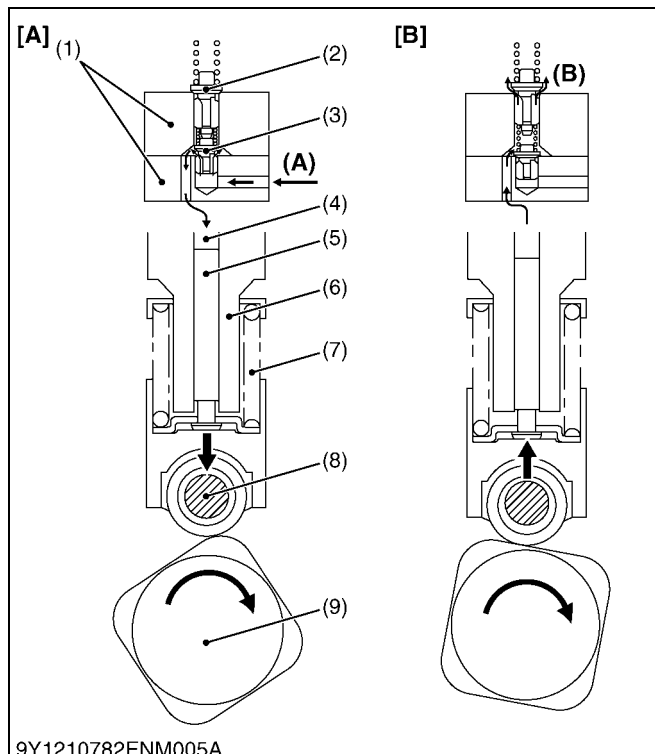
The suction control valve (SCV) is a proportional control valve that adjusts the amount of fuel delivered from the fuel pump to achieve the fuel pressure requested by the engine, has a function of delivering to the pressurizing part, and is made up of a piston (5), cylinder (6), armature (3), and solenoid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

- **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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**Pressurizing Part (Pump Body)**

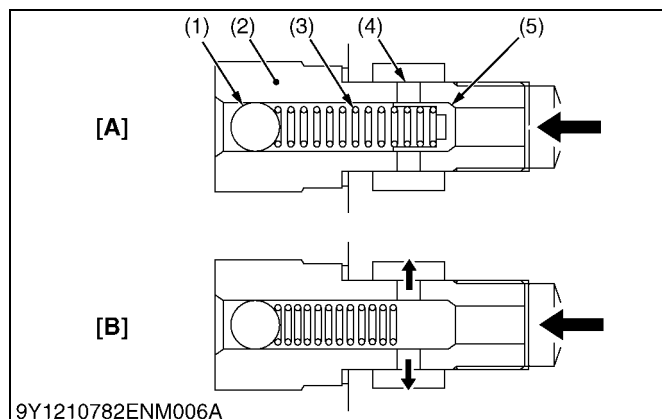
The pressurizing part (pump body) applies pressure to the fuel supplied from the suction control valve, has a function of supplying fuel to the rail, and is made up of an IO valve (1), plunger (5), plunger barrel (6), spring (7), tappet (8), and pump housing etc.

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        | (8) Tappet                     |
| (2) Outlet Valve    | (9) Fuel Camshaft              |
| (3) Inlet Valve     |                                |
| (4) Plunger Chamber | (A) From suction control valve |
| (5) Plunger         | (B) To rail                    |
| (6) Plunger Barrel  | [A] Suction Stroke             |
| (7) Spring          | [B] Compression Stroke         |

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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.

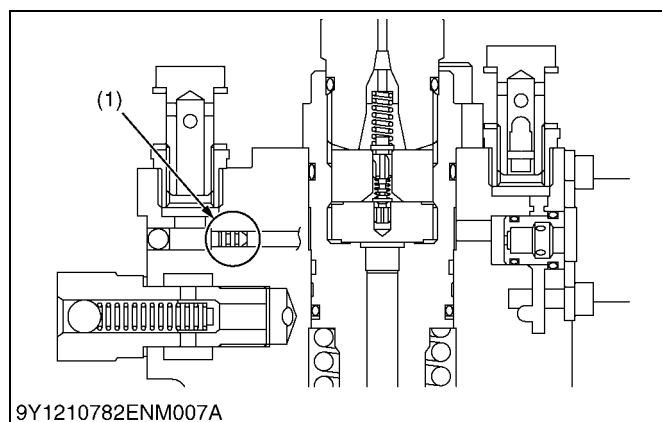
Therefore, the pressure in the suction control valve is stabilized and fuel flow is accurately adjusted.

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

[A] While Open

[B] While Closed

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### 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.

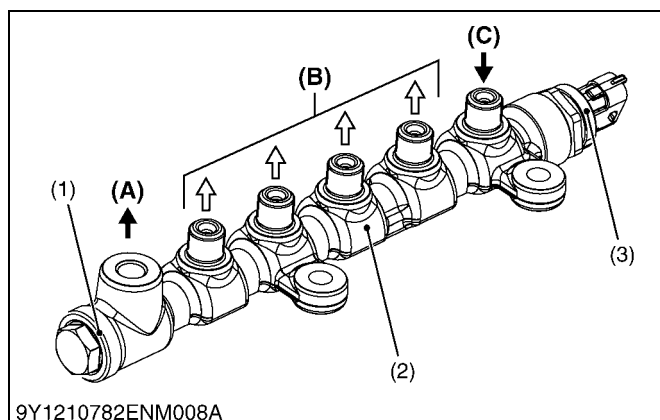
#### ■ NOTE

- 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

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### [3] RAIL



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

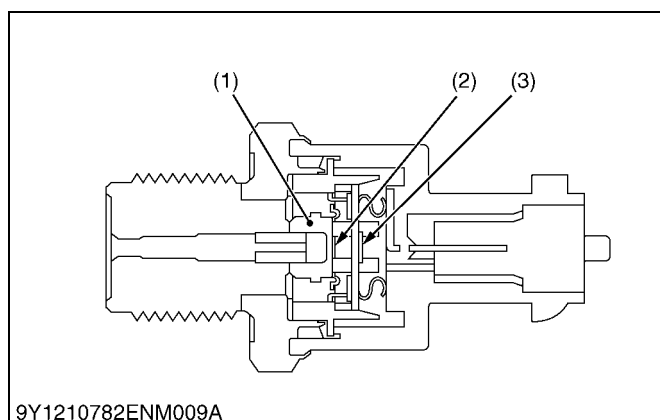
The pressure limiter operates when the pressure inside the rail becomes excessively high (valve opens), and then once the pressure drops to a certain pressure, it acts to keep the pressure (valve closes).

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

Valve opening pressure	Reference value	Approx. 170 MPa (1735 kgf/cm <sup>2</sup> , 24700 psi)
Valve closing pressure		Approx. 40 MPa (408 kgf/cm <sup>2</sup> , 5800 psi)

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

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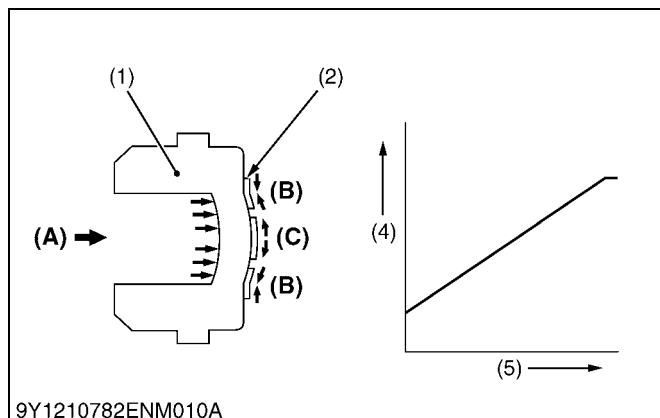
#### Rail Pressure Sensor

The rail pressure sensor is mounted on the rail, detects the fuel pressure inside the rail and 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 set 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.

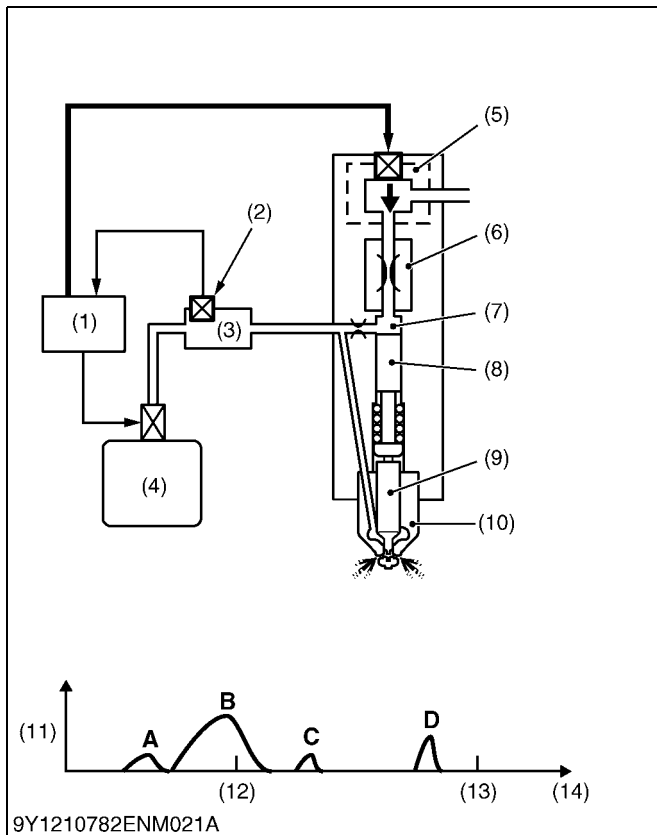


- (1) Metal Diaphragm (A) Fuel pressure  
 (2) Distortion Sensor Part (Metal Gauge) (B) Pressurization  
 (3) Signal Processing Circuit (C) Tensile  
 (4) Voltage  
 (5) Pressure

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## [4] INJECTOR



### General

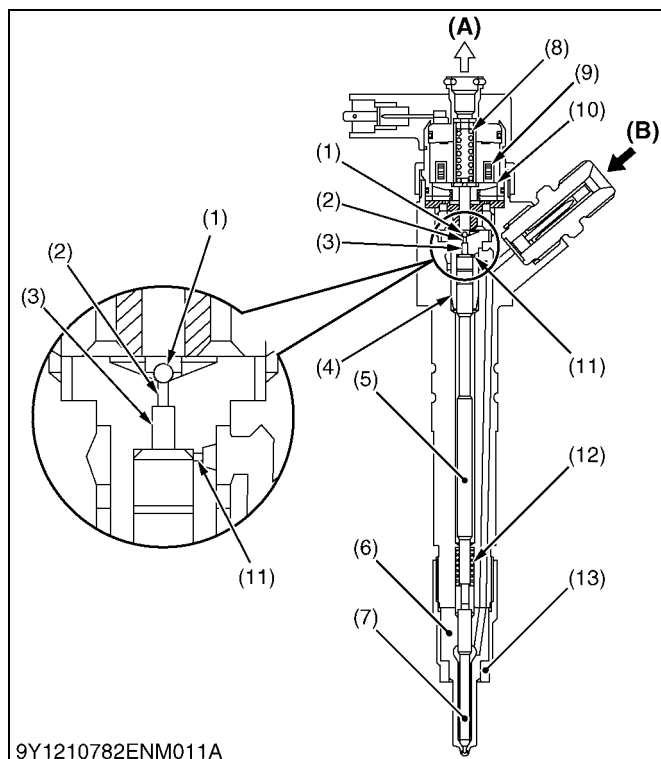
The injectors inject high-pressure fuel sent from the rail into the combustion chamber of the engine.

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 NO<sub>x</sub> (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                  | <b>A: Pre-injection</b>   |
| (2) Rail Pressure Sensor        | <b>B: Main Injection</b>  |
| (3) Rail                        | <b>C: After Injection</b> |
| (4) Supply Pump                 | <b>D: Post Injection</b>  |
| (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                |                           |

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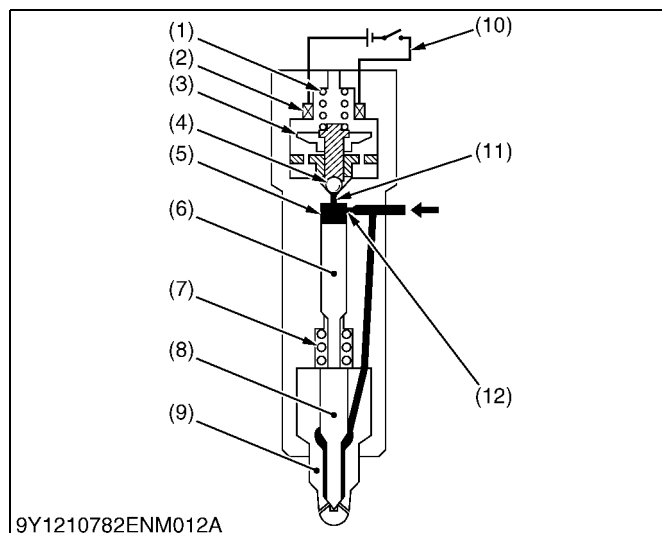
### Injector Structure

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        | (9) Solenoid             |
| (2) Discharge Orifice | (10) TWV (Two Way Valve) |
| (3) Control Chamber   | (11) Suction Orifice     |
| (4) Valve Body        | (12) Nozzle Spring       |
| (5) Command Piston    | (13) Nozzle Nut          |
| (6) Nozzle Body       |                          |
| (7) Needle Valve      |                          |
| (8) Valve Spring      |                          |
- (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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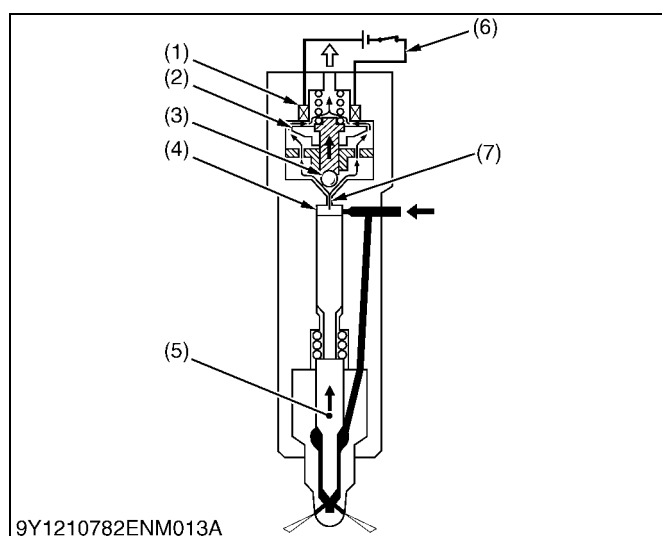
## Injector Operation

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

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### ■ Injection Start

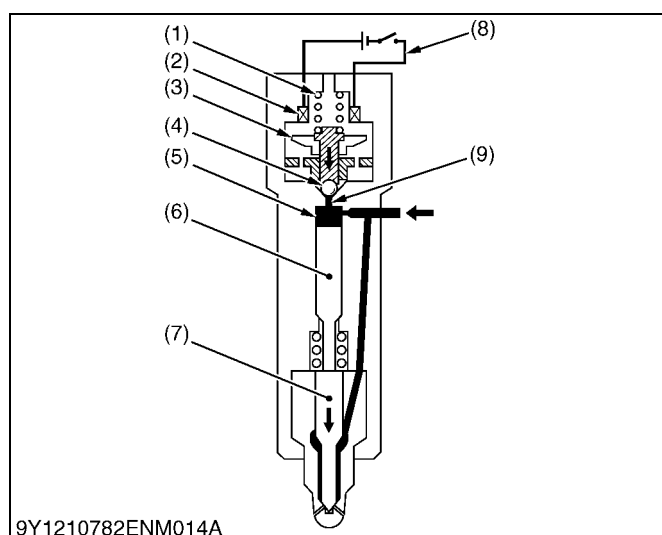
When the solenoid (1) is electrified by the drive circuit (6) the two way electromagnetic valve (2) is lifted by an electromagnetic force and the valve ball (3) is lifted by fuel pressure opening the discharge orifice (7). Here, fuel inside the control chamber (4) passes through the discharge orifice 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                      | (5) Needle Valve      |
| (2) Two Way Electromagnetic Valve | (6) Drive Circuit     |
| (3) Valve Ball                    | (7) Discharge Orifice |
| (4) Control Chamber               |                       |

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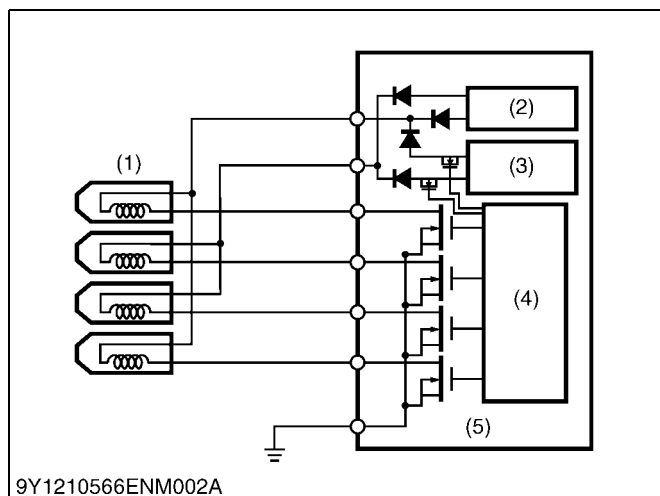


### ■ Injection Complete

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

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

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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.

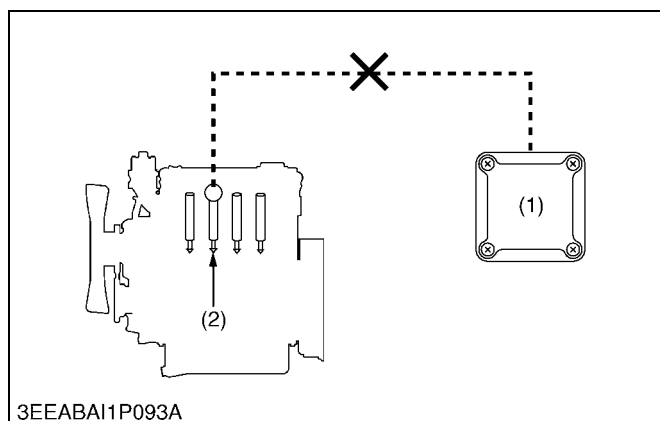
During manufacture, the QR code is read by a scanner and the correction value is registered in the ECU.

#### ■ 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

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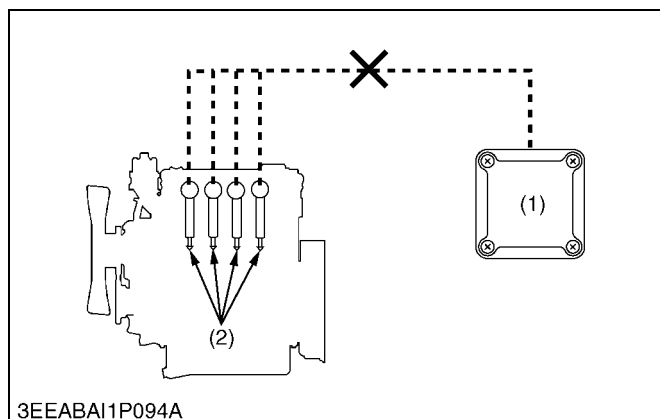


### When Replacing an Injector

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

- (1) Engine ECU      (2) Replacement Injector

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### When Replacing the Engine ECU

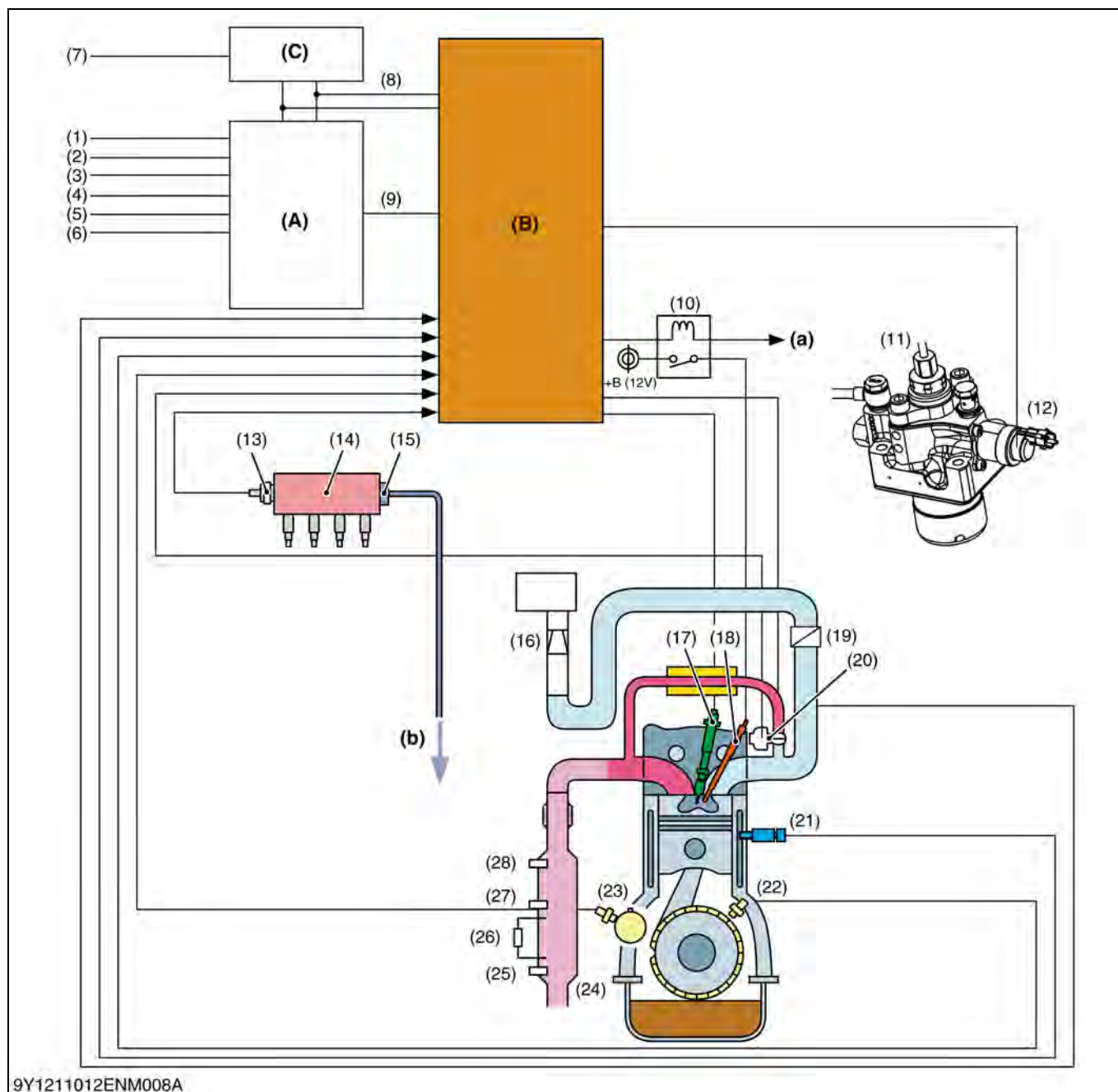
Register the ID codes of all of the injectors into the replacement engine ECU.

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

9Y1211012ENM0026US0

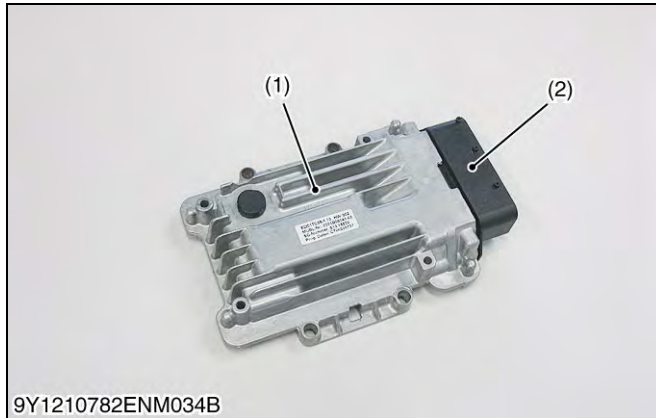
## [5] ENGINE CONTROL SYSTEM



- |                                  |  |  |                             |
|----------------------------------|--|--|-----------------------------|
| (1) Key Switch                   | (14) Rail  | (25) Temperature Sensor (DPF Outlet Exhaust Temperature) ( $T_2$ )           | <b>(A) Main ECU</b>         |
| (2) Acceleration Sensor          | (15) Rail Pressure Limiter   | (26) Differential Pressure Sensor (DPF Differential Pressure) ( $\Delta P$ ) | <b>(B) Engine ECU</b>       |
| (3) DPF INHIBIT Switch           | (16) Air Flow Sensor   | (27) Temperature Sensor (DPF Inlet Exhaust Temperature) ( $T_1$ )            | <b>(C) Instrument Panel</b> |
| (4) Parked Regeneration Switch   | (17) Injector  | (28) Temperature Sensor (DOC Inlet Exhaust Temperature) ( $T_0$ )            | <b>(a) From Main ECU</b>    |
| (5) Starter Relay                | (18) Glow Plug   |  | <b>(b) To Fuel Tank</b>     |
| (6) Parking Brake Switch         | (19) Intake Throttle Valve   |  |                             |
| (7) Oil Switch                   | (20) EGR Valve   |  |                             |
| (8) CAN Communication            | (21) Coolant Temperature Sensor  |  |                             |
| (9) OPC Signal                   | (22) Crankshaft Position Sensor  |  |                             |
| (10) Glow Relay                  | (23) Camshaft Position Sensor  |  |                             |
| (11) Supply Pump                 | (24) Diesel Particulate Filter (Hereinafter Referred As The "DPF") Muffler |  |                             |
| (12) SCV (Suction Control Valve) |  |  |                             |
| (13) Rail Pressure Sensor        |  |  |                             |

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## (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

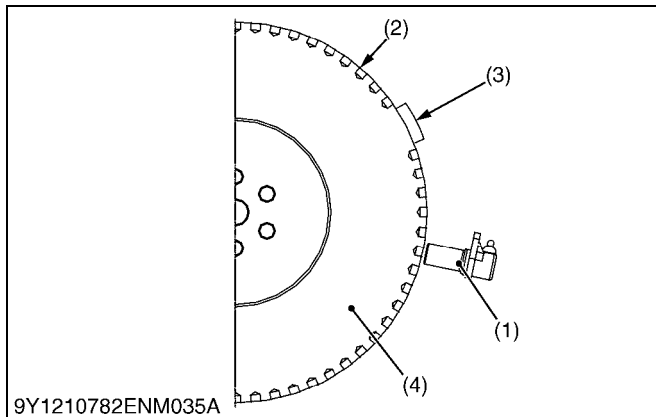
The ECU calculates the set fuel injection pressure based on the engine load (last injection amount and engine RPM) and controls the amount the supply pump supplies and the fuel pressure inside the rail.

(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.

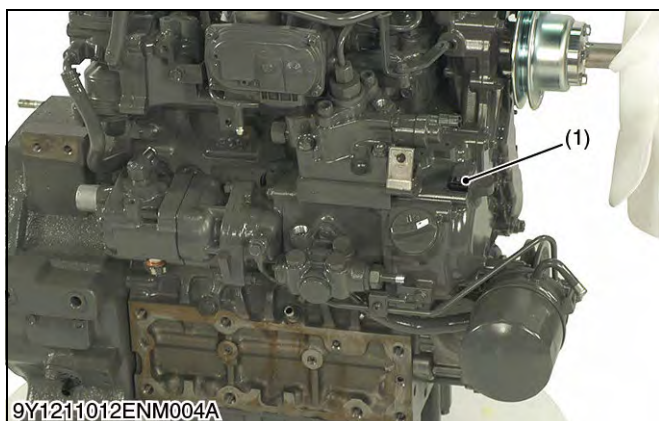
The engine ECU uses the signals to calculate the crank angle and engine speed.

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

9Y1211012ENM0029US0







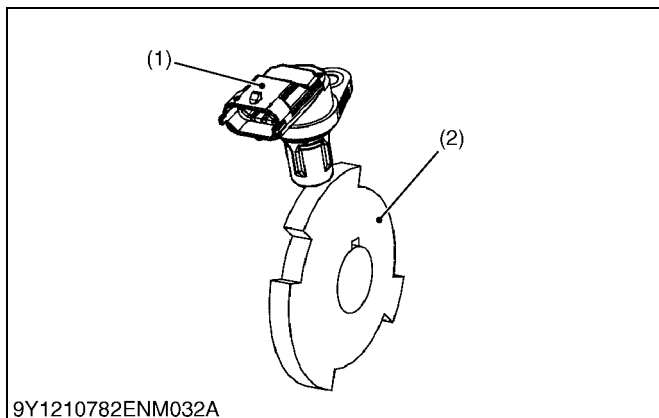
### Camshaft Position Sensor

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

9Y1211012ENM0030US0



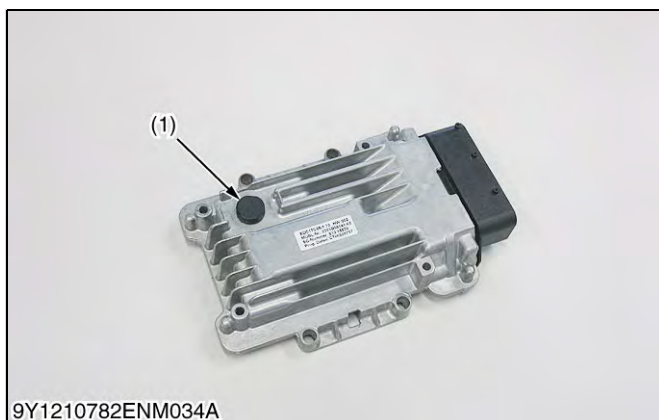
### Coolant Sensor

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.

- (1) Coolant Sensor

9Y1211012ENM0031US0



### 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

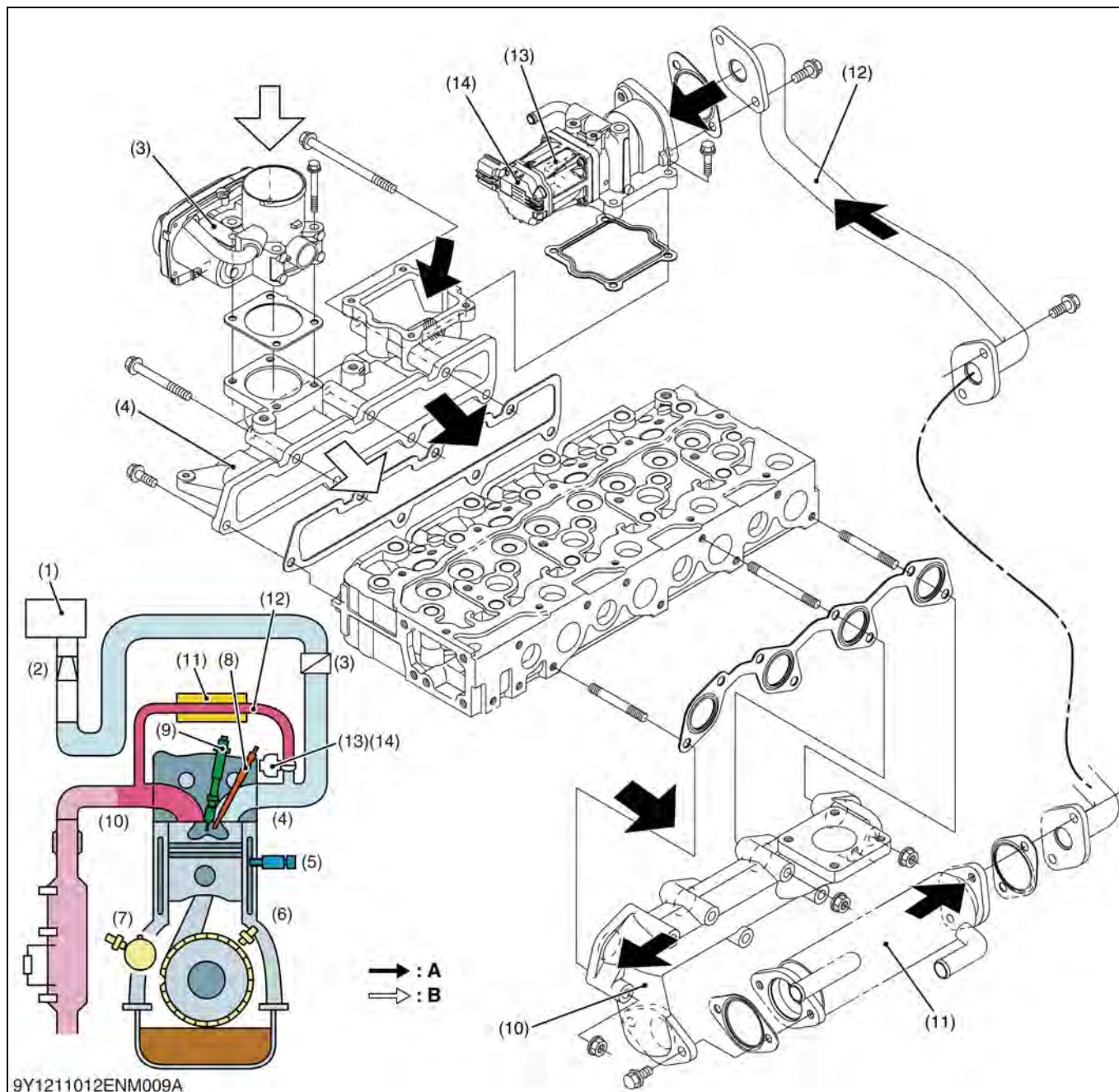
- Since the atmospheric pressure sensor has not been adopted as a part, replace the ECU assembly when the atmospheric pressure is needed to replace.

- (1) Atmosphere Pressure Sensor

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## 6. EGR SYSTEM

### [1] OVERVIEW



- |                                |                                |                      |
|--------------------------------|--------------------------------|----------------------|
| (1) Air Cleaner                | (6) Crankshaft Position Sensor | (11) EGR Cooler      |
| (2) Air Flow Sensor            | (7) Camshaft Position Sensor   | (12) EGR Pipe        |
| (3) Intake Throttle Valve      | (8) Glow Plug                  | (13) EGR Valve Motor |
| (4) Intake Manifold            | (9) Injector                   | (14) EGR LIFT Sensor |
| (5) Coolant Temperature Sensor | (10) Exhaust Manifold          |                      |

**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).

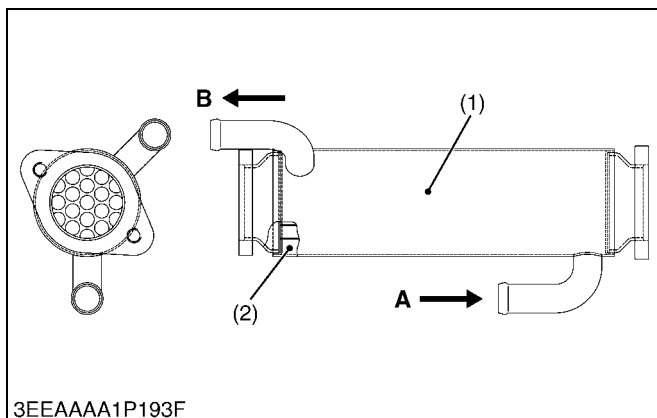
The EGR being used on this engine is electronic and is made up of an EGR cooler (11), EGR lift sensor (14), EGR valve motor (13).

The exhaust gas that is returned to the intake side (hereafter EGR gas) is cooled in the EGR cooler (11), adjusted to a suitable flow by an EGR valve motor that is controlled by the engine ECU, and is sent to the intake manifold (4).

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## [2] EGR COOLER



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 placed 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

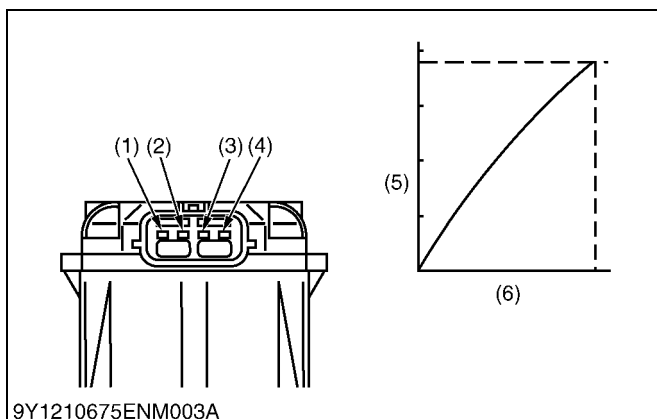


### Water Cooled EGR Valve

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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### 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.

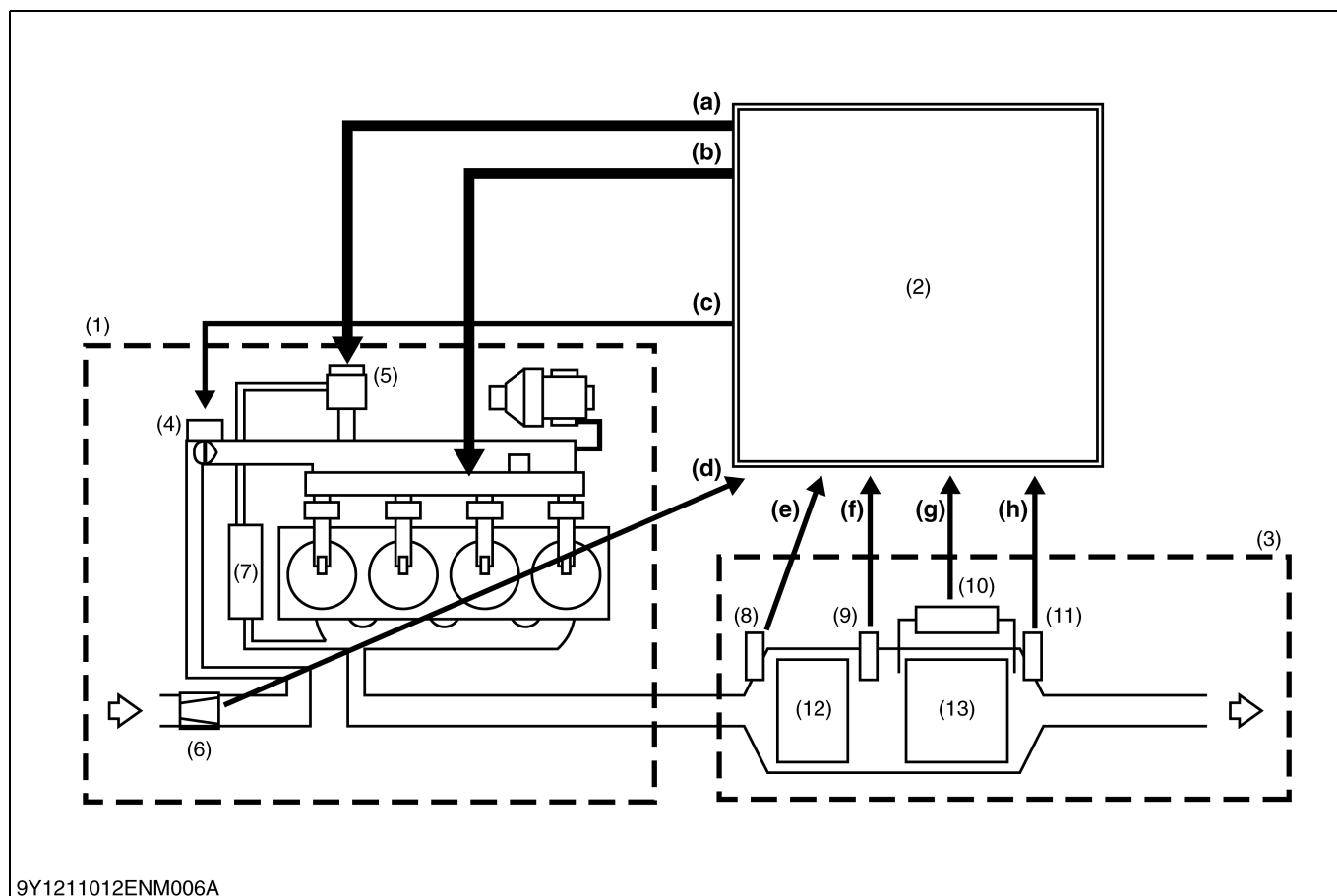
- (1) CAN H
- (2) CAN L
- (3) GND (-)

- (4) Power (+)
- (5) Exhaust Gas Flow
- (6) CAN Communication Data

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## 7. AFTER TREATMENT SYSTEM

### [1] AFTER TREATMENT DEVICES






9Y1211012ENM006A

- |                             |  |  |  |
|-----------------------------|--|--|--|
| (1) Common Rail System      | (8) Temperature Sensor (DOC Inlet Exhaust Temperature) ( $T_0$ )             | (11) Temperature Sensor (DPF Outlet Exhaust Temperature) ( $T_2$ ) | (a) EGR Valve Opening                      |
| (2) Engine ECU              | (9) Temperature Sensor (DPF Inlet Exhaust Temperature) ( $T_1$ )             | (12) Diesel Oxidation Catalyst (DOC)                               | (b) Injection Pattern                      |
| (3) After Treatment Devices | (10) Differential Pressure Sensor (DPF Differential Pressure) ( $\Delta P$ ) | (13) Diesel Particulate Filter (DPF)                               | (c) Inlet Throttle Valve Angle             |
| (4) Intake Throttle Valve   |  |  | (d) Air Flow Sensor Signal                 |
| (5) EGR Valve               |  |  | (e) $T_0$ (DOC Inlet Exhaust Temperature)  |
| (6) Air Flow Sensor         |  |  | (f) $T_1$ (DPF Inlet Exhaust Temperature)  |
| (7) EGR Cooler              |  |  | (g) $\Delta P$ (DPF Differential Pressure) |
|                             |  |  | (h) $T_2$ (DPF Outlet Exhaust Temperature) |

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


**Auto Mode**

Auto Mode	REGENER- ATION INDI- CATOR	PARKED REGENER- ATION INDI- CATOR	WARNING INDICATOR	Buzzer Interval	State
					
Level 0 (No need Regeneration)				Not sounding	Regeneration is not required
Level 1 (Auto Regeneration)	★			Not sounding	The regeneration cycle begins and continues until cycle is complete then the indicator will turn "OFF".
Level 2 (Request parked Regeneration)	★	★		every few seconds	The parked regeneration indicator start flashing, and the parked regeneration can also be started.
Level 3 (Parked Regeneration)		★	★	every 1 second	At this PM warning level, the Auto Regeneration Mode does not function. If the tractor is operated further, the regeneration cycle will be disabled. Output of tractor is restricted.
Level 4 (Regeneration with service tools)			●	every 1 second	Parked regeneration is impossible. Regeneration is possible with service tools only. (Service tools are available among all levels without level 5)
Level 5 (DPF Cleaning)			●	every 1 second	Regeneration is impossible even with service tools. DPF cleaning is necessary.

●: Lighting, ★: Flashing

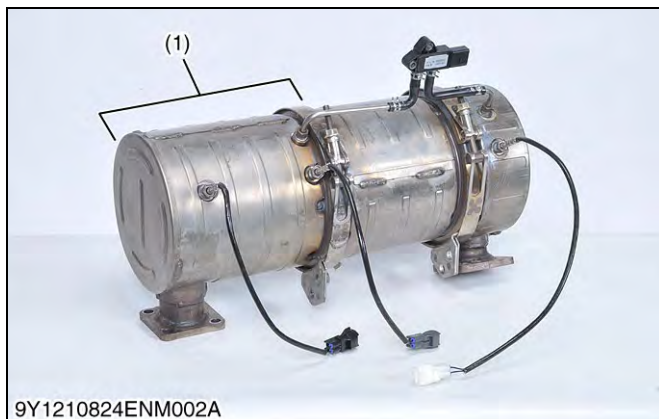
9Y1211012ENM0039US0

**Regeneration INHIBIT Mode**

INHIBIT Mode	REGENER- ATION INDI- CATOR	PARKED REGENER- ATION INDI- CATOR	WARNING INDICATOR	Buzzer Interval	State
					
Level 0 (No need Regeneration)				Not sounding	Regeneration is not required
Level 1 (Auto Regeneration)	★			Not sounding	A specific level of PM has built up in the DPF muffler.
Level 2 (Request parked Regeneration)	★	★		every few seconds	Move the tractor to a safe area, then do the Parked Regeneration.
Level 3 (Parked Regeneration)		★	★	every 1 second	Immediately stop working the tractor, move the tractor to a safe area, then do the Parked Regeneration. If the tractor is operated further and the operator ignores the warning signs, then regeneration will be disabled.
Level 4 (Regeneration with service tools)			●	every 1 second	Parked regeneration is impossible. Regeneration is possible with service tools only. (Service tools are available among all levels without level 5)
Level 5 (DPF Cleaning)			●	every 1 second	Regeneration is impossible even with service tools. DPF cleaning is necessary.

●: Lighting, ★: Flashing

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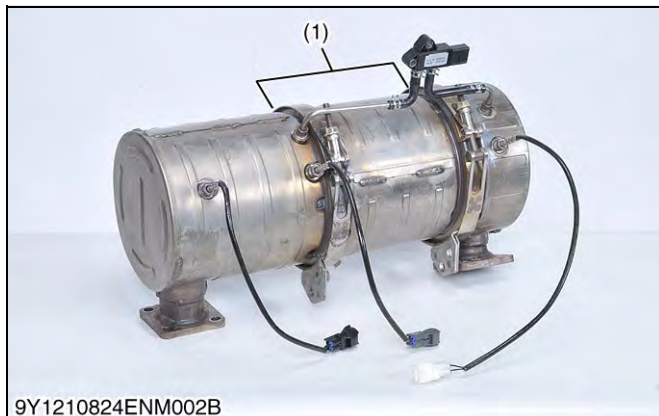


### **Diesel Oxidation Catalyst (DOC)**

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)

9Y1211012ENM0041US0



### **Diesel Particulate Filter (DPF)**

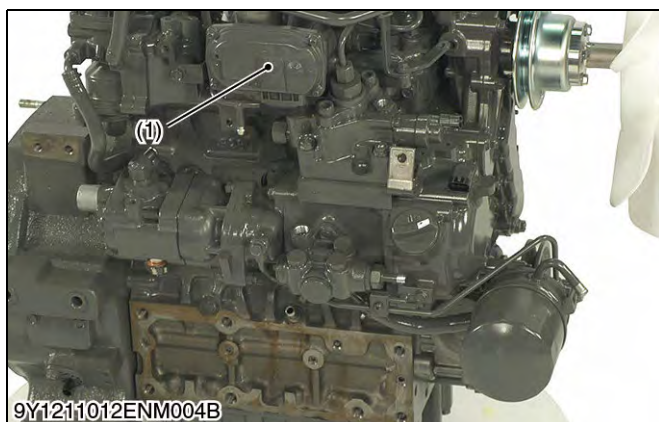
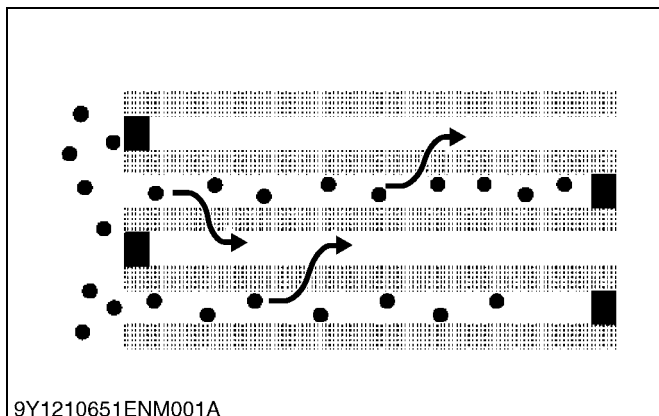
The Diesel Particulate Filter (DPF) is a device that captures and combusts PM in the exhaust gas.

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))

9Y1211012ENM0042US0



### **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

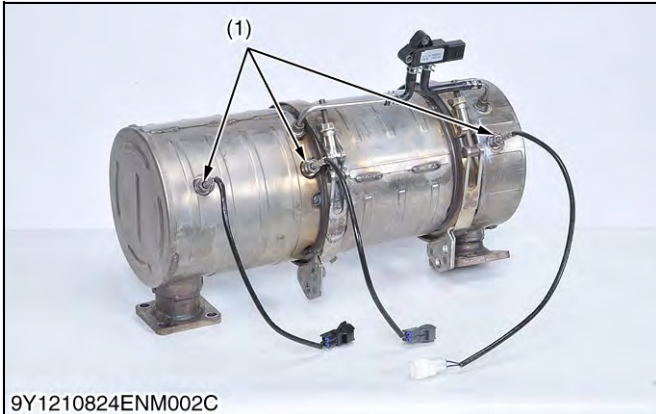
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### Air Flow Sensor

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

9Y1211012ENM0044US0

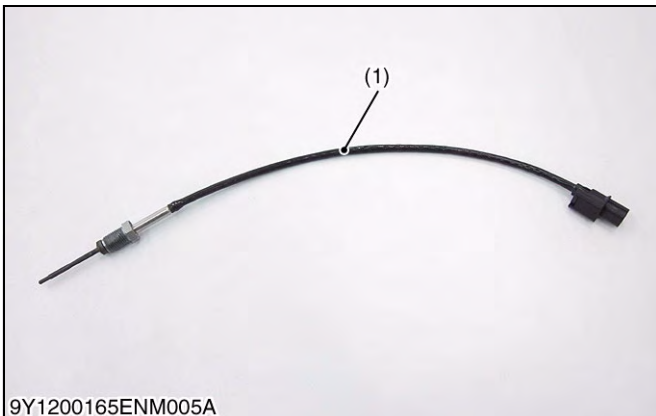


### Temperature Sensor

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

9Y1211012ENM0045US0



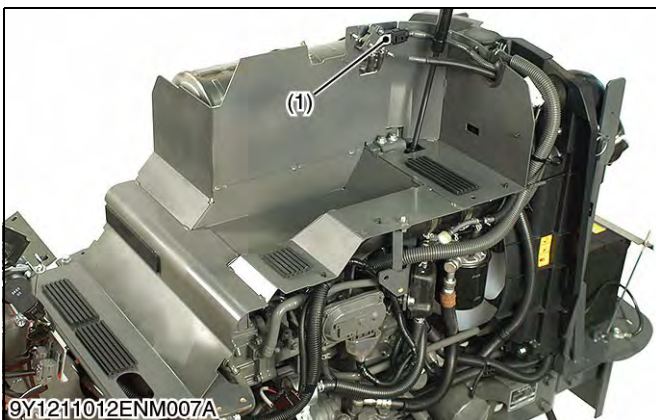
### Differential Pressure Sensor

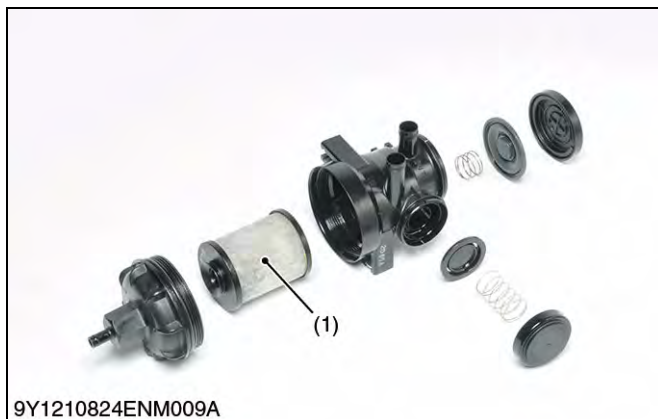
The differential pressure sensor is a sensor that detects the pressure differential between the inlet and the outlet of the DPF.

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

(1) Differential Pressure Sensor

9Y1211012ENM0046US0





### **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.

(1) Element

9Y1211012ENM0047US0

# SERVICING

## CONTENTS

1. TROUBLESHOOTING.....	1-S1
2. SERVICING SPECIFICATIONS .....	1-S4
3. TIGHTENING TORQUES.....	1-S9
4. CHECKING AND ADJUSTING .....	1-S11
[1] ENGINE BODY .....	1-S11
[2] LUBRICATING SYSTEM.....	1-S13
[3] COOLING SYSTEM .....	1-S13
[4] PCV VALVE.....	1-S16
[5] EGR COOLER.....	1-S16
[6] ACCELERATION SENSOR .....	1-S17
5. PREPARATION .....	1-S18
[1] SEPARATING DPF MUFFLER FROM TRACTOR .....	1-S18
[2] SEPARATING ENGINE FROM CLUTCH HOUSING.....	1-S24
[3] SEPARATING ENGINE FROM FRONT AXLE FRAME.....	1-S36
6. DISASSEMBLING AND ASSEMBLING .....	1-S40
[1] OUTER PARTS .....	1-S40
[2] EGR.....	1-S40
[3] COMMON RAIL .....	1-S41
[4] CYLINDER HEAD AND VALVES .....	1-S43
[5] THERMOSTAT .....	1-S48
[6] SUPPLY PUMP .....	1-S49
[7] WATER PUMP AND OIL COOLER.....	1-S50
[8] GEAR CASE AND TIMING GEAR .....	1-S51
[9] PISTON AND CONNECTING ROD .....	1-S54
[10] FLYWHEEL AND CRANKSHAFT .....	1-S57
7. SERVICING .....	1-S63
[1] CYLINDER HEAD AND VALVES .....	1-S63
[2] TIMING GEARS .....	1-S69
[3] PISTON AND CONNECTING ROD .....	1-S72
[4] CRANKSHAFT .....	1-S74
[5] CYLINDER .....	1-S79
[6] OIL PUMP .....	1-S80

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>Engine Does Not Start</b>	No fuel	Fill fuel	G-21, G-50
	Air in the fuel system	Bleed	G-46, G-74
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel pipe clogged	Clean	–
	Fuel filter clogged	Replace	G-39, G-66
	Excessively high viscosity of fuel at low temperature	Use the specified fuel	G-10, G-11
	Fuel with low cetane number	Use the specified fuel	G-10, G-11
	Fuel leak due to loose injection pipe retaining nut	Tighten nut	1-S41
	Injector stuck or clogged	Replace	1-S44
	Fuel supply pump malfunctioning	Replace	1-S49
	Seizure of crankshaft, camshaft, piston or bearing	Repair or replace	1-S52, 1-S55, 1-S61
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and injector	1-S43, 1-S44, 1-S46
	Improper valve timing	Correct or replace timing gear	1-S52, 1-S52
	Piston ring and cylinder worn out	Replace	1-S56, 1-S79
	Incorrect valve clearance	Adjust	1-S12
<b>Starter Does Not Operate</b>	Battery discharged	Charge	G-33, G-61
	Starter malfunctioning	Repair or replace	9-S29, 9-S59
	Key switch malfunctioning	Repair or replace	9-S26
	Safety switches improperly adjusted or damaged	Adjust or replace	9-S27
	Starter relay damaged	Replace	9-S30
	Wiring disconnected	Connect	–
<b>Engine Revolution Is Not Smooth</b>	Fuel filter clogged or dirty	Change	G-39, G-66
	Air cleaner clogged	Clean or change	G-29, G-58
	Fuel leak due to loose injection pipe retaining nut	Tighten nut	1-S41
	Fuel supply pump malfunctioning	Replace	1-S49
	Injector stuck or clogged	Replace	1-S44
<b>Either White or Blue Exhaust Gas Is Observed</b>	Excessive engine oil	Reduce to the specified level	G-36, G-64
	Piston ring and cylinder worn or stuck	Repair or replace	1-S56, 1-S79



Symptom	Probable Cause	Solution	Reference Page
<b>Either Black or Dark Gray Exhaust Gas Is Observed</b>	Overload	Decrease the load	–
	Low grade fuel used	Use the specified fuel	G-10, G-11
	Fuel filter clogged	Change	G-39, G-66
	Air cleaner clogged	Clean or change	G-29, G-58
	Injector damaged	Replace	1-S44
<b>Deficient Output</b>	Engine's moving parts stuck	Repair or replace	–
	Supply pump damaged	Replace	1-S49
	Injector damaged	Replace	1-S44
	Compression leak	Check compression pressure and repair	1-S11
	Air cleaner clogged	Clean or replace element	G-29, G-58
	Breather hose or CCV clogged due to ice	Melt the ice in the breather hose or CCV, or Replace	1-S16, 1-S36
<b>Excessive Lubricant Oil Consumption</b>	Piston ring's gap points in the same direction	Shift ring gap direction	1-S56
	Oil ring worn or stuck	Replace	1-S56
	Piston ring groove worn out	Replace piston and piston ring	1-S55, 1-S56, 1-S74
	Valve stem and guide worn out	Replace	1-S64
	Crankshaft bearing and crankpin bearing are worn out	Replace	1-S75
<b>Fuel Mixed Into Lubricant Oil</b>	Injector damaged	Replace	1-S44
	Oil dilution due to regeneration	Change engine oil	G-36, G-64
<b>Water Mixed Into Lubricant Oil</b>	Head gasket damaged	Replace	1-S46
	Cylinder block or cylinder head flawed	Replace	1-S46
<b>Low Oil Pressure</b>	Engine oil insufficient	Fill	G-36, G-64
	Oil strainer clogged	Clean	1-S54
	Relief valve stuck with dirt	Repair or replace	–
	Excessive oil clearance of the bearings	Replace the metal, bushing or shaft	1-S75, 1-S76, 1-S76
	Oil passage clogged	Clean	–
	Different type of oil	Use the specified type of oil	G-10, G-11
	Oil Pump damaged	Replace	1-S53
<b>High Oil Pressure</b>	Difference type oil	Use the specified type of oil	G-10, G-11
	Relief valve damaged	Repair or replace	–
	Breather hose or CCV clogged due to ice	Melt the ice in the breather hose or CCV, or Replace	1-S16, 1-S36

Symptom	Probable Cause	Solution	Reference Page
<b>Engine Overheated</b>	Engine oil insufficient	Fill oil prescribed level	G-36, G-64
	Fan belt broken or elongated	Change or adjust	1-S13
	Coolant insufficient	Fill oil prescribed level	1-S24
	Radiator net and radiator fin clogged with dust	Clean	G-24, G-52
	Inside of radiator corroded	Clean or replace	–
	Coolant flow route corroded	Clean or replace	–
	Radiator or radiator cap damaged	Replace	1-S14
	Overload	Reduce the load	–
	Head gasket damaged	Replace	1-S46
	Unsuitable fuel used	Use the specified fuel	G-10, G-11

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## 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 <sup>-1</sup> (rpm) 30.0 to 33.0 kgf/cm <sup>2</sup> / 290 min <sup>-1</sup> (rpm) 427 to 469 psi / 290 min <sup>-1</sup> (rpm)	2.35 MPa / 290 min <sup>-1</sup> (rpm) 24.0 kgf/cm <sup>2</sup> / 290 min <sup>-1</sup> (rpm) 341 psi / 290 min <sup>-1</sup> (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	Height (Intake / Exhaust)	33.90 mm 1.335 in.	33.85 mm 1.333 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	Clearance	0.050 to 0.090 mm 0.0020 to 0.0035 in.	0.20 mm 0.0079 in.
Second Ring to Ring Groove	Clearance	0.0780 to 0.110 mm 0.00307 to 0.00433 in.	0.20 mm 0.0079 in.
Oil Ring to Ring Groove	Clearance	0.030 to 0.070 mm 0.0012 to 0.0027 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	Ring Gap	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.

Item		Factory Specification	Allowable Limit
Oil Ring	Ring Gap	0.20 to 0.40 mm 0.0079 to 0.015 in.	1.25 mm 0.0492 in.
Connecting Rod	Alignment	–	0.05 mm 0.002 in.
Piston Pin to Small End Bushing	Oil Clearance	0.014 to 0.036 mm 0.00056 to 0.0014 in.	0.15 mm 0.0059 in.
	• Piston Pin O.D.	25.004 to 25.011 mm 0.98441 to 0.98468 in.	–
	• Small End Bushing I.D.	25.025 to 25.040 mm 0.98524 to 0.98582 in.	–
Crankshaft	Bend	–	0.03 mm 0.0001 in.
Crankshaft Journal to Crankshaft Bearing 1	Oil Clearance	0.0400 to 0.118 mm 0.00158 to 0.00464 in.	0.20 mm 0.0079 in.
	• Crankshaft Journal O.D.	59.921 to 59.940 mm 2.3591 to 2.3598 in.	–
	• Crankshaft Bearing 1 I.D.	59.980 to 60.039 mm 2.3615 to 2.3637 in.	–
Replacement of Crankshaft Bearing 1	Dimension	3.90 to 4.10 mm 0.154 to 0.161 in.	–
Crankshaft Journal to Crankshaft Bearing 2	Oil Clearance	0.0400 to 0.104 mm 0.00158 to 0.00409 in.	0.20 mm 0.0079 in.
	• Crankshaft Journal O.D.	59.921 to 59.940 mm 2.3591 to 2.3598 in.	–
	• Crankshaft Bearing 2 I.D.	59.980 to 60.025 mm 2.3615 to 2.3631 in.	–
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	I.D.	87.000 to 87.022 mm 3.4252 to 3.4260 in.	87.170 mm 3.4319 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 <sup>2</sup> 14 psi	50 kPa 0.5 kgf/cm <sup>2</sup> 7 psi
	At Rated Speed	300 to 440 kPa 3.0 to 4.5 kgf/cm <sup>2</sup> 43 to 64 psi	250 kPa 2.5 kgf/cm <sup>2</sup> 36 psi
Engine Oil Pressure Switch	Working Pressure	50 kPa 0.5 kgf/cm <sup>2</sup> 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 [L3301/L3901]	Tension	7 to 9 mm (0.28 to 0.35 in.) deflection at 98 N (10 kgf, 22 lbf) of force	—
Fan Belt [L4701]	Tension	12 mm (0.48 in.) deflection at 68 N (7 kgf, 15.4 lbs) of force	—
Thermostat Valve	Opening-Temperature (When the valve starts to open)	80.5 to 83.5 °C 167.9 to 182.3 °F	—
	Opening-Temperature (When the valve opened completely)	95 °C 203 °F	—
Radiator	Water Tightness	No leak at 137 kPa 1.4 kgf/cm <sup>2</sup> 20 psi	—
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 <sup>2</sup> from 10 to 9 psi	—

**ELECTRICAL SYSTEM**

Item		Factory Specification	Allowable Limit
Acceleration Wire	Clearance	1 to 3 mm 0.04 to 0.1 in.	—

### 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-13.)

#### [Tractor]

Item	N·m	kgf·m	lbf·ft
Acceleration wire adjusting nut	12 to 13	1.2 to 1.4	8.7 to 10
Exhaust pipe mount bolt	29.4 to 34.3	3.0 to 3.5	22 to 25
Flange mount bolt and nut	49.0 to 55.9	5.0 to 5.7	37 to 41
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
Steering wheel mounting nut	48 to 55	4.9 to 5.7	36 to 41
Oil cooler return pipe bolt	92 to 101	9.0 to 10.0	6.7 to 7.3
Delivery pipe joint screw	49 to 69	5.0 to 7.0	37 to 50

#### [L3301/L3901]

Item	N·m	kgf·m	lbf·ft
Steering shaft universal joint bolt	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2
Steering bearing flange bolt	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2
Front Axle Frame Mounting Bolt (M10)	77.5 to 90.2	7.9 to 9.2	58 to 66

#### [L4701]

Item	N·m	kgf·m	lbf·ft
Front Axle Frame Mounting Bolt (M10)	60.8 to 70.6	6.2 to 7.2	45 to 52
Front Axle Frame Mounting Bolt (M12)	103.0 to 117.7	10.5 to 12.0	76 to 86



**[ENGINE]**

Item	Dimension × Pitch	N·m	kgf·m	lbf·ft
B terminal nut of starter	M8 × 1.25	5.9 to 11	0.60 to 1.2	4.4 to 8.6
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
Oil pressure switch screw	R 1/8	15 to 19	1.5 to 2.0	11 to 14
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
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 screw	—	24 to 27	2.4 to 2.8	18 to 20
Injection pipe cap nut	M12 × 1.5	24.5 to 29.4	2.5 to 3.0	18.1 to 21.6
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
Supply pump mounting nut	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Injection pipe retaining nut	—	24.5 to 29.4	2.5 to 3.0	18.1 to 21.6
Oil cooler joint screw	M20 × 1.5	40 to 44	4.0 to 4.5	29 to 32
Mounting nut of fan drive pulley	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
Camshaft set bolt	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
Mounting screw of bearing case cover	M8 × 1.25	24 to 27	2.4 to 2.8	18 to 20
Screw 2 of main bearing case	M10 × 1.25	69 to 73	7.0 to 7.5	51 to 54
Screw 1 of main bearing case	M9 × 1.25	46 to 50	4.7 to 5.2	34 to 37

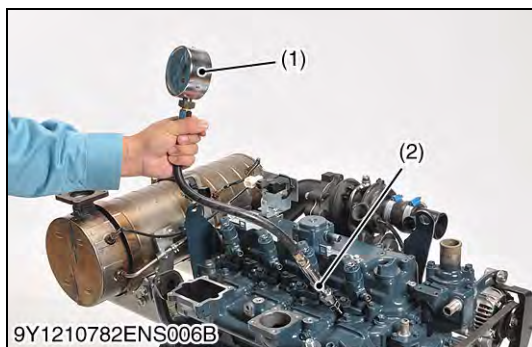
**■ NOTE**

- 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.

9Y1211012ENS0003US0

## 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<sup>-1</sup> (rpm).
4. Measure a maximum value of the compression pressure. Do the same steps for each cylinder.

#### ■ **NOTE**

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

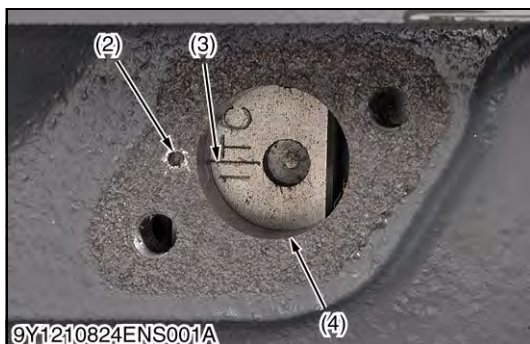
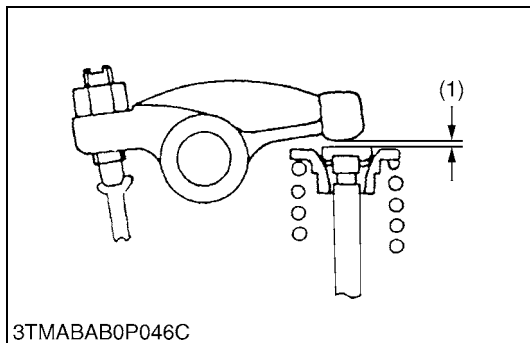
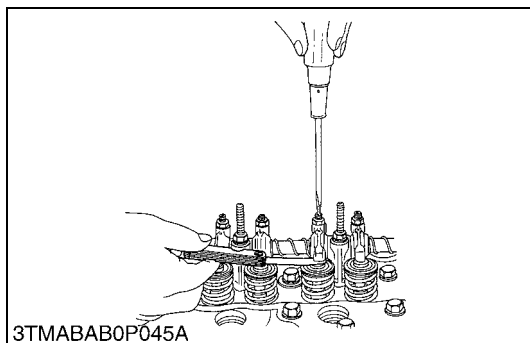
Compression pressure	Factory specification	2.95 to 3.23 MPa 30.0 to 33.0 kgf/cm <sup>2</sup> 427 to 469 psi
	Allowable limit	2.35 MPa 24.0 kgf/cm <sup>2</sup> 341 psi

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

9Y1211012ENS0004US0



## Valve Clearance

### ■ IMPORTANT

- You must check and adjust the valve clearance when the engine is cold.**
- Remove the head cover.
  - 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.
  - Check the subsequent valve clearance (1) at the mark "☆" with a feeler gauge.
  - 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.
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### ■ 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 with the timing mark (2) correctly. Adjust all the other valve clearance if necessary.
- After you turn the flywheel counterclockwise 2 or 3 times, check the valve clearance (1) again.
- After you adjust the valve clearance (1), tighten the lock nut of the adjusting screw.

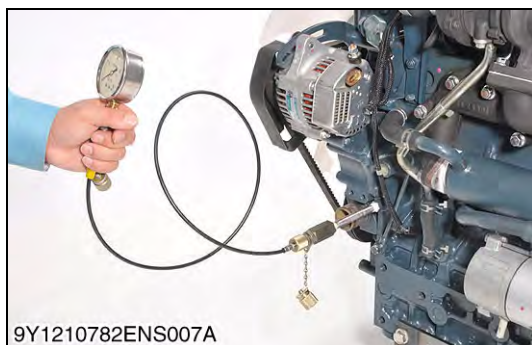
Adjustable Cylinder Location of Piston		Valve Arrangement			
		3 Cylinder		4 Cylinder	
		IN.	EX.	IN.	EX.
When No. 1 piston is at compression top dead center	No. 1	☆	☆	☆	☆
	No. 2		☆	☆	
	No. 3	☆			☆
	No. 4	—	—		
When No. 1 piston is at overlap position	No. 1				
	No. 2	☆			☆
	No. 3		☆	☆	
	No. 4	—	—	☆	☆

- (1) Valve Clearance  
(2) Timing Mark

- (3) 1TC Mark Line  
(4) Timing Window

9Y1211012ENS0005US0

## [2] LUBRICATING SYSTEM



### 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 <sup>2</sup> 14 psi
		Allowable limit	50 kPa 0.5 kgf/cm <sup>2</sup> 7 psi
	At rated speed	Factory specification	300 to 440 kPa 3.0 to 4.5 kgf/cm <sup>2</sup> 43 to 64 psi
		Allowable limit	250 kPa 2.5 kgf/cm <sup>2</sup> 36 psi

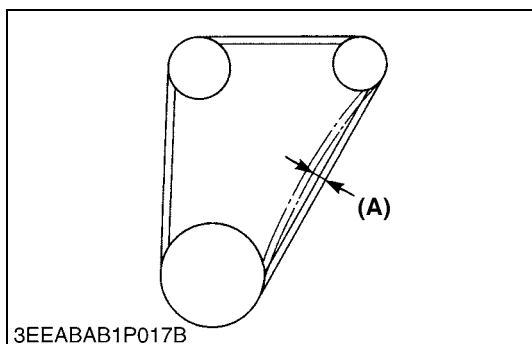
### (When reassembling)

- After you check 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



### 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.

Moderate Pressure:

### [L3301/L3901]

- 98 N (10 kgf, 22 lbs)

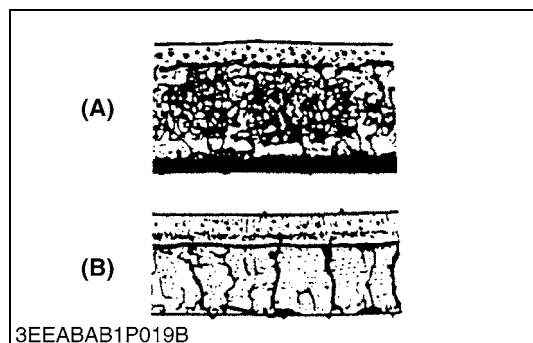
### [L4701]

- 68 N (7 kgf, 15.4 lbs)

Deflection (A)	Factory specification	L3301/L3901	7 to 9 mm 0.28 to 0.35 in.
		L4701	12 mm 0.48 in.

(A) Deflection

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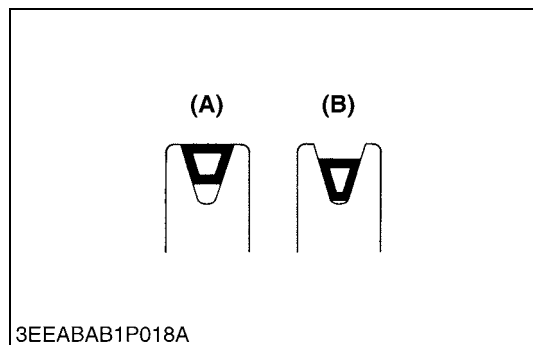
### Fan Belt Damage and Wear

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

(A) Good

(B) Bad

9Y1211012ENS0008US0



### 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<sup>2</sup>, 10 psi).
3. Measure the time for the pressure to decrease to 60 kPa (0.6 kgf/cm<sup>2</sup>, 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 <sup>2</sup> , from 10 to 9 psi)
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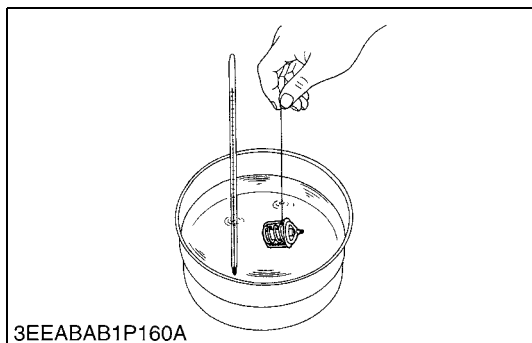


### Radiator Water Leakage

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. Check 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 <sup>2</sup> 20 psi
-----------------------------	-----------------------	---

9Y1211012ENS0010US0



### **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		95 °C 203 °F

9Y1211012ENS0011US0

[4] 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.

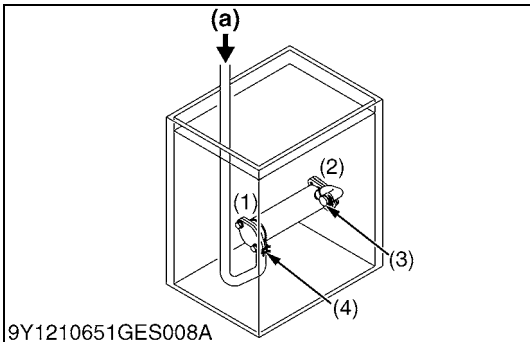
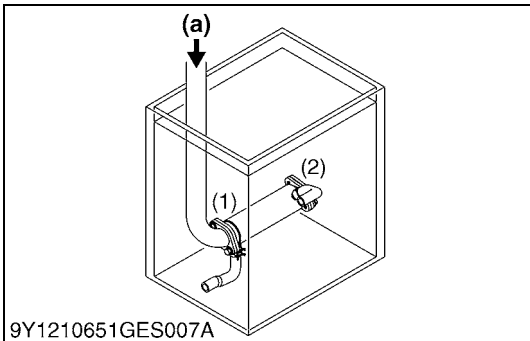
■ **NOTE**

- 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

9Y1211012ENS0012US0

[5] 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<sup>2</sup>, 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<sup>2</sup>, 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	300 kPa 3.0 kgf/cm <sup>2</sup> 43 psi
		Coolant passage	250 kPa 2.5 kgf/cm <sup>2</sup> 36 psi

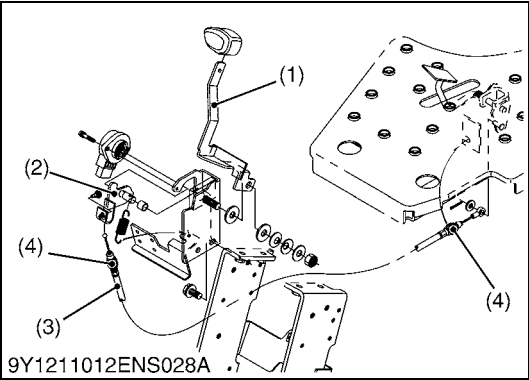
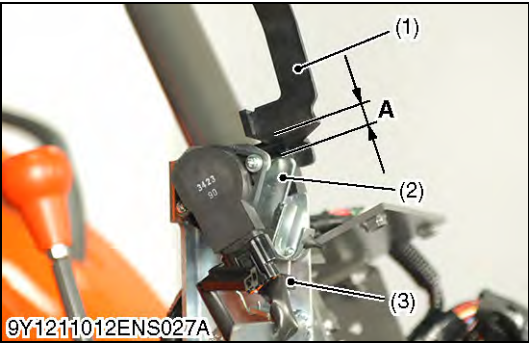
- (1) Exhaust Gas Inlet
- (2) Exhaust Gas Outlet
- (3) Coolant Outlet
- (4) Coolant Inlet

**(a) Air Pressure**

9Y1211012ENS0013US0



[6] ACCELERATION SENSOR



Acceleration Sensor Wire Adjustment

- 1. Turn the key switch to **OFF** position and stop the engine.
- 2. Set the acceleration lever (1) to **MAX** rpm position.
- 3. Measure the clearance "A" between acceleration lever (1) and the sensor lever (2).
- 4. If measurement is not within factory specification, adjust the adjusting nut (4).

NOTE

- If adjusting the acceleration sensor wire, be sure to perform mode "c" adjustment (See page 9-S14).

Clearance "A"	Factory specification	1 to 3 mm 0.04 to 0.1 in.
---------------	-----------------------	------------------------------

(When reassembling)

Tightening torque	Acceleration wire adjusting nut	12 to 13 N·m 1.2 to 1.4 kgf·m 8.7 to 10 lbf·ft
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- (1) Acceleration Lever

(2) Sensor Lever
- (3) Acceleration Wire

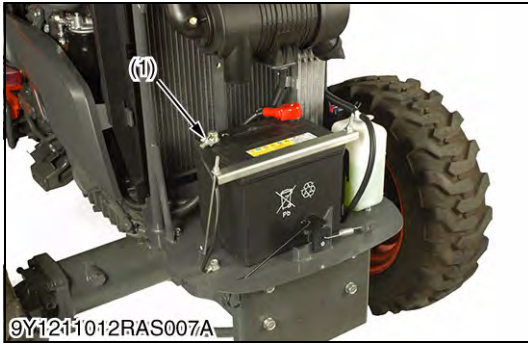
(4) Adjusting Nut

9Y1211012ENS0113US0



## 5. PREPARATION

### [1] SEPARATING DPF MUFFLER FROM TRACTOR

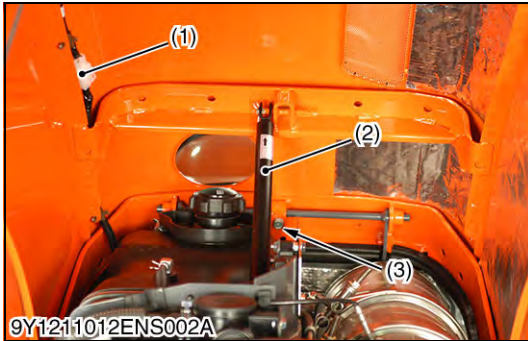


#### Battery Negative Cable Connector

1. Open bonnet.
2. Disconnect battery negative cable connector (1).

(1) Battery Negative Cable Connector

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#### Bonnet and Side Covers

1. Disconnect the headlight connector (1).
2. Remove the damper (2) from the bonnet.
3. Disconnect the bolt (3) from the bonnet.
4. Remove the bonnet (4).
5. Remove the R.H. and L.H. side covers (5).

(1) Headlight Connector

(4) Bonnet

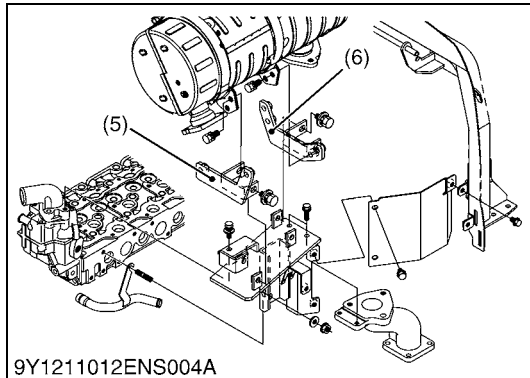
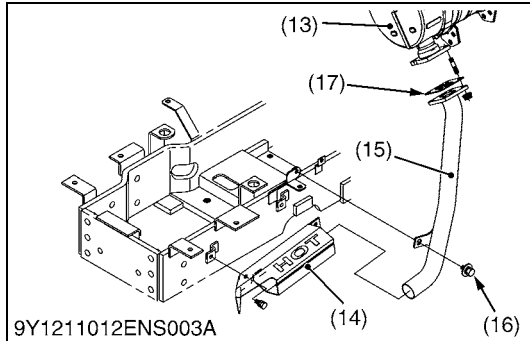
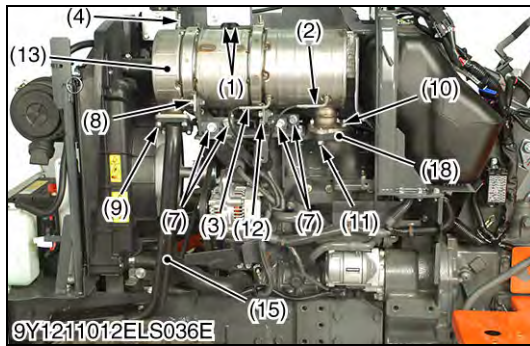
(2) Damper

(5) Side Cover

(3) Bolt

9Y1211012ENS0014US0





### DPF Muffler

1. Disconnect connectors for differential pressure sensor (1) and DPF temperature sensors (2), (3), (4).
2. Remove front exhaust pipe (14).
3. Remove exhaust pipe (15).
4. Remove flange mount bolts (10) and flange mount nut (11).
5. Remove bracket mount bolts (7) and remove DPF muffler assembly (13).
6. Remove DPF bracket 1 (5) and DPF bracket 2 (6) from DPF muffler assembly (13).

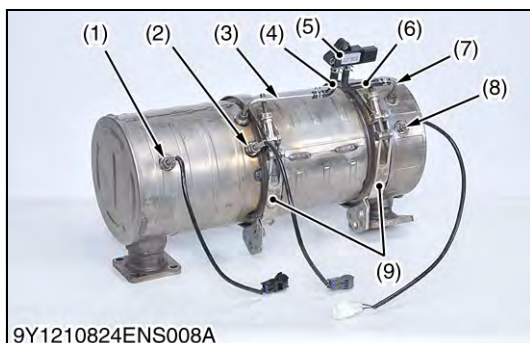
### (When reassembling)

- Be sure to change gasket (17), (18) into new one.
  - When mounting DPF muffler assembly (13), be sure to follow procedure below.
1. Assemble front exhaust pipe (14) to front axle frame.
  2. Tighten bracket 1 mount bolt (8) and bracket 2 mount bolt (12) temporarily.
  3. Tighten exhaust pipe mount bolt (9) splitting twice.
  4. Tighten bracket mount bolt (7) temporarily.
  5. Tighten Flange mount bolt (10) and Flange mount nut (11) splitting twice.
  6. Tighten exhaust pipe mount bolt 2 (16).
  7. Tighten bracket mount bolt (7).
  8. Tighten bracket 1 mount bolt (8) and bracket 2 mount bolt (12) with specified torque.

Tightening torque	Exhaust pipe mount bolt (1st)	23.6 to 27.5 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Exhaust pipe mount bolt (2nd)	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
	Flange mount bolt and nut (1st)	39.2 to 44.8 N·m 4.0 to 4.6 kgf·m 29 to 33 lbf·ft
	Flange mount bolt and nut (2nd)	49.0 to 55.9 N·m 5.0 to 5.7 kgf·m 37 to 41 lbf·ft

- |                                  |                                |
|----------------------------------|--------------------------------|
| (1) Differential Pressure Sensor | (10) Flange Mount Bolt         |
| (2) DPF Temperature Sensor (T0)  | (11) Flange Mount Nut          |
| (3) DPF Temperature Sensor (T1)  | (12) Bracket 2 Mount Bolt      |
| (4) DPF Temperature Sensor (T2)  | (13) DPF Muffler Assembly      |
| (5) DPF Bracket 1                | (14) Front Exhaust Pipe        |
| (6) DPF Bracket 2                | (15) Exhaust Pipe              |
| (7) Bracket Mount Bolt           | (16) Exhaust Pipe Mount Bolt 2 |
| (8) Bracket 1 Mount Bolt         | (17) Gasket                    |
| (9) Exhaust Pipe Mount Bolt 1    | (18) Gasket                    |

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### Filter Comp (DPF) (If necessary)

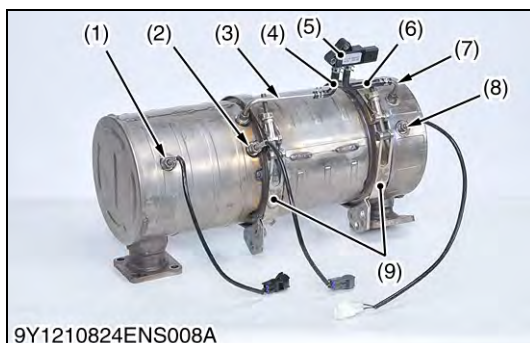
#### ■ IMPORTANT

- Always work in the workshop equipped with a electric hoist (including mobile hoist).
  - Put a product (engine) on a stable ground, and set the parking brake.
  - As the DPF muffler full assembly 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 or replacing, 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 form.
- 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 DPF muffler full assembly, make sure that the temperature sensor, differential pressure sensor, and differential pressure pipe do not make contact with surrounding parts.
  - Be sure to loosen the temperature sensor tightening nut or 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.

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

**(To be continued)**

**(Continued)**

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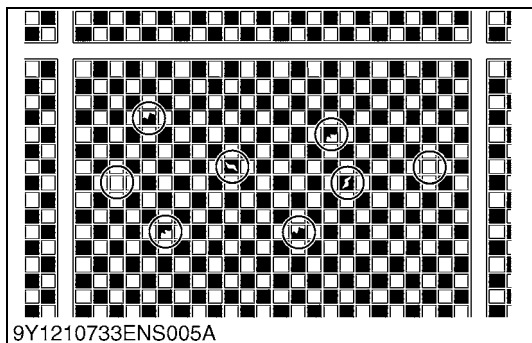
**(When reassembling)****■ IMPORTANT**

- 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 and lubricating compound, apply a anti-seize and 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 and 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 and 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 ( $T_0$ ) | (8) Temperature Sensor ( $T_2$ )          |
| (2) Temperature Sensor ( $T_1$ ) | (9) Filter Comp (DPF) Mounting Clamp Band |
| (3) Differential Pressure Pipe   | (10) Diesel Oxidation Catalyst (DOC)      |
| (4) Hose                         | (11) Gasket                               |
| (5) Differential Pressure Sensor | (12) Diesel Particulate Filter (DPF)      |
| (6) Hose                         | (13) DPF Outlet Body                      |
| (7) Differential Pressure Pipe   |   |

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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.

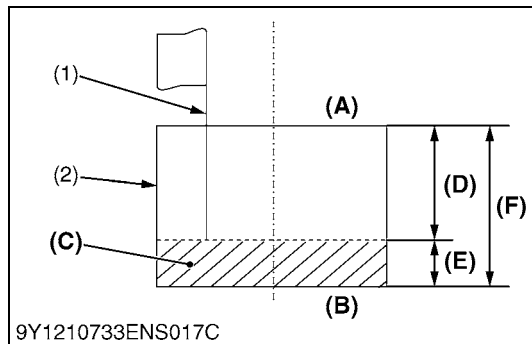
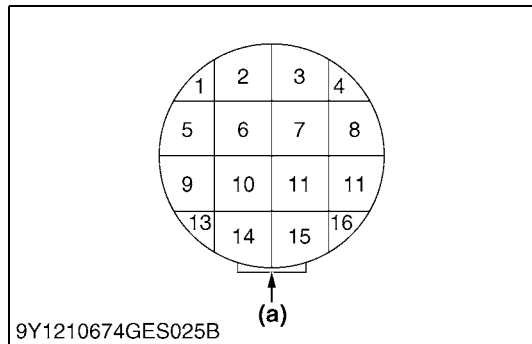
1. Check to see that the exhaust gas outlet side on the removed DPF is not darkened.
2. Check whether there is no crack or failure of the sealing wall on both ends of the cell (inlet side and outlet side) of DPF.  
If the number of cells with failure sealing wall exceeds the allowable limit, the DPF 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, they should measure the quantity of remaining ash in the following procedure, and evaluate the reusability.
- After having cleaned the filter comp (DPF), measure the actual cell depth (D) with a pin gauge 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

- If the actual cell depth (D) is less than the allowable limit, the DPF cannot be reused.  
If the DPF 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 with a new one.

#### (Reference)

Actual Cell Depth (D) = Cell Depth (F) – Accumulated Ash Depth (E)

#### ■ NOTE

- Select a metal pin gauge 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 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)	Allow- able limit	L3301/L3901	85 mm 3.3 in.
		L4701	102 mm 4.02 in.

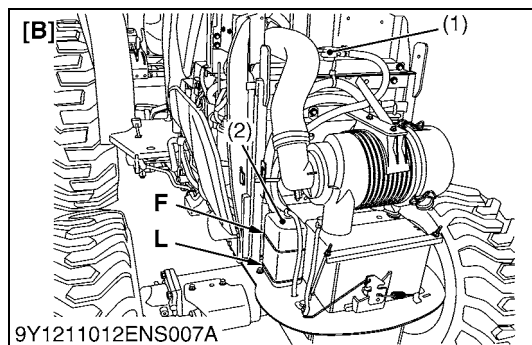
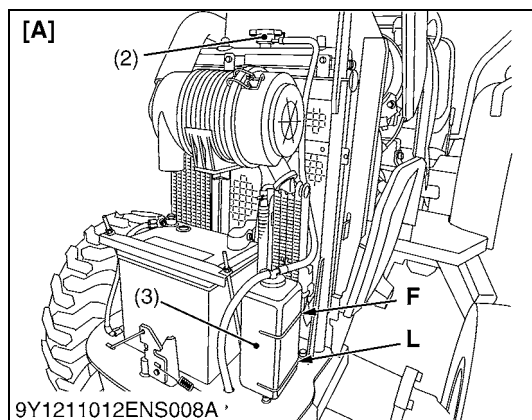
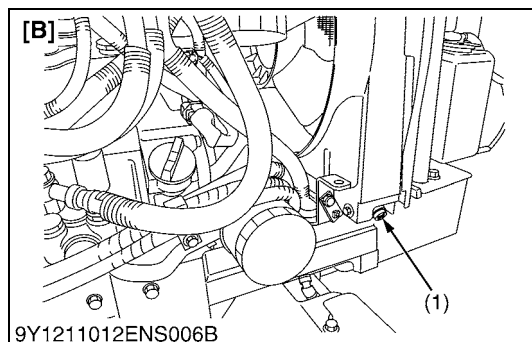
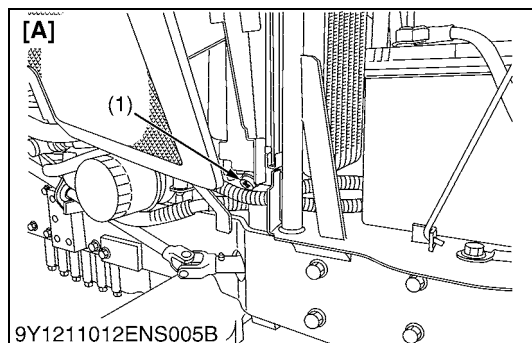
- Pin Gauge (0.60 to 0.80 mm dia., 0.024 to 0.031 in. dia.)
- DPF

(a) Serial Number

- (A) Exhaust Inlet Side  
(B) Exhaust Outlet Side  
(C) Accumulated Ash  
(D) Actual Cell Depth  
(E) Accumulated Ash Depth  
(F) Cell Depth

9Y1211012ENS0018US0

## [2] SEPARATING ENGINE FROM CLUTCH HOUSING



### Draining Coolant



#### CAUTION

- 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.

- Stop the engine and let cool down.
- To drain the coolant, open the radiator drain plug (1) and remove the radiator cap (2). The radiator cap (2) must be removed to completely drain the coolant.
- After all coolant is drained, close the drain plug (1).

#### (When refilling)

- Fill with clean water and anti-freeze until the coolant level is just below the port. Install the radiator cap (2) 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 (3) and add coolant if necessary.

#### ■ IMPORTANT

- Do not start engine without coolant.
- Use clean, fresh water 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.
- Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-10.

Coolant (with recovery tank)	Capacity	L3301/L3901	6.6 L 7.0 U.S.qts 5.8 Imp.qts
		L4701	7.1 L 7.5 U.S.qts 6.2 Imp.qts

- Drain Plug
- Radiator Cap
- Recovery Tank

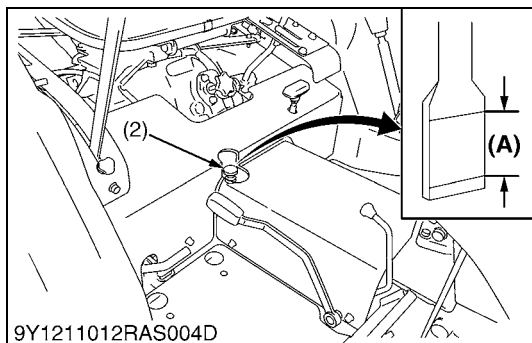
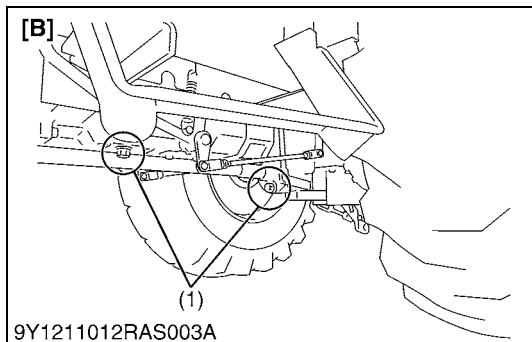
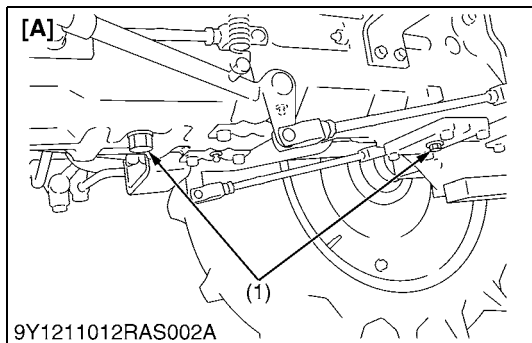
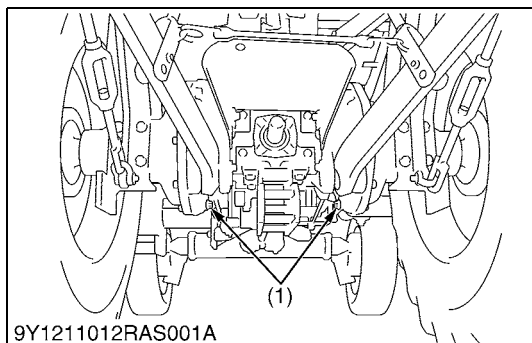
[A] L3301/L3901

[B] L4701

F: FULL

L: LOW

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## Draining Transmission Fluid (L3301/L3901)



### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
  2. After draining reinstall the drain plugs.

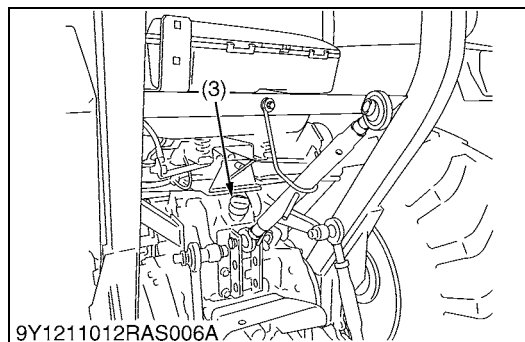
### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	2WD	28.0 L 7.4 U.S.gals 6.1 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.2 Imp.gals
		HST	23.5 L 6.2 U.S.gals 5.2 Imp.gals



- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

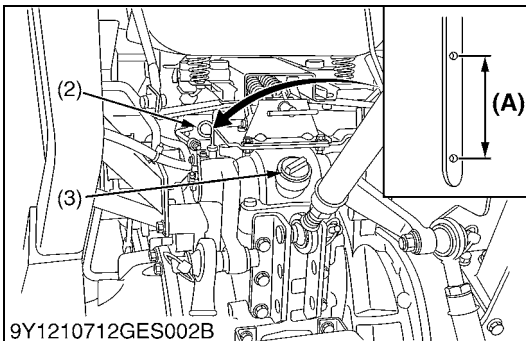
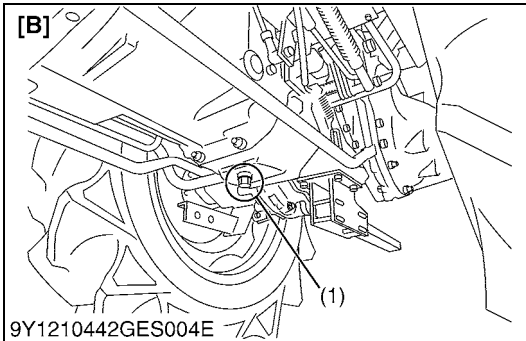
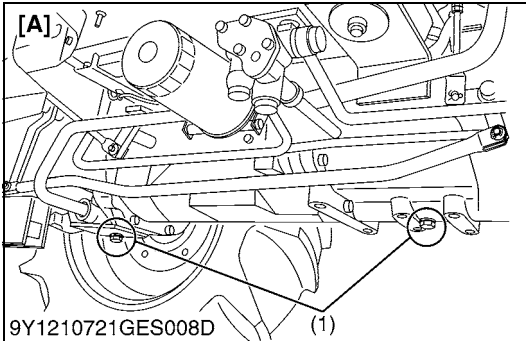
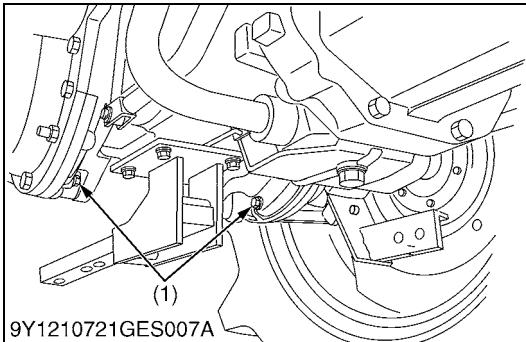
[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

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### Draining Transmission Fluid (L4701)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	40.0 L 10.6 U.S.gals 8.8 Imp.gals
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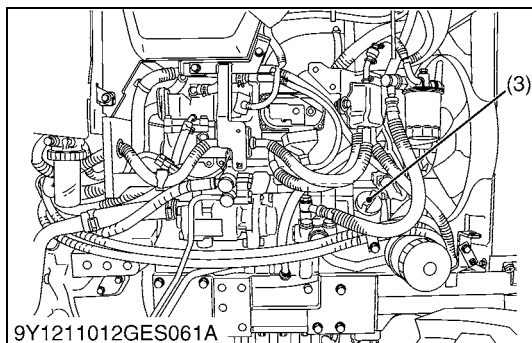
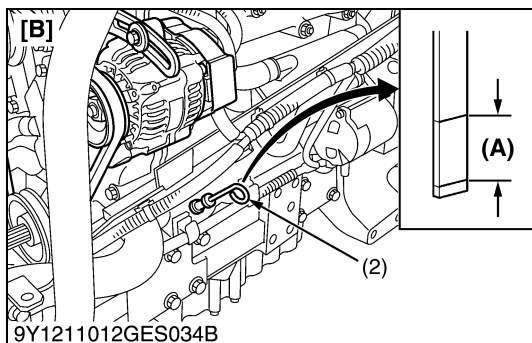
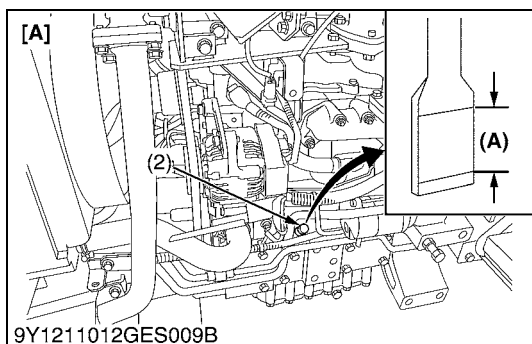
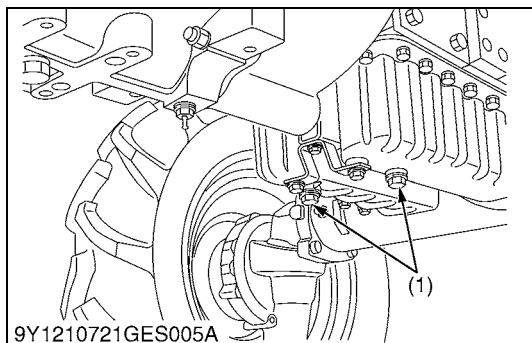
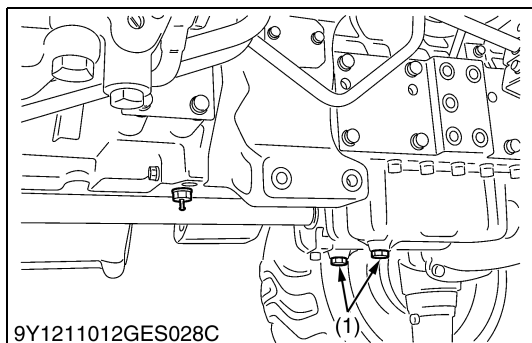
- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0004US0



## Draining Engine Oil



### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the engine and drain the oil completely into the oil pan.
  2. After draining, reinstall the drain plug (1).
  3. Fill with the new oil up to the upper notch on the dipstick (2).

### IMPORTANT

- Use DPF-compatible oil (CJ-4) for the engine.
- Never mix two different types of oil.

Engine oil (with filter)	Capacity	L3301/L3901	8.2 L 8.7 U.S.qts. 7.2 Imp.qts
		L4701	6.7 L 7.1 U.S.qts. 5.9 Imp.qts

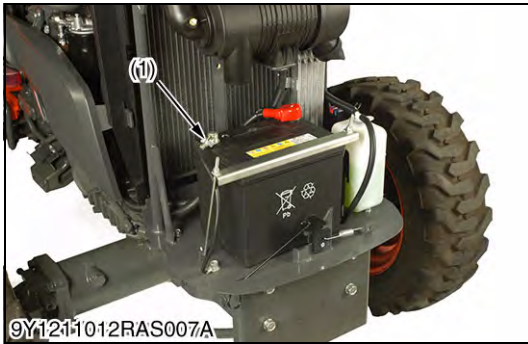
- (1) Drain Plug  
(2) Dipstick  
(3) Oil Inlet

[A] L3301/L3901

[B] L4701

(A) Oil level is acceptable within this range.

9Y1211012ENS0111US0

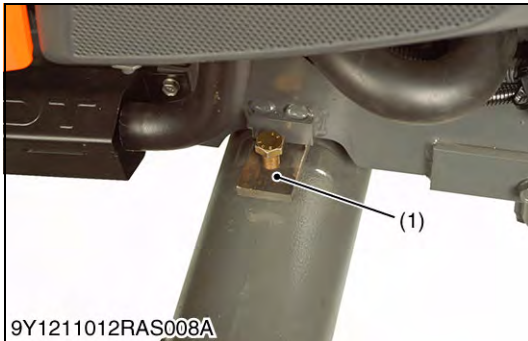


### **Battery Negative Cable Connector**

1. Open bonnet.
2. Disconnect battery negative cable connector (1).

(1) Battery Negative Cable Connector

9Y1211012RAS0005US0

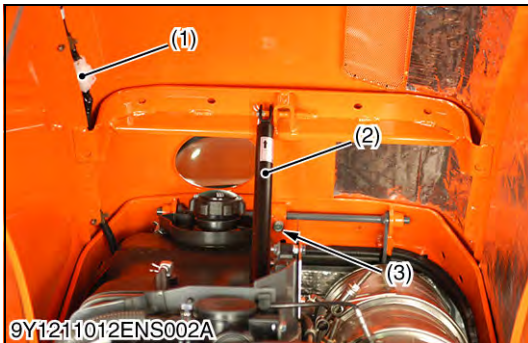


### **Front Axle Rocking Restrictor**

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-95.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0



### **Bonnet and Side Covers**

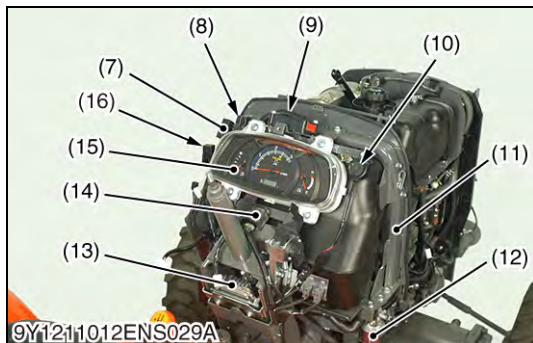
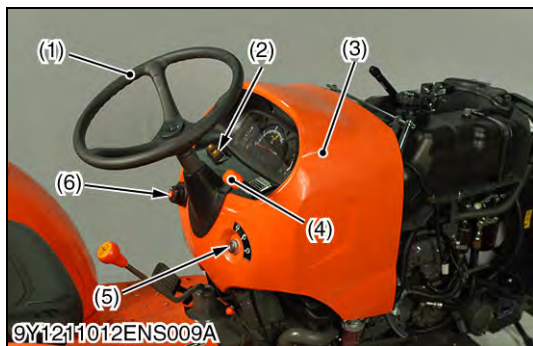
1. Disconnect the headlight connector (1).
2. Remove the damper (2) from the bonnet.
3. Disconnect the bolt (3) from the bonnet.
4. Remove the bonnet (4).
5. Remove the R.H. and L.H. side covers (5).

(1) Headlight Connector  
(2) Damper  
(3) Bolt

(4) Bonnet  
(5) Side Cover

9Y1211012ENS0014US0





### Steering Wheel and Rear Bonnet

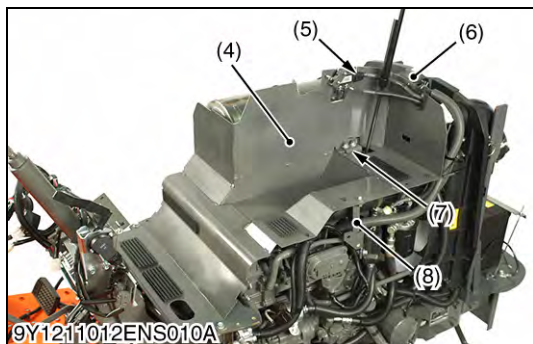
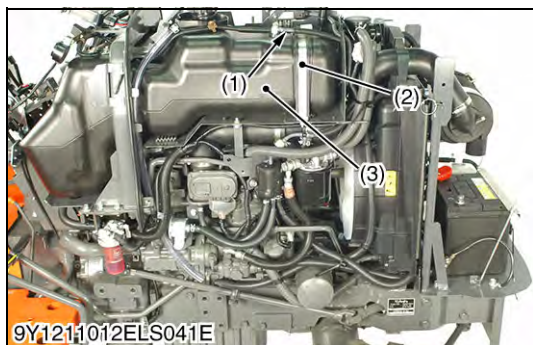
1. Remove the steering wheel (1) with a steering wheel puller.
2. Remove the throttle grip (4).
3. Disconnect the main switch (5).
4. Disconnect the combination switch (6).
5. Disconnect the DPF switches (2).
6. Remove the rear bonnet (3).
7. Remove the meter panel (15).
8. Disconnect the DPF buzzer (10).
9. Disconnect the flasher unit (14).
10. Disconnect the starter relay (7), glow relay (8) and CCV heater relay (16).
11. Disconnect the engine ECU (13).
12. Remove the separator (12).
13. Remove the rear bonnet stay (11).

### (When reassembling)

Tightening torque	Steering wheel mounting nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-----------------------------	---

- |                        |                       |
|------------------------|-----------------------|
| (1) Steering Wheel     | (9) Main ECU          |
| (2) DPF Switch         | (10) DPF Buzzer       |
| (3) Rear Bonnet        | (11) Rear Bonnet Stay |
| (4) Throttle Grip      | (12) Separator        |
| (5) Main Switch        | (13) Engine ECU       |
| (6) Combination Switch | (14) Flasher Unit     |
| (7) Starter Relay      | (15) Meter Panel      |
| (8) Glow Relay         | (16) CCV heater relay |

9Y1211012ENS0020US0

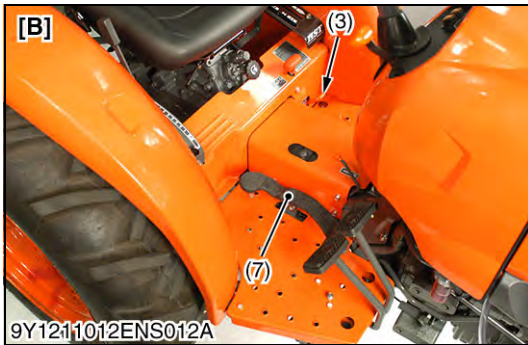
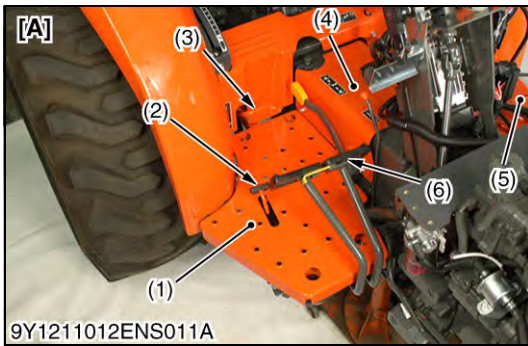


### Fuel Tank and Base

1. Disconnect the fuel return line (1).
2. Remove the fuel tank band (2).
3. Remove the fuel tank (3).
4. Remove the damper bracket (7).
5. Disconnect the connector and hoses from the differential pressure sensor (5).
6. Disconnect the oil separator (6) from the fuel tank base.
7. Disconnect the fuel reserve tank bracket (8) from the fuel tank base.
8. Remove the fuel tank base (4).

- |                      |                                  |
|----------------------|----------------------------------|
| (1) Fuel Return Line | (5) Differential Pressure Sensor |
| (2) Fuel Tank Band   | (6) Oil Separator                |
| (3) Fuel Tank        | (7) Damper Bracket               |
| (4) Fuel Tank Base   | (8) Fuel Reserve Tank Bracket    |

9Y1211012ENS0021US0



### Step and Center Cover (L3301/L3901)

1. Remove the center cover (4).
2. Disconnect the throttle cable from the throttle pedal (2).
3. Remove the HST pedal (7).
4. Disconnect the differential lock spring and rod from the differential lock lever (3).
5. Remove the brake pedal springs from the brake pedals (6).
6. Remove the R.H. step (1).
7. Remove the clutch pedal spring from the clutch pedal.
8. Remove the L.H. step (5).

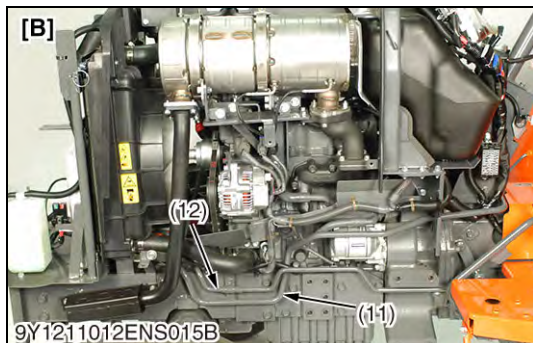
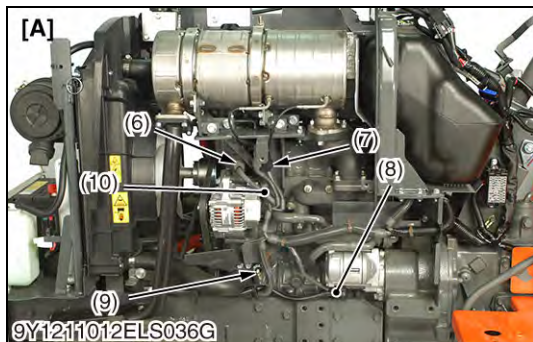
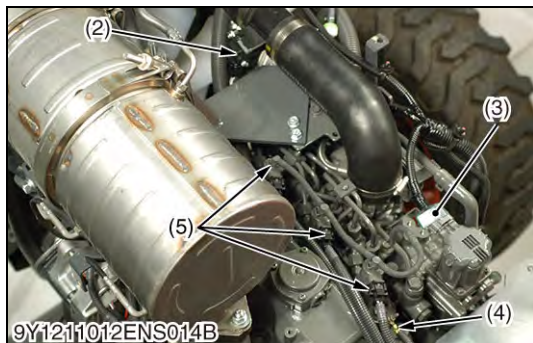
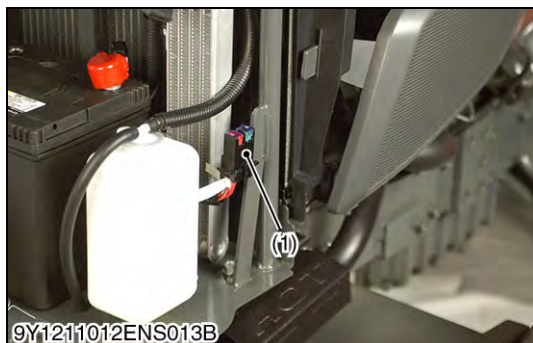
- |                             |                 |
|-----------------------------|-----------------|
| (1) R.H. Step               | (6) Brake Pedal |
| (2) Throttle Pedal          | (7) HST Pedal   |
| (3) Differential Lock Lever |                 |
| (4) Center Cover            |                 |
| (5) L.H. Step               |                 |

**[A] FW and DW Model**

**[B] DHW Model**

9Y1211012ENS0022US0





### Hydraulic Pipes and Electrical Wiring (Under Fuel Tank Base and Left Side)

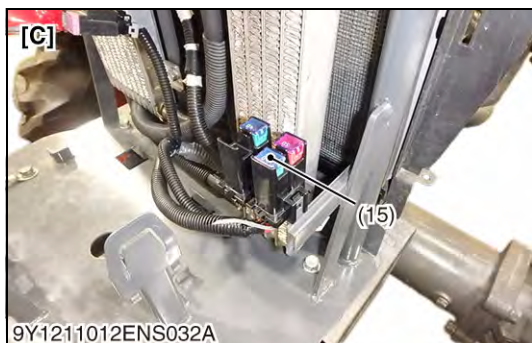
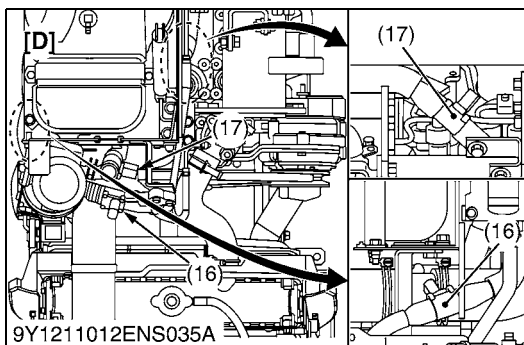
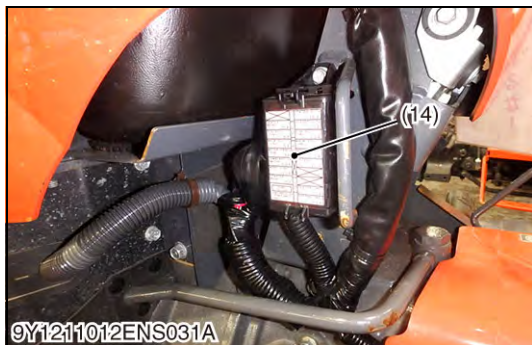
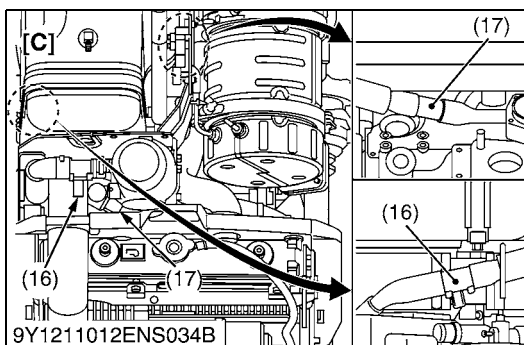
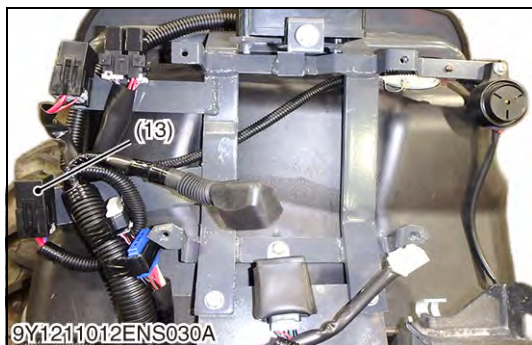
1. Disconnect the connectors of injector (5).
2. Disconnect the glow plug (4).
3. Disconnect the EGR valve (3).
4. Disconnect the air flow sensor (2).
5. Disconnect the rail pressure sensor.
6. Remove the slow blow fuses (1).
7. Disconnect the positive battery cable.
8. Disconnect the water temperature sensor (6).
9. Disconnect the DPF temperature sensors (7).
10. Disconnect the alternator (10).
11. Disconnect the starter (8).
12. Disconnect the oil switch (9).
13. Disconnect CCV heater relay (14), CCV heater fuse (15), CCV slow blow fuse (16) and CCV heater (17) (18). (If equipped)
14. Remove the oil cooler return pipe (11).
15. Remove the power steering return pipe (12).

Tightening torque	Oil cooler return pipe bolt	92 to 101 N·m 9.0 to 10.0 kgf·m 67 to 73 lbf·ft
-------------------	-----------------------------	---

- |                              |  |
|------------------------------|--|
| (1) Slow Blow Fuse           | (10) Alternator                                  |
| (2) Air Flow Sensor          | (11) Oil Cooler Return Pipe                      |
| (3) EGR Valve                | (12) Power Steering Return Pipe<br>(L3301/L3901) |
| (4) Glow Plug                |  |
| (5) Injector                 |  |
| (6) Water Temperature Sensor | [A] FW and DW Model                              |
| (7) DPF Temperature Sensor   | [B] DHW Model                                    |
| (8) Starter                  |  |
| (9) Oil Switch               |  |

(To be continued)

(Continued)

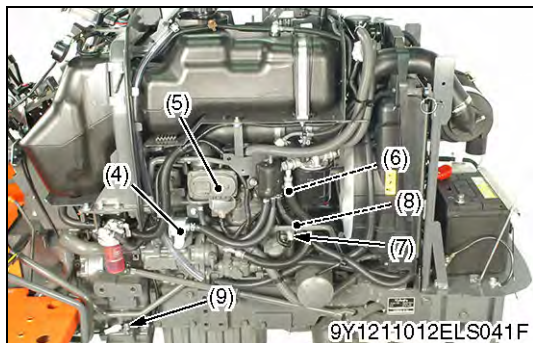
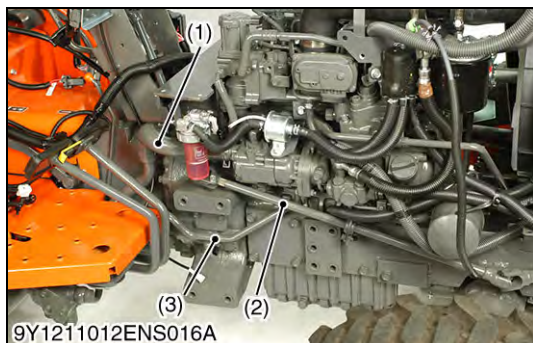


- (13) CCV Heater relay
- (14) CCV Heater Fuse
- (15) CCV SB Fuse
- (16) CCV Heater (OUT)
- (17) CCV Heater (IN)

[C] L3301/L3901  
[D] L4701

9Y1211012ENS0115US0





### Hydraulic Pipes, Steering Joint, and Electrical Wiring (Right Side)

1. Remove the suction hose (1).
2. Remove the delivery pipe (3).
3. Remove the steering shaft (2).
4. Disconnect the crank shaft position sensor (9).
5. Disconnect the parking brake sensor.
6. Disconnect the fuel pump (4).
7. Disconnect the intake throttle valve (5).
8. Disconnect the rail pressure sensor (6).
9. Disconnect the supply pump (7) connector.
10. Disconnect the camshaft position sensor (8).

#### (When reassembling)

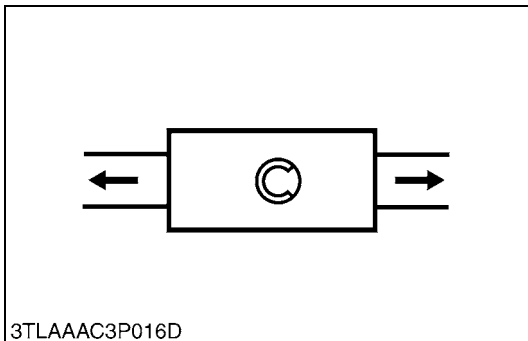
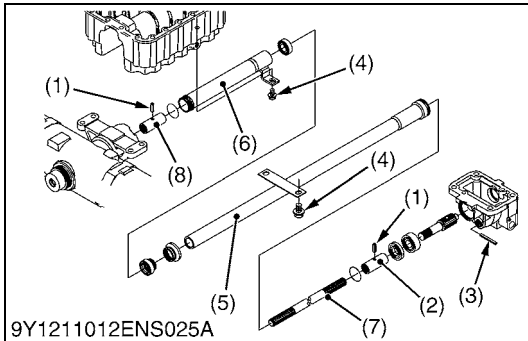
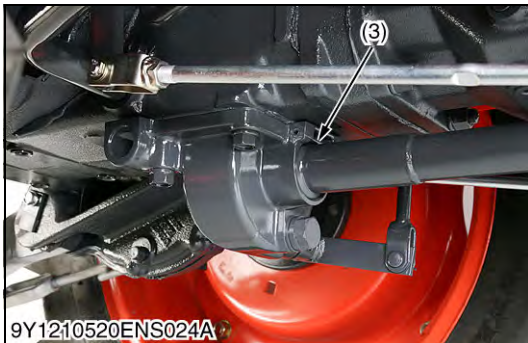
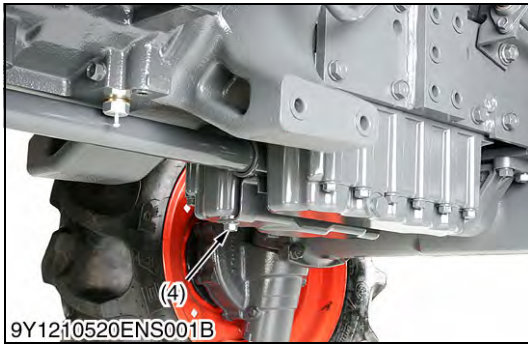
- Be sure that the steering joint shaft (2) does not contact with both hydraulic pump and flywheel housing.

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Steering shaft universal joint bolt (L3301/L3901)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.3 to 20.2 lbf·ft
	Steering bearing flange bolt (L3301/L3901)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.3 to 20.2 lbf·ft

- |  |                                 |
|--|---------------------------------|
| (1) Suction Hose                       | (6) Rail Pressure Sensor        |
| (2) Steering Joint Shaft (L3301/L3901) | (7) Supply Pump                 |
| (3) Delivery Pipe                      | (8) Camshaft Position Sensor    |
| (4) Fuel Pump                          | (9) Crank Shaft Position Sensor |
| (5) Intake Throttle Valve              |                                 |

9Y1211012ENS0024US0





### Propeller Shaft (L3301/L3901)

1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

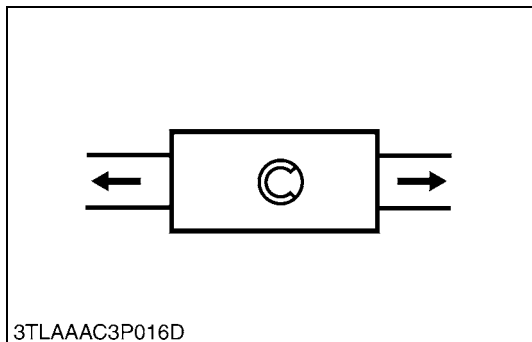
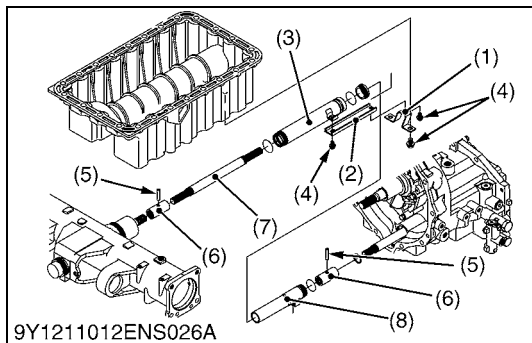
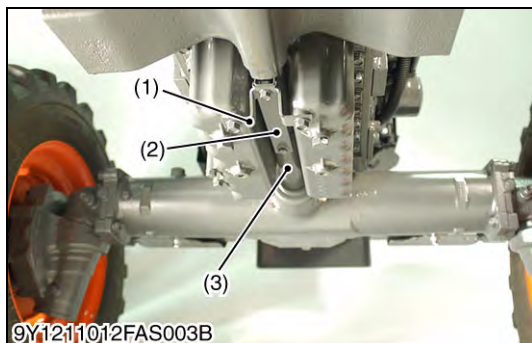
#### (When reassembling)

- Apply greasing to the splines of the propeller shaft (7) and pinion shaft.
- Tap in spring pins (1) as shown in the figure.

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



9Y1211012ENS0112US0



### **Propeller Shaft (L4701)**

1. Remove the bracket 1 (1).
2. Remove the bracket 2 (2).
3. Slide the propeller shaft cover 2 (8) to the front and the propeller shaft cover 1 (3) to the rear.
4. Tap out the spring pins (5) and then slide the coupling (6) to the front and rear.

#### **(When reassembling)**

- Apply grease to the splines of the propeller shaft (8) and pinion shaft.
- Tap in spring pins (5) as shown in the figure.

- |                             |                             |
|-----------------------------|-----------------------------|
| (1) Bracket 1               | (5) Spring Pin              |
| (2) Bracket 2               | (6) Coupling                |
| (3) Propeller Shaft Cover 1 | (7) Propeller Shaft         |
| (4) Screw                   | (8) Propeller Shaft Cover 2 |

9Y1211012ENS0025US0

### **Separating Engine from Clutch Housing Case**

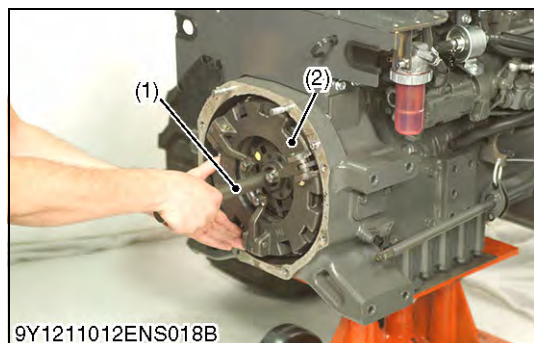
1. Place the disassembling stands under the engine and clutch housing case.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine and clutch housing.

#### **(When reassembling)**

- Apply grease to the splines.
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the engine and clutch housing case.

9Y1211012ENS0026US0

### [3] SEPARATING ENGINE FROM FRONT AXLE FRAME



#### Clutch Assembly

1. Insert the clutch center tool (1).
2. Remove the clutch assembly (2) together with the clutch center tool.

#### (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.
- Insert the pressure plate, noting the position of straight pins.
- After docking the engine and the clutch housing case, assemble the outer parts, referring to the picture.

#### ■ IMPORTANT

- **Be sure to align the center of disc and flywheel by inserting the clutch tool set.**

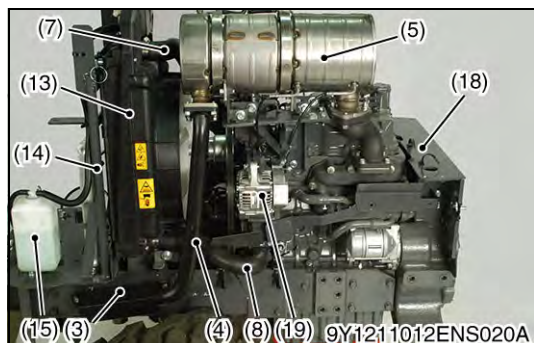
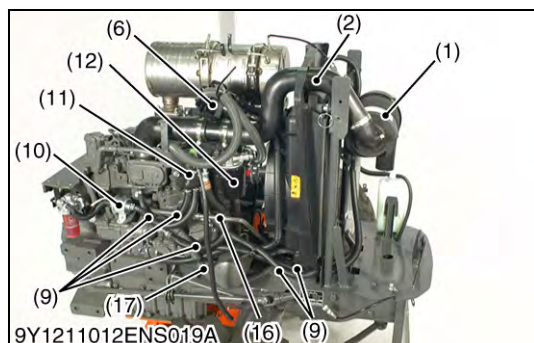
#### ■ NOTE

- **Be sure to align the center of disc and flywheel by inserting the clutch tool set.**

(1) Clutch Center Tool

(2) Clutch Assembly

9Y1211012ENS0027US0



#### Radiator Assembly

1. Remove battery.
2. Remove air cleaner (1) together with air cleaner hoses (2).
3. Remove front exhaust pipe (3) and exhaust pipe (4).
4. Remove DPF muffler assembly (5).
5. Remove the cramps and hoses of oil separator (6), then remove the oil separator (6).
6. Remove radiator hoses (7), (8).
7. Remove fuel hoses (9) together with fuel pump (10), fuel sub tank (11), fuel filter (12).
8. Remove radiator (13) together with front support (14), reserve tank (15).
9. Remove power steering delivery pipe (16) and return hose (17).
10. Remove plate (18).
11. Remove alternator (19) and fan belt.

#### (When reassembling)

- When reassembling DPF muffler assembly to tractor, follow the provided procedure (See page 1-S19).
- If CCV Heater is equipped, be careful not to assemble in the wrong direction. Refer to the images shown below.

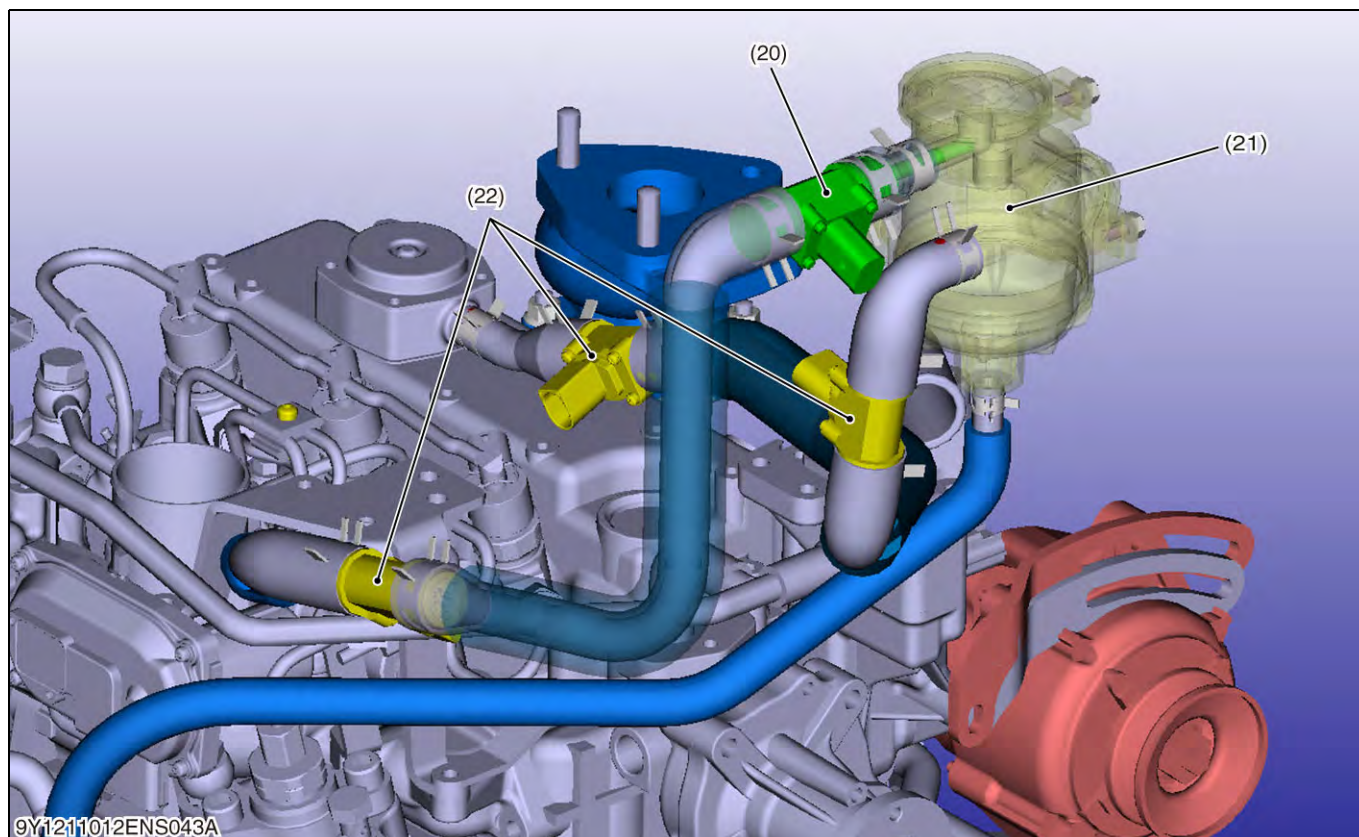
- |                           |                                   |
|---------------------------|-----------------------------------|
| (1) Air Cleaner           | (11) Fuel Sub Tank                |
| (2) Air Cleaner Hose      | (12) Fuel Filter                  |
| (3) Front Exhaust Pipe    | (13) Radiator                     |
| (4) Exhaust Pipe          | (14) Front Support                |
| (5) DPF Muffler Assembly  | (15) Reserve Tank                 |
| (6) Oil Separator         | (16) Power Steering Delivery Pipe |
| (7) Radiator Hose (Upper) | (17) Return Hose                  |
| (8) Radiator Hose (Lower) | (18) Plate                        |
| (9) Fuel Hose             | (19) Alternator                   |
| (10) Fuel Pump            |                                   |



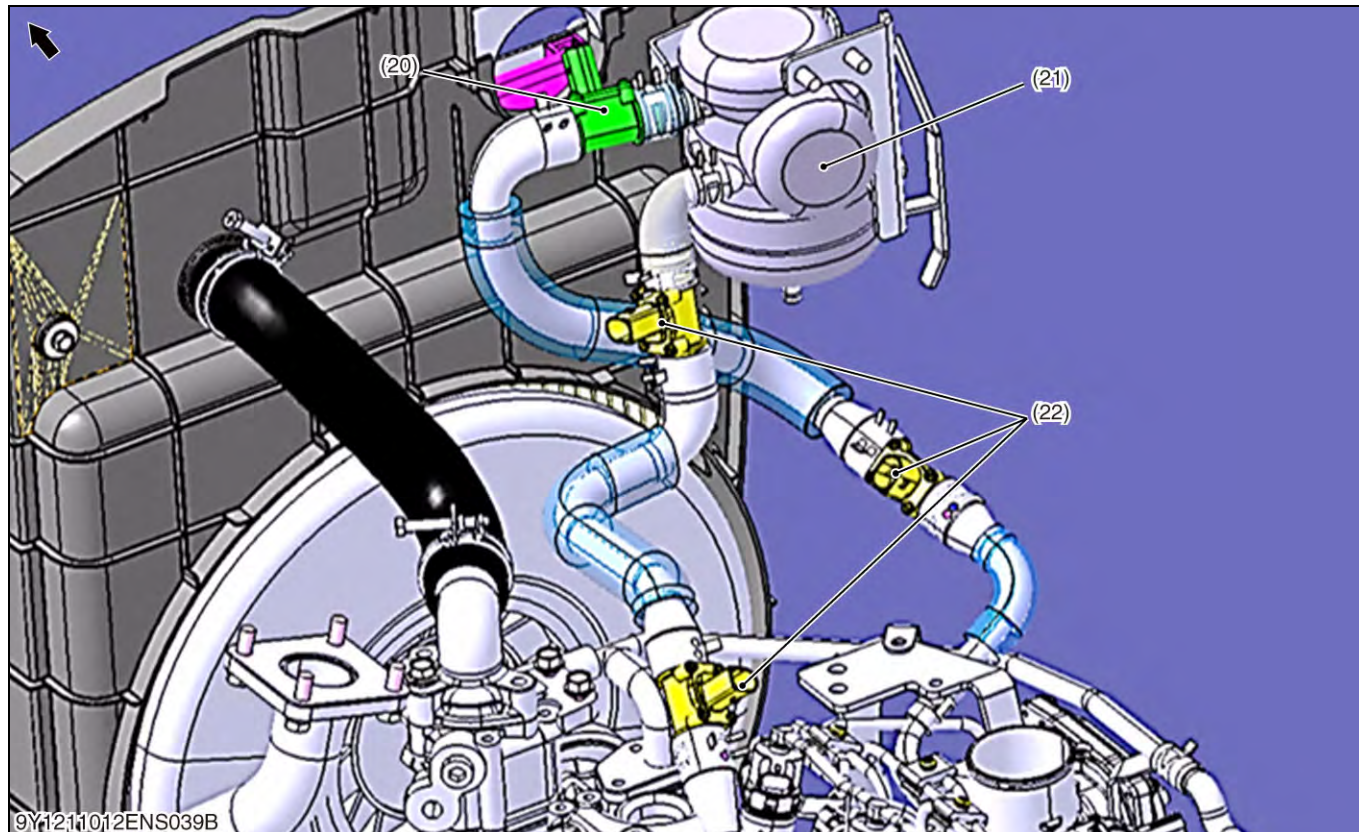
**(To be continued)**



(Continued)  
[L3301, L3901]



[L4701]

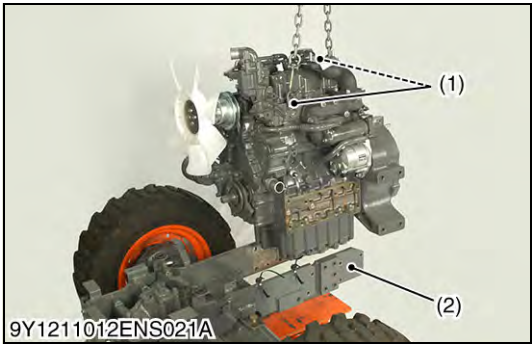


(20) CCV Heater 1

(21) Separator (CCV)

(22) CCV Heater 2

9Y1211012ENS0028US0



**Front Axle Frame**

- 1. Remove one of two engine hooks attached on the flywheel side of engine and install it on left side of the engine.
- 2. Hold the engine by using hoist and engine hooks (1).
- 3. Remove engine mounting bolts.
- 4. Separate the engine from front axle frame (2).

**L3301/L3901**

Tightening torque	Front axle frame mounting bolt (M10)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
-------------------	--------------------------------------	---

**L4701**

Tightening torque	Front axle frame mounting bolt (M10)	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
	Front axle frame mounting bolt (M12)	103.0 to 117.7 N·m 10.5 to 12.0 kgf·m 76 to 86 lbf·ft

(1) Engine Hook

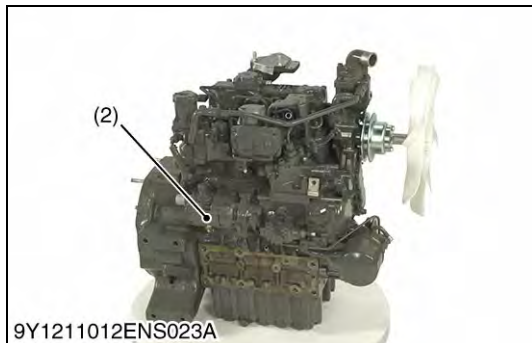
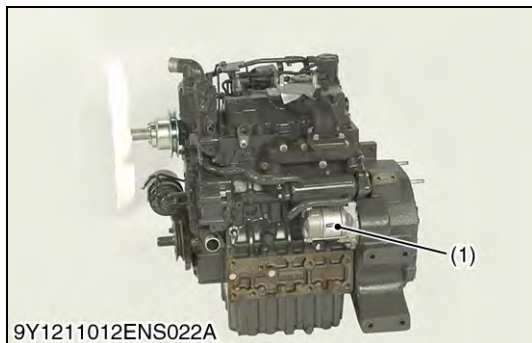
(2) Front Axle Frame

9Y1211012ENS0029US0



## 6. DISASSEMBLING AND ASSEMBLING

### [1] OUTER PARTS



#### Outer Parts

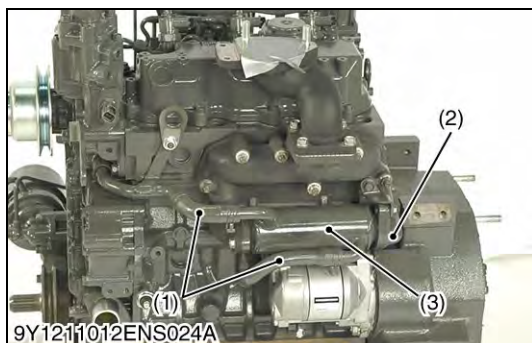
1. Remove starter motor (1).
2. Remove hydraulic pump (2) with pump holder and regulator valve (L4701 only).

(1) Starter Motor

(2) Hydraulic Pump

9Y1211012ENS0030US0

### [2] EGR



#### EGR Related Parts

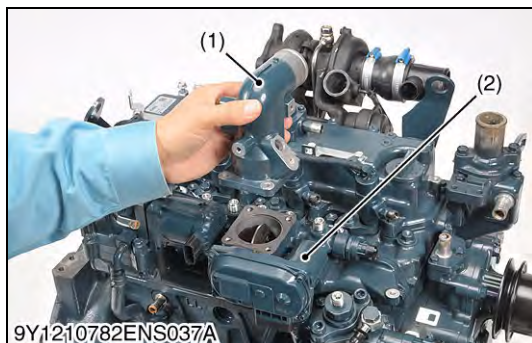
1. Remove EGR cooler hose (1).
2. Remove EGR pipe (2).
3. Remove EGR cooler (3).

(1) EGR Cooler Hose

(3) EGR Cooler

(2) EGR Pipe

9Y1211012ENS0031US0



#### 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.

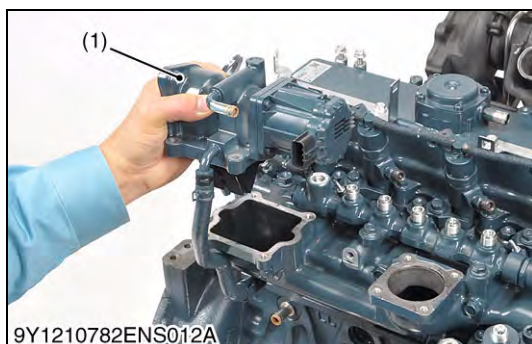
(When reassembling)

- Replace the gaskets with new ones.

(1) Air Cleaner Flange

(2) Intake Throttle Valve

9Y1211012ENS0032US0



#### EGR Valve

1. Disconnect the cooler pipe of EGR valve.
2. Remove the EGR valve (1).

#### ■ NOTE

- Do not disassemble the EGR valve assembly.

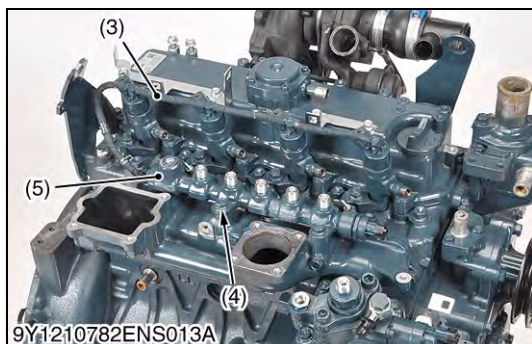
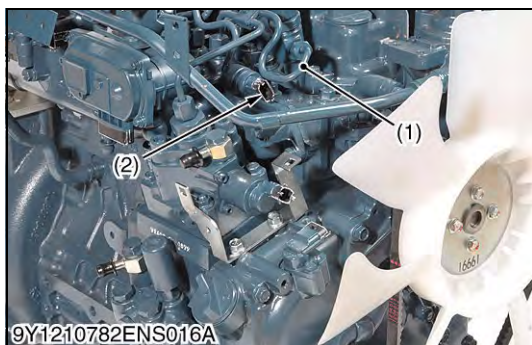
(When reassembling)

- Replace the gaskets with new ones.

(1) EGR Valve

9Y1211012ENS0033US0

### [3] COMMON RAIL



#### Common Rail and Injection Pipes

##### ⚠ CAUTION

- Do not loosen the injection pipe when the fuel is under high pressure (within 5 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).

- Remove the injection pipe (1).
- Remove the overflow pipe (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)

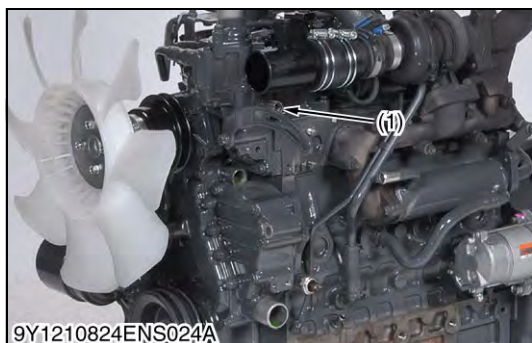
##### ■ NOTE

- 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       | (4) Common Rail      |
| (2) Rail Pressure Sensor | (5) Pressure Limiter |
| (3) Overflow Pipe        |                      |

9Y1211012ENS0034US0



#### Coolant Temperature Sensor

- Remove the coolant temperature sensor (1).

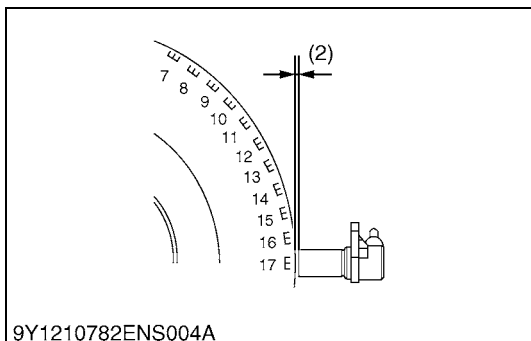
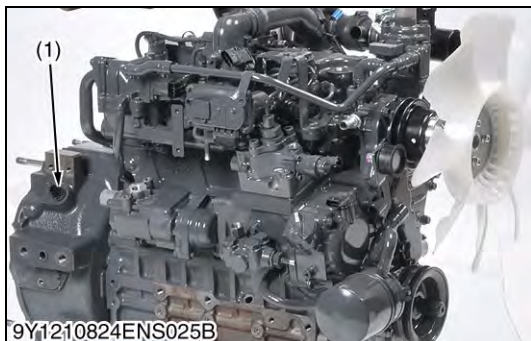
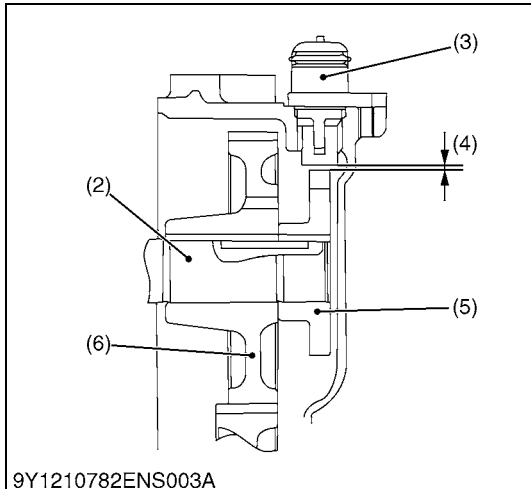
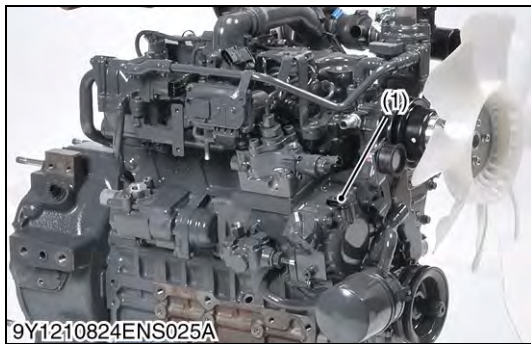
(When reassembling)

- 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
-------------------	--	---

- Coolant Temperature Sensor

9Y1211012ENS0035US0



### 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 | (4) Air Gap          |
| (2) Fuel Camshaft            | (5) Pulse Cam        |
| (3) Sensor                   | (6) Supply Pump Gear |

9Y1211012ENS0036US0

### 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.
---------	-----------------------	-------------------------------------

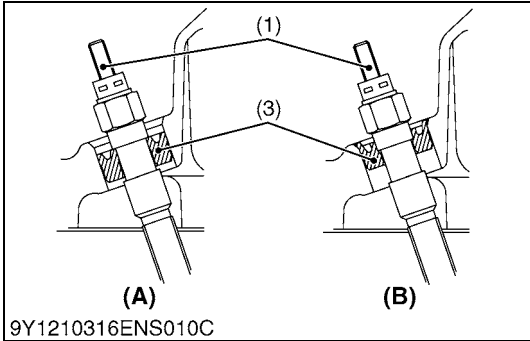
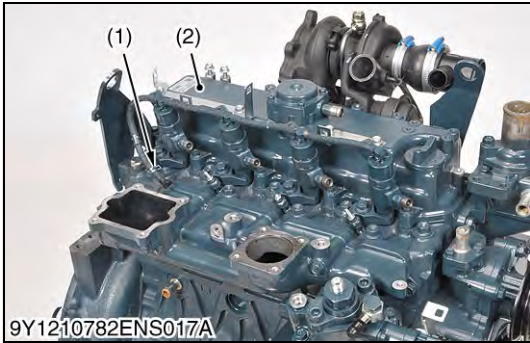
Tightening torque	Crankshaft position sensor mounting screw	4 to 6 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft
-------------------	---	---

- |                                |             |
|--------------------------------|-------------|
| (1) Crankshaft Position Sensor | (2) Air Gap |
|--------------------------------|-------------|

9Y1211012ENS0037US0



[4] 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 damaged.
- 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

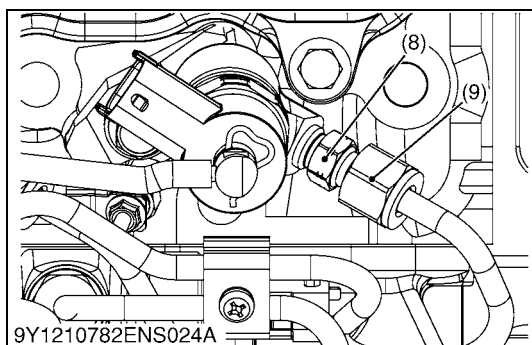
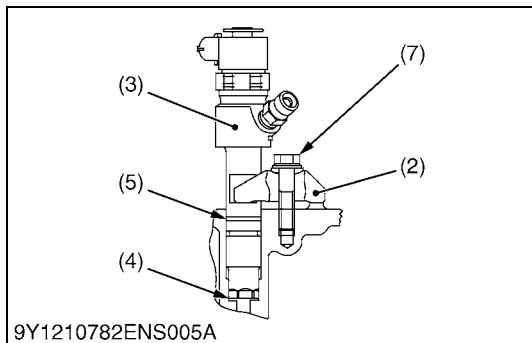
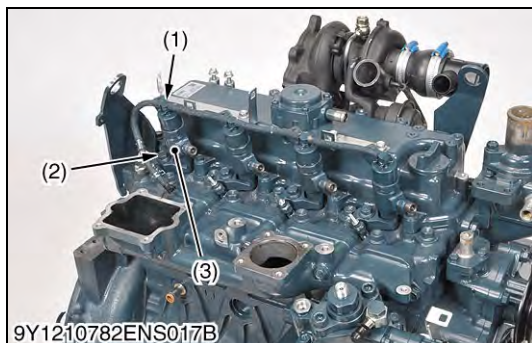
- (1) Glow Plug

(2) Cylinder Head Cover

(3) Seal
- (A) Good

(B) Bad

9Y1211012ENS0038US0



## 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 ID code (6).
- Do not damage the injector IDcode (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 just 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

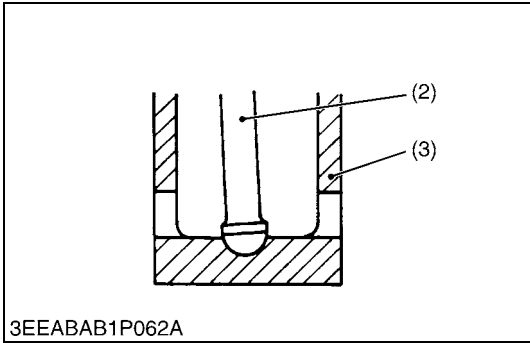
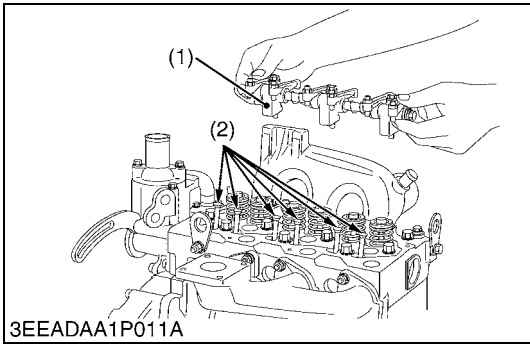
- If you replace the injectors, it is necessary to perform injector correction (writing the injector ID codes (6) to the engine ECU).

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

9Y1211012ENS0039US0



**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.

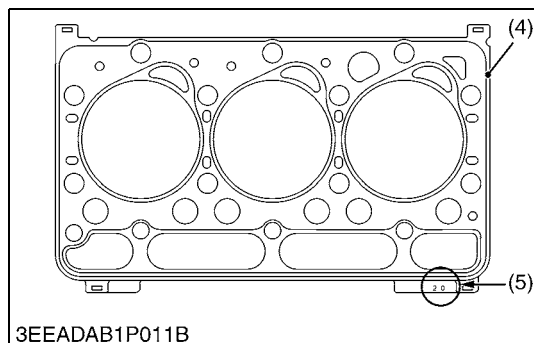
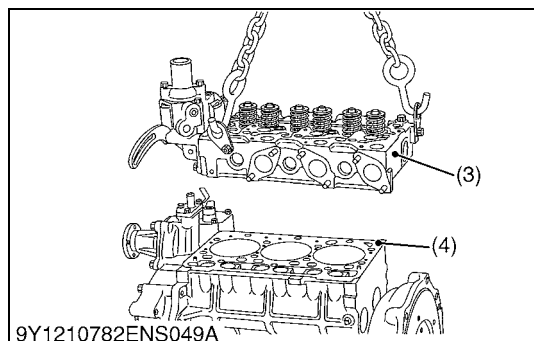
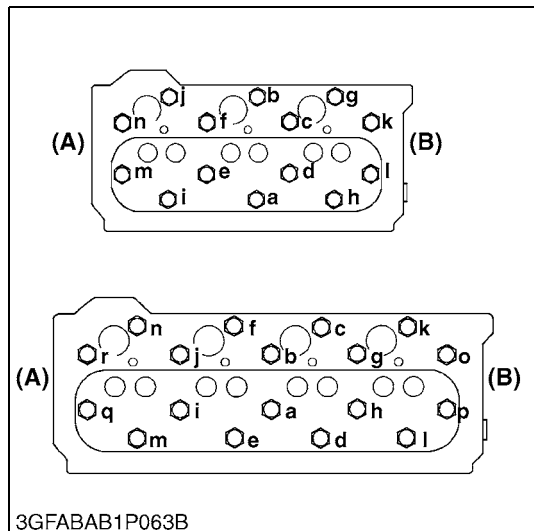
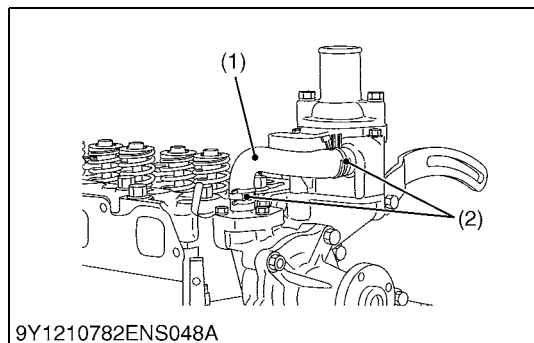
**■ IMPORTANT**

- 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

9Y1211012ENS0040US0



### 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 mounting screw	93.2 to 98.0 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.

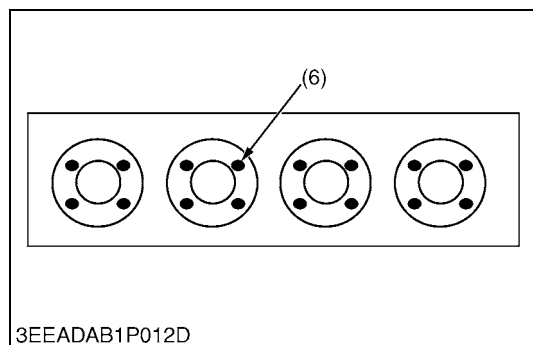
Gasket Mark and Code Number	Model	
	D1803-CR-E4	V2403-CR-E4
15	1G750-03600	1G790-03600
20	1G750-03310	1G790-03310
25	1G750-03610	1G790-03610
30	1G750-03620	1G790-03620
35	1G750-03630	1G790-03630

- (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

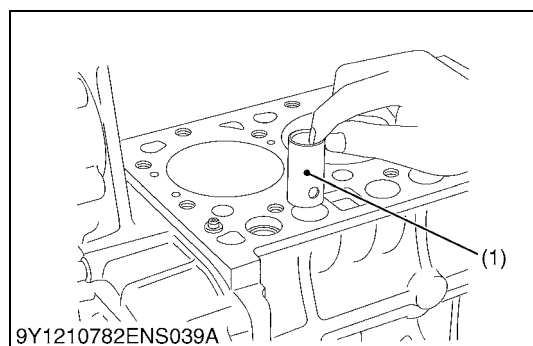
### To select the cylinder head gasket

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

9Y1211012ENS0041US0



### Tappets

1. Remove the tappets (1) from the crankcase.

### (When reassembling)

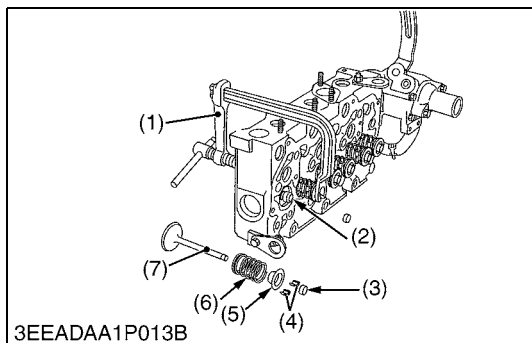
- Before you install the tappets, apply a thin layer of engine oil around them.
- Check the contact between tappets and cams that it turns correctly. If it is damaged, replace the tappets.

### ■ IMPORTANT

- Do not change the combination of tappet and tappet guide.

(1) Tappet

9Y1211012ENS0042US0



### 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.

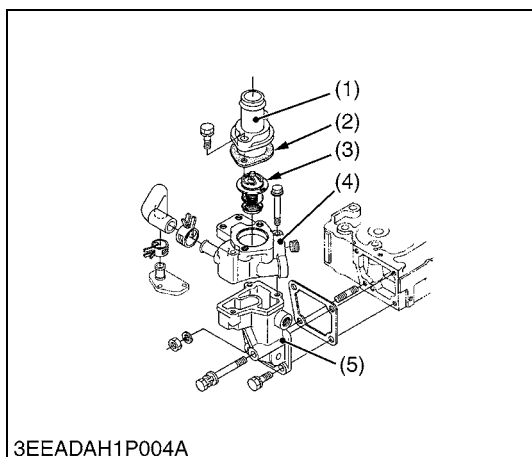
### ■ IMPORTANT

- **Do not change the combination of valve and valve guide.**

- |                           |                           |
|---------------------------|---------------------------|
| (1) Valve Spring Replacer | (5) Valve Spring Retainer |
| (2) Valve Stem Seal       | (6) Valve Spring          |
| (3) Valve Cap             | (7) Valve                 |
| (4) Valve Spring Collet   |                           |

9Y1211012ENS0043US0

## [5] THERMOSTAT



### Thermostat Assembly

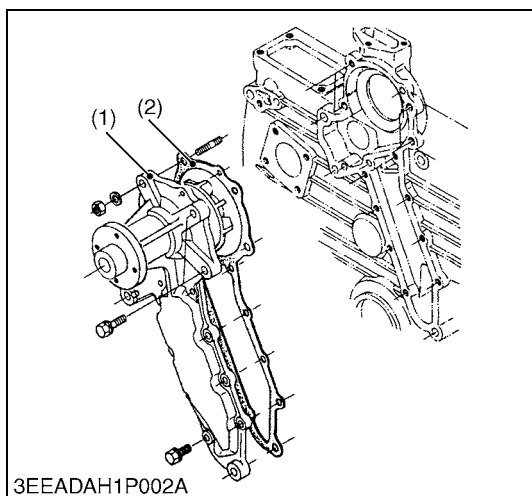
1. Remove the thermostat cover mounting screws, and remove the thermostat cover (1).
2. Remove the thermostat assembly (3).

#### (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        | (4) Water Flange 1 |
| (2) Thermostat Cover Gasket | (5) Water Flange 2 |
| (3) Thermostat Assembly     |                    |

9Y1211012ENS0044US0



### Water Pump Assembly (If Necessary)

1. Remove the water pump assembly (1) from the gear case.

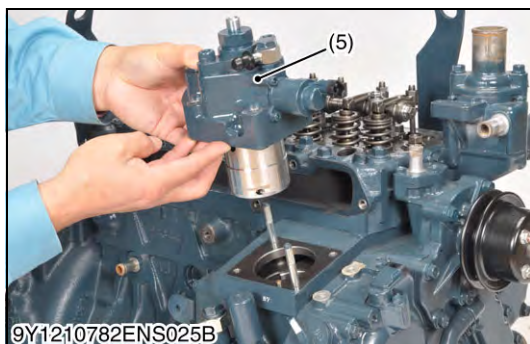
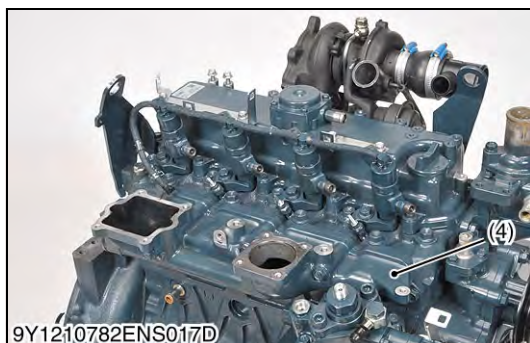
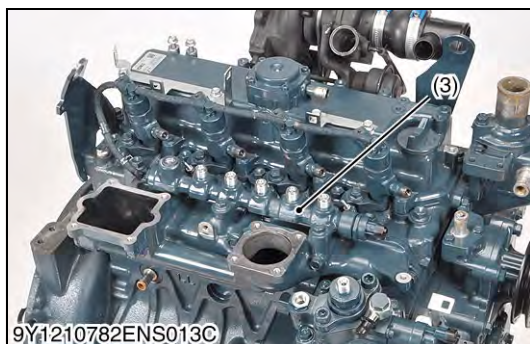
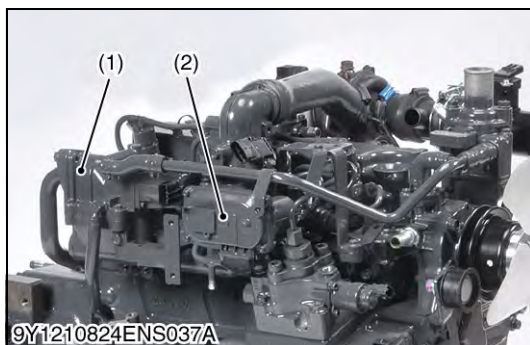
#### (When reassembling)

- Replace the gasket (2) with a new one.

- |                         |            |
|-------------------------|------------|
| (1) Water Pump Assembly | (2) Gasket |
|-------------------------|------------|

9Y1211012ENS0045US0

## [6] SUPPLY PUMP



### Supply Pump

#### CAUTION

- Do not loosen the injection pipe when the fuel is under high pressure (Within 5 minutes of stopping the engine).

- Remove the intake throttle valve assembly (2).
- Remove the EGR valve assembly (1).
- Remove the rail (3).
- Remove the intake manifold (4).
- 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.

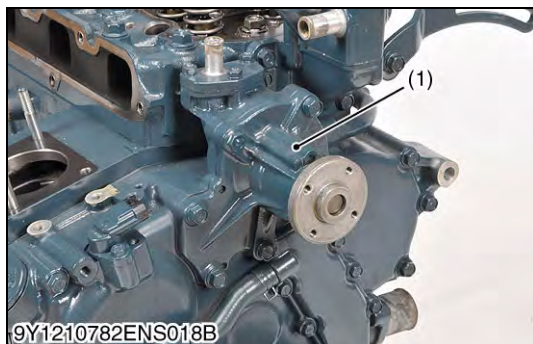
Tightening torque	Supply pump mounting nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Injection pipe retaining nut	24.5 to 29.0 N·m 2.5 to 3.0 kgf·m 18.1 to 21.3 lbf·ft

- |                                    |                     |
|------------------------------------|---------------------|
| (1) EGR Valve Assembly             | (4) Intake Manifold |
| (2) Intake Throttle Valve Assembly | (5) Supply Pump     |
| (3) Rail                           |                     |

9Y1211012ENS0046US0



## [7] WATER PUMP AND OIL COOLER



### Water Pump

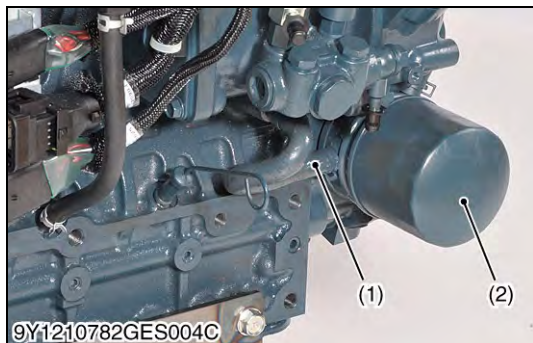
1. Remove the pipe band and the water pipe (water pump side).
2. Remove the water pump (1).

#### **(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

9Y1211012ENS0047US0



### 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
-------------------	------------------------	---

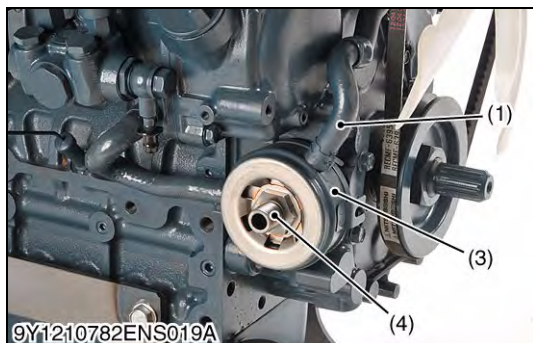
(1) Water Pipe

(3) Oil Cooler

(2) Oil Filter Cartridge

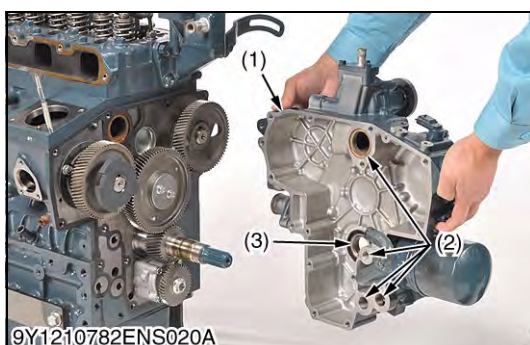
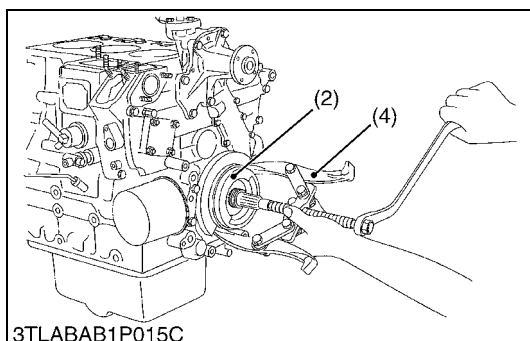
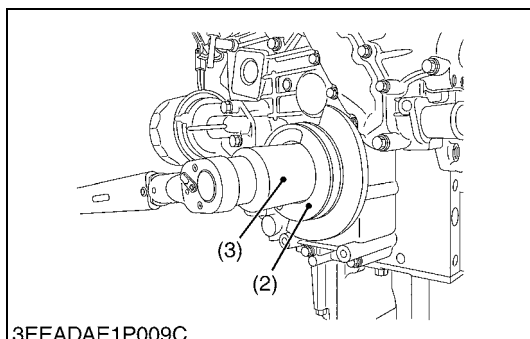
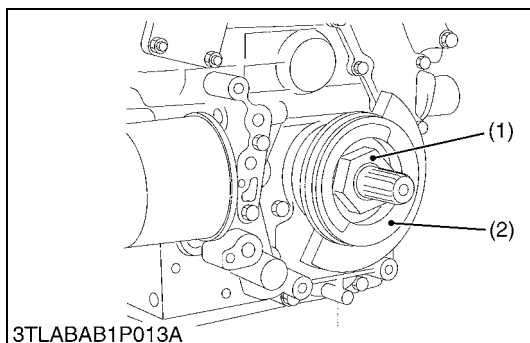
(4) Oil Cooler Joint Screw

9Y1211012ENS0048US0





## [8] 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

9Y1211012ENS0049US0

### Gear Case

1. Remove the gear case (1).
2. 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

9Y1211012ENS0050US0

### Crankshaft Oil Slinger

1. Remove the crankshaft collar (3).
2. Remove the O-ring (2).
3. Remove the crankshaft oil slinger (1).

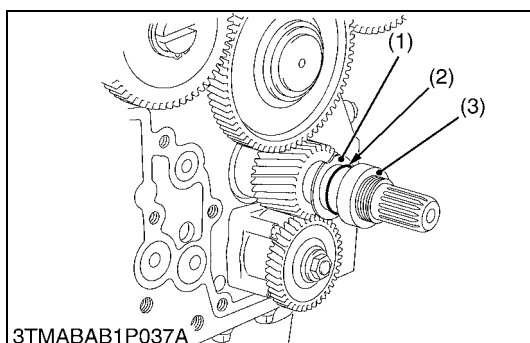
#### (When reassembling)

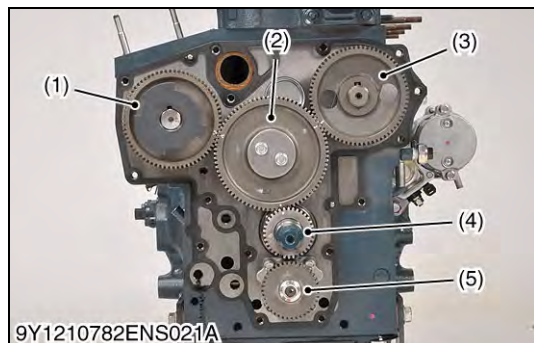
- Attach the crankshaft collar (3) after you install the gear case to the cylinder body.

- (1) Crankshaft Oil Slinger  
(2) O-ring

- (3) Crankshaft Collar

9Y1211012ENS0051US0





### Idle Gear (D1803-CR-E4)

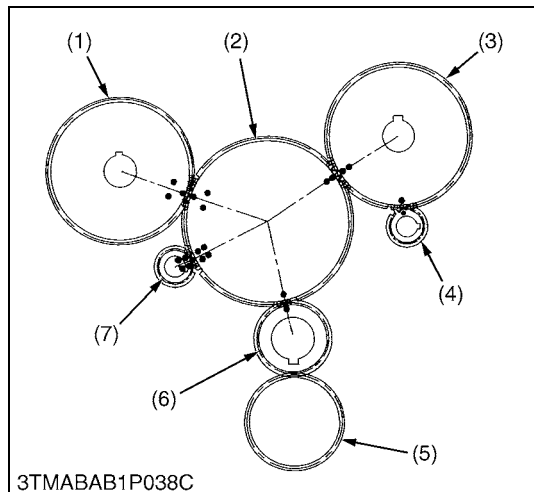
1. Remove the external snap ring.
2. Remove the idle gear collar.
3. Remove the idle gear (2).

#### (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 | (4) Crank Gear          |
| (2) Idle Gear             | (5) Oil Pump Drive Gear |
| (3) Cam Gear              |                         |

9Y1211012ENS0052US0



### Idle Gear (V2403-CR-E4)

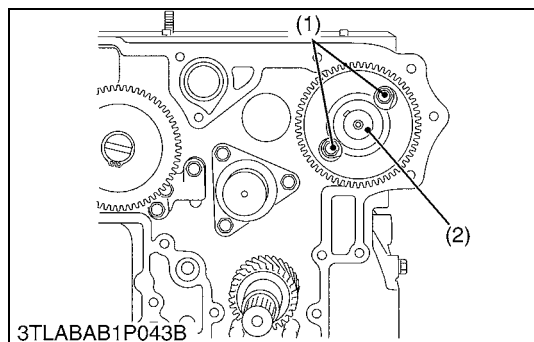
1. Remove the external snap ring.
2. Remove the idle gear collar.
3. Remove the idle gear (2).

#### (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 | (5) Oil Pump Drive Gear |
| (2) Idle Gear             | (6) Crank Gear          |
| (3) Cam Gear              | (7) Balancer Gear       |
| (4) Balancer Gear         |                         |

9Y1211012ENS0053US0



### Camshaft (D1803-CR-E4)

1. Remove the camshaft set screws (1) and pull out the camshaft (2).

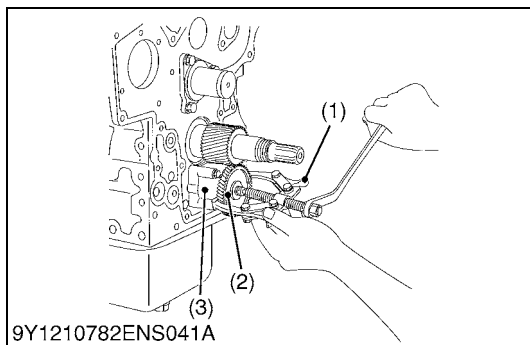
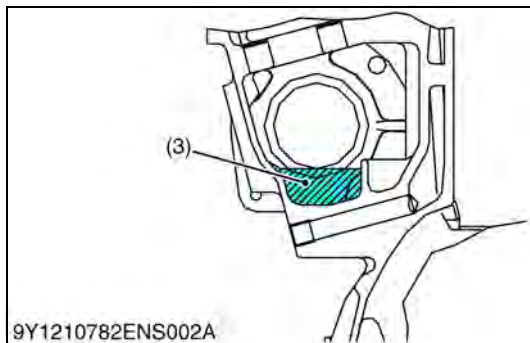
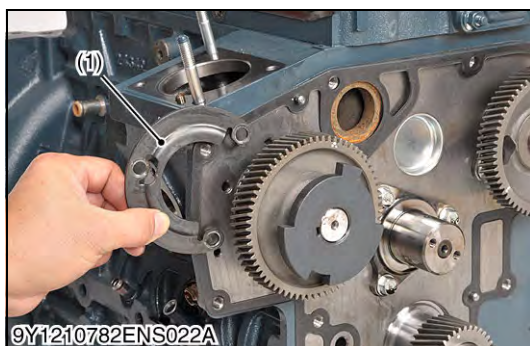
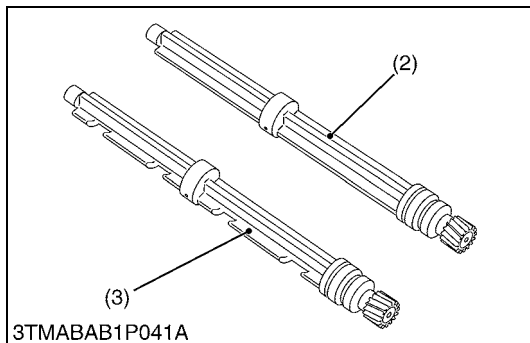
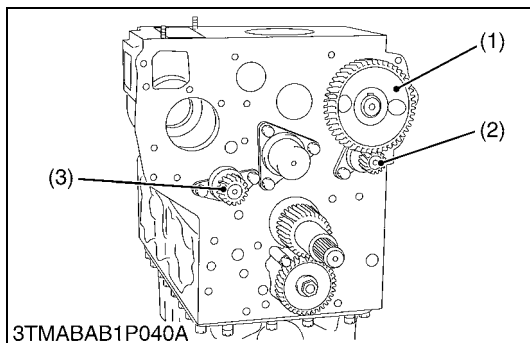
#### (When reassembling)

- 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 |
|------------------------|--------------|

9Y1211012ENS0054US0



### Camshaft and Balancer Shaft (V2403-CR-E4)

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

9Y1211012ENS0055US0

### Fuel Camshaft

1. Remove the fuel feed pump.
2. Remove the fuel camshaft stopper (1).
3. Pull out the fuel camshaft (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

9Y1211012ENS0056US0

### Oil Pump

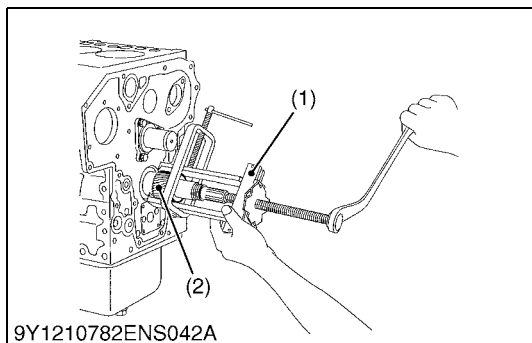
1. Remove the nut.
2. Pull out the oil pump drive gear (2) with a gear puller (1).
3. Remove the 4 mounting screws of the oil pump. Remove the oil pump (3).

(1) Gear Puller

(3) Oil Pump

(2) Oil Pump Drive Gear

9Y1211012ENS0057US0



### Crank Gear

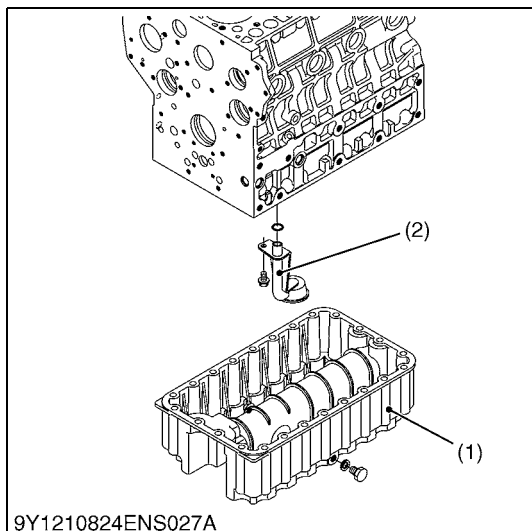
1. Pull out the crank gear (2) with a puller (1).
2. Remove the feather key.

(1) Puller

(2) Crank Gear

9Y1211012ENS0058US0

## [9] PISTON AND CONNECTING ROD



### 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**

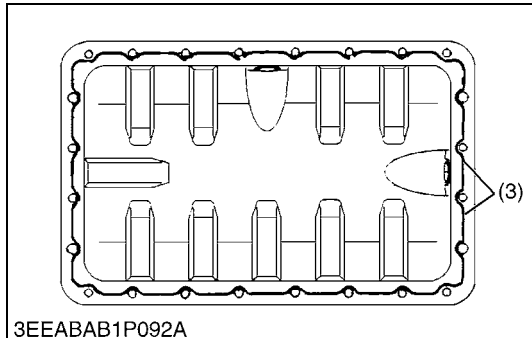
- **Make sure the surfaces align when mounting parts with a liquid gasket applied to them.**
- **Mount parts with a liquid gasket within 10 minutes of application.**
- **Tighten the mounting screws of the oil pan in diagonal sequence from the center to tighten equally.**
- **After cleaning the oil strainer, install it.**
- **Attach the oil pan with its central drain plug facing toward the air suction side.**

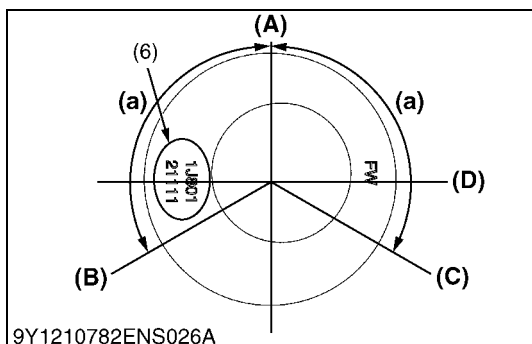
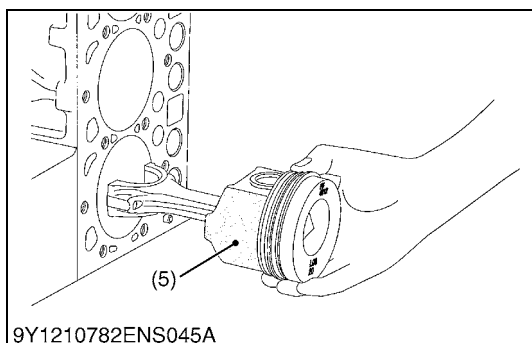
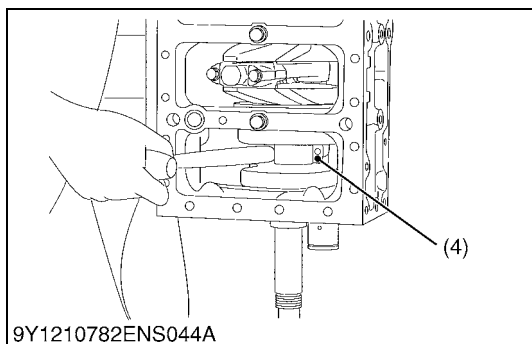
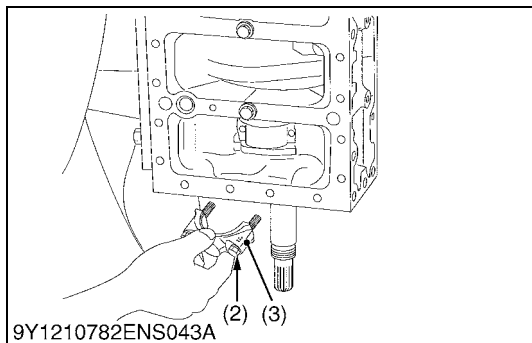
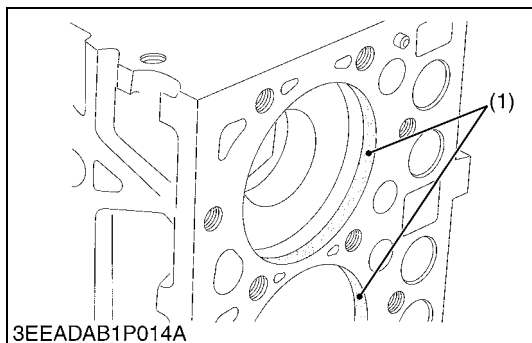
(1) Oil Pan

(3) Liquid Gasket

(2) Oil Strainer

9Y1211012ENS0059US0





## Pistons

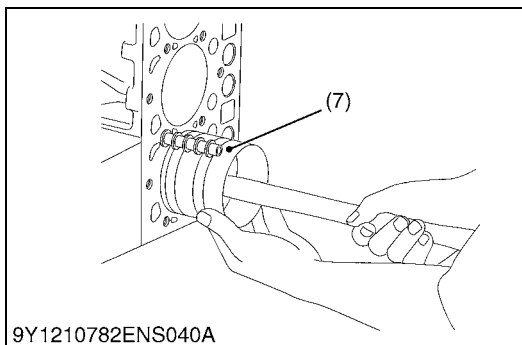
1. Fully clean the carbon (1) in the cylinders.
2. Remove the connecting rod cap (3).
3. Turn the flywheel and move the piston to top dead center.
4. Lightly tap the piston from the bottom of the crankcase with the grip of a hammer to pull the piston out.
5. Pull out the other piston in the same procedure 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.**

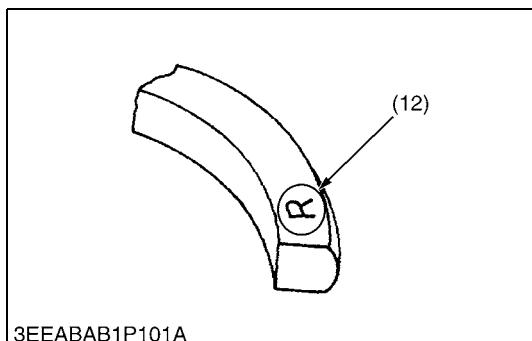
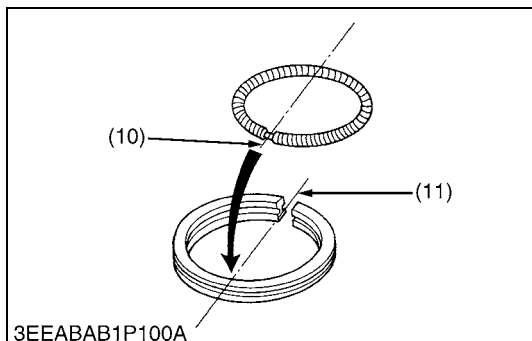
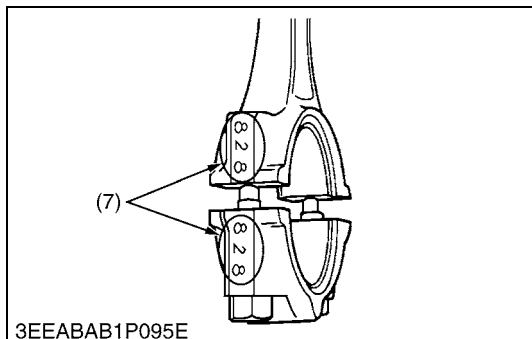
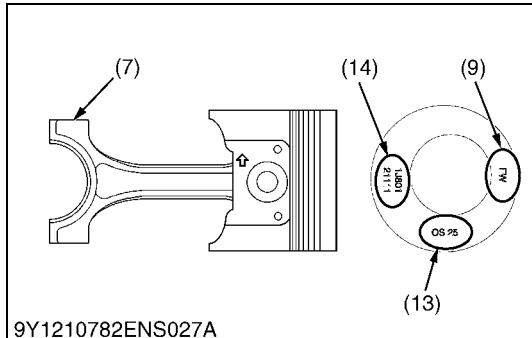
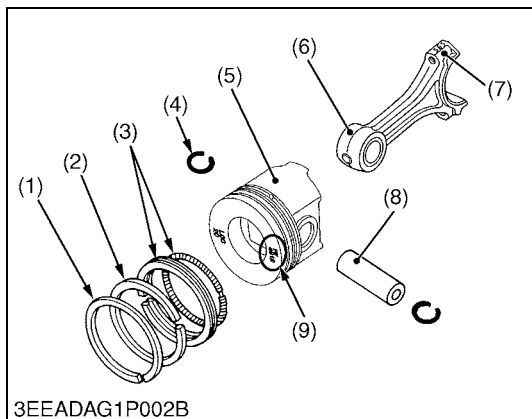


Tightening torque	Connecting rod screw	40 to 45 N·m 4.1 to 4.5 kgf·m 30 to 33 lbf·ft
-------------------	----------------------	---

- (1) Carbon
- (2) Connecting Rod Bolt
- (3) Connecting Rod Cap
- (4) Connecting Rod
- (5) Layer of Molybdenum Disulfide
- (6) Code Number
- (7) Piston Ring Compressor
- (8) Serration (Spiral)
- (9) Serration (Axial Direction)

- (A) Top Ring Gap
- (B) Second Ring Gap
- (C) Oil Ring Gap
- (D) Piston Pin Hole
- (a) 2.09 rad (120 °)

9Y1211012ENS0060US0



### 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.

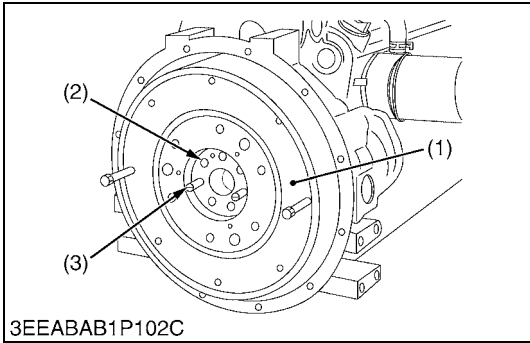
#### NOTE

- Put a mark on the connecting rod (6) and the piston (5) with the same number to keep the same combination.

- |                          |                        |
|--------------------------|------------------------|
| (1) Top Ring             | (8) Piston Pin         |
| (2) Second Ring          | (9) FW Mark            |
| (3) Oil Ring             | (10) Expander Joint    |
| (4) Piston Pin Snap Ring | (11) Oil Ring Gap      |
| (5) Piston               | (12) Manufacturer Mark |
| (6) Connecting Rod       | (13) Over Size Mark    |
| (7) Mark                 | (14) Part Number       |

9Y1211012ENS0061US0

[10] FLYWHEEL AND CRANKSHAFT



Flywheel

- 1. Attach the stopper to the flywheel (1).
- 2. Remove 2 flywheel screws (2).
- 3. Put the 2 flywheel guide screws (3) in the holes.
- 4. Remove all the flywheel screws (2).
- 5. Remove the flywheel (1) slowly along the flywheel guide screws (3).

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 (3).
- 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 N·m 10.0 to 11.0 kgf·m 72.4 to 79.5 lbf·ft
-------------------	----------------	--

- (1) Flywheel
- (2) Flywheel Screw
- (3) Flywheel Guide Screw

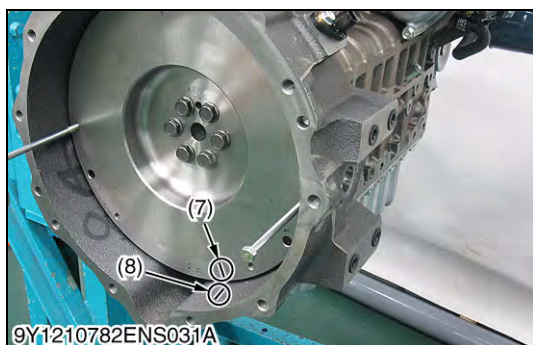
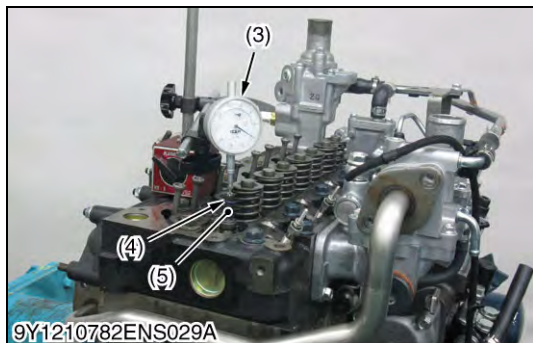
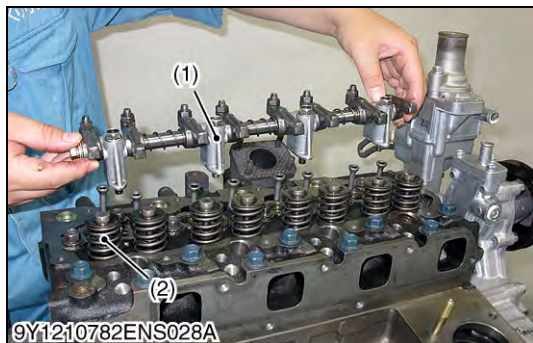
9Y1211012ENS0062US0



**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.

9Y1211012ENS0063US0

**Confirmation of Top Dead Center**

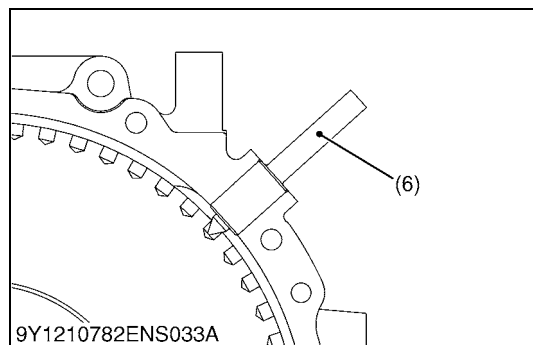
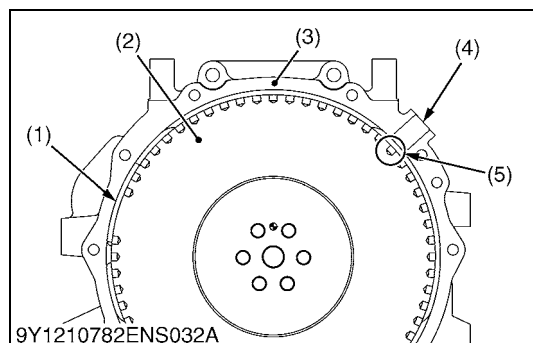
1. Remove the rocker arm (1). (See page 1-S45.)
2. Align the #4 piston with top dead center and remove the valve spring (2) of the #4 cylinder
3. Insert an O-ring (4) to prevent the exhaust valve (5) from falling into the cylinder and position the dial gauge (3) at the tip of the valve.
4. While turning 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 shown in the picture to the left. Mark the reference line (8) on the engine body side and put a mark for top dead center (7) on the flywheel 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

9Y1211012ENS0064US0



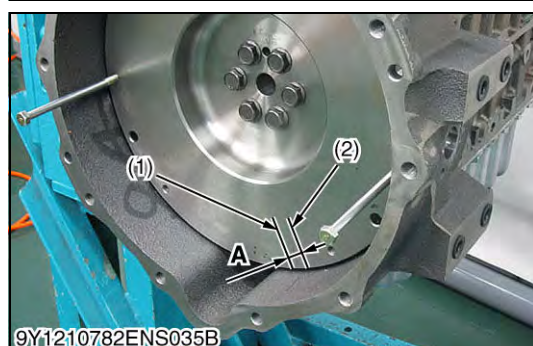
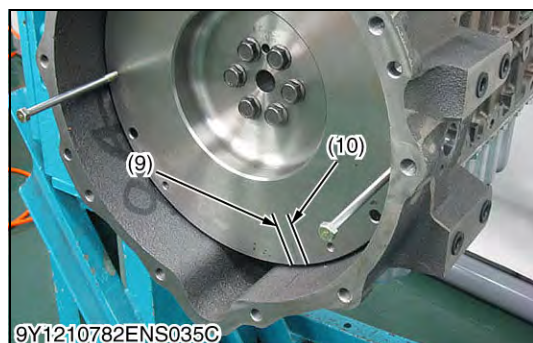
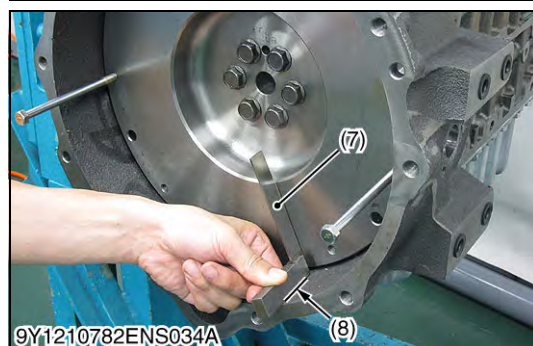


### Confirmation of Crank Position Sensor Top Dead Center Detection Position

1. Align the 20th pulsar hole (5) from the area where there is no pulsar 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 timing top correction handle (6) into the crank position sensor mounting hole and align the center of handle and pulsar.
3. This position is the crank position sensor top dead center detection position, so set the tri-square (7) on the reference line (9) as mentioned in the previous item and put a mark for crank position sensor detecting top dead center position (10) on the flywheel.

- |  |  |
|--|--|
| (1) Area where there is no pulsar hole     | (7) Tri-square   |
| (2) Flywheel                               | (8) Reference Line   |
| (3) Flywheel Housing                       | (9) Mark for Top Dead Center   |
| (4) Crank Position Sensor Mounting Hole    | (10) Mark for Crank Position Sensor Detecting Top Dead Center Detection Position |
| (5) 20th Pulsar Hole                       |  |
| (6) Injection Timing Top Correction Handle |  |

9Y1211012ENS0065US0



### 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.

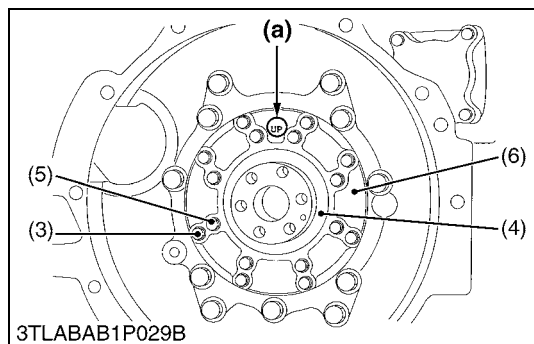
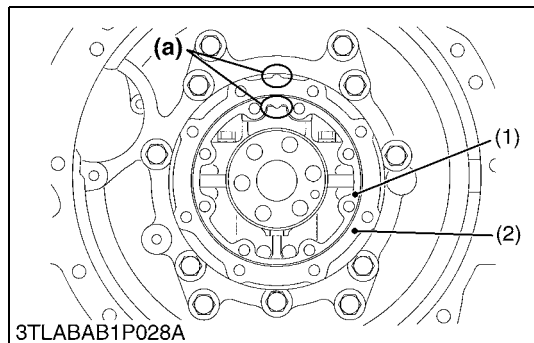
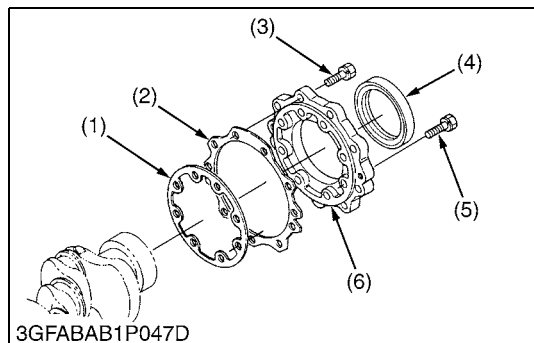
Calculate the correction value referencing the following and using a diagnostics tool, overwrite the injection timing correction amount in the "data overwrite/confirmation".

#### **(Reference)**

- 1 mm: 0.28 °
- 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 |
|------------------------------|--|

9Y1211012ENS0066US0



### 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.

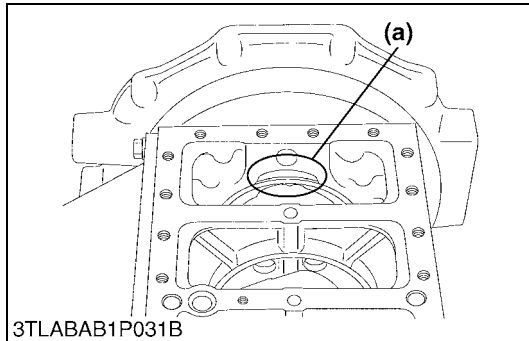
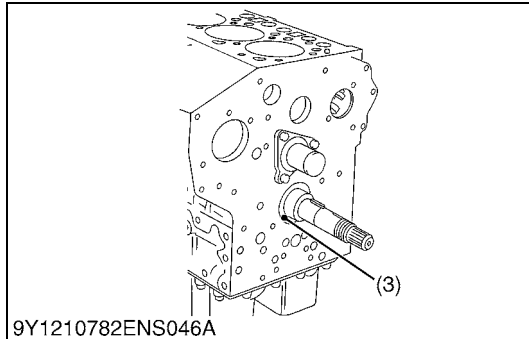
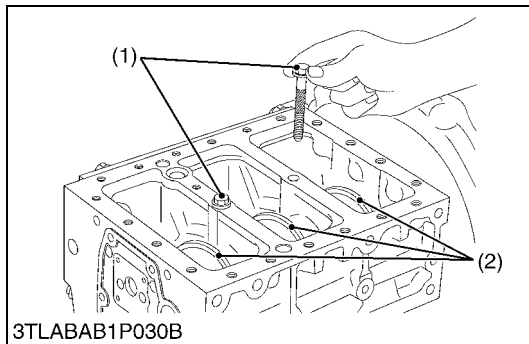
#### (When reassembling)

- 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                                  | (5) Inner Screw (Mounting Bolt of Bearing Case Cover) |
| (2) Bearing Case Cover Gasket                            | (6) Bearing Case Cover                                |
| (3) External Screw (Mounting Bolt of Bearing Case Cover) |   |
| (4) Oil Seal   | (a) Upside  |

9Y1211012ENS0067US0



## 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]

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.

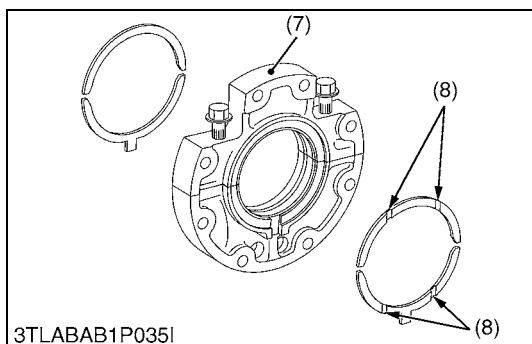
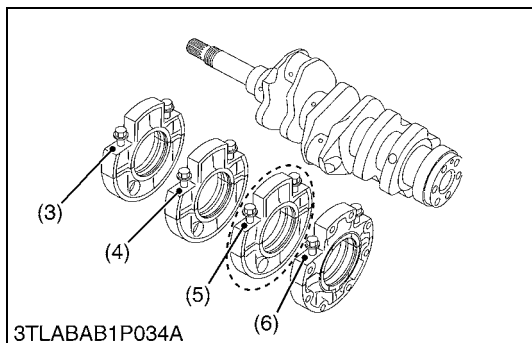
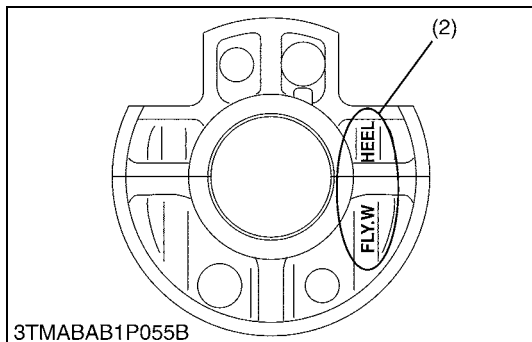
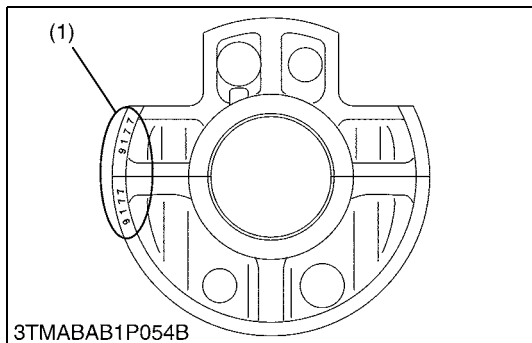
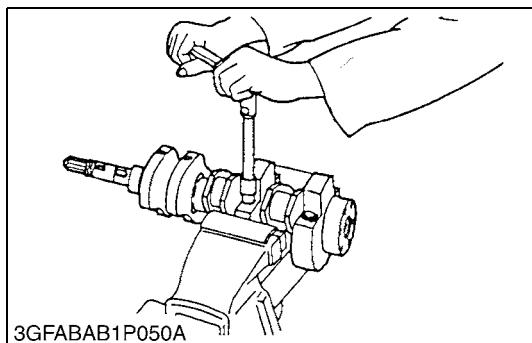
Then tighten the screw 2 to the specified tightening torque with a torque wrench.

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

9Y1211012ENS0068US0



### Main Bearing Case Assembly

1. Remove the screws 1 of the main bearing case (7). Then remove the main bearing case.
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) and mark (2) on the main bearing case.
- When you install the main bearing case 1 and 2, point the mark "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 (7) to the specified torque, make sure that the main bearing case moves smoothly.

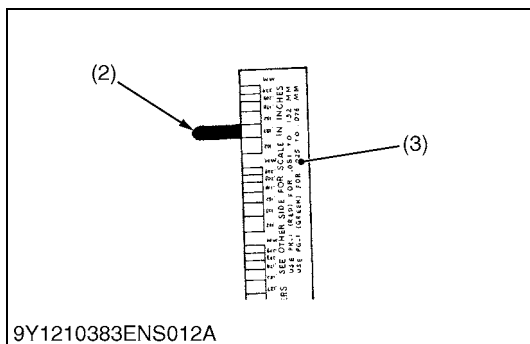
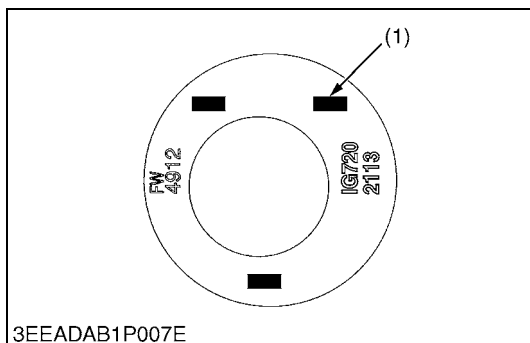
Tightening torque	Screw 1 of main bearing case	46 to 50 N·m 4.7 to 5.2 kgf·m 34 to 37 lbf·ft
-------------------	------------------------------	---

- |                      |                                  |
|----------------------|----------------------------------|
| (1) Alignment Number | (5) C                            |
| (2) Alignment Mark   | (6) No Mark                      |
| (3) A                | (7) Screw 1 of Main Bearing Case |
| (4) B                | (8) Oil Groove                   |

9Y1211012ENS0069US0

## 7. SERVICING

### [1] CYLINDER HEAD AND VALVES



#### 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.

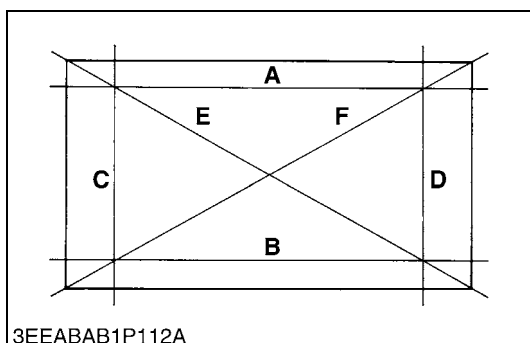
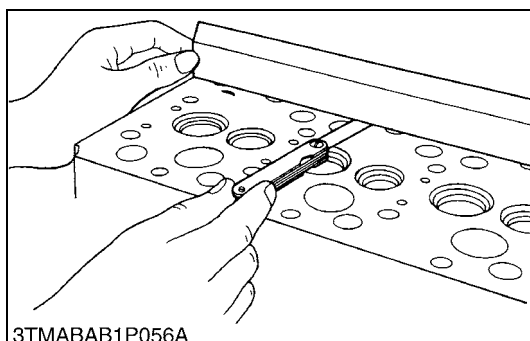
#### NOTE

- 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 mounting screw	93.2 to 98.0 N·m 9.50 to 10.0 kgf·m 68.8 to 72.3 lbf·ft

- (1) Plastigauge (3) Scale  
(2) Crushed Plastigauge

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#### Cylinder Head Surface Flatness

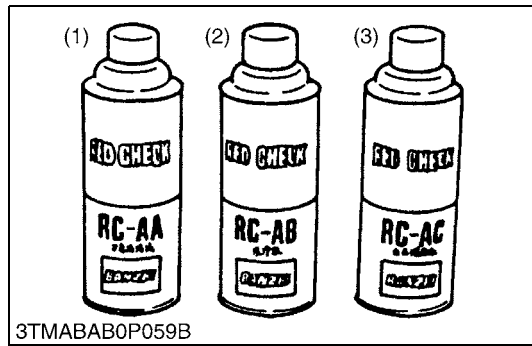
1. Clean the cylinder head surface.
2. Put a straightedge on the cylinder head.
3. Measure the clearance with a feeler gauge at the 6 places (see the figure).
4. If the measurement is more than the allowable limit, make it straight with a surface grinder.

#### IMPORTANT

- Do not put a straightedge on the combustion chamber.
- Check the valve recessing after you correct.

Cylinder head surface flatness	Allowable limit	0.05 mm 0.002 in.
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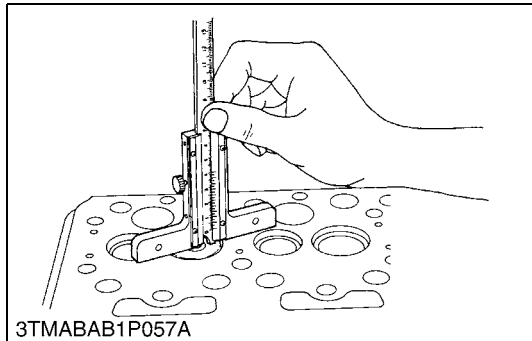
### Cylinder Head Flaw

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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### Valve Recessing

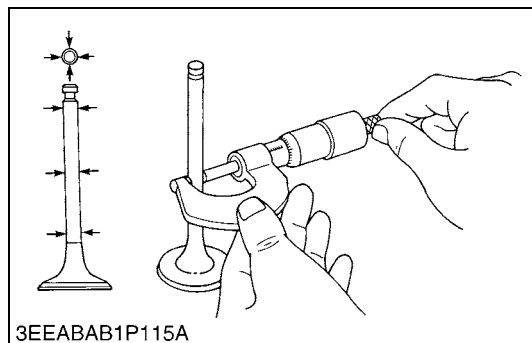
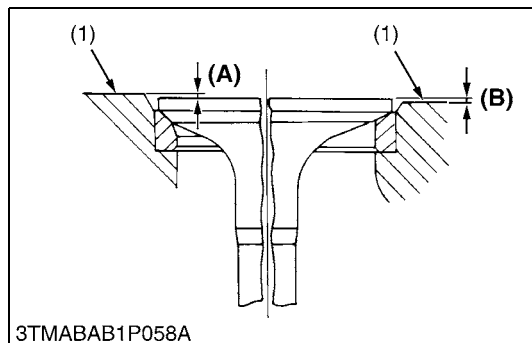
1. Clean the cylinder head surface, valve face and valve seat.
2. Set the valve into the valve guide.
3. Measure the valve recessing with a depth gauge.
4. If the measurement is more than the allowable limit, replace the valve.
5. If it stays more than the allowable limit after you replace the valve, 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.

(1) Cylinder Head Surface

(A) Recessing  
(B) Protrusion

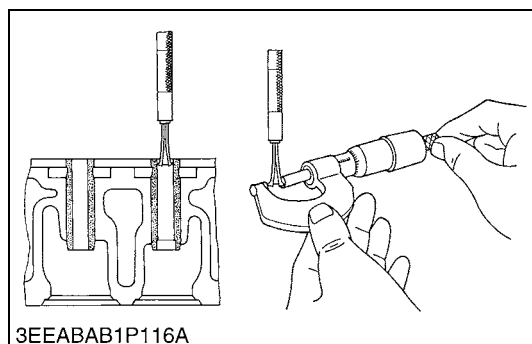
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### Clearance between Valve Stem and Valve Guide

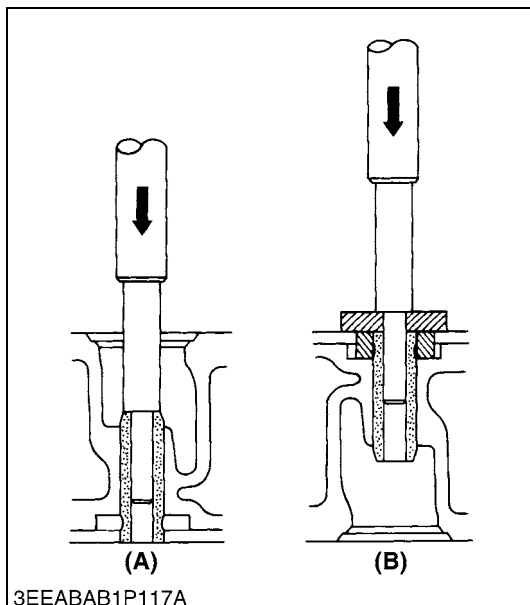
1. Remove carbon from the valve guide section.
2. Measure the valve stem O.D. with an external micrometer.
3. Measure the valve guide I.D. with a small hole gauge, and calculate the clearance.
4. If the clearance is more than the allowable limit, replace the valves.
5. If the clearance stays more than 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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### Replacement of Valve Guide

#### (When removing)

1. Press out the used valve guide with the valve guide replacing tool. (See page G-83.)

#### (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.
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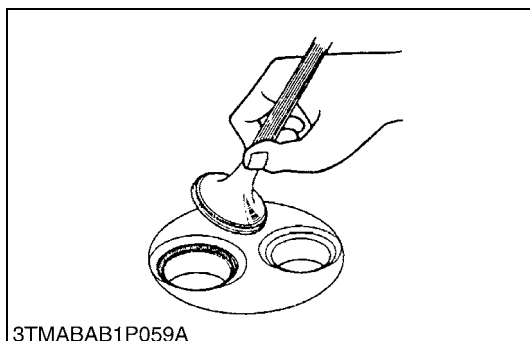
#### ■ IMPORTANT

- Do not hit the valve guide with a hammer during replacement.

(A) When Removing

(B) When Installing

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### Valve Seating

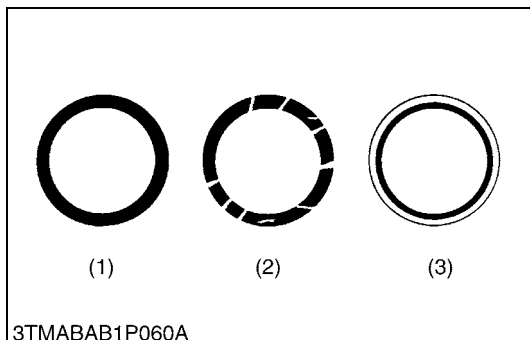
1. Apply a thin layer of Prussian Blue on the valve face. Then put the valve on its seat to check the contact.
2. If the valve is not fully around the seat or the contact is less than 70 % of the factory specification, correct the valve seat. See the next section.
3. If the valve contact width cannot get the factory specification, replace the valve or correct the contact of the valve seat.

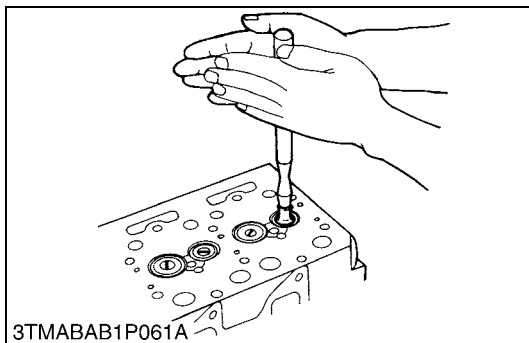
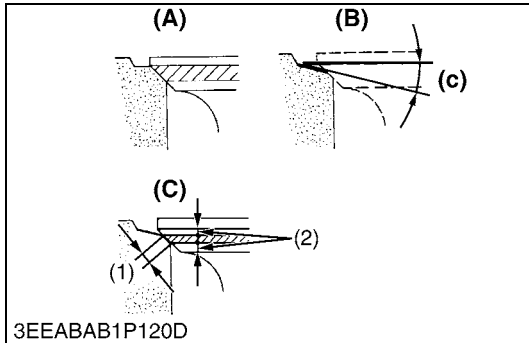
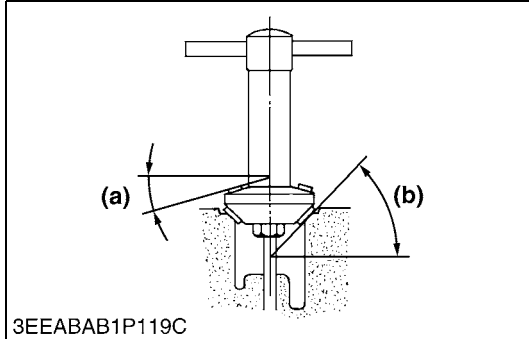
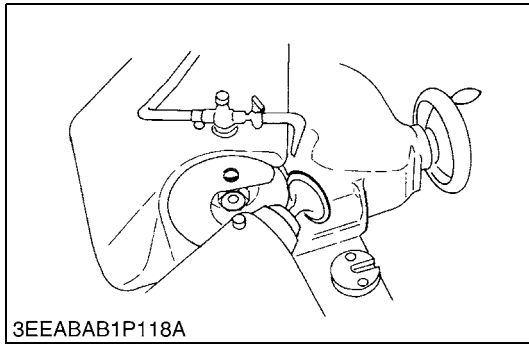
Valve contact width	Factory specification	2.12 mm 0.0835 in.
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- (1) Correct  
(2) Incorrect

(3) Incorrect

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## Correction of Valve and Valve Seat

### NOTE

- Before you correct the valve and seat, check 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 check the valve recessing.

### 1) Correction of valve

- 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

- Slightly correct the seat surface with a 1.0 rad (60 °) or 0.79 rad (45 °) valve seat cutter.
- 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.).
- After you correct the seat, check 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.
- Check 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) Check the Contact  
(B) Correct Seat Width  
(C) Check 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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## Valve Lapping

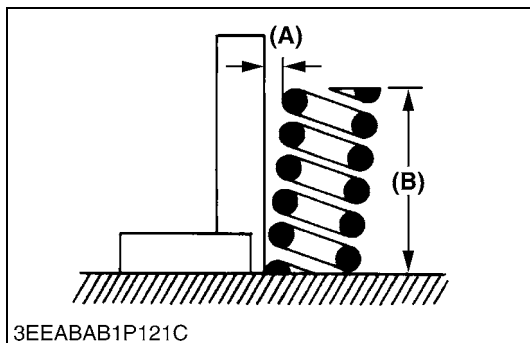
- Apply the compound equally to the valve lapping surface.
- Put the valve into the valve guide. Lap the valve on its seat with a valve lapping tool.
- After you lap the valve, clean away the compound and apply oil, then lap the valve again with oil.
- Apply Prussian Blue to the contact surface to measure the seated rate.
- If the seated rate is less than 70 %, lap the valve again.

### IMPORTANT

- After you complete the valve lapping and assemble the valve, check the valve recessing and adjust the valve clearance.

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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. Check the full surface of the valve spring for scratches.
8. If there is a problem, replace it.

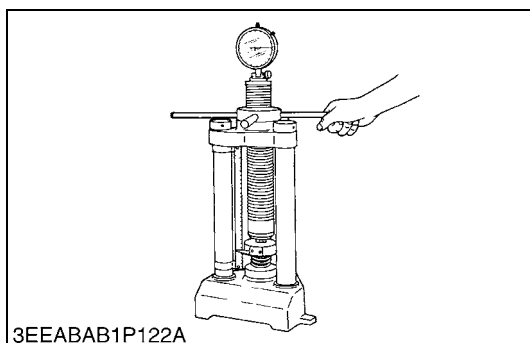
Tilt <b>(A)</b>	Allowable limit	1.0 mm 0.039 in.
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Free length <b>(B)</b>	Factory specification	41.7 to 42.2 mm 1.65 to 1.66 in.
	Allowable limit	41.2 mm 1.62 in.

(A) Tilt

(B) Free Length

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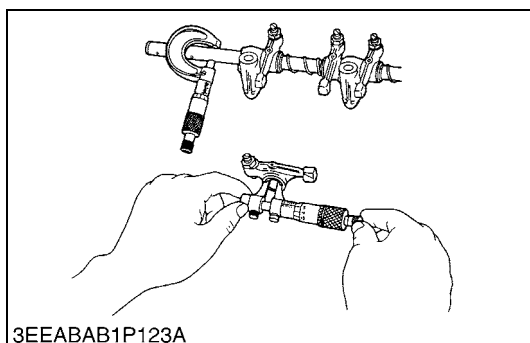


### Setting Load of Valve Spring

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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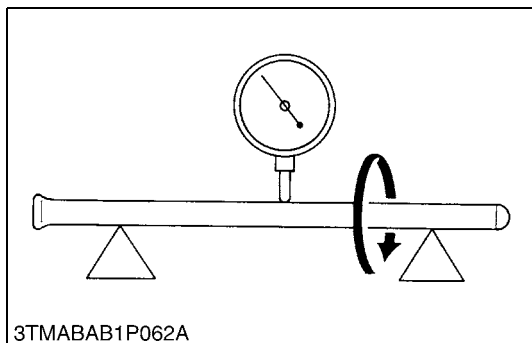
### Oil Clearance between Rocker Arm and Rocker Arm Shaft

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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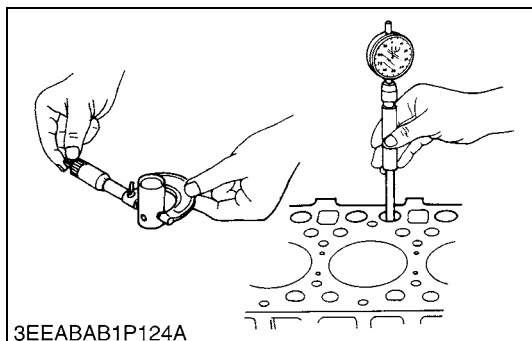


### **Push Rod Bend**

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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### **Oil Clearance between Tappet and Tappet Guide Bore**

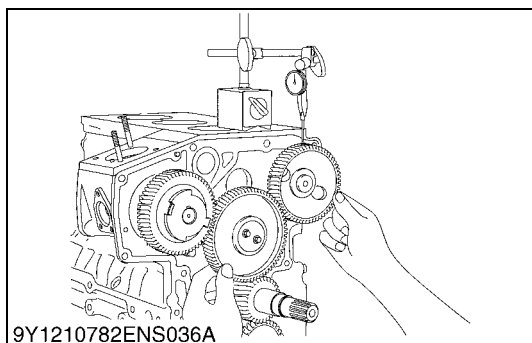
1. Measure the tappet O.D. with an external micrometer.
2. Measure the tappet guide bore I.D. with a cylinder gauge.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit or the tappet has a damage, replace the tappet.

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



### 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.

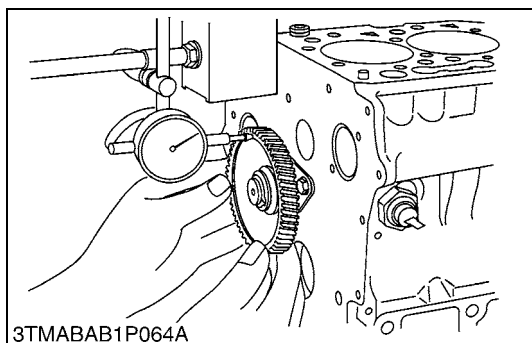
Backlash between crank gear and oil pump gear	Factory specification	0.04150 to 0.1090 mm 0.001634 to 0.004291 in.
	Allowable limit	0.15 mm 0.0059 in.

### [V2403-CR-E4]

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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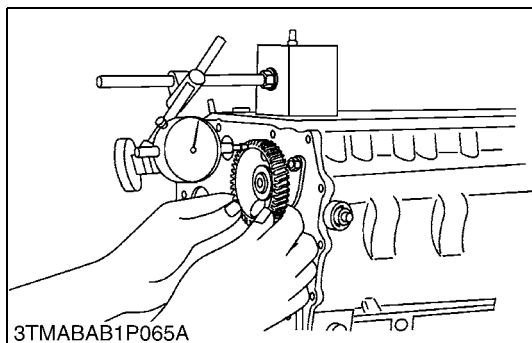


### Side Clearance of Idle Gear

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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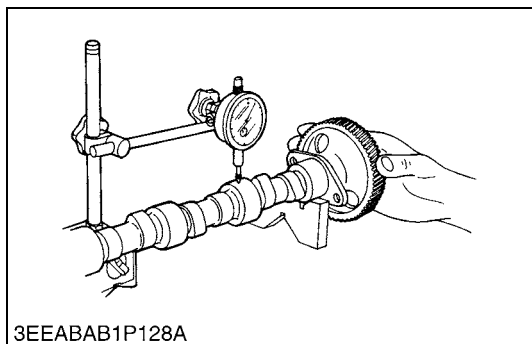


### Side Clearance of Camshaft

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.

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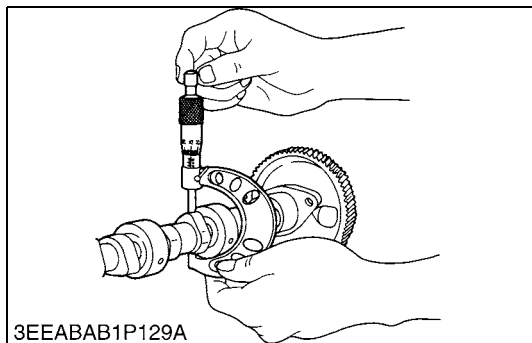


### Camshaft Bend

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.
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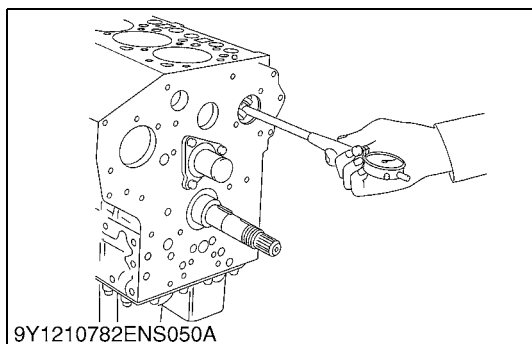
### Cam Height

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.

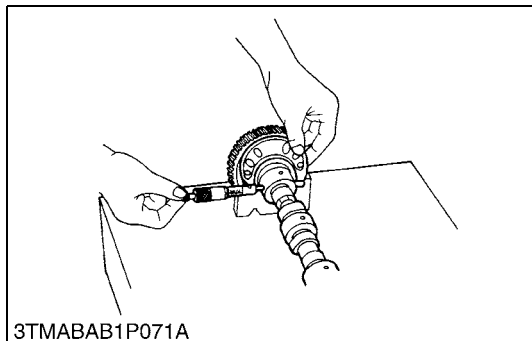
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### Oil Clearance of Camshaft Journal

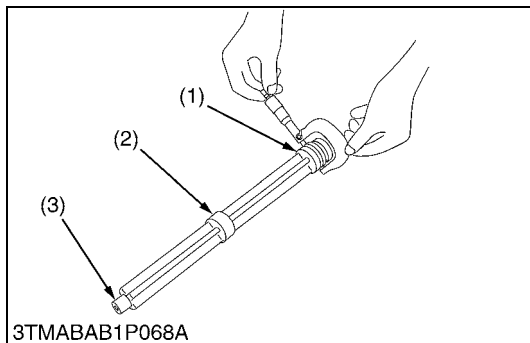
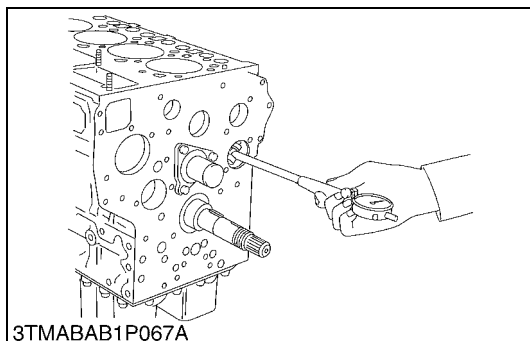
1. Measure the camshaft journal O.D. with an external micrometer.
2. Measure the cylinder block bore I.D. for the camshaft with a cylinder gauge.
3. Calculate the oil clearance.
4. If the oil clearance is more than the allowable limit, replace the camshaft.

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.

9Y1211012ENS0089US0



### Oil Clearance of Balancer Shaft Journal (V2403-CR-E4)

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.

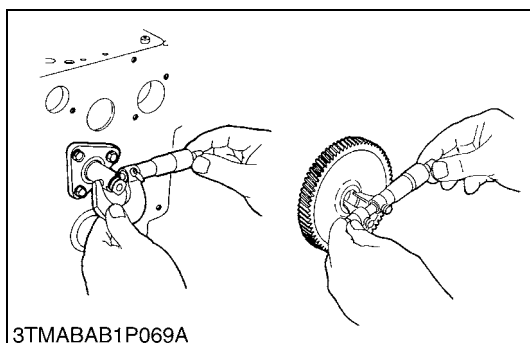
Oil clearance of balancer shaft journal 3	Factory specification	0.020 to 0.094 mm 0.00079 to 0.0037 in.
	Allowable limit	0.20 mm 0.0079 in.

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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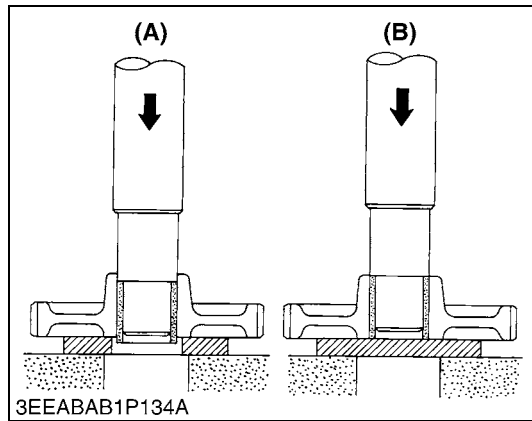
### Oil Clearance between Idle Gear Shaft and Idle Gear Bushing

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.

9Y1211012ENS0091US0



### Replacement of Idle Gear Bushing

#### (When removing)

1. Press out the used idle gear bushing with the replacing tool.  
(See page G-83.)

#### (When installing)

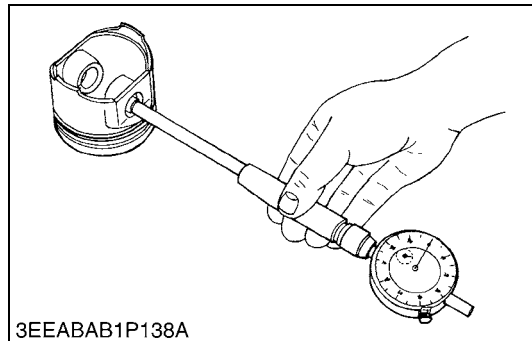
1. Clean a new idle gear bushing and idle gear bore, and apply engine oil to them.
2. Press fit the new bushing with the replacing tool.  
Make sure that the bushing end aligns the end of the idle gear.

(A) When Removing

(B) When Installing

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## [3] PISTON AND CONNECTING ROD

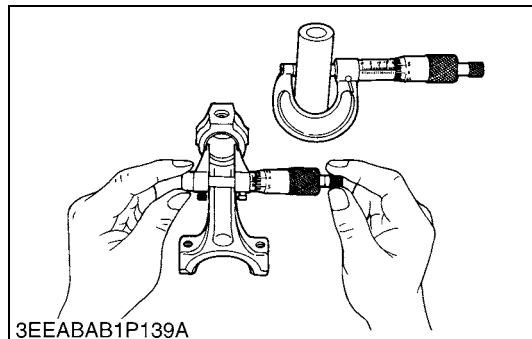


### Piston Pin Bore I.D.

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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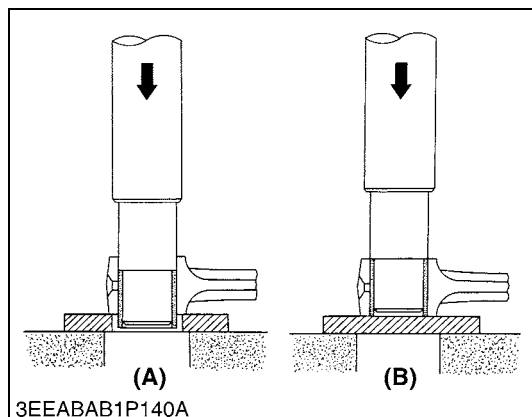
### Oil Clearance between Piston Pin and Small End Bushing

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.

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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-83.)

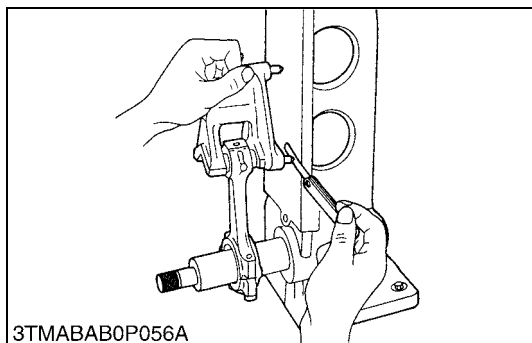
#### (When installing)

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

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### Connecting Rod Alignment

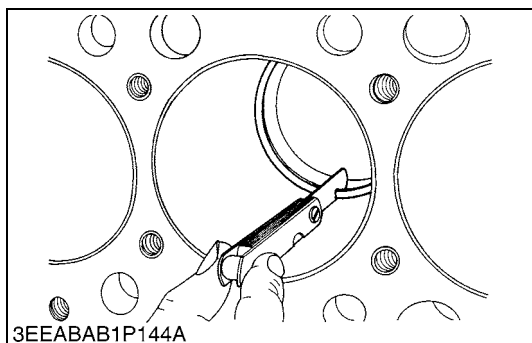
#### ■ NOTE

- 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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9Y1211012ENS0096US0



### Piston Ring Gap

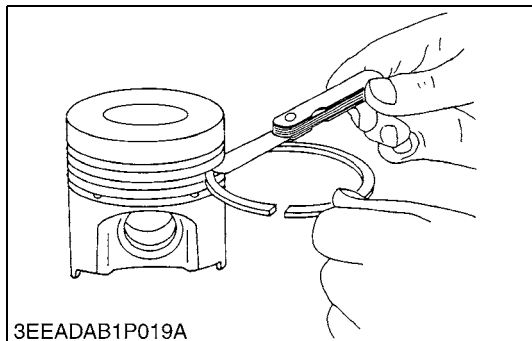
1. Put the piston ring into the lower part of the liner (the least worn out part) with the piston.
2. Measure the ring gap with a feeler gauge.
3. If the ring gap is more than the allowable limit, replace the ring.

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	0.30 to 0.45 mm 0.012 to 0.017 in.
	Allowable limit	1.25 mm 0.0492 in.

Oil ring	Factory specification	0.20 to 0.40 mm 0.0079 to 0.015 in.
	Allowable limit	1.25 mm 0.0492 in.

9Y1211012ENS0097US0



### 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.

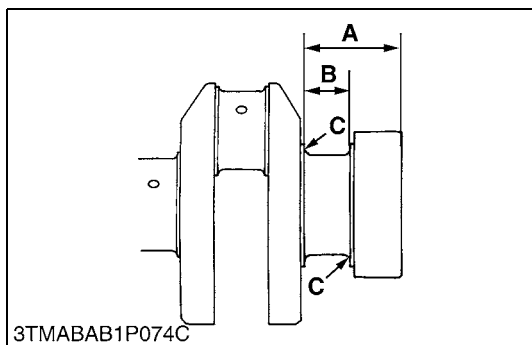
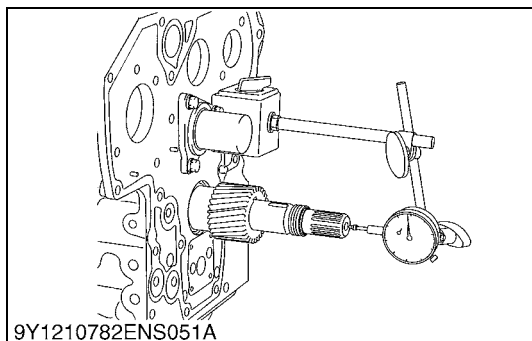
Top ring	Factory specification	0.050 to 0.090 mm 0.0020 to 0.0035 in.
	Allowable limit	0.20 mm 0.0079 in.

Second ring	Factory specification	0.0780 to 0.110 mm 0.00307 to 0.00433 in.
	Allowable limit	0.20 mm 0.0079 in.

Oil ring	Factory specification	0.030 to 0.070 mm 0.0012 to 0.0027 in.
	Allowable limit	0.15 mm 0.0059 in.

9Y1211012ENS0098US0

## [4] CRANKSHAFT



### 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)

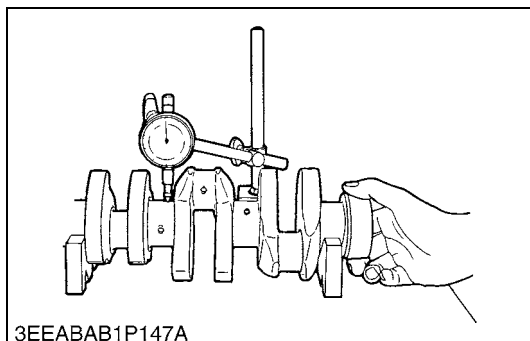
- Oversize dimensions of crankshaft journal

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  $R_{max} = 0.4S$

9Y1211012ENS0099US0



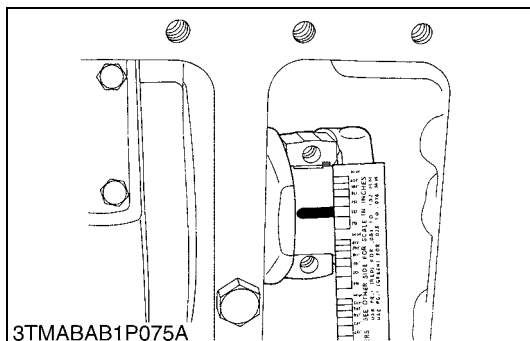


### Crankshaft Bend

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.
-----------------	-----------------	----------------------

9Y1211012ENS0100US0



### 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.

#### 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.

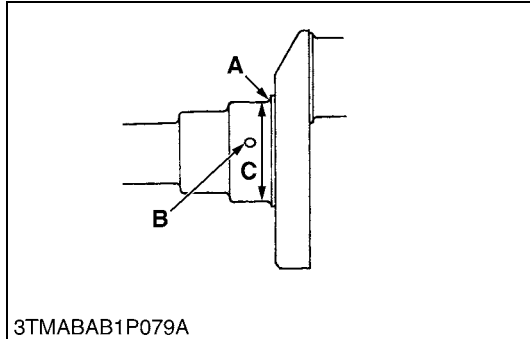
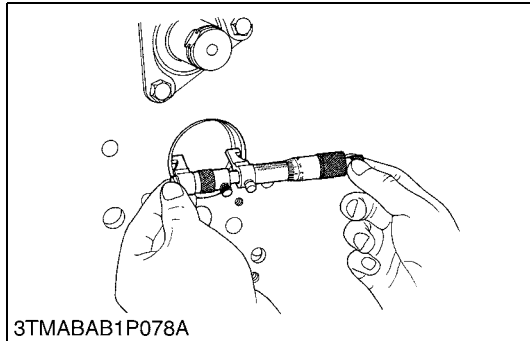
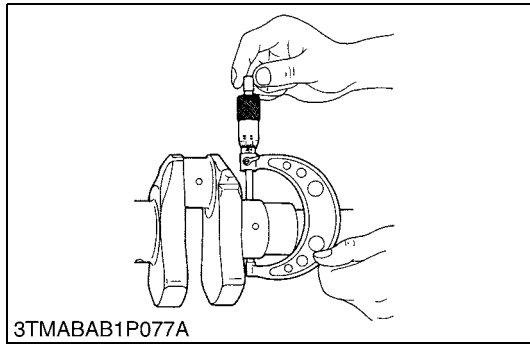
Crankpin O.D.	Factory specification	46.959 to 46.975 mm 1.8488 to 1.8494 in.
Crankpin bearing I.D.	Factory specification	47.000 to 47.046 mm 1.8504 to 1.8522 in.

### (Reference)

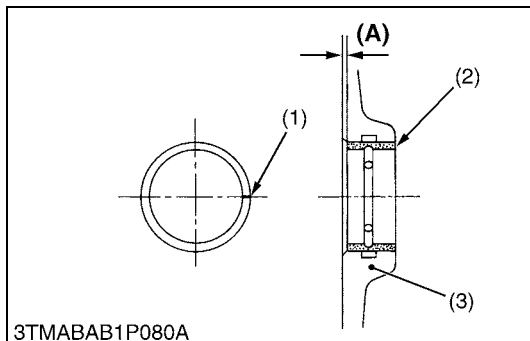
- Undersize dimensions of crankpin

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.		

9Y1211012ENS0101US0



3TMABAB1P079A



3TMABAB1P080A

### 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.		

9Y1211012ENS0102US0

### Replacement of Crankshaft Bearing 1

#### (When removing)

1. Press out the used crankshaft bearing 1 with the replacing tool.  
(See page G-84.)

#### (When installing)

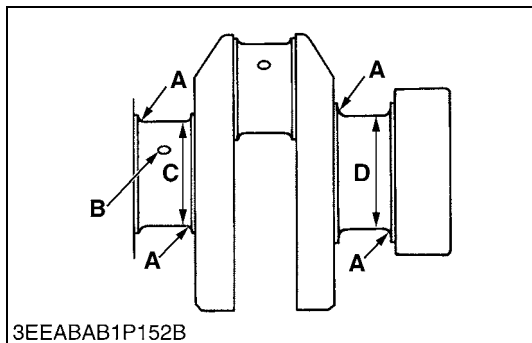
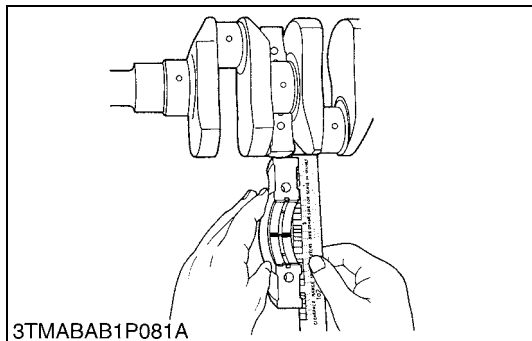
1. Clean a new crankshaft bearing 1 and crankshaft journal bore, and apply engine oil to them.
2. Make sure that the seam (1) of the new bearing 1 (2) points to the exhaust manifold side (see the figure). Then press fit the new bearing 1 (2) with the replacing tool.

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

9Y1211012ENS0103US0



### 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 bearing 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.

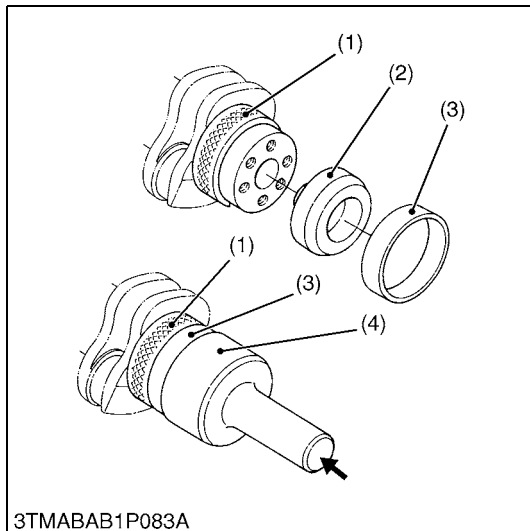
Crankshaft journal O.D.	Factory specification	59.921 to 59.940 mm 2.3591 to 2.3598 in.
Crankshaft bearing 2 I.D.	Factory specification	59.980 to 60.025 mm 2.3615 to 2.3631 in.

#### (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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### Replacement of Crankshaft Sleeve

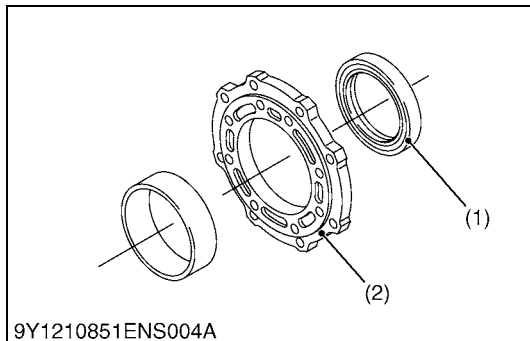
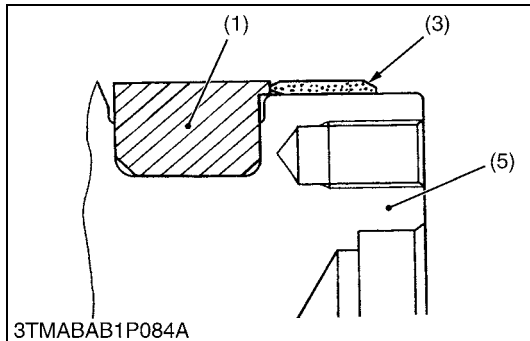
1. Remove the used crankshaft sleeve (3).
2. Set the sleeve guide (2) to the crankshaft (5).
3. Set the stopper (1) to the crankshaft (5) (see the figure).
4. Increase the temperature of a new sleeve to between 150 and 200 °C (302 and 392 °F).
5. Install the sleeve to the crankshaft with the auxiliary socket for pushing (4) (see the figure). (See page G-81.)

#### 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           | (4) Auxiliary Socket for Pushing |
| (2) Sleeve Guide      | (5) Crankshaft                   |
| (3) Crankshaft Sleeve |                                  |

9Y1211012ENS0105US0



### Replacement of Bearing Case Cover Oil Seal

#### (When removing)

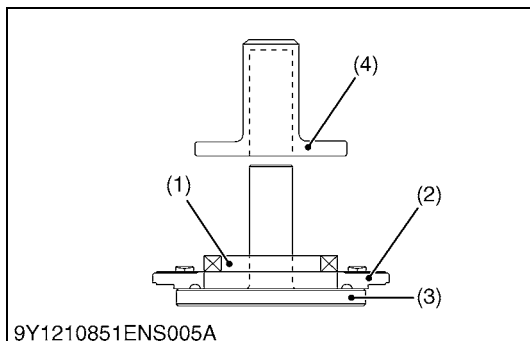
1. Remove the used oil seal by using appropriate tool and be careful not to scratch the bearing case cover.

#### (When installing)

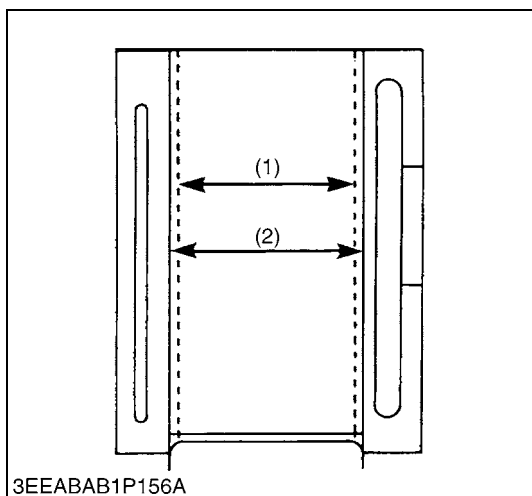
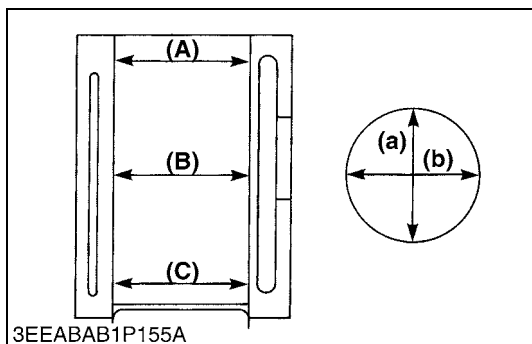
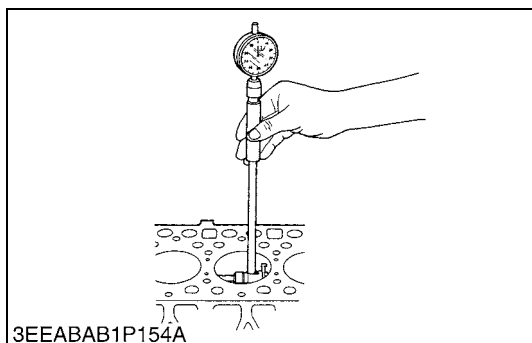
1. Clean a new oil seal (1) and bearing case cover (2).
2. Set the bearing case cover on the replacing tool 1 (3) and fix it with bolts.
3. Apply a layer of engine oil to the seal outer periphery.
4. Install the oil seal into the bearing case cover by using the replacing tool 2 (4) as shown in the figure, until it is flush with the bearing case cover.

- |                        |                      |
|------------------------|----------------------|
| (1) Oil Seal           | (3) Replacing Tool 1 |
| (2) Bearing Case Cover | (4) Replacing Tool 2 |

9Y1211012ENS0106US0



## [5] CYLINDER



### 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)**" on page 1-S79.).
5. Check the cylinder wall for scratches. If you find deep scratches, bore the cylinder. (Refer to "**Cylinder Correction (Oversize)**" on page 1-S79.)

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

9Y1211012ENS0107US0

### 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 $\mu$ mRz. (0.000087 to 0.000118 in.Rz)	

2. Replace the piston and piston rings with oversize ones.  
Oversize: 0.25 mm (0.0098 in.)

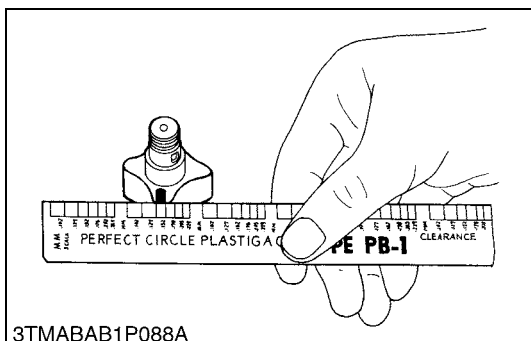
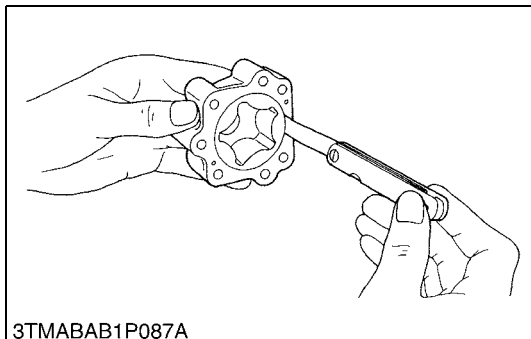
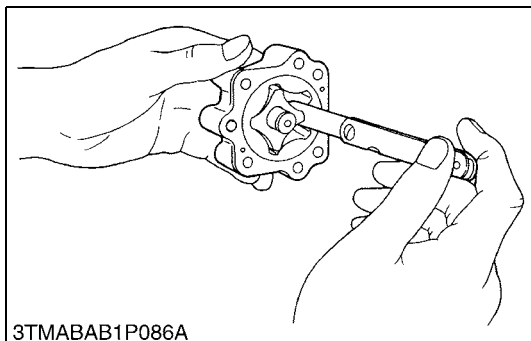
#### NOTE

- 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)

9Y1211012ENS0108US0

## [6] OIL PUMP



### 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.

9Y1211012ENS0109US0

### 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.

9Y1211012ENS0110US0

# **2 CLUTCH**

# MECHANISM

## CONTENTS

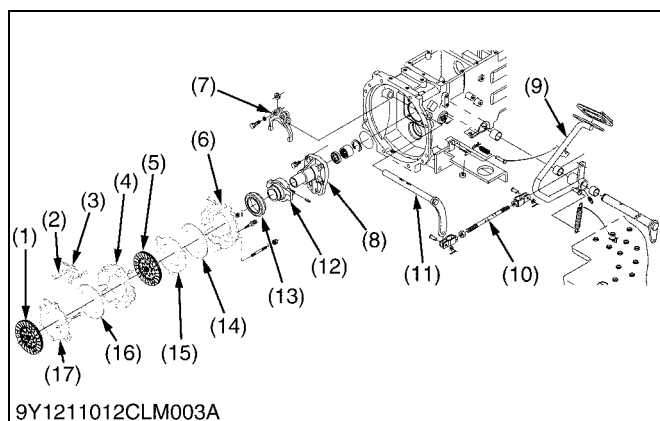
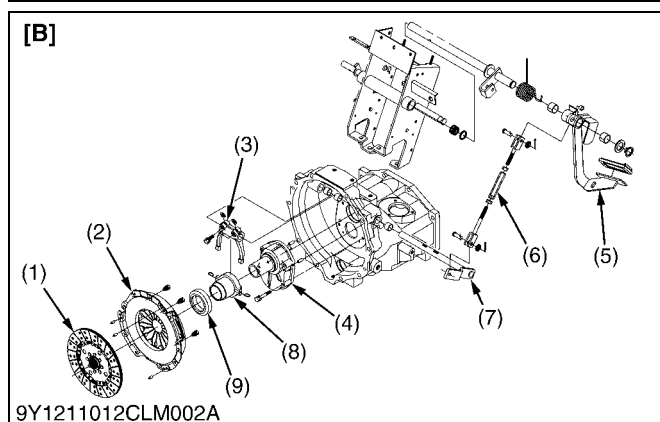
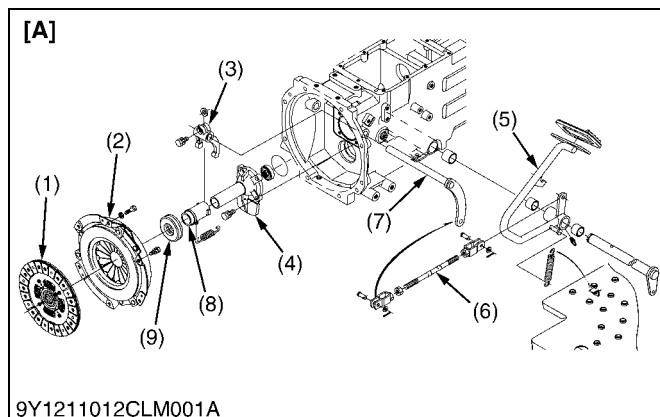
- 1. FEATURE ..... 2-M1
  - [1] TRAVELING CLUTCH..... 2-M1
    - (1) Manual Transmission Model..... 2-M1
    - (2) Hydrostatic Transmission (HST) Model..... 2-M2



# 1. FEATURE

## [1] TRAVELING CLUTCH

### (1) Manual Transmission Model



#### Single Stage Clutch (L3301, L4701)

Manual Transmission Model (L3301, L4701) are equipped with the single stage clutch.

The clutch is located between the engine and the transmission and is operated by stepping on the clutch pedal.

When the clutch pedal is depressed, the clutch is disengaged. And when the clutch pedal is released, the clutch is engaged and power from the engine is transmitted to the transmission.

- |                             |                     |
|-----------------------------|---------------------|
| (1) Clutch Disc             | (7) Clutch Lever    |
| (2) Pressure Plate Assembly | (8) Release Hub     |
| (3) Release Fork            | (9) Release Bearing |
| (4) Shaft Case              |                     |
| (5) Clutch Pedal            |                     |
| (6) Clutch Rod              |                     |

**[A] L3301**

**[B] L4701**

9Y1211012CLM0001US0

#### Dual Stage Clutch (L3901)

Manual Transmission Model (L3901) is equipped with dual stage clutch.

The clutch is located between the engine and the transmission and is operated by stepping on the clutch pedal.

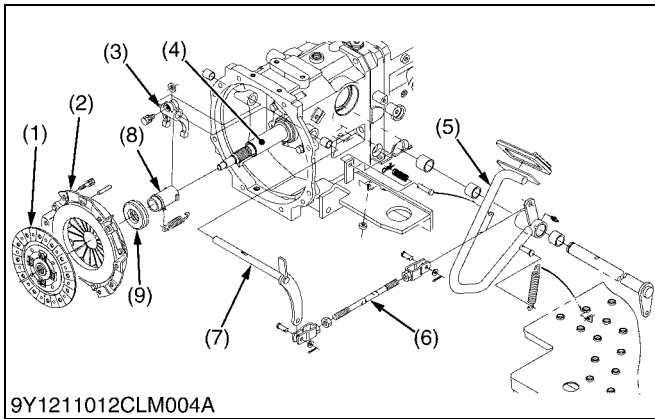
When the clutch pedal is depressed, the clutch is disengaged. And when the clutch pedal is released, the clutch is engaged and power from the engine is transmitted to the transmission.

Tractors equipped with dual stage clutch have a live PTO function which enables stoppage of the power transmission to the traveling system while the PTO is in rotation.

- |                               |                       |
|-------------------------------|-----------------------|
| (1) Clutch Disc 1 (Traveling) | (10) Clutch Rod       |
| (2) Release Rod               | (11) Clutch Lever     |
| (3) Release Lever             | (12) Release Hub      |
| (4) Clutch Cover 1            | (13) Release Bearing  |
| (5) Clutch Disc 2 (PTO)       | (14) Diaphragm Spring |
| (6) Clutch Cover 2            | (15) Pressure Plate 1 |
| (7) Release Fork              | (16) Diaphragm Spring |
| (8) Shaft Case                | (17) Pressure Plate 2 |
| (9) Clutch Pedal              |                       |

9Y1211012CLM0002US0

## (2) Hydrostatic Transmission (HST) Model



### Single Stage Clutch (L3301, L3901)

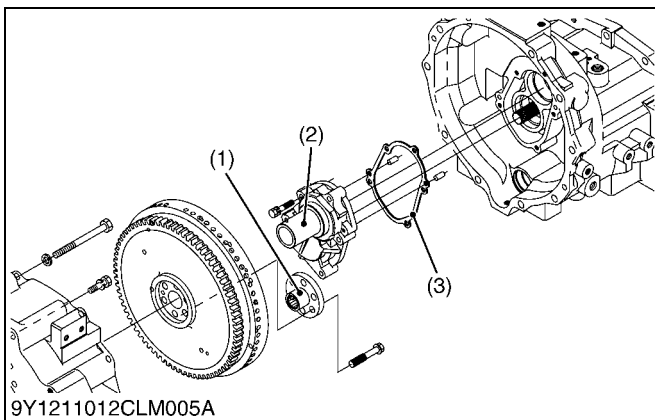
HST models (L3301, L3901) are equipped with the single stage clutch.

The clutch is located between the engine and the transmission and is operated by stepping on the clutch pedal.

When the clutch pedal is depressed, the clutch is disengaged. And when the clutch pedal is released, the clutch is engaged and power from the engine is transmitted to the transmission.

- |                             |                     |
|-----------------------------|---------------------|
| (1) Clutch Disc             | (6) Clutch Rod      |
| (2) Pressure Plate Assembly | (7) Clutch Lever    |
| (3) Release Fork            | (8) Release Hub     |
| (4) Shaft Case              | (9) Release Bearing |
| (5) Clutch Pedal            |                     |

9Y1211012CLM0003US0



### Clutch Less (L4701)

Unlike the other models, HST model of L4701 is not equipped with a clutch. Only clutch coupling is adopted.

- |                     |            |
|---------------------|------------|
| (1) Clutch Coupling | (3) Gasket |
| (2) Shaft Case      |            |

9Y1211012CLM0004US0

# SERVICING

## CONTENTS

1. TROUBLESHOOTING.....	2-S1
2. SERVICING SPECIFICATIONS .....	2-S3
3. TIGHTENING TORQUES.....	2-S4
4. CHECKING AND ADJUSTING .....	2-S5
5. DISASSEMBLING AND ASSEMBLING .....	2-S6
[1] L3301/L3901 .....	2-S6
(1) Separating Engine and Clutch Housing.....	2-S6
(2) Separating Clutch Assembly .....	2-S13
[2] L4701 .....	2-S14
(1) Separating Engine and Clutch Housing.....	2-S14
(2) Separating Clutch Assembly .....	2-S21
6. SERVICING .....	2-S22
[1] SINGLE STAGE CLUTCH.....	2-S22
[2] DUAL STAGE CLUTCH .....	2-S24

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>Clutch Drags</b>	Clutch pedal free travel excessive	Adjust	2-S5
	Clutch disc boss spline sticking or rusted	Replace or remove dust	2-S21
	Dust on clutch disc generated from clutch disc facing	Remove rust	–
	Release fork broken	Replace	2-S21
	Grease or oil on clutch disc facing	Replace	2-S21
	Clutch disc or pressure plate warped	Replace	2-S21
	Pilot bearing sticking or worn	Replace	2-S23
	Release lever improperly adjusted (Dual stage clutch)	Adjust	2-S5
<b>Clutch Slips</b>	Clutch disc excessively worn	Replace	2-S21, 2-S22
	Grease or oil on clutch disc facing	Replace	2-S21
	Clutch disc or pressure plate warped	Replace	2-S21
	Diaphragm spring weaken or broken	Replace	2-S21
	Release lever improperly adjusted (Dual stage clutch)	Adjust	2-S5
<b>Chattering</b>	Grease or oil on clutch disc facing	Replace	2-S21
	Clutch disc or pressure plate warped	Replace	2-S21
	Clutch disc boss spline worn or rusted	Replace or remove rust	2-S21
	Main shaft bent	Replace	3-S39, 3-S48, 3-S74, 3-S86
	Pressure plate or flywheel face cracked or scored	Replace	2-S21
	Clutch disc boss spline and gear shaft spline worn	Replace	2-S21
	Diaphragm spring strength uneven or diaphragm spring broken	Replace	2-S21
<b>Rattle During Operating</b>	Clutch disc boss spline worn	Replace	2-S21
	Release bearing worn or sticking	Replace	2-S21
	Pilot bearing worn or sticking	Replace	2-S21
<b>Clutch Squeaks</b>	Release bearing worn or sticking	Replace	2-S21
	Pilot bearing worn or sticking	Replace	2-S21
	Clutch disc excessively worn	Replace	2-S21, 2-S22

Symptom	Probable Cause	Solution	Reference Page
Vibration	Main shaft bent	Replace	3-S39, 3-S48, 3-S74, 3-S86
	Clutch disc rivet worn or broken	Replace	2-S21, 2-S22
	Clutch parts broken	Replace	—

9Y1211012CLS0001US0

## 2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Clutch Pedal	Free Travel	20 to 30 mm 0.8 to 1.2 in.	—
Pressure Plate to Adjusting Bolt	Clearance	0.9 to 1.0 mm 0.035 to 0.039 in.	—
Clutch Disc Boss to Main Shaft (Travelling)	Backlash (Displacement Around Disc Edge)	—	2.0 mm 0.079 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 to Straightedge	Clearance	—	0.2 mm 0.008 in.
Belleville Spring	Free Height	7.24 mm 0.285 in.	6.76 mm 0.266 in.
Release Lever	Mutual Difference	0 to 0.2 mm 0 to 0.008 in.	—
Gauge Ring to Adjusting Screw	Clearance	0 to 0.7 mm 0 to 0.003 in.	—
Pressure Plate 2 to Adjusting Screw	Clearance	0.90 to 1.0 mm 0.036 to 0.039 in.	—

9Y1211012CLS0002US0

### 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-13.)

Item	N·m	kgf·m	lbf·ft
Steering wheel mounting nut	48 to 55	4.9 to 5.7	36 to 41
Oil cooler return pipe bolt	92 to 101	9.0 to 10.0	67 to 73
Delivery pipe joint bolt	49 to 69	5.0 to 7.0	37 to 50
Release fork mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
HST return pipe bolt	79.2 to 88.2	8.1 to 9.0	58.4 to 65.1
Delivery pipe mounting screw	18 to 20	1.8 to 2.0	13 to 15
Main delivery hose retaining nut	46.6 to 50.9	4.8 to 5.2	35 to 37
Turning delivery hoses retaining nut	24.5 to 29.4	2.5 to 3.0	18 to 21
Adjusting screw lock nut	16 to 21	1.6 to 2.2	12 to 15
Pressure plate 2 height adjusting screw lock nut	16 to 21	1.6 to 2.2	12 to 15

#### [L3301/L3901]

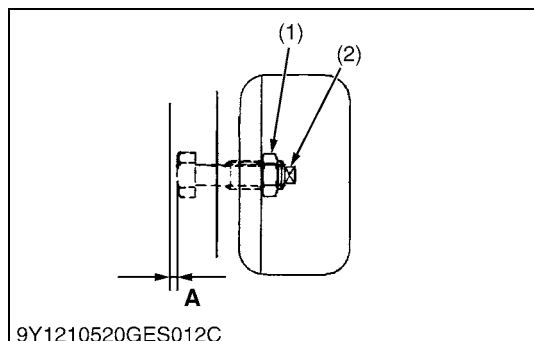
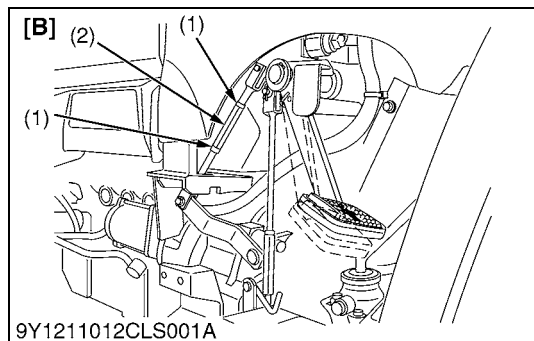
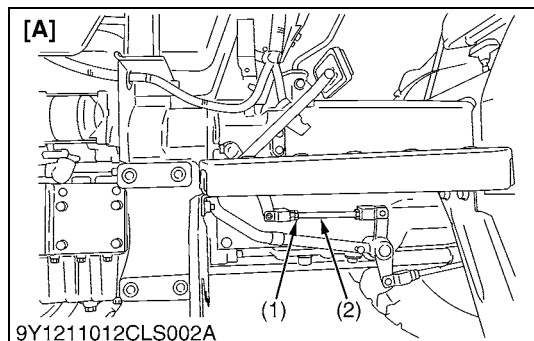
Item	N·m	kgf·m	lbf·ft
Steering shaft universal joint bolt	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2
Steering bearing flange bolt	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2

#### [L4701]

Item	N·m	kgf·m	lbf·ft
Engine and clutch housing mounting bolt and nut	77.5 to 90.2	7.9 to 9.2	58 to 66

9Y1211012CLS0003US0

## 4. CHECKING AND ADJUSTING



### Adjusting Clutch Pedal (Single Clutch)

1. Stop the engine and remove the key.
2. Slightly depress the clutch pedal and measure free travel at the top of pedal stroke.
3. If measurement is needed, loosen the lock nut (1) and turn the clutch rod (2) or turnbuckle (3) to adjust the rod length within acceptable limits.
4. Retighten the lock nut.

Clutch pedal free travel	Factory specification	20 to 30 mm 0.8 to 1.2 in.
--------------------------	-----------------------	-------------------------------

- (1) Lock Nut  
(2) Clutch Rod  
(3) Turnbuckle

[A] L3301/L3901  
[B] L4701

9Y1211012CLS0004US0

### Adjusting Clutch Pedal (Dual Stage Clutch)

1. At first adjust clutch play, same as with single disc clutch.
2. Remove the cover located on the right side of flywheel housing case.
3. Loosen the lock nut (1), tighten the adjust bolt (2) by using 7 mm spanner until head of the bolt contacts pressure plate slightly. Make 3/4 turn counterclockwise to give 0.9 to 1.0 mm (0.035 to 0.039 in.) clearance.
4. Tighten the lock nut (1), holding the adjust bolt (2).
5. Turn the flywheel to adjust the clearance of other adjusting bolts (3 bolts).
6. Repeat step 3. and readjust free travel of clutch pedal if necessary.

Clutch pedal free travel	Factory specification	20 to 30 mm 0.79 to 1.1 in.
Clearance "A" between pressure plate and adjusting bolt	Factory specification	0.9 to 1.0 mm 0.035 to 0.039 in.

- (1) Lock Nut  
(2) Adjust Bolt

**A: Clearance**

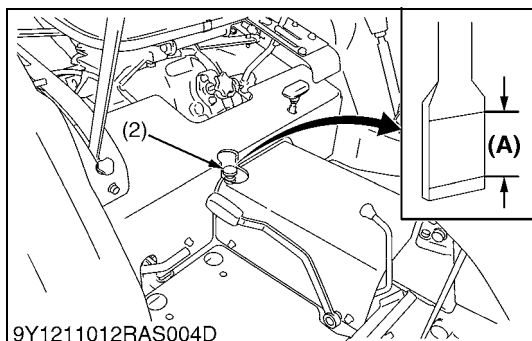
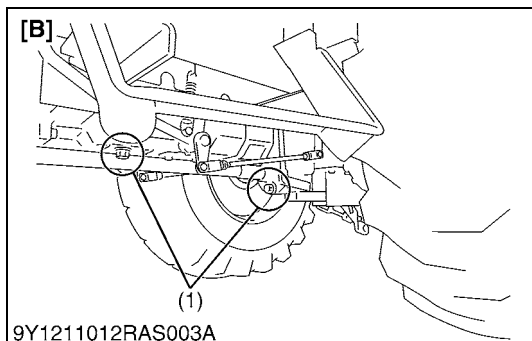
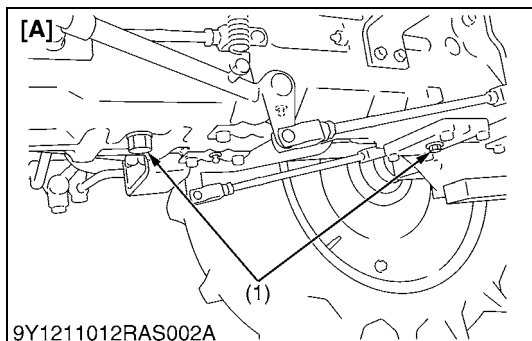
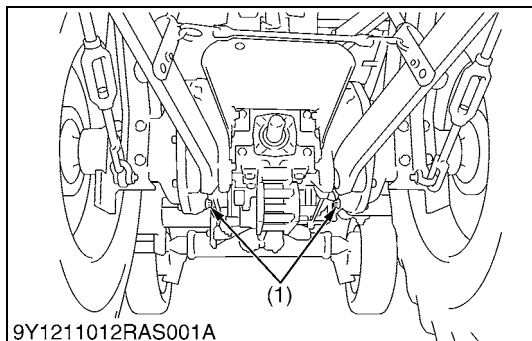
9Y1211012CLS0005US0



## 5. DISASSEMBLING AND ASSEMBLING

### [1] L3301/L3901

#### (1) Separating Engine and Clutch Housing



#### Draining Transmission Fluid (L3301/L3901)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

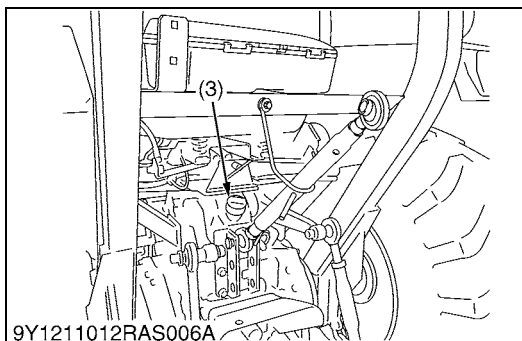
#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	2WD	28.0 L 7.4 U.S.gals 6.1 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.2 Imp.gals
		HST	23.5 L 6.2 U.S.gals 5.2 Imp.gals



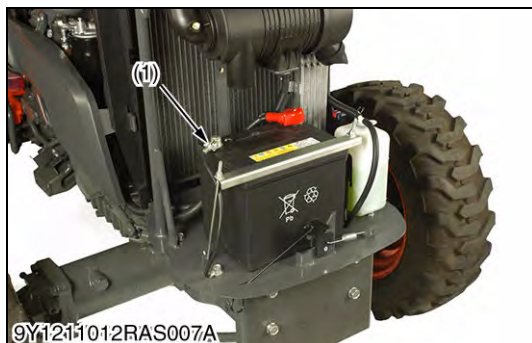
- (1) Drain Plug
- (2) Gauge
- (3) Oil Inlet Plug

[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0003US0

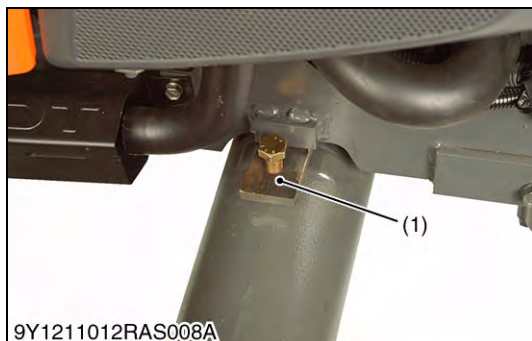


### **Battery Negative Cable Connector**

1. Open bonnet.
2. Disconnect battery negative cable connector (1).

(1) Battery Negative Cable Connector

9Y1211012RAS0005US0

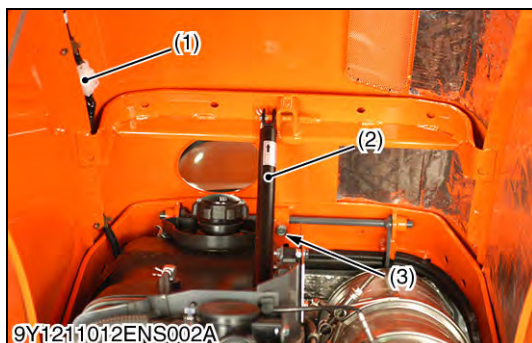


### **Front Axle Rocking Restrictor**

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-95.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0



### **Bonnet and Side Covers**

1. Disconnect the headlight connector (1).
2. Remove the damper (2) from the bonnet.
3. Disconnect the bolt (3) from the bonnet.
4. Remove the bonnet (4).
5. Remove the R.H. and L.H. side covers (5).

(1) Headlight Connector

(4) Bonnet

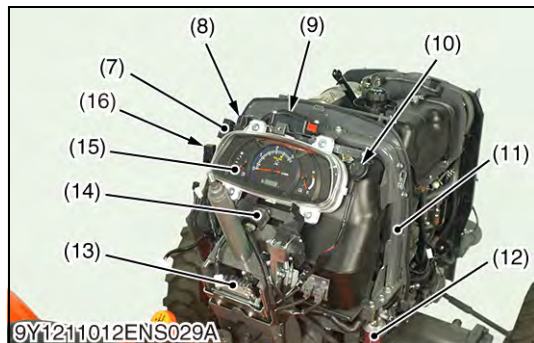
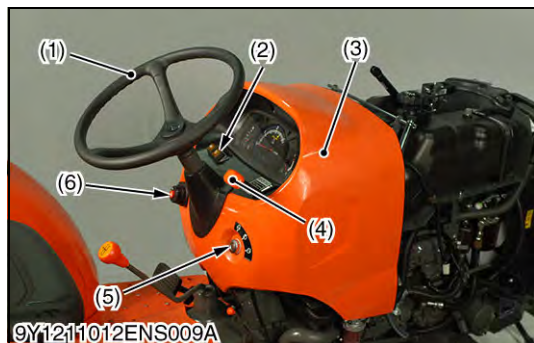
(2) Damper

(5) Side Cover

(3) Bolt

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### Steering Wheel and Rear Bonnet

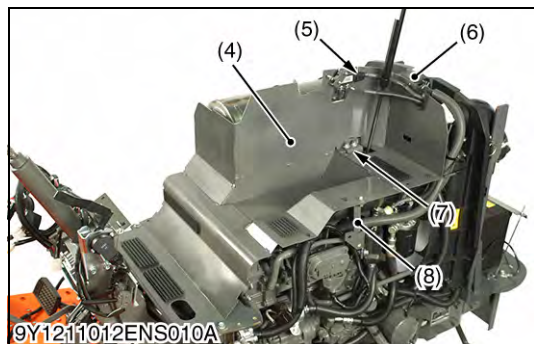
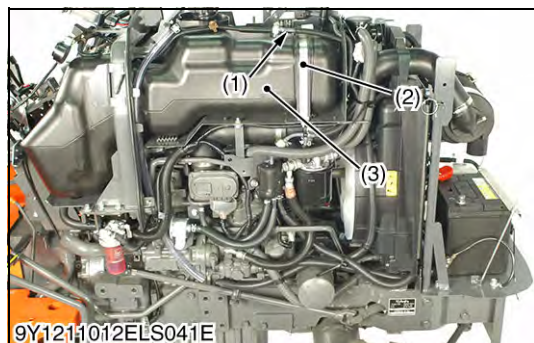
1. Remove the steering wheel (1) with a steering wheel puller.
2. Remove the throttle grip (4).
3. Disconnect the main switch (5).
4. Disconnect the combination switch (6).
5. Disconnect the DPF switches (2).
6. Remove the rear bonnet (3).
7. Remove the meter panel (15).
8. Disconnect the DPF buzzer (10).
9. Disconnect the flasher unit (14).
10. Disconnect the starter relay (7), glow relay (8) and CCV heater relay (16).
11. Disconnect the engine ECU (13).
12. Remove the separator (12).
13. Remove the rear bonnet stay (11).

#### (When reassembling)

Tightening torque	Steering wheel mounting nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-----------------------------	---

- |                        |                       |
|------------------------|-----------------------|
| (1) Steering Wheel     | (9) Main ECU          |
| (2) DPF Switch         | (10) DPF Buzzer       |
| (3) Rear Bonnet        | (11) Rear Bonnet Stay |
| (4) Throttle Grip      | (12) Separator        |
| (5) Main Switch        | (13) Engine ECU       |
| (6) Combination Switch | (14) Flasher Unit     |
| (7) Starter Relay      | (15) Meter Panel      |
| (8) Glow Relay         | (16) CCV heater relay |

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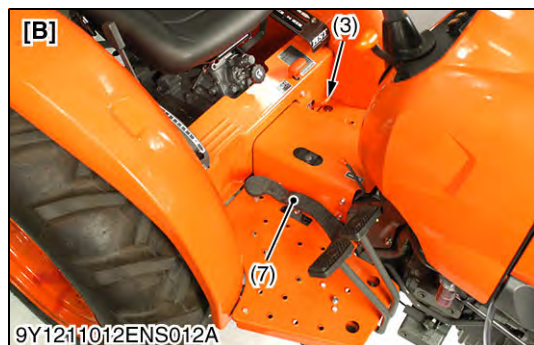
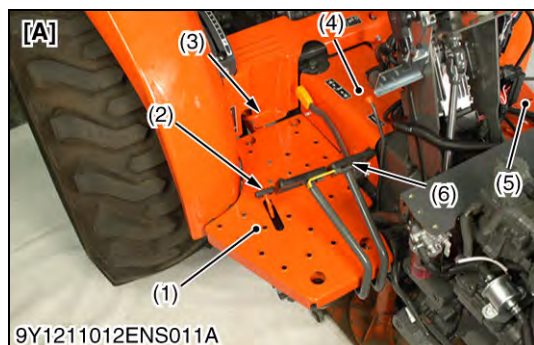


### Fuel Tank and Base

1. Disconnect the fuel return line (1).
2. Remove the fuel tank band (2).
3. Remove the fuel tank (3).
4. Remove the damper bracket (7).
5. Disconnect the connector and hoses from the differential pressure sensor (5).
6. Disconnect the oil separator (6) from the fuel tank base.
7. Disconnect the fuel reserve tank bracket (8) from the fuel tank base.
8. Remove the fuel tank base (4).

- |                      |                                  |
|----------------------|----------------------------------|
| (1) Fuel Return Line | (5) Differential Pressure Sensor |
| (2) Fuel Tank Band   | (6) Oil Separator                |
| (3) Fuel Tank        | (7) Damper Bracket               |
| (4) Fuel Tank Base   | (8) Fuel Reserve Tank Bracket    |

9Y1211012ENS0021US0



### **Step and Center Cover (L3301/L3901)**

1. Remove the center cover (4).
2. Disconnect the throttle cable from the throttle pedal (2).
3. Remove the HST pedal (7).
4. Disconnect the differential lock spring and rod from the differential lock lever (3).
5. Remove the brake pedal springs from the brake pedals (6).
6. Remove the R.H. step (1).
7. Remove the clutch pedal spring from the clutch pedal.
8. Remove the L.H. step (5).

- (1) R.H. Step  
 (2) Throttle Pedal  
 (3) Differential Lock Lever  
 (4) Center Cover  
 (5) L.H. Step

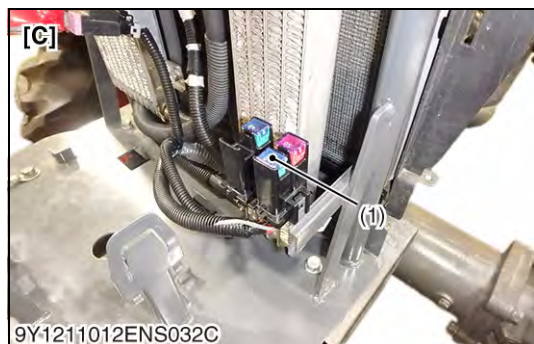
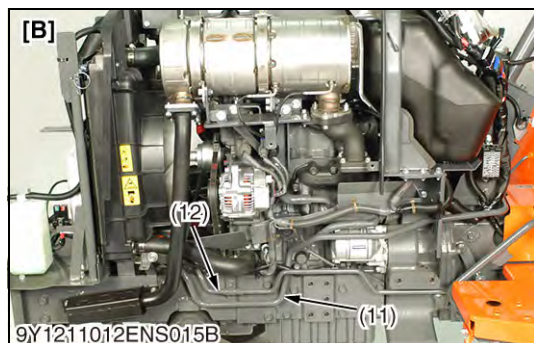
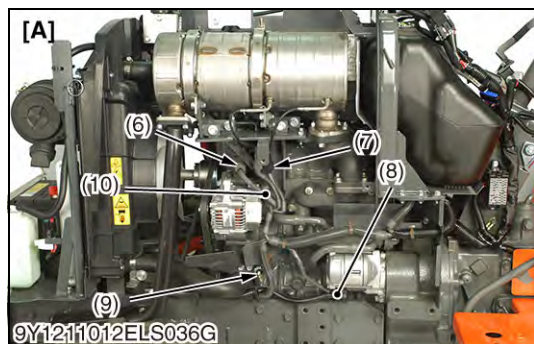
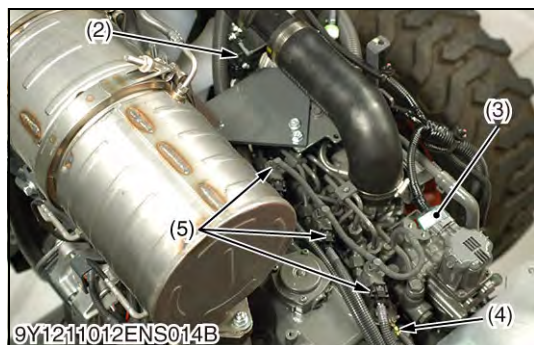
- (6) Brake Pedal  
 (7) HST Pedal

**[A] FW and DW Model**

**[B] DHW Model**

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### Hydraulic Pipes and Electrical Wiring (Under Fuel Tank Base and Left Side)

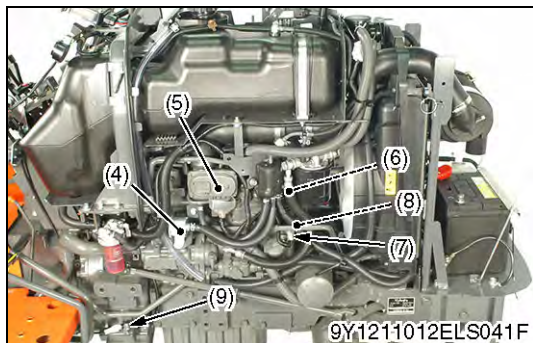
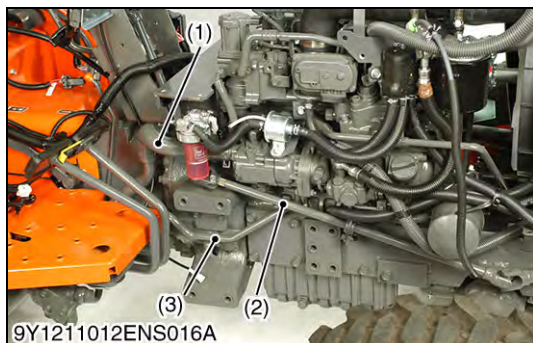
1. Disconnect the connectors of injector (5).
2. Disconnect the glow plug (4).
3. Disconnect the EGR valve (3).
4. Disconnect the air flow sensor (2).
5. Disconnect the rail pressure sensor.
6. Remove the slow blow fuses (1).
7. Disconnect the positive battery cable.
8. Disconnect the water temperature sensor (6).
9. Disconnect the DPF temperature sensors (7).
10. Disconnect the alternator (10).
11. Disconnect the starter (8).
12. Disconnect the oil switch (9).
13. Remove the oil cooler return pipe (11).
14. Remove the power steering return pipe (12).



Tightening torque	Oil cooler return pipe bolt	92 to 101 N·m 9.0 to 10.0 kgf·m 67 to 73 lbf·ft
-------------------	-----------------------------	---

- |                              |  |
|------------------------------|--|
| (1) Slow Blow Fuse           | (10) Alternator                                  |
| (2) Air Flow Sensor          | (11) Oil Cooler Return Pipe                      |
| (3) EGR Valve                | (12) Power Steering Return Pipe<br>(L3301/L3901) |
| (4) Glow Plug                |  |
| (5) Injector                 |  |
| (6) Water Temperature Sensor | <b>[A] FW and DW Model</b>                       |
| (7) DPF Temperature Sensor   | <b>[B] DHW Model</b>                             |
| (8) Starter                  | <b>[C] L3301/L3901</b>                           |
| (9) Oil Switch               | <b>[D] L4701</b>                                 |

9Y1211012ENS0023US0



### Hydraulic Pipes, Steering Joint, and Electrical Wiring (Right Side)

1. Remove the suction hose (1).
2. Remove the delivery pipe (3).
3. Remove the steering shaft (2).
4. Disconnect the crank shaft position sensor (9).
5. Disconnect the parking brake sensor.
6. Disconnect the fuel pump (4).
7. Disconnect the intake throttle valve (5).
8. Disconnect the rail pressure sensor (6).
9. Disconnect the supply pump (7) connector.
10. Disconnect the camshaft position sensor (8).

#### (When reassembling)

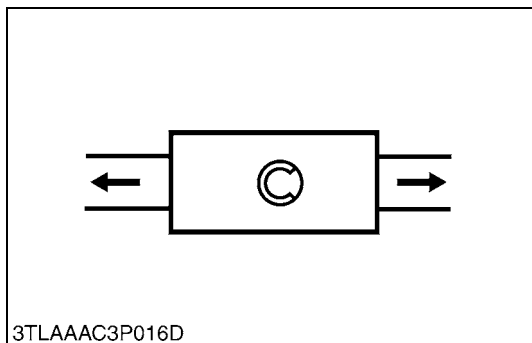
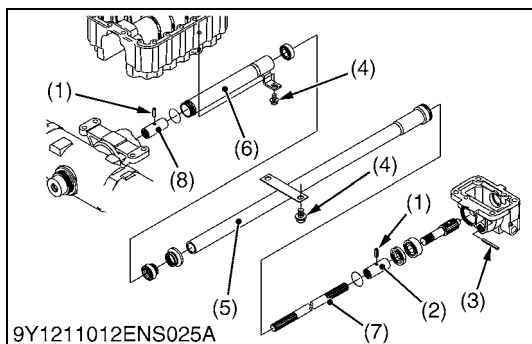
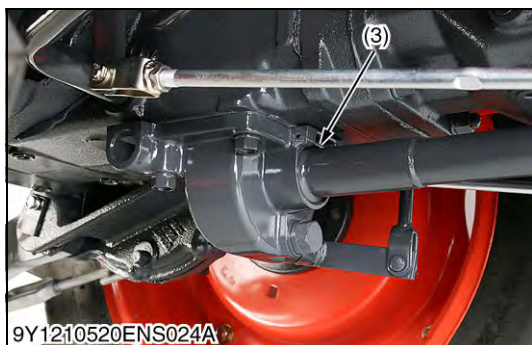
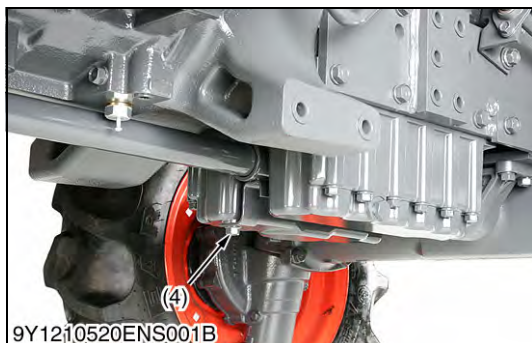
- Be sure that the steering joint shaft (2) does not contact with both hydraulic pump and flywheel housing.

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Steering shaft universal joint bolt (L3301/L3901)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.3 to 20.2 lbf·ft
	Steering bearing flange bolt (L3301/L3901)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.3 to 20.2 lbf·ft

- |  |                                 |
|--|---------------------------------|
| (1) Suction Hose                       | (6) Rail Pressure Sensor        |
| (2) Steering Joint Shaft (L3301/L3901) | (7) Supply Pump                 |
| (3) Delivery Pipe                      | (8) Camshaft Position Sensor    |
| (4) Fuel Pump                          | (9) Crank Shaft Position Sensor |
| (5) Intake Throttle Valve              |                                 |

9Y1211012ENS0024US0





### **Propeller Shaft (L3301/L3901)**

1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

#### **(When reassembling)**

- Apply greasing to the splines of the propeller shaft (7) and pinion shaft.
- Tap in spring pins (1) as shown in the figure.

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

9Y1211012ENS0112US0

### **Separating Engine from Clutch Housing Case**

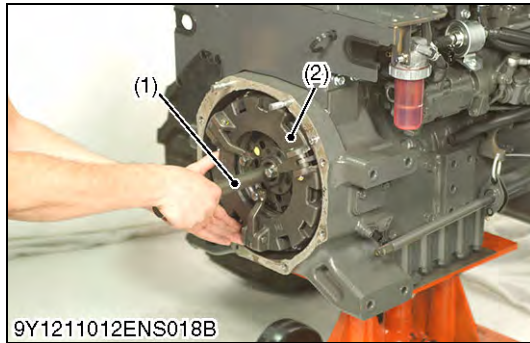
1. Place the disassembling stands under the engine and clutch housing case.
2. Remove the engine and clutch housing mounting screws and nuts.
3. Separate the engine and clutch housing.

#### **(When reassembling)**

- Apply grease to the splines.
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the engine and clutch housing case.

9Y1211012ENS0026US0

## (2) Separating Clutch Assembly



### Clutch Assembly

1. Insert the clutch center tool (1).
2. Remove the clutch assembly (2) together with the clutch center tool.

### (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.
- Insert the pressure plate, noting the position of straight pins.
- After docking the engine and the clutch housing case, assemble the outer parts, referring to the picture.

### ■ IMPORTANT

- Be sure to align the center of disc and flywheel by inserting the clutch tool set.

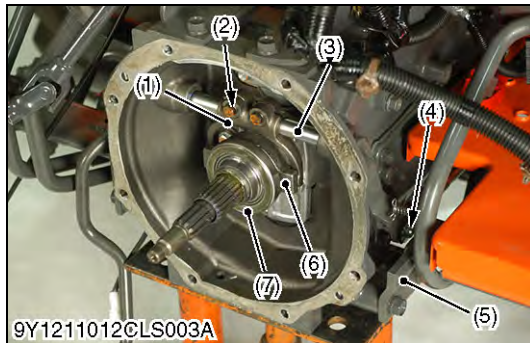
### ■ NOTE

- Be sure to align the center of disc and flywheel by inserting the clutch tool set.

(1) Clutch Center Tool

(2) Clutch Assembly

9Y1211012ENS0027US0



### Release Hub and Clutch Lever

1. Remove the step brackets (5).
2. Disconnect the clutch rod (4) from the clutch lever (3).
3. Remove the release fork mounting screws (2).
4. Draw out the clutch lever (3) and remove the release fork (1).
5. Remove the thrust bearing (7) and clutch holder (6) as a unit.

### (When reassembling)

- Inject grease to the clutch holder (6).
- Make sure the direction of the clutch release fork (1) is correct.
- Apply grease to contact face of the clutch release fork and clutch holder.
- Apply grease to the clutch lever (3).

Tightening torque	Release fork mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
-------------------	-----------------------------	---

(1) Clutch Release Fork

(2) Screw

(3) Clutch Lever

(4) Clutch Rod

(5) Step Bracket

(6) Clutch Holder

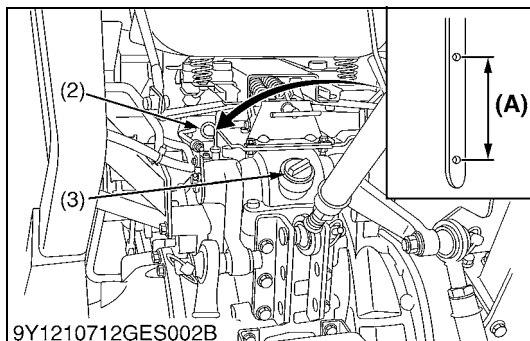
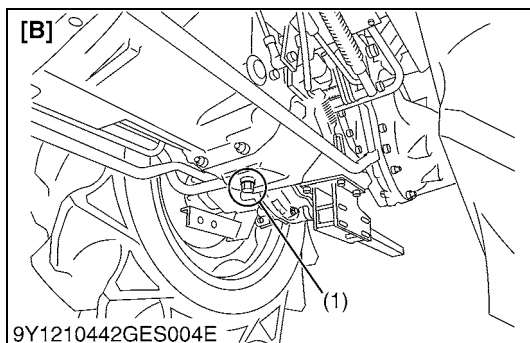
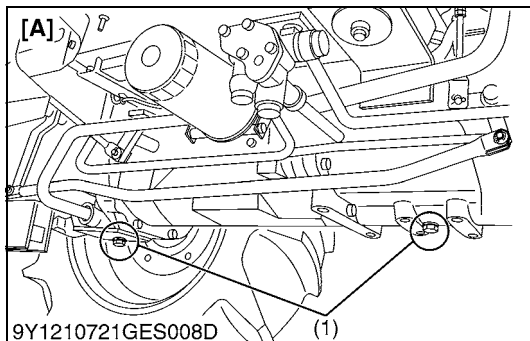
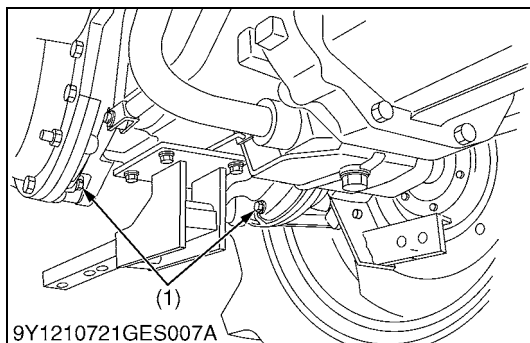
(7) Thrust Bearing

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## [2] L4701

### (1) Separating Engine and Clutch Housing



#### Draining Transmission Fluid (L4701)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	40.0 L 10.6 U.S.gals 8.8 Imp.gals
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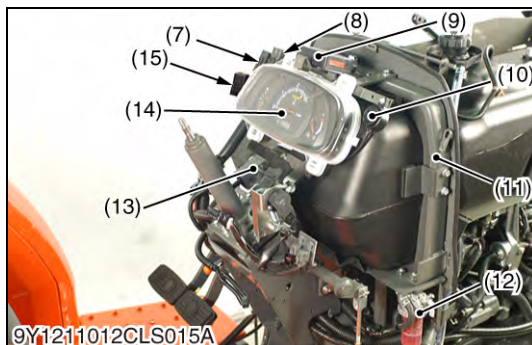
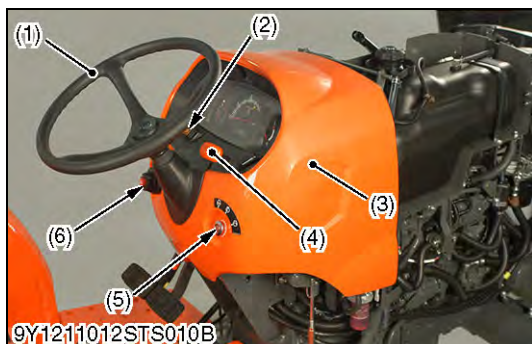
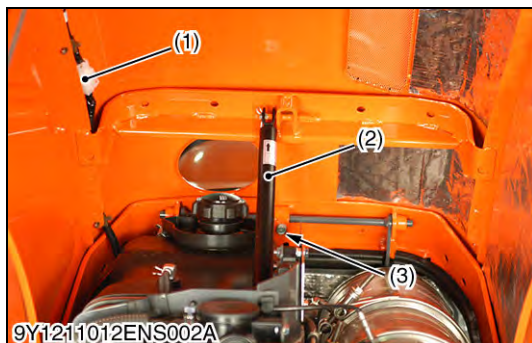
- (1) Drain Plug
- (2) Gauge
- (3) Oil Inlet Plug

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0004US0



### Bonnet and Side Covers

1. Disconnect the headlight connector (1).
2. Remove the damper (2) from the bonnet.
3. Disconnect the bolt (3) from the bonnet.
4. Remove the bonnet (4).
5. Remove the R.H. and L.H. side covers (5).

- |                         |                |
|-------------------------|----------------|
| (1) Headlight Connector | (4) Bonnet     |
| (2) Damper              | (5) Side Cover |
| (3) Bolt                |                |

9Y1211012ENS0014US0

### Rear Bonnet and Stay

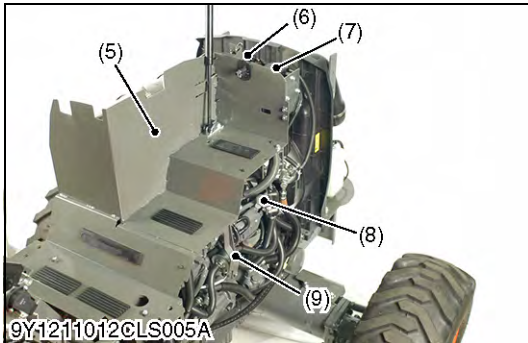
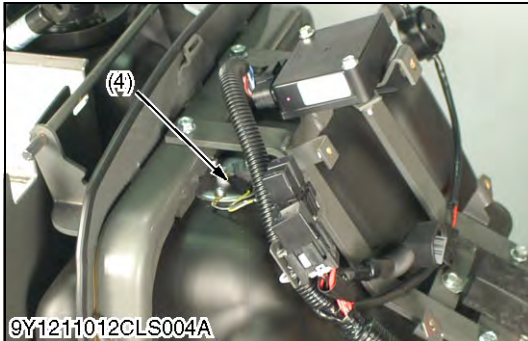
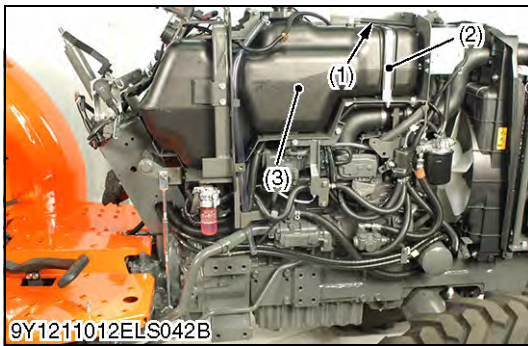
1. Remove the steering wheel (1) with a steering wheel puller.
2. Remove the throttle grip (4).
3. Disconnect the main switch (5).
4. Disconnect the combination switch (6).
5. Disconnect the DPF switches (2).
6. Remove the rear bonnet (3).
7. Remove the meter panel (14).
8. Disconnect the DPF alarm (10).
9. Disconnect the flasher unit (13).
10. Disconnect the starter (8), glow plug relays (7) and CCV heater relay (15).
11. Disconnect the ECU (9).
12. Remove the separator (12).
13. Remove the rear bonnet stay (11).

#### (When reassembling)

Tightening torque	Steering wheel mounting nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-----------------------------	---

- |                        |                       |
|------------------------|-----------------------|
| (1) Steering Wheel     | (9) ECU               |
| (2) DPF Switch         | (10) DPF Alarm        |
| (3) Rear Bonnet        | (11) Rear Bonnet Stay |
| (4) Throttle Grip      | (12) Separator        |
| (5) Main Switch        | (13) Flasher Unit     |
| (6) Combination Switch | (14) Meter Panel      |
| (7) Glow Plug Relay    | (15) CCV Heater Relay |
| (8) Starter Relay      |                       |

9Y1211012CLS0007US0



### Fuel Tank and Base

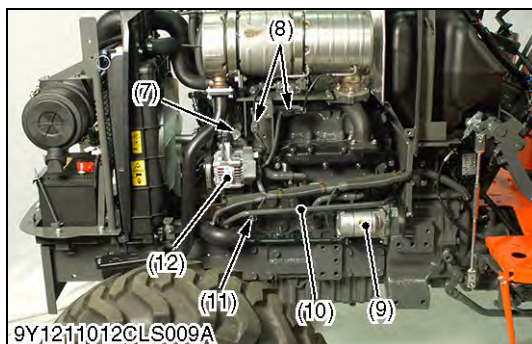
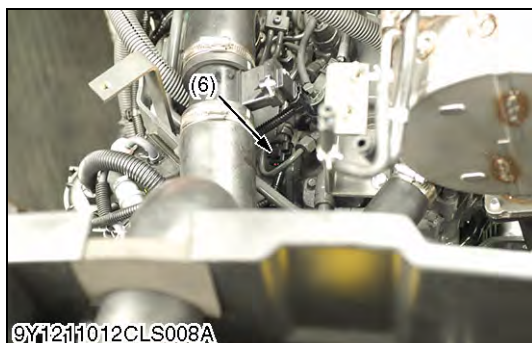
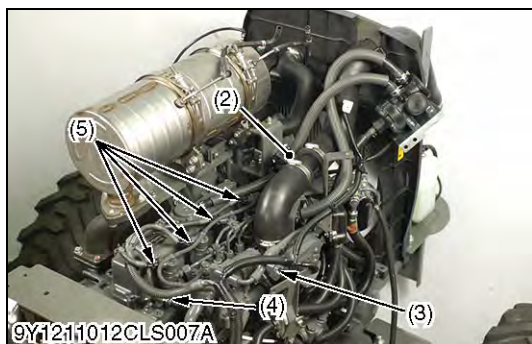
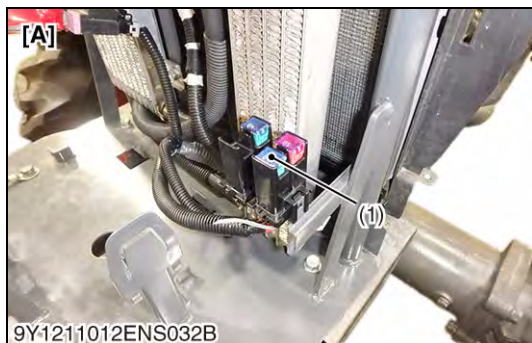
1. Disconnect the fuel sensor (4).
2. Disconnect the fuel return line (1).
3. Remove the fuel tank band (2).
4. Remove the fuel tank (3).
5. Disconnect the connector and hoses from the differential pressure sensor (6).
6. Disconnect the oil separator (7) from the fuel tank base.
7. Disconnect the fuel reserve tank bracket (8) from the fuel tank base.
8. Disconnect the fuel pump bracket (9) from the fuel tank base.
9. Remove the fuel tank base (5).

- |                      |                                  |
|----------------------|----------------------------------|
| (1) Fuel Return Line | (6) Differential Pressure Sensor |
| (2) Fuel Tank Band   | (7) Oil Separator                |
| (3) Fuel Tank        | (8) Fuel Reserve Tank Bracket    |
| (4) Fuel Sensor      | (9) Fuel Pump Bracket            |
| (5) Fuel Tank Base   |                                  |



9Y1211012CLS0020US0





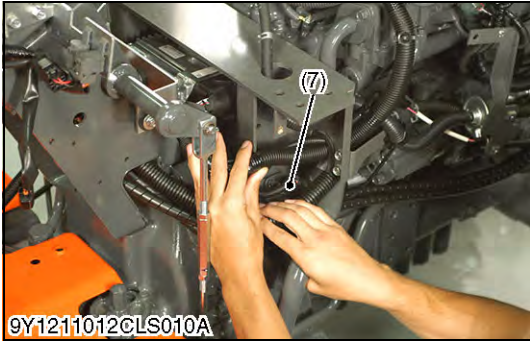
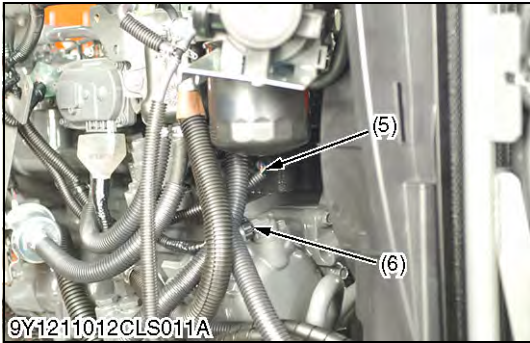
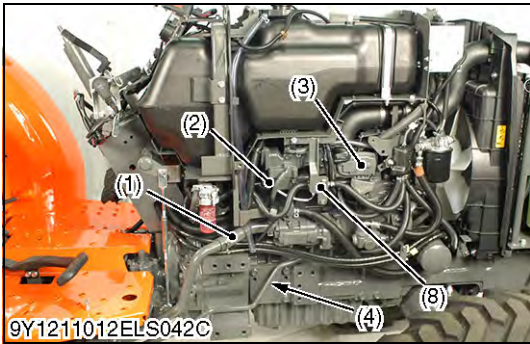
### Hydraulic Pipes and Electrical Wiring (Under Fuel Tank Base and Left Side)

1. Disconnect the injector connectors (5).
2. Disconnect the glow plug (4).
3. Disconnect the EGR valve (3) connector.
4. Disconnect the air flow sensor (2) connector.
5. Disconnect the rail pressure sensor (6) connector.
6. Remove the slow blow fuses (1).
7. Disconnect the coolant temperature sensor (7) connector.
8. Disconnect the DPF temperature sensors (8).
9. Disconnect the alternator (12).
10. Disconnect the starter (9).
11. Disconnect the oil switch (11).
12. Remove the HST return pipe (10).

Tightening torque	HST return pipe bolt	79.2 to 88.2 N·m 8.1 to 9.0 kgf·m 58.4 to 65.1 lbf·ft
-------------------	----------------------	---

- |                                |                        |
|--------------------------------|------------------------|
| (1) Slow Blow Fuse             | (9) Starter            |
| (2) Air Flow Sensor            | (10) HST Return Pipe   |
| (3) EGR Valve                  | (11) Oil Switch        |
| (4) Glow Plug                  | (12) Alternator        |
| (5) Injector Connector         | (13) HST Return Pipe   |
| (6) Rail Pressure Sensor       |                        |
| (7) Coolant Temperature Sensor | <b>[A] L3301/L3901</b> |
| (8) DPF Temperature Sensor     | <b>[B] L4701</b>       |

9Y1211012CLS0008US0



Hydraulic Pipes and Electrical Wiring (Right Side)

- 1. Remove the suction hose (1).
- 2. Remove the delivery pipe (4).
- 3. Remove the EGR valve (2) connector.
- 4. Disconnect the crank position sensor (7).
- 5. Disconnect the fuel pump (8).
- 6. Disconnect the intake throttle valve (3).
- 7. Disconnect the camshaft position sensor (6).
- 8. Disconnect the rail pressure sensor (5).
- 9. Disconnect supply pump connector.

(When reassembling)

Tightening torque	Delivery pipe mounting screw	18 to 20 N·m 1.8 to 2.0 kgf·m 13 to 15 lbf·ft
	Delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

- (1) Suction Hose

(2) EGR Valve

(3) Intake Throttle Valve

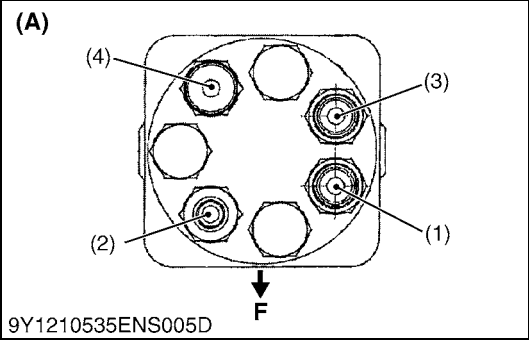
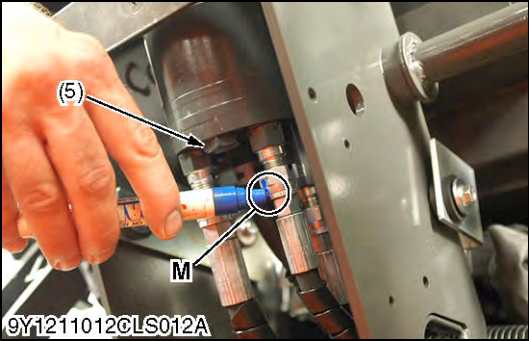
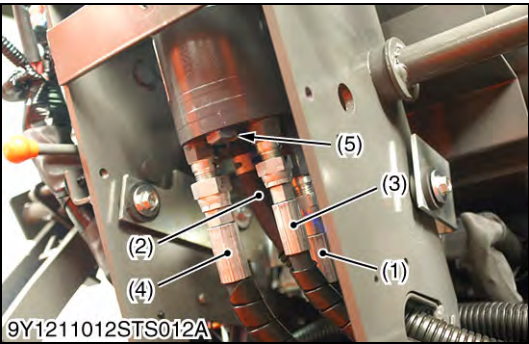
(4) Delivery Pipe
- (5) Rail Pressure Sensor

(6) Camshaft Position Sensor

(7) Crankshaft Position Sensor

(8) Fuel Pump

9Y1211012CLS0009US0



**Power Steering Controller Hoses**

- 1. Since identification tapes are not installed to the hoses, mark the hoses as shown in the picture.
- 2. After marking, disconnect the left delivery hose (3) and the right delivery hose (1).

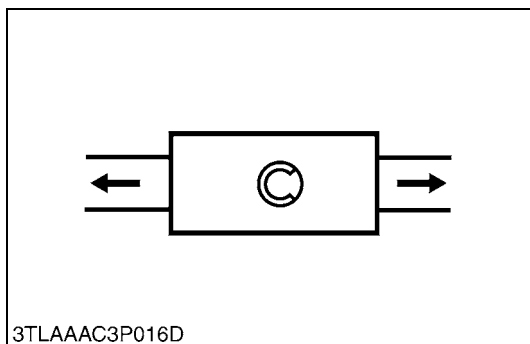
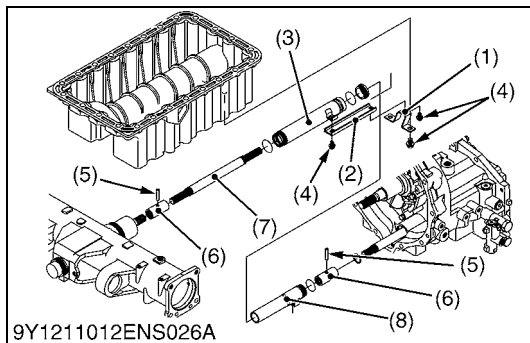
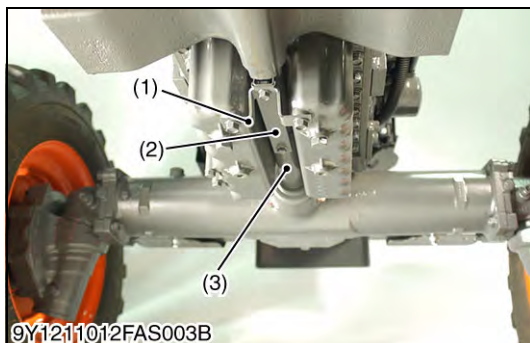
Tightening torque	Main delivery hose retaining nut	46.6 to 50.9 N·m 4.8 to 5.2 kgf·m 35 to 37 lbf·ft
	Turning delivery hoses retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

- (1) Delivery Hose (R.H.)
- (2) Return Hose
- (3) Delivery Hose (L.H.)
- (4) Main Delivery Hose
- (5) Plug

(A) Steering controller viewing from the bottom side  
F: Front  
M: Marking

9Y1211012CLS0010US0





### Propeller Shaft (L4701)

1. Remove the bracket 1 (1).
2. Remove the bracket 2 (2).
3. Slide the propeller shaft cover 2 (8) to the front and the propeller shaft cover 1 (3) to the rear.
4. Tap out the spring pins (5) and then slide the coupling (6) to the front and rear.

#### (When reassembling)

- Apply grease to the splines of the propeller shaft (8) and pinion shaft.
- Tap in spring pins (5) as shown in the figure.

- |                             |                             |
|-----------------------------|-----------------------------|
| (1) Bracket 1               | (5) Spring Pin              |
| (2) Bracket 2               | (6) Coupling                |
| (3) Propeller Shaft Cover 1 | (7) Propeller Shaft         |
| (4) Screw                   | (8) Propeller Shaft Cover 2 |

9Y1211012ENS0025US0

### Separating Engine from Clutch Housing

1. Disconnect the clutch rod (2).
2. Place the disassembling stands under the engine and clutch housing case.
3. Remove the engine and clutch housing mounting screws and nuts.
4. Separate the engine and clutch housing.

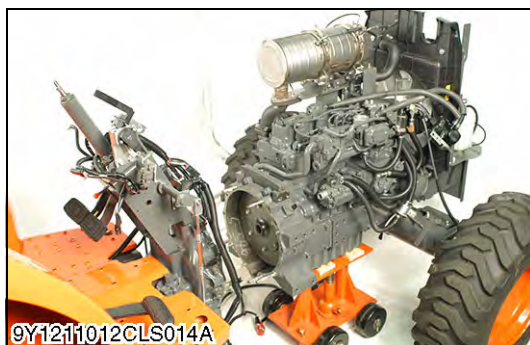
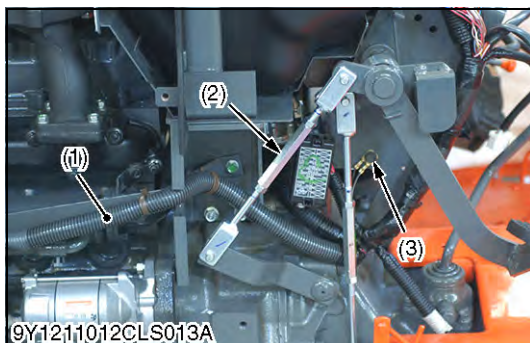
#### (When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the engine and clutch housing.
- Install the ground cable to the steering support securely.

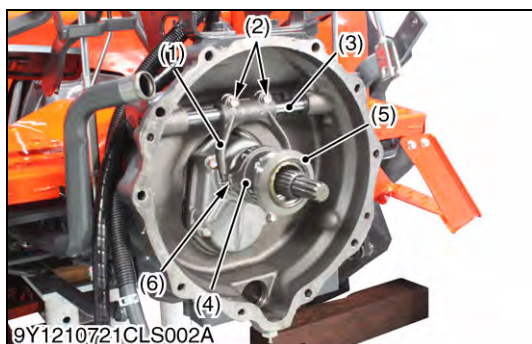
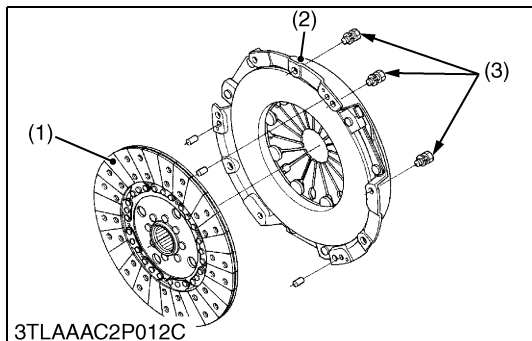
Tightening torque	Engine and clutch housing mounting bolt and nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
-------------------	---	---

- |                         |                  |
|-------------------------|------------------|
| (1) Main Wiring Harness | (3) Ground Cable |
| (2) Clutch Rod          |                  |

9Y1211012CLS0011US0



## (2) Separating Clutch Assembly



### Clutch Assembly

1. Insert the clutch center tool.
2. Remove the clutch assembly together with the clutch center tool.

### **(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.
- Insert the pressure plate, noting the position of straight pins.

### ■ **IMPORTANT**

- **Be sure to align the center of disc and flywheel by inserting the clutch tool set.**

(1) Clutch Disc

(3) Clutch Mounting Screw

(2) Pressure Plate Assembly

9Y1211012CLS0012US0

### Release Fork and Clutch Lever

1. Draw out the clutch release hub (4) and the release bearing (5) as a unit.
2. Remove the release fork setting screws (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 (4).
- Be sure to set the snap pins (6) on both sides.

(1) Release Fork

(4) Release Hub

(2) Setting Screw

(5) Release Bearing

(3) Clutch Lever

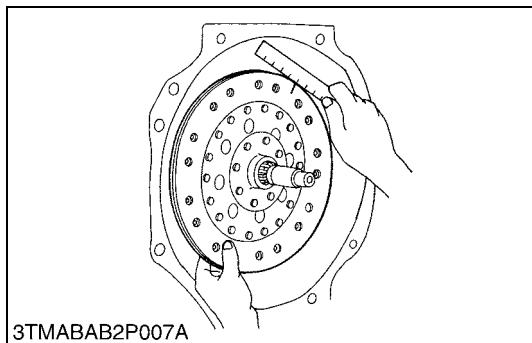
(6) Snap Pin

9Y1211012CLS0013US0



## 6. SERVICING

### [1] SINGLE STAGE CLUTCH

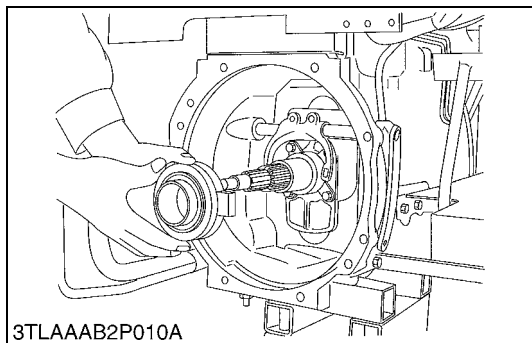


#### Backlash between Clutch Disc Boss and Shaft

1. Mount the clutch disc to the main shaft.
2. Hold the main shaft so that it does not turn.
3. Rotate disc lightly and measure the displacement around the disc edge.
4. If the measurement exceeds the allowable limit, replace the clutch disc.

Backlash (Displacement around disc edge)	Allowable limit	2.0 mm 0.079 in.
--	-----------------	---------------------

9Y1211012CLS0014US0



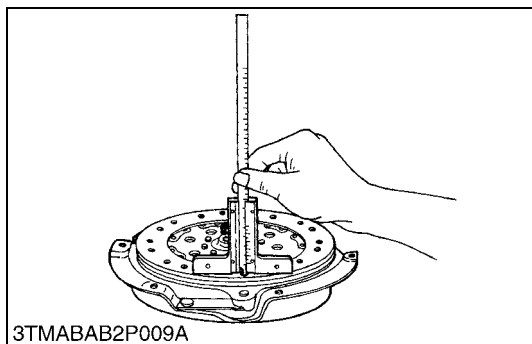
#### Release Bearing

1. Check for abnormal wear on contact surface.
2. Rotate bearing outer race, while applying pressure to it.
3. If the bearing rotation is rough or noisy, replace the release bearing.

#### ■ NOTE

- Do not depress bearing outer race, when replacing the release bearing.
- Do not wash the release bearing with a cleaning solvent.

9Y1211012CLS0015US0

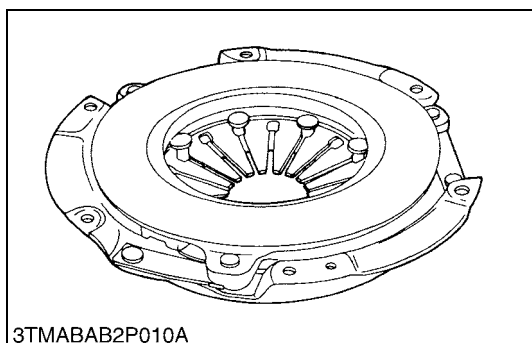


#### Clutch Disc Wear

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 clutch 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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9Y1211012CLS0016US0

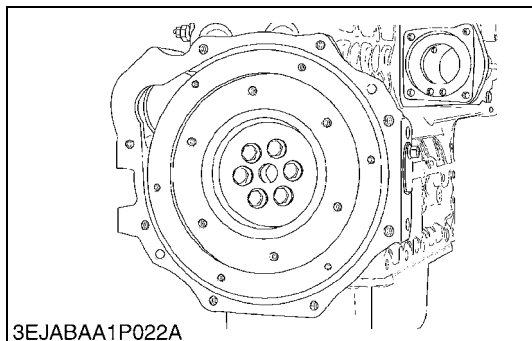


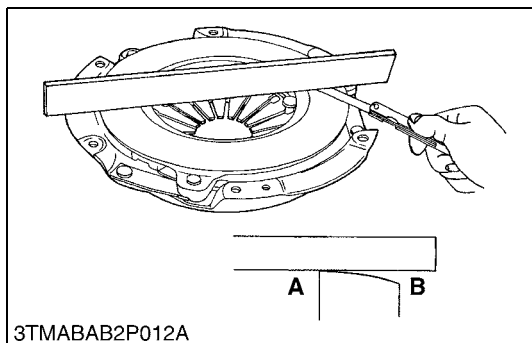
#### Checking Pressure Plate Assembly and Flywheel

1. Wash the disassembling parts except clutch disc with a suitable cleaning solvent to remove dirt and grease before making inspection and adjustment.
2. Inspect the 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. Inspect the surface of diaphragm spring for wear.  
If excessive wear is found, replace the 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.

Diaphragm spring mutual difference	Allowable limit	0.5 mm 0.02 in.
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9Y1211012CLS0017US0



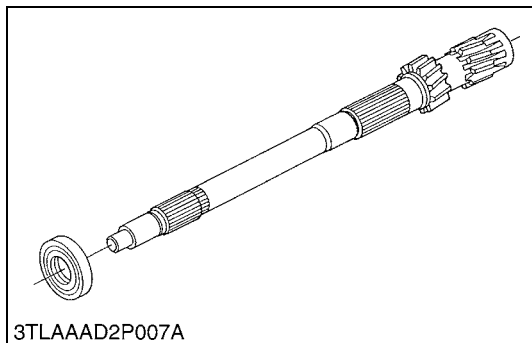


### **Pressure Plate Flatness**

1. Place a straightedge 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 straightedge, replace even if the clearance is within allowable limit.

Clearance between pressure plate and straightedge	Allowable limit	0.2 mm 0.008 in.
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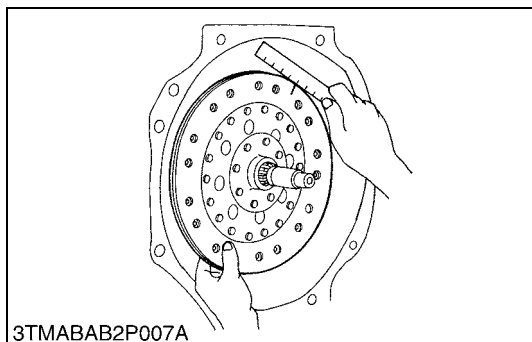


### **Pilot Bearing**

1. Remove the pilot bearing in crank shaft with a puller.
2. Check for abnormal wear of pilot bearing.
3. Hold bearing inner race and rotate outer race. If the bearing rotation is not smooth or it is noisy, replace bearing.

9Y1211012CLS0019US0

## [2] DUAL STAGE CLUTCH



### Backlash between Clutch Disc Boss and Shaft

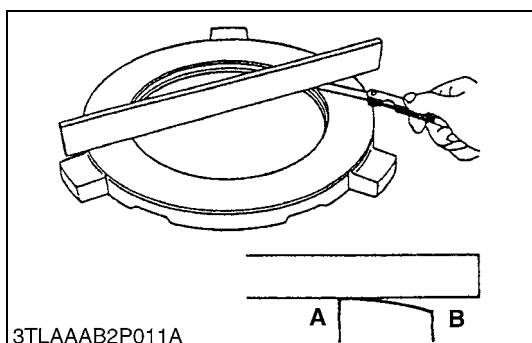
1. Mount the PTO clutch disc to the 16T gear shaft.
2. Hold the gear 16T gear shaft so that it does not turn.
3. Rotate disc lightly and measure the displacement around the disc edge.
4. If the measurement exceeds the allowable limit, replace.

Backlash (Displacement around disc edge (PTO))	Allowable limit	2.0 mm 0.079 in.
--	-----------------	---------------------

5. Perform measurement for the traveling clutch disc and the main shaft in the same way as a above.

Backlash (Displacement around disc edge (Travelling))	Allowable limit	2.0 mm 0.079 in.
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9Y1211012CLS0021US0



### Pressure Plate Flatness

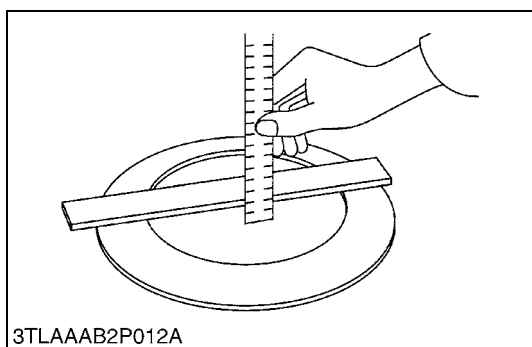
1. Place a straightedge on the pressure plate and measure clearance with a feeler gauge at several points.
2. If the clearance exceeds the allowable limit, replace it.
3. When the pressure plate is worn around its outside and its inside surface only is in contact with the straightedge, replace even if the clearance is within the allowable limit.

Clearance between pressure plate and straightedge	Allowable limit	2.0 mm 0.008 in.
---	-----------------	---------------------

A: Inside

B: Outside

9Y1211012CLS0022US0

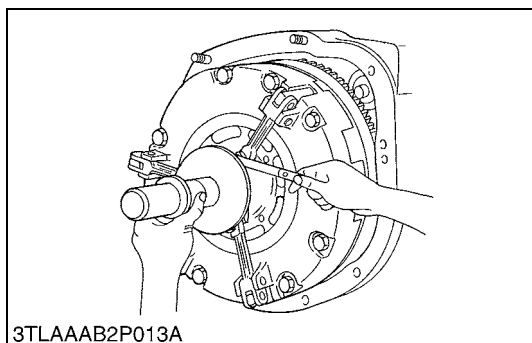


### Belleville Spring Free Height

1. Put the belleville spring on the surface plate.
2. Place a straightedge on the belleville spring and measure the free height.
3. If the measurement is less than the allowable limit, replace.
4. Check for cracks, if problems are found, replace.

Belleville spring free height	Factory specification	7.24 mm 0.285 in.
	Allowable limit	6.76 mm 0.266 in.

9Y1211012CLS0023US0

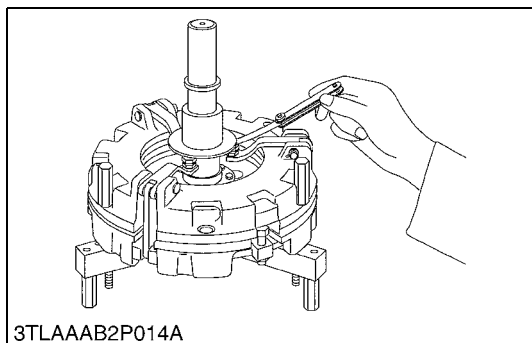


### Mutual Difference of Release Lever

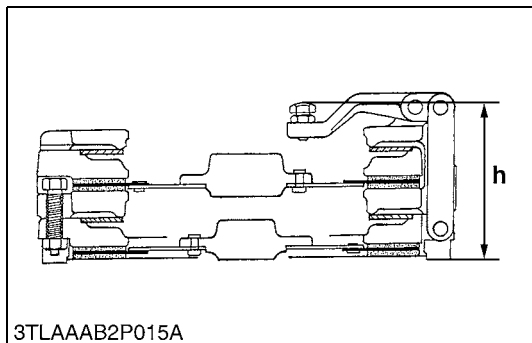
1. Insert the dual stage clutch exclusive tool (Code No, 07916-90052).
2. Measure the clearance between gauge ring and the top of adjusting screw with a feeler gauge.
3. If the clearance is not within the factory specifications, adjust with the adjusting screws.

Mutual difference of release lever	Factory specification	0 to 0.2 mm 0 to 0.008 in.
---------------------------------------	-----------------------	-------------------------------

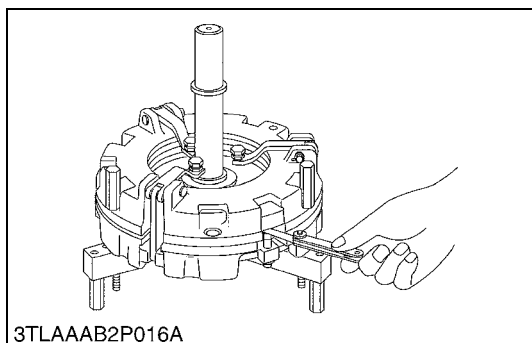
9Y1211012CLS0024US0



3TLAAAB2P014A



3TLAAAB2P015A



3TLAAAB2P016A

### Release Lever Height

1. Mount the dual stage clutch exclusive tool (Code No. 07916-90052).
2. Measure the clearance between gauge ring and the top of adjusting screw with a feeler gauge.
3. If the clearance is not within the factory specifications, adjust with the adjusting screws.

Clearance between gauge ring and the top of adjusting screw	Factory specification	0 to 0.7 mm 0 to 0.003 in.
---	-----------------------	-------------------------------

Tightening torque	Adjusting screw lock nut	16 to 21 N·m 1.6 to 2.2 kgf·m 12 to 15 lbf·ft
-------------------	--------------------------	---

### ■ IMPORTANT

- Be sure to adjust the mutual difference of release lever to within the factory specifications.

### ■ NOTE

- Apply adhesive (Cemdine No. 110 by Cemdine Industry Co., Ltd. or equivalent) to the adjusting screws, replace lever and lock nuts.

### (Reference)

Release lever height h	Reference value	97.8 to 99.2 mm 3.85 to 3.90 in.
------------------------	-----------------	-------------------------------------

9Y1211012CLS0025US0

### Clearance between Pressure Plate 2 and Adjusting Screw

1. Measure the clearance between pressure plate 2 and the top of adjusting screw with a feeler gauge.
2. If the clearance is not within the factory specifications, rotate adjusting screw to adjust.

Clearance between pressure plate 2 and adjusting screw	Factory specification	0.90 to 1.0 mm 0.036 to 0.039 in.
--	-----------------------	--------------------------------------

Tightening torque	Pressure plate 2 height adjusting screw lock nut	16 to 21 N·m 1.6 to 2.2 kgf·m 12 to 15 lbf·ft
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9Y1211012CLS0026US0

# **3 TRANSMISSION**

# MECHANISM

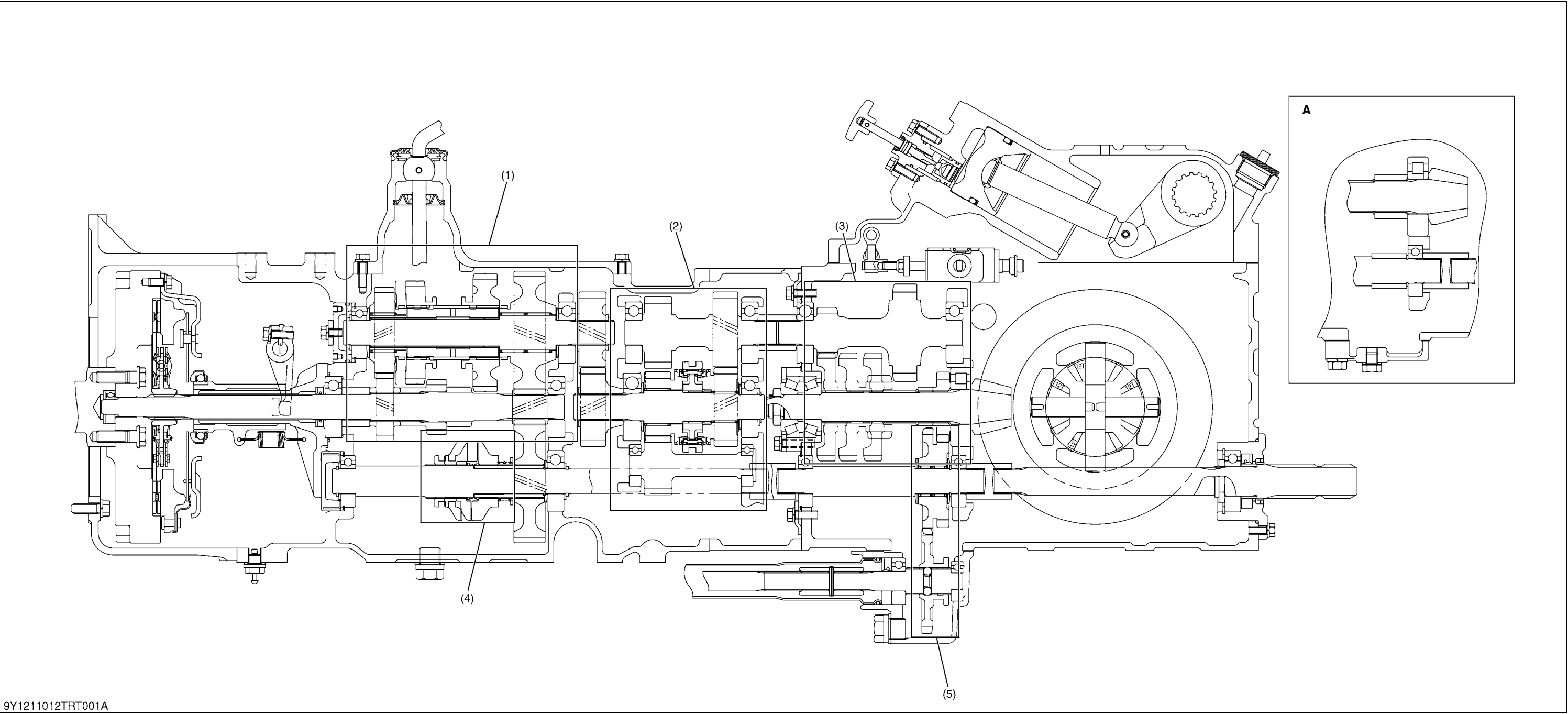
## CONTENTS

1. STRUCTURE.....	3-M1
[1] MANUAL TRANSMISSION MODEL .....	3-M1
(1) L3301.....	3-M1
(2) L3901.....	3-M2
(3) L4701.....	3-M3
[2] HYDROSTATIC TRANSMISSION (HST) MODEL .....	3-M4
(1) L3301/L3901.....	3-M4
(2) L4701.....	3-M5
2. MANUAL TRANSMISSION MODEL.....	3-M6
[1] POWER TRAIN FOR TRAVELING GEARS.....	3-M6
(1) Main Gear Shift Section.....	3-M6
(2) Synchro-Shuttle Section .....	3-M7
(3) Range Gear Shift Section.....	3-M8
(4) Front Wheel Drive Section (4WD Model Only) .....	3-M9
[2] PTO SYSTEM .....	3-M10
(1) Structure .....	3-M10
(2) Shift Linkage (L3301/L3901) .....	3-M12
(3) System of PTO Clutch (L4701).....	3-M12
3. HYDROSTATIC TRANSMISSION (HST) MODEL .....	3-M15
[1] Hydrostatic Transmission Assembly.....	3-M15
(1) Structure .....	3-M15
(2) Oil Flow.....	3-M19
(3) Operation.....	3-M21
[2] POWER TRAIN FOR TRAVELING GEARS.....	3-M28
(1) Range Gear Shift Section.....	3-M28
(2) Front Wheel Drive Section.....	3-M29
[3] LINKAGE MECHANISM .....	3-M30
(1) HST PEDAL CONTROL LINKAGE .....	3-M30
(2) Cruise Control.....	3-M32
[4] PTO SYSTEM .....	3-M34
(1) Structure .....	3-M34
(2) Mechanism .....	3-M35

1. STRUCTURE

[1] MANUAL TRANSMISSION MODEL

(1) L3301



(1) Main Gear Shift Section

(2) Synchro-shuttle Gear Shift Section

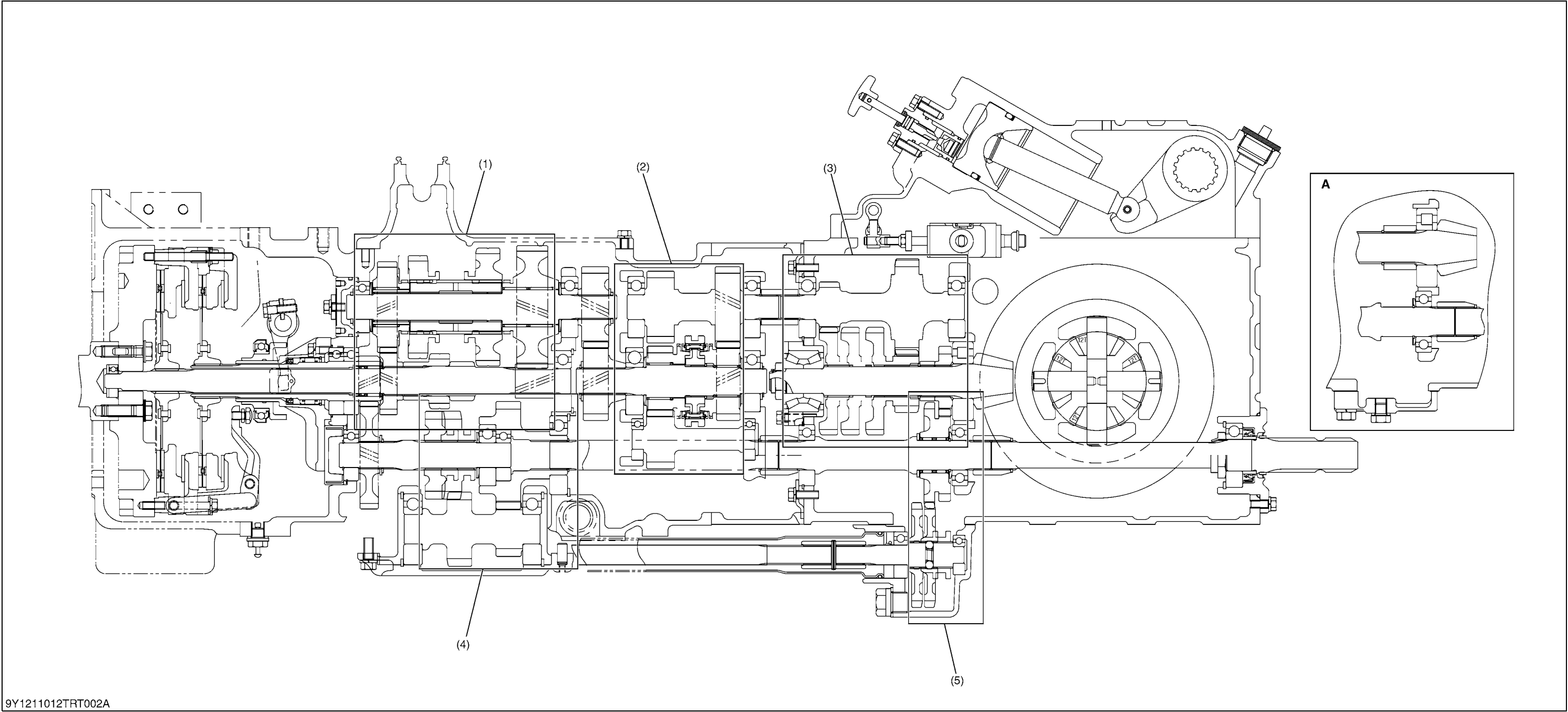
(3) Range Gear Shift Section

(4) PTO Clutch Section

(5) Front Wheel Drive Section (4WD Model Only)

A: 2WD Model

(2) L3901



(1) Main Gear Shift Section

(2) Synchro-shuttle Gear Shift Section

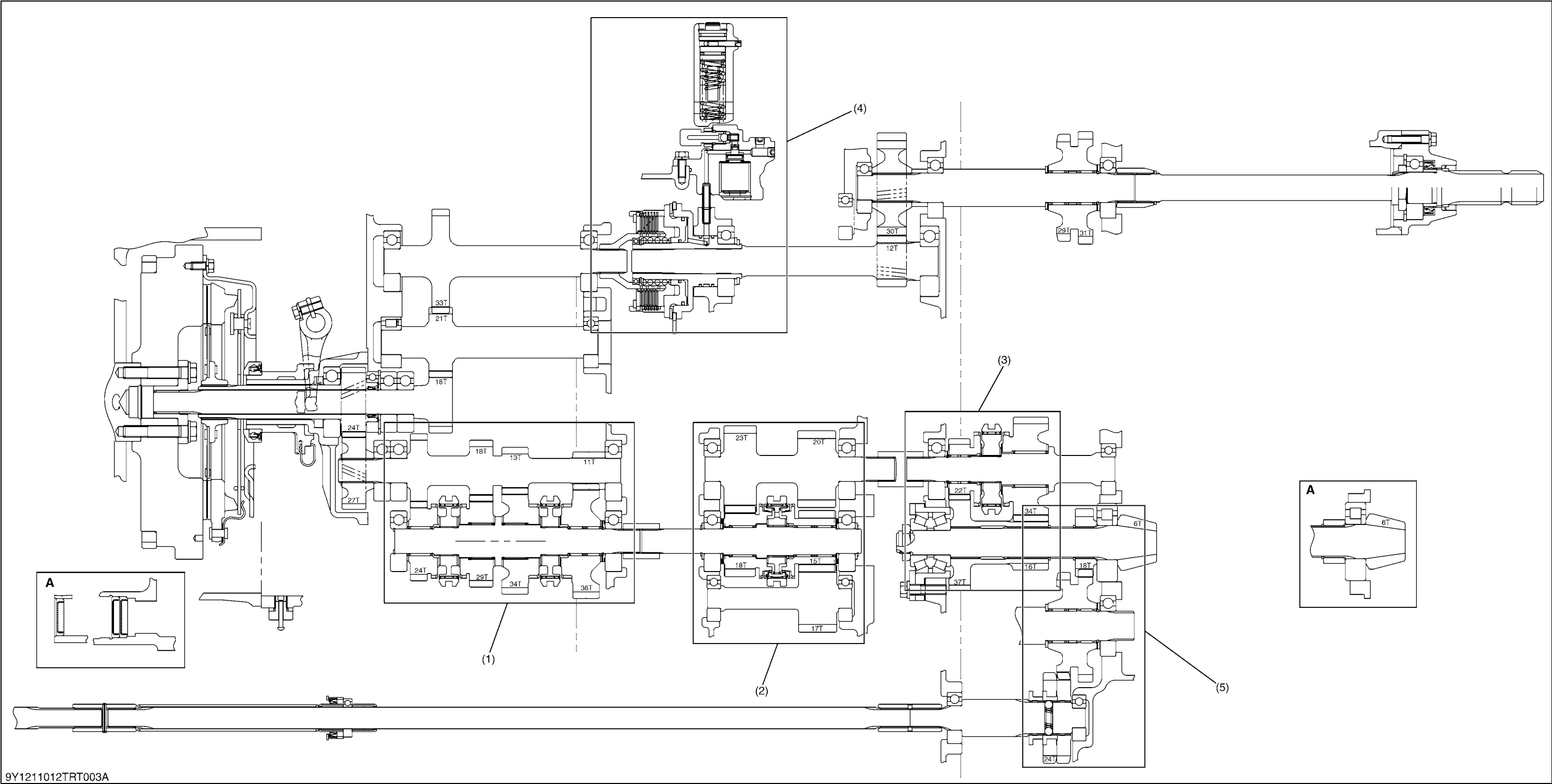
(3) Range Gear Shift Section

(4) PTO Gear Shift Section

(5) Front Wheel Drive Section (4WD Model Only) A: 2WD Model



(3) L4701



9Y1211012TRT003A

(1) Main Gear Shift Section

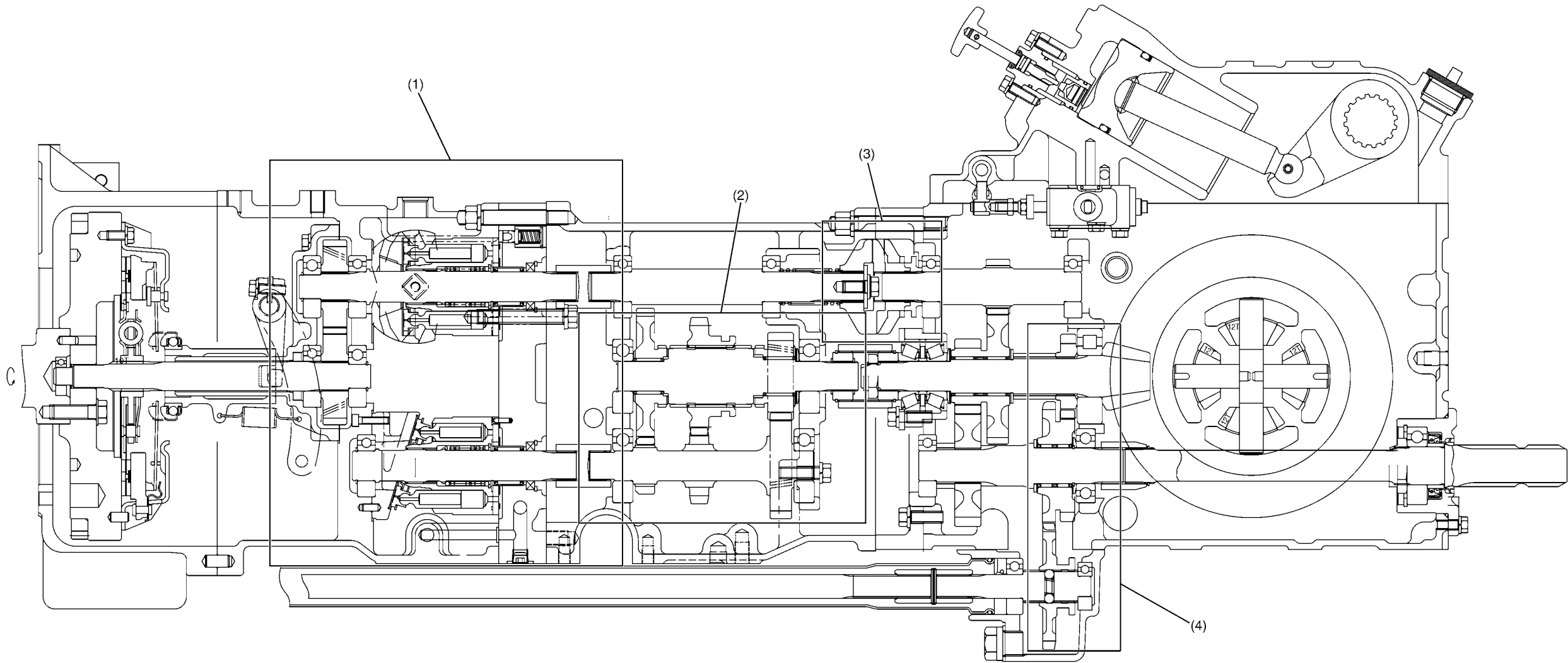
(2) Synchro-shuttle Gear Shift Section

(3) Lo Range Gear Shift Section

(4) PTO Clutch Section

(5) Front Wheel Drive Section (4WD Model Only) A: 2WD Model

[2] HYDROSTATIC TRANSMISSION (HST) MODEL  
(1) L3301/L3901



9Y1211012TRT004A

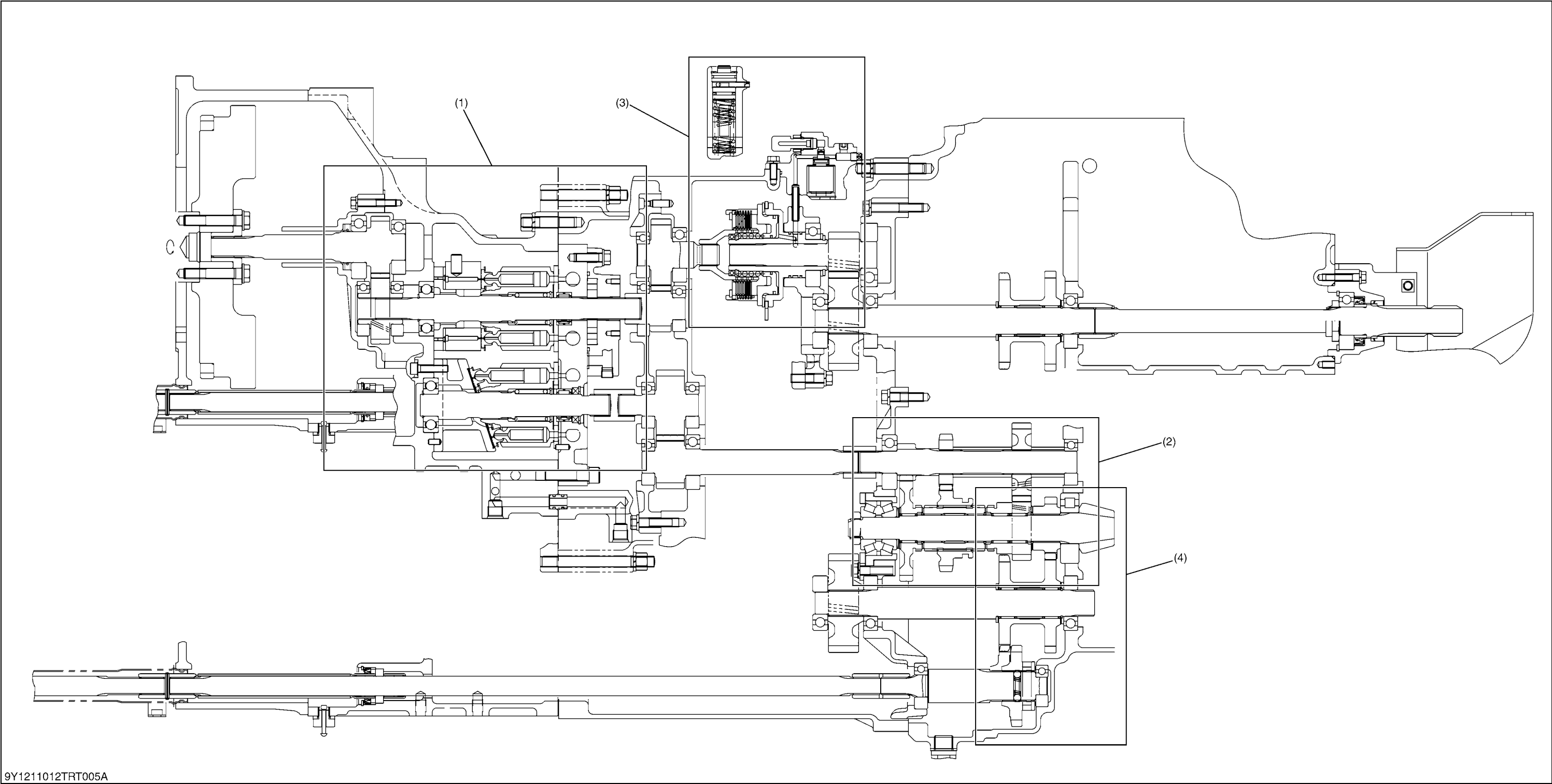
(1) Hydrostatic Transmission Section

(2) Range Gear Shift Section

(3) PTO Clutch Section

(4) Front Wheel Drive Section

(2) L4701



9Y1211012TRT005A

(1) Hydrostatic Transmission Section

(2) Range Gear Shift Section

(3) PTO Clutch Section

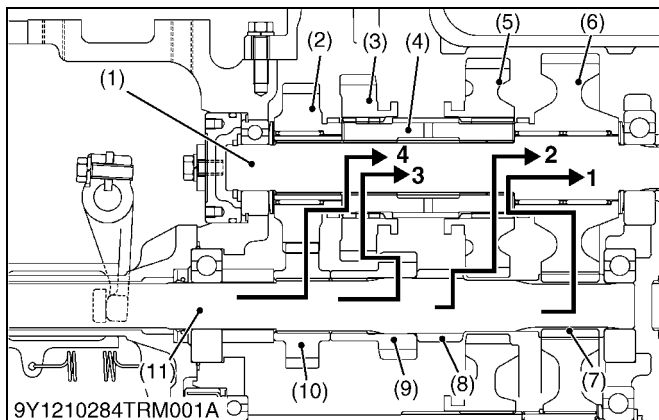
(4) Front Wheel Drive Section

## 2. MANUAL TRANSMISSION MODEL

### [1] POWER TRAIN FOR TRAVELING GEARS

#### (1) Main Gear Shift Section

**L3301/L3901**



Besides neutral, four ways of power train from the main gear shaft (11) to the counter shaft (1) are available by operating the **1, 2, 3, 4** range shift lever.

Power is transmitted as follows.

#### 1: 1st Speed

Main Gear Shaft (11) → **10T** Gear (7) → **45T** Gear (6) → **45T** Shift Gear (5) → Spline Boss (4) → Counter Shaft (1).

#### 2: 2nd Speed

Main Gear Shaft (11) → **13T** Gear (8) → **45T** Shift Gear (5) → Spline Boss (4) → Counter Shaft (1).

#### 3: 3rd Speed

Main Gear Shaft (11) → **19T** Gear (9) → **39T** Shift Gear (3) → Spline Boss (4) → Counter Shaft (1).

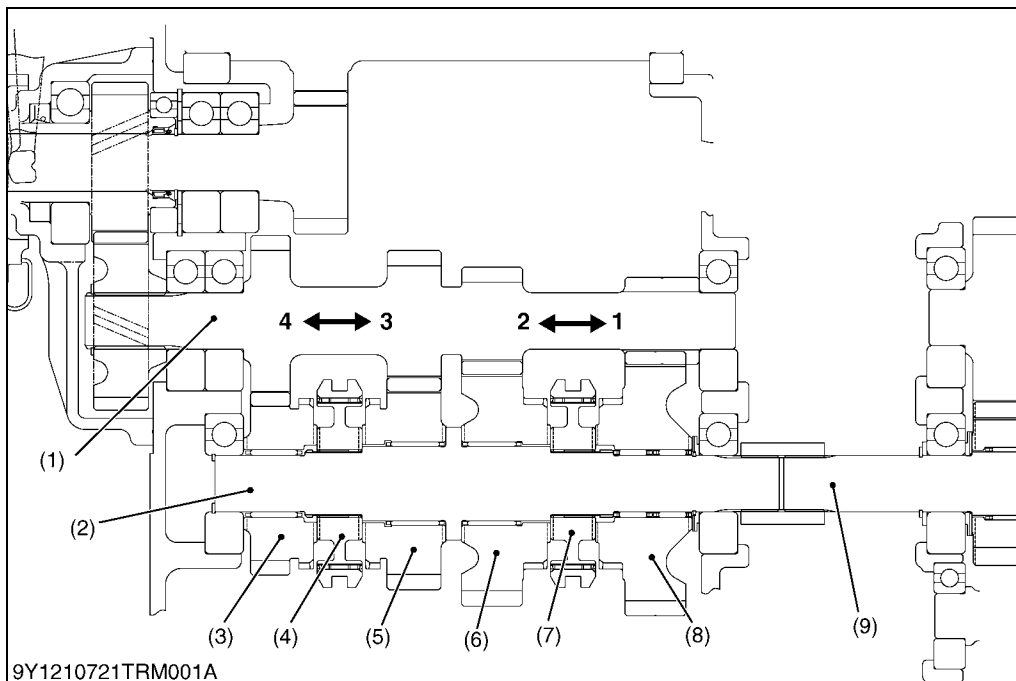
#### 4: 4th Speed

Main Gear Shaft (11) → **23T** Gear (10) → **32T** Gear (2) → **39T** Shift Gear (3) → Spline Boss (4) → Counter Shaft (1).

- |                           |                      |
|---------------------------|----------------------|
| (1) Counter Shaft         | (7) <b>10T</b> Gear  |
| (2) <b>32T</b> Gear       | (8) <b>13T</b> Gear  |
| (3) <b>39T</b> Shift Gear | (9) <b>19T</b> Gear  |
| (4) Spline Boss           | (10) <b>23T</b> Gear |
| (5) <b>45T</b> Shift Gear | (11) Main Gear Shaft |
| (6) <b>45T</b> Gear       |                      |

9Y1211012TRM0001US0

**L4701**



- |                   |
|-------------------|
| (1) Gear Shaft    |
| (2) Counter Shaft |
| (3) Gear for 4th  |
| (4) Shifter       |
| (5) Gear for 3rd  |
| (6) Gear for 2nd  |
| (7) Shifter       |
| (8) Gear for 1st  |
| (9) Shuttle Shaft |

- |                     |
|---------------------|
| 1: <b>1st Speed</b> |
| 2: <b>2nd Speed</b> |
| 3: <b>3rd Speed</b> |
| 4: <b>4th Speed</b> |

9Y1210721TRM001A

The main gear shift section is located in the clutch housing, and it uses a constant mesh.

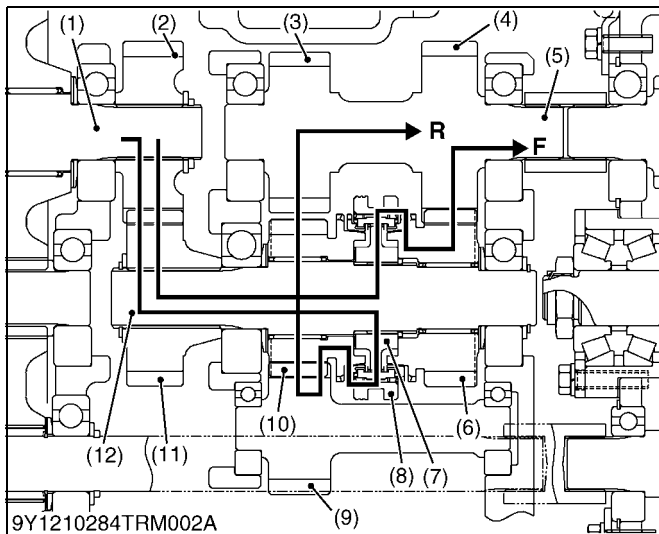
Power is transmitted from the engine to the gear shaft (input) (1) and the counter shaft (2) through the main shaft.

Gear shifting is done by sliding the shifters (4), (7).

9Y1211012TRM0002US0

## (2) Synchro-Shuttle Section

### L3301/L3901



Besides neutral, forward and reverse of power train from counter shaft (1) are available by operating the synchro-shuttle lever.

Power is transmitted as follows.

#### **F: Forward**

Counter Shaft (1) → **23T** Gear (2) → **22T** Gear (11) → Shuttle Shaft (12) → Coupling (7) → Shifter (8) → **22T** Gear (6) → **23T** Gear (4) → Shuttle Gear Shaft (5).

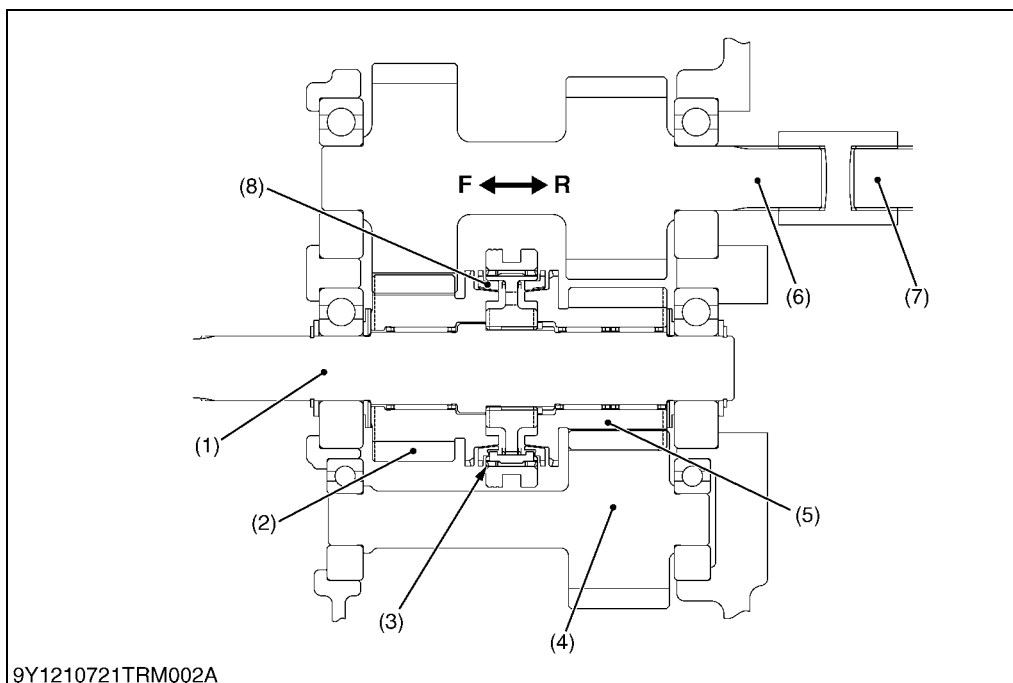
#### **R: Reverse**

Counter Shaft (1) → **23T** Gear (2) → **22T** Gear (11) → Shuttle Shaft (12) → Coupling (7) → Shifter (8) → **21T** Gear (10) → **17T** Gear (9) → **22T** Gear (3) → Shuttle Gear Shaft (5).

- |                        |                      |
|------------------------|----------------------|
| (1) Counter Shaft      | (7) Coupling         |
| (2) <b>23T</b> Gear    | (8) Shifter          |
| (3) <b>22T</b> Gear    | (9) <b>17T</b> Gear  |
| (4) <b>23T</b> Gear    | (10) <b>21T</b> Gear |
| (5) Shuttle Gear Shaft | (11) <b>22T</b> Gear |
| (6) <b>22T</b> Gear    | (12) Shuttle Shaft   |

9Y1211012TRM0003US0

### L4701



- |  |
|--|
| (1) Shuttle Gear Shaft<br>(Connected to Counter Shaft)       |
| (2) Gear for Forward   |
| (3) Single Cone Type Synchro Mesh                            |
| (4) Reverse Gear Shaft                                       |
| (5) Gear for Reverse   |
| (6) Shuttle Counter Shaft<br>(Connected to Range Gear Shaft) |
| (7) Range Gear Shaft   |
| (8) Synchronizer Ring  |

**F: Forward**  
**R: Reverse**

The shuttle shift section is located in the mid case.

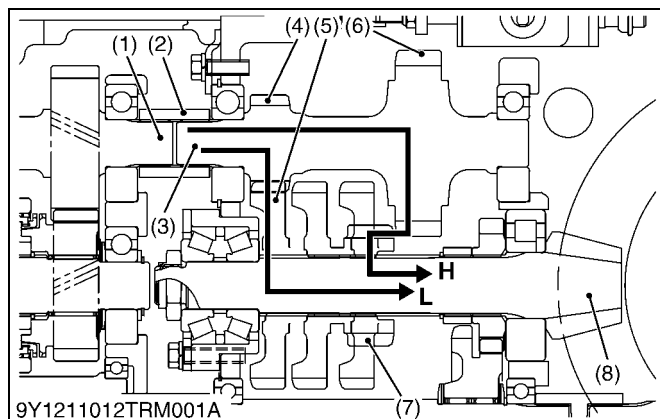
It uses a single cone type synchro mesh. It allows the operator to change forward and reverse with one shuttle shift lever.

One synchronizer ring (8) is installed on one side as shown in the figure.

9Y1211012TRM0004US0

### (3) Range Gear Shift Section

#### L3301/L3901



Two ways of power train from the shuttle gear shaft (1) to the spiral bevel pinion shaft (8) are available by operating the range gear shift lever.

Power is transmitted as follows.

#### **L: Lo-Range**

Shuttle Gear Shaft (1) → Coupling (2) → Range Gear Shaft (3) → **18T** Gear (4) → **42T** Gear (5) → Spiral Bevel Pinion Shaft (8).

#### **H: Hi-Range**

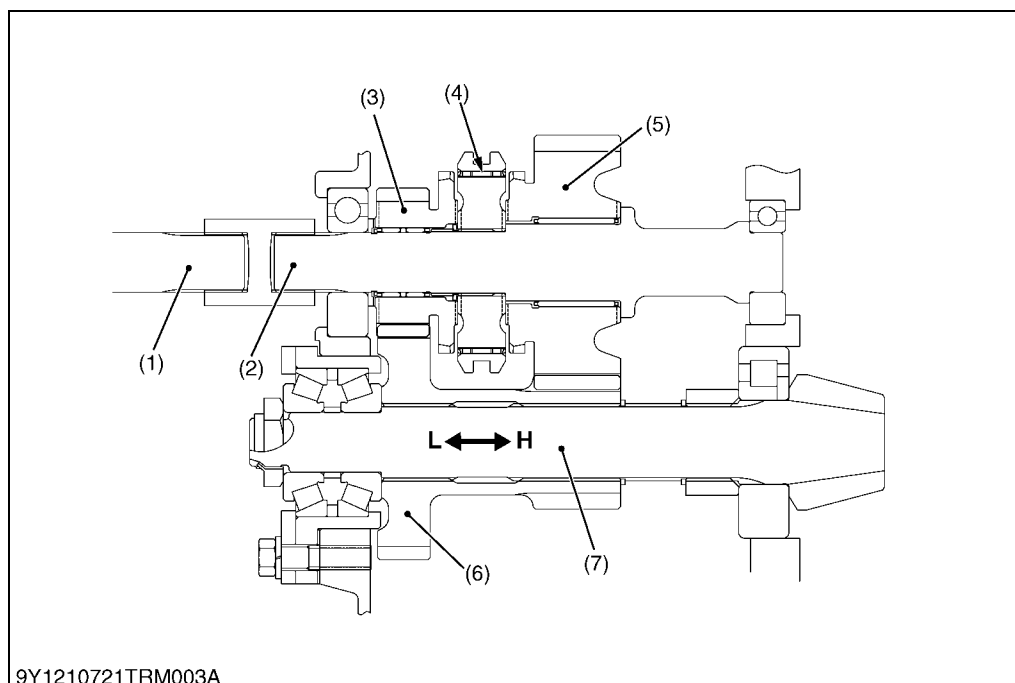
Shuttle Gear Shaft (1) → Coupling (2) → Range Gear Shaft (3) → **31T** Gear (6) → **19T** Gear (7) → Spiral Bevel Pinion Shaft (8).

- (1) Shuttle Gear Shaft
- (2) Coupling
- (3) Range Gear Shaft
- (4) **18T** Gear

- (5) **42T** Gear
- (6) **31T** Gear
- (7) **19T** Gear
- (8) Spiral Bevel Pinion Shaft

9Y1211012TRM0005US0

#### L4701



- (1) Shuttle Gear Shaft
- (2) Range Gear Shaft
- (3) Gear for Low Speed
- (4) Shifter
- (5) Gear for High Speed
- (6) Counter Gear
- (7) Spiral Bevel Pinion Gear

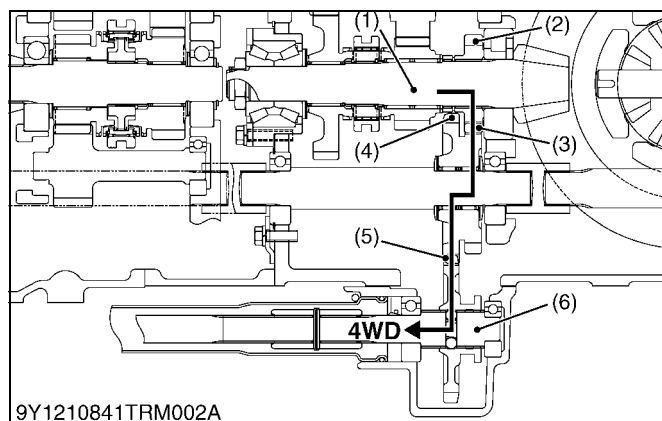
**L: Low Speed**  
**H: High Speed**

The Hi-Lo range gear shift section is located in the differential gear case. It uses constant mesh gears.

9Y1211012TRM0006US0

## (4) Front Wheel Drive Section (4WD Model Only)

### L3301/L3901



9Y1210841TRM002A

2-wheel drive or 4-wheel drive is selected by operating the front wheel drive lever to shift the 33T shift gear (5).

When the front wheel drive lever is set to disengage, 33T shift gear (5) is neutral.

When the front wheel drive lever is set to engage, 33T shift gear splined with front axle drive shaft side to the left side to engage with **34T** gear.

Then, power is transmitted as follows.

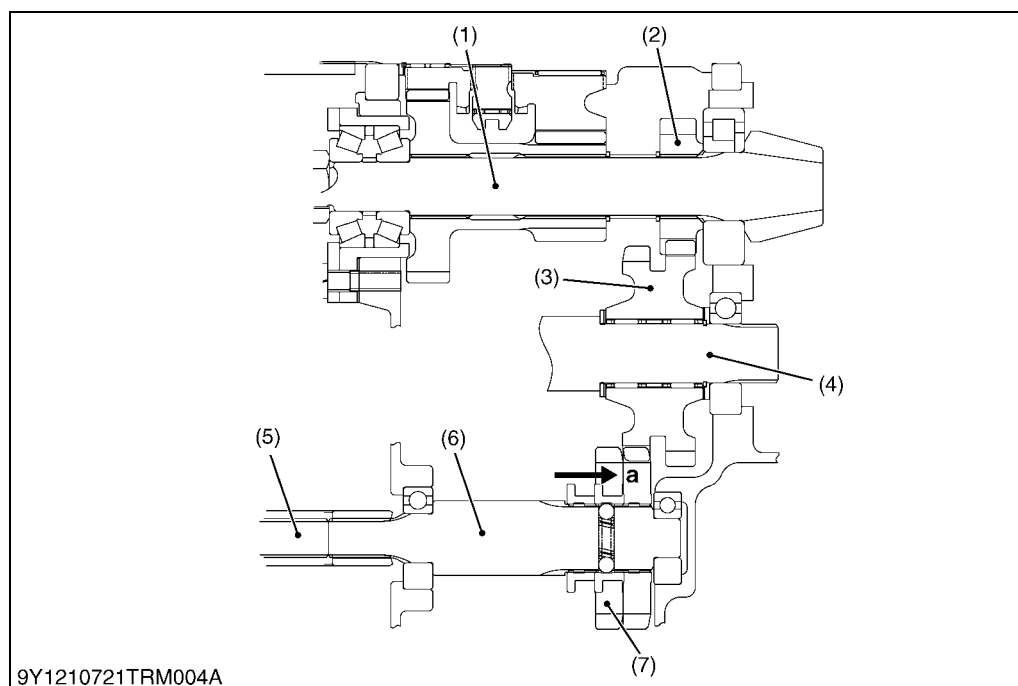
#### ■ Engage

Spiral Bevel Pinion Shaft (1) → **18T** Gear (2) → **25T** Gear (3) → **34T** Gear (4) → 33T Shift Gear (5) → Front Wheel Drive Shaft (6).

- |                               |                             |
|-------------------------------|-----------------------------|
| (1) Spiral Bevel Pinion Shaft | (4) <b>34T</b> Gear         |
| (2) <b>18T</b> Gear           | (5) <b>33T</b> Shift Gear   |
| (3) <b>25T</b> Gear           | (6) Front Wheel Drive Shaft |

9Y1211012TRM0007US0

### L4701



9Y1210721TRM004A

- |  |
|--|
| (1) Spiral Bevel Pinion Gear                                     |
| (2) Gear   |
| (3) Front Wheel Drive Gear                                       |
| (4) Rear PTO Shaft   |
| (5) Propeller Shaft  |
| (6) Front Wheel Drive Shaft<br>(Connected to Propeller<br>Shaft) |
| (7) Shifter Gear   |

**a: Four Wheel Drive Position**

Front wheel drive shift section is located in the differential gear case.

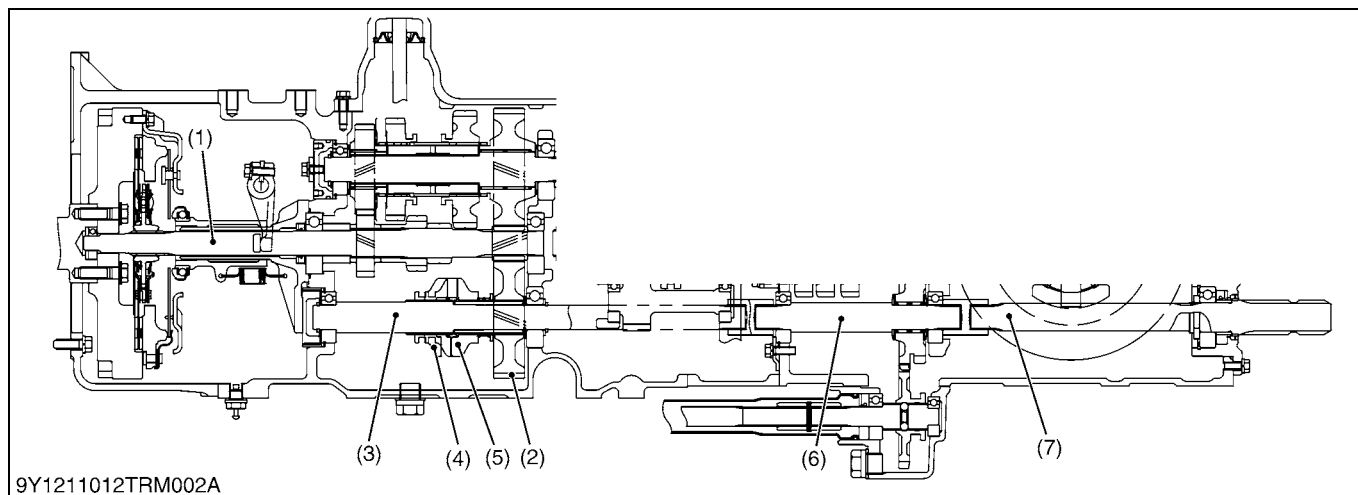
Two wheel drive or four wheel drive is selected by operating the front wheel drive lever to shift the shifter gear (7).

9Y1211012TRM0008US0

## [2] PTO SYSTEM

### (1) Structure

#### L3301

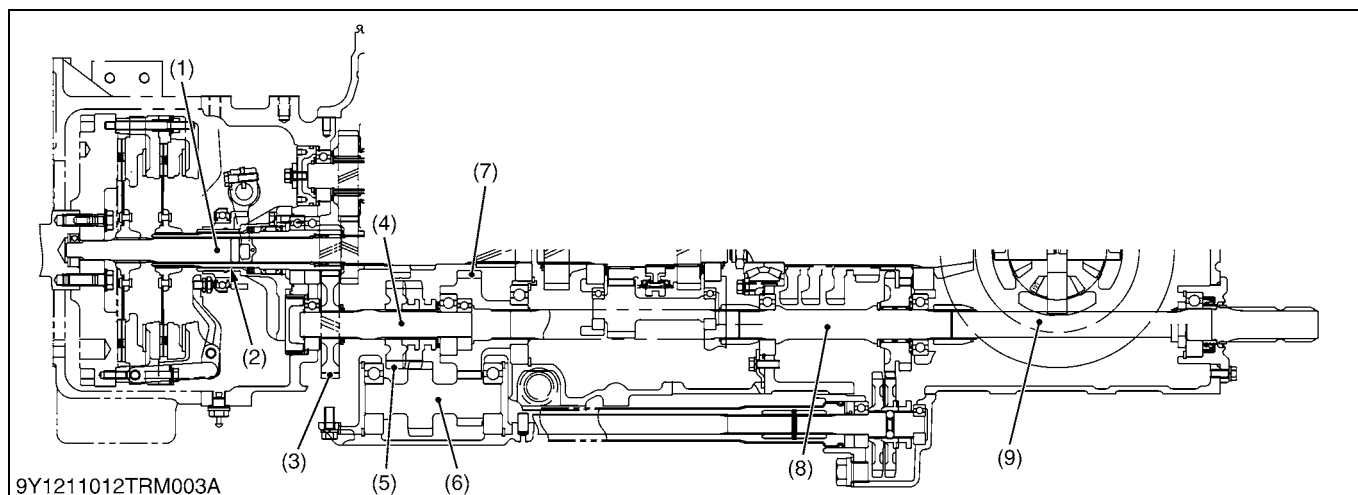


- |                     |                        |                     |               |
|---------------------|------------------------|---------------------|---------------|
| (1) Main Gear Shaft | (3) PTO Counter Shaft  | (5) PTO Clutch      | (7) PTO Shaft |
| (2) 45T Gear        | (4) PTO Clutch Shifter | (6) PTO Drive Shaft |               |

PTO is "**ENGAGED**" or "**DISENGAGED**" by operating the shift lever of the PTO shifter.  
The power train from the main gear shaft to PTO shaft is composed as shown in figure above.

9Y1211012TRM0009US0

#### L3901

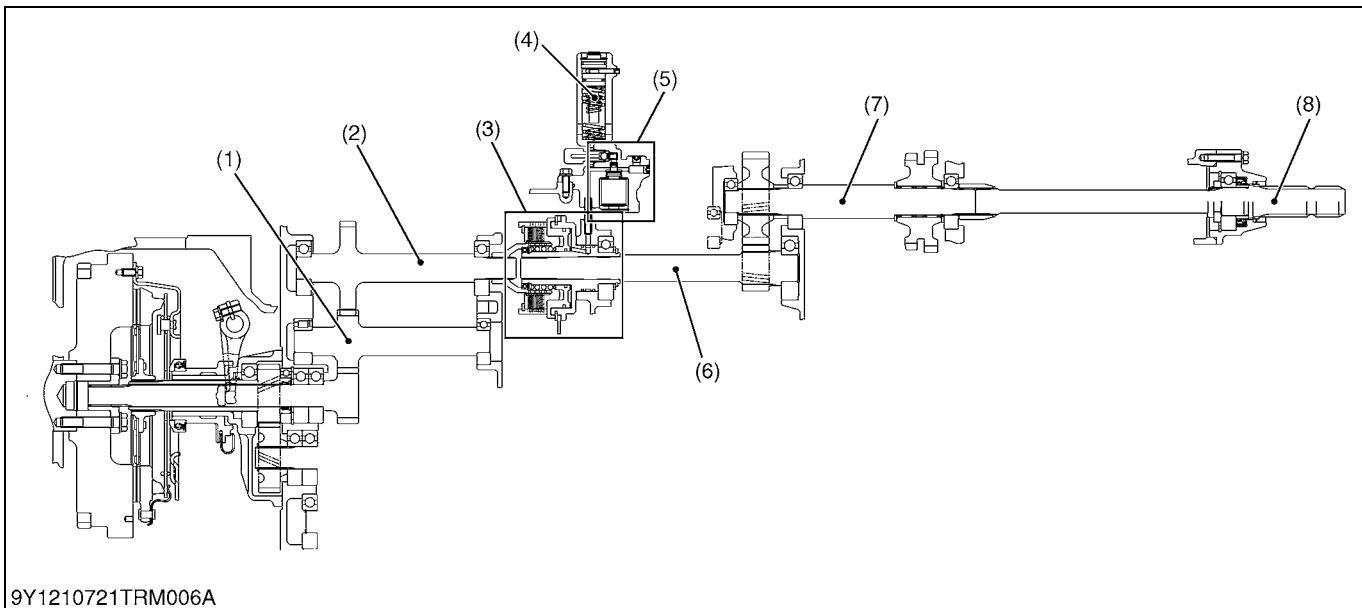


- |                        |                       |                        |                     |
|------------------------|-----------------------|------------------------|---------------------|
| (1) Input Gear Shaft 1 | (4) PTO Counter Shaft | (6) 19T-13T Gear Shaft | (8) PTO Drive Shaft |
| (2) Input Gear shaft 2 | (5) 23T Shift Gear    | (7) 29T Gear           | (9) PTO Shaft       |
| (3) 39T Gear           |                       |                        |                     |

PTO is "**ENGAGED**" or "**DISENGAGED**" by operating the shift lever of the PTO 23T shift gear (5).  
The power train from the 16T input gear shaft to PTO shaft is composed as shown in figure above.

9Y1211012TRM0010US0



**L4701**

- |                      |                      |                    |                     |
|----------------------|----------------------|--------------------|---------------------|
| (1) PTO Gear Shaft 1 | (4) Accumulator      | (6) PTO Gear Shaft | (7) PTO Drive Shaft |
| (2) PTO Gear Shaft 2 | (5) PTO Clutch Valve | (PTO Clutch Shaft) | (8) Rear PTO Shaft  |
| (3) PTO Clutch Pack  |                      |                    |                     |

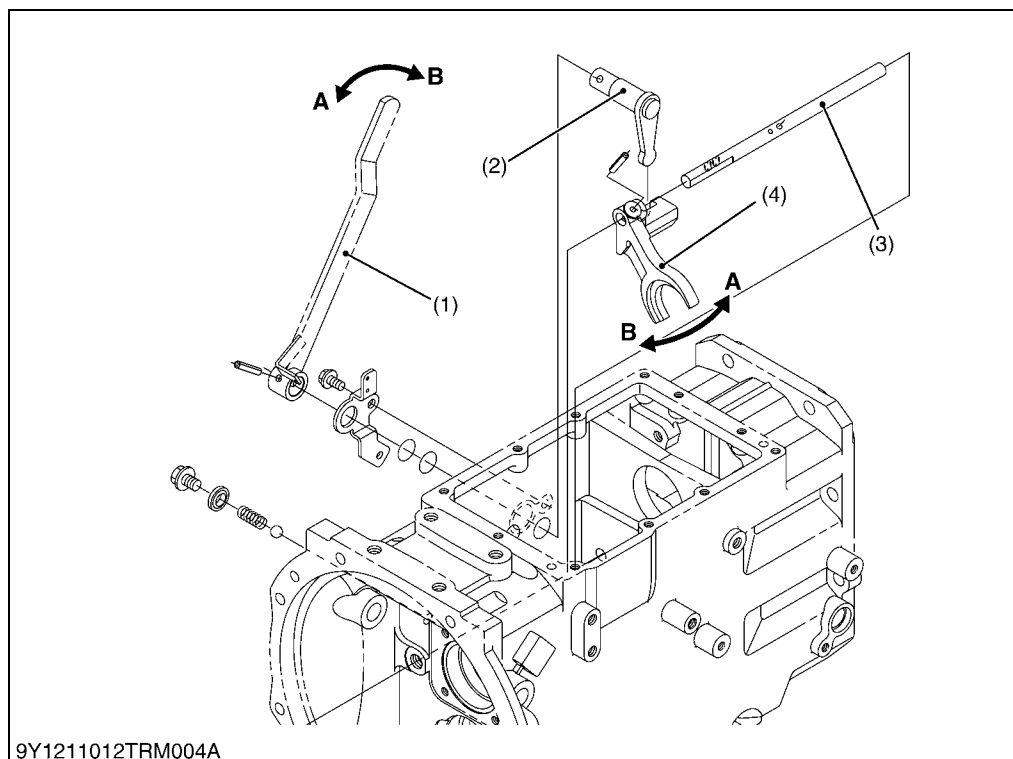
The independent PTO operated by PTO clutch pack (3) is adopted to L4701.

The rear PTO is "**ENGAGED**" or "**DISENGAGED**" by pushing the PTO clutch control switch.

The PTO power train from the clutch to the rear PTO shaft is composed as shown in the figure above.

9Y1211012TRM0011US0

## (2) Shift Linkage (L3301/L3901)



- (1) PTO Shift Lever
- (2) PTO Shift Range Arm
- (3) PTO Fork Rod
- (4) PTO Shift Fork

**A: Disengaged**  
**B: Engaged**

The PTO shift lever (1) to the PTO shift fork (4) are connected by the PTO shift range arm (2) as shown in the figure above.

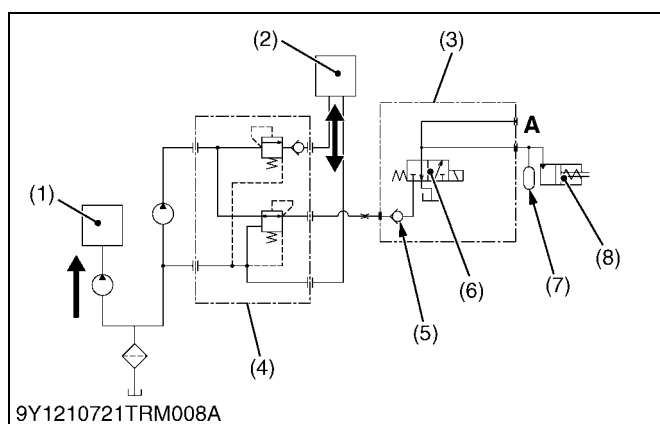
When the PTO shift lever (1) is moved to the "A" side or the "B" side, the PTO shift fork (4) is moved by means of the PTO shift lever (1).

When the PTO shift lever (1) is moved to the "A" side, the PTO is shifted to the "**Disengaged**" position.

When the PTO shift lever (1) is moved to the "B" side, the PTO is shifted to the "**Engaged**" position.

9Y1211012TRM0013US0

## (3) System of PTO Clutch (L4701)



The pressured oil adjusted by the regulator valve flows into the PTO clutch valve (6).

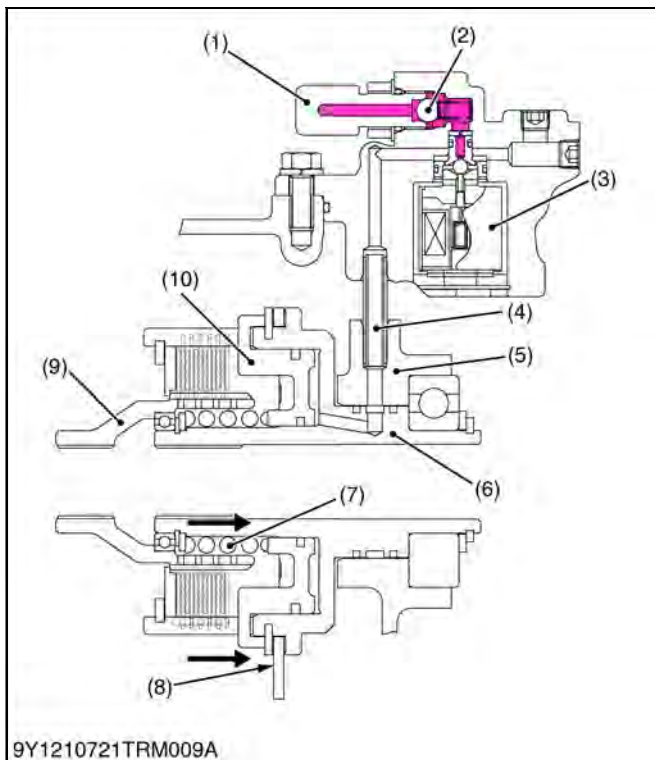
When the PTO clutch control switch is at the "ON" position, PTO clutch solenoid valve is opened and the oil flows through the PTO clutch valve (6) to the accumulator (7) and the PTO clutch pack (8) to engage it.

- (1) 3P Hydraulic Control Valve and Cylinder
- (2) Power Steering Controller and Cylinders
- (3) PTO Valve
- (4) Regulator
- (5) Check Valve
- (6) PTO Clutch Valve
- (7) Accumulator
- (8) PTO Clutch Pack

**A: PTO Clutch Operating Pressure Check Port**

9Y1211012TRM0012US0

## ■ PTO Clutch Control Switch "OFF" Position



When the PTO control switch is set at **"OFF"** position, the coil is not a magnetic.

The spring pushes the rod and the ball (12) is pushed by the plunger (11).

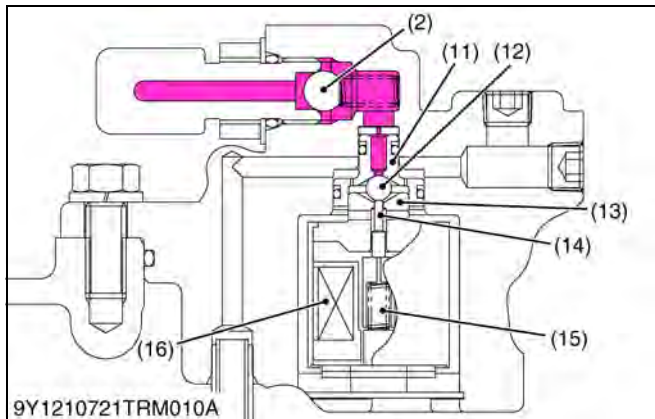
Since oil passage between the ball (12) and the plunger (11) is closed, oil from the pump port is blocked at the PTO clutch solenoid valve (3).

Since the pressured oil is not supplied to the PTO clutch, the PTO clutch is not engaged.

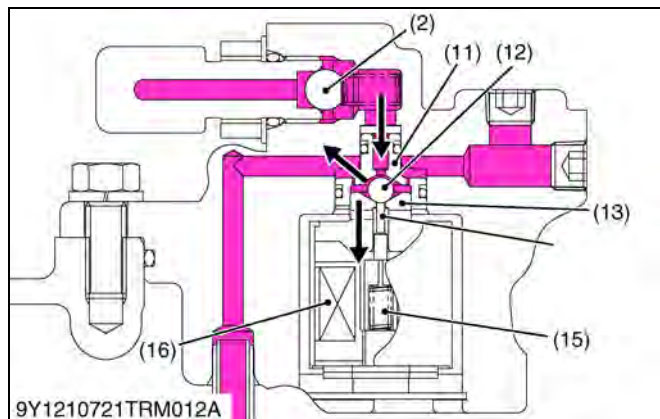
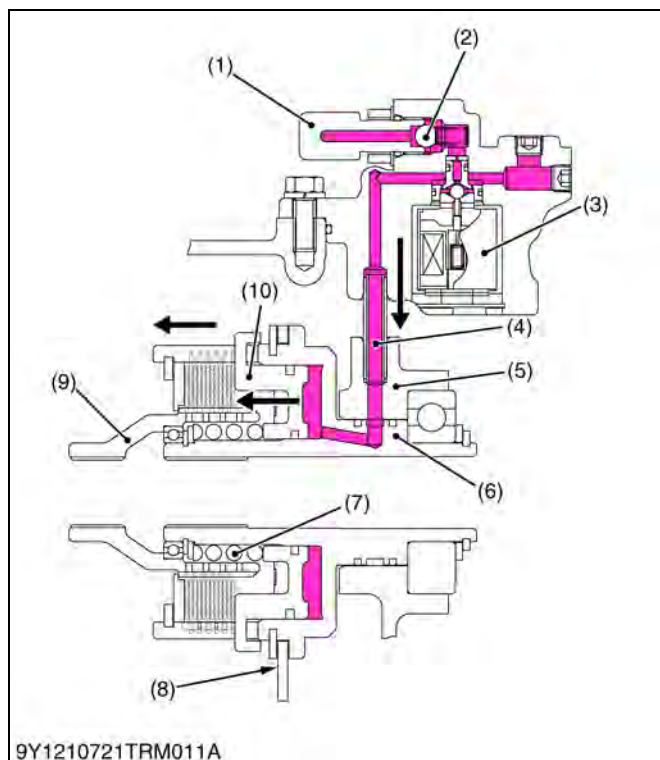
In this condition, the return spring (7) pushes the brake disk (8), and PTO clutch assembly does not rotate.

- |                               |                |
|-------------------------------|----------------|
| (1) Joint                     | (9) Clutch HUb |
| (2) Ball                      | (10) Piston    |
| (3) PTO Clutch Solenoid Valve | (11) Plunger   |
| (4) Hydraulic Pipe            | (12) Ball      |
| (5) Mid Case                  | (13) Seat      |
| (6) I-PTO Clutch              | (14) Rod       |
| (7) Return Spring             | (15) Spring    |
| (8) Brake Disk                | (16) Coil      |

9Y1211012TRM0014US0



### ■ PTO Clutch Control Switch "ON" Position



When the PTO control switch is set at "**ON**" position the coil (16) of the solenoid valve (3) is excited.

The rod (14) is pulled in to the solenoid valve (3) by the excited coil (16).

The ball (9) is pushed to the seat (13) by the pressured oil from pump port.

The pressured oil flows through the oil passage between the ball (2) and the plunger (11) to the PTO clutch pack.

The pressured oil in the PTO clutch pack pushes the piston (10).

As a result, PTO clutch disks and clutch plates are attached and the PTO clutch engages.

The power from the engine is transmitted through PTO clutch to the rear PTO shaft.

The spring (15) pushes the rod and the ball (12) is pushed to the plunger (11).

Since oil passage between the ball (12) and the plunger (11) is closed, oil from the pump port is blocked at the PTO clutch solenoid valve (3).

- |                               |                |
|-------------------------------|----------------|
| (1) Joint                     | (9) Clutch Hub |
| (2) Ball                      | (10) Piston    |
| (3) PTO Clutch Solenoid Valve | (11) Plunger   |
| (4) Hydraulic Pipe            | (12) Ball      |
| (5) Mid Case                  | (13) Seat      |
| (6) I-PTO Clutch              | (14) Rod       |
| (7) Return Spring             | (15) Spring    |
| (8) Brake Disk                | (16) Coil      |

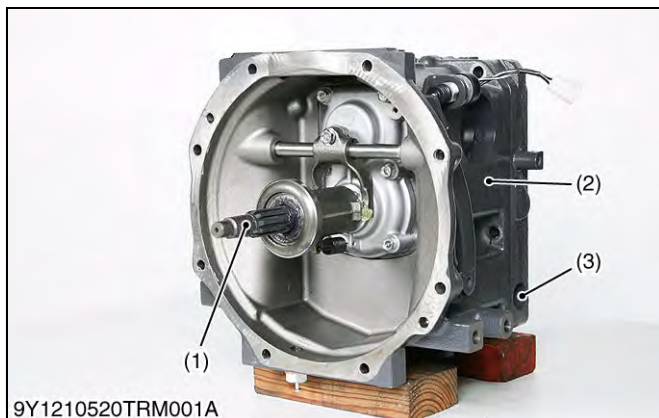
9Y1211012TRM0015US0

### 3. HYDROSTATIC TRANSMISSION (HST) MODEL

#### [1] Hydrostatic Transmission Assembly

##### (1) Structure

##### [A] L3301/L3901



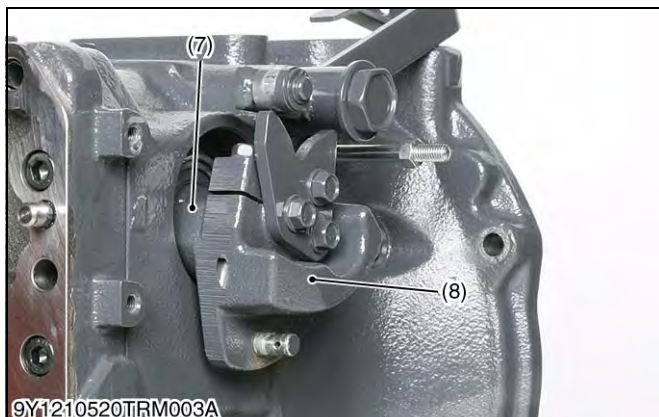
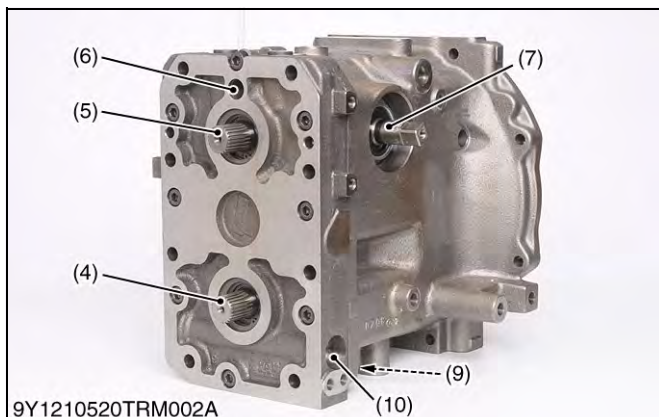
The HST of this tractor is a built-in type to the clutch housing.

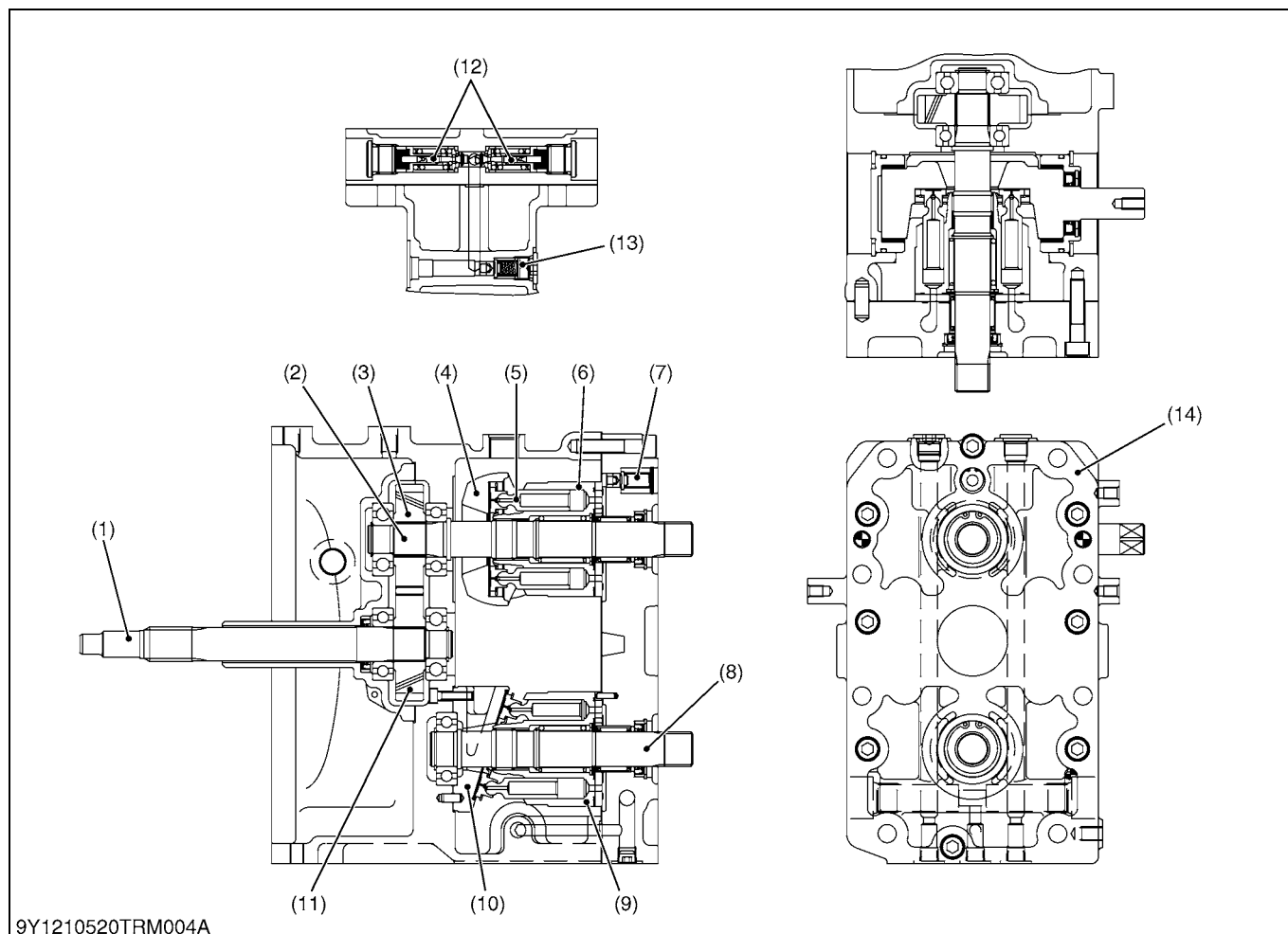
HST assembly chiefly consists of HST case (clutch housing case), variable displacement piston pump, fixed displacement piston motor, charge pump and various valves.

Refer to the next page for detailed parts in HST.

- |  |   |
|--|---|
| (1) Input Shaft                          | (6) Case Relief Valve                     |
| (2) HST Case                             | (7) Trunnion Shaft                        |
| (Clutch Housing Case)                    | (8) Neutral Holder                        |
| (3) Check and High Pressure Relief Valve | (9) Charge Relief Valve                   |
| (4) Output Shaft (Motor Shaft)           | (10) Check and High Pressure Relief Valve |
| (5) Pump Shaft                           |   |

9Y1211012TRM0016US0





- (1) Input Shaft
- (2) Pump Shaft
- (3) 27T Gear
- (4) Variable Swashplate

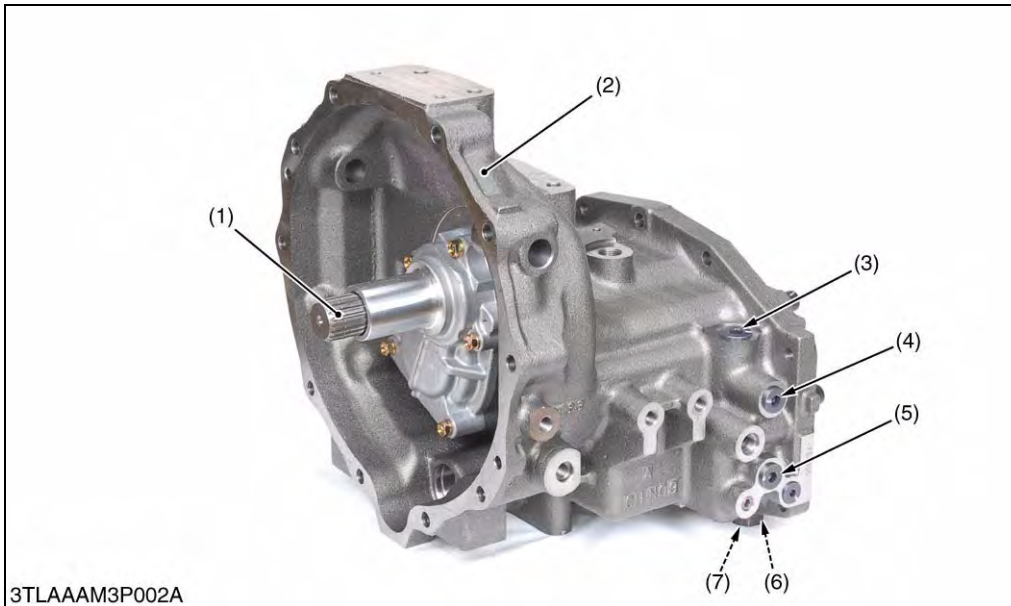
- (5) Piston (Pump)
- (6) Cylinder Block (Pump)
- (7) Case Relief Valve
- (8) Output Shaft (Motor Shaft)

- (9) Cylinder Block (Motor)
- (10) Fixed Swashplate
- (11) 28T Gear

- (12) Check and High Pressure Relief Valve
- (13) Charge Relief Valve
- (14) Port Block

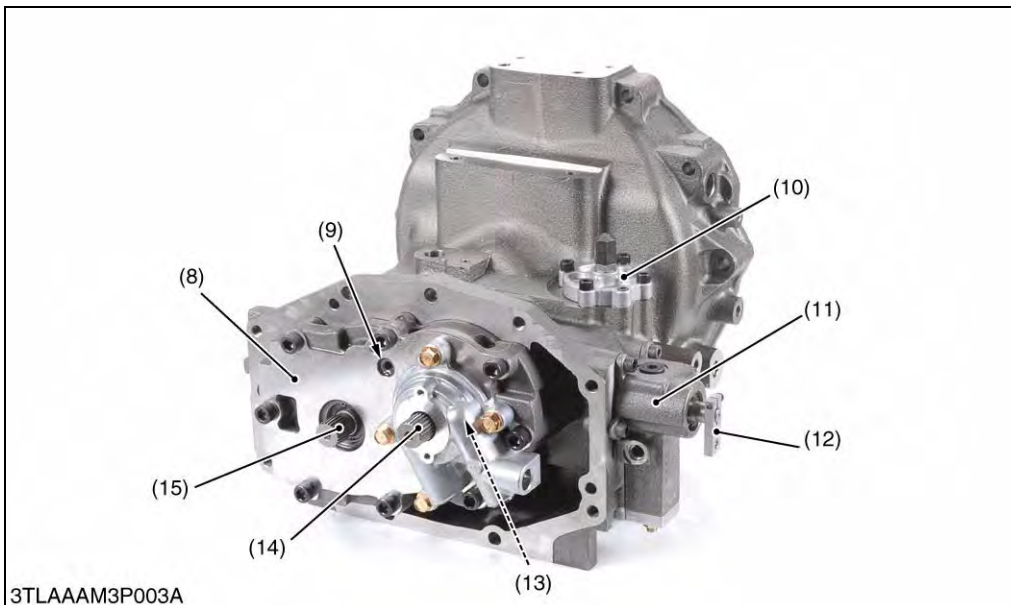
9Y1211012TRM0017US0

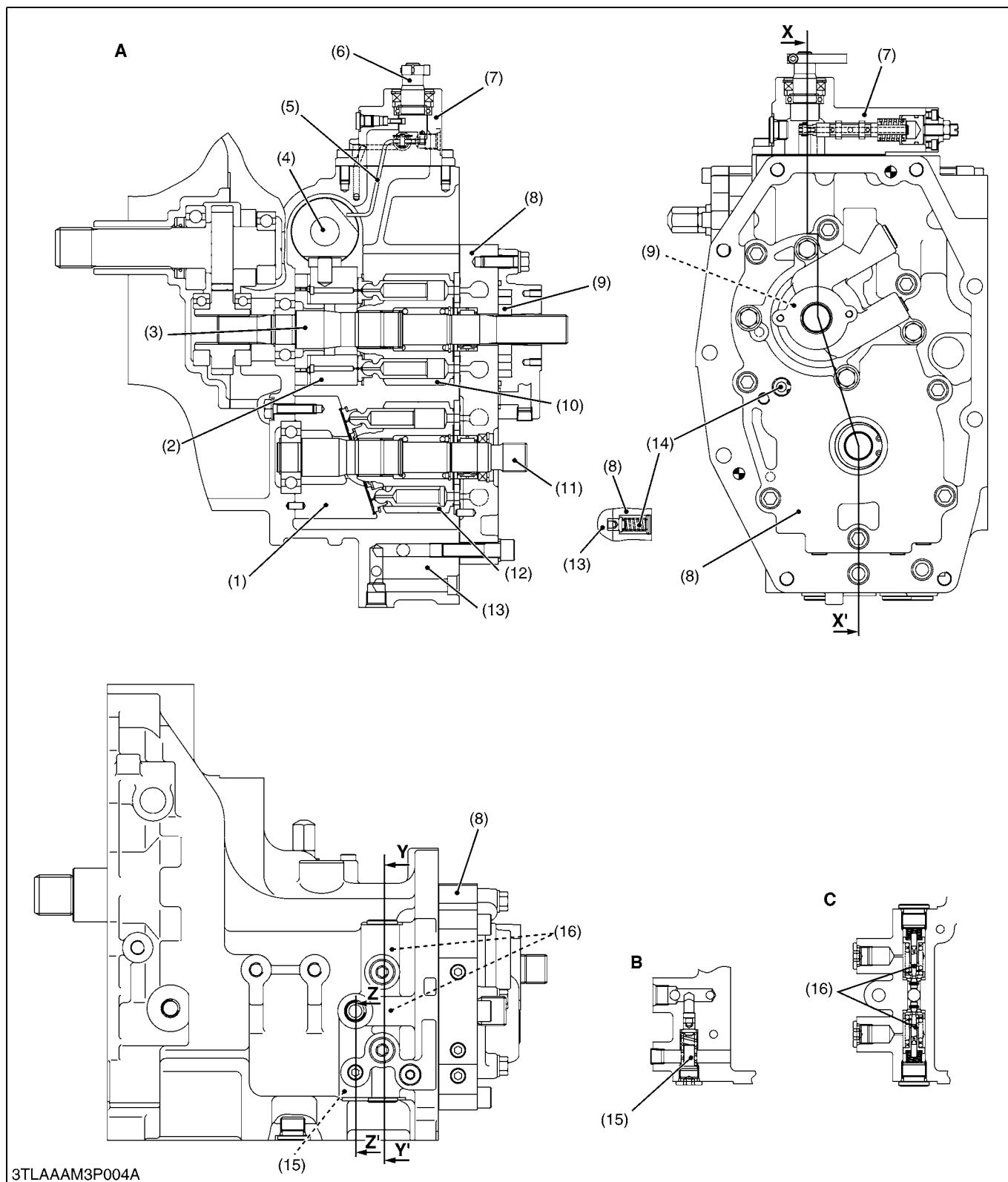


**[B] L4701**

- (1) 23T Input Gear Shaft
- (2) HST Case (Clutch Housing)
- (3) Check and High Pressure Relief Valve
- (4) Check Port (for High Pressure Relief Valve)
- (5) Check Port (for High Pressure Relief Valve)
- (6) Check and High Pressure Relief Valve
- (7) Charge Relief Valve
- (8) Port Block Cover
- (9) Case Relief Valve
- (10) Servo Piston
- (11) Servo Regulator
- (12) Control Lever (Connect to HST Pedal)
- (13) Charge Pump
- (14) Input Shaft (Pump Shaft)
- (15) Output Shaft (Motor Shaft)

9Y1211012TRM0018US0





- (1) Fixed Swashplate
- (2) Variable Swashplate
- (3) Pump Shaft
- (4) Servo Piston
- (5) Feedback Lever
- (6) Control Shaft

- (7) Regulator Assembly
- (8) Port Block Cover
- (9) Charge Pump
- (10) Cylinder Block (Pump)
- (11) Motor Shaft
- (12) Cylinder Block (Motor)

- (13) HST Case
- (14) Case Relief Valve
- (15) Charge Relief Valve
- (16) Check and High Pressure Relief Valve

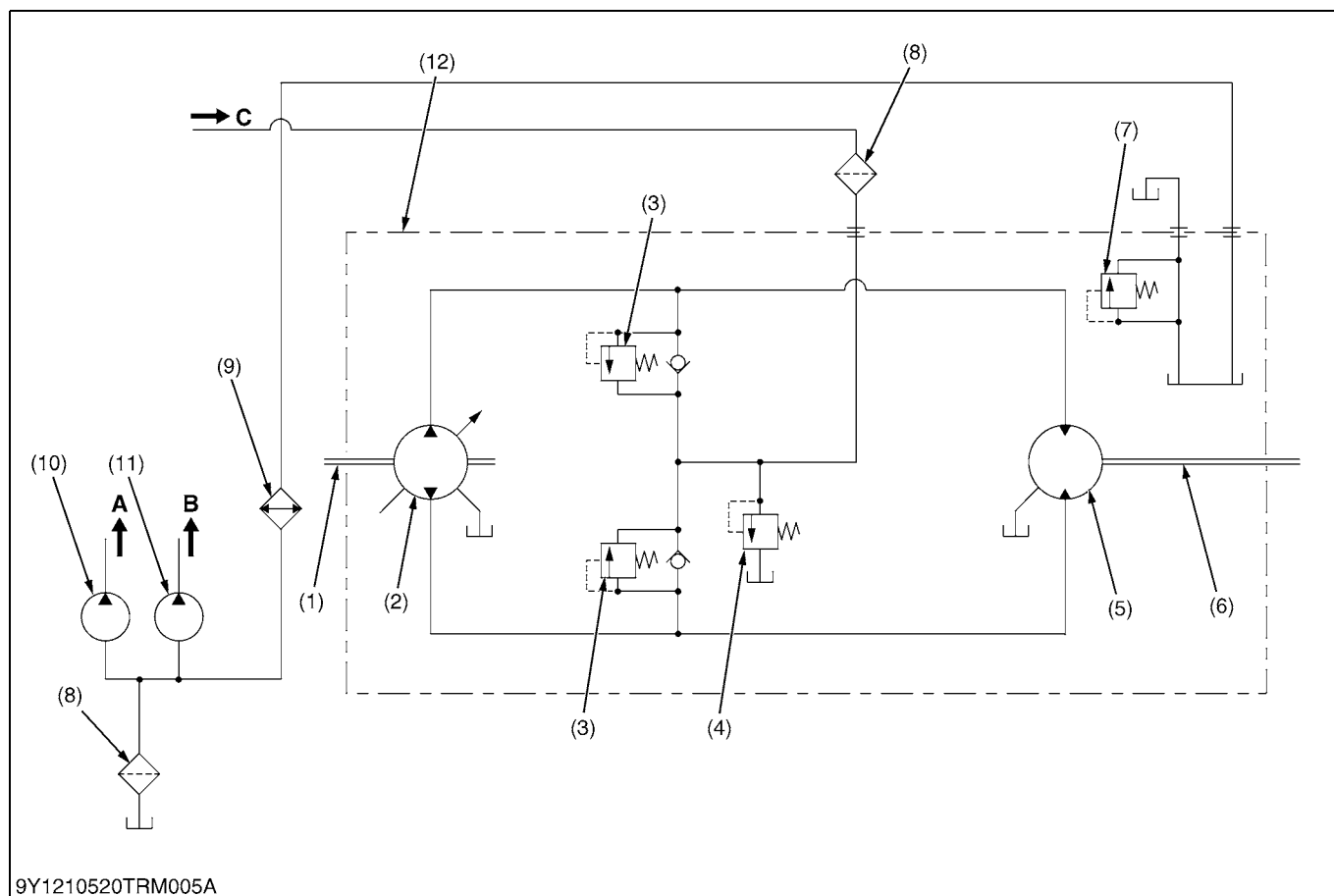
- A: Sectional View X-X'**
- B: Sectional View Z-Z'**
- C: Sectional View Y-Y'**

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## (2) Oil Flow

### L3301/L3901



9Y1210520TRM005A

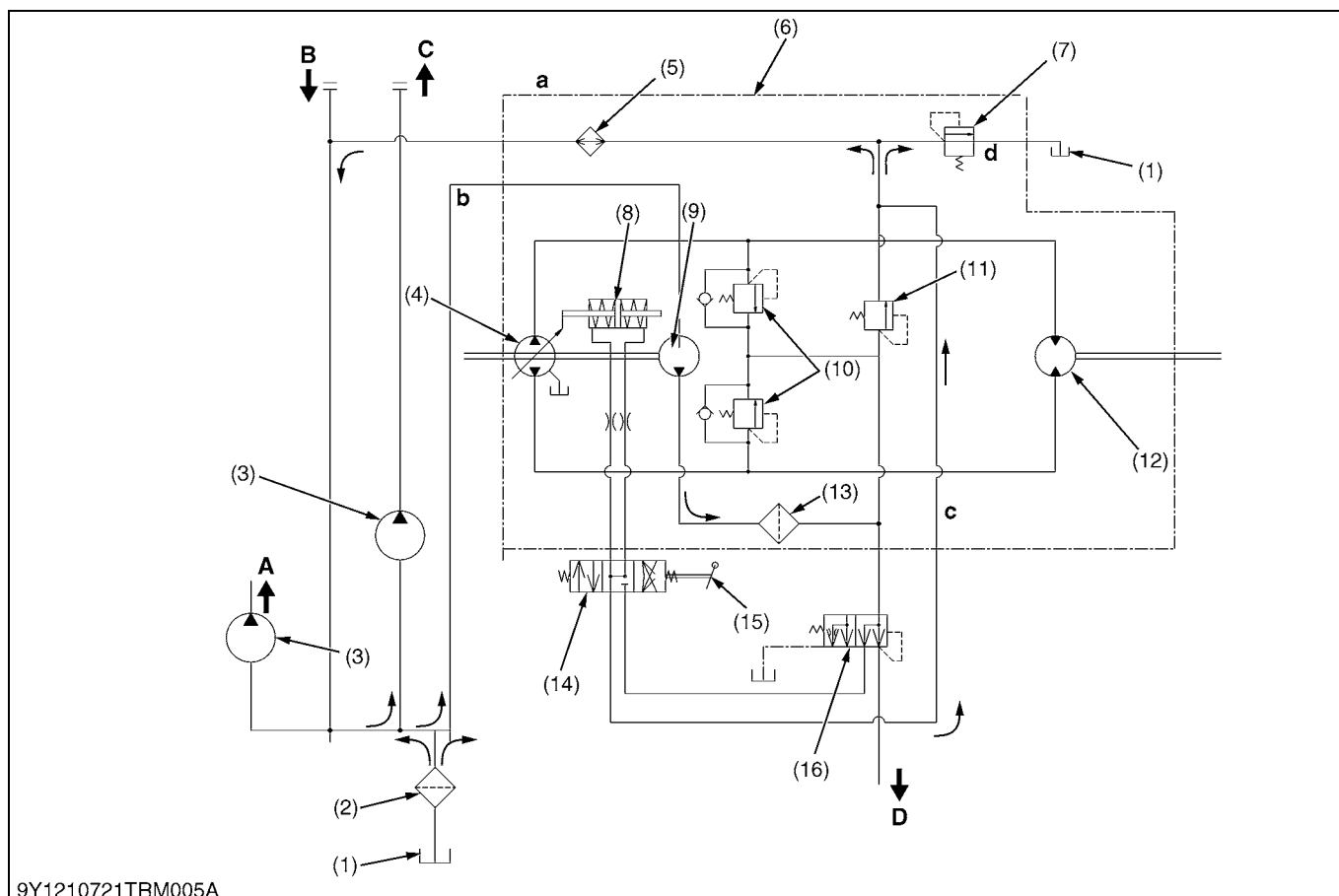
- |  |                                |                                      |                               |
|--|--------------------------------|--------------------------------------|-------------------------------|
| (1) Pump Shaft                           | (5) Fixed Displacement Motor   | (9) Oil Cooler                       | <b>A: To Hydraulic Block</b>  |
| (2) Variable Displacement Pump           | (6) Output Shaft (Motor Shaft) | (10) Hydraulic Pump (Main Circuit)   | <b>B: To Power Steering</b>   |
| (3) Check and High Pressure Relief Valve | (7) Case Relief Valve          | (11) Hydraulic Pump (Power Steering) | <b>C: From Power Steering</b> |
| (4) Charge Relief Valve                  | (8) Oil Filter                 | (12) HST Unit                        |                               |

The pump (2) and motor (5) are joined in a closed hydraulic loop and most of oil circulates within the main oil circuit. When the variable swash-plate is at right angle to the pump piston, the oil is not send to the motor (5). When the variable swash-plate is tilted to forward or reverse, oil forced out of pump (2) at high pressure and send to the motor.

And then the output shaft (6) rotates with the motor and oil is forced out of motor at low pressure and return to the pump (2). On the other hand, oil is send to the main circuit through the filter (8) and excessive oil passes to the case through the charge relief valve (4). The case relief valve (7) controls pressure in the HST case.

The check and high pressure relief valve (3) between the two lines in the main oil circuit monitors the oil pressure in each line, it opens and close the oil into another line.

9Y1211012TRM0020US0

**L4701**

- (1) Transmission Case
- (2) Hydraulic Filter
- (3) Hydraulic Pump
- (4) Pump Cylinder Block
- (5) Oil Cooler
- (6) HST Assembly
- (7) Case Relief Valve
- (8) Servo Piston

- (9) Charge Pump
- (10) Check and High Pressure Relief Valve
- (11) Charge Relief Valve
- (12) Motor Cylinder Block
- (13) Filter
- (14) Regulator Valve

- (15) HST Pedal
- (16) PTO Clutch Pressure Priority Valve
- A: To Hydraulic Block and 3-point Hitch**
- B: From Power Steering Controller**

- C: To Power Steering Controller**
- D: To PTO Clutch Valve**
- a: a port**
- b: b port**
- c: c port**
- d: d port**

Oil flows in HST case from **b**-port and is sent to c-port with the charge pump (9). Oil from c-port is sent to HST circuit and the PTO clutch valve.

The oil in the regulator valve (14) is used for the movement of the servo piston (8) which is operated by the regulator valve (14) and the HST pedal (15). And the oil in the HST main circuit gets circulated between the variable displacement pump cylinder block (4) and the fixed displacement motor cylinder block (12), which forms a closed circuit.

The case relief valve (7) controls pressure in the HST case.

The PTO pressure priority valve (16) switches the pressurized oil from the charge pump (9) to the PTO clutch and HST regulator valve (HST servo valve) (14). When the oil pressure at the PTO pressure priority valve (16) is below the setting pressure, approx. 14.0 to 15.0 kgf/cm<sup>2</sup> (1.38 to 1.47 MPa, 199 to 213 psi) at engine idling speeds, the PTO pressure priority valve (16) delivers preferentially the oil from the charge pump (9) to the PTO clutch valve to operate the PTO clutch.

**(Reference)**

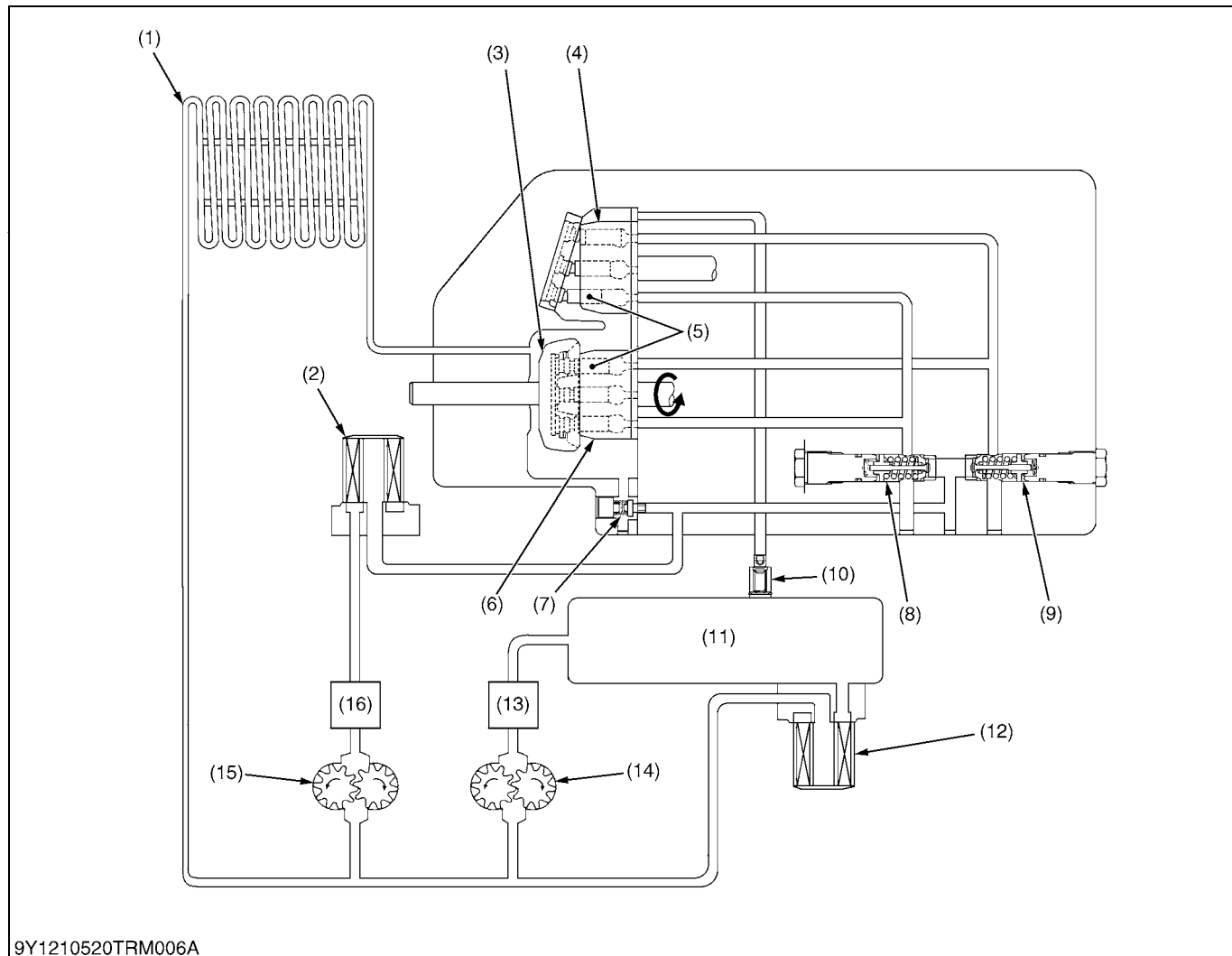
- Valve Setting Pressure [Oil temperature: 40 to 60 °C (104 to 140 °F)]
  - Charge Relief Valve: 2.3 to 2.6 MPa (23.5 to 27.0 kgf/cm<sup>2</sup>, 334 to 384 psi)
  - Check and High Pressure Relief Valve: 33.3 to 36.3 MPa (340 to 370 kgf/cm<sup>2</sup>, 4836 to 5262 psi)
  - Case Relief Valve: 0.29 MPa (3.0 kgf/cm<sup>2</sup>, 42.7 psi)

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### (3) Operation

#### [A] L3301/L3901

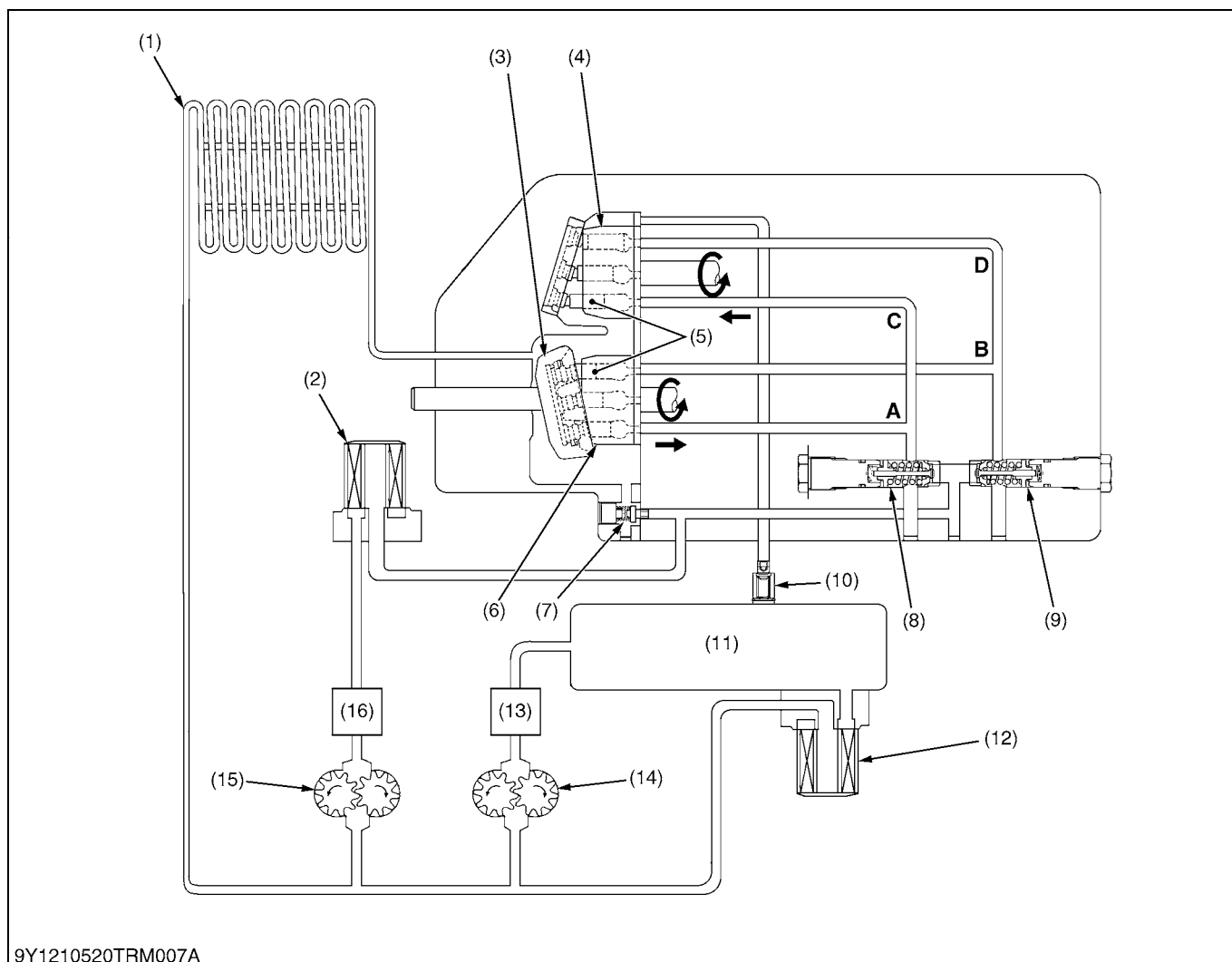
When the HST pedal is in the neutral position



- |                            |  |                              |                                      |
|----------------------------|--|------------------------------|--------------------------------------|
| (1) Oil Cooler             | (7) Charge Relief Valve                            | (10) Case Relief Valve       | (14) Hydraulic Pump (Main Circuit)   |
| (2) Oil Filter (HST)       | (8) Check and High Pressure Relief Valve (Forward) | (11) Transmission Case       | (15) Hydraulic Pump (Power Steering) |
| (3) Swash plate            | (9) Check and High Pressure Relief Valve (Reverse) | (12) Oil Filter              | (16) Power Steering Controller       |
| (4) Cylinder Block (Motor) |  | (13) Hydraulic Control Valve |                                      |
| (5) Piston                 |  |                              |                                      |
| (6) Cylinder Block (Pump)  |  |                              |                                      |

When the speed control pedal is in neutral, the variable swash-plate is at right angles to the pump piston and they only rotate with cylinder block without reciprocating. Since the oil is not being pumped to the motor, the cylinder block in the motor is stationary and the output shaft does not move.

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**When the HST pedal is pressed toward the forward side**

9Y1210520TRM007A

- |                            |  |                                      |                        |
|----------------------------|--|--------------------------------------|------------------------|
| (1) Oil Cooler             | (8) Check and High Pressure Relief Valve (Forward) | (13) Hydraulic Control Valve         | <b>A: Pump Port A</b>  |
| (2) Oil Filter (HST)       | (9) Check and High Pressure Relief Valve (Reverse) | (14) Hydraulic Pump (Main Circuit)   | <b>B: Pump Port B</b>  |
| (3) Swash plate            | (10) Case Relief Valve                             | (15) Hydraulic Pump (Power Steering) | <b>C: Motor Port C</b> |
| (4) Cylinder Block (Motor) | (11) Transmission Case                             | (16) Power Steering Controller       | <b>D: Motor Port D</b> |
| (5) Piston                 | (12) Oil Filter                                    |                                      |                        |
| (6) Cylinder Block (Pump)  |  |                                      |                        |
| (7) Charge Relief Valve    |  |                                      |                        |

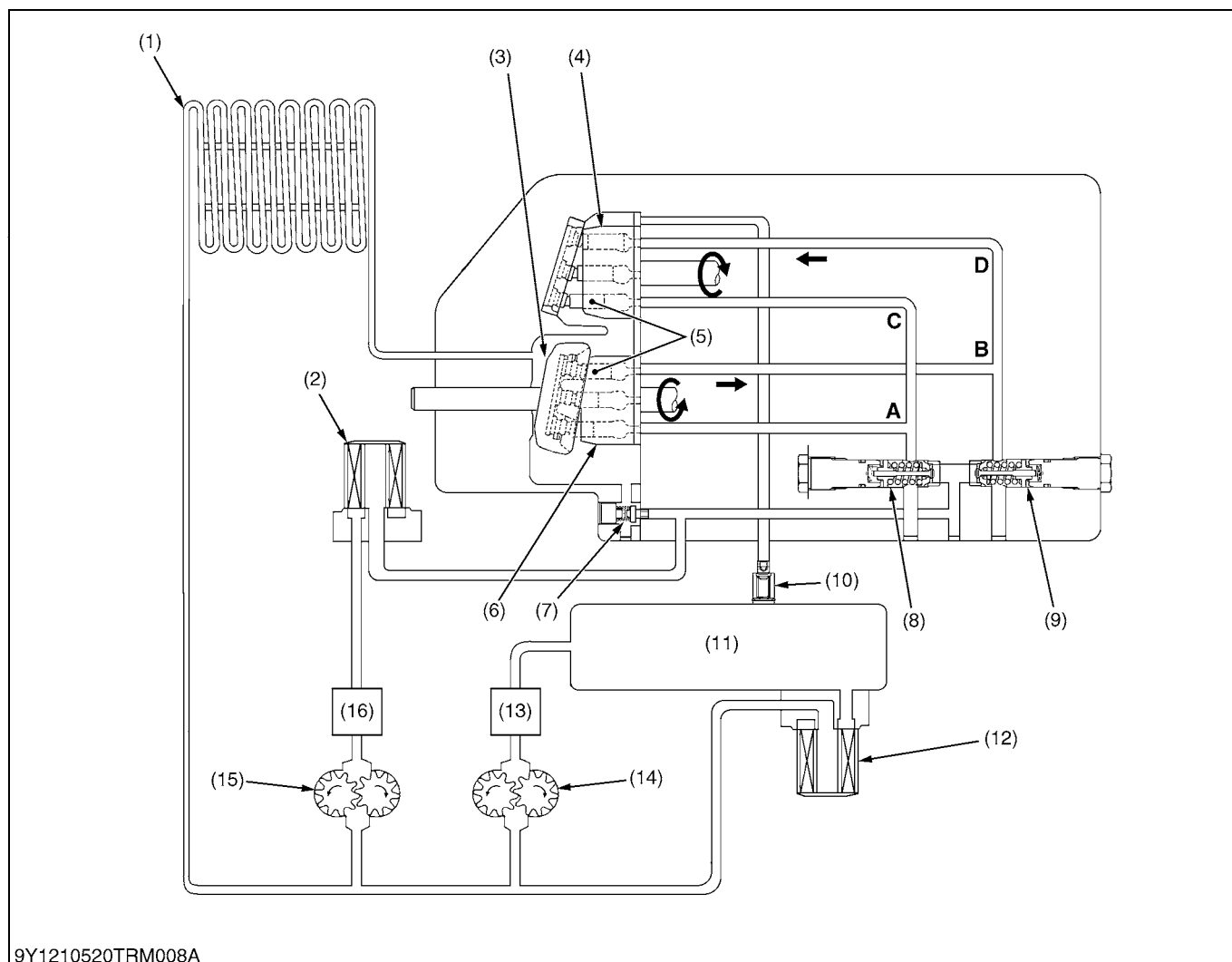
When the speed control pedal is stepped on and in forward, the variable swash-plate is tilted as shown in figure above.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **A** at high pressure. As pressure oil enters motor port **C**, the pistons, which align with port **C**, are pushed against the swash-plate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine forward and the angle of pump swash-plate determines the output shaft speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **D** at low pressure and returns to the pump port **B**.

9Y1211012TRM0023US0

**When the HST pedal is pressed toward the reverse side**

9Y1210520TRM008A

- |                            |  |                                      |                        |
|----------------------------|--|--------------------------------------|------------------------|
| (1) Oil Cooler             | (8) Check and High Pressure Relief Valve (Forward) | (13) Hydraulic Control Valve         | <b>A: Pump Port A</b>  |
| (2) Oil Filter (HST)       | (9) Check and High Pressure Relief Valve (Reverse) | (14) Hydraulic Pump (Main Circuit)   | <b>B: Pump Port B</b>  |
| (3) Swash plate            | (10) Case Relief Valve                             | (15) Hydraulic Pump (Power Steering) | <b>C: Motor Port C</b> |
| (4) Cylinder Block (Motor) | (11) Transmission Case                             | (16) Power Steering Controller       | <b>D: Motor Port D</b> |
| (5) Piston                 | (12) Oil Filter                                    |                                      |                        |
| (6) Cylinder Block (Pump)  |  |                                      |                        |
| (7) Charge Relief Valve    |  |                                      |                        |

When the speed control pedal is stepped on and in reverse, the variable swash-plate is tilted as shown in figure above.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **B** at high pressure. As pressure oil enters motor port **D**, the pistons, which align with port **D**, are pushed against the swash-plate and slide down the inclined surface.

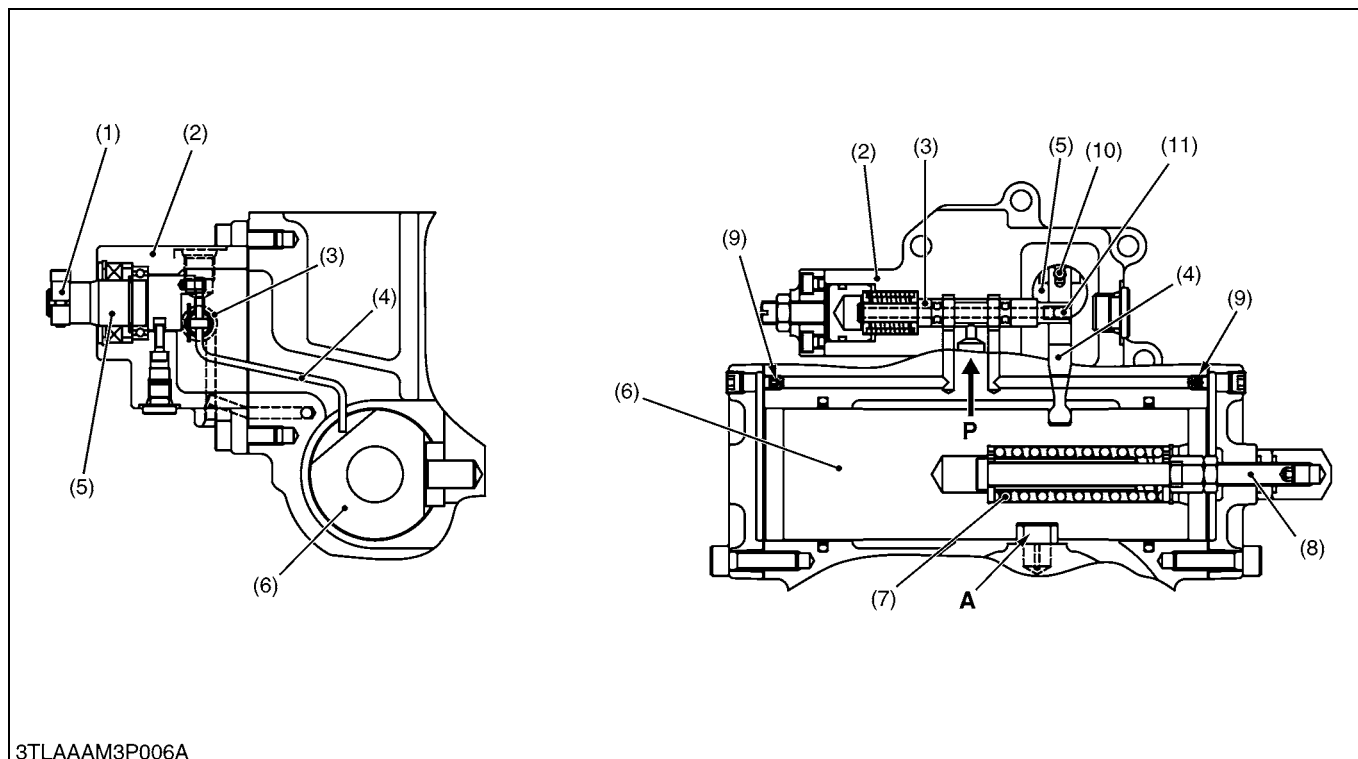
Then the output shaft rotates with the motor cylinder block. This drives the machine rearward and the angle of pump swash-plate determines the output shaft speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **C** at low pressure and returns to the pump port **A**.

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## [B] L4701

### Servomechanism



- |   |                            |  |   |
|---|----------------------------|--|---|
| (1) Control Lever<br>(Connected to HST Pedal) | (5) Control Shaft          | (9) Orifice                              | <b>A: Slit for Connection of<br/>Swashplate</b> |
| (2) Regulator Valve Assembly                  | (6) Servo Piston           | (10) Pin A<br>(Fixed with Control Shaft) | <b>P: IN Port (From Bypass Pipe)</b>            |
| (3) Spool                                     | (7) Spring                 | (11) Pin B                               |   |
| (4) Feedback Lever                            | (8) Piston Adjusting Screw |  |   |

As for the servomechanism, the regulator (2) and servo piston (6) are chiefly composed. The regulator is connected to the HST pedal through linkages, and controls the flow of oil to the servo piston by the pedal operation.

The servo piston moved by hydraulic force, is connected to the pump cylinder swashplate. Therefore, a tilt angle of swashplate is varied by servo piston movement.

As for the regulator and the servo piston, it is connected with feedback lever (4), and the movement of the piston is restricted according to the amount of depressing of the HST pedal.

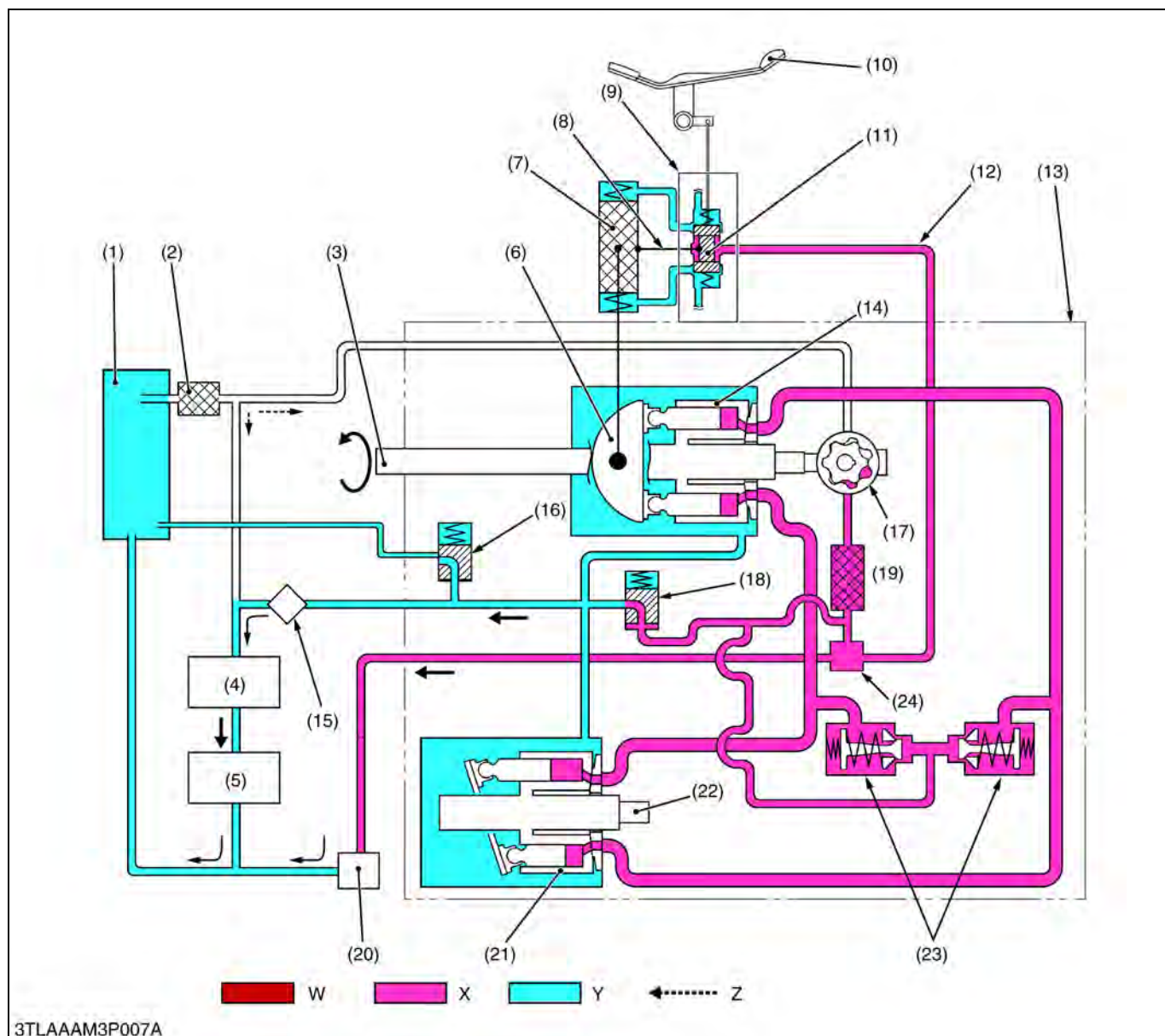
Refer to Workshop Manual of "**TRACTOR MECHANISM**" (Code No. 97897-18200) for the operation of the servomechanism, that is, the operation of regulator and servo piston.

#### ■ Valves

As for the mechanism and function of check and high pressure relief valve, charge relief valve and case relief valve, refer to Workshop Manual of "**TRACTOR MECHANISM**" (Code No. 97897-18200).

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Neutral

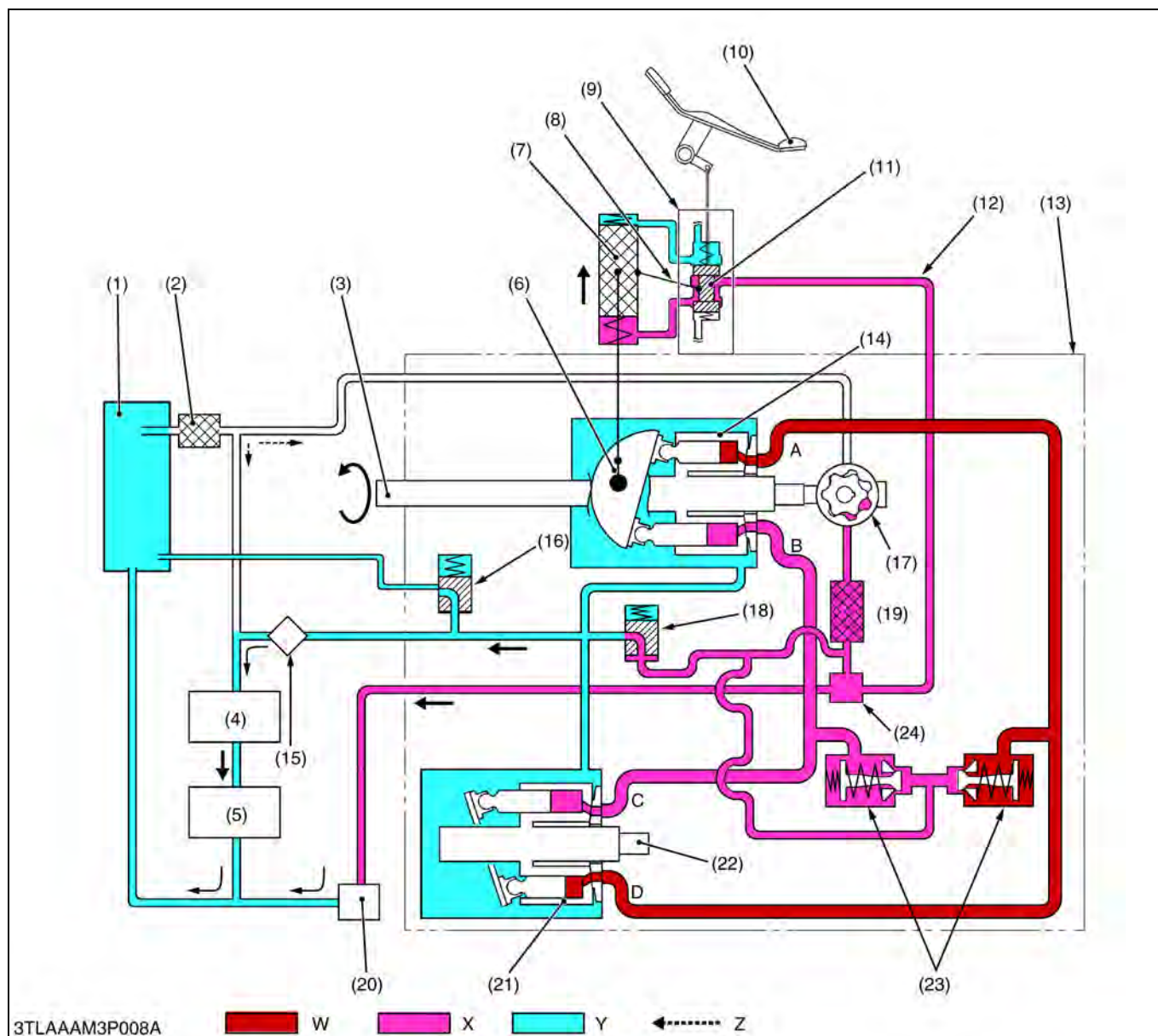


- |                            |                              |                               |   |
|----------------------------|------------------------------|-------------------------------|---|
| (1) Transmission Case      | (9) Regulator Valve Assembly | (16) Case Relief Valve        | (23) Check and High Pressure Relief Valve |
| (2) Filter                 | (10) HST Pedal               | (17) Charge Pump              | (24) PTO Clutch Pressure Priority Valve   |
| (3) Input Shaft            | (11) Spool                   | (18) Charge Relief Valve      |   |
| (4) Hydraulic Pump         | (12) Bypass Pipe             | (19) Oil Filter               |   |
| (5) Power Steering Circuit | (13) HST Assembly            | (20) PTO Clutch Valve Circuit | <b>W: High Pressure Oil</b>               |
| (6) Variable Swashplate    | (14) Pump Cylinder Block     | (21) Motor Cylinder Block     | <b>X: Low Pressure Oil</b>                |
| (7) Servo Piston           | (15) Oil Cooler              | (22) Output Shaft             | <b>Y: Free Oil</b>                        |
| (8) Feedback Lever         |                              |                               | <b>Z: Suction Oil</b>                     |

The sucked oil from the transmission case (1) by the charge pump (17) flows into the HST assembly (13) and the regulator valve (9) through the oil filter (19) and the charge relief valve (18). Overflow oil from HST assembly (13) flows to hydraulic pump (4) through the oil cooler (15).

When the HST pedal (10) is in neutral, regulator valve (9) is not activated, so the variable swashplate (6) is at right angle to the pump pistons and they only rotate with the pump cylinder block (14) without reciprocation. Since the oil is not being pumped to motor, the cylinder block in the motor cylinder block (21) is stationary and the output shaft (22) does not rotate.

9Y1211012TRM0026US0

**Forward**

- (1) Transmission Case
- (2) Filter
- (3) Input Shaft
- (4) Hydraulic Pump
- (5) Power Steering Circuit
- (6) Variable Swashplate
- (7) Servo Piston
- (8) Feedback Lever
- (9) Regulator Valve Assembly

- (10) HST Pedal
- (11) Spool
- (12) Bypass Pipe
- (13) HST Assembly
- (14) Pump Cylinder Block
- (15) Oil Cooler
- (16) Case Relief Valve
- (17) Charge Pump
- (18) Charge Relief Valve

- (19) Oil Filter
- (20) PTO Clutch Valve Circuit
- (21) Motor Cylinder Block
- (22) Output Shaft
- (23) Check and High Pressure Relief Valve
- (24) PTO Clutch Pressure Priority Valve

- A: Pump Port A
- B: Pump Port B
- C: Motor Port C
- D: Motor Port D
- W: High Pressure Oil
- X: Low Pressure Oil
- Y: Free Oil
- Z: Suction Oil

When the HST pedal (10) is stepped on and in forward, so the variable swashplate (6) is tilted by the servo piston (7) and the regulator valve (9) as shown in figure above.

As the pump cylinder block (14) rotates with the input shaft (3), the oil is forced out of pump port **A** at high pressure.

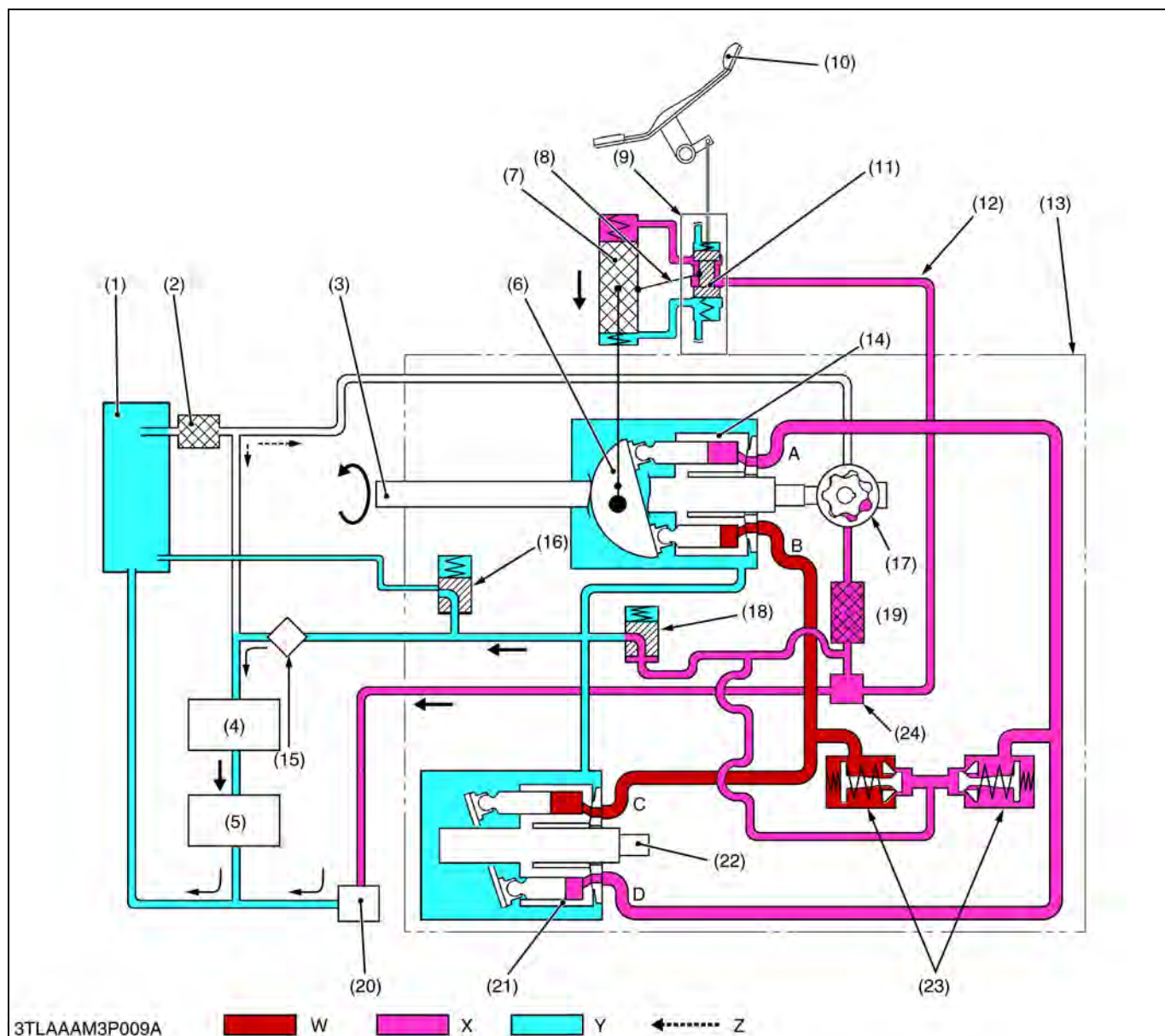
As the pressured oil enters to motor port **D**, the pistons, which align with port **D**, are pushed against the thrust plate and slide down inclined surface.

Then the output shaft (22) rotates with the motor cylinder block (21). This drives the machine forward and the angle of pump swashplate determines the output shaft speed.

As the motor cylinder block (21) continues to rotate, oil is forced out of motor port **C** at low pressure and returns to the pump port **B**.

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**Reverse**

- |                              |                          |   |                              |
|------------------------------|--------------------------|---|------------------------------|
| (1) Transmission Case        | (10) HST Pedal           | (19) Oil Filter                           | <b>A: Pump Port</b>          |
| (2) Filter                   | (11) Spool               | (20) PTO Clutch Valve Circuit             | <b>AB: Pump Port</b>         |
| (3) Input Shaft              | (12) Bypass Pipe         | (21) Motor Cylinder Block                 | <b>BC: Motor Port</b>        |
| (4) Hydraulic Pump           | (13) HST Assembly        | (22) Output Shaft                         | <b>CD: Motor Port</b>        |
| (5) Power Steering Circuit   | (14) Pump Cylinder Block | (23) Check and High Pressure Relief Valve | <b>DW: High Pressure Oil</b> |
| (6) Variable Swashplate      | (15) Oil Cooler          | (24) PTO Clutch Pressure Priority Valve   | <b>X: Low Pressure Oil</b>   |
| (7) Servo Piston             | (16) Case Relief Valve   |   | <b>Y: Free Oil</b>           |
| (8) Feedback Lever           | (17) Charge Pump         |   | <b>Z: Suction Oil</b>        |
| (9) Regulator Valve Assembly | (18) Charge Relief Valve |   |                              |

When the HST pedal (10) is stepped on and in reverse, the variable swashplate (6) is tilted by the servo piston (7) and the regulator valve (9) as shown in figure above.

As the pump cylinder block (14) rotates with the input shaft (3), the oil is forced out of pump port B at high pressure. As the pressured oil enters motor port C, the pistons, which align with port C, are pushed against the thrust plate and slide down inclined surface.

Then the output shaft (22) rotates with the motor cylinder block (21). This drives the machine rearward and the angle of pump swashplate determines the output shaft speed.

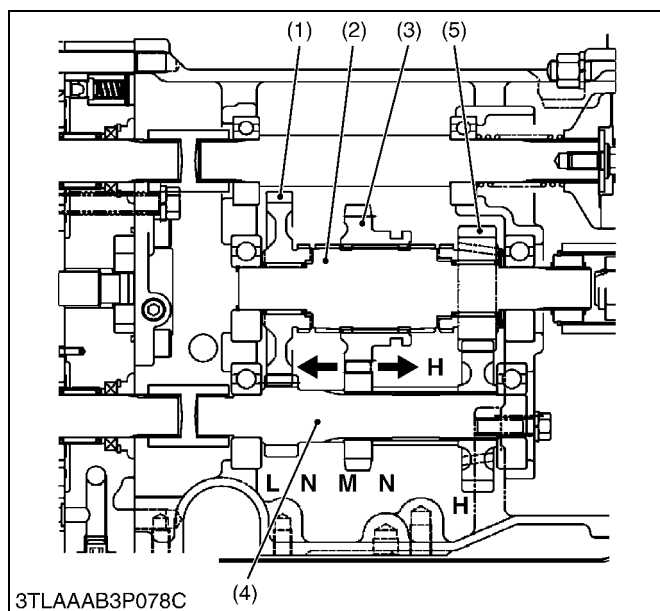
As the motor cylinder block (21) continues to rotate, oil is forced out of motor port D at low pressure and returns to the pump port A.

9Y1211012TRM0028US0

## [2] POWER TRAIN FOR TRAVELING GEARS

### (1) Range Gear Shift Section

**L3301/L3901**



3TLAAAB3P078C

**L4701**

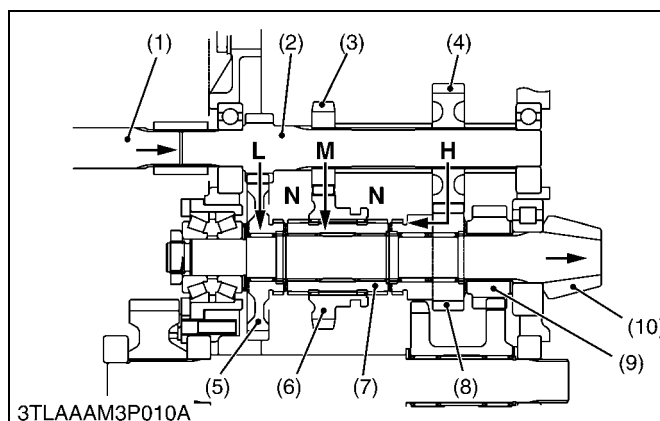
The range gear shift section is located in the mid case.

It changes the speed to five position (**L**, **N**, **M**, **N** and **H**) by shifting of shift gear (3) in the straight line on shaft (2).

- (1) 37T Gear
- (2) Shaft
- (3) 31T Gear
- (4) 13T-13T-28T Gear Shaft
- (5) 22T Gear

- L: Low Speed Position**
- N: Neutral Position**
- M: Middle Speed Position**
- H: High Speed Position**

9Y1211012TRM0029US0



3TLAAAM3P010A

The Hi-Mid-Lo range gear 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 (6) in the straight line on 6T spiral bevel pinion shaft (10).

- (1) 18T Gear Shaft
- (2) 11T Sub Shaft
- (3) 19T Sub Gear
- (4) 28T Sub Gear
- (5) 37T Gear (Low Speed)
- (6) 31T Gear (Middle Speed, Shifter Gear)
- (7) Spline Boss

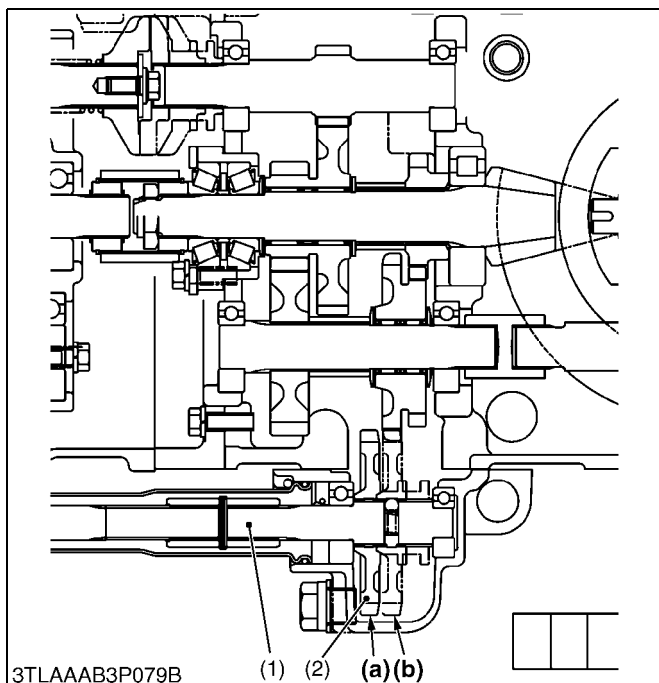
- (8) 22T Gear (High Speed)
- (9) 18T Gear (DT)
- (10) 6T Spiral Bevel Pinion Shaft

- L: Low Speed Position**
- N: Neutral Position**
- M: Middle Speed Position**
- H: High Speed Position**

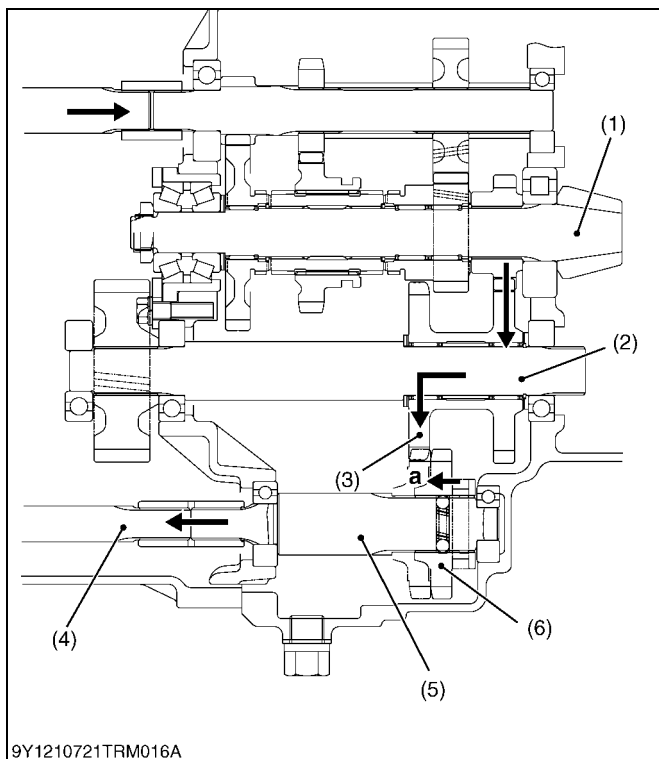
9Y1211012TRM0030US0

## (2) Front Wheel Drive Section

### L3301/L3901



### L4701



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 shift gear (2).

- |                             |                            |
|-----------------------------|----------------------------|
| (1) Front Wheel Drive Shaft | (a) 2 Wheel Drive Position |
| (2) Shift Gear              | (b) 4 Wheel Drive Position |

9Y1211012TRM0031US0

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 DT shift gear (6).

- |                                  |                   |
|----------------------------------|-------------------|
| (1) 6T Spiral Bevel Pinion Shaft | (5) DT Shaft      |
| (2) PTO Drive Shaft              | (6) DT Shift Gear |
| (3) 29T-31T DT Gear              |                   |
| (4) Propeller Shaft              |                   |

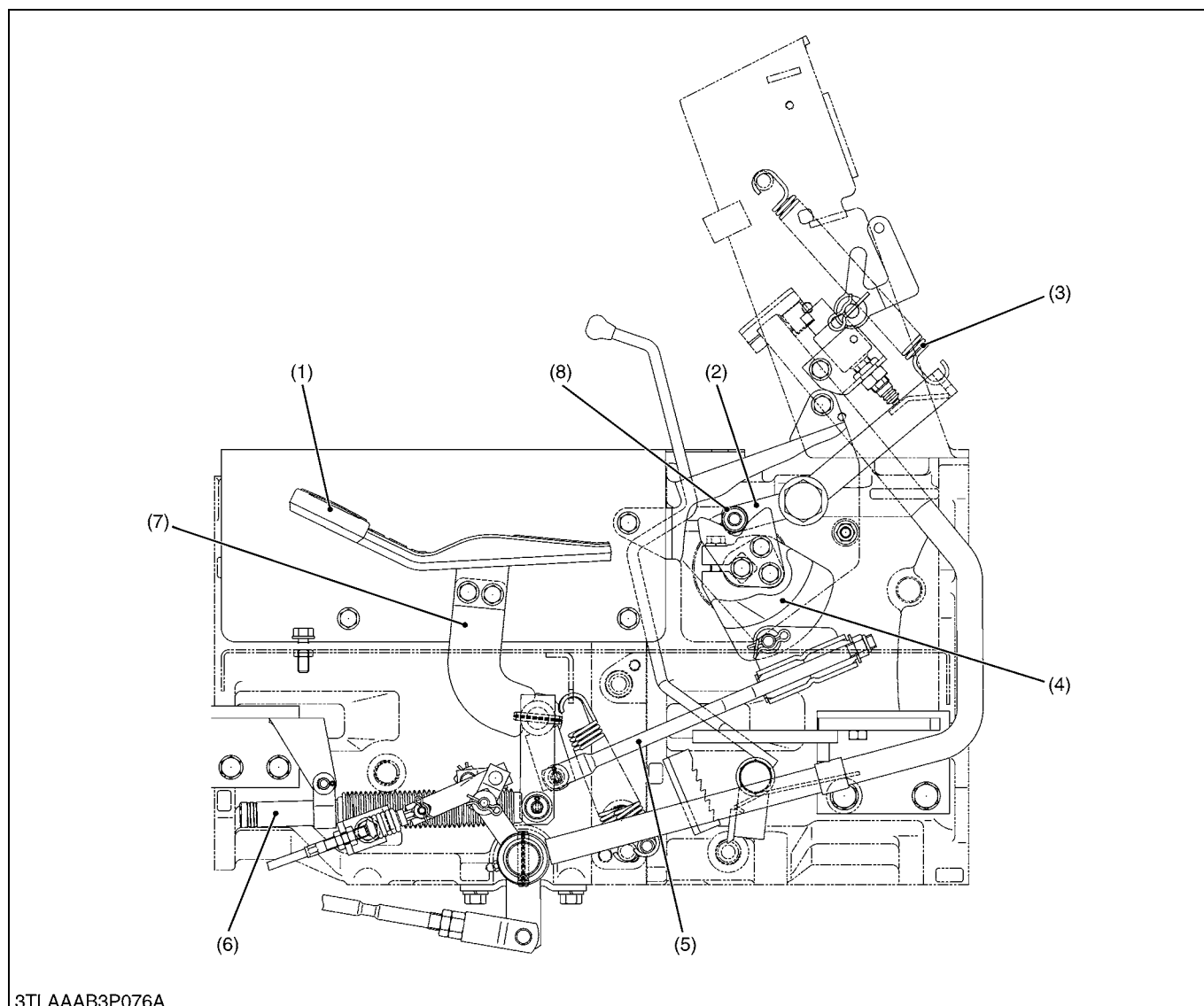
**a: 4 Wheel Drive (DT) Position**

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### [3] LINKAGE MECHANISM

#### (1) HST PEDAL CONTROL LINKAGE

L3301/L3901



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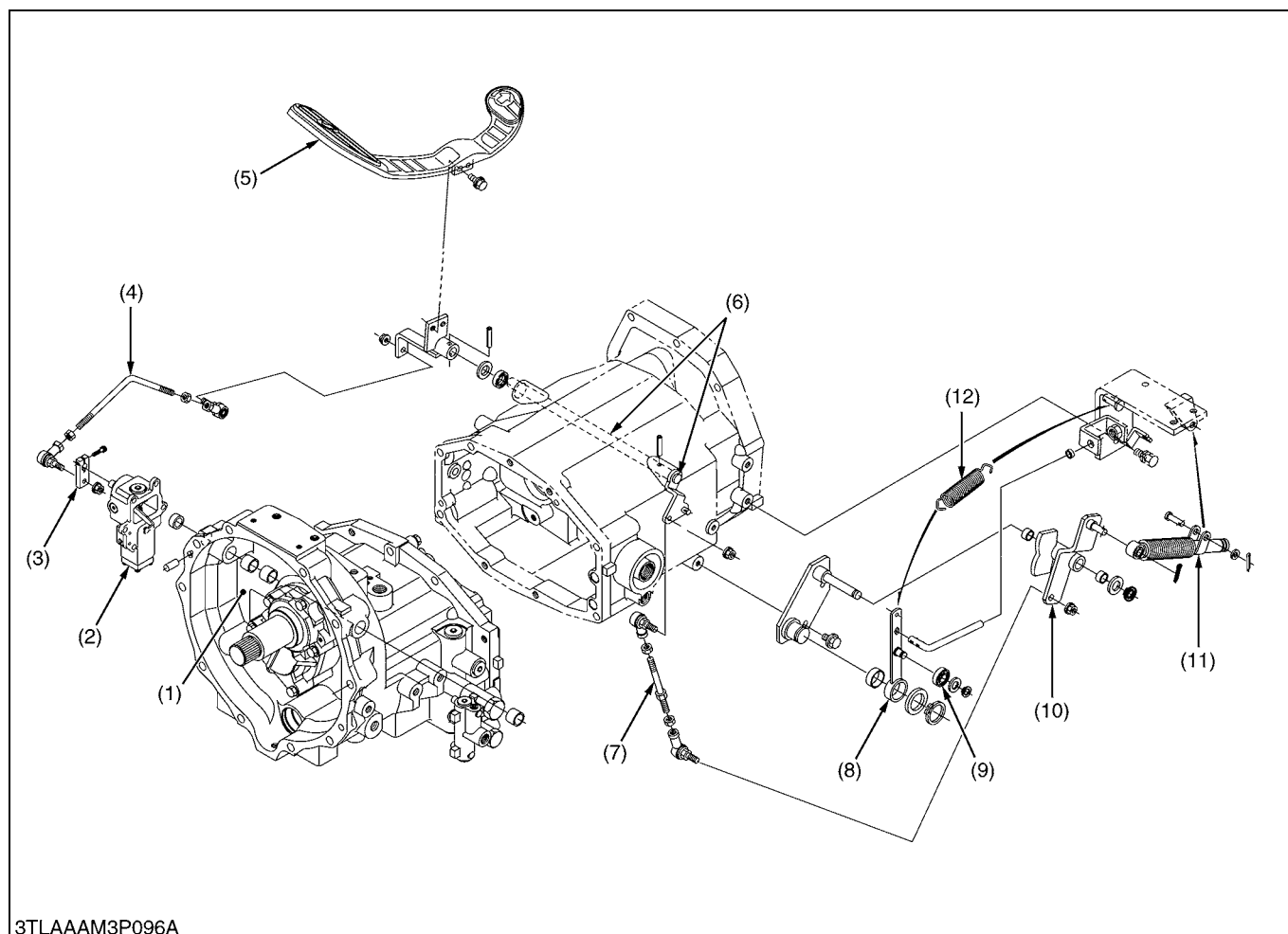
- |                        |                    |                 |                   |
|------------------------|--------------------|-----------------|-------------------|
| (1) HST Pedal          | (3) Spring         | (5) Neutral Rod | (7) Pedal Bracket |
| (2) Neutral Holder Arm | (4) Neutral Holder | (6) Damper      | (8) Ball Bearing  |

The speed control pedal (HST pedal) (1) and the holder (Trunnion) are linked with the pedal bracket and HST neutral rod (5).

As the HST pedal (1) is depressed to forward, the neutral holder (4) is rotated, then the swash-plate is tilted by trunnion shaft and forward travelling speed increases. Then, the swash-plate is returned to neutral with the neutral holder arm (2), when the pedal is released. The ball bearing (8) on the neutral holder (2) pulled with the neutral spring (3) seats the detent of the neutral holder arm (4) so that the neutral holder arm returns to neutral.

The damper (6) is connected to the HST pedal (1) and restricts the movement of the linkage to prevent abrupt operation or reversing.

9Y1211012TRM0033US0

**L4701**

- |                              |                      |                    |                         |
|------------------------------|----------------------|--------------------|-------------------------|
| (1) HST Assembly             | (4) HST Control Rod  | (7) Neutral Rod    | (10) Neutral Holder Arm |
| (2) Regulator Valve Assembly | (5) HST Pedal        | (8) Neutral Holder | (11) Damper             |
| (3) HST Control Lever        | (6) Connecting Shaft | (9) Ball Bearing   | (12) Neutral Spring     |

The speed control pedal (HST pedal) (5) and the regulator valve assembly (2) are linked with the pedal bracket and HST control rod (4). And HST pedal (5) and the neutral holder arm (10) are linked with pedal bracket and neutral rod (7) through connecting shaft (6).

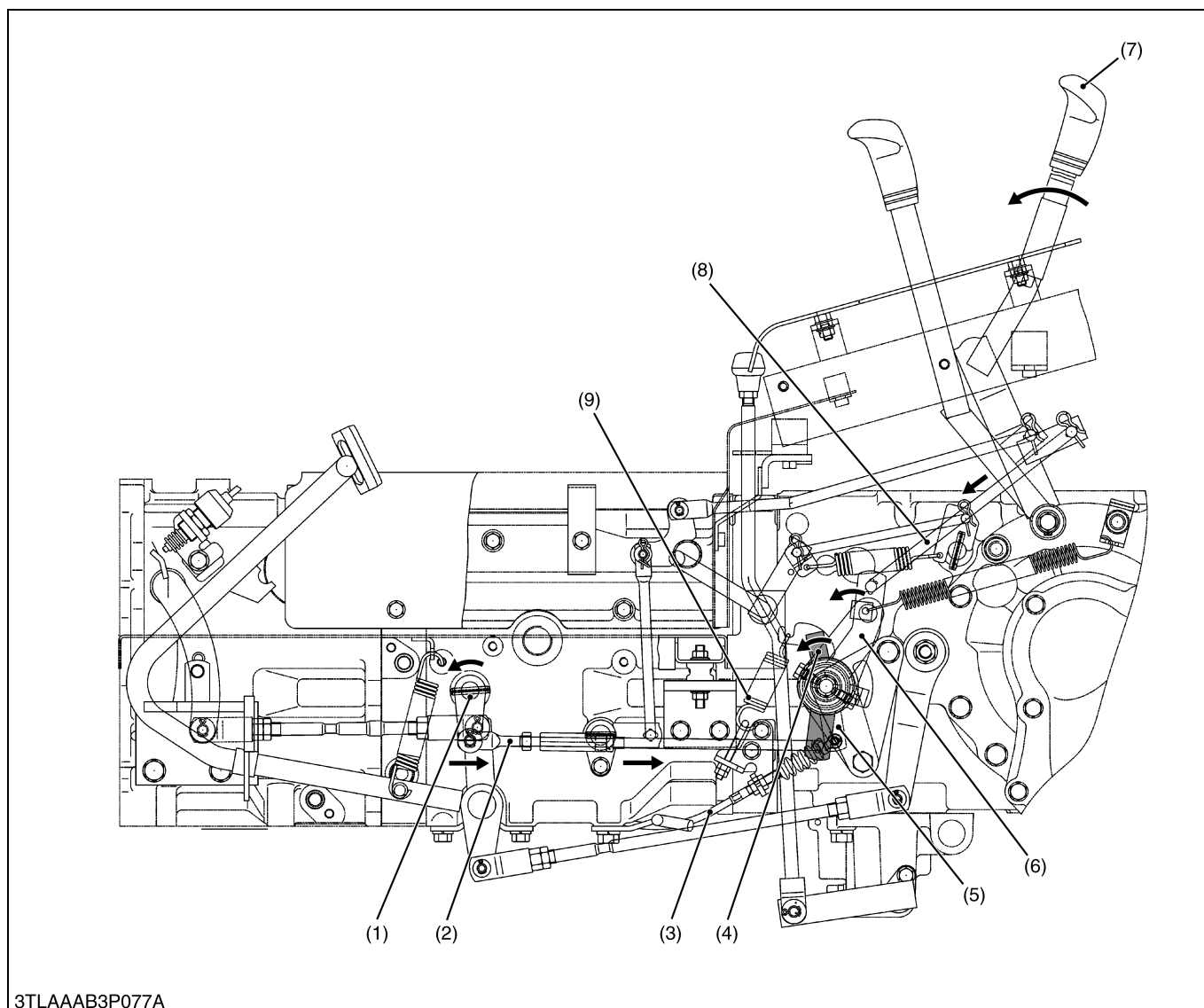
As the HST pedal (5) is depressed to forward, the HST control lever (3) is rotated, then the swashplate is tilted by servomechanism and forward travelling speed increases. Then, the swashplate is returned to neutral with the neutral holder arm (10), when the pedal is released. The ball bearing (9) on the neutral holder (8) pulled with the neutral spring (12) seats the detente of the neutral holder arm (10) so that the neutral holder arm returns to neutral.

The damper (11) is connected to the HST pedal (5) through the connecting shaft (6), the neutral rod (7) and the neutral holder arm (10), restricts the movement of the linkage to prevent abrupt operation or reversing.

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## (2) Cruise Control

### L3301/L3901 (Option)



3TLAAAB3P077A

- |                          |                    |                          |                    |
|--------------------------|--------------------|--------------------------|--------------------|
| (1) Connecting Shaft     | (4) Cruise Lever 1 | (6) Cruise Lever 2       | (8) Lever Rod      |
| (2) Cruise Adjusting Rod | (5) Release Lever  | (7) Cruise Control Lever | (9) Release Spring |
| (3) Release Wire         |                    |                          |                    |

The cruise control lever (7) and HST pedal are linked with the lever rod (8), cruise lever 1 (4), cruise lever 2 (6), cruise adjusting rod (2) and connecting shaft (1).

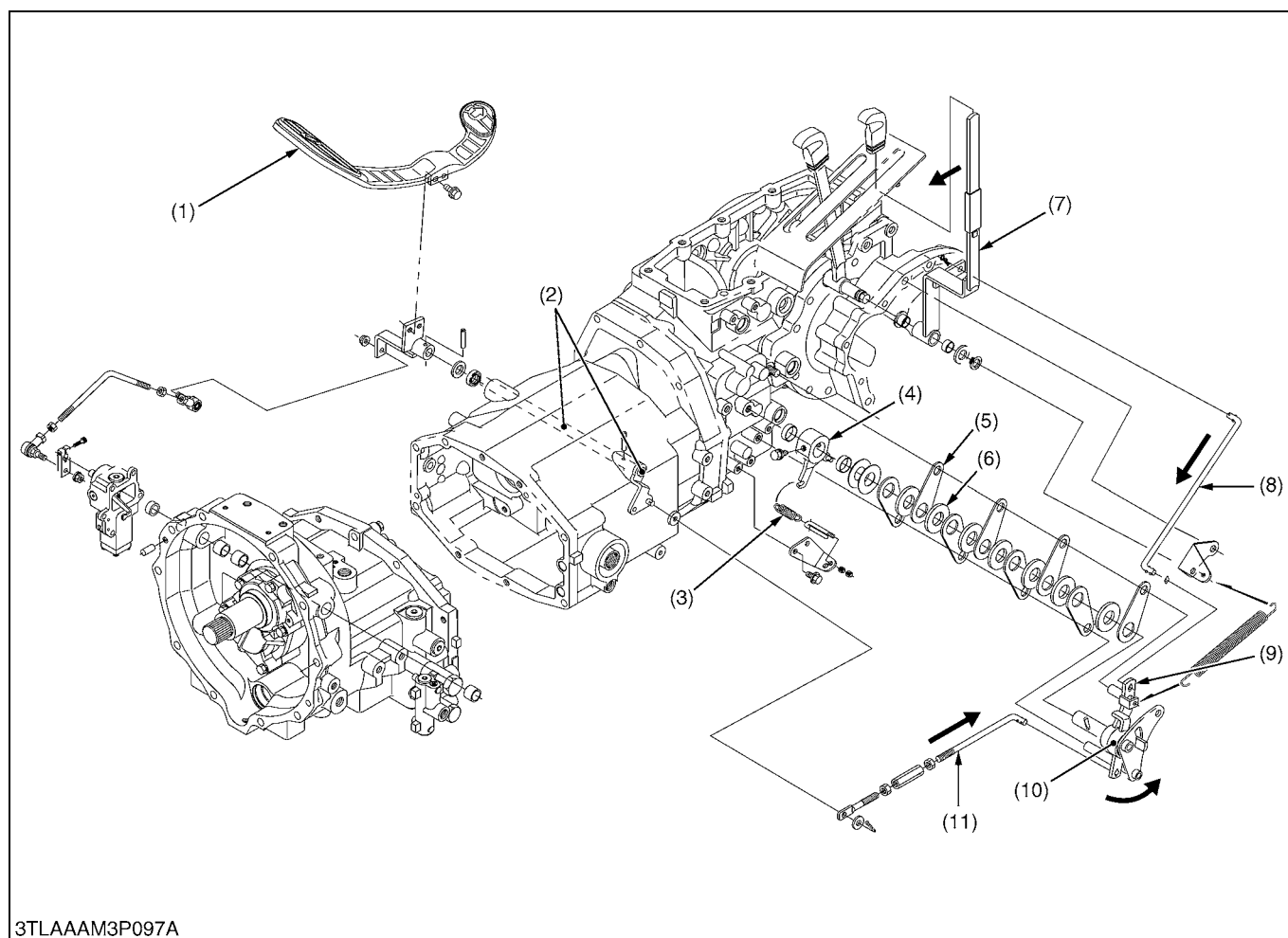
When the cruise control lever (7) is moved to forward direction, cruise lever 2 (6) is moved to arrow direction by the lever rod (8). The cruise lever 1 (4) is moved forward by being pushed to the cruise lever 2 (6), and cruise adjusting rod (2) is pulled backward. Because cruise adjusting rod (2) and the HST pedal are connected by the connecting shaft (1), the HST pedal is moved and HST becomes forward position.

The cruise control can be returned to neutral automatically when brake pedals are depressed.

When brake pedals are depressed, release wire pull the release lever (5) to forward.

As result, the holding force of cruise control lever (7) is lost and the cruise control lever (7) return to neutrality by force of release spring (9).

9Y1211012TRM0035US0

**L4701****■ Speed Set**

- |                      |                    |                          |                           |
|----------------------|--------------------|--------------------------|---------------------------|
| (1) HST Pedal        | (4) Release Lever  | (7) Cruise Control Lever | (10) Cruise Lever 1       |
| (2) Connecting Shaft | (5) Friction Plate | (8) Lever Rod            | (11) Cruise Adjusting Rod |
| (3) Cruise Spring    | (6) Friction Disk  | (9) Cruise Lever 2       |                           |

The cruise control lever (7) and the HST pedal (1) are linked with the lever rod (8), the cruise lever 1 (10), the cruise lever 2 (9), the cruise adjusting rod (11) and the connecting shaft (2).

When the cruise control lever (7) is moved to forward direction, the cruise lever 2 (9) is moved to arrow direction by the lever rod (8). The cruise lever 1 (10) is moved forward by being pushed to the cruise lever 2 (9), and the cruise adjusting rod (11) is pulled backward. Because the cruise adjusting rod (11) and the HST pedal (1) are connected by the connecting shaft (2), the HST pedal is moved and HST becomes forward position.

On the other hand, because the friction plate (5) and the friction disk (6) are suppressed outside by the release lever (4) and the cruise spring (3), the cruise lever 1 (10) and the cruise lever 2 (9) are fixed at the position. As a result, the cruise control lever position can be infinitely set.

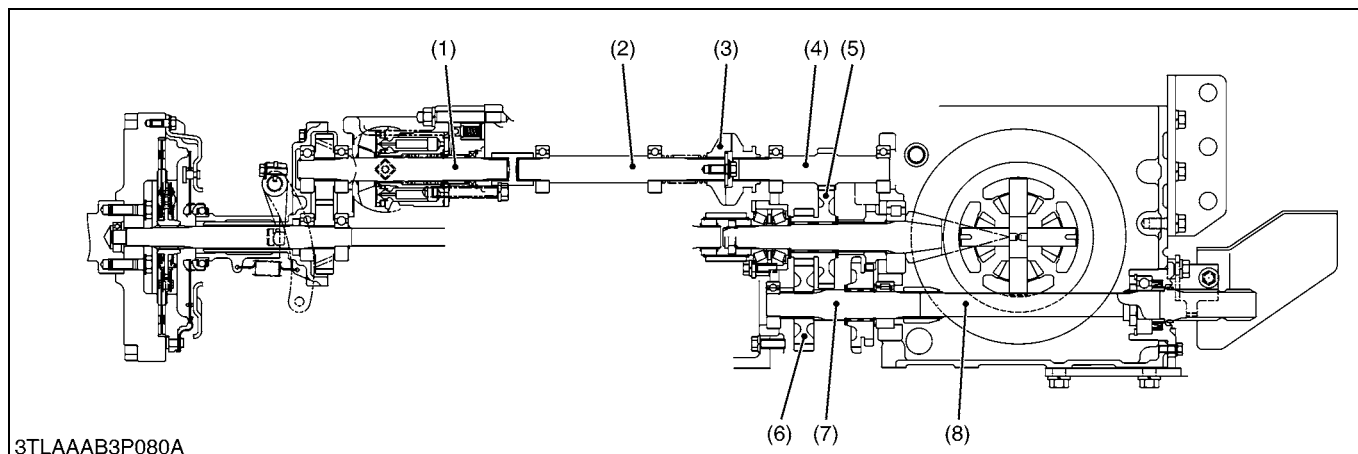
In addition, because the movement of the cruise lever 1 (10) is restricted by the cruise lever 2 (9), the backward pedal operation cannot be done while the cruise control lever (7) is operating.

9Y1211012TRM0036US0

## [4] PTO SYSTEM

### (1) Structure

#### L3301/L3901



- (1) Pump Shaft (HST)  
(2) PTO Counter Shaft

- (3) PTO Clutch  
(4) 16T Gear Shaft

- (5) 15T-44T Gear  
(6) 27T Gear

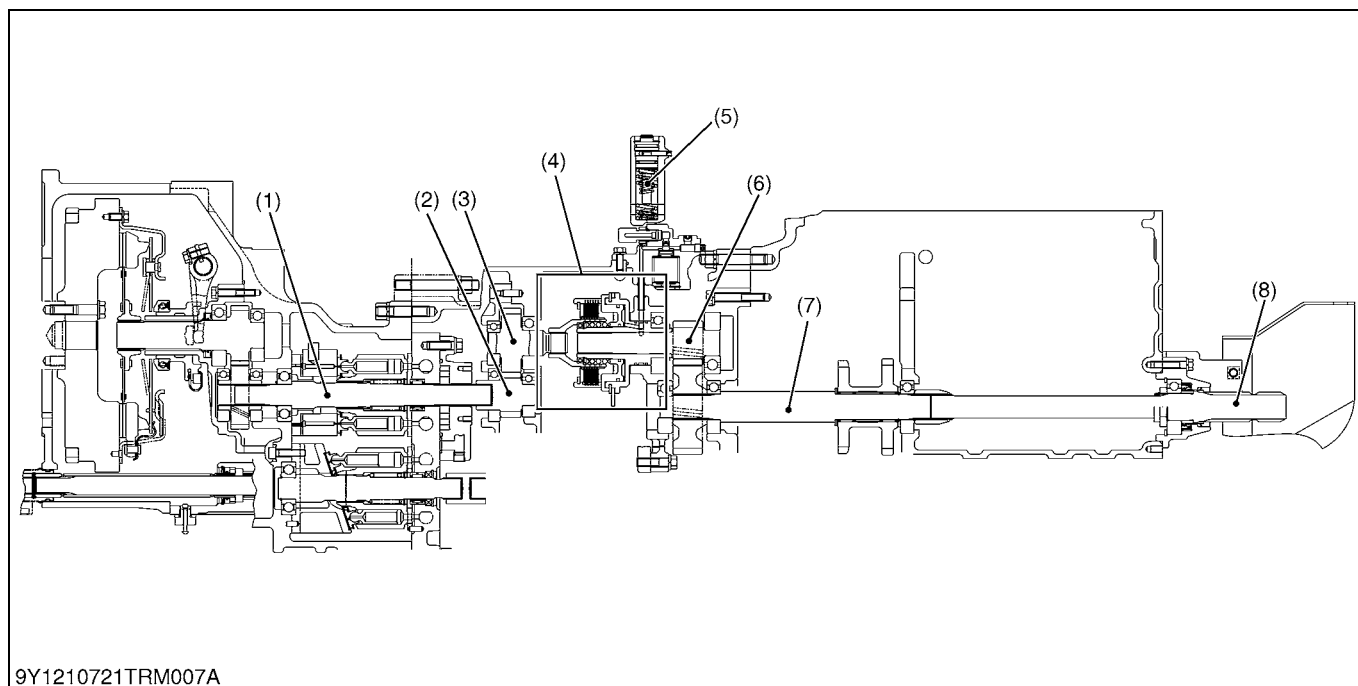
- (7) PTO Drive Shaft  
(8) PTO Shaft

PTO is "**ENGAGED**" or "**DISENGAGED**" by operating the shift lever of the PTO clutch (3).

The power train from the clutch to PTO shaft is composed as shown in figure above.

9Y1211012TRM0037US0

#### L4701



- (1) HST Motor Shaft  
(2) PTO Gear Shaft 1

- (3) PTO Counter Gear Shaft  
(4) PTO Clutch Pack

- (5) Accumulator  
(6) PTO Counter Shaft

- (7) PTO Drive Shaft  
(8) Rear PTO Shaft

The independent PTO operated by PTO clutch pack (4) is adopted to L4701.

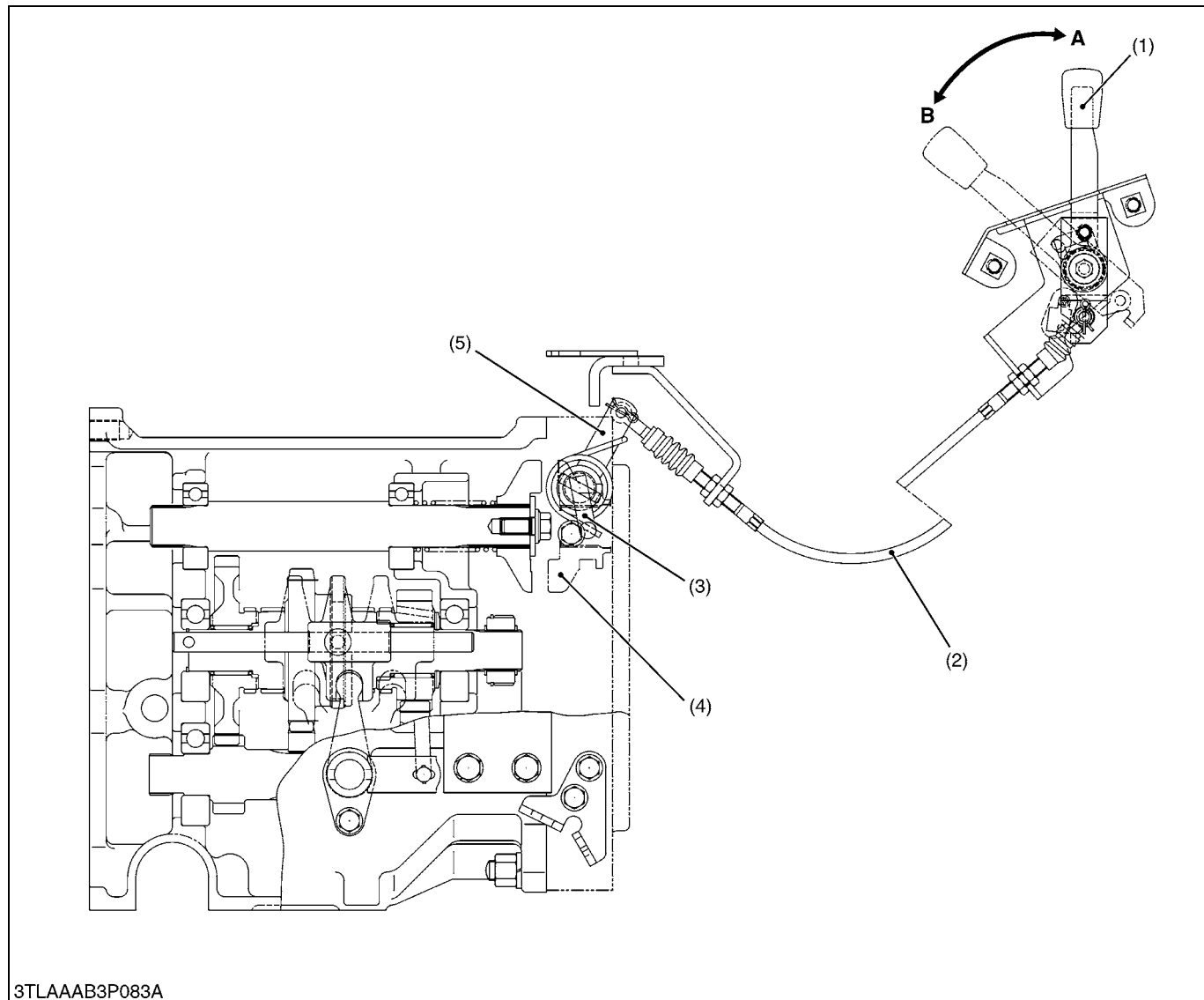
The rear PTO is "**ENGAGED**" or "**DISENGAGED**" by operating the PTO clutch control switch.

Mid PTO is not adopted.

The PTO power train from the clutch to the rear PTO shaft is composed as shown in the figure above.

9Y1211012TRM0038US0



**(2) Mechanism****[A] L3301/L3901****Shift Linkage**

- |                     |                    |           |
|---------------------|--------------------|-----------|
| (1) PTO Lever       | (3) PTO Shift Fork | (5) Lever |
| (2) PTO Shift Cable | (4) 16T PTO Clutch |           |

**A: Disengaged**  
**B: Engaged**

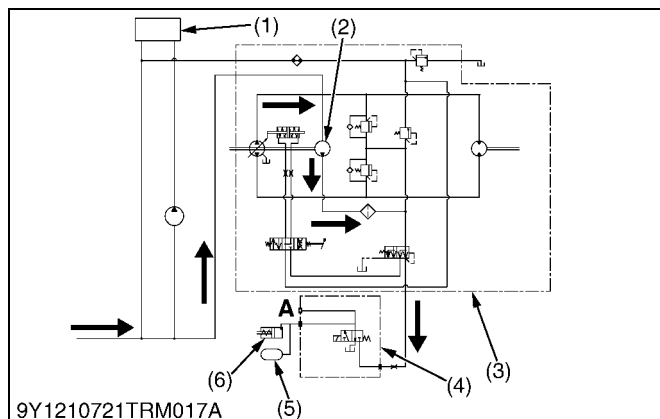
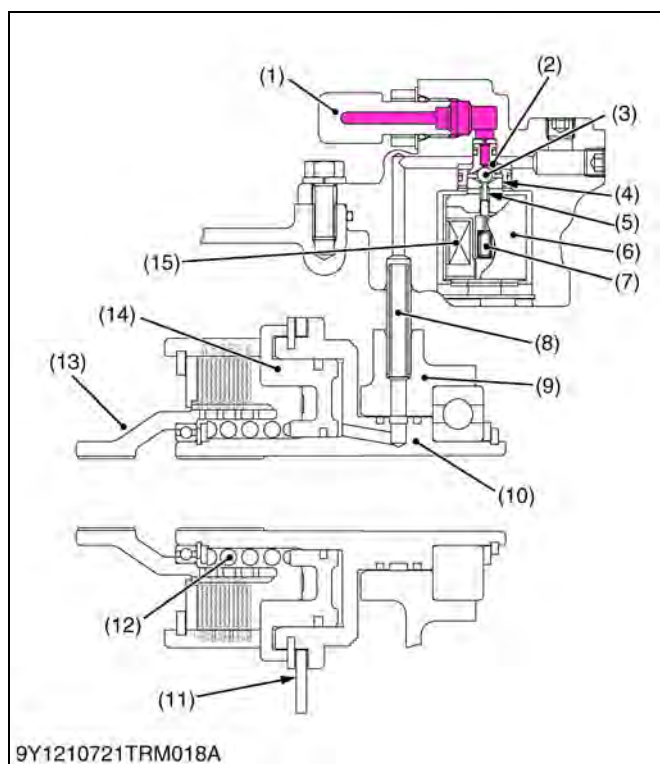
The PTO lever (1) through the shift fork (3) are connected by shift cable (2), as shown in the figure above.

When the shift lever (1) is moved to the "A" side or the "B" side, the shift fork (3) is moved by means of the shift cable (2) and lever (5).

When the shift lever (1) is moved to the "A" side, the PTO is shifted to the "**Disengaged**" position.

When the shift lever (1) is moved to the "B" side, the PTO is shifted to the "**Engaged**" position.

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**[B] L4701****Oil Flow****Function of PTO Clutch****■ PTO Clutch Control Switch "OFF" Position**

The pressured oil from the charge pump (2) located in the HST assembly (3) flows into the PTO clutch valve (4).

When the PTO clutch control switch is at the **"ON"** position, PTO clutch solenoid valve is opened and the oil flows through the PTO clutch pack (6) to the accumulator (5) and the PTO clutch pack (6) to engage it.

- |   |                     |
|---|---------------------|
| (1) Power Steering Controller and Cylinders | (5) Accumulator     |
| (2) Charge Pump                             | (6) PTO Clutch Pack |
| (3) HST Assembly                            |                     |
| (4) PTO Valve                               |                     |

**A: PTO Clutch Operating Pressure Check Port**

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When the PTO control switch is set at **"OFF"** position, the coil is not a magnetic.

The spring pushes the rod (5) and the ball (3) is pushed the plunger (2).

Since oil passage between the ball (3) and the plunger (2) is closed, oil from the pump port is blocked at the PTO clutch solenoid valve (6).

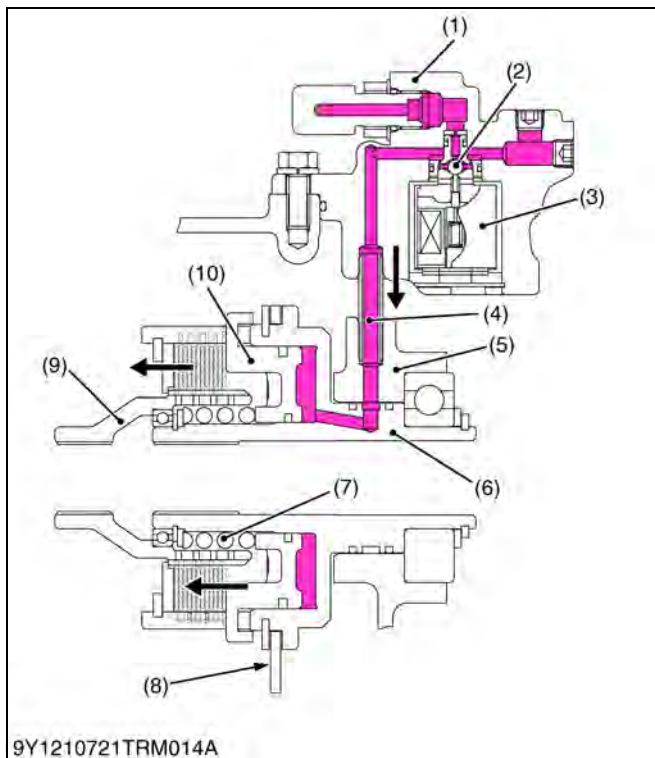
Since the pressured oil is not supplied to the PTO clutch, the PTO clutch is not engaged.

In this condition, the return spring (12) pushes the brake disk (11), and PTO clutch assembly does not rotate.

- |                               |                    |
|-------------------------------|--------------------|
| (1) Joint                     | (9) Mid Case       |
| (2) Plunger                   | (10) I-PTO Clutch  |
| (3) Ball                      | (11) Brake Disk    |
| (4) Seat                      | (12) Return Spring |
| (5) Rod                       | (13) Clutch Hub    |
| (6) PTO Clutch Solenoid Valve | (14) Piston        |
| (7) Spring                    | (15) Coil          |
| (8) Hydraulic Pipe            |                    |

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## ■ PTO Clutch Control Switch "ON" Position



When the PTO control switch is set at "ON" position the coil of the PTO solenoid valve (3) is excited.

The spring (15) under the ball (2) is pushed into the solenoid valve (3).

The ball is pushed to the seat (13).

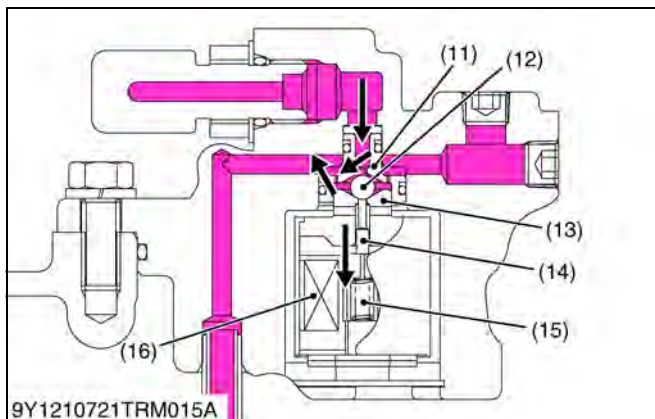
Since oil passage between the ball (12) and the plunger (11) is opened, oil from the pump port flows to the PTO clutch pack.

Since the pressured oil pushes the piston (10) to the clutch plates and the clutch disks side, the PTO clutch is engaged.

In this condition, the return spring (7) is pushed by the piston (10), the brake disk separates from the I-PTO case (6), and PTO brake is not engaged.

- |                               |                |
|-------------------------------|----------------|
| (1) Joint                     | (9) Clutch Hub |
| (2) Ball                      | (10) Piston    |
| (3) PTO Clutch Solenoid Valve | (11) Plunger   |
| (4) Hydraulic Pipe            | (12) Ball      |
| (5) Mid Case                  | (13) Seat      |
| (6) I-PTO Clutch              | (14) Rod       |
| (7) Return Spring             | (15) Spring    |
| (8) Brake Disk                | (16) Coil      |

9Y1211012TRM0042US0



# SERVICING

## CONTENTS

1. TROUBLESHOOTING.....	3-S1
2. SERVICING SPECIFICATIONS .....	3-S6
[1] L3301/L3901.....	3-S6
[2] L4701.....	3-S8
3. TIGHTENING TORQUES.....	3-S10
[1] L3301/L3901.....	3-S10
[2] L4701.....	3-S11
4. CHECKING AND ADJUSTING .....	3-S13
[1] L3301/L3901.....	3-S13
(1) MANUAL TRANSMISSION MODEL .....	3-S13
(2) HST Model.....	3-S14
[2] L4701.....	3-S18
(1) MANUAL TRANSMISSION MODEL .....	3-S18
(2) HST Model.....	3-S20
5. DISASSEMBLING AND ASSEMBLING .....	3-S26
[1] L3301/L3901.....	3-S26
(1) Preparation .....	3-S26
(2) Disassembling and Assembling (Manual Transmission Model) .....	3-S39
(3) Disassembling and Assembling (HST Model) .....	3-S48
[2] L4701.....	3-S60
(1) Preparation .....	3-S60
(2) Disassembling and Assembling (Manual Transmission Model) .....	3-S73
(3) Disassembling and Assembling (HST Model) .....	3-S86
6. SERVICING .....	3-S100
[1] L3301/L3901.....	3-S100
(1) Clutch Housing Case.....	3-S100
(2) Transmission Case.....	3-S104
[2] L4701.....	3-S108
(1) Clutch Housing Case.....	3-S108
(2) Mid Case .....	3-S112
(3) Transmission Case.....	3-S113

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>Excessive Transmission Noise</b>	Transmission fluid insufficient	Fill	G-37, G-65
	Gear worn or backlash improper	Replace	3-S100, 3-S104, 3-S108, 3-S113
	Bearing worn or broken	Replace	3-S104, 3-S108, 3-S113
	Shift fork worn	Replace	3-S100, 3-S104, 3-S108, 3-S114
	Spline worn	Replace	3-S100, 3-S104, 3-S108, 3-S113
	Snap rings on the shaft come off	Repair or replace	–
	Spiral bevel pinion staking nut improperly tightened	Tighten	3-S46, 3-S80, 3-S96
	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S105, 3-S115
	Improper backlash between differential pinion and differential side gear	Adjust	3-S107, 3-S117
	Synchronizer unit damaged	Repair or replace	3-S101
<b>Gear Slip Out of Mesh</b>	Shift linkages rusted	Repair	–
	Shifter or shift fork damaged	Replace	3-S100, 3-S104, 3-S108, 3-S114
	Shift fork interlock ball spring weaken or damaged	Replace	–
	Interlock ball fallen	Reassemble	–
	Gears worn or broken	Replace	3-S100, 3-S104, 3-S108, 3-S113
	Synchronizer unit damaged	Repair or replace	3-S101

Symptom	Probable Cause	Solution	Reference Page
<b>Hard Shifting</b>	Shifter or shift fork worn or damaged	Replace	3-S100, 3-S104, 3-S108, 3-S114
	Shift fork bent	Replace	3-S100, 3-S104, 3-S108, 3-S114
	Shift linkage rusted	Repair	–
	Shaft part of shift arms rusted	Repair	–
	Synchronizer unit damaged	Repair or replace	3-S101
<b>Gears Clash When Shifting</b>	Clutch does not release	Adjust or repair	2-S5
	Gears worn or damaged	Replace	3-S100, 3-S104, 3-S108, 3-S113
<b>Differential Lock Can Not Be Set</b>	Differential lock shift fork damaged	Replace	–
	Differential lock shift fork mounting spring pin damaged	Replace	–
	Differential lock shifter pin bent or damaged	Replace	–
	Differential lock fork shaft bent or damaged	Replace	–
<b>Differential Lock Pedal Does Not Return</b>	Differential lock pedal return spring weaken or damaged	Replace	–
	Differential lock shifter pin bent or damaged	Replace	–
	Differential lock fork shaft bent	Replace	–
<b>Excessive or Unusual Noise at All Time</b>	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S105, 3-S115
	Improper backlash between differential pinion and differential side gear	Adjust	3-S107, 3-S117
	Bearings worn	Replace	3-S104, 3-S108, 3-S113
	Insufficient or improper type of transmission fluid used	Fill or replace	G-37, G-65
<b>Noise While Turning</b>	Differential pinions or differential side gears worn or damaged	Replace	–
	Differential lock binding (does not disengage)	Replace	–
	Bearing worn	Replace	3-S104, 3-S108, 3-S113

**HST**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Solution</b>	<b>Reference Page</b>
<b>System Will Not Operate in Either Direction</b>	Oil level is low	Check oil level or fill oil to propeller level	G-37, G-65
	Speed control pedal linkage damaged	Repair or linkage	3-S16, 3-S23
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-34, G-62
		2. Check charge pressure	3-S15, 3-S22
		3. Inspect or flush charge relief valve	3-S15, 3-S22
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S14, 3-S21
	Component parts damaged	Replace hydraulic transmission assembly	3-S48, 3-S86
<b>Vibration and Noise</b>	Oil level is too low	Check oil level or fill oil to proper level	G-37, G-65
	Speed control pedal linkage damaged	Repair linkage	3-S16, 3-S23
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-34, G-62
		2. Check charge pressure	3-S15, 3-S22
		3. Inspect or flush charge relief valve	3-S15, 3-S22
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S14, 3-S21
	Component parts damaged	Replace hydrostatic transmission assembly	3-S48, 3-S86

Symptom	Probable Cause	Solution	Reference Page
<b>Loss of Power</b>	Oil level is low	Check oil level or fill oil to proper level	G-37, G-65
	Speed control pedal linkage damaged	Repair linkage	3-S16, 3-S23
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-34, G-62
		2. Check charge pressure	3-S15, 3-S22
		3. Inspect or flush charge relief valve	3-S15, 3-S22
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S14, 3-S21
	Neutral valve damaged	Inspect or replace neutral valve	–
	Component parts damaged	Replace hydrostatic transmission assembly	3-S48, 3-S86
<b>Transmission Oil Over Heats</b>	Low transmission oil level	Fill transmission oil level up to proper level	G-37, G-65
	Radiator net clogged	Clean radiator net	G-24, G-52
	Excessive machine load	Reduce machine load	–
	Improper charge pressure	1. Check high relief pressure	3-S14, 3-S21
		2. Replace transmission oil filter cartridge	G-34, G-62
		3. Replace check and high pressure relief valve	3-S14, 3-S21
		4. Inspect and replace charge relief valve	3-S15, 3-S22
<b>Machine Will Not Stop in Neutral Position</b>	Speed control linkage is out of adjustment or sticking	Repair or replace linkage	–
		Adjust neutral adjuster	3-S16, 3-S23
	Neutral valve damaged	Inspect or replace neutral valve	–
<b>System Operates in One Direction Only</b>	Speed control linkage damaged	Repair or replace linkage	3-S16, 3-S23
	Check and high pressure relief valve damaged	Replace check and high pressure relief valve	3-S14, 3-S21



**PTO CLUTCH**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Solution</b>	<b>Reference Page</b>
<b>PTO Clutch Slips</b>	Operating pressure is low	Adjust	3-S19, 3-S20
	PTO clutch valve malfunctioning	Repair or replace	3-S78
	Clutch disc or drive plate excessively worn	Replace	3-S80
	Deformation of piston or return plate	Replace	3-S80
<b>PTO Shaft Does Not Rotate</b>	PTO clutch malfunctioning	Repair or replace	3-S78
	PTO coupling left behind	Install	—
<b>PTO Clutch Operating Pressure Is Low</b>	Transmission oil improper or insufficient	Fill or change	G-37, G-65
	Relief valve malfunctioning	Adjust or replace	3-S19, 3-S20
<b>PTO Clutch Drags</b>	Brake plate excessively worn	Replace	3-S80
	Return spring weaken or broken	Replace	3-S80
	Deformation or return plate or steel plate	Replace	3-S80

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## 2. SERVICING SPECIFICATIONS

### [1] L3301/L3901

Item		Factory Specification	Allowable Limit
Gear	Backlash	0.1 to 0.3 mm 0.0040 to 0.011 in.	0.4 mm 0.02 in.
Gear to Spline	Clearance	0.030 to 0.078 mm 0.0012 to 0.0030 in.	0.20 mm 0.008 in.
Shift Fork and Shift Gear Groove	Clearance	0.15 to 0.40 mm 0.0059 to 0.015 in.	0.6 mm 0.02 in.
Shift Fork to Shifter Groove	Clearance	0.15 to 0.40 mm 0.0059 to 0.015 in.	0.6 mm 0.02 in.
Shift Fork Spring	Free Length	22.0 mm 0.87 in.	20.0 mm 0.79 in.
Differential Gear	Rotating Torque	3.9 to 6.3 N·m 0.40 to 0.6 kgf·m 2.9 to 4.6 lbf·ft	—
Bevel Gear to 8T Spiral Bevel Pinion	Backlash	0.15 to 0.30 mm 0.0059 to 0.011 in.	—
Differential Case Bore to Differential Side Gear Boss	Clearance	0.0500 to 0.151 mm 0.00197 to 0.00594 in.	0.350 mm 0.014 in.
• Differential Case Bore	I.D.	40.500 to 40.562 mm 1.5945 to 1.5969 in.	—
• Differential Side Gear Boss	O.D.	40.411 to 40.450 mm 1.5910 to 1.5925 in.	—
Differential Case Cover Bore to Differential Side Gear Boss	Clearance	0.090 to 0.169 mm 0.00355 to 0.00665 in.	0.350 mm 0.014 in.
• Differential Case Cover Bore	I.D.	40.540 to 40.580 mm 1.5961 to 1.5976 in.	—
• Differential Side Gear Boss	O.D.	40.411 to 40.450 mm 1.5910 to 1.5925 in.	—
Differential Pinion Shaft to Differential Pinion	Clearance	0.0800 to 0.122 mm 0.00315 to 0.00480 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	I.D.	20.060 to 20.081 mm 0.78977 to 0.79059 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.

**HST**

<b>Item</b>		<b>Factory Specification</b>	<b>Allowable Limit</b>
Check and High Pressure Relief Valve <b>Condition</b>	Setting Pressure	33.4 to 36.2 MPa 340 to 370 kgf/cm <sup>2</sup> 4840 to 5260 psi	—
<ul style="list-style-type: none"> <li>• Engine Speed: Maximum</li> <li>• Oil Temperature 45 to 55 °C (113 to 131 °F)</li> <li>• Range Gear Shift Lever: <b>H</b> Position</li> <li>• HST Pedal: Depress Forward or Reverse with Brake</li> </ul>			
Charge Relief Valve <b>Condition</b>	Setting Pressure	0.5 to 0.6 MPa 5 to 8 kgf/cm <sup>2</sup> 80 to 90 psi	—
<ul style="list-style-type: none"> <li>• Engine Speed: Maximum</li> <li>• Oil Temperature: 45 to 55 °C (113 to 131 °F)</li> <li>• HST Pedal: Neutral</li> </ul>			
HST Pedal to Stopper Bolt	Clearance	2 to 5 mm 0.08 to 0.1 in.	—
	Height <b>(A)</b>	20 mm 0.79 in.	—
	Height <b>(B)</b>	13 mm 0.51 in.	—
Cruise Control Rod	Length	315 mm 12.4 in.	—

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**[2] L4701**

Item		Factory Specification	Allowable Limit
Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	0.4 mm 0.02 in.
Gear to Spline	Clearance	0.030 to 0.078 mm 0.0012 to 0.0030 in.	0.2 mm 0.008 in.
Shift Fork and Shift Gear Groove	Clearance	0.15 to 0.40 mm 0.0059 to 0.0015 in.	0.6 mm 0.02 in.
Shift Fork Spring	Free Length	22 mm 0.87 in.	20 mm 0.79 in.
Spiral Bevel Gear to Spiral Bevel Pinion Shaft	Backlash	0.15 to 0.30 mm 0.006 to 0.012 in.	0.4 mm 0.016 in.
Differential Case Bore (Differential Case Cover Bore) to Differential Side Gear Boss	Clearance	0.050 to 0.151 mm 0.00197 to 0.00594 in.	0.35 mm 0.014 in.
• Differential Case Bore	I.D.	40.500 to 40.562 mm 1.5945 to 1.5969 in.	—
• Differential Side Gear Boss	O.D.	40.411 to 40.450 mm 1.5910 to 1.5925 in.	—
Differential Case Cover Bore to Differential Side Gear Boss	Clearance	0.090 to 0.169 mm 0.00355 to 0.00665 in.	0.35 mm 0.014 in.
• Differential Case Cover Bore	I.D.	40.540 to 40.580 mm 1.5961 to 1.5976 in.	—
• Differential Side Gear Boss	O.D.	40.411 to 40.450 mm 1.5910 to 1.5925 in.	—
Differential Pinion Shaft to Differential Pinion	Clearance	0.0800 to 0.122 mm 0.00315 to 0.00480 in.	0.25 mm 0.0098 in.
	O.D.	19.959 to 19.980 mm 0.78579 to 0.78661 in.	—
	I.D.	20.060 to 20.081 mm 0.78977 to 0.79059 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.

**HST**

Item		Factory Specification	Allowable Limit
High Pressure Relief Valve <b>Condition</b> • Oil Temperature 40 to 60 °C (104 to 140 °F)	Setting Pressure	33.4 to 36.3 MPa 340.0 to 370.0 kgf/cm <sup>2</sup> 4836 to 5263 psi	—
			—
Charge Relief Valve	Setting Pressure	2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm <sup>2</sup> 334 to 384 psi	—
HST Pedal to Stopper Bolt	Clearance	2 to 6 mm 0.08 to 0.2 in.	—
	Height (A)	25 mm 0.98 in.	—
	Height (B)	15 mm 0.59 in.	—
Cruise Control Lever	Operating Force	60 to 100 N 6.2 to 10.1 kgf 14 to 22.4 lbf	—

**PTO CLUTCH**

Item		Factory Specification	Allowable Limit
PTO Clutch Valve <b>Condition</b> • Engine Speed: Idling • Oil Temperature: 40 to 60 °C (104 to 140 °F)	When PTO Clutch Control Switch is Set to "ON" Position	[Manual Transmission Model] 2.25 to 2.45 MPa 23.0 to 25.0 kgf/cm <sup>2</sup> 327 to 356 psi	—
		[HST Model] 2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm <sup>2</sup> 335 to 384 psi	—
	When PTO Clutch Control Switch is Set to "OFF" Position	No pressure	—
PTO Clutch Disc	Thickens	1.70 to 1.90 mm 0.067 to 0.075 in.	1.55 mm 0.061 in.
PTO Steel 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 0.006 in.
PTO Steel Plate	Flatness	—	0.30 mm 0.0012 in.
PTO Return Spring	Free Length	42.5 to 43.5 mm 1.67 to 1.71 in.	38.3 mm 1.51 in.
Seal Ring	Thickness	2.45 to 2.5 mm 0.096 to 0.098 in.	2.0 mm 0.079 in.

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### 3. TIGHTENING TORQUES

#### [1] L3301/L3901

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-13.)

Item	N·m	kgf·m	lbf·ft
HST trunnion plate mounting screw	24 to 27	2.4 to 2.8	18 to 20
Steering wheel mounting nut	48 to 55	4.9 to 5.7	36 to 41
Oil cooler return pipe bolt	92 to 101	9.0 to 10.0	6.7 to 7.3
Delivery pipe joint screw	49 to 69	5.0 to 7.0	37 to 50
Steering shaft universal joint bolt	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2
Steering bearing flange bolt	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2
Delivery pipe mounting joint bolt	49 to 69	5.0 to 7.0	37 to 50
Clutch housing and transmission case mounting nut	103 to 117	10.5 to 12.0	76.0 to 86.7
ROPS mounting screw	166.7 to 196.1	17.0 to 20.0	123 to 144
ROPS fulcrum screw	118 to 137	12 to 14	87 to 101
Rear wheel mounting screw and nut	215	22	160
Hydraulic cylinder assembly mounting screw and nut	78 to 90	7.9 to 9.2	58 to 66
Rear axle case mounting screw and nut	48 to 55	4.9 to 5.7	36 to 41
Brake case mounting stud bolt	39 to 45	3.9 to 4.6	29 to 33
Bearing holder mounting screw	48 to 55	4.9 to 5.7	36 to 41
PTO shaft staking nut	147 to 196	15.0 to 20.0	109 to 144
Differential bearing case mounting screw	48 to 55	4.9 to 5.7	36 to 41
Spiral bevel pinion shaft lock nut	147 to 196	15.0 to 20.0	109 to 144
Pinion bearing case mounting screw	40 to 44	4.0 to 4.5	29 to 32
Spiral bevel gear UBS screw	69 to 88	7.0 to 9.0	51 to 65
Release fork mounting screw	24 to 27	2.4 to 2.8	18 to 20
Plate mounting screw	24 to 27	2.4 to 2.8	18 to 20
Neutral holder mounting screw	24 to 27	2.4 to 2.8	18 to 20
Port block mounting hex. socket screw	61 to 70	6.2 to 7.2	45 to 52
Hex. head plug (Check and high pressure relief valve)	59 to 78	6.0 to 8.0	44 to 57
Hex. head plug (Charge relief valve)	31 to 37	3.1 to 3.8	23 to 27
Hex. socket head screw	25 to 29	2.5 to 3.0	18 to 21
Swashplate mounting hex. head screw	29 to 35	2.9 to 3.6	21 to 26
Clutch cam mounting screw	61 to 70	6.2 to 7.2	45 to 52
Bearing holder mounting screw	48 to 55	4.9 to 5.7	36 to 41
Hydraulic cylinder assembly mounting screws and nut	78 to 90	7.9 to 9.2	58 to 66
Lock nut	150 to 190	15 to 20	110 to 140
Pinion bearing holder mounting screw	40 to 44	4.0 to 4.5	29 to 32
Spacer mounting screw	48 to 55	4.9 to 5.7	36 to 41
Rear axle case mounting screws and nuts	48 to 55	4.9 to 5.7	36 to 41
Brake case mounting stud bolts	39 to 45	3.5 to 5.0	26 to 36
Differential bearing case mounting screw	48 to 55	4.9 to 5.7	36 to 41

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## [2] L4701

Tightening torques of screws, bolts and nuts on the table below are especially specified.  
(For general use screws, bolts and nuts: "5. TIGHTENING TORQUES" on page G-13.)

Item	N·m	kgf·m	lbf·ft
HST control lever setting hex. head screw	6.9 to 8.3	0.7 to 0.85	5.06 to 6.15
Steering wheel mounting nut	48 to 55	4.9 to 5.7	36 to 41
HST return pipe bolt	79.2 to 88.2	8.1 to 9.0	58.4 to 65.1
Delivery pipe mounting screw	18 to 20	1.8 to 2.0	13 to 15
Delivery pipe joint bolt	49.0 to 69.0	5.0 to 7.0	37 to 50
Main delivery hose retaining nut	46.6 to 50.9	4.8 to 5.2	35 to 37
Turning delivery hoses retaining nut	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Engine and clutch housing case mounting screws and nuts	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
<b>3P</b> delivery pipe joint bolt	49.0 to 69.0	5.0 to 7.0	36.2 to 50.6
<b>3P</b> delivery pipe mounting M8 bolt	23.5 to 24.7	2.4 to 2.8	18 to 20
Clutch housing case and mid case mounting nuts	102.9 to 117.6	10.5 to 12.0	76.9 to 86.8
Clutch housing case and mid case mounting screws	78 to 90	7.9 to 9.2	57.1 to 66.5
Mid case and transmission case mounting stud bolts	39.2 to 49.0	4.0 to 5.0	28.9 to 36.2
ROPS mounting M14 screws	166.7 to 196.1	17.0 to 20.0	123 to 144
ROPS fulcrum screws	118 to 137	12.0 to 14.0	87 to 101
Rear wheel mounting screw and nut	196.0 to 225.0	20.0 to 23.0	144.6 to 166.0
Hydraulic cylinder assembly mounting screws and nut	77.4 to 90.2	7.9 to 9.2	57.1 to 66.5
Rear axle case mounting M10 nuts	60.8 to 70.5	6.2 to 7.2	44.9 to 52.1
Rear axle case mounting M12 screws and nuts	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Brake case mounting stud bolts	38.2 to 45.1	3.9 to 4.6	28.2 to 33.3
Brake case mounting screws, and nuts	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Brake case lever mounting screw	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5
Release fork mounting screw	23.5 to 27.4	2.4 to 2.8	17.4 to 20.2
Shaft case mounting screw	23.5 to 27.4	2.4 to 2.8	17.4 to 20.2
Clutch housing bearing holder mounting screws	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Stopper screw	34.3 to 44.1	3.5 to 4.5	25.3 to 32.5
PTO clutch valve mounting screws	23.5 to 27.4	2.4 to 2.8	17.4 to 20.2
PTO clutch holder mounting screw	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Lock nut	147 to 196	15 to 20	109 to 145
Pinion bearing case mounting screw	39.2 to 44.1	4.0 to 4.5	28.9 to 32.5
Bearing case mounting screw	23.5 to 27.4	2.4 to 2.8	17.4 to 20.2
Differential support mounting screws	48.1 to 55.9	4.9 to 5.7	35.5 to 41.2
Differential case cover mounting screw	48.1 to 55.9	4.9 to 5.7	35.5 to 41.2
Spiral bevel gear UBS screws	68.6 to 88.3	7.0 to 9.0	50.6 to 65.1
Charge pump case mounting bolt (M10)	48 to 56	4.9 to 5.7	35.4 to 41.2
Port block mounting hex. head screw (without seal washer)	103 to 118	10.5 to 12.0	76.0 to 86.7
Port block mounting hex. head screw (with seal washer)	31 to 36	3.2 to 3.7	23.1 to 26.8
Swashplate setting bolt	24 to 28	2.4 to 2.8	17.4 to 20.3

Item	N·m	kgf·m	lbf·ft
Cradle bearing bracket mounting hex. head screw	61 to 71	6.2 to 7.2	44.8 to 52.1
Check and high pressure relief valve hex. head plug (G1/2)	59 to 78	6.0 to 8.0	43.4 to 57.9
Charge relief valve hex. head plug (G3/8)	49 to 59	5.0 to 6.0	36.2 to 43.4
Servo regulator assembly mounting hex. head screw (M8)	29 to 34	3.0 to 3.5	21.7 to 25.3
Servo piston and under cover mounting hex. head screw (M10)	61 to 71	6.2 to 7.2	44.7 to 52.1

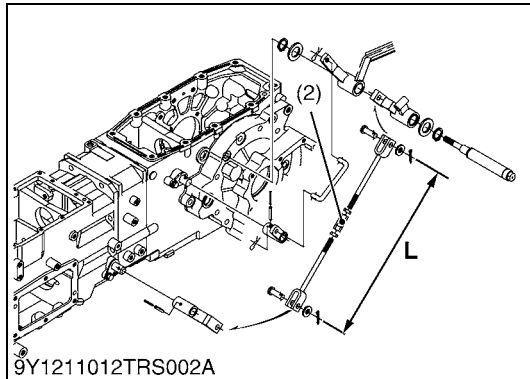
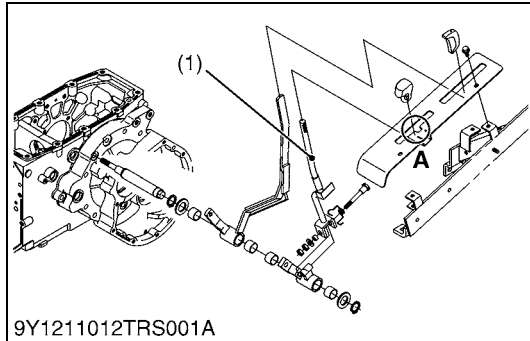
9Y1211012TRS0005US0



## 4. CHECKING AND ADJUSTING

### [1] L3301/L3901

#### (1) MANUAL TRANSMISSION MODEL



#### Checking Shuttle Shift Lever Neutral Position

1. Check if the shuttle shift lever (1) is in position "A" when lever is released at position "N".
2. If the lever is not in position "A", adjust shuttle shift lever position with the turnbuckle (2).
3. Also check if neutral switch is pressed when the shuttle shift lever (1) is in "N" position.

#### **(Reference)**

- Turnbuckle length "L": 363 mm (14.3 in.)

(1) Shuttle Shift Lever

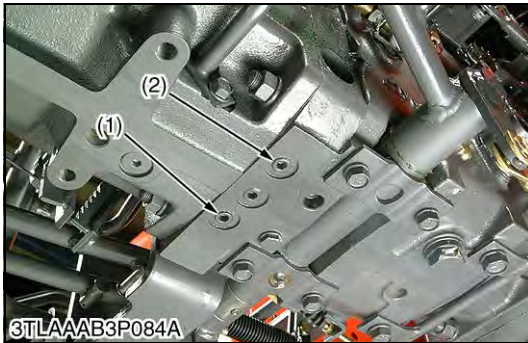
(2) Turnbuckle

**A:** Groove For Shuttle Lever

**L:** Turnbuckle Length

9Y1211012TRS0006US0

## (2) HST Model



### 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. (**P2** is for forward and **P1** is for reverse.)
  2. Assemble long adaptor **C** (07916-60831) and threaded joint (07916-50341) with the gasket between them.
  3. Install the assemble long adaptor **C** and threaded joint to **P2** (forward) or **P1** (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. Operate the engine at maximum speed.
  7. Place the range gear shift lever in **H** position.
  8. Depress the HST pedal, and measure the high pressure relief valve pressure.
  9. If the measurement is not within the factory specification, check the high pressure relief valve assembly. (See page 3-S49.)

#### (When reassembling)

- Install the hex. socket head plug to the port with O-ring.

Check high pressure relief valve	Factory specification	33.4 to 36.2 MPa 340 to 370 kgf/cm <sup>2</sup> 4840 to 5260 psi
----------------------------------	-----------------------	--

#### Condition

- Engine speed:  
Maximum
- Oil temperature:  
45 to 55 °C (113 to 131 °F)

#### ■ IMPORTANT

- **Measure quickly so that the relief valve may not be in operation more than 10 seconds.**

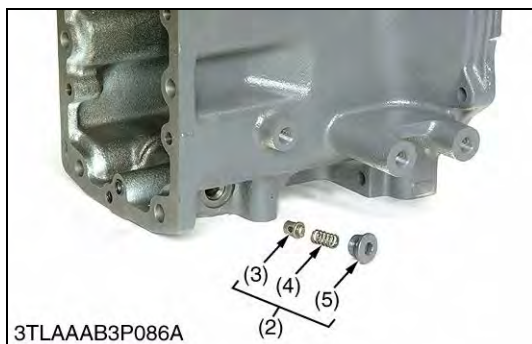
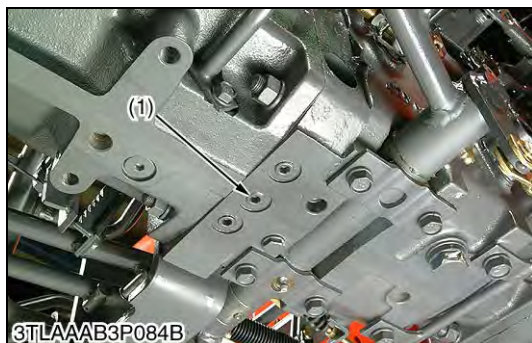
#### ■ NOTE

- **Be sure to use a pressure gauge with over 39.2 MPa (400 kgf/cm<sup>2</sup>, 5690 psi) capacity.**

(1) **P1** Port (for Reverse)

(2) **P2** Port (for Forward)

9Y1211012TRS0007US0



## Checking Charge Relief Pressure

### ⚠ CAUTION

- When parking, park the machine on flat ground, apply the parking brake.
1. Remove the brake rod and the propeller shaft. (See page 1-S34.)
  2. Remove the hex. socket head plug from **P** port (1).
  3. Assemble long adaptor **C** (07916-60831) and thread joint (07916-50341) with the gasket between them.
  4. Install the assembled long adaptor **C** and thread joint to **P** port (1).
  5. Install the cable, thread joint in relief valve set pressure tester and low pressure gauge to threaded joint in order.
  6. Place the range gear shift lever in neutral.
  7. Operate the engine at maximum speed.
  8. Release the HST pedal to set in neutral, and measure the charge pressure.
  9. If the measurement is not within the factory specifications, check charge relief valve (2). (See page 3-S53.)

### (When reassembling)

- Apply liquid lock (Three Bond 1324 or its equivalent) to the hex. socket head plug.

Charge relief pressure	Factory specification	0.5 to 0.6 MPa 5 to 8 kgf/cm <sup>2</sup> 80 to 90 psi
------------------------	-----------------------	--

### Condition

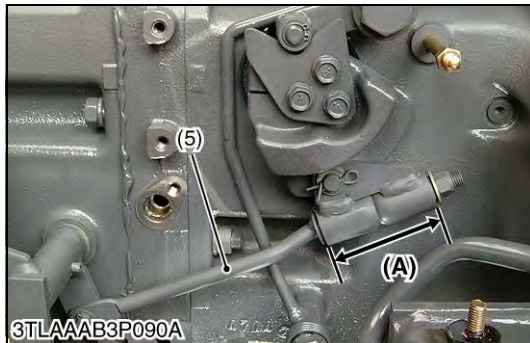
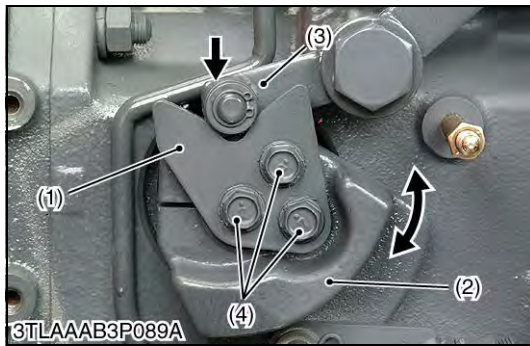
- Engine speed:  
Maximum
- Oil temperature:  
45 to 55 °C (113 to 131 °F)

### ■ NOTE

- Use a new transmission oil filter.
- Be sure to use a pressure gauge with over 2.9 MPa (30 kgf/cm<sup>2</sup>, 430 psi) capacity.

- |                         |                    |
|-------------------------|--------------------|
| (1) P Port              | (4) Spring         |
| (2) Charge Relief Valve | (5) Plug (GPF 3/8) |
| (3) Poppet              |                    |

9Y1211012TRS0008US0



### Adjusting Neutral

1. Disengage the front wheel drive lever. (Drive only rear wheels.)
2. Set the cruise control to "OFF" position. (HST pedal is neutral position.)
3. Check to see that the length **(A)** of HST neutral rod (5) is specified length.  
If not, adjust as follows  
Length **(A)**: 73.0 to 74.0 mm (2.88 to 2.91 in.).
4. Lift the rear of the tractor so that the rear wheels are off the ground and operate the engine at maximum speed and drive only rear wheels.
5. Slightly loosen the plate mounting screws (4).
6. Press the neutral holder arm (3) to the HST trunnion plate (1).
7. Then rotate the neutral holder (2) clockwise or counter clockwise until wheels stop completely.
8. Hold the neutral holder (2) and tighten the plate mounting screws (4).

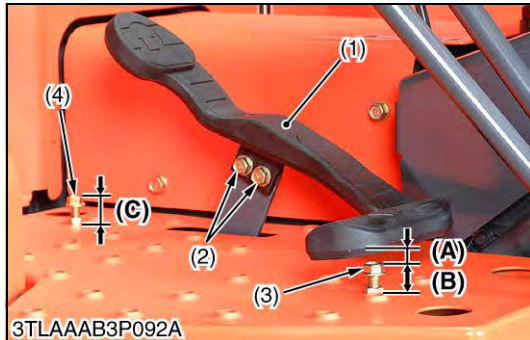
#### NOTE

- Be sure to tighten the plate mounting screw with specified torque.

Tightening torque	HST trunnion plate mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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- (1) HST Trunnion Plate  
(2) Neutral Holder  
(3) Neutral Holder Arm  
(4) Screws  
(5) HST Neutral Rod
- (A) Length**

9Y1211012TRS0009US0



### Adjusting HST Pedal and Stopper Bolt

#### NOTE

- Stop the engine when adjusting the pedal stroke.
- Be sure to adjust the HST neutral position.

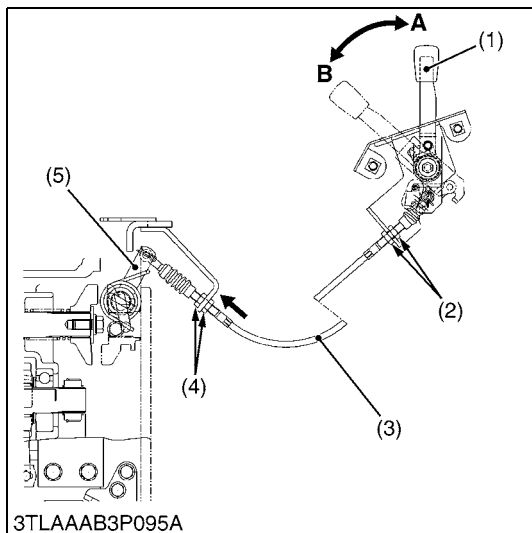
1. Adjust the height **(B)** and **(C)** of the pedal stopper bolt (3), (4).
2. Loosen the HST pedal mounting screws (2).
3. Tighten the HST pedal mounting screws (2) so that the clearance **(A)** between HST pedal and stopper bolt (3) may become specified value.

Clearance <b>(A)</b>	Factory specification	2 to 5 mm 0.08 to 0.1 in.
Height <b>(B)</b>	Factory specification	20 mm 0.79 in.
Height <b>(C)</b>	Factory specification	13 mm 0.51 in.

- (1) HST Pedal  
(2) Screws  
(3) Stopper Bolt (Forward)  
(4) Stopper Bolt (Reverse)

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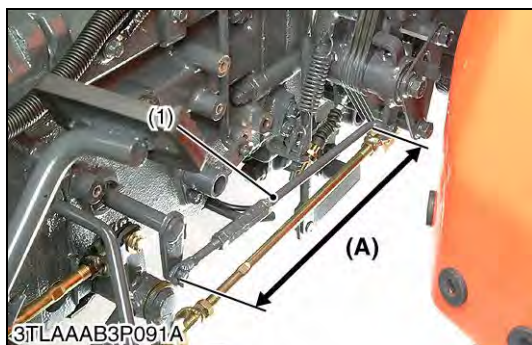
### Adjusting PTO Wire

1. Check to see that the threaded portion of PTO wire(3) rear side is set at center position.  
If not, set by lock nuts (2).
2. Set the PTO lever (1) at the "OFF" position "A".
3. The lock nut (4) is tightened in the direction of the arrow. Then stop it before the lever (5) moves.
4. Retighten the lock nut securely.

- (1) PTO Lever  
(2) Lock Nuts (Rear Side)  
(3) PTO Wire  
(4) Lock Nuts (Front Side)  
(5) Lever

**A: OFF Position**  
**B: ON Position**

9Y1211012TRS0011US0



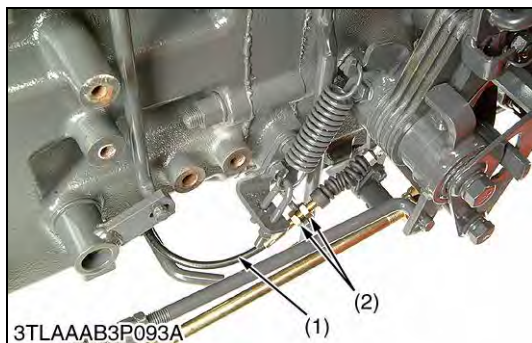
### Adjusting Cruise Control Rod (Option)

1. Set the cruise control lever to fully forward.
2. Adjust the cruise control rod (1) so that trunnion shaft may maximum incline forward.

Length of cruise control rod (A)	Factory specification	315 mm 12.4 in.
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- (1) Cruise Control Rod (A) Length

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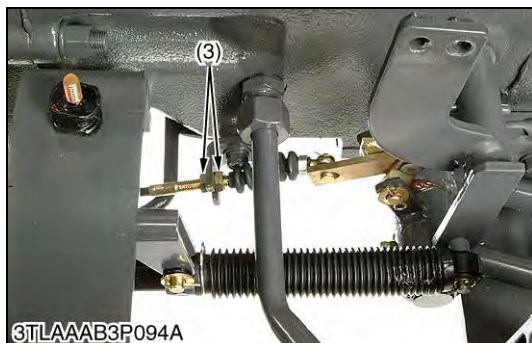


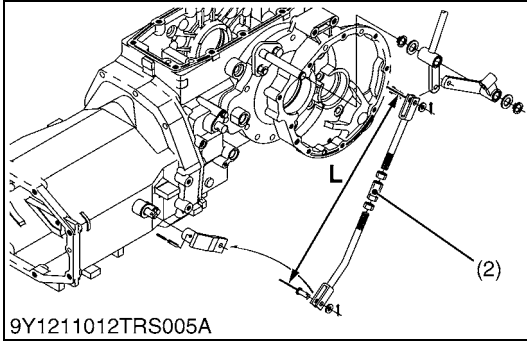
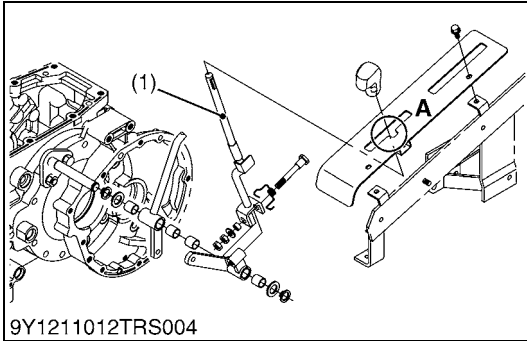
### Adjusting Cruise Control Release Linkage (Option)

1. Adjust the brake pedals play first.
2. Depress one of the brake pedals to make sure the cruise control is not released. Also depress both the brake pedals coupled together to make sure that the cruise control is released.
3. If the cruise control does not work as above adjust with release wire (1) as follows.
  - Check to see that the threaded portion of the wire (1) rear side is set at the center position. If not, set by lock nuts (2).
4. In the end of the play of the brake pedal, adjust the lock nuts (3) so that slack of the wire may become 0.
  - Make sure whether to move as above-mentioned 2. If not, adjust by lock nut (3).

- (1) Release Wire (3) Lock Nut (Front)  
(2) Lock Nut (Rear)

9Y1211012TRS0013US0



**[2] L4701****(1) MANUAL TRANSMISSION MODEL****Checking Shuttle Shift Lever Neutral Position**

1. Check if the shuttle shift lever (1) is in position "A" when lever is released at position "N".
2. If the lever is not in position "A", adjust shuttle shift lever position with the turnbuckle (2).
3. Also check if neutral switch is pressed when the shuttle shift lever (1) is in "N" position.

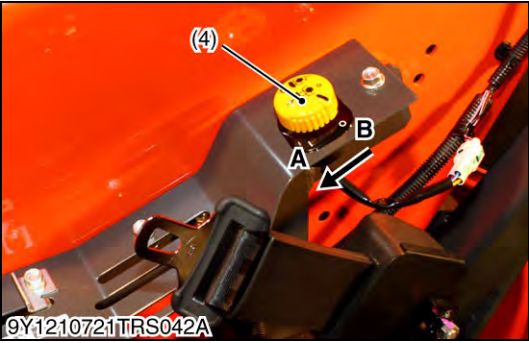
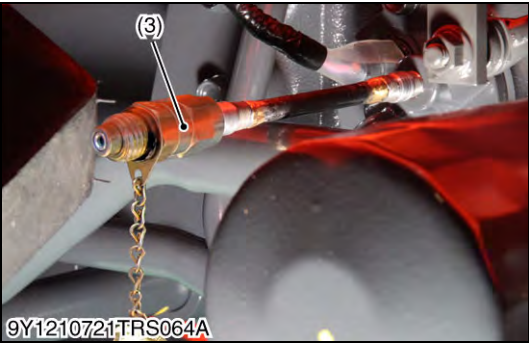
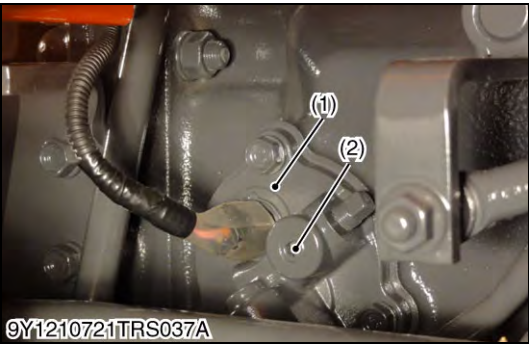
**(Reference)**

- Turnbuckle length "L": 389 mm (15.3 in.)

- (1) Shuttle Shift Lever  
(2) Turnbuckle

- A: Groove For Shuttle Lever**  
**L: Turnbuckle Length**

9Y1211012TRS0015US0



**PTO Clutch Oil Operating Pressure**

1. Remove the plug (2) from the PTO clutch solenoid valve (1).
2. Install the adaptor (3) to the PTO clutch solenoid valve (1).
3. Install the hydraulic cable and the gauge to the adaptor (3).
4. Start the engine.
5. Set the engine revolution to the idling speed.
6. Set the PTO clutch control switch (4) to **"ON"** position.
7. Measure the PTO clutch operation pressure.

PTO clutch pressure	When PTO clutch control switch is set to <b>"ON"</b> position	2.25 to 2.45 MPa 23.0 to 25.0 kgf/cm <sup>2</sup> 327 to 356 psi
	When PTO clutch control switch is set to <b>"OFF"</b> position	No pressure

**Condition**

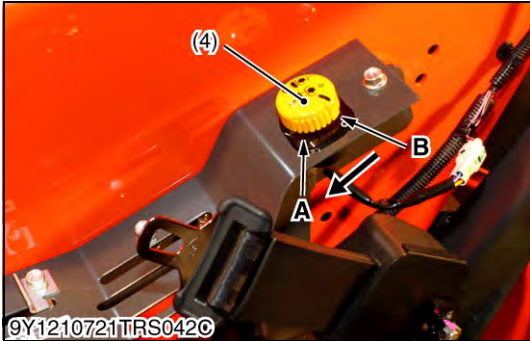
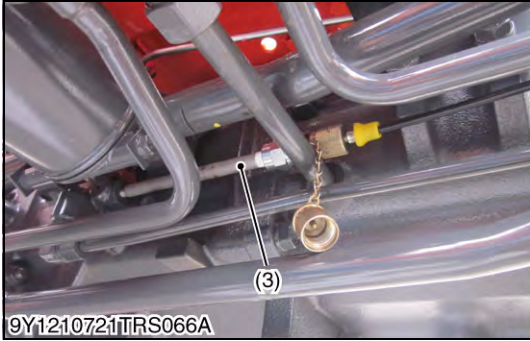
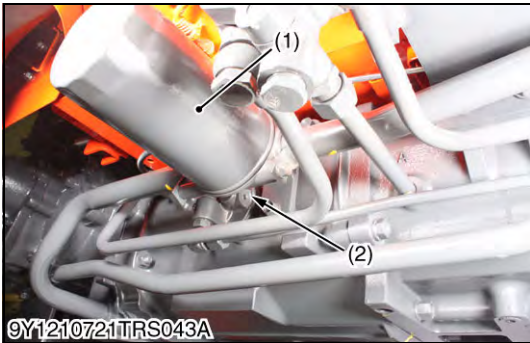
- Engine speed:  
Idling speed
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

- (1) Solenoid Valve  
(2) Plug (1/8)  
(3) Adaptor  
(4) PTO Clutch Control Switch

**A: ON Position**  
**B: OFF Position**

9Y1211012TRS0014US0

(2) HST Model



**PTO Clutch Oil Operating Pressure**

1. Remove the plug (2) from the PTO clutch solenoid valve.
2. Install the adaptor (3) to the PTO clutch solenoid valve.
3. Install the hydraulic cable and the gauge to the adaptor (3).
4. Start the engine.
5. Set the engine revolution to the idling speed.
6. Set the PTO clutch control switch (4) to **"ON"** position.
7. Measure the PTO clutch oil operation pressure.

PTO clutch pressure	When PTO clutch control switch is set to <b>"ON"</b> position	2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm <sup>2</sup> 335 to 384 psi
	When PTO clutch control switch is set to <b>"OFF"</b> position	No pressure

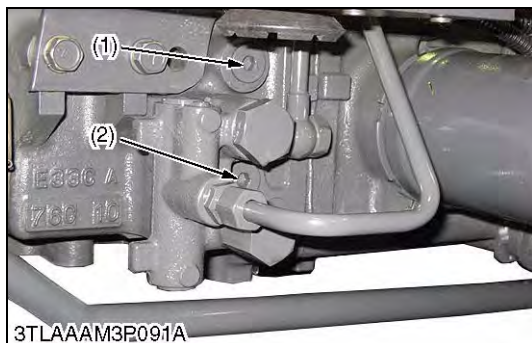
**Condition**

- Engine speed:  
Idling speed
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

- |                                    |                        |
|------------------------------------|------------------------|
| (1) Hydraulic Oil Filter Cartridge | <b>A: ON Position</b>  |
| (2) Plug (1/8)                     | <b>B: OFF Position</b> |
| (3) Adaptor                        |                        |
| (4) PTO Clutch Control Switch      |                        |

9Y1211012TRS0016US0





### 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. (**P2** is for forward and **P1** 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 **P2** (forward) or **P1** (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. Operate the engine at maximum 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 pressure relief valve assembly. (See page 3-S90.)

Check and high relief pressure (Oil temperature at 40 to 60 °C (104 to 140 °F))	Factory specification	33.4 to 36.3 MPa 340.0 to 370.0 kgf/cm <sup>2</sup> 4836 to 5263 psi
--	-----------------------	--

#### ■ IMPORTANT

- Measure quickly so that the relief valve may not be in operation more than 10 seconds.

#### ■ NOTE

- Be sure to use high pressure gauge with over 40 MPa (400 kgf/cm<sup>2</sup>, 5800 psi).

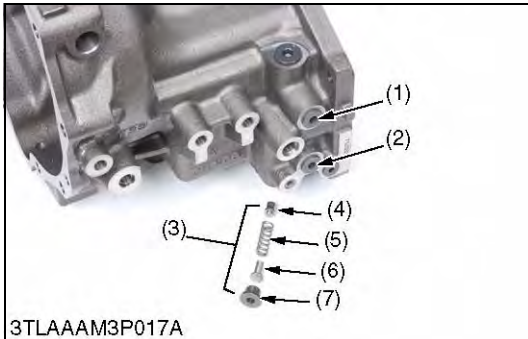
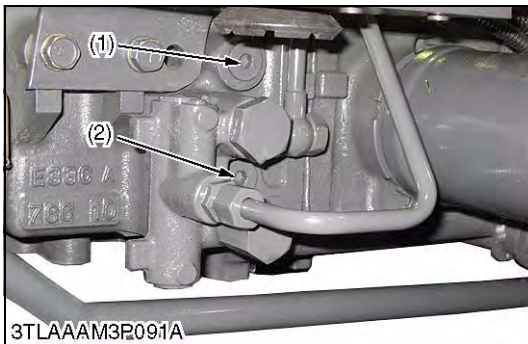
#### (When reassembling)

- Install the hex. socket head plug to the port with O-ring.

(1) **P1** Port (for Reverse)

(2) **P2** Port (for Forward)

9Y1211012TRS0017US0



## Checking Charge Relief Pressure

### CAUTION

- When checking, park the machine on flat ground, apply the parking brake.

### NOTE

- Use a new transmission oil filter.

- Remove the hex. socket head plug from **P2** (or **P1**) port.
- Assemble adaptor **58** (07916-52391) and thread joint (07916-50341) with the gasket between them.
- Install the assembled adaptor **58** and thread joint to **P2** port.
- Install the cable, thread joint in relief valve set pressure tester and low pressure gauge to threaded joint in order.
- Place the range gear shift lever in neutral.
- Operate the engine at maximum speed.
- Release the HST pedal to set in neutral, and measure the charge pressure.
- If the measurement is not within the factory specifications, check charge relief valve (3) (see page 3-S91.) or adjust with adjusting shim.

### NOTE

- Adjusting shim is located on between spring guide (6) and plug (7).

### (Reference)

- Thickness of adjusting shim:  
0.5 mm (0.02 in.) or 0.2 mm (0.008 in.)
- Pressure change per 0.5 mm (0.02 in.) of shim:  
Approx. 125 kPa (1.27 kgf/cm<sup>2</sup>, 18.1 psi)

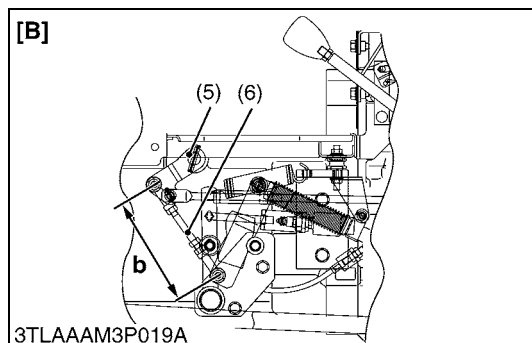
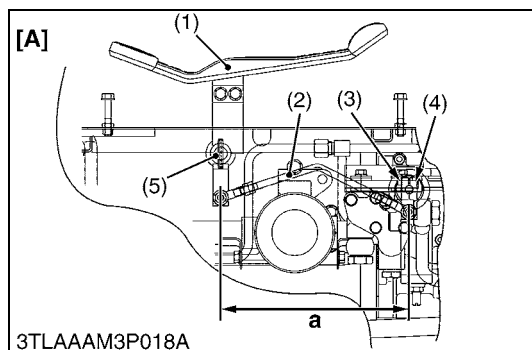
Charge pressure (oil temperature at 50 to 60 °C (122 to 140 °F))	Factory specification	2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm <sup>2</sup> 334 to 384 psi
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### NOTE

- Low pressure gauge is 5 MPa (50 kgf/cm<sup>2</sup>, 711 psi) full scale.

- |                           |                    |
|---------------------------|--------------------|
| (1) P1 Port (Reverse)     | (5) Spring         |
| (2) P2 Port (for Forward) | (6) Spring Guide   |
| (3) Charge Relief Valve   | (7) Plug (GPF 3/8) |
| (4) Poppet                |                    |

9Y1211012TRS0018US0



### Adjusting Neutral

#### CAUTION

- **Stop the engine when adjusting the HST neutral.**
1. Set the cruise control lever to "**OFF**" position. (HST pedal is in **Neutral** position.)
  2. Check to see that the length a of HST control rod (2) and the length b of neutral rod (6) are specified length.  
If not, adjust as follows.  
Length "**a**": 231.2 to 232.2 mm (9.07 to 9.11 in.)  
Length "**b**": 138.5 to 139.5 mm (5.49 to 5.53 in.)
  3. Loosen the hex. head screw (3) to make situation that HST control lever (4) moves freely. Operate the engine for 5 seconds to make sure that the HST is in neutral position.
  4. Tighten the hex. head screw (3) so that the HST control lever (4) does not turn.

#### ■ NOTE

- **Be sure to tighten the hex. head screw with specified torque.**

Tightening torque	HST control lever setting hex. head screw	6.9 to 8.3 N·m 0.7 to 0.85 kgf·m 5.06 to 6.15 lbf·ft
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- (1) HST Pedal
- (2) HST Control Rod
- (3) Hex. Head Screw
- (4) HST Control Lever
- (5) Connecting Shaft
- (6) Neutral Rod

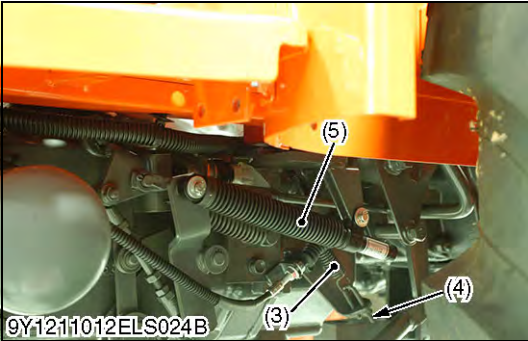
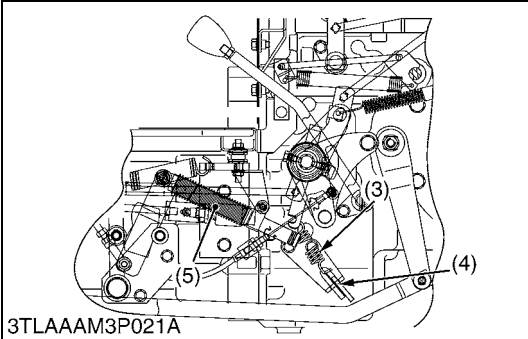
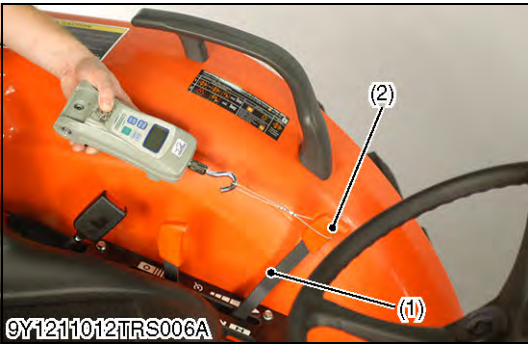
**[A] Right Side View**

**[B] Left Side View**

**a: Length of HST Control Rod**

**b: Length of Neutral Rod**

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Cruise Lever Operating Force

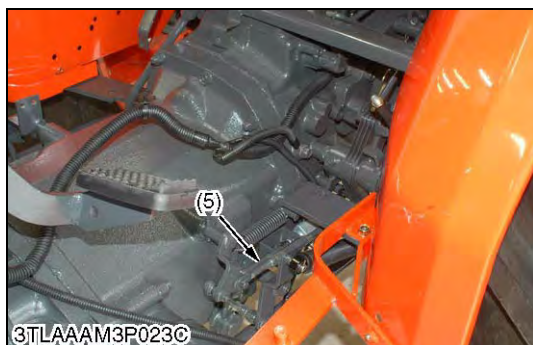
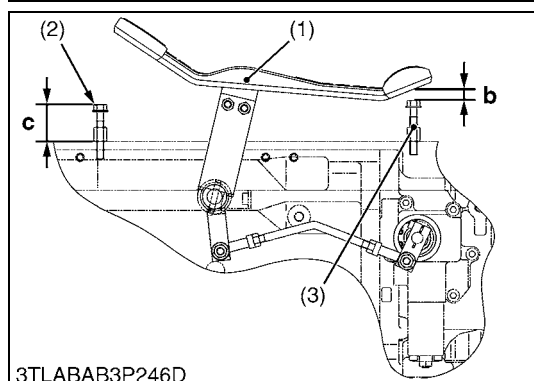
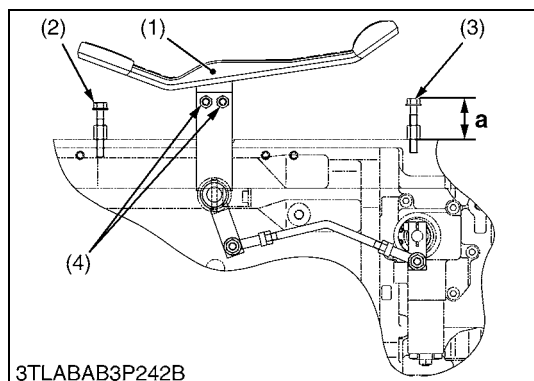
- 1. Push the cruise control lever (1) into maximum tied position. After that pull it 50 mm (2 in.) back.
- 2. Measure the force needed to move the cruise control lever back into the maximum position at middle of the lever grip (2).
- 3. If the force is not within the factory specifications, loosen the lock nut (4) and adjust the tension of cruise spring (3).
- 4. Retighten the lock nut (4) securely.

Cruise control lever operating force	Factory specification	60 to 100 N 6.2 to 10.1 kgf 14 to 22.4 lbf
--------------------------------------	-----------------------	--

- (1) Cruise Control Lever
- (2) Lever Grip
- (3) Cruise Spring
- (4) Lock Nut
- (5) Damper

9Y1211012TRS0020US0





## Cruise Control Linkage and Maximum Travel Speed

### CAUTION

- Stop the engine when adjusting the cruise control linkage and pedal stroke.

### NOTE

- Be sure to adjust the HST neutral position.
- Be sure to check whether the "traveling speed coefficient" is suitable for tire size.

- Loosen the HST pedal mounting screws (4) and tighten the screws (4) while pulling up the front of HST pedal (1).
- Adjust the height a of the pedal stopper bolt (Forward) (3) to approx. 25 mm (0.98 in.) from the step.
- Operate the tractor actually and make whether the tractor can put on sufficient speed.
- Set the cruise control lever to fully forward (Maximum position). HST pedal also tilts.
- Measure the clearance b between bottom of HST pedal and tip of pedal stopper bolt (Forward) (3).
- If the measurement is not within factory specification, adjust by the cruise adjusting rod (5). (Cruise Linkage Adjustment.)
- Shorten the pedal stopper bolt (Reverse) (2) to the position where the length of the bolt is not touched to the HST pedal (1) even if the HST pedal is fully depressed rearward.
- Lengthen the length of the pedal stopper bolt (Reverse) (2) gradually with the HST pedal fully depressed rearward to contact to the HST pedal.

### (Reference)

- Height "a": 25 mm (0.98 in.)
- Clearance "b": 2 to 6 mm (0.08 to 0.2 in.)
- Height "c": 15 mm (0.59 in.)

- |                                  |   |
|----------------------------------|---|
| (1) HST Pedal                    | a: Stopper Bolt Height (Forward)                          |
| (2) Pedal Stopper Bolt (Reverse) | b: Clearance between HST pedal and stepper bolt (Forward) |
| (3) Pedal Stopper Bolt (Forward) | c: Stopper Bolt Height (Reverse)                          |
| (4) HST Pedal Mounting Screw     | F: Forward  |
| (5) Cruise Adjusting Rod         | R: Reverse  |

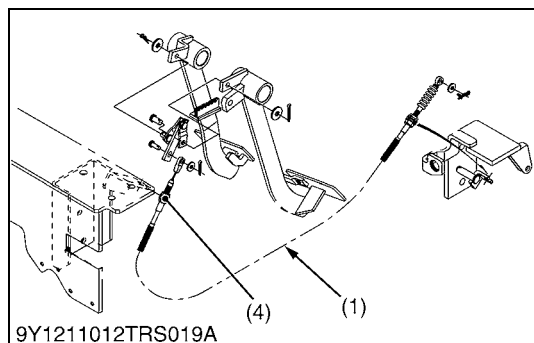
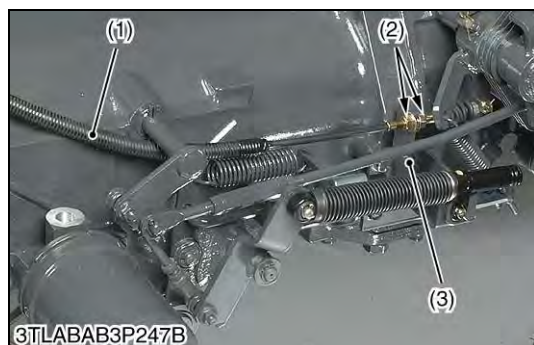
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## Adjusting Cruise Control Release Linkage

- Adjust the brake pedals free travel first.
- Depress one of the brake pedal to make sure the cruise control is not released. Also depress both the brake pedals coupled together to make sure that the cruise control is released.
- If the cruise control does not work as above adjust with release wire (1) as follows.
  - Check to see that the threaded portion of the wire (1) rear side is set at the end position. If not, set by lock nuts (2).
  - Adjust by lock nuts (4) for the center of the threaded portion of the release wire front side to come to the hook position.
  - Make sure whether to move as above-mentioned 2.
  - If not, adjust by lock nuts (4).

- |                     |                      |
|---------------------|----------------------|
| (1) Release Wire    | (3) Damper Stay      |
| (2) Lock Nut (Rear) | (4) Lock Nut (Front) |

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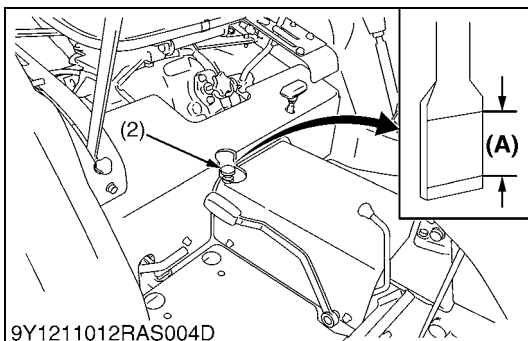
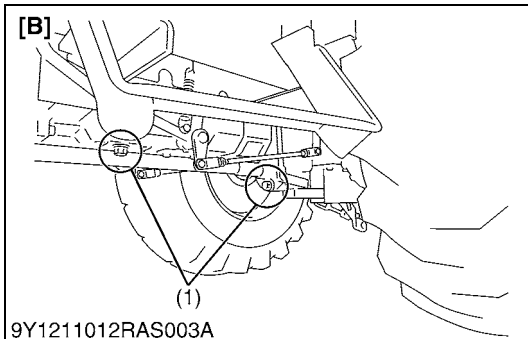
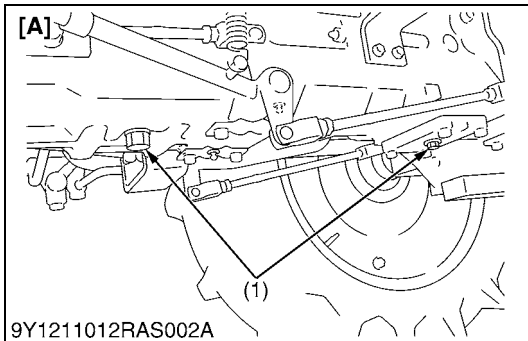
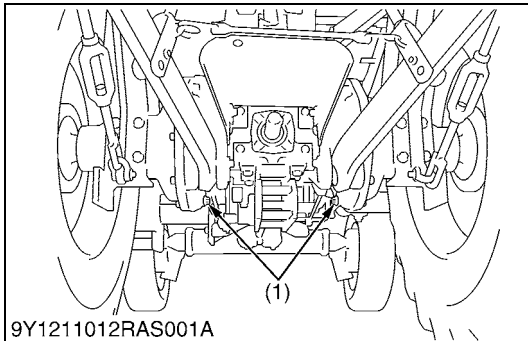


## 5. DISASSEMBLING AND ASSEMBLING

### [1] L3301/L3901

#### (1) Preparation

##### [A] Separating Engine and Clutch Housing



#### Draining Transmission Fluid (L3301/L3901)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

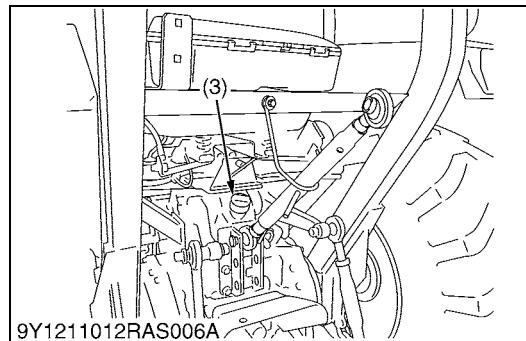
#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	2WD	28.0 L 7.4 U.S.gals 6.1 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.2 Imp.gals
		HST	23.5 L 6.2 U.S.gals 5.2 Imp.gals



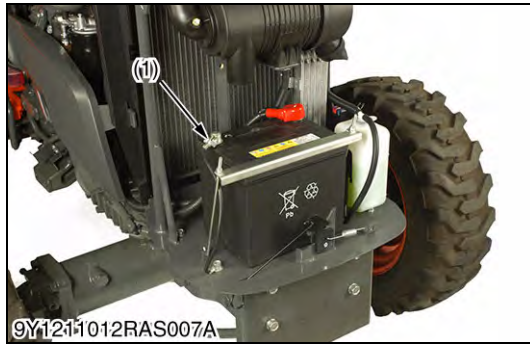
- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

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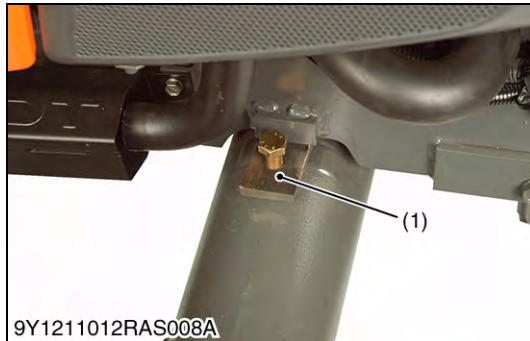


### **Battery Negative Cable Connector**

1. Open bonnet.
2. Disconnect battery negative cable connector (1).

(1) Battery Negative Cable Connector

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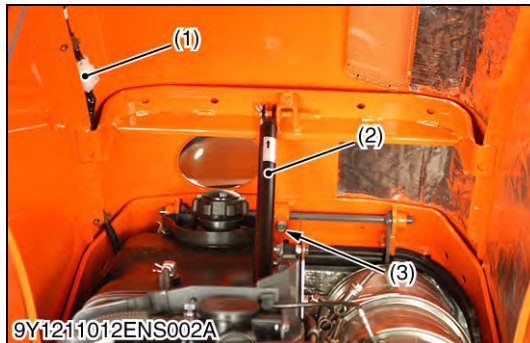


### **Front Axle Rocking Restrictor**

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-95.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

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### **Bonnet and Side Covers**

1. Disconnect the headlight connector (1).
2. Remove the damper (2) from the bonnet.
3. Disconnect the bolt (3) from the bonnet.
4. Remove the bonnet (4).
5. Remove the R.H. and L.H. side covers (5).

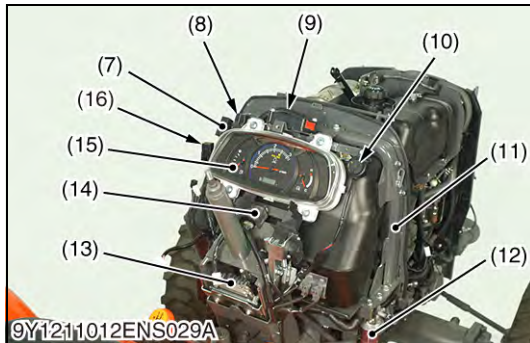
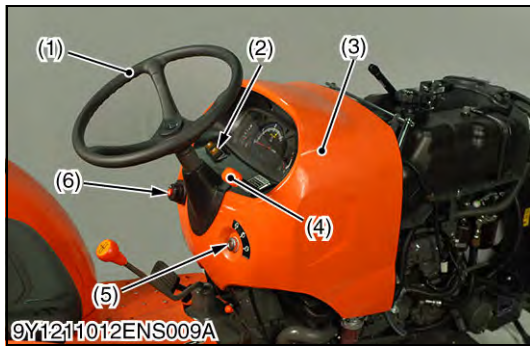
(1) Headlight Connector  
(2) Damper  
(3) Bolt

(4) Bonnet  
(5) Side Cover

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### Steering Wheel and Rear Bonnet

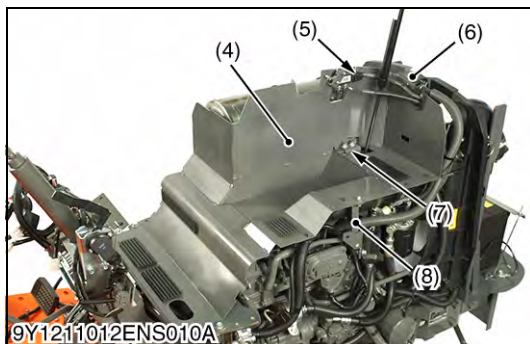
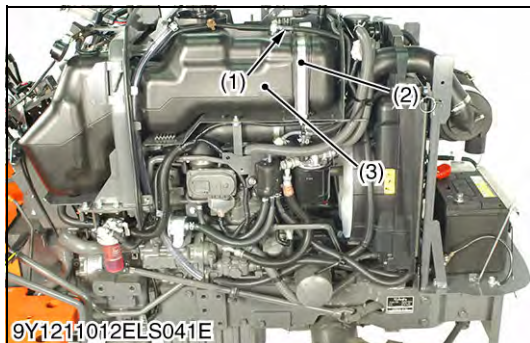
1. Remove the steering wheel (1) with a steering wheel puller.
2. Remove the throttle grip (4).
3. Disconnect the main switch (5).
4. Disconnect the combination switch (6).
5. Disconnect the DPF switches (2).
6. Remove the rear bonnet (3).
7. Remove the meter panel (15).
8. Disconnect the DPF buzzer (10).
9. Disconnect the flasher unit (14).
10. Disconnect the starter relay (7), glow relay (8) and CCV heater relay (16).
11. Disconnect the engine ECU (13).
12. Remove the separator (12).
13. Remove the rear bonnet stay (11).

#### (When reassembling)

Tightening torque	Steering wheel mounting nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-----------------------------	---

- |                        |                       |
|------------------------|-----------------------|
| (1) Steering Wheel     | (9) Main ECU          |
| (2) DPF Switch         | (10) DPF Buzzer       |
| (3) Rear Bonnet        | (11) Rear Bonnet Stay |
| (4) Throttle Grip      | (12) Separator        |
| (5) Main Switch        | (13) Engine ECU       |
| (6) Combination Switch | (14) Flasher Unit     |
| (7) Starter Relay      | (15) Meter Panel      |
| (8) Glow Relay         | (16) CCV heater relay |

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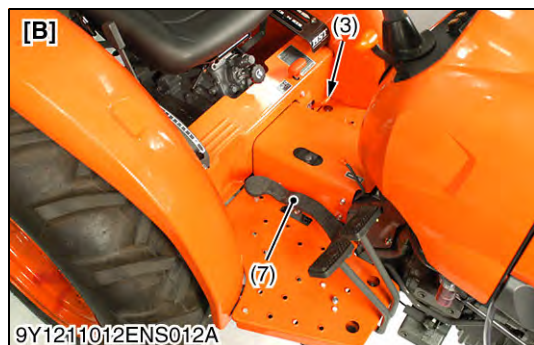
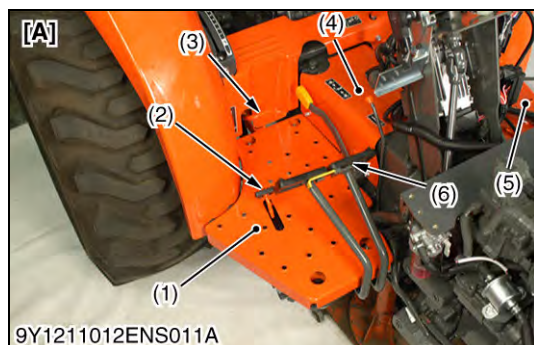
### Fuel Tank and Base

1. Disconnect the fuel return line (1).
2. Remove the fuel tank band (2).
3. Remove the fuel tank (3).
4. Remove the damper bracket (7).
5. Disconnect the connector and hoses from the differential pressure sensor (5).
6. Disconnect the oil separator (6) from the fuel tank base.
7. Disconnect the fuel reserve tank bracket (8) from the fuel tank base.
8. Remove the fuel tank base (4).

- |                      |                                  |
|----------------------|----------------------------------|
| (1) Fuel Return Line | (5) Differential Pressure Sensor |
| (2) Fuel Tank Band   | (6) Oil Separator                |
| (3) Fuel Tank        | (7) Damper Bracket               |
| (4) Fuel Tank Base   | (8) Fuel Reserve Tank Bracket    |

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### Step and Center Cover (L3301/L3901)

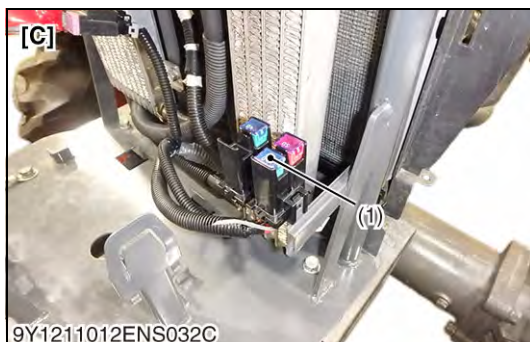
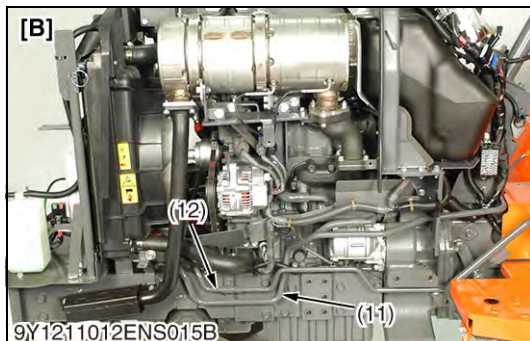
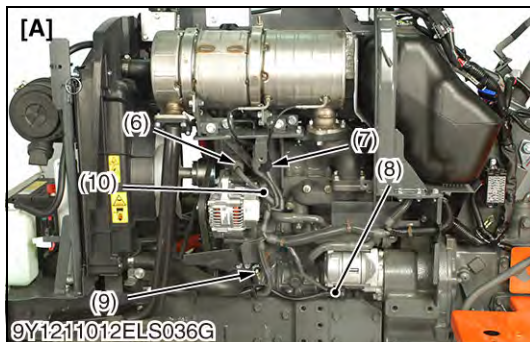
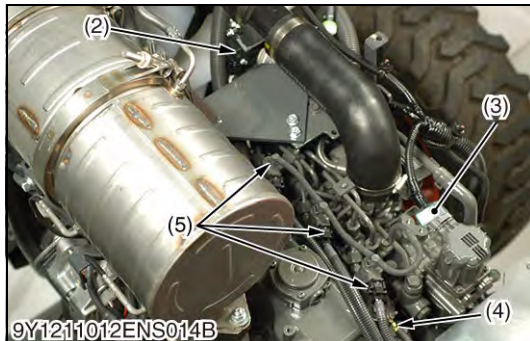
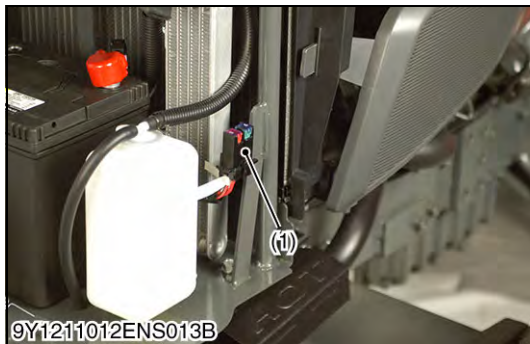
1. Remove the center cover (4).
2. Disconnect the throttle cable from the throttle pedal (2).
3. Remove the HST pedal (7).
4. Disconnect the differential lock spring and rod from the differential lock lever (3).
5. Remove the brake pedal springs from the brake pedals (6).
6. Remove the R.H. step (1).
7. Remove the clutch pedal spring from the clutch pedal.
8. Remove the L.H. step (5).

- |                             |                 |
|-----------------------------|-----------------|
| (1) R.H. Step               | (6) Brake Pedal |
| (2) Throttle Pedal          | (7) HST Pedal   |
| (3) Differential Lock Lever |                 |
| (4) Center Cover            |                 |
| (5) L.H. Step               |                 |

**[A] FW and DW Model**

**[B] DHW Model**

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### Hydraulic Pipes and Electrical Wiring (Under Fuel Tank Base and Left Side)

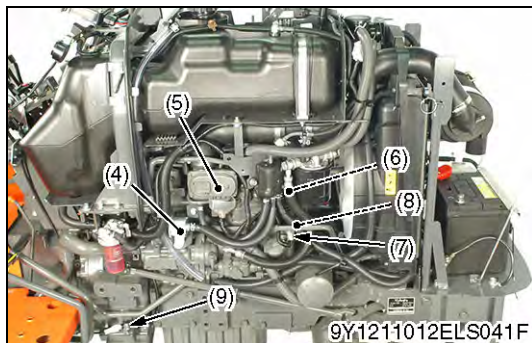
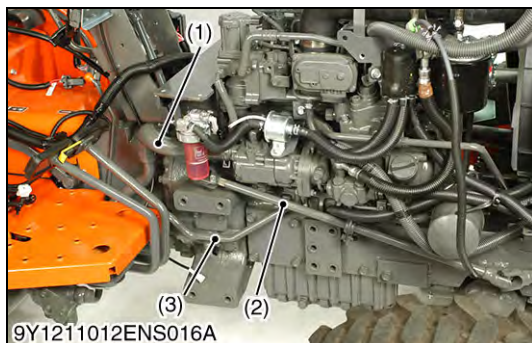
1. Disconnect the connectors of injector (5).
2. Disconnect the glow plug (4).
3. Disconnect the EGR valve (3).
4. Disconnect the air flow sensor (2).
5. Disconnect the rail pressure sensor.
6. Remove the slow blow fuses (1).
7. Disconnect the positive battery cable.
8. Disconnect the water temperature sensor (6).
9. Disconnect the DPF temperature sensors (7).
10. Disconnect the alternator (10).
11. Disconnect the starter (8).
12. Disconnect the oil switch (9).
13. Remove the oil cooler return pipe (11).
14. Remove the power steering return pipe (12).



Tightening torque	Oil cooler return pipe bolt	92 to 101 N·m 9.0 to 10.0 kgf·m 67 to 73 lbf·ft
-------------------	-----------------------------	---

- |                              |  |
|------------------------------|--|
| (1) Slow Blow Fuse           | (10) Alternator                                  |
| (2) Air Flow Sensor          | (11) Oil Cooler Return Pipe                      |
| (3) EGR Valve                | (12) Power Steering Return Pipe<br>(L3301/L3901) |
| (4) Glow Plug                |  |
| (5) Injector                 |  |
| (6) Water Temperature Sensor | <b>[A] FW and DW Model</b>                       |
| (7) DPF Temperature Sensor   | <b>[B] DHW Model</b>                             |
| (8) Starter                  | <b>[C] L3301/L3901</b>                           |
| (9) Oil Switch               | <b>[D] L4701</b>                                 |

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### Hydraulic Pipes, Steering Joint, and Electrical Wiring (Right Side)

1. Remove the suction hose (1).
2. Remove the delivery pipe (3).
3. Remove the steering shaft (2).
4. Disconnect the crank shaft position sensor (9).
5. Disconnect the parking brake sensor.
6. Disconnect the fuel pump (4).
7. Disconnect the intake throttle valve (5).
8. Disconnect the rail pressure sensor (6).
9. Disconnect the supply pump (7) connector.
10. Disconnect the camshaft position sensor (8).

#### (When reassembling)

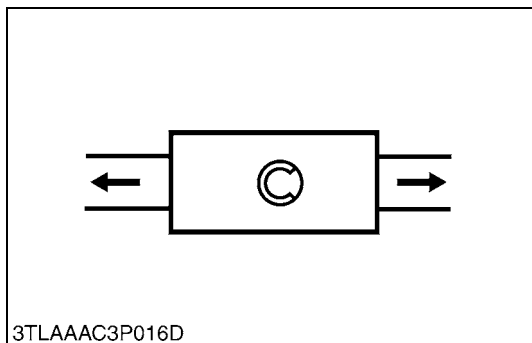
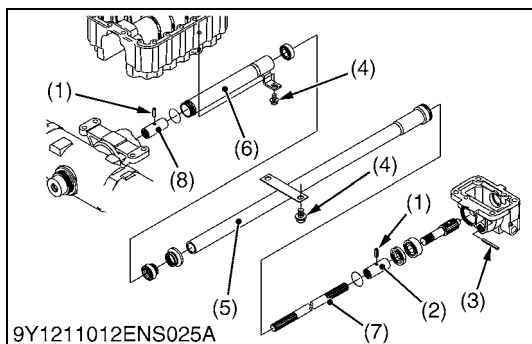
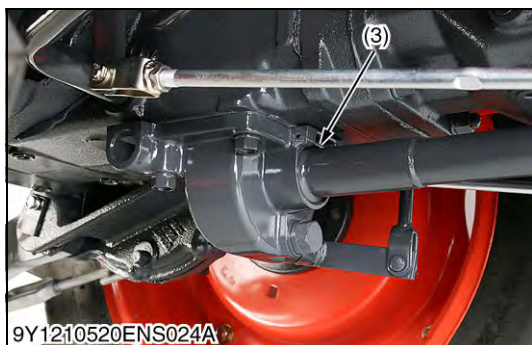
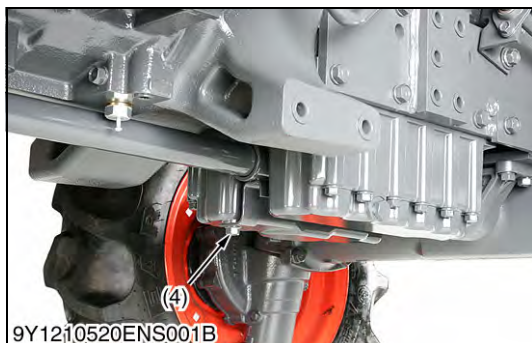
- Be sure that the steering joint shaft (2) does not contact with both hydraulic pump and flywheel housing.

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Steering shaft universal joint bolt (L3301/L3901)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.3 to 20.2 lbf·ft
	Steering bearing flange bolt (L3301/L3901)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.3 to 20.2 lbf·ft

- |  |                                 |
|--|---------------------------------|
| (1) Suction Hose                       | (6) Rail Pressure Sensor        |
| (2) Steering Joint Shaft (L3301/L3901) | (7) Supply Pump                 |
| (3) Delivery Pipe                      | (8) Camshaft Position Sensor    |
| (4) Fuel Pump                          | (9) Crank Shaft Position Sensor |
| (5) Intake Throttle Valve              |                                 |

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### **Propeller Shaft (L3301/L3901)**

1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

#### **(When reassembling)**

- Apply greasing to the splines of the propeller shaft (7) and pinion shaft.
- Tap in spring pins (1) as shown in the figure.

- (1) Spring Pin
- (2) Coupling
- (3) Spring Pin
- (4) Screw

- (5) Propeller Shaft Cover 1
- (6) Propeller Shaft Cover 2
- (7) Propeller Shaft
- (8) Coupling

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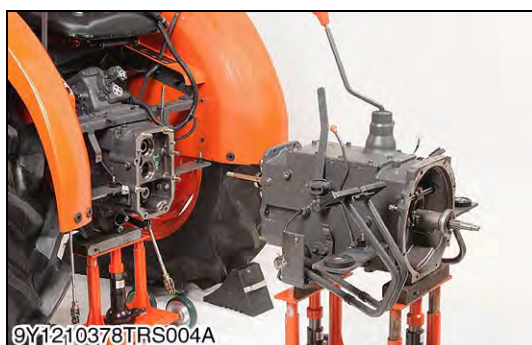
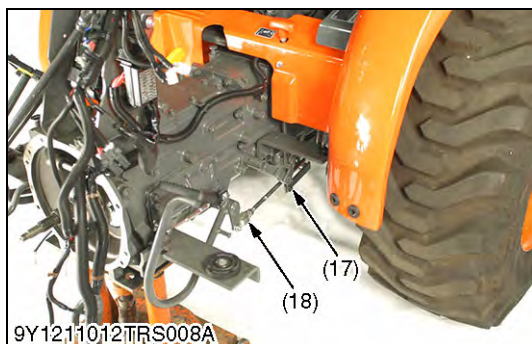
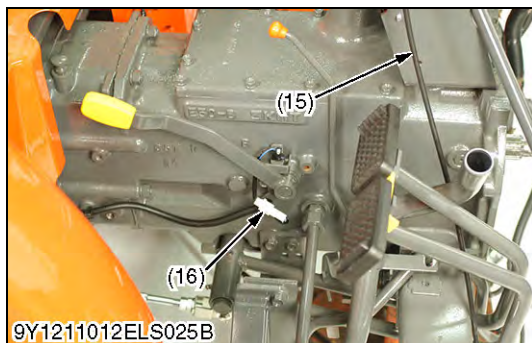
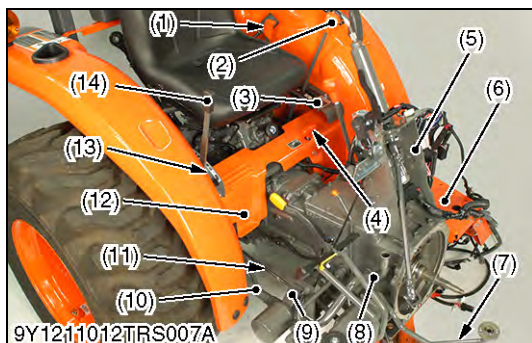
### **Separating Engine from Clutch Housing Case**

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

#### **(When reassembling)**

- Apply grease to the splines.
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the engine and clutch housing case.

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**[B] Separating Clutch Housing Case****Outer Components**

1. Disconnect the throttle cable (15).
2. Remove the steering support (5).
3. Remove the grips (1), (2), and (14).
4. Remove the lever guides (3) and (13).
5. Remove the floor sheet cover (12).
6. Remove the steps (6).
7. Remove the suction pipe 1 (8).
8. Remove the oil filter base (9) with the filter and suction pipe 2 (10).
9. Remove the delivery pipe (7).
10. Remove the brake rods (11) and (18).
11. Remove the shuttle rod (17).
12. Disconnect the PTO safety switch connector (16).

**(When reassembling)**

- Apply grease to the O-rings and be careful not to damage it.

Tightening torque	Delivery pipe mounting joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
-------------------	-----------------------------------	---

- |                                      |                                  |
|--------------------------------------|----------------------------------|
| (1) Range Gear Shift Lever Grip      | (10) Suction Pipe 2              |
| (2) Synchro-shuttle Shift Lever Grip | (11) Brake Rod                   |
| (3) Lever Guide                      | (12) Floor Sheet Cover           |
| (4) Front Wheel Drive Lever Grip     | (13) Lever Guide                 |
| (5) Steering Support                 | (14) Position Control Lever Grip |
| (6) Step                             | (15) Throttle Cable              |
| (7) Delivery Pipe                    | (16) PTO Safety Switch Connector |
| (8) Suction Pipe 1                   | (17) Shuttle Rod                 |
| (9) Oil Filter Base                  | (18) Brake Rod                   |

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**Separating Clutch Housing from Transmission Case**

1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Remove the clutch housing mounting screws.
3. Separate the clutch housing from the transmission case.

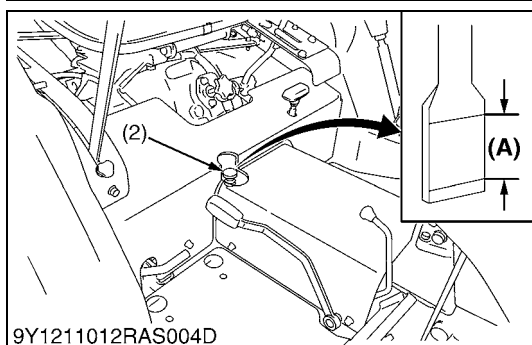
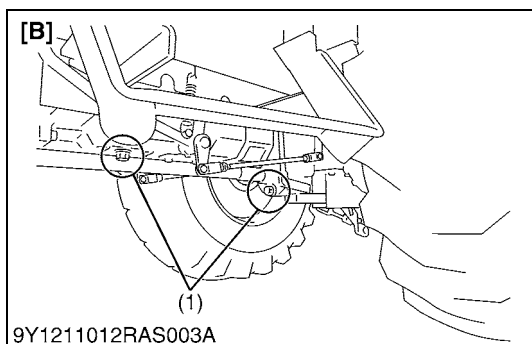
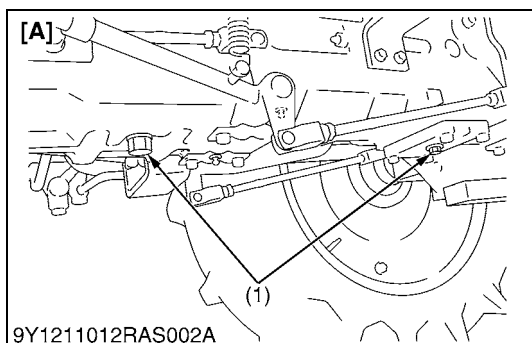
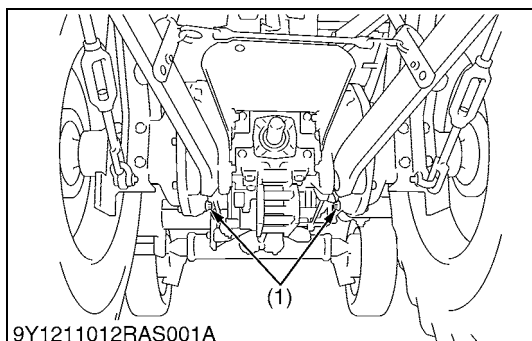
**(When reassembling)**

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of clutch housing case and mid case.

Tightening torque	Clutch housing 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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## [C] Separating Transmission Case



### Draining Transmission Fluid (L3301/L3901)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

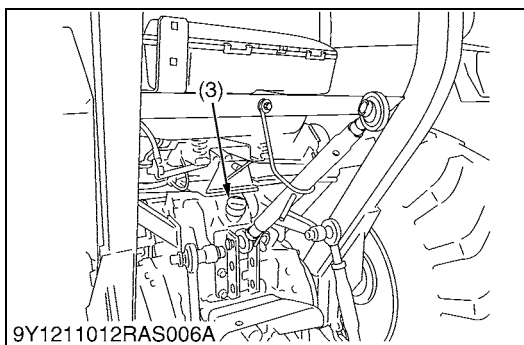
#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	2WD	28.0 L 7.4 U.S.gals 6.1 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.2 Imp.gals
		HST	23.5 L 6.2 U.S.gals 5.2 Imp.gals



- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

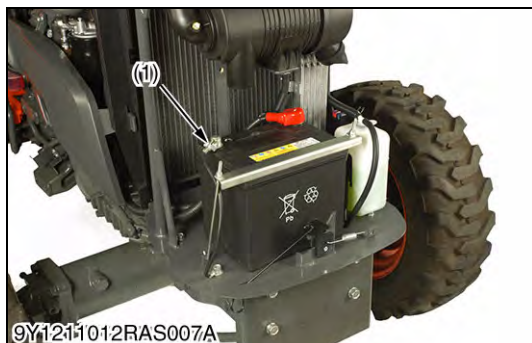
[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

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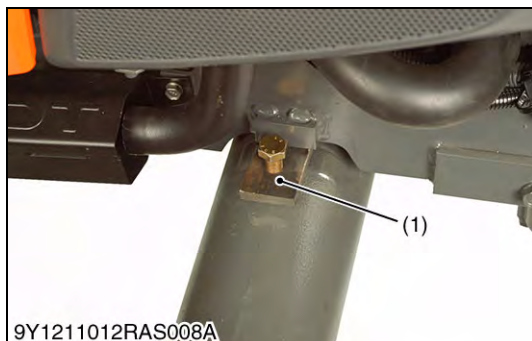


### Battery Negative Cable Connector

1. Open bonnet.
2. Disconnect battery negative cable connector (1).

(1) Battery Negative Cable Connector

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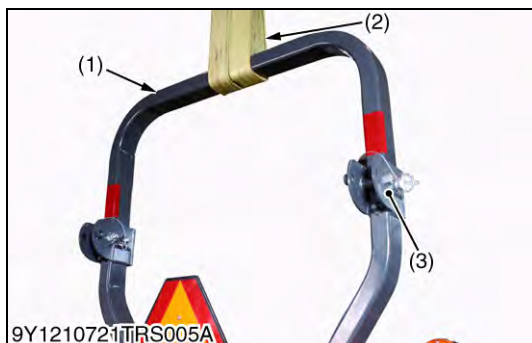


### Front Axle Rocking Restrictor

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-95.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

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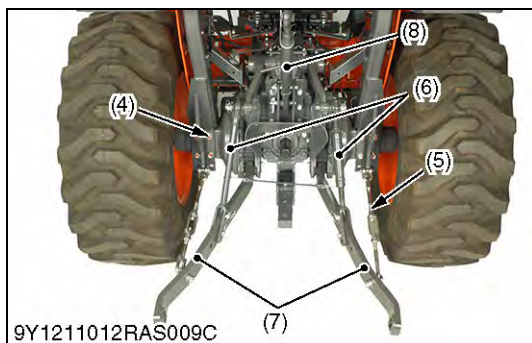


### Three Point Linkage and ROPS

1. Secure the ROPS (1) with safety strap (2).
2. Remove the stabilizer joint (5), the top link (8), the lift rods (6) and the lower links (7).
3. Remove ROPS mounting screws (4), and remove the ROPS.

**(When reassembling)**

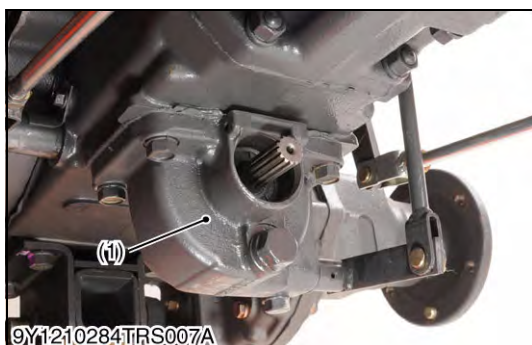
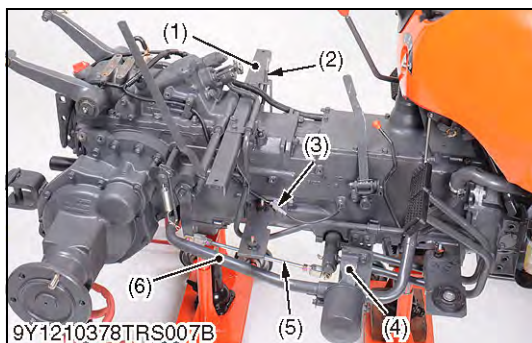
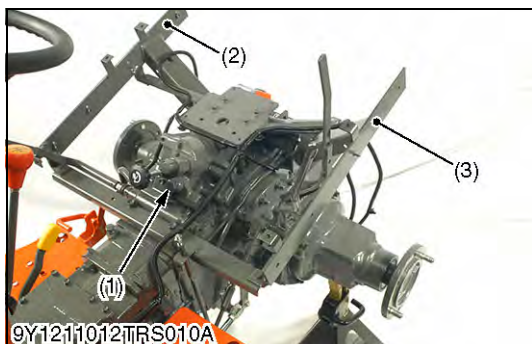
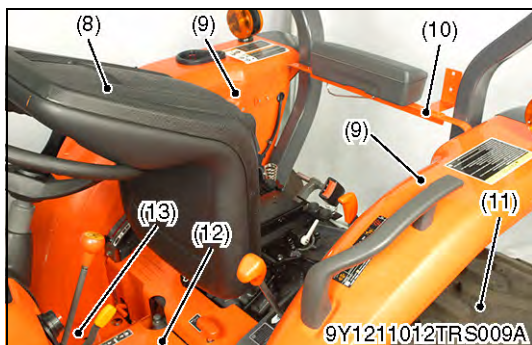
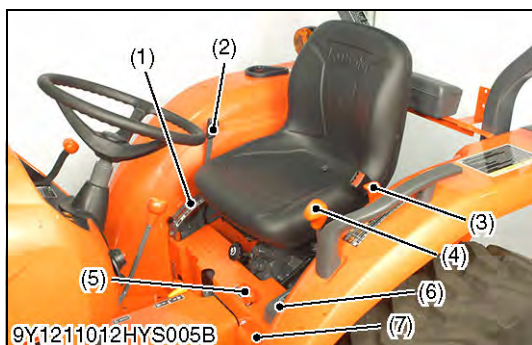
Tightening torque	ROPS mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum screw	118 to 137 N·m 12 to 14 kgf·m 87 to 101 lbf·ft



- (1) ROPS  
(2) Safety Strap  
(3) ROPS Fulcrum Screw  
(4) ROPS Mounting Screw

- (5) Stabilizer Joint  
(6) Lift Rod  
(7) Lower Link  
(8) Top Link

9Y1211012TRS0025US0



### Outer Components

1. Place the disassembling stands under the transmission case.
2. Remove the grips (3), (4), and (5).
3. Remove the lever guides (1) and (6).
4. Remove the center cover (12) and floor sheet cover (7).
5. Remove the rear wheels (11).
6. Remove the fender support (10).
7. Remove the fenders (9) and steps (13).
8. Remove the seat assembly (8).

### (When reassembling)

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

- |                                      |                     |
|--------------------------------------|---------------------|
| (1) Position Control Lever Guide     | (8) Seat Assembly   |
| (2) Position Control Lever Grip      | (9) Fender          |
| (3) Range Gear Shift Lever Grip      | (10) Fender Support |
| (4) Synchro-shuttle Shift Lever Grip | (11) Rear Wheel     |
| (5) Front Wheel Drive Lever Grip     | (12) Center Cover   |
| (6) Shift Lever Guide                | (13) Step           |
| (7) Floor Sheet Cover                |                     |

9Y1211012TRS0026US0

### Fender Support and Delivery Pipe

1. Remove the fenders supports (2) and (3).
2. Disconnect the delivery pipe (1).

Tightening torque	Delivery pipe mounting joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
-------------------	-----------------------------------	---

- |                         |                         |
|-------------------------|-------------------------|
| (1) Delivery Pipe       | (3) Fender Support (LH) |
| (2) Fender Support (RH) |                         |

9Y1211012TRS0027US0

### Suction Pipe and Brake Rods

1. Remove the R.H. and L.H. brake rods (5).
2. Remove the oil filter base (4) with the filter and suction pipe (6).
3. Disconnect the PTO safety switch connector (3).
4. Remove the front wheel drive lever (2).
5. Remove the fender support (1).

- |                                 |                     |
|---------------------------------|---------------------|
| (1) Fender Stay                 | (4) Oil Filter Base |
| (2) Front Wheel Drive Lever     | (5) Brake Rod       |
| (3) PTO Safety Switch Connector | (6) Suction Pipe    |

9Y1211012TRS0028US0

### Front Wheel Drive Case

1. Remove the front wheel drive case (1).

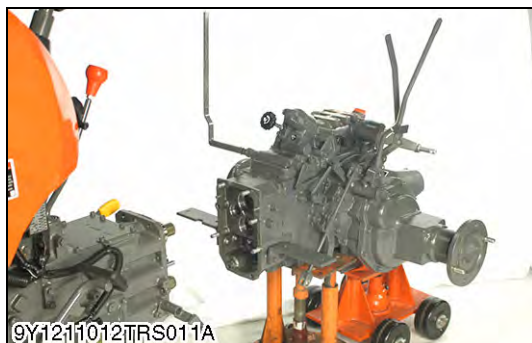
### (When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to both faces of the gasket that is to be installed between the front drive case and the transmission case.

- (1) Front Wheel Drive Case

9Y1211012TRS0029US0





### Separating Transmission Case and Clutch Housing

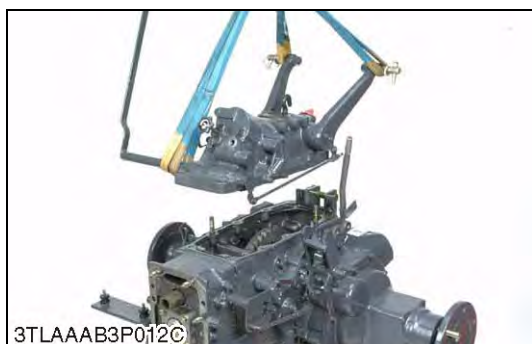
1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Loosen and remove the transmission case mounting nut.
3. Separate the transmission case from the clutch housing case.

#### (When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of transmission case and clutch housing case.

Tightening torque	Clutch housing and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
-------------------	---	---

9Y1211012TRS0030US0



### Hydraulic Cylinder

1. Loosen and remove the hydraulic cylinder assembly mounting screws and nuts.
2. Support the hydraulic cylinder assembly with nylon lift strap and lift, and then remove it.

#### (When reassembling)

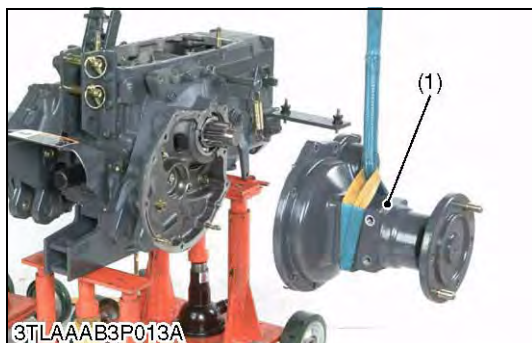
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.

Tightening torque	Hydraulic cylinder assembly mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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#### ■ NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod. (See page 8-S15.)

9Y1211012TRS0031US0



### Rear Axle Case

1. Loosen and remove the rear axle case mounting screws and nuts.
2. Support the rear axle case (1) with the nylon lift strap and lift.
3. Separate the rear axle case from brake case.
4. Follow the same procedure as above for the other side.

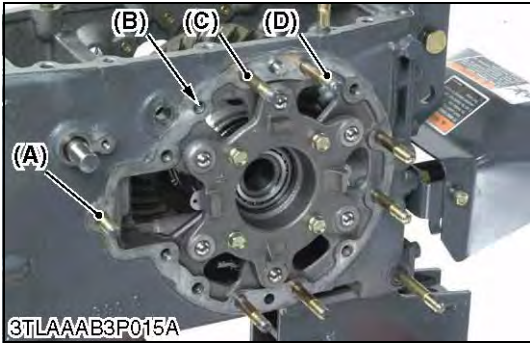
#### (When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting screw and nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	---------------------------------------	---

(1) Rear Axle Case

9Y1211012TRS0032US0



**Brake Case**

1. Loosen and remove the brake case mounting screws and nuts.
2. Separate the brake case, tapping the brake case lever lightly.

**(When reassembling)**

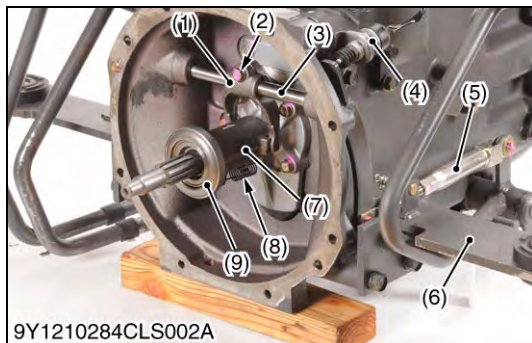
- Apply grease to the brake ball seats. (Do not apply grease excessively.).
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.
- Apply liquid lock (Three Bond 1324 or equivalent) to **(A)**, **(B)**, **(C)**, **(D)** portions of the stud bolts, RH and LH.

Tightening torque	Brake case mounting stud bolt	35 to 49 N·m 3.5 to 5.0 kgf·m 26 to 36 lbf·ft
-------------------	-------------------------------	---

9Y1211012TRS0033US0

## (2) Disassembling and Assembling (Manual Transmission Model)

### [A] Clutch Housing Case



#### Release Hub and Clutch Lever

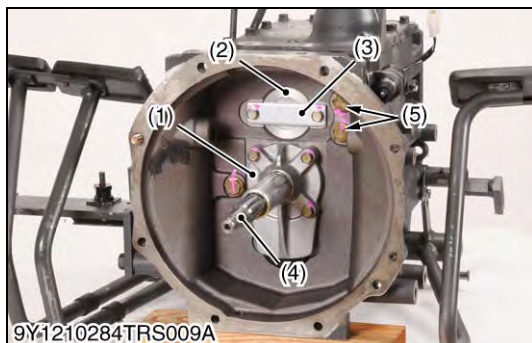
1. Remove the safety switch (4).
2. Remove the step brackets (6).
3. Disconnect the clutch rod (5) from clutch lever (3).
4. Remove the release fork (1) mounting screw (2).
5. Draw out the clutch lever (3) to remove the release fork (1).
6. Remove the hub return spring (8).
7. Remove the release bearing (9) and release hub (7) as a unit.

#### (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 hub return spring (8).

- |                   |                       |
|-------------------|-----------------------|
| (1) Release Fork  | (6) Step Bracket      |
| (2) Screw         | (7) Release Hub       |
| (3) Clutch Lever  | (8) Hub Return Spring |
| (4) Safety Switch | (9) Release Bearing   |
| (5) Clutch Rod    |                       |

9Y1211012TRS0034US0



#### Main Shaft Case

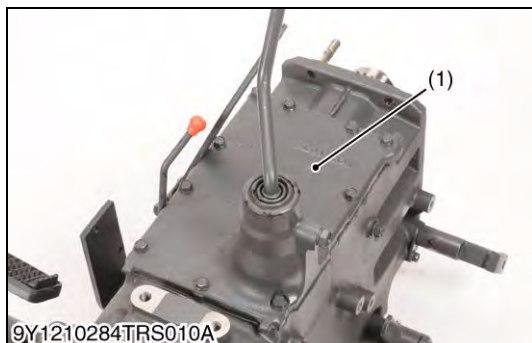
1. Remove the main shaft case (1).
2. Remove the stopper plate (3).
3. Remove the screws (5).

#### (When reassembling)

- Apply grease to the O-ring and install it to the clutch housing.
- After reassembling the main shaft case, check that the main shaft (4) rotate respectively and that they have a little axial play.

- |                     |                |
|---------------------|----------------|
| (1) Main Shaft Case | (4) Main Shaft |
| (2) Bearing Cover   | (5) Screw      |
| (3) Stopper Plate   |                |

9Y1211012TRS0035US0



#### Shift Base and Cover

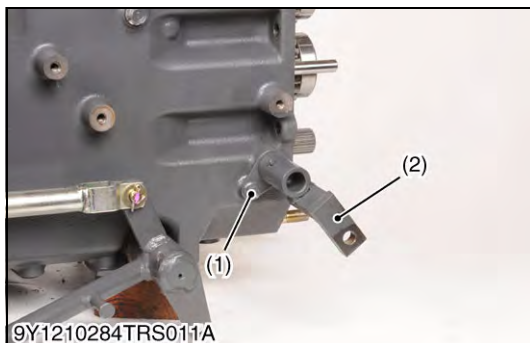
1. Remove the speed change cover (1).

#### (When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of speed change cover and clutch housing.

- (1) Speed Change Cover

9Y1211012TRS0036US0



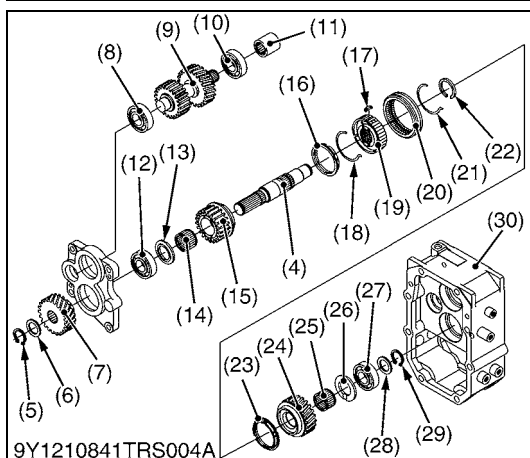
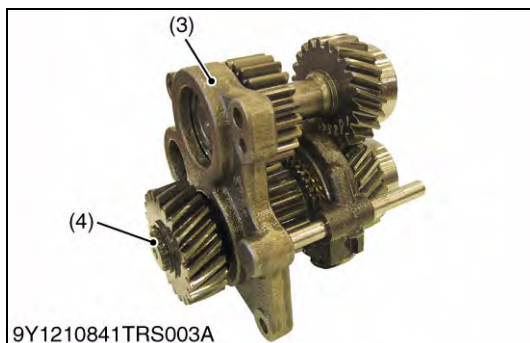
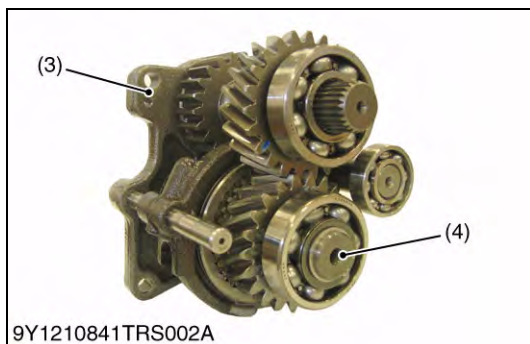
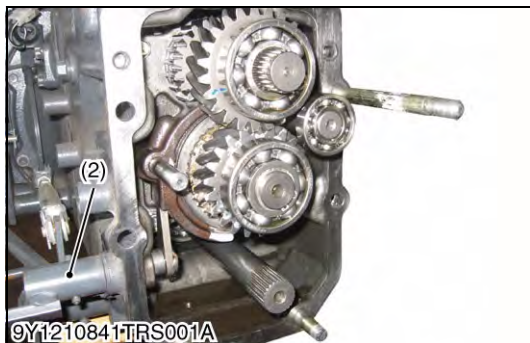
### Synchro-shuttle Gear Assembly

1. Remove the shuttle lever stopper screw (1).
2. Remove the bearing holder (3) with synchro-shuttle assembly.

#### (When reassembling)

- Reinstall the synchronizer keys (17) in the key grooves of the synchronizer rings (16) firmly.

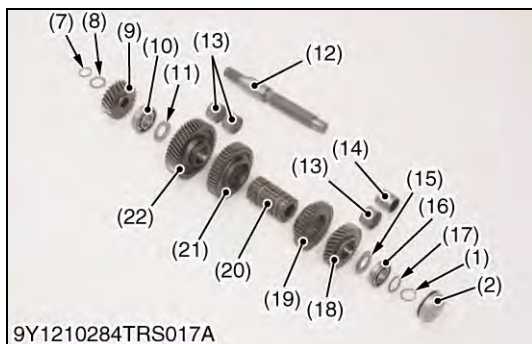
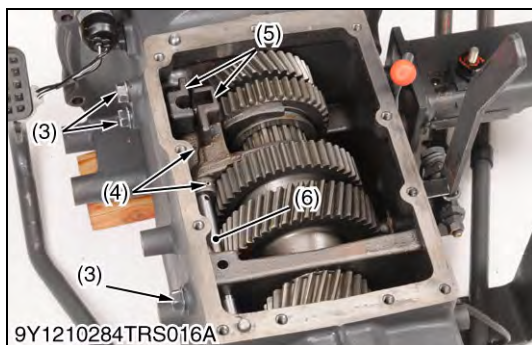
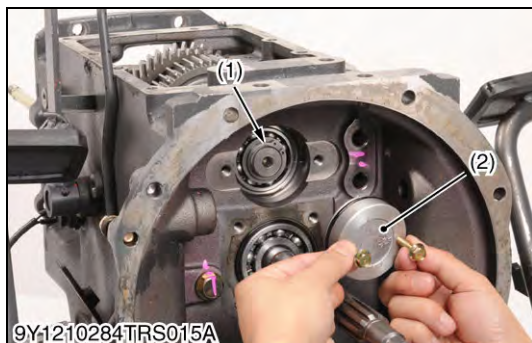
Tightening torque	Bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-------------------------------	---



- |                                       |                          |
|---------------------------------------|--------------------------|
| (1) Screw                             | (16) Synchronizer Ring   |
| (2) Shuttle Lever Arm                 | (17) Synchronizer Key    |
| (3) Bearing Holder                    | (18) Syncho Key Spring   |
| (4) Shuttle Shaft                     | (19) Shuttle Coupling    |
| (5) External Circlip                  | (20) Shuttler Shifter    |
| (6) Shuttle Washer                    | (21) Syncho Key Spring   |
| (7) <b>22T</b> Gear                   | (22) External Circlip 32 |
| (8) Ball Bearing                      | (23) Synchronizer Ring   |
| (9) <b>22T-23T</b> Shuttle Gear Shaft | (24) <b>22T</b> Gear     |
| (10) Ball Bearing                     | (25) Needle Bearing      |
| (11) Coupling                         | (26) Thrust Collar       |
| (12) Ball Bearing                     | (27) Ball Bearing        |
| (13) Thrust Collar                    | (28) Washer              |
| (14) Needle Bearing                   | (29) External Circlip    |
| (15) <b>21T</b> Gear                  | (30) Mid Case            |

9Y1211012TRS0037US0





### Counter Shaft

1. Remove the bearing cover (2).
2. Screw down the two M6 screws in to bearing cover and pull it out.
3. Remove the screws (3) and remove the springs and balls.
4. Tap out the spring pins (4).
5. Draw out the fork rod (6) to the front and remove the shift fork (5).
6. Remove the external snap ring (1).
7. Tap out the counter shaft (12) to the rear.

### NOTE

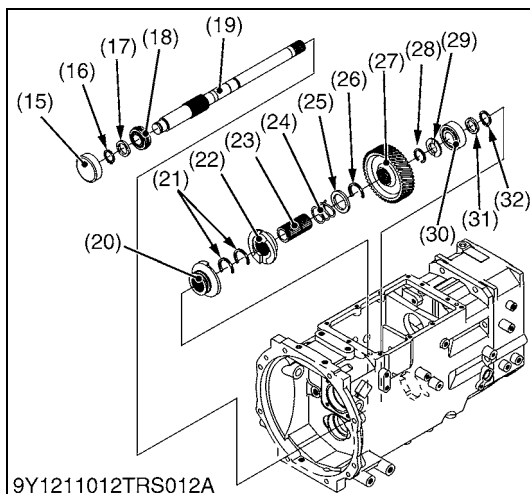
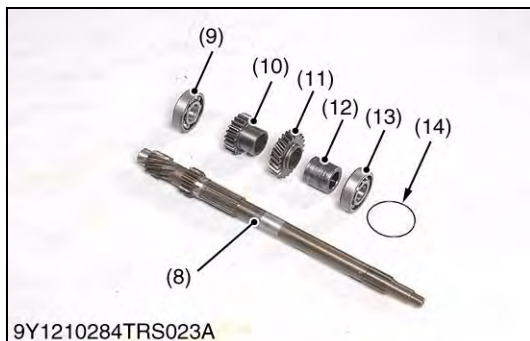
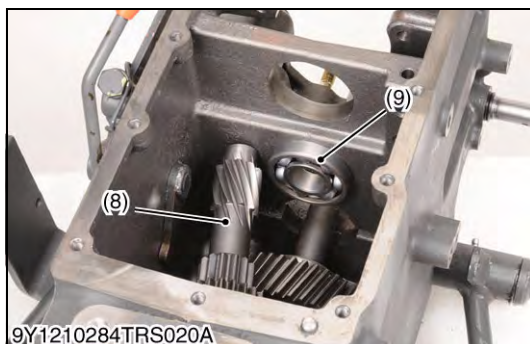
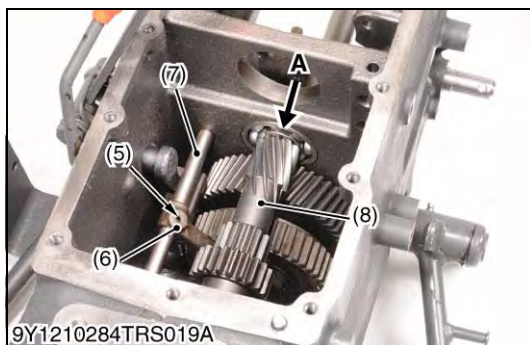
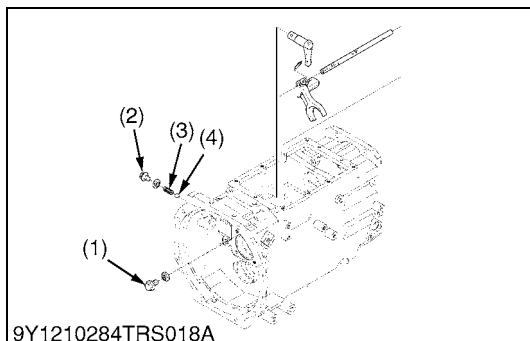
- When drawing out the counter shaft, remove the following parts one by one: thrust collar (15), 32T gear (18), 39T gear (19), 45T shift gear (21), 45T gear (22) and thrust collar (11).

### (When reassembling)

- Apply molybdenum disulfide (Three Bond 1091 or equivalent) to the inner circumferential surface of the spline boss.
- Point the oil groove side of thrust collars (11), (15) towards the gear side.
- Apply small amount of grease for the O-ring.

- |                        |                     |
|------------------------|---------------------|
| (1) External Snap Ring | (12) Counter Shaft  |
| (2) Bearing Cover      | (13) Needle Bearing |
| (3) Screw              | (14) Spline Boss    |
| (4) Spring Pin         | (15) Thrust Collar  |
| (5) Shift Fork         | (16) Ball Bearing   |
| (6) Fork Rod           | (17) Thrust Collar  |
| (7) External Snap Ring | (18) 32T Gear       |
| (8) Thrust Collar      | (19) 39T Gear       |
| (9) 23T Gear           | (20) Spline Boss    |
| (10) Ball Bearing      | (21) 45T Shift Gear |
| (11) Thrust Collar     | (22) 45T Gear       |

9Y1211012TRS0038US0



### Main Shaft and PTO Counter Shaft

1. Remove the screws (1), (2) and remove the spring (3) and ball (4).
2. Tap out the spring pin (5).
3. Draw out the fork rod (7) to front.
4. Remove the shift fork (6).
5. Remove the bearing cover (15).
6. Remove external circlip (32).
7. Tap in PTO counter shaft (19) to front side.
8. Remove bearing (9).
9. Tap out main shaft (8) to rear side.
10. Remove external snap ring (16).
11. Tap out PTO counter shaft (19) to rear and remove 45T gear (27).

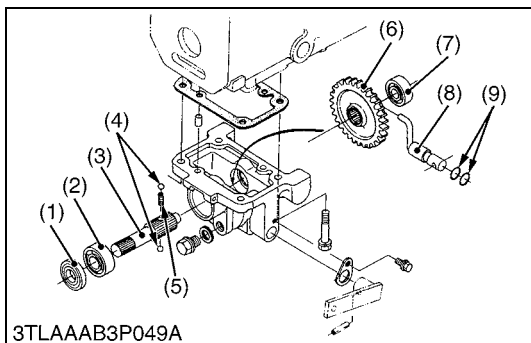
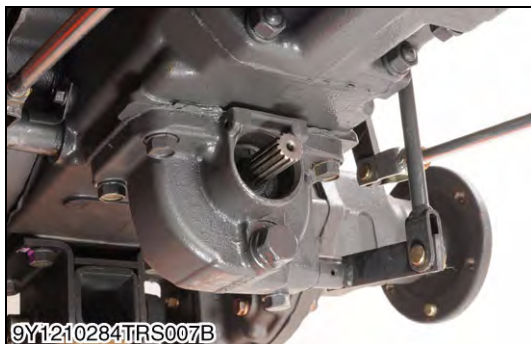
### (When reassembling)

- Be careful not damage or lose ball (4) and spring (3).
- Apply molydeum disulfide (Three Bond 1091 or equivalent) to the inner circumferential surface of spline boss (23).
- Point the oil groove side of thrust collar (29) towards the spline boss.
- Bearing cover (15) should be replaced with new one.

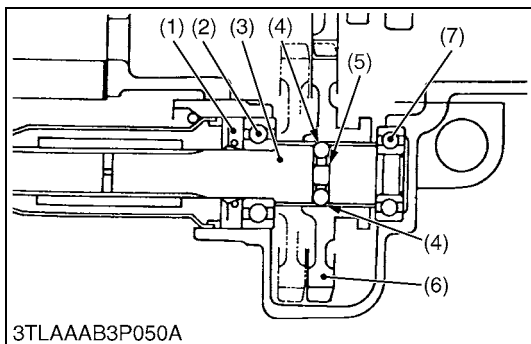
- |                         |                        |
|-------------------------|------------------------|
| (1) Screw               | (17) Collar            |
| (2) Screw               | (18) Bearing           |
| (3) Spring              | (19) PTO Counter Shaft |
| (4) Ball                | (20) PTO Clutch Cam 1  |
| (5) Spring Pin          | (21) Circlip           |
| (6) Shift Fork          | (22) PTO Clutch Cam 2  |
| (7) Fork Rod            | (23) Spline Boss       |
| (8) Main Shaft          | (24) Spring            |
| (9) Bearing             | (25) Washer            |
| (10) 21T Gear           | (26) Circlip           |
| (11) 23T Gear           | (27) 45T Gear          |
| (12) Collar             | (28) Circlip           |
| (13) Bearing            | (29) Thrust Collar     |
| (14) O-ring             | (30) Ball Bearing      |
| (15) Bearing Cover      | (31) Washer            |
| (16) External Snap Ring | (32) External Circlip  |

9Y1211012TRS0039US0

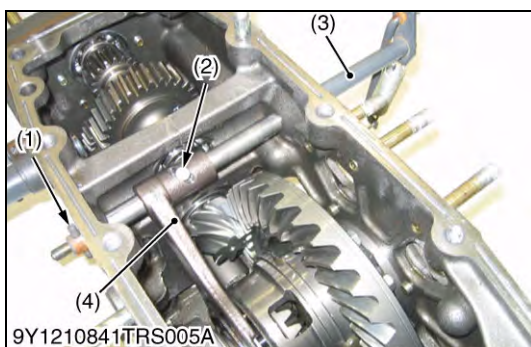
## [B] Transmission Case



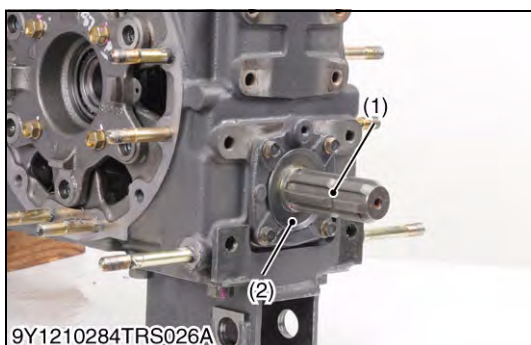
3TLAAB3P049A



3TLAAB3P050A



9Y1210841TRS005A



9Y1210284TRS026A

### Front Drive Case

1. Remove the front drive case.
2. Remove the oil seal (1).
3. Tap out the propeller shaft 1 (3) to the front.
4. Remove the shift gear (6).

#### (When reassembling)

- Replace the oil seal (1) with new one and apply grease to its inside.
- Apply liquid gasket (Three Bond 1206C or equivalent) to both faces of the gasket that is to be installed between the front drive case and the transmission case.

- |                       |                  |
|-----------------------|------------------|
| (1) Oil Seal          | (6) Shift Gear   |
| (2) Ball Bearing      | (7) Ball Bearing |
| (3) Propeller Shaft 1 | (8) Shift Lever  |
| (4) Balls             | (9) O-ring       |
| (5) Spring            |                  |

9Y1211012TRS0040US0

### Differential Lock

1. Remove the clevis pin (2).
2. Remove the spring pin (1).
3. Draw out the differential lock fork shaft (3).
4. Remove the shift fork (4).

- |                |                |
|----------------|----------------|
| (1) Spring Pin | (3) Fork Shaft |
| (2) Clevis Pin | (4) Shift Fork |

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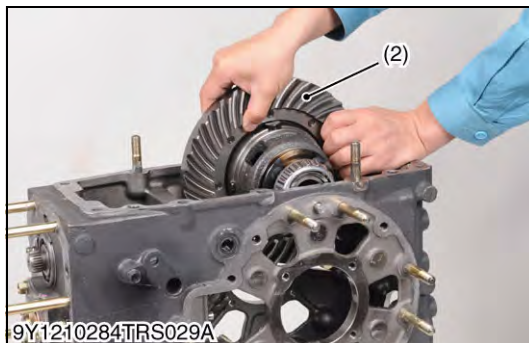
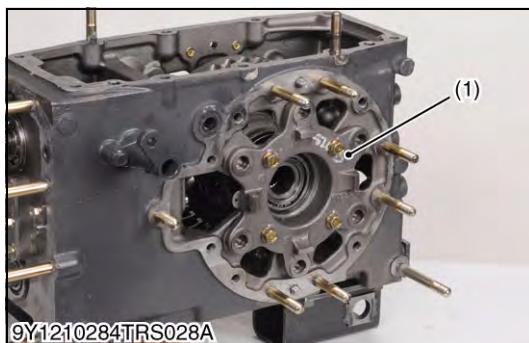
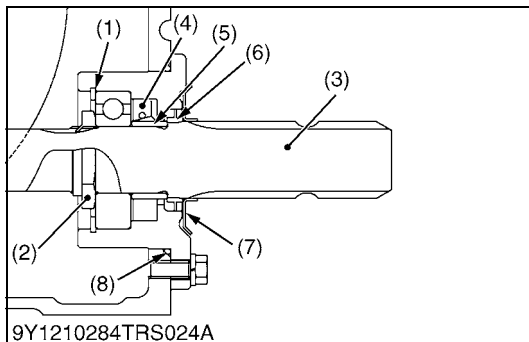
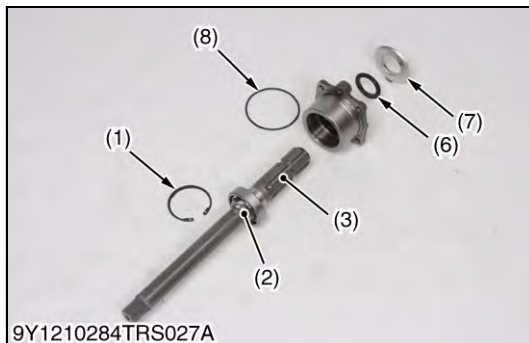
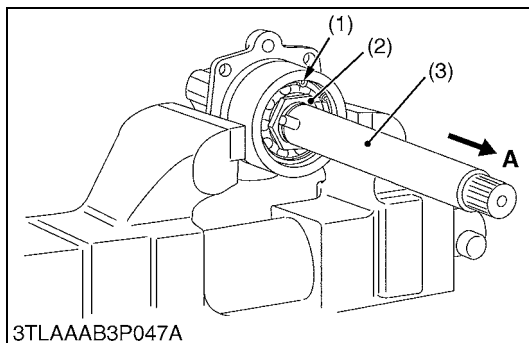
### PTO Bearing Case

1. Remove the bearing case (2) mounting screws.
2. Remove the PTO shaft (1) with bearing case.

- |               |                      |
|---------------|----------------------|
| (1) PTO Shaft | (2) PTO Bearing Case |
|---------------|----------------------|

9Y1211012TRS0042US0





### PTO Shaft

1. Remove the internal snap ring (1).
2. Tap out the PTO shaft (3) to the front "A".

#### (When reassembling)

- In the staking nut (2) was removed, replace a new one, and after tightening it to the specified torque, be sure to stake it firmly.
- Install the slinger (6) firmly.
- After applying liquid gasket (Three Bond 1141 or equivalent) to joint face of the collar (5), and insert the collar to PTO shaft.
- Apply grease to oil seal (4) and install it, noting its direction.

Tightening torque	PTO shaft staking nut	147 to 196 N·m 15.0 to 20.0 kgf·m 109 to 144 lbf·ft
-------------------	-----------------------	---

- |                        |                    |
|------------------------|--------------------|
| (1) Internal Snap Ring | (5) Collar         |
| (2) Staking Nut        | (6) Slinger        |
| (3) PTO Shaft          | (7) Oil Seal Cover |
| (4) Oil Seal           | (8) O-ring         |

9Y1211012TRS0043US0

### Differential Gear Assembly

1. Remove the differential bearing case (1) mounting screws.
2. Remove the differential bearing case (1), noting the number of left and right shims.
3. Remove the differential gear assembly (2) from transmission case.

#### (When reassembling)

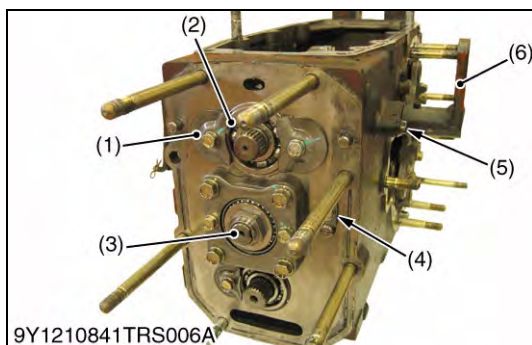
- Use same number of shim as before disassembling.
- Replace the left and right bearing cases on the same sides as before.
- Apply grease to ball and ball seats.

Tightening torque	Differential bearing case mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	--	---

- |                               |                                |
|-------------------------------|--------------------------------|
| (1) Differential Bearing Case | (2) Differential Gear Assembly |
|-------------------------------|--------------------------------|

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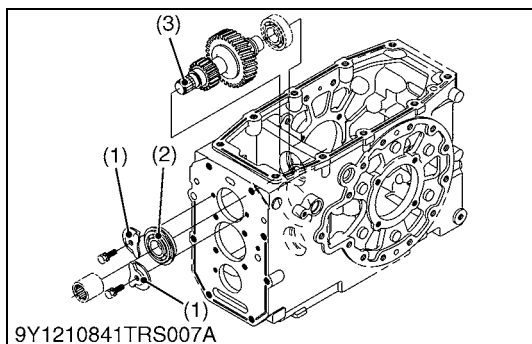
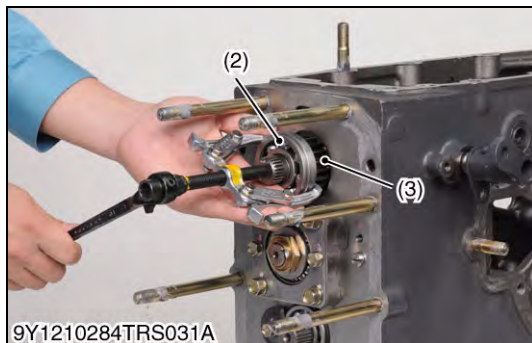


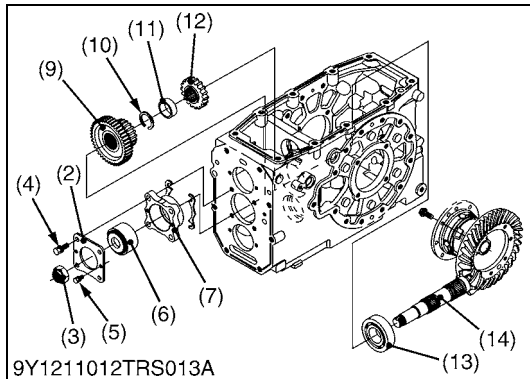
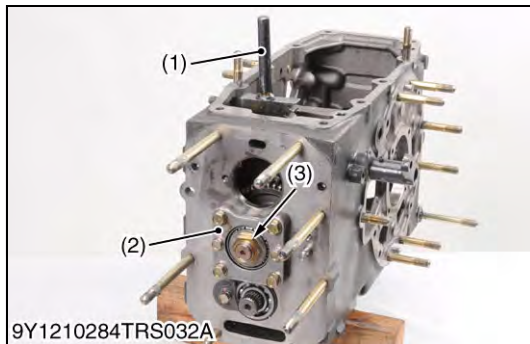
### Range Gear Shaft

1. Remove the bearing stoppers (1), shift fork rod stopper (4) and stopper screw (5).
2. Slide the shift arm (6) to outside.
3. Remove the bearing (2) with puller.
4. Remove the **18T-31T** range gear shaft (3).

- |                                     |                            |
|-------------------------------------|----------------------------|
| (1) Bearing Stopper                 | (4) Shift Fork Rod Stopper |
| (2) Bearing                         | (5) Stopper Screw          |
| (3) <b>18T-31T</b> Range Gear Shaft | (6) Shift Arm              |

9Y1211012TRS0045US0





### Pinion Shaft

1. Remove the lock nut (3).
2. Remove the pinion bearing cover (2), shim (8) and taper roller bearing (6).
3. Move the **6T** pinion shaft assembly backward and then remove the **42T** gear and the **6T** pinion shaft (14) assembly.

#### (When reassembling)

- Make sure of the number of shims (8).
- Replace the lock nut (3) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

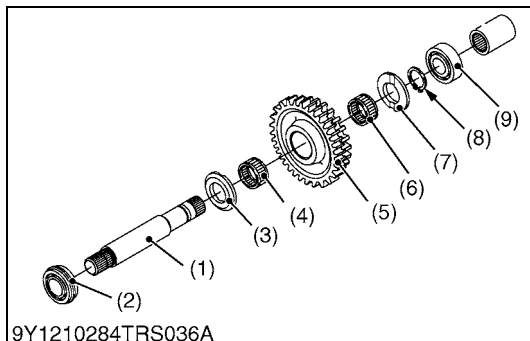
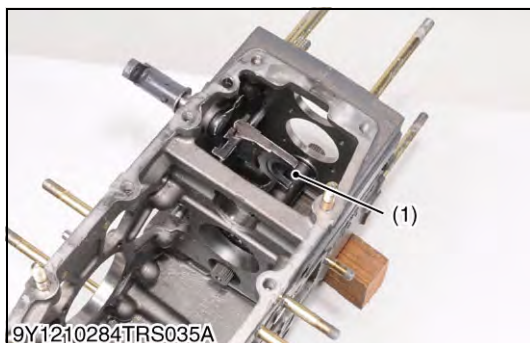
#### ■ NOTE

- To ensure that the taper roller bearing has been properly installed, a running test is performed after mounting. The spiral bevel pinion shaft is first rotated by hand, and if no problems are observed, a low speed, no load power test is performed.
- Then assembling the differential gear, check the turning torque.

Tightening torque	Spiral bevel pinion shaft lock nut	147 to 196 N·m 15.0 to 20.0 kgf·m 109 to 144 lbf·ft
	Pinion bearing cover mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

- |                          |                               |
|--------------------------|-------------------------------|
| (1) Gear Stopper         | (8) Shims                     |
| (2) Pinion Bearing Cover | (9) <b>42T-19T</b> Slide Gear |
| (3) Lock Nut             | (10) External Circlip         |
| (4) Sems Bolt            | (11) Collar                   |
| (5) Bolt                 | (12) <b>18T</b> Gear          |
| (6) Taper Roller Bearing | (13) Roller Bearing           |
| (7) Bearing Case         | (14) <b>6T</b> Pinion shaft   |

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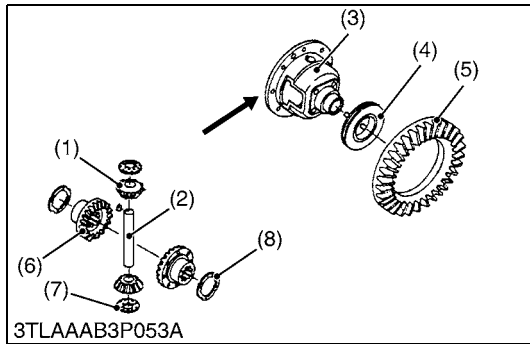
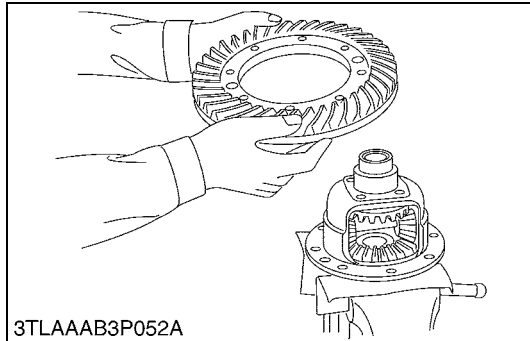
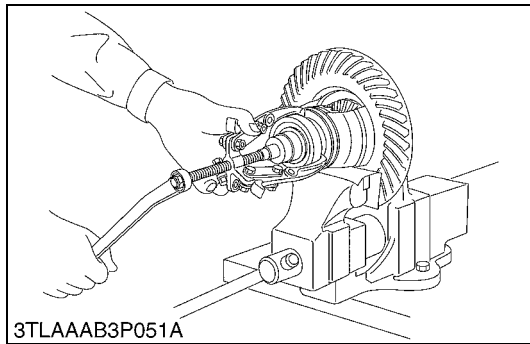
### PTO Drive Shaft

1. Tap the PTO drive shaft (1) to front side.
2. Remove the bearing (2).
3. Remove the PTO drive shaft (1).
4. Remove the bearing (9).
5. Remove the external snap ring (8).
6. Remove the **34T- 25T** gear (5).

- |                          |                        |
|--------------------------|------------------------|
| (1) PTO Drive Shaft      | (6) Needle Bearing     |
| (2) Bearing              | (7) Thrust Collar      |
| (3) Thrust Collar        | (8) External Snap Ring |
| (4) Needle Bearing       | (9) Bearing            |
| (5) <b>34T- 25T</b> Gear |                        |

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## [C] Differential Gear Assembly



### Bearing and Differential Lock Shifter

1. Secure the differential gear in a vise.
2. Remove the ball bearing with a puller.
3. Remove the differential lock shifter.

9Y1211012TRS0048US0

### 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.
- Apply liquid lock (Three Bond 1324 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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### Differential Pinion and Differential Side Gear

1. Draw out the differential pinion shaft (2).
2. Remove the differential pinions (1), differential pinion washers (7) and the differential side gears (6), differential side gear washers (8).

#### ■ NOTE

- Arrange the parts to know their original position.

#### **(When reassembling)**

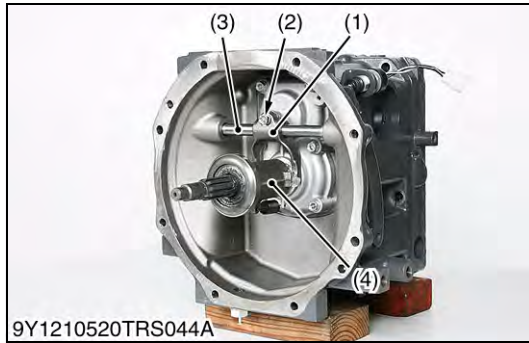
- Check the thrust and bearing surface of both differential side gears (6). If they are worn or damaged, bores in the differential case may also be damaged.
- Check the differential pinions (1) and pinion shaft (2) for excessive wear. If these parts are damaged or excessively worn, also replace parts they are in mesh with, or they are 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.

(1) Differential Pinion	(5) Spiral Bevel Gear
(2) Differential Pinion Shaft	(6) Differential Side Gear
(3) Differential Case	(7) Differential Pinion Washer
(4) Differential Lock Shifter	(8) Differential Side Gear Washer

9Y1211012TRS0050US0

### (3) Disassembling and Assembling (HST Model)

#### [A] Clutch Housing Case



#### Clutch Lever, Release Fork and Release Bearing

1. Remove the release fork mounting screws (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the release bearing and release hub (4) together.

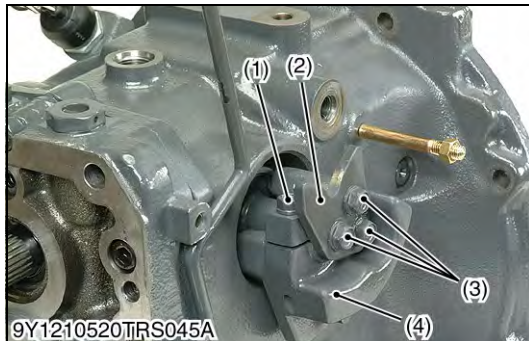
#### **(When reassembling)**

- Apply grease to the sliding surface of the clutch release hub.
- Apply grease to the clutch lever.

Tightening torque	Release fork mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
-------------------	-----------------------------	---

- |                                 |                  |
|---------------------------------|------------------|
| (1) Release Fork                | (3) Clutch Lever |
| (2) Release Fork Mounting Screw | (4) Release Hub  |

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#### Plate and Neutral Holder

1. Remove the plate mounting screws (3) and plate (2).
2. Remove the neutral holder mounting screw (1) and neutral holder (4).

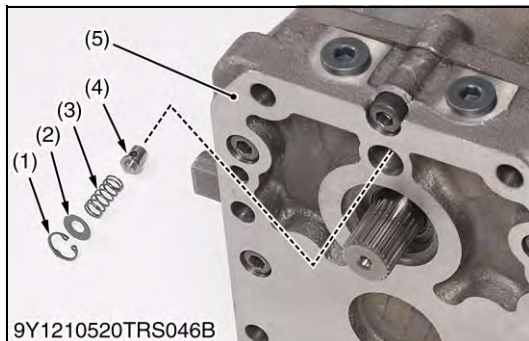
#### **(When reassembling)**

- Be sure to adjust the HST neutral position. (See page 3-S16.)

Tightening torque	Plate mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Neutral holder mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

- |                                   |                          |
|-----------------------------------|--------------------------|
| (1) Neutral Holder Mounting Screw | (3) Plate Mounting Screw |
| (2) Plate                         | (4) Neutral Holder       |

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#### Case Relief Valve

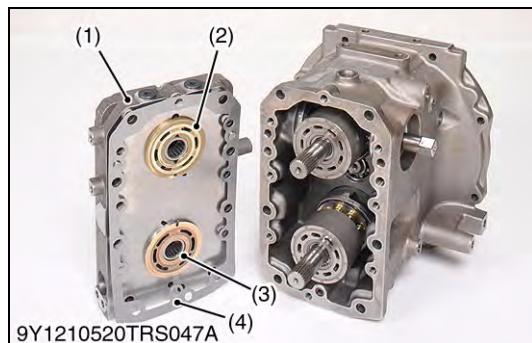
1. Remove the internal cir-clip (1).
2. Remove the holder (2), spring (3) and valve poppet (4).

#### **(When reassembling)**

- Apply hydrostatic transmission oil to the poppet before reassembling.

- |                       |                  |
|-----------------------|------------------|
| (1) Internal Cir-clip | (4) Valve Poppet |
| (2) Holder            | (5) Port Block   |
| (3) Spring            |                  |

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### Port Block

1. Remove the port block mounting hex. head screws.
2. Pull and remove the port block (1) from clutch housing.

#### (When reassembling)

- Install port block (1) with valve plates (2), (3) and new gasket (4) in place.

#### ■ NOTE

- Valve plates (2), (3) 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 screw	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
-------------------	---------------------------------------	---

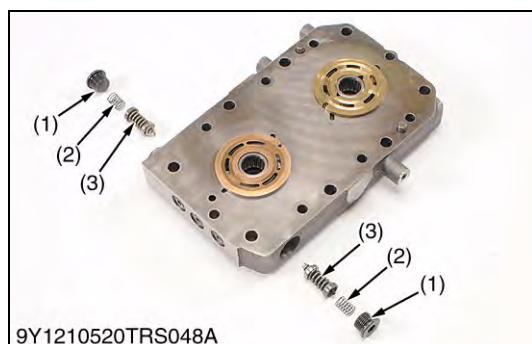
(1) Port Block

(3) Valve Plate (Motor)

(2) Valve Plate (Pump)

(4) Gasket

9Y1211012TRS0054US0



### Check and High Pressure Relief Valve

1. Remove the hex. head plug (1) and remove the spring (2) and relief valve assembly (3).

#### (When reassembling)

- When replacing the valves, check and adjust the setting pressure (see page 3-S14).

#### ■ NOTE

- Be careful not to damage the O-ring on the hex. head plug.

Tightening torque	Hex. head plug	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft
-------------------	----------------	---

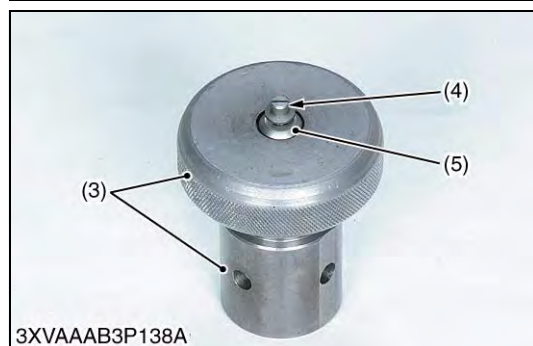
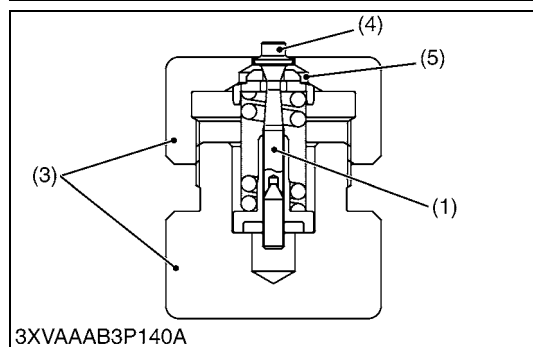
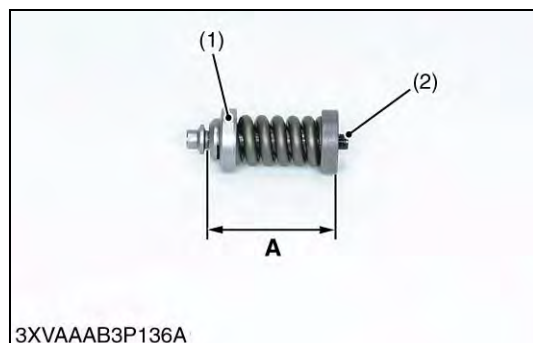
(1) Hex. Head Plug

(3) Check and High Pressure Relief Valve

(2) Spring

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### **Readjustment of Relief Valve (When the HST does not work due to its loose hexagon socket head screw)**

#### ■ IMPORTANT

- The KUBOTA does not recommend the readjustment of relief valve. And KUBOTA will recommend the exhaust with genuine parts.
- As the HST may be damaged if the pressure is set to higher by mistake, be careful when adjusting it.

#### ■ NOTE

- The relief pressure is set in between 33.4 to 36.2 MPa (340 to 370 kgf/cm<sup>2</sup>, 4840 to 5260 psi) when shipped from the factory. But, for the purpose of after-sales services, as it is impossible to reset the pressure precisely as set in the factory, its setting range is defined as a slightly wider range between 31.4 to 35.3 MPa (320 to 360 kgf/cm<sup>2</sup>, 4560 to 5120 psi).

1. Measure the pre-adjustment distance "A".
2. Compress the spring of the relief valve with a relief valve assembling tool (3). (See page G-98.)
3. Then, find the distance "A" by turning the poppet (4) with a screwdriver.

Reference: The distance "A" changes by about 1.5 mm (0.02 in.) per one turn of the poppet (4).

4. Repeat the same operation a few times to find the distance "A" as it is difficult to acquire at the first time.
5. After finding the distance "A", hold the setscrew (6) to a vice and fasten the hexagon socket head screw (2) with specified torque.

On this occasion, use a copper plate, etc. for the vice jaws not to damage the setscrew (6).

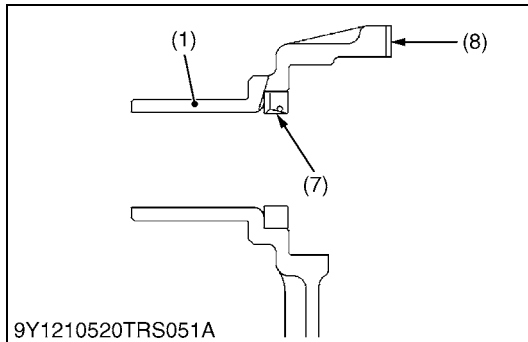
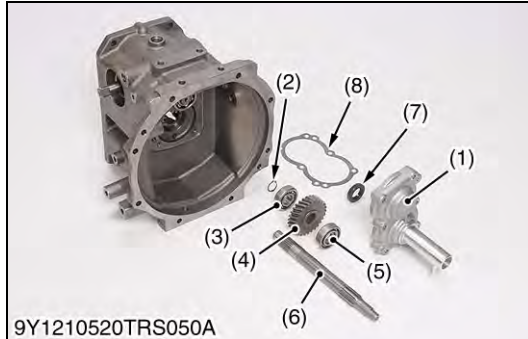
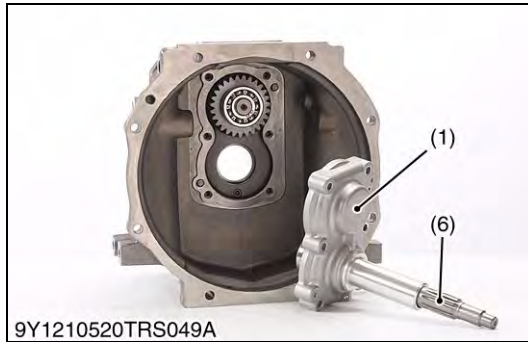
6. Install the relief valve in the HST.
7. Check the relief pressure as indicated in page 3-S14.
8. If the relief pressure does not fall within the readjustment pressure range, repeat the processes of the above item 1 onward.

Reference: The pressure changes by 1.5 MPa (15 kgf/cm<sup>2</sup>, 210 psi) per 0.1 mm (0.004 in.) in distance "A".

Tightening torque	Hex. socket head screw	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft
Relief valve readjusting pressure	Factory specification	33.4 to 36.2 MPa 340 to 370 kgf/cm <sup>2</sup> 4840 to 5260 psi
Distance "A"	Reference value	37.90 to 38.00 mm 1.493 to 1.496 in.

- |                                  |                |
|----------------------------------|----------------|
| (1) Relief Valve Assembly        | (4) Poppet     |
| (2) Hexagon Socket Head Screw    | (5) Valve Seat |
| (3) Relief Valve Assembling Tool | (6) Setscrew   |

9Y1211012TRS0056US0



### Shaft Case, Input Shaft and Gear

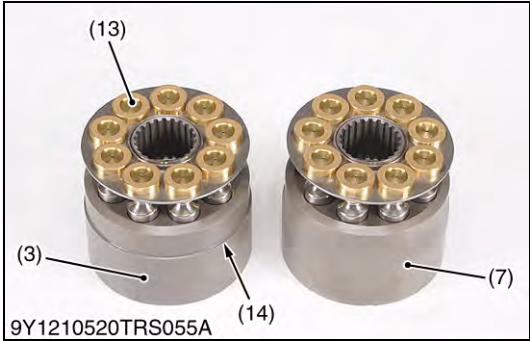
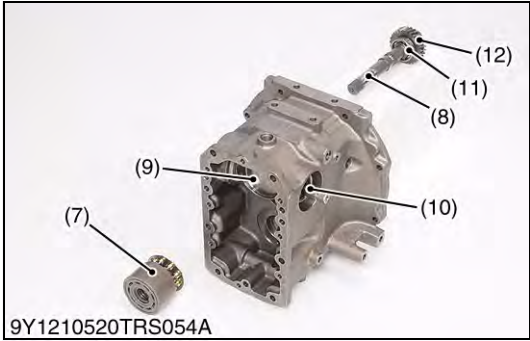
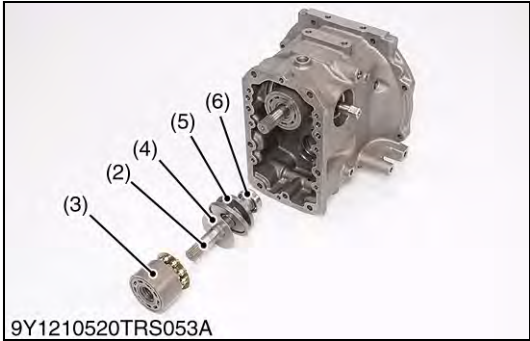
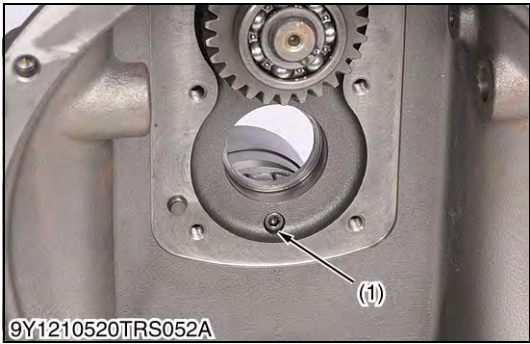
1. Remove the shaft case mounting screws.
2. Screw down the two M6 screws into the shaft case (1).
3. Remove the shaft case (1) with the input shaft assembly.
4. Separate the input shaft assembly with shaft case (1).
5. Remove the external cir-clip (2).
6. Remove the bearings (3), (5) with a bearing puller and 28T gear (4).

### (When reassembling)

- Install the shaft case (1) the new gasket (8) in the place.
- Install the oil seal (7) as shown in the figure, noting its direction.
- Apply grease to the oil seal (7).

- |                       |                 |
|-----------------------|-----------------|
| (1) Shaft Case        | (5) Bearing     |
| (2) External Cir-clip | (6) Input Shaft |
| (3) Bearing           | (7) Oil Seal    |
| (4) 28T Gear          | (8) Gasket      |

9Y1211012TRS0057US0



Cylinder Block Assemblies

- 1. Remove the motor swashplate setting hex. head screw (1).
- 2. Remove the motor cylinder block assembly (3) with a motor shaft (2).
- 3. Remove the pump cylinder block assembly (7) and pump shaft (8).

(When reassembling)

- Apply clean hydrostatic transmission oil to cylinder block.
- When installing the swashplate to clutch housing, be sure to align the hole of swashplate and straight pin.

NOTE

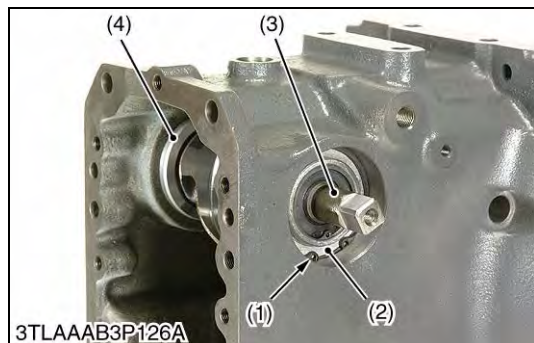
- Be careful not to damage the surface of cylinder block, pistons.
- Do not interchange pistons between pump and motor cylinder block.

Tightening torque	Swashplate mounting hex. head screw	29 to 35 N·m 2.9 to 3.6 kgf·m 21 to 26 lbf·ft
-------------------	-------------------------------------	---

- |  |                            |
|--|----------------------------|
| (1) Swashplate setting hex. head Screw | (8) Pump Shaft             |
| (2) Output Shaft (Motor)               | (9) Thrust Plate           |
| (3) Motor cylinder Block Assembly      | (10) Trunnion              |
| (4) Thrust Plate                       | (11) Bearing               |
| (5) Swashplate                         | (12) 27T Gear              |
| (6) Bearing                            | (13) Piston                |
| (7) Pump Cylinder Block Assembly       | (14) Identification Groove |

9Y1211012TRS0058US0





### Trunnion

1. Remove the internal cir-clip (1) both side.
2. Remove the cover (2) and (4).
3. Remove the trunnion (3).

#### (When reassembling)

- Apply transmission oil to the O-ring.

#### ■ NOTE

- Be careful not to damage the O-ring with cover (4).

(1) Internal Cir-clip

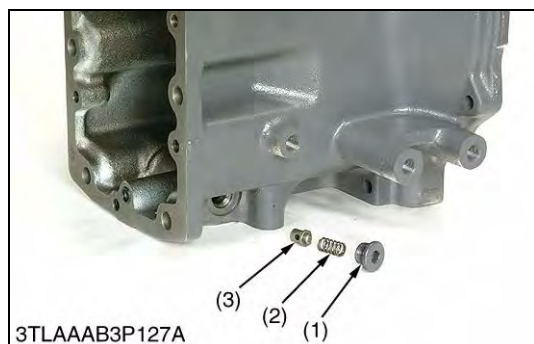
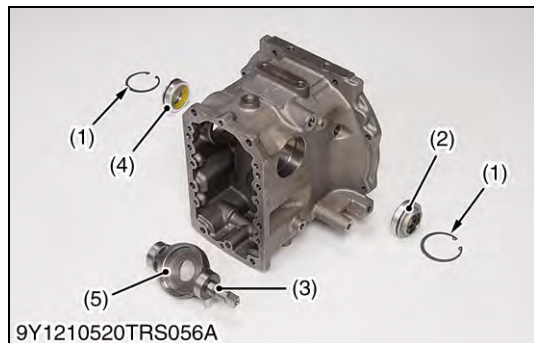
(2) Cover

(3) Trunnion

(4) Cover

(5) Thrust Plate

9Y1211012TRS0059US0



### Charge Relief Valve

1. Remove the hex. head plug (1).
2. Remove the spring (2) and valve poppet (3).

#### (When reassembling)

- When replacing the valves, check and adjust the setting pressure. (See page 3-S15.)

#### ■ NOTE

- Be careful not to damage the O-ring.

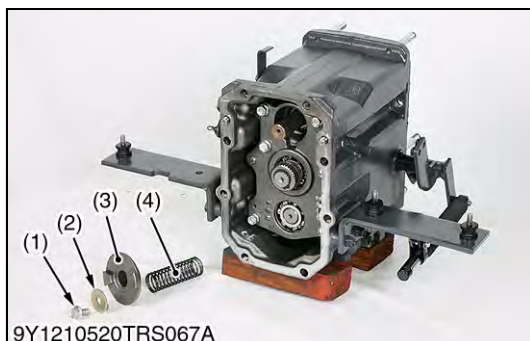
Tightening torque	Hex. head plug	31 to 37 N·m
		3.1 to 3.8 kgf·m
		23 to 27 lbf·ft

(1) Hex. Head Plug

(2) Spring

(3) Valve Poppet

9Y1211012TRS0060US0

**[B] Mid Case****PTO Clutch**

1. Remove the PTO clutch mounting screw (1).
2. Remove the washer (2), clutch cam (3) and spring (4).

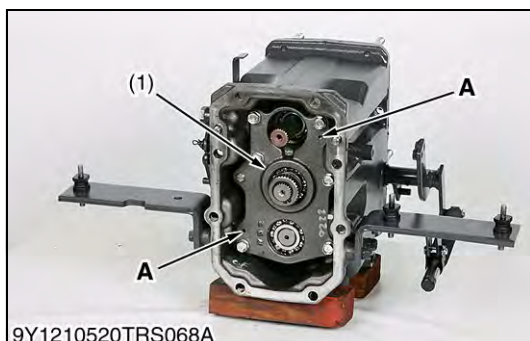
**(When reassembling)**

Tightening torque	Clutch cam mounting screw	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
-------------------	---------------------------	---

- (1) Screw  
(2) Washer

- (3) Clutch Cam  
(4) Spring

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**Bearing Holder**

1. Remove the bearing holder mount screws.
2. Jack up the bearing holder (1) by using the two jack screws then remove the bearing holder (1).

**(When reassembling)**

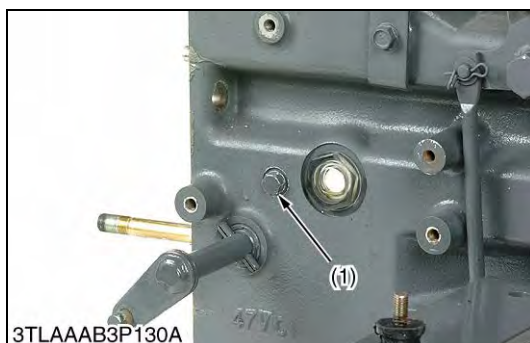
- Tap in the bearing holder (1) with plastic hammer until contact to mid case and then tighten the screws to specified torque.

Tightening torque	Bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-------------------------------	---

- (1) Bearing Holder

**A: Hole for Jack Screw**

9Y1211012TRS0062US0

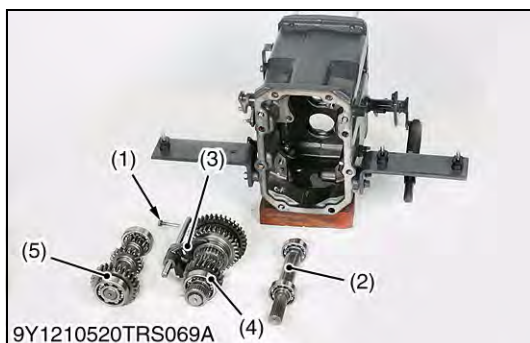
**Gears and Shafts**

1. Remove the screw (1).
2. Tap out the PTO counter shaft (2).
3. Remove the shift fork (3) and sub shaft assembly (4).
4. Remove the 13T gear shaft assembly (5).

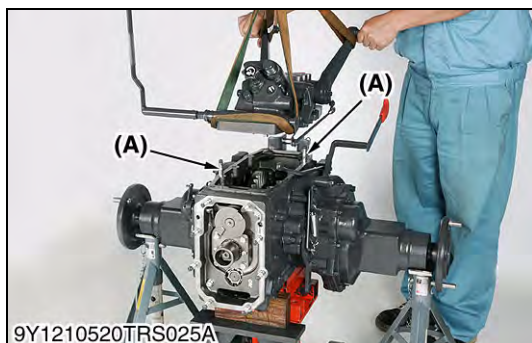
- (1) Screw  
(2) PTO Counter Shaft  
(3) Shift Fork

- (4) Sub Shaft Assembly  
(5) 13T Gear Shaft Assembly

9Y1211012TRS0063US0



## [C] Transmission Case



### Hydraulic Cylinder Assembly

1. Loosen and remove the hydraulic cylinder assembly mounting screws and nuts.
2. Support the hydraulic cylinder assembly with nylon lift strap and hoist, and then remove it.

#### (When reassembling)

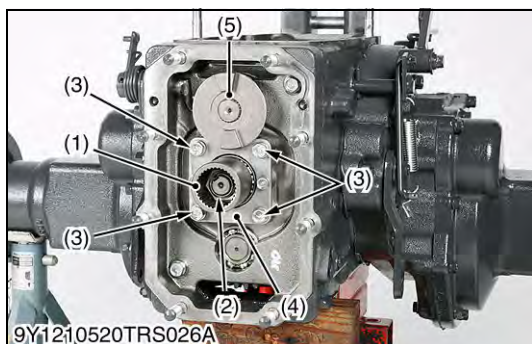
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.
- When replacing the hydraulic cylinder assembly mounting stud bolts, apply liquid lock (Three Bond 1324 or equivalent) to (A) portion of the stud bolt.

Tightening torque	Hydraulic cylinder assembly mounting screws and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
-------------------	---	---

#### ■ NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control rod. (See page 8-S15.)

9Y1211012TRS0064US0



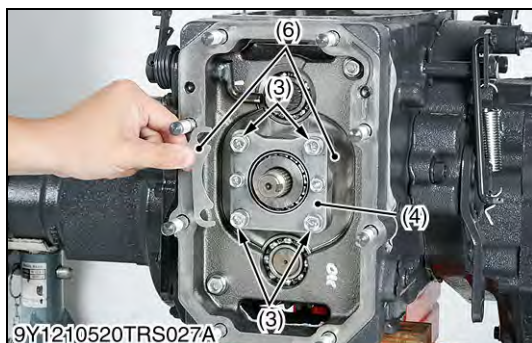
### PTO Clutch and Pinion Bearing Holder

1. Remove the coupling (1) and the PTO clutch cam (5).
2. Remove the screws (3) and pinion bearing holder assembly (4).
3. Remove the lock nut (2).

#### (When reassembling)

- Make sure of the number of shims in the pinion bearing holder.
- Replace the lock nut (2) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

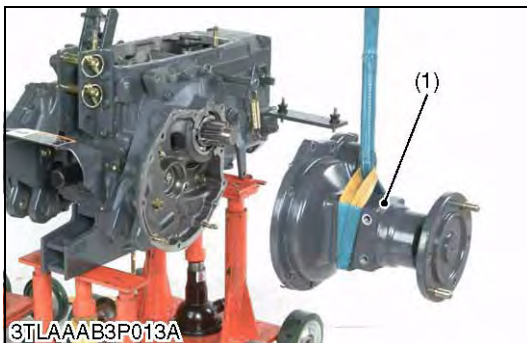
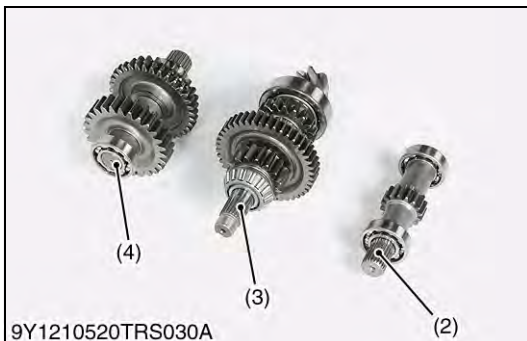
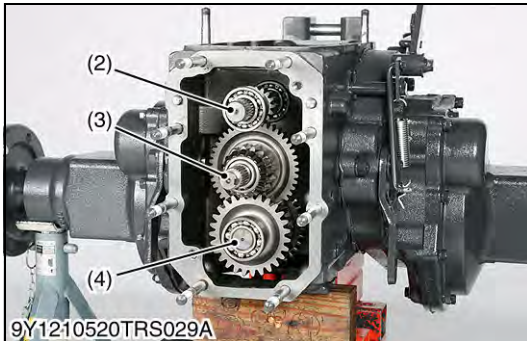
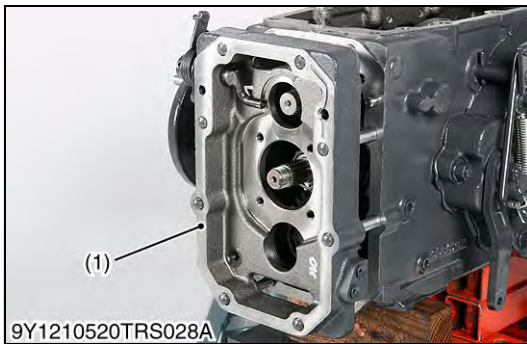
Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Pinion bearing holder mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft



- |                                  |                                    |
|----------------------------------|------------------------------------|
| (1) Coupling (Pinion Shaft)      | (4) Pinion Bearing Holder Assembly |
| (2) Lock Nut                     | (5) PTO Clutch Cam                 |
| (3) Screw (Pinion Bearing Cover) | (6) Shim                           |

9Y1211012TRS0065US0





### **Gear and Shaft Assembly**

1. Remove the spacer mounting screws.
2. Separate the spacer (1) from the transmission case.
3. Remove the 16T gear shaft assembly (2).
4. remove the pinion shaft assembly (3) and PTO drive shaft assembly (4).

#### **(When reassembling)**

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint faces of spacer and transmission case.

Tightening torque	Spacer mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-----------------------	---

- |                             |                              |
|-----------------------------|------------------------------|
| (1) Spacer                  | (3) Pinion Shaft Assembly    |
| (2) 16T Gear Shaft Assembly | (4) PTO Drive Shaft Assembly |

9Y1211012TRS0066US0

### **Rear Axle Case**

1. Loosen and remove the rear axle case mounting screws and nuts.
2. Support the rear axle case (1) with the nylon lift strap and hoist.
3. Separate the rear axle case from brake case.
4. Follow the same procedure as above for the other side.

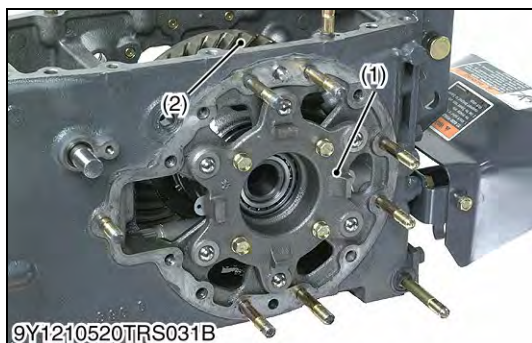
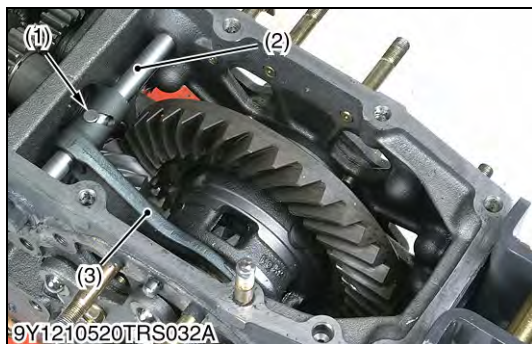
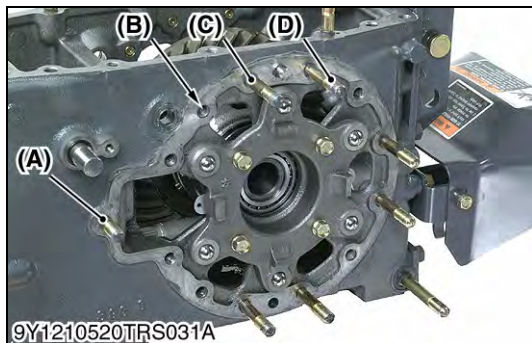
#### **(When reassembling)**

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting screws and nuts	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	---	---

- (1) Rear Axle Case

9Y1211012TRS0067US0



### Brake Case

1. Loosen the remove the brake case mounting screws and nut.
2. Separate the brake case, tapping the brake case lever lightly.

#### (When reassembling)

- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.
- Apply liquid lock (Three Bond 1324 or equivalent) to (A), (B), (C), (D) portions of the stud bolts, R.H. and L.H..

Tightening torque	Brake case mounting stud bolts	39 to 45 N·m 3.5 to 5.0 kgf·m 26 to 36 lbf·ft
-------------------	--------------------------------	---

9Y1211012TRS0068US0

### Differential Lock

1. Remove the clevis pin (1).
2. Draw out the differential lock fork shaft (2).
3. Remove the shift fork (3).

- (1) Clevis Pin  
(2) Fork Shaft

- (3) Shift Fork

9Y1211012TRS0069US0

### Differential Gear Assembly

1. Remove the differential bearing case (1) mounting screws.
2. Remove the differential bearing case (1), noting the number of left and right shims.
3. Remove the differential gear assembly (2) from transmission case.

#### (When reassembling)

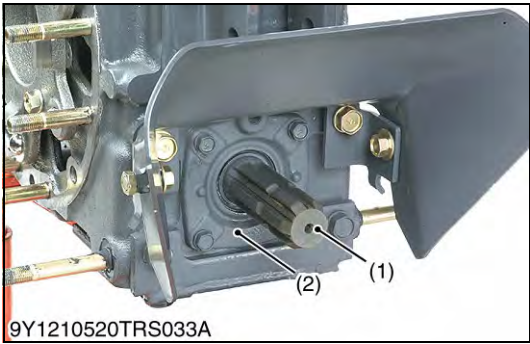
- Use same number of shim as before disassembling.
- Replace the left and right bearing cases on the same sides as before.
- Apply grease to ball and ball seats.

Tightening torque	Differential bearing case mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	--	---

- (1) Differential Bearing Case

- (2) Differential Gear Assembly

9Y1211012TRS0070US0

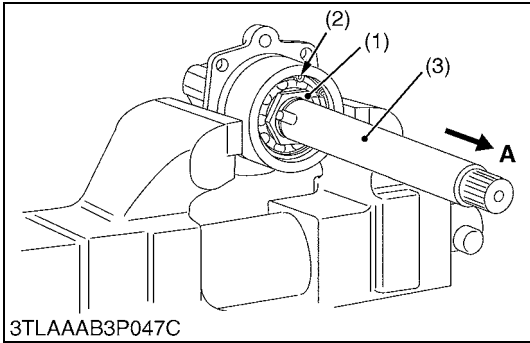


**PTO Bearing Case**

- 1. Remove the bearing case (2) mounting screws.
- 2. Remove the PTO shaft (1) with bearing case.

- (1) PTO Shaft

(2) PTO Bearing Case
- 9Y1211012TRS0071US0



**PTO Shaft**

- 1. Remove the internal cir-clip (2).
- 2. Tap out the PTO shaft (6) to the front "A".

**(When reassembling)**

- In the lock nut (1) was removed, replace a new one, and after tightening it to the specified torque, be sure to stake it firmly.
- Install the slinger (5) firmly.
- After applying liquid gasket (Three Bond 1141 or equivalent) to joint face of the collar (4), and insert the collar to PTO shaft.
- Apply grease to 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

- (1) Lock Nut

(2) Internal Cir-clip

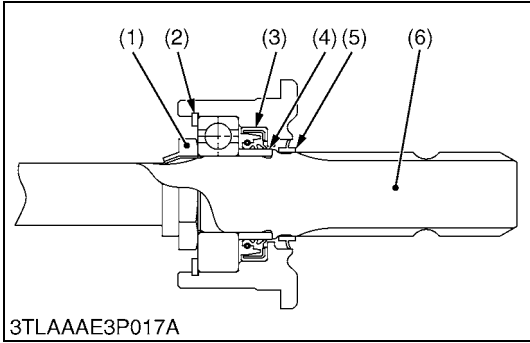
(3) Oil Seal

(4) Collar

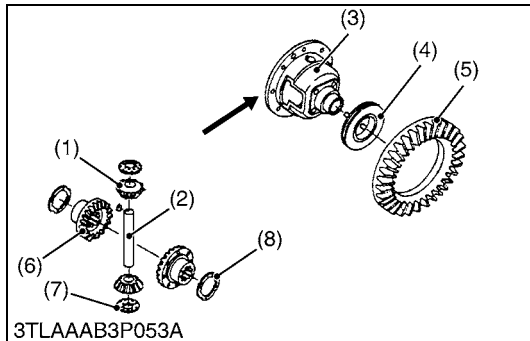
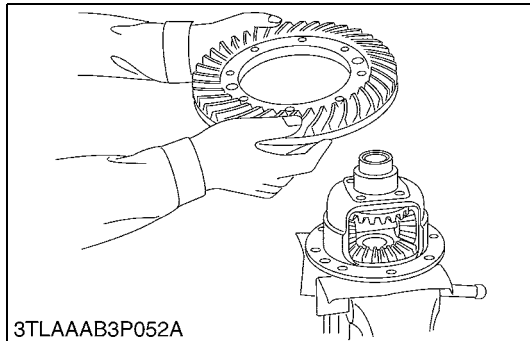
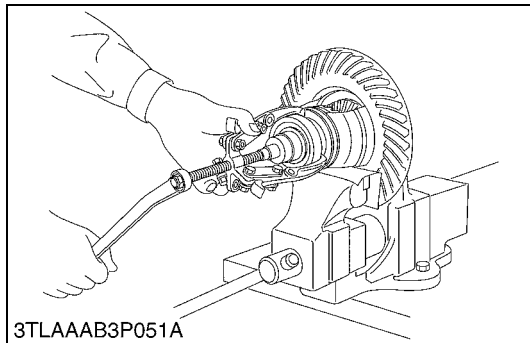
(5) Slinger

(6) PTO Shaft

9Y1211012TRS0072US0



## [D] Differential Gear Assembly



### Bearing and Differential Lock Shifter

1. Secure the differential gear in a vise.
2. Remove the ball bearing with a puller.
3. Remove the differential lock shifter.

9Y1211012TRS0048US0

### 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.
- Apply liquid lock (Three Bond 1324 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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9Y1211012TRS0049US0

### Differential Pinion and Differential Side Gear

1. Draw out the differential pinion shaft (2).
2. Remove the differential pinions (1), differential pinion washers (7) and the differential side gears (6), differential side gear washers (8).

#### ■ NOTE

- Arrange the parts to know their original position.

#### **(When reassembling)**

- Check the thrust and bearing surface of both differential side gears (6). If they are worn or damaged, bores in the differential case may also be damaged.
- Check the differential pinions (1) and pinion shaft (2) for excessive wear. If these parts are damaged or excessively worn, also replace parts they are in mesh with, or they are 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.

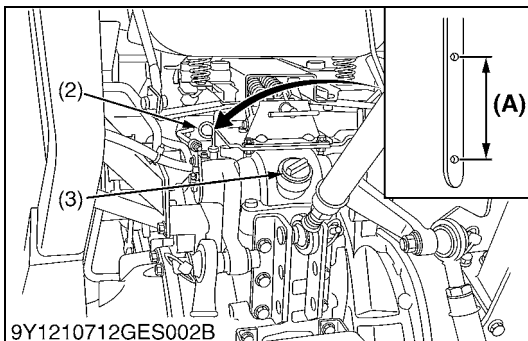
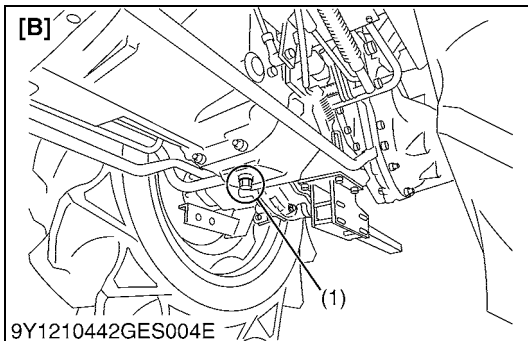
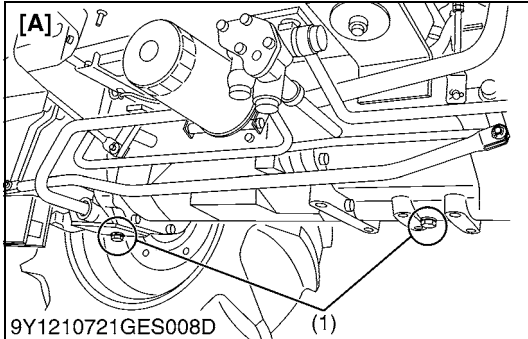
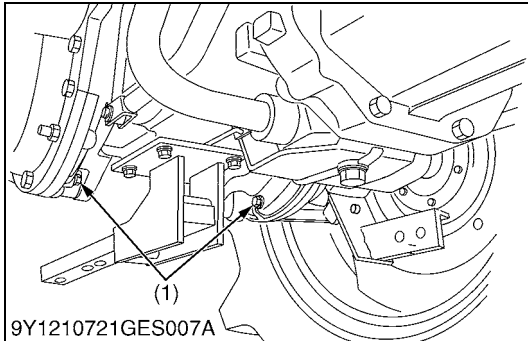
(1) Differential Pinion	(5) Spiral Bevel Gear
(2) Differential Pinion Shaft	(6) Differential Side Gear
(3) Differential Case	(7) Differential Pinion Washer
(4) Differential Lock Shifter	(8) Differential Side Gear Washer

9Y1211012TRS0050US0

## [2] L4701

### (1) Preparation

#### [A] Separating Engine and Clutch Housing Case



#### Draining Transmission Fluid (L4701)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	40.0 L 10.6 U.S.gals 8.8 Imp.gals
--------------------	----------	---

- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

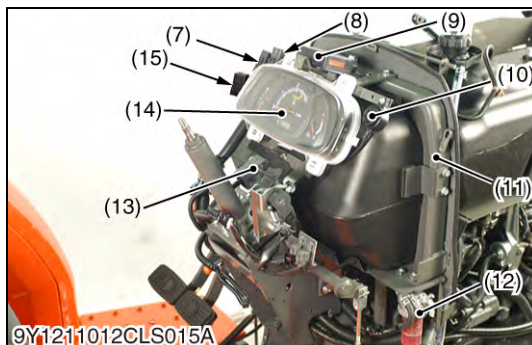
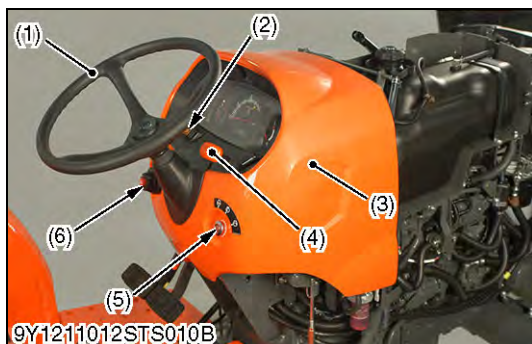
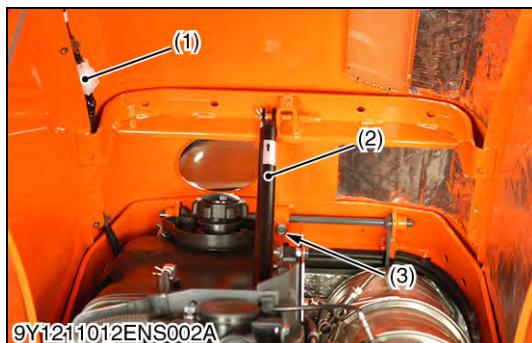
[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0004US0





### Bonnet and Side Covers

1. Disconnect the headlight connector (1).
2. Remove the bolt (2) from the bonnet bracket.
3. Disconnect the damper (3) from the bonnet.
4. Remove the bonnet (4).
5. Remove the R.H. and L.H. side covers (5).

- |                         |                |
|-------------------------|----------------|
| (1) Headlight Connector | (4) Bonnet     |
| (2) Bolt                | (5) Side Cover |
| (3) Damper              |                |

9Y1211012TRS0073US0

### Rear Bonnet and Stay

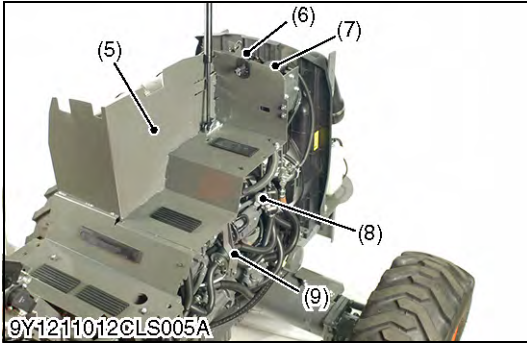
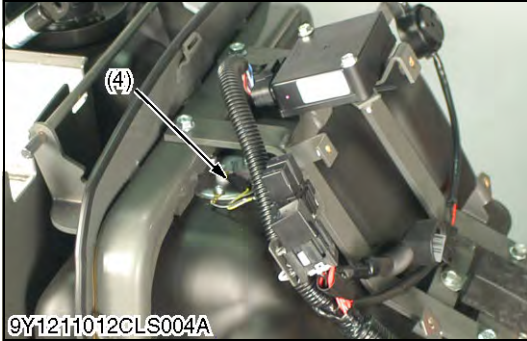
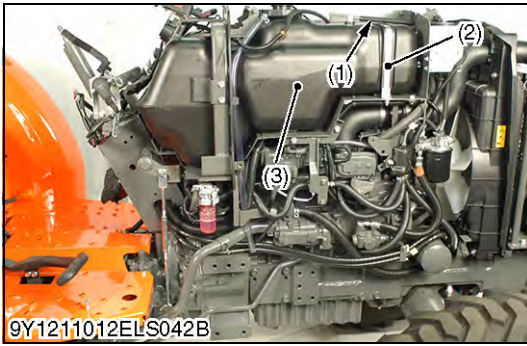
1. Remove the steering wheel (1) with a steering wheel puller.
2. Remove the throttle grip (4).
3. Disconnect the main switch (5).
4. Disconnect the combination switch (6).
5. Disconnect the DPF switches (2).
6. Remove the rear bonnet (3).
7. Remove the meter panel (14).
8. Disconnect the DPF alarm (10).
9. Disconnect the flasher unit (13).
10. Disconnect the starter (8), glow plug relays (7) and CCV heater relay (15).
11. Disconnect the ECU (9).
12. Remove the separator (12).
13. Remove the rear bonnet stay (11).

#### (When reassembling)

Tightening torque	Steering wheel mounting nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-----------------------------	---

- |                        |                       |
|------------------------|-----------------------|
| (1) Steering Wheel     | (9) ECU               |
| (2) DPF Switch         | (10) DPF Alarm        |
| (3) Rear Bonnet        | (11) Rear Bonnet Stay |
| (4) Throttle Grip      | (12) Separator        |
| (5) Main Switch        | (13) Flasher Unit     |
| (6) Combination Switch | (14) Meter Panel      |
| (7) Glow Plug Relay    | (15) CCV Heater Relay |
| (8) Starter Relay      |                       |

9Y1211012CLS0007US0



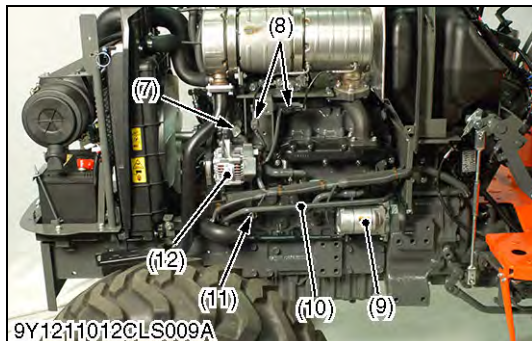
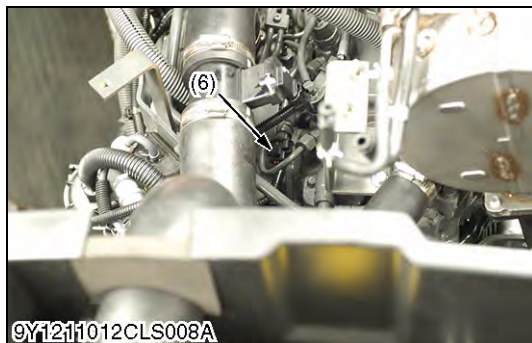
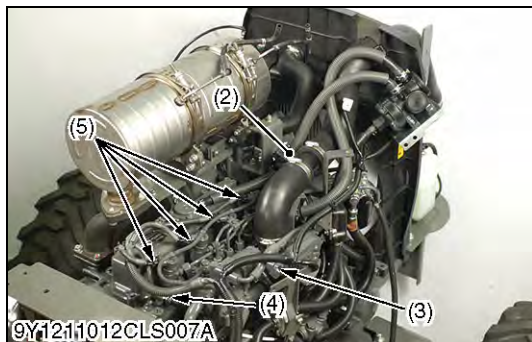
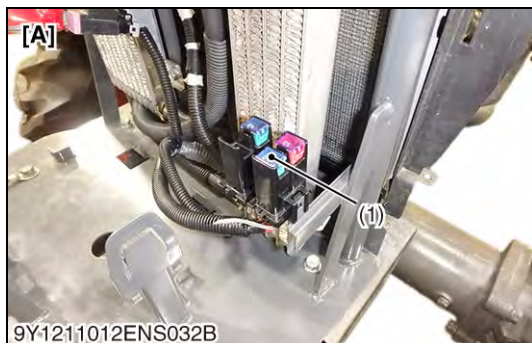
### Fuel Tank and Base

1. Disconnect the fuel sensor (4).
2. Disconnect the fuel return line (1).
3. Remove the fuel tank band (2).
4. Remove the fuel tank (3).
5. Disconnect the connector and hoses from the differential pressure sensor (6).
6. Disconnect the oil separator (7) from the fuel tank base.
7. Disconnect the fuel reserve tank bracket (8) from the fuel tank base.
8. Disconnect the fuel pump bracket (9) from the fuel tank base.
9. Remove the fuel tank base (5).

- |                      |                                  |
|----------------------|----------------------------------|
| (1) Fuel Return Line | (6) Differential Pressure Sensor |
| (2) Fuel Tank Band   | (7) Oil Separator                |
| (3) Fuel Tank        | (8) Fuel Reserve Tank Bracket    |
| (4) Fuel Sensor      | (9) Fuel Pump Bracket            |
| (5) Fuel Tank Base   |                                  |



9Y1211012CLS0020US0



### Hydraulic Pipes and Electrical Wiring (Under Fuel Tank Base and Left Side)

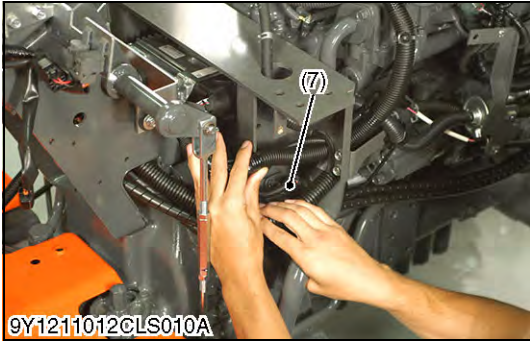
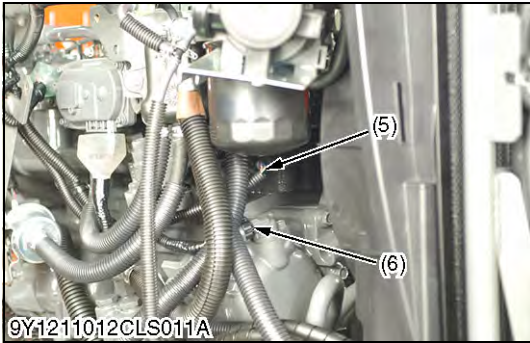
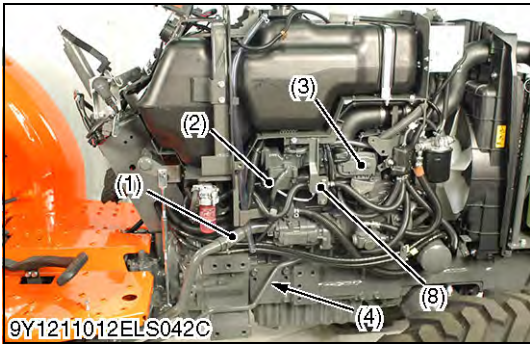
1. Disconnect the injector connectors (5).
2. Disconnect the glow plug (4).
3. Disconnect the EGR valve (3) connector.
4. Disconnect the air flow sensor (2) connector.
5. Disconnect the rail pressure sensor (6) connector.
6. Remove the slow blow fuses (1).
7. Disconnect the coolant temperature sensor (7) connector.
8. Disconnect the DPF temperature sensors (8).
9. Disconnect the alternator (12).
10. Disconnect the starter (9).
11. Disconnect the oil switch (11).
12. Remove the HST return pipe (10).

Tightening torque	HST return pipe bolt	79.2 to 88.2 N·m 8.1 to 9.0 kgf·m 58.4 to 65.1 lbf·ft
-------------------	----------------------	---

- |                                |                        |
|--------------------------------|------------------------|
| (1) Slow Blow Fuse             | (9) Starter            |
| (2) Air Flow Sensor            | (10) HST Return Pipe   |
| (3) EGR Valve                  | (11) Oil Switch        |
| (4) Glow Plug                  | (12) Alternator        |
| (5) Injector Connector         | (13) HST Return Pipe   |
| (6) Rail Pressure Sensor       |                        |
| (7) Coolant Temperature Sensor | <b>[A] L3301/L3901</b> |
| (8) DPF Temperature Sensor     | <b>[B] L4701</b>       |

9Y1211012CLS0008US0





Hydraulic Pipes and Electrical Wiring (Right Side)

- 1. Remove the suction hose (1).
- 2. Remove the delivery pipe (4).
- 3. Remove the EGR valve (2) connector.
- 4. Disconnect the crank position sensor (7).
- 5. Disconnect the fuel pump (8).
- 6. Disconnect the intake throttle valve (3).
- 7. Disconnect the camshaft position sensor (6).
- 8. Disconnect the rail pressure sensor (5).
- 9. Disconnect supply pump connector.

(When reassembling)

Tightening torque	Delivery pipe mounting screw	18 to 20 N·m 1.8 to 2.0 kgf·m 13 to 15 lbf·ft
	Delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

- (1) Suction Hose

(2) EGR Valve

(3) Intake Throttle Valve

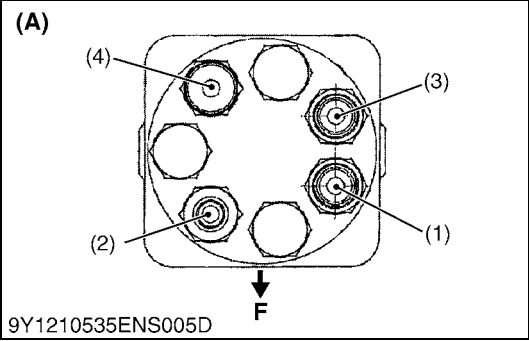
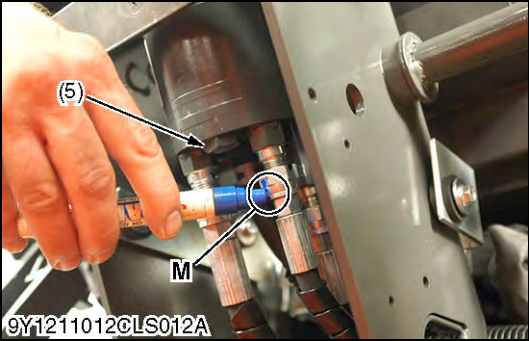
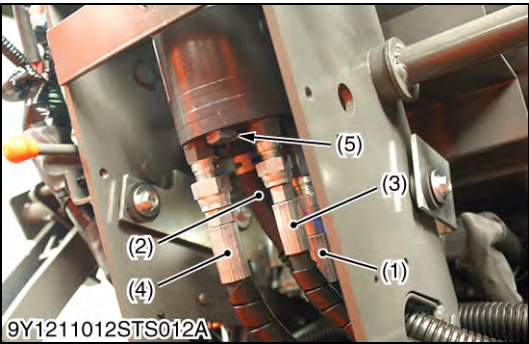
(4) Delivery Pipe
- (5) Rail Pressure Sensor

(6) Camshaft Position Sensor

(7) Crankshaft Position Sensor

(8) Fuel Pump

9Y1211012CLS0009US0



**Power Steering Controller Hoses**

- 1. Since identification tapes are not installed to the hoses, mark the hoses as shown in the picture.
- 2. After marking, disconnect the left delivery hose (3) and the right delivery hose (1).

Tightening torque	Main delivery hose retaining nut	46.6 to 50.9 N·m 4.8 to 5.2 kgf·m 35 to 37 lbf·ft
	Turning delivery hoses retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

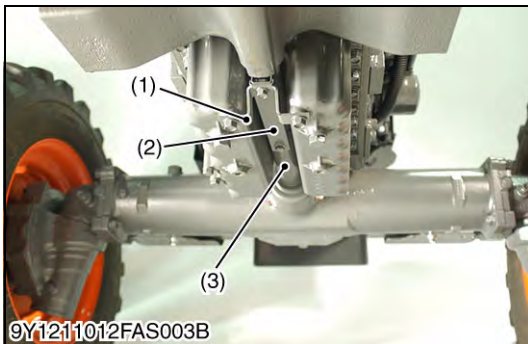
- (1) Delivery Hose (R.H.)
- (2) Return Hose
- (3) Delivery Hose (L.H.)
- (4) Main Delivery Hose
- (5) Plug

**(A) Steering controller viewing from the bottom side**

**F: Front**

**M: Marking**

9Y1211012CLS0010US0



### Propeller Shaft (L4701)

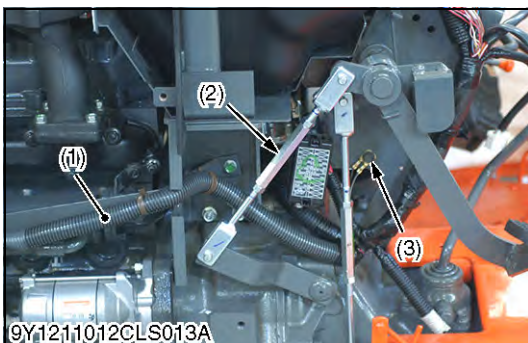
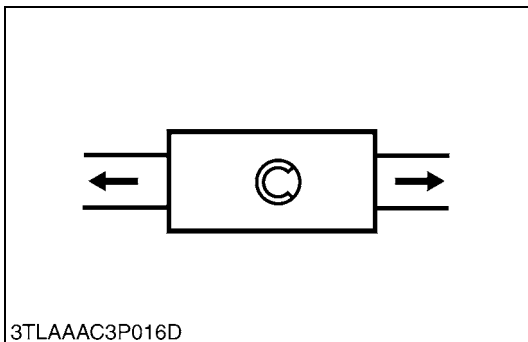
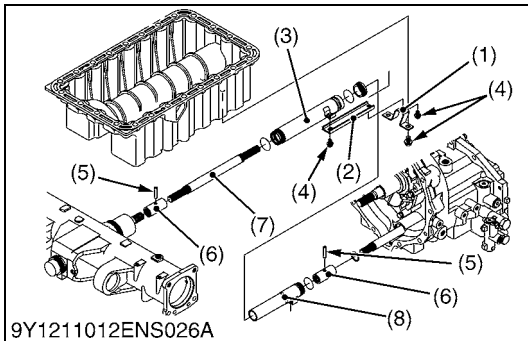
1. Remove the bracket 1 (1).
2. Remove the bracket 2 (2).
3. Slide the propeller shaft cover 2 (8) to the front and the propeller shaft cover 1 (3) to the rear.
4. Tap out the spring pins (5) and then slide the coupling (6) to the front and rear.

#### (When reassembling)

- Apply grease to the splines of the propeller shaft (8) and pinion shaft.
- Tap in spring pins (5) as shown in the figure.

- |                             |                             |
|-----------------------------|-----------------------------|
| (1) Bracket 1               | (5) Spring Pin              |
| (2) Bracket 2               | (6) Coupling                |
| (3) Propeller Shaft Cover 1 | (7) Propeller Shaft         |
| (4) Screw                   | (8) Propeller Shaft Cover 2 |

9Y1211012ENS0025US0



### Separating Engine from Clutch Housing

1. Disconnect the clutch rod (2).
2. Place the disassembling stands under the engine and clutch housing case.
3. Remove the engine and clutch housing mounting screws and nuts.
4. Separate the engine and clutch housing.

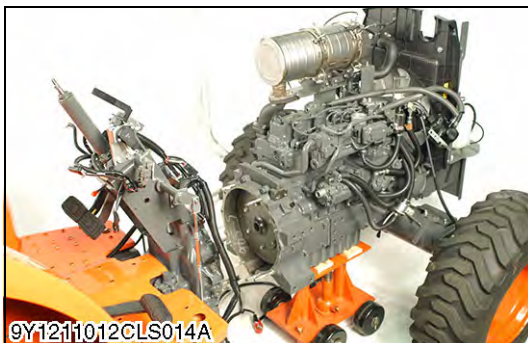
#### (When reassembling)

- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the engine and clutch housing.
- Install the ground cable to the steering support securely.

Tightening torque	Engine and clutch housing mounting bolt and nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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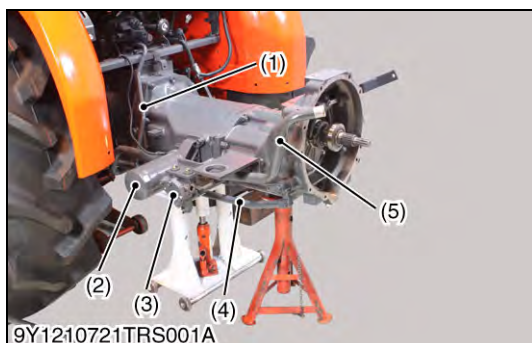
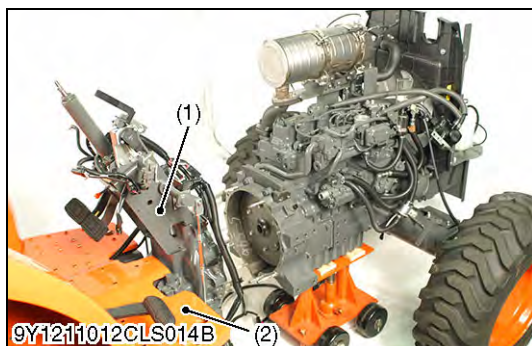
- |                         |                  |
|-------------------------|------------------|
| (1) Main Wiring Harness | (3) Ground Cable |
| (2) Clutch Rod          |                  |

9Y1211012CLS0011US0





## [B] Separating Clutch Housing and Mid Case



### Outer Components

1. Remove the mounting bolts and the steering support (1).
2. Disconnect the differential lock pedal.
3. Remove the step (2) and the main wiring harness.

(1) Steering Support

(2) Step

9Y1211012TRS0074US0

### Suction Pipe and Hydraulic Block

1. Remove the suction pipe (5).
2. Remove the hydraulic block (3).
3. Remove 3P delivery pipe (1).
4. Remove the brake connecting rod R.H. (4) and L.H..

#### (When reassembling)

- Apply grease to the O-rings.

Tightening torque	3P delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 lbf·ft
	3P delivery pipe mounting M8 bolt	23.5 to 24.7 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) 3P Delivery Pipe

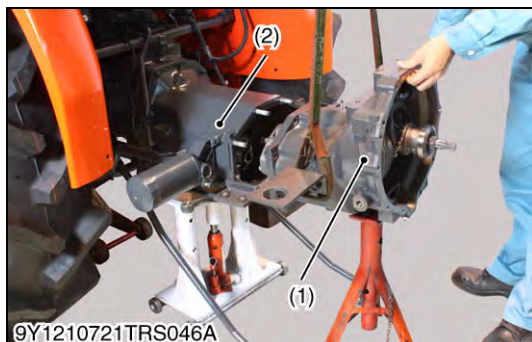
(4) Brake Connecting Rod (R.H.)

(2) Oil Filter

(5) Suction Pipe

(3) Hydraulic Block

9Y1211012TRS0075US0



### Separating Clutch Housing Case from Mid Case

1. Loosen and remove the screws and the nuts securing the clutch housing case (1) to mid case (2).
2. Separate the clutch housing case (1) from the mid case (2).

#### (When reassembling)

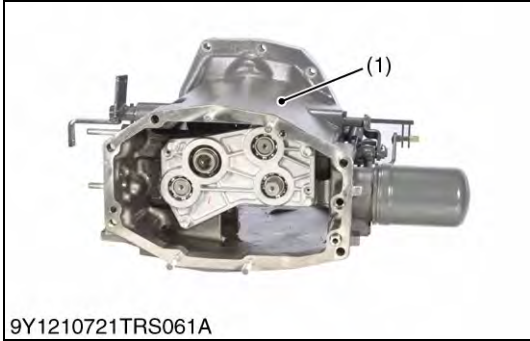
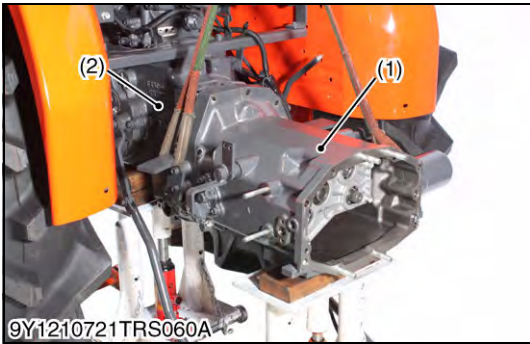
- Replace the gasket with a new one.

Tightening torque	Clutch housing case and mid case mounting screw and nut	102.9 to 117.6 N·m 10.5 to 12.0 kgf·m 75.9 to 86.8 lbf·ft
-------------------	---	---

(1) Clutch Housing Case

(2) Mid Case

9Y1211012TRS0076US0



**Separating Mid Case from Transmission Case**

1. Loosen and remove screws and nuts securing mid case (1) to transmission case (2).
2. Separate mid case from transmission case (2).

**(When reassembling)**

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of mid case and transmission case after eliminate water, oil and stuck liquid gasket.

Tightening torque	Clutch housing case and mid case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting stud bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 28.9 to 36.2 lbf·ft

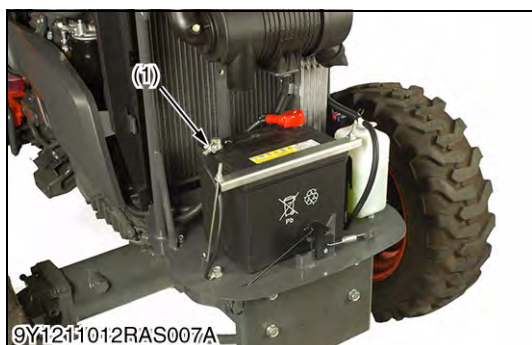
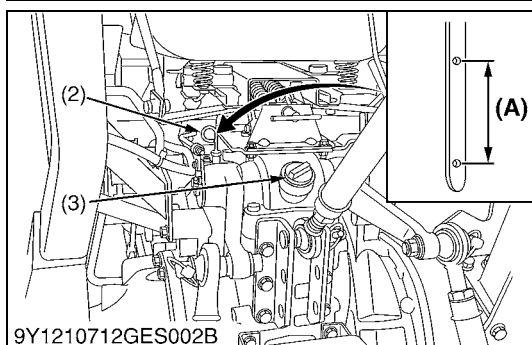
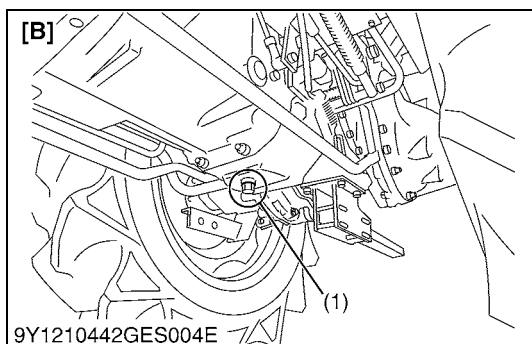
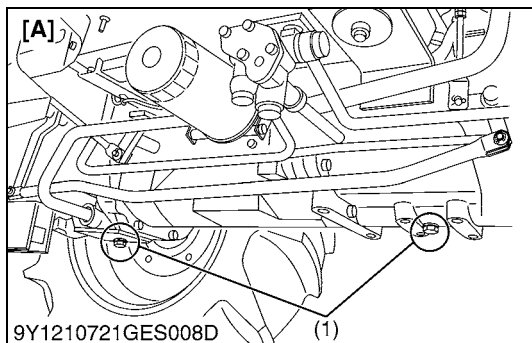
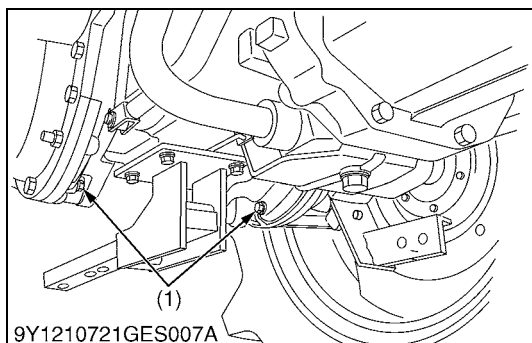
(1) Mid Case

(2) Transmission Case

9Y1211012TRS0177US0



## [C] Separating Transmission Case



## Draining Transmission Fluid (L4701)



### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
  2. After draining reinstall the drain plugs.

### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	40.0 L 10.6 U.S.gals 8.8 Imp.gals
--------------------	----------	---

- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0004US0

## Battery Negative Cable

1. Open the bonnet and disconnect the battery negative cable from the battery.

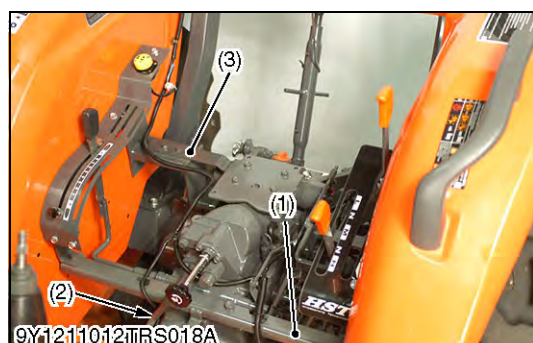
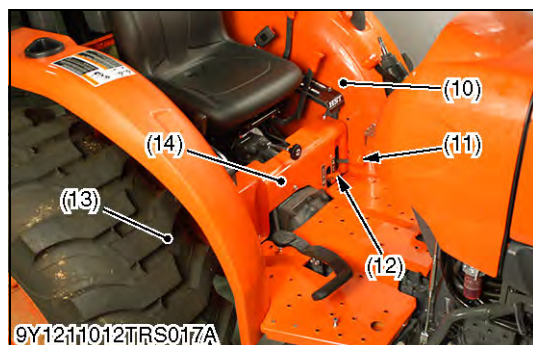
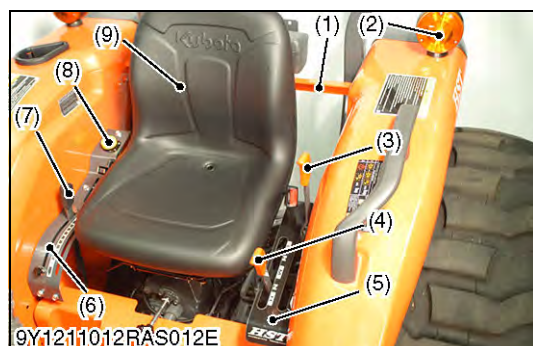
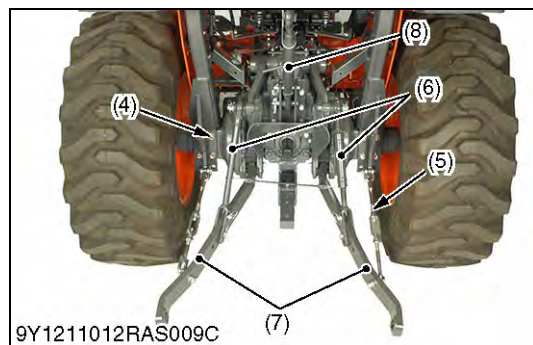
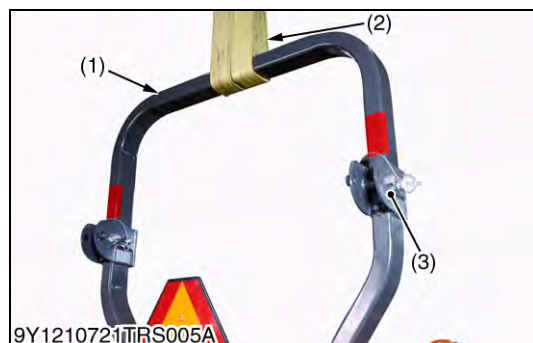
### (When reassembling)

### ■ NOTE

- When connecting the battery cords, connect the battery positive cable first.

- (1) Battery Negative Cable Connector

9Y1211012TRS0081US0



### Three Point Linkage and ROPS

1. Secure the ROPS (1) with safety strap (2).
2. Remove the stabilizer joint (5), the top link (8), the lift rods (6) and the lower links (7).
3. Remove ROPS mounting screws (4), and remove the ROPS.

#### (When reassembling)

Tightening torque	ROPS mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum screw	118 to 137 N·m 12 to 14 kgf·m 87 to 101 lbf·ft

- |                         |                      |
|-------------------------|----------------------|
| (1) ROPS                | (5) Stabilizer Joint |
| (2) Safety Strap        | (6) Lift Rod         |
| (3) ROPS Fulcrum Screw  | (7) Lower Link       |
| (4) ROPS Mounting Screw | (8) Top Link         |

9Y1211012TRS0025US0

### Outer Components

1. Place the disassembling stands under the transmission case.
2. Remove the seat assembly (9).
3. Remove the grips (3), (4), (7), and (11).
4. Disconnect the PTO switch (8).
5. Remove the lever guides (5) and (6).
6. Disconnect the combination lamps (2).
7. Disconnect the differential lock lever (12).
8. Remove the center cover (14).
9. Remove the rear wheels (13).
10. Remove the fender support (1).
11. Remove the fenders (10).

#### (When reassembling)

Tightening torque	Rear wheel mounting screw and nut	196.0 to 225.0 N·m 20.0 to 23.0 kgf·m 144.6 to 166.0 lbf·ft
-------------------	-----------------------------------	---

- |                                      |                                   |
|--------------------------------------|-----------------------------------|
| (1) Fender Support                   | (8) PTO Switch                    |
| (2) Combination Lamp                 | (9) Seat Assembly                 |
| (3) Range Gear Shift Lever Grip      | (10) Fender                       |
| (4) Synchro-shuttle Shift Lever Grip | (11) Front Wheel Drive Lever Grip |
| (5) Shift Lever Guide                | (12) Differential Lock Lever      |
| (6) Position Control Lever Guide     | (13) Rear Wheel                   |
| (7) Position Control Lever Grip      | (14) Center Cover                 |

9Y1211012TRS0082US0

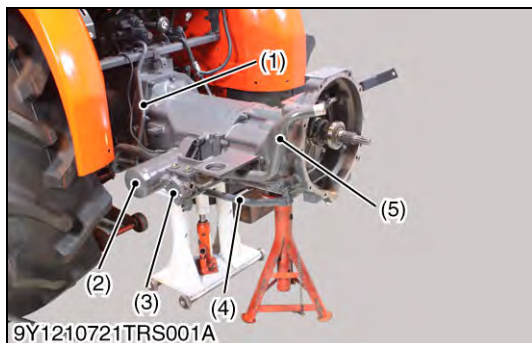
### Fender Support and Delivery Pipe

1. Disconnect the delivery pipe (2).
2. Remove the fender stay (1).
3. Remove the R.H. (3) and L.H. fender supports.

Tightening torque	3P Delivery pipe mounting M8 bolt	23.5 to 24.7 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
-------------------	-----------------------------------	---

- |                   |                         |
|-------------------|-------------------------|
| (1) Fender Stay   | (3) Fender Support R.H. |
| (2) Delivery Pipe |                         |

9Y1211012TRS0083US0



### Suction Pipe and Hydraulic Block

1. Remove the suction pipe (5).
2. Remove the hydraulic block (3).
3. Remove **3P** delivery pipe (1).
4. Remove the brake connecting rod R.H. (4) and L.H..

#### **(When reassembling)**

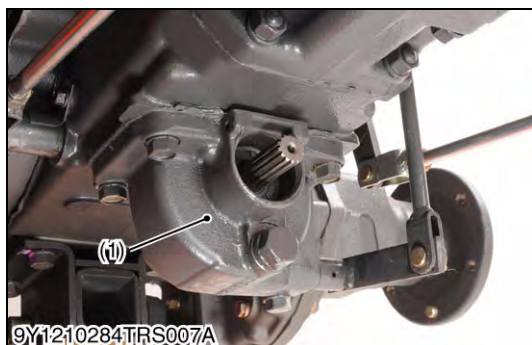
- Apply grease to the O-rings.

Tightening torque	<b>3P</b> delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 lbf·ft
-------------------	------------------------------------	---

- (1) **3P** Delivery Pipe  
(2) Oil Filter  
(3) Hydraulic Block

- (4) Brake Connecting Rod (R.H.)  
(5) Suction Pipe

9Y1211012TRS0084US0



### Front Wheel Drive Case

1. Remove the front wheel drive case (1).

#### **(When reassembling)**

- Apply liquid gasket (Three Bond 1206C or equivalent) to both faces of the gasket that is to be installed between the front drive case and the transmission case.

- (1) Front Wheel Drive Case

9Y1211012TRS0029US0



### Hydraulic Cylinder

1. Loosen and remove the hydraulic cylinder assembly mounting screws and nuts.
2. Support the hydraulic cylinder assembly with nylon lift strap and hoist, and then remove it.

#### **(When reassembling)**

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.

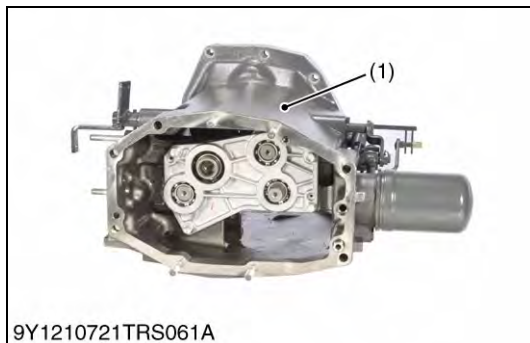
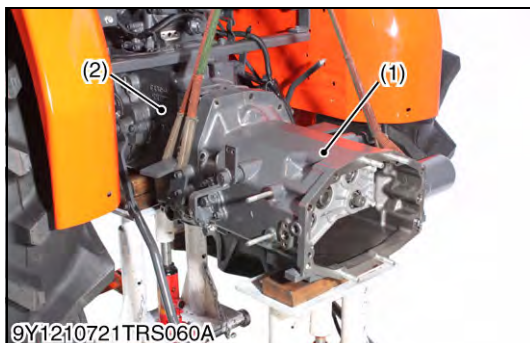
Tightening torque	Hydraulic cylinder assembly mounting screws and nuts	77.4 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 lbf·ft
-------------------	--	---

#### ■ **NOTE**

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod. (See page 8-S16.)

9Y1211012TRS0086US0





### Separating Mid Case from Transmission Case

1. Loosen and remove screws and nuts securing mid case (1) to transmission case (2).
2. Separate mid case from transmission case (2).

#### **(When reassembling)**

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of mid case and transmission case after eliminate water, oil and stuck liquid gasket.

Tightening torque	Clutch housing case and mid case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting stud bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 28.9 to 36.2 lbf·ft

(1) Mid Case

(2) Transmission Case

9Y1211012TRS0177US0

### Rear Axle Case

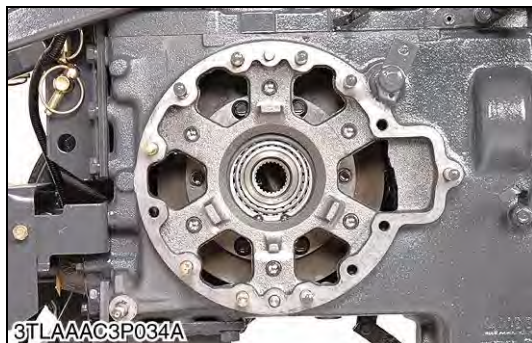
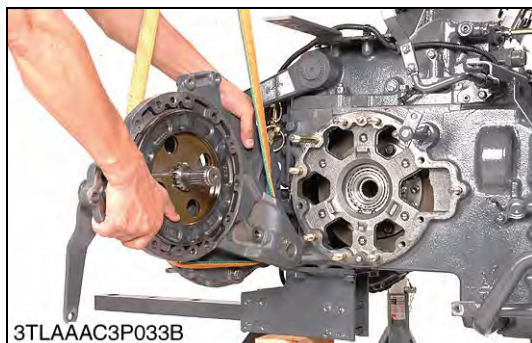
1. Place the support stand under the rear axle case.
2. Loosen and remove the rear axle case mounting screws and nuts.
3. Support the rear axle case with nylon lift strap and hoist.
4. Separate the rear axle case from brake case.

#### **(When reassembling)**

- Apply liquid gasket (Three Bond 1206C or equivalent) to the joint face of the rear axle case and the brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting M10 nuts	60.8 to 70.5 N·m 6.2 to 7.2 kgf·m 44.9 to 52.1 lbf·ft
	Rear axle case mounting M12 bolts and nuts	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 lbf·ft

9Y1211012TRS0087US0



### Brake Case

1. Remove the brake case mounting screws and nuts.
2. Separate the brake case, tapping the brake case lever lightly.

#### (When reassembling)

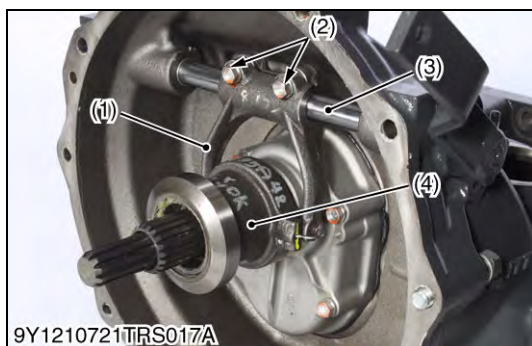
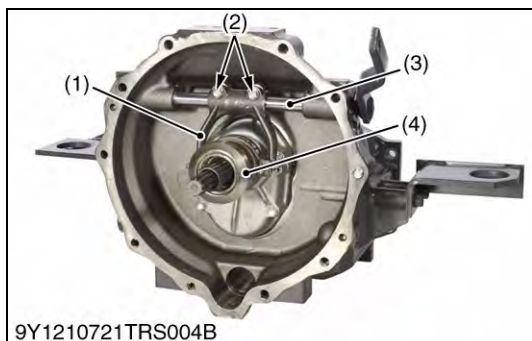
- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminate the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.

Tightening torque	Brake case mounting stud bolts	38.2 to 45.1 N·m 3.9 to 4.6 kgf·m 28.2 to 33.3 lbf·ft
	Brake case mounting screws and nuts	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 lbf·ft
	Brake case lever mounting screw	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft

9Y1211012TRS008US0

## (2) Disassembling and Assembling (Manual Transmission Model)

### [A] Clutch Housing Case



### Clutch Lever, Release Fork and Release Bearing

1. Remove the release fork mounting screws (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the release bearing (4) together with release holder.

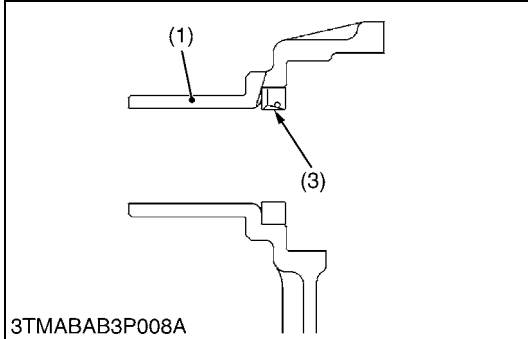
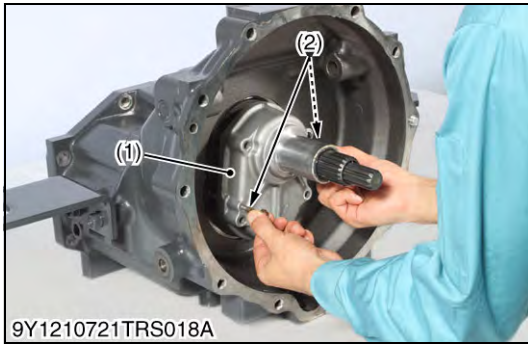
#### (When reassembling)

- Apply grease to the sliding surface of the clutch release hub.
- Apply grease to the clutch lever.

Tightening torque	Release fork mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
-------------------	-----------------------------	---

- (1) Release Fork (3) Clutch Lever  
(2) Release Fork Mounting Screw (4) Release Bearing

9Y1211012TRS0089US0



### Shaft Case

1. Remove the shaft case mounting screws.
2. Remove the shaft case (1) by using jack screw M6.

#### (When reassembling)

- Replace the gasket with a new one.

#### (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).

Tightening torque	Shaft case mounting screw	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
-------------------	---------------------------	---

- (1) Shaft Case (3) Oil Seal  
(2) Jack Screw M6

9Y1211012TRS0090US0

### 24T Gear Shaft and 27T Gear

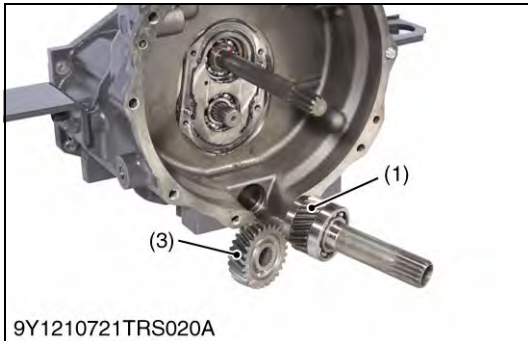
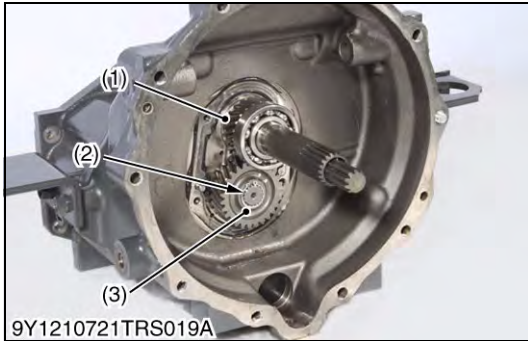
1. Remove the 24T gear shaft (1).
2. Remove the external snap ring (2) and 27T gear (3).

#### (When reassembling)

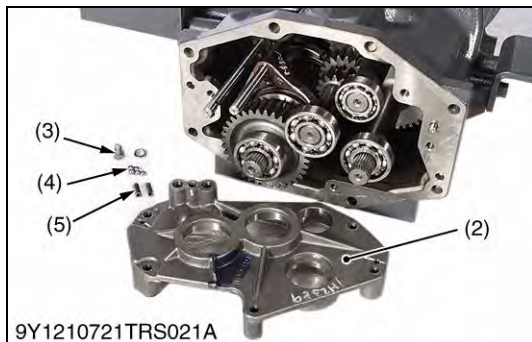
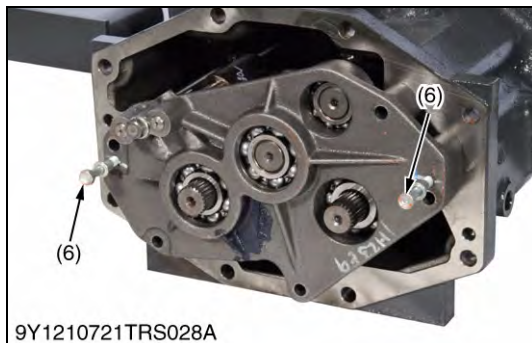
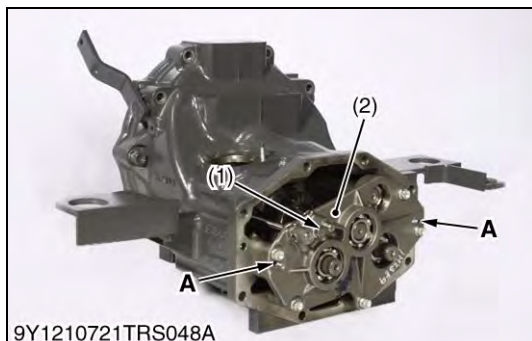
- Install the parts to the original positions.

- (1) 24T Gear Shaft (3) 27T Gear  
(2) External Snap Ring

9Y1211012TRS0091US0







### Clutch Housing Bearing Holder

1. Remove clutch housing bearing holder (2) mounting screws.
2. Remove three interlock balls (4) after removing stopper screw (1).
3. Pull out clutch housing bearing holder (2) by using two jack screws (6) M8 to the hole "A".

#### NOTE

- Be careful not to fly out interlock balls (4) and springs (5) when pull out bearing holder (2).

#### (When reassembling)

- Install three interlock balls (4) with a small amount of grease to clutch housing bearing holder (2) after setting the shift forks and shift rods to neutral position.

Tightening torque	Clutch housing bearing holder mounting screws	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
	Stopper screw	34.3 to 44.1 N·m 3.5 to 4.5 kgf·m 25.3 to 32.6 lbf·ft

(1) Stopper Screw

(2) Clutch Housing Bearing Holder

(3) Shift Lock Ball

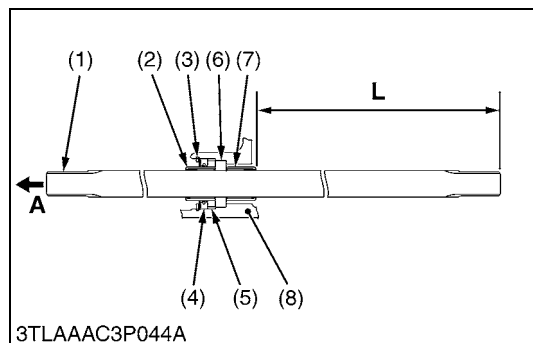
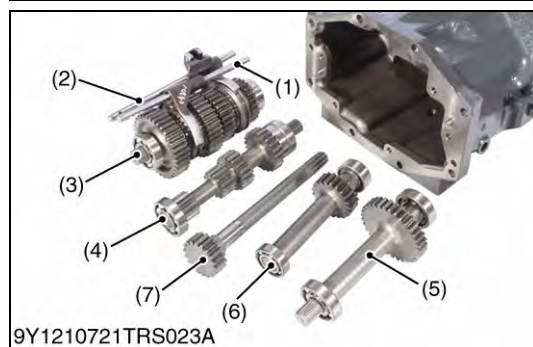
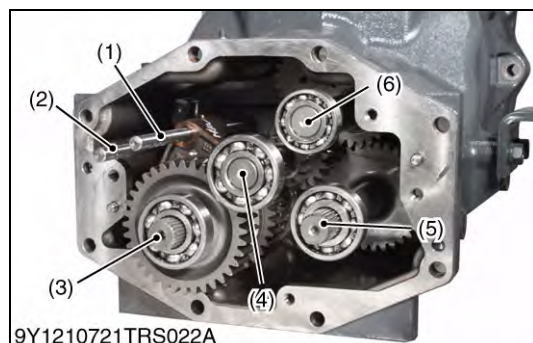
(4) Interlock Ball

(5) Spring

(6) Jack Screw

**A: Portion to use jack screw**

9Y1211012TRS0092US0



### Gear Shaft Assemblies

1. Remove shift fork assembly (1), (2) together with main gear shaft assembly (3).
2. Remove counter gear shaft assembly (4), the PTO counter gear shaft assembly (5), the PTO gear shaft assembly (6), and then the main shaft (7).

#### ■ NOTE

- To easily remove the gear shaft assembly, tap lightly a tool, through small holes from front inside wall of clutch housing.

- |                                 |                                     |
|---------------------------------|-------------------------------------|
| (1) Shift Fork Assembly (1-2)   | (5) PTO Counter Gear Shaft Assembly |
| (2) Shift Fork Assembly (3-4)   | (6) PTO Gear Shaft Assembly         |
| (3) Main Gear Shaft Assembly    | (7) Main Shaft                      |
| (4) Counter Gear Shaft Assembly |                                     |

9Y1211012TRS0093US0

### Front Axle Drive Shaft (4WD)

1. Pull out the front axle drive shaft (1) from the rear.

#### **(When reassembling)**

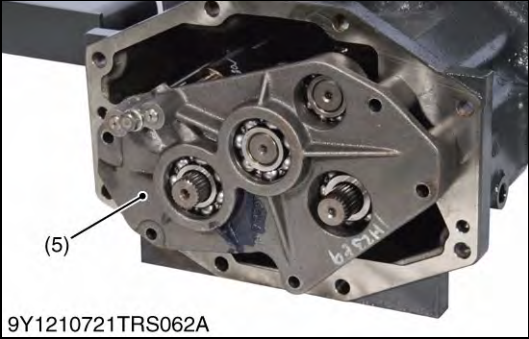
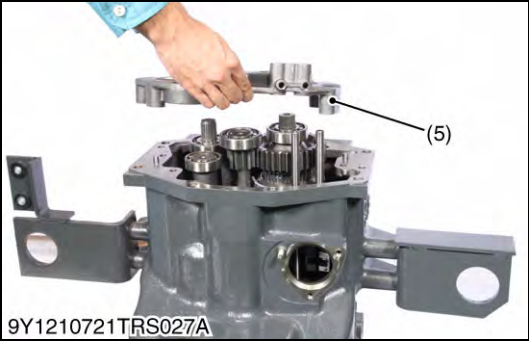
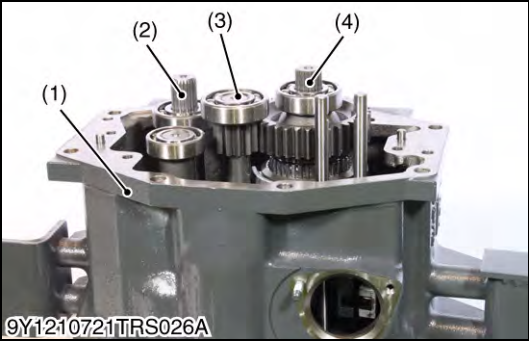
- Install the bearing (6), the spacer (5), the oil seal (4) and the internal snap ring to the clutch housing (8).
- Install the sleeve (7) to the front propeller shaft with dimension shown on the figure, then install the front propeller shaft from the rear.
- Install the sleeve (2) by using a rear propeller shaft tool.

- |                            |                    |
|----------------------------|--------------------|
| (1) Front Axle Drive Shaft | (7) Sleeve         |
| (2) Sleeve                 | (8) Clutch Housing |
| (3) Internal Snap Ring     |                    |
| (4) Oil Seal               |                    |
| (5) Spacer                 |                    |
| (6) Bearing                |                    |

**A: To Front Propeller Shaft**  
**L: 538 mm (21.182 in.)**

9Y1211012TRS0094US0





**Assembling Shafts to Clutch Housing Case**

- 1. Turn the clutch housing case vertical.
- 2. Assemble all shafts to the clutch housing case.
- 3. Install the rear cover.
- 4. Tighten the rear cover mounting bolts to the tightening torque.

Tightening torque	Release fork mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
-------------------	-----------------------------	---

- (1) Clutch Housing Case

(2) PTO Counter Gear Shaft

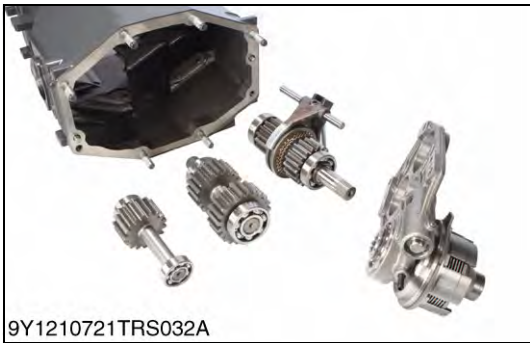
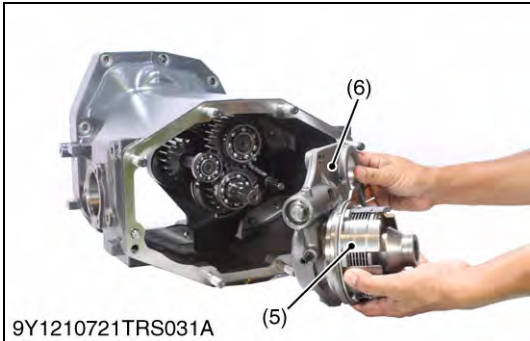
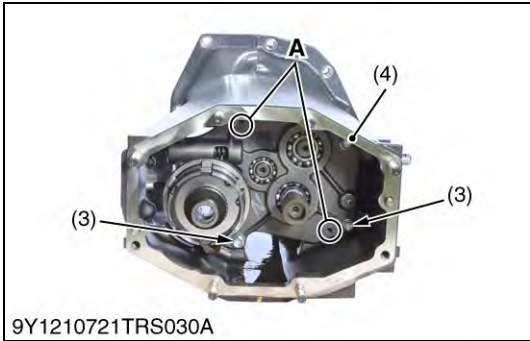
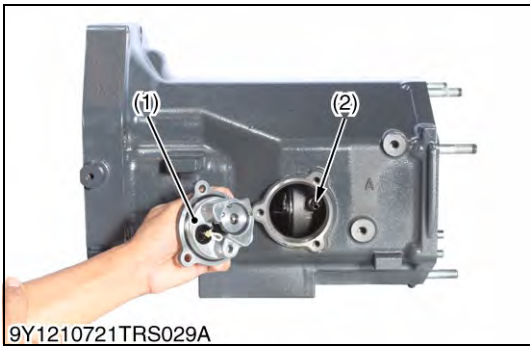
(3) Counter Gear Shaft

(4) Main Gear Shaft

(5) Clutch Housing Bearing Holder

9Y1211012TRS0095US0

[B] Mid Case



**PTO Clutch Valve and PTO Clutch Holder**

- 1. Remove PTO clutch valve (1).
- 2. Remove PTO clutch holder (6) together with PTO clutch pack (5) by using two jack screw M8 to the holes "A" of the PTO clutch holder (6).
- 3. Tap out other shafts

**(When reassembling)**

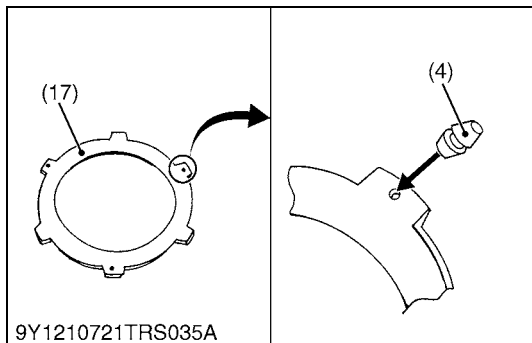
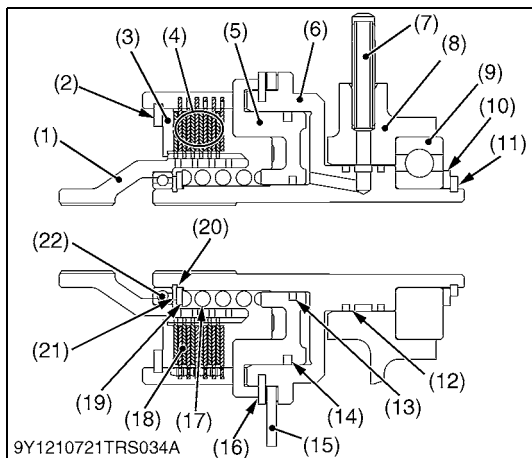
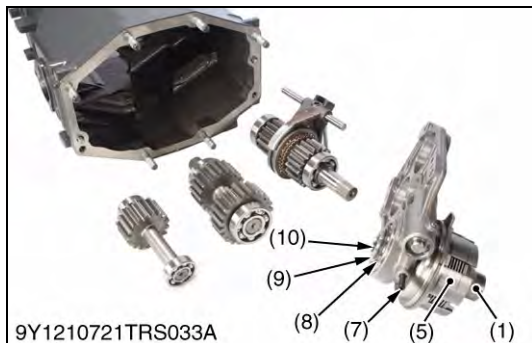
- Apply a small amount of transmission fluid to the O-ring.
- Install oil pipe (2) to the side hole of PTO clutch holder (6) firmly.

Tightening torque	PTO clutch valve mounting screw	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft
	PTO clutch holder mounting screw	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 lbf·ft

- (1) PTO Clutch Valve
- (2) Oil Pipe
- (3) Bolt (M8)
- (4) Mid Case

- (5) PTO Clutch Pack
- (6) PTO Clutch Holder

**A: Portion to Use Jack Bolt (M 8)**  
9Y1211012TRS0096US0



### Removing Clutch Hub, Clutch Disks and Clutch Plates

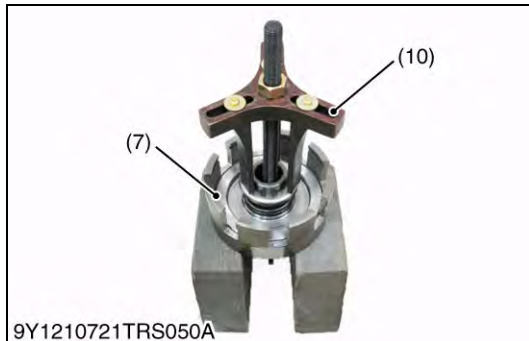
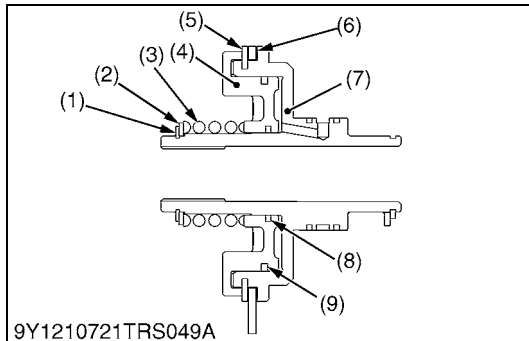
1. Remove the snap ring (2) and the back plate (3).
2. Remove the clutch hub (1), the plates (17) and the disks (18) from the PTO clutch case (6).
3. Remove the cir-clip (11). Remove the hydraulic pipe (7) from the bearing case (8).

### (When reassembling)

- Install the clutch disks (18) and plates (17) mutually.
- Do not confuse the back plate (3) and the plates (17). The back plate (3) is thicker than the plates (17).
- Assemble the rubbers (4) portion of the plates (17) are same positions while assembling them.
- Replace the seal ring (12) with new one.

- |                     |                   |
|---------------------|-------------------|
| (1) Clutch Hub      | (12) Seal Ring    |
| (2) Snap Ring       | (13) Inner D-ring |
| (3) Back Plate      | (14) Outer D-ring |
| (4) Rubber          | (15) Brake Disk   |
| (5) Piston          | (16) Brake Plate  |
| (6) PTO Clutch Case | (17) Plate        |
| (7) Hydraulic Pipe  | (18) Disk         |
| (8) Bearing Case    | (19) Washer       |
| (9) Ball Bearing    | (20) Snap Ring    |
| (10) Plate          | (21) Shim         |
| (11) Cir-clip       | (22) Ball Bearing |

9Y1211012TRS0097US0



### Removing Piston and PTO Brake Disk

1. Depress the return spring (3) by using a jig (10).
2. Remove the cir-clip (1) from the PTO clutch case (7).
3. Remove the piston (4).
4. Remove the brake plate (5) and the brake disk (6).

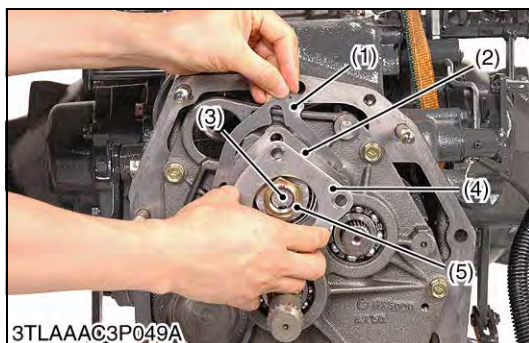
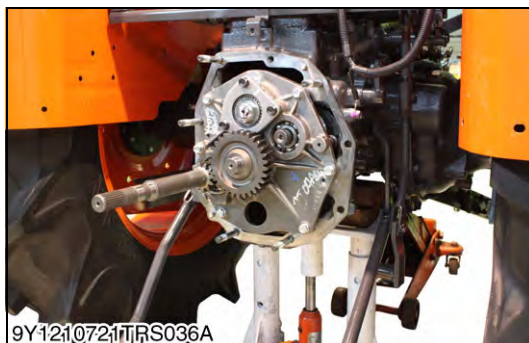
#### (When reassembling)

- Replace the inner D-ring with a new one.
- Replace the outer D-ring with a new one.

- |                   |                  |
|-------------------|------------------|
| (1) Cir-clip      | (6) Brake Disk   |
| (2) Washer        | (7) Clutch Case  |
| (3) Return Spring | (8) Inner D-ring |
| (4) Piston        | (9) Outer D-ring |
| (5) Brake Plate   | (10) Jig         |

9Y1211012TRS0098US0

## [C] Transmission Case



### Pinion Bearing Cover

1. Remove the stake of lock nut (5).
2. Fix the 37T-22T gear by pinion locking tool (Code No. 07916-52311) 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)

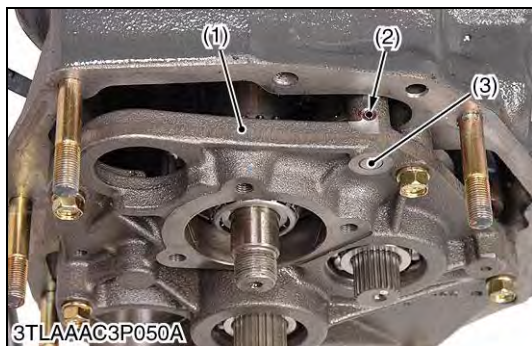
- Make sure of the number of shims in the pinion bearing case.
- Replace the lock nut (5) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

Tightening torque	Lock nut	147 to 196 N·m 15 to 20 kgf·m 109 to 145 lbf·ft
	Pinion bearing case mounting screw	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 lbf·ft

- |                                    |                          |
|------------------------------------|--------------------------|
| (1) Shim                           | (4) Pinion Bearing Cover |
| (2) Pinion Bearing Case            | (5) Lock Nut             |
| (3) Spiral Bevel Pinion Gear Shaft |                          |

9Y1211012TRS0099US0





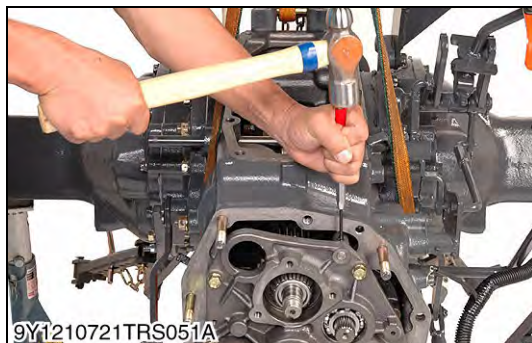
### **Transmission Bearing Holder**

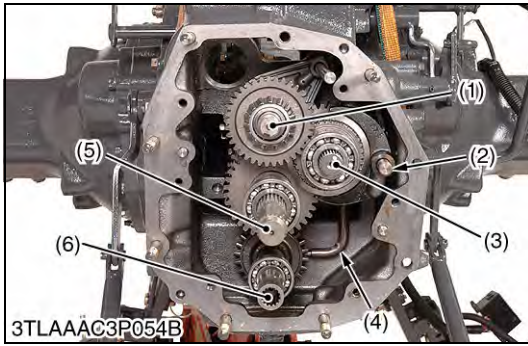
1. Remove spring pin (2) holding hi-shift fork rod (3) to transmission bearing holder (1).
2. Remove transmission bearing holder by using 2 jack screws M8 (4).

(1) Transmission Bearing Holder  
(2) Spring Pin

(3) Hi-Shift Fork Rod  
(4) Jack Screws M8

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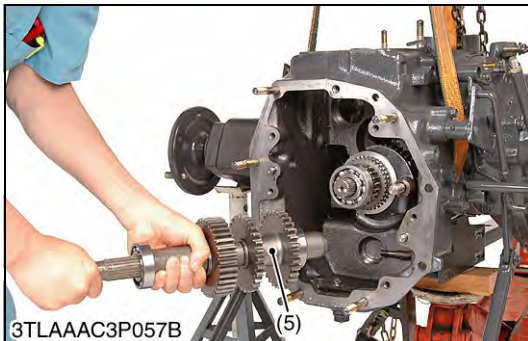
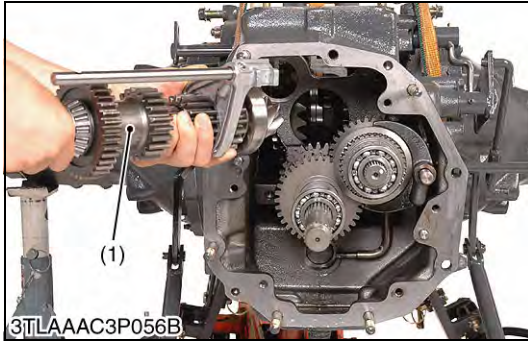


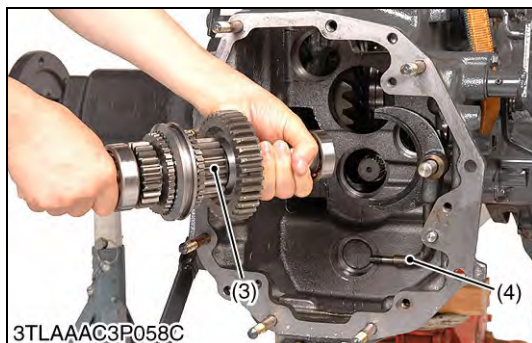
### Shaft Assemblies

1. Remove front wheel drive gear shaft assembly (6).
2. Remove pinion gear shaft assembly (1).
3. Remove PTO gear shaft assembly (5).

- |                                   |   |
|-----------------------------------|---|
| (1) Pinion Gear Shaft Assembly    | (5) PTO Gear Shaft Assembly               |
| (2) Hi-Lo Gear Shift Fork Rod     | (6) Front Wheel Drive Gear Shaft Assembly |
| (3) Hi-Lo Gear Shaft Assembly     |   |
| (4) Front Wheel Drive Shift Lever |   |

**(To be continued)**

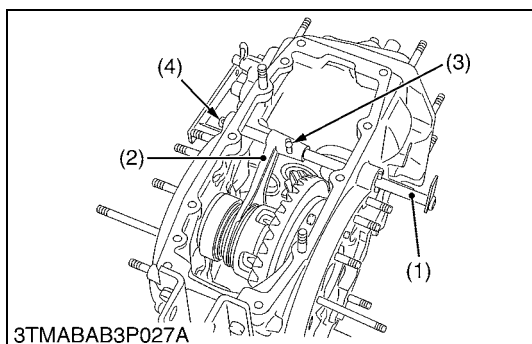
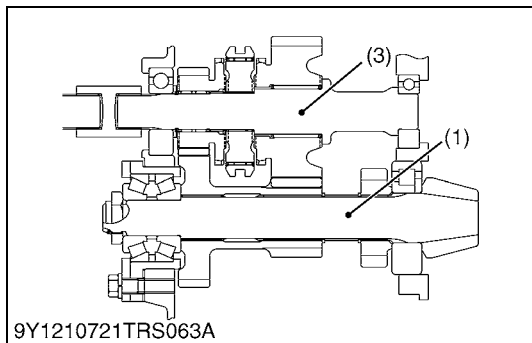


**(Continued)**

4. Remove the Hi-Lo gear shaft assembly (3).
5. Remove the Hi-Lo gear fork rod (2) and the front wheel drive shift lever (4).

- |                                |                                   |
|--------------------------------|-----------------------------------|
| (1) Pinion Gear Shaft Assembly | (3) Hi-Lo Gear Shaft Assembly     |
| (2) Hi-Lo Gear Shift Fork Rod  | (4) Front Wheel Drive Shift Lever |

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**Differential Lock Shift Fork**

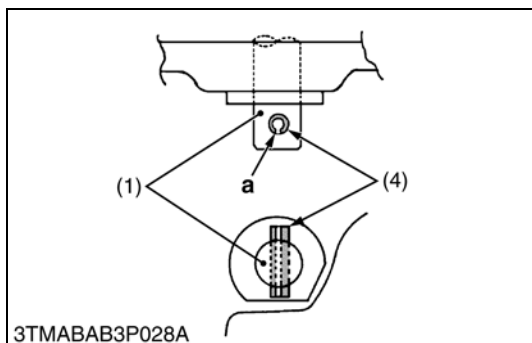
1. Tap out the left side spring pin (4).
2. Remove the cotter pin and remove the clevis pin (3).
3. Draw out the differential lock fork shaft (1) and remove the differential lock shift fork (2).

**(When reassembling)**

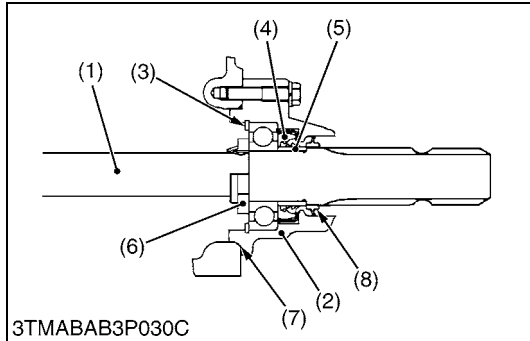
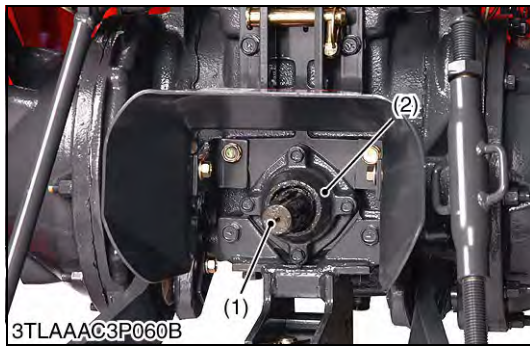
- Apply grease to the left and right oil seals on the transmission case.
- Insert the clevis pin (3) from the top and install the washer and cotter pin.
- Tap in the spring pin (4) so that its split portion a may face outward as shown in the figure.

- |                                  |                         |
|----------------------------------|-------------------------|
| (1) Differential Lock Fork Shaft | <b>a: Split Portion</b> |
| (2) Differential Lock Shift Fork |                         |
| (3) Clevis Pin                   |                         |
| (4) Spring Pin                   |                         |

9Y1211012TRS0102US0







### 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. Tap out the PTO shaft (1) to the front.

#### (When reassembling)

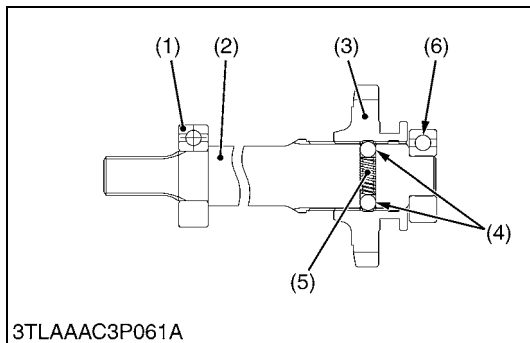
#### ■ NOTE

- If the lock nut (6) was removed, replace it with a new one. After replacing, be sure to stake it firmly.
- Install the slinger (8) firmly.
- Apply grease to the oil seal (4) and install it, noting its direction.

Tightening torque	Lock nut	147 to 196 N·m 15 to 20 kgf·m 109 to 145 lbf·ft
	Bearing case mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft

- |                        |                     |
|------------------------|---------------------|
| (1) PTO Shaft          | (5) Oil Seal Collar |
| (2) Bearing Case       | (6) Lock Nut        |
| (3) Internal Snap Ring | (7) O-ring          |
| (4) Oil Seal           | (8) Slinger         |

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### Front Wheel Drive Shaft

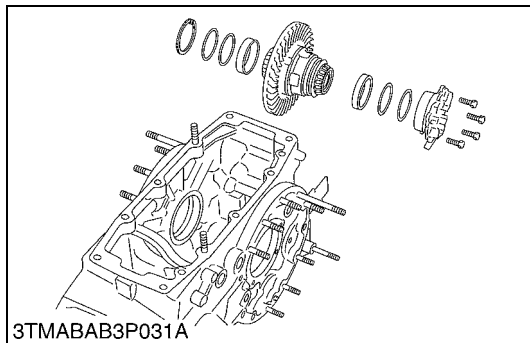
1. Remove the ball bearing (6).
2. Remove the 24T shifter gear (3), balls and spring (5).

#### ■ NOTE

- Be careful not to fly out the balls (4) and spring (5) when takeout the 24T shifter gear (3).

- |                             |                  |
|-----------------------------|------------------|
| (1) Ball Bearing            | (4) Ball         |
| (2) Front Wheel Drive Shaft | (5) Spring       |
| (3) 24T Shifter Gear        | (6) Ball Bearing |

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### Differential Gear Assembly

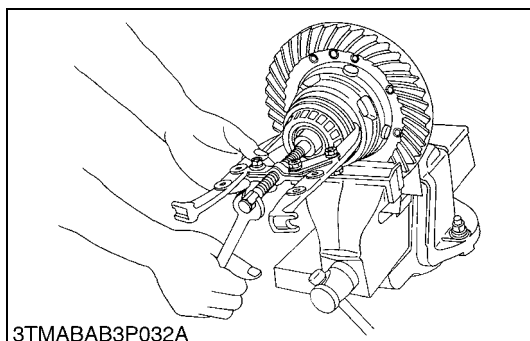
1. Remove the differential support, noting the number of left shims.
2. Remove the differential gear assembly, noting the number of right shims.

#### (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	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
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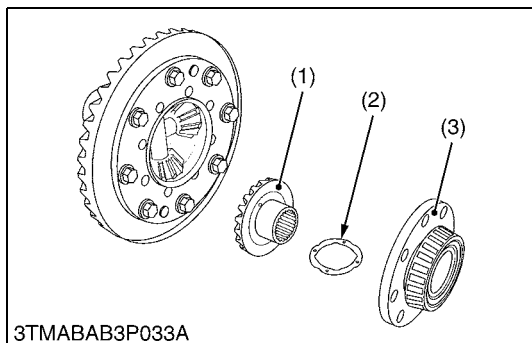


### Bearing and Differential Lock Shifter

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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### 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)

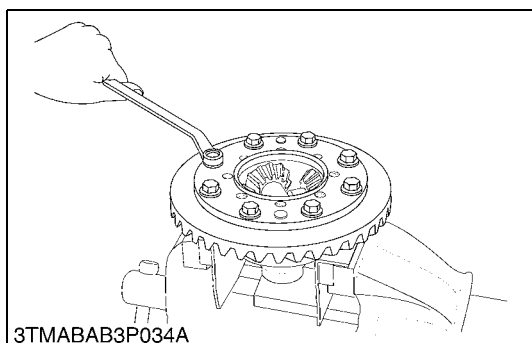
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gear boss.

Tightening torque	Differential case cover mounting screw	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
-------------------	--	---

- (1) Differential Side Gear  
(2) Differential Side Gear Washer

- (3) Differential Case Cover

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### Spiral Bevel Gear

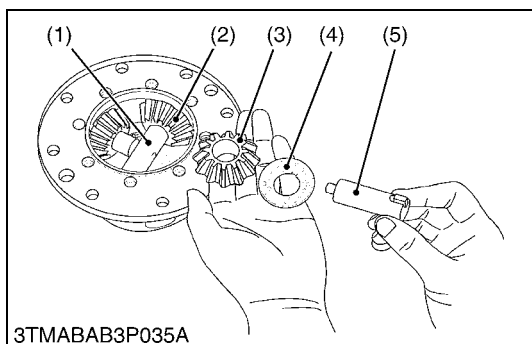
1. Remove the spiral bevel gear.

#### (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.
- Apply liquid lock (Three Bond 1372 or equivalent) to the spiral bevel gear UBS screws.

Tightening torque	Spiral bevel gear UBS screw	68.6 to 88.3 N·m 7.0 to 9.0 kgf·m 50.6 to 65.1 lbf·ft
-------------------	-----------------------------	---

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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 note their original position.

#### (When reassembling)

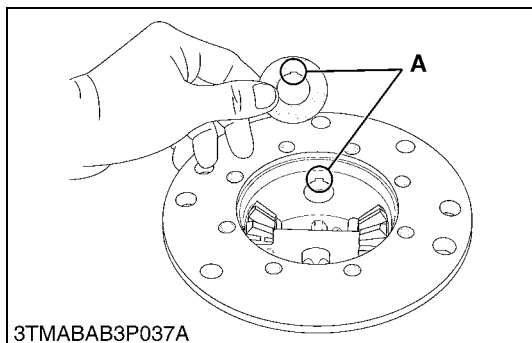
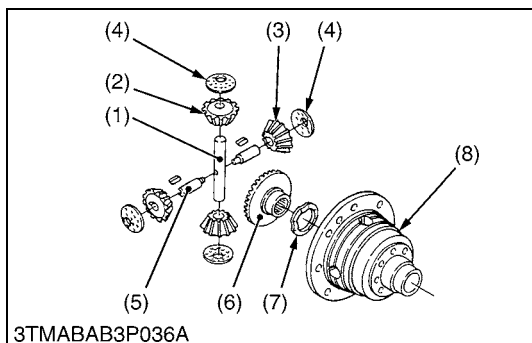
- Check the differential pinions (2) and (3), and pinion shaft (1) and (5) for excessive wear. If these parts are damaged or excessively worn, replace the parts they are in mesh with, or they slide on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential pinions.
- Install the parts to their original position.
- Install the differential pinion washers (4), noting its groove position.

- (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

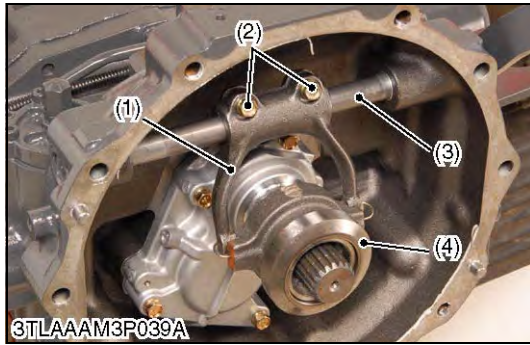
#### A: Fit Groove

9Y1211012TRS0109US0



### (3) Disassembling and Assembling (HST Model)

#### [A] HST Housing Case



#### Clutch Lever, Release Fork and Release Bearing

1. Remove the release fork mounting bolts (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the release bearing and the release hub (4) together.

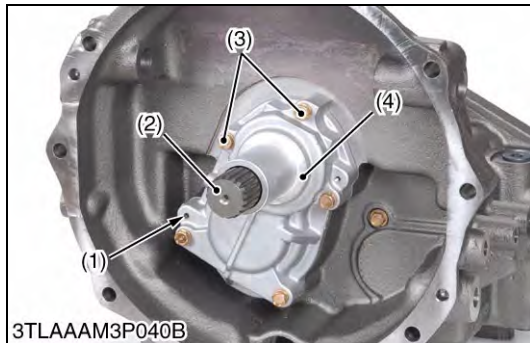
#### **(When reassembling)**

- Apply grease to the sliding surface of the clutch release hub.
- Apply grease to the clutch lever.

Tightening torque	Release fork mounting bolt	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
-------------------	----------------------------	---

- |                                |                  |
|--------------------------------|------------------|
| (1) Release Fork               | (3) Clutch Lever |
| (2) Release Fork Mounting Bolt | (4) Release Hub  |

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#### Input Shaft Case, Input Gear Shaft and HST Gear

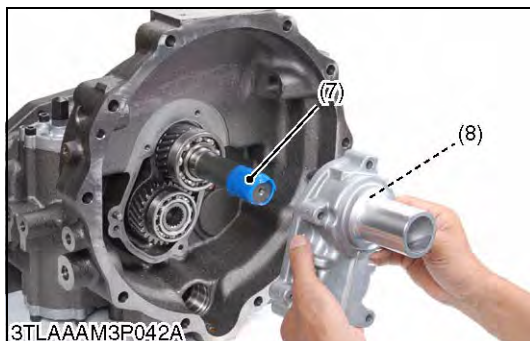
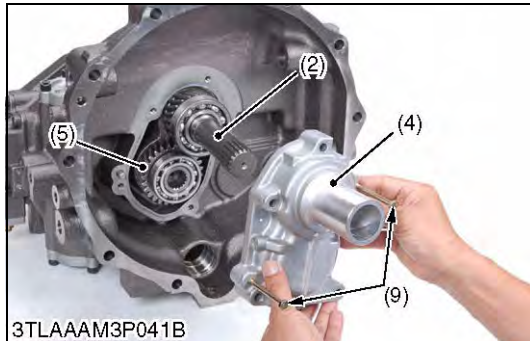
1. Remove the shaft case mounting bolts (3).
2. Screw down the two M6 screw into the bolt hole (1) of the input shaft case (4) and pull it out.
3. Remove the input shaft case (4).
4. Remove the 23T input gear shaft (2).

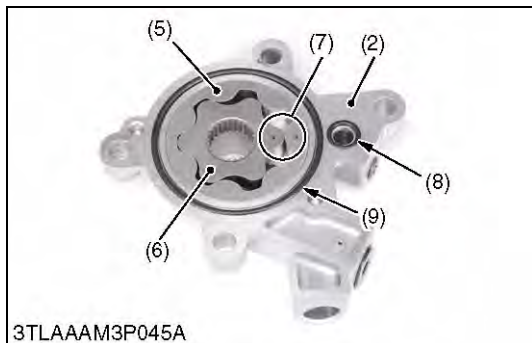
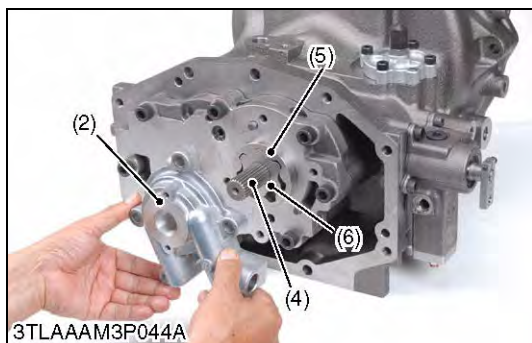
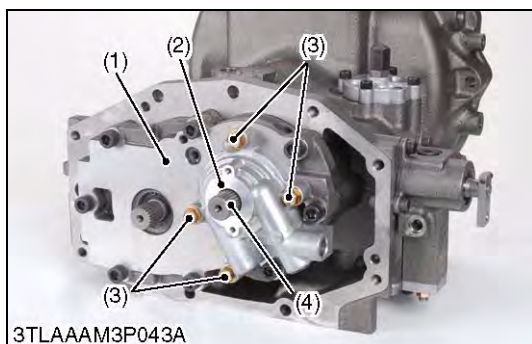
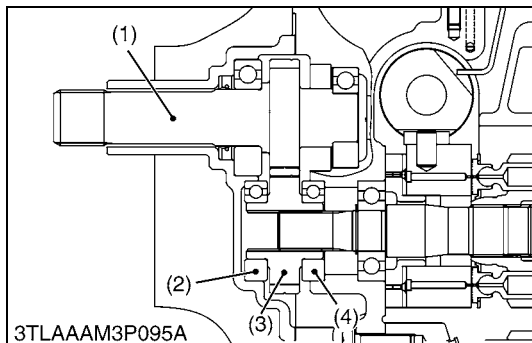
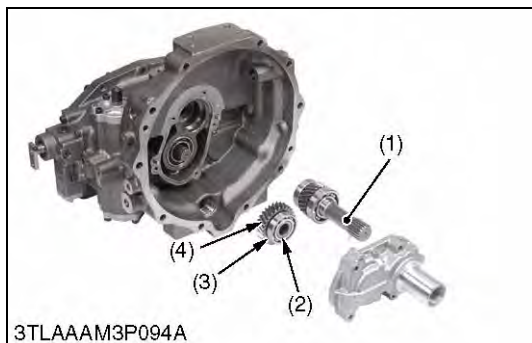
#### **(When reassembling)**

- Be sure to install the gasket between the shaft case and the HST housing case.
- Do not damage the oil seal using the vinyl tape to the 23T input gear shaft.
- Apply grease to the oil seal.

- |                          |                    |
|--------------------------|--------------------|
| (1) Bolt Hole            | (6) HST Pump Shaft |
| (2) 23T Input Gear Shaft | (7) Vinyl Tape     |
| (3) Bolt                 | (8) Oil Seal       |
| (4) Input Shaft Case     | (9) Jack Bolt      |
| (5) 27T HST Gear         |                    |

9Y1211012TRS0111US0





### HST Gear and Bearing

1. Remove the 27T HST gear (3) with the bearings (2), (4) from the HST housing case.
2. Remove the ball bearing (2) and the bearing (4) from the 27T HST gear (3).

#### NOTE

- Since the size of the ball bearing (2) and the bearing (4) is same, identify the difference as shown in the figure.
- The bearing installed in front of the 27T HST gear is a standard ball bearing. The bearing install at the 27T HST gear rear side is a bearing with the brown plastic retainer.

#### (When reassembling)

- Install the bearings (2), (4) to the 27T HST gear (3).
- Install the 27T HST gear (3) with the bearings (2), (4) to the HST housing case.

- (1) 23T Input Gear Shaft  
(2) Ball Bearing (08101-06007)

- (3) 27T HST Gear  
(4) Bearing (6007RSH2, 36920-40091, Brown Plastic Retainer)

9Y1211012TRS0112US0

### Charge Pump

1. Remove the charge pump mounting bolts (3).
2. Remove the charge pump case (2).
3. Remove the rotors (5), (6) from the charge pump case (2).

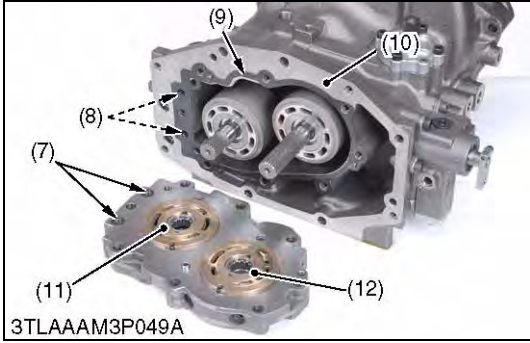
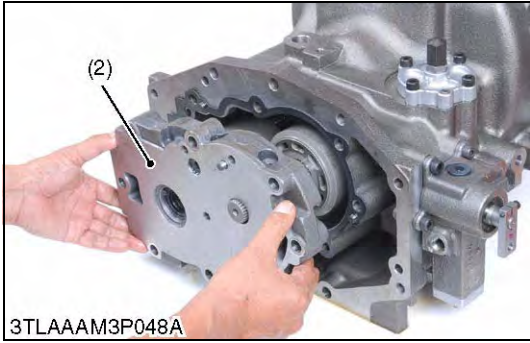
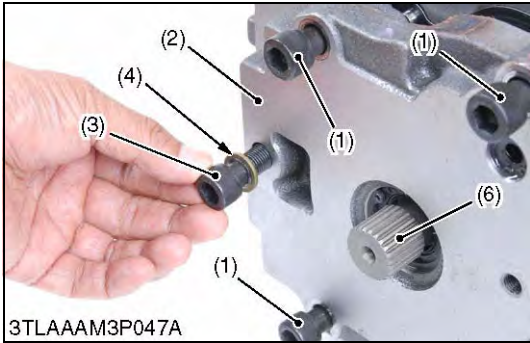
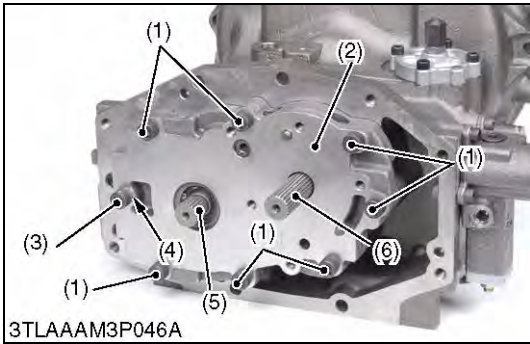
#### (When reassembling)

- Align the alignment mark of the rotors.
- Check the O-rings for damage.

Tightening torque	Charge pump case mounting bolt (M10)	48 to 56 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
-------------------	--------------------------------------	---

- (1) Port Block Cover  
(2) Charge Pump Case  
(3) Bolt  
(4) HST Pump Shaft  
(5) Outer Rotor  
(6) Inner Rotor  
(7) Alignment Mark  
(8) O-ring  
(9) O-ring

9Y1211012TRS0113US0



**Port Block**

1. Remove the port block mounting hex. head screws (1).
2. Pull and remove the port block (2).
3. Remove the gasket between port block (2) and the HST housing case (10).

**(When reassembling)**

- Install the washer with rubber to the original position. Do not damage the washer with rubber.
- Install the O-ring to the original positions.

**■ IMPORTANT**

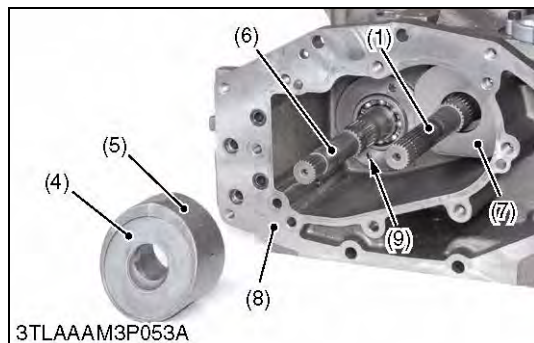
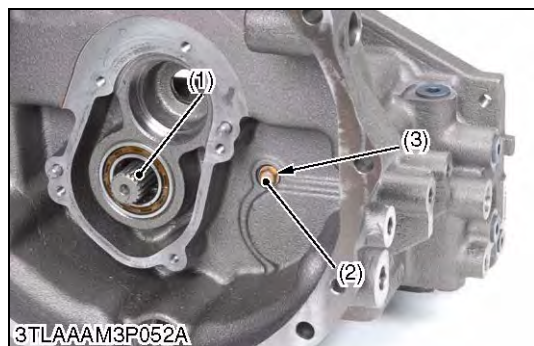
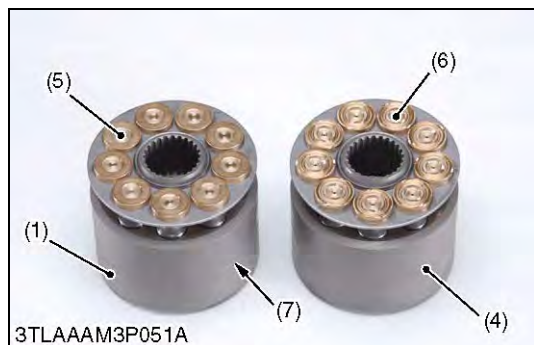
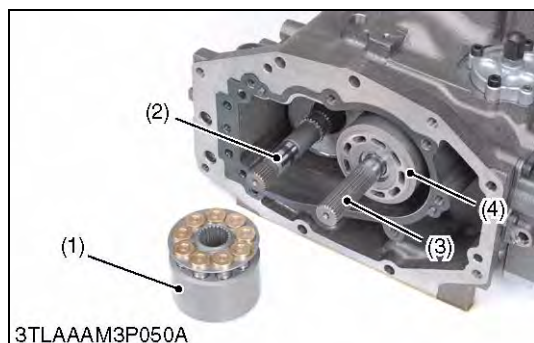
- **Valve plates (11), (12) may stick to the port block (2), but they are not fixed. Be careful not to drop them.**
- **And these valve plates (11), (12) are not interchangeable.**

Tightening torque	Port block mounting hex. head screw (without seal washer)	103 to 118 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Port block mounting hex. head screw (with seal washer)	31 to 36 N·m 3.2 to 3.7 kgf·m 23.1 to 26.8 lbf·ft

- |   |                          |
|---|--------------------------|
| (1) Hex. Head Screw (without Seal Washer) | (6) Pump Shaft           |
| (2) Port Block                            | (7) O-ring               |
| (3) Hex. Head Screw (with Seal Washer)    | (8) O-ring               |
| (4) Seal Washer                           | (9) Gasket               |
| (5) Motor Shaft                           | (10) HST Housing Case    |
|   | (11) Valve Plate (Motor) |
|   | (12) Valve Plate (Pump)  |

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### Cylinder Block Assemblies

1. Remove the cylinder block assemblies (1), (4) with pistons (5), (6).

#### (When reassembling)

- Apply clean transmission oil to cylinder blocks.

#### NOTE

- Be careful not to damage the surface of the cylinder blocks and the pistons.
- Do not interchange the pistons between the pump and the motor cylinder block.

- (1) Cylinder Block (Motor)  
(2) Motor Shaft  
(3) Pump Shaft  
(4) Cylinder Block (Pump)

- (5) Piston (Motor)  
(6) Piston (Pump)  
(7) Identification Groove (Motor)

9Y1211012TRS0115US0

### Motor Shaft

1. Remove the motor swashplate setting bolt (2).
2. Remove the motor swashplate from the motor shaft (6).
3. Remove the motor shaft (6) with the ball bearing from the HST housing case (8).

#### (When reassembling)

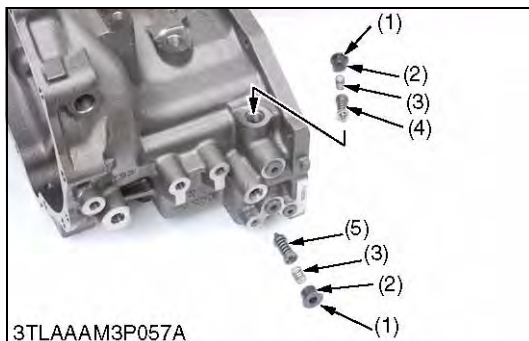
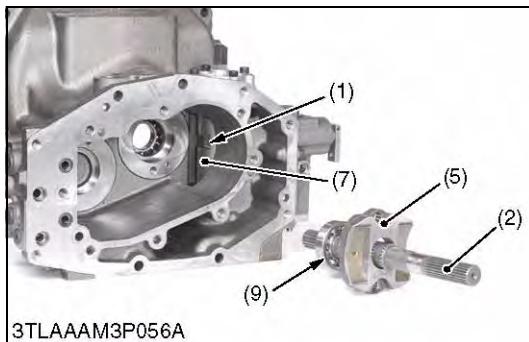
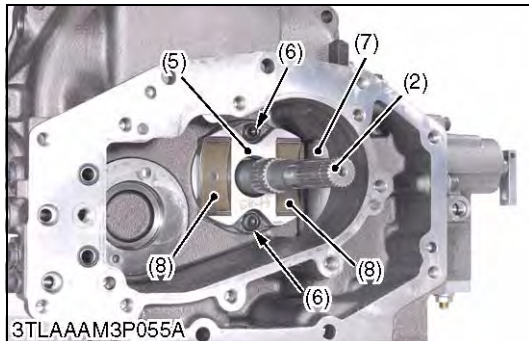
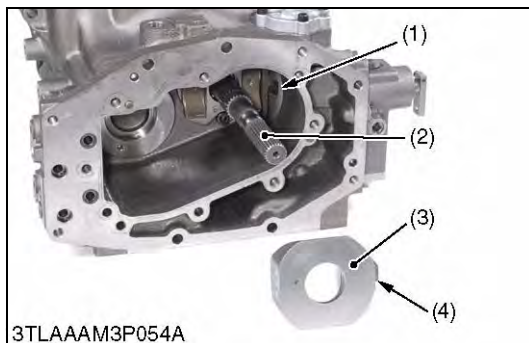
- Be sure to install the thrust plate to the swashplate.
- When installing the swashplate to the HST housing case, be sure to align the straight pin of the swashplate and the hole of the HST housing case.
- Don't damage the seal washer.

Tightening torque	Swashplate setting bolt	24 to 28 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
-------------------	-------------------------	---

- (1) Pump Shaft  
(2) Bolt  
(3) Seal Washer  
(4) Thrust Plate  
(5) Swashplate (Motor)

- (6) Motor Shaft  
(7) Swashplate (Pump)  
(8) HST Housing Case  
(9) Hole (for Straight Pin)

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### Swashplate and Pump Shaft

1. Remove the swashplate (3) from the pump shaft (2).
2. Remove the cradle bearing bracket mounting hex. head screws (6).
3. Tap the pump shaft (2) with a plastic hammer slightly to slide out it with cradle bearing bracket (5) and the ball bearing (9) to the rear side.

#### (When reassembling)

- Tighten the cradle bearing bracket mounting hex. head screws to the specified tightening torque.
- Place the swashplate (3) to the pump shaft (2), and align the slot guide (4) of the swashplate (3) and the groove (1) of the servo piston (7).
- Apply clean transmission oil to the surface of the swashplate (3) and the cradle bearing (8).

Tightening torque	Cradle bearing bracket mounting hex. head screw	61 to 71 N·m 6.2 to 7.2 kgf·m 44.8 to 52.1 lbf·ft
-------------------	---	---

- |                            |   |
|----------------------------|---|
| (1) Groove                 | (6) Cradle Bearing Bracket Mounting Hex. Head Screw |
| (2) Pump Shaft             | (7) Servo Piston                                    |
| (3) Swashplate (Pump)      | (8) Cradle Bearing                                  |
| (4) Slot Guide             | (9) Ball Bearing                                    |
| (5) Cradle Bearing Bracket |   |

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### Check and High Pressure Relief Valve

1. Remove the hex. head plug (1) and remove the spring (3) and the relief valve assembly (4), (5).

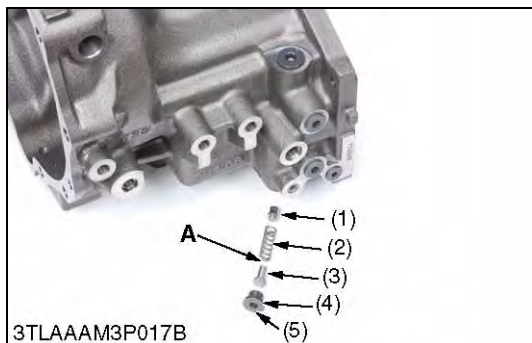
#### (When reassembling)

- Be careful not to damage O-ring on the plug (1).

Tightening torque	Check and high pressure relief valve hex. head plug (G1/2)	59 to 78 N·m 6.0 to 8.0 kgf·m 43.4 to 57.9 lbf·ft
-------------------	--	---

- |                           |   |
|---------------------------|---|
| (1) Hex. Head Plug (G1/2) | (4) Check and High Pressure Relief Valve Assembly (Reverse) |
| (2) O-ring                | (5) Check and High Pressure Relief Valve Assembly (Forward) |
| (3) Spring                |   |

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### Charge Relief Valve

1. Remove the hex. head plug (5).
2. Remove the spring guide (3), the shim (if installed), the spring (2) and the valve poppet (1).

#### NOTE

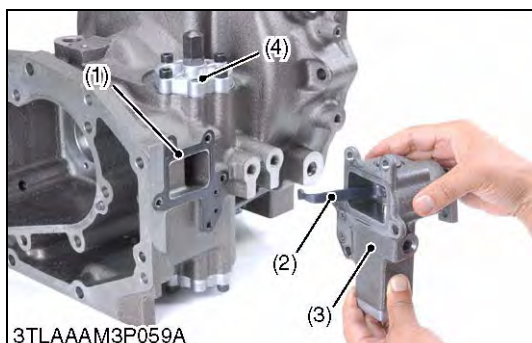
- Install the valve component, noting the number of the shims in the charge relief valve.
- Be careful not to damage O-ring.
- When replacing the charge relief valve, check and adjust the charge relief valve setting pressure. (See page 3-S22.)

Tightening torque	Charge relief valve hex. head plug (G3/8)	49 to 59 N·m 5.0 to 6.0 kgf·m 36.2 to 43.4 lbf·ft
-------------------	---	---

- (1) Poppet  
(2) Spring  
(3) Spring Guide

- (4) O-ring  
(5) Plug (GPF 3/8)  
**A: Shim (If Shim is Installed)**

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### Servo Regulator Assembly

1. Remove the regulator mounting hex. head screws.
2. Remove the servo regulator assembly (3) from the HST housing case.

#### (When reassembling)

- Place a new gasket on the HST housing case.
- Align the feedback lever (2) of the servo regulator and the groove of the servo piston securely. And install the servo regulator assembly (3) to the HST housing case.

#### NOTE

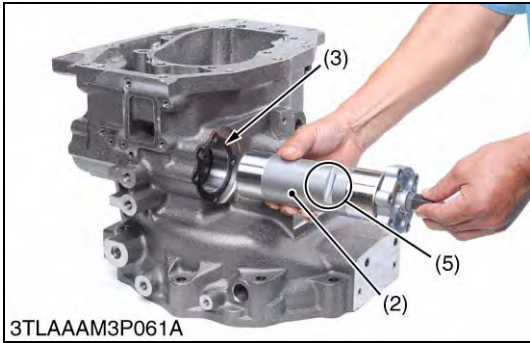
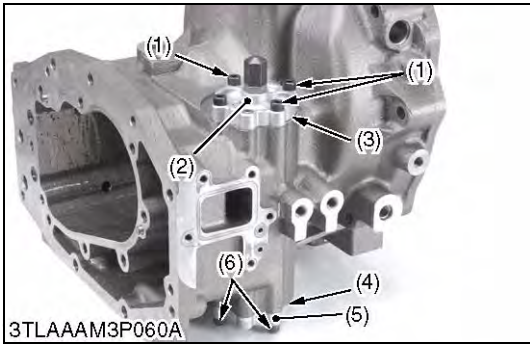
- Since the servo regulator assembly has been factory adjusted, do not disassemble the servo regulator assembly.

Tightening torque	Servo regulator assembly mounting hex. head screw (M8)	29 to 34 N·m 3.0 to 3.5 kgf·m 21.7 to 25.3 lbf·ft
-------------------	--	---

- (1) Gasket  
(2) Feedback Lever

- (3) Servo Regulator Assembly  
(4) Servo Piston

9Y1211012TRS0120US0



**Servo Piston Assembly**

- 1. Remove the servo piston assembly mounting hex. head screws (1).
- 2. Remove the servo piston under cover mounting hex. head screws (6).
- 3. Remove the servo piston assembly (2).

**(When reassembling)**

**NOTE**

- Be careful not to do damage the surface of servo piston.
- Place the gaskets (3), (4) between the servo piston assembly and the HST housing case.

**IMPORTANT**

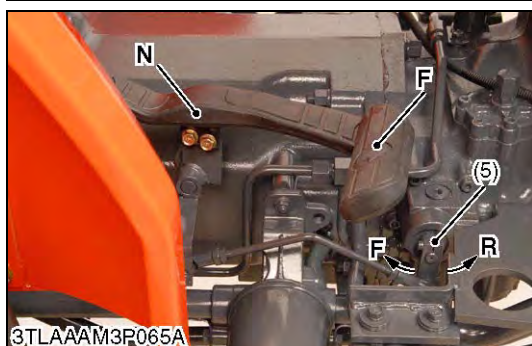
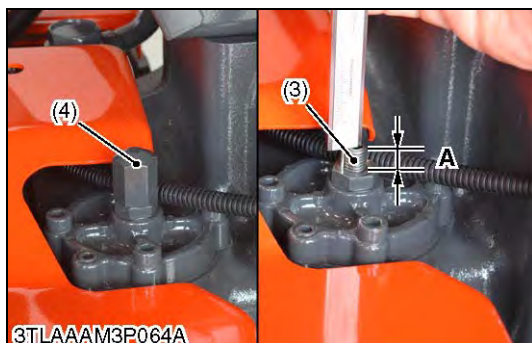
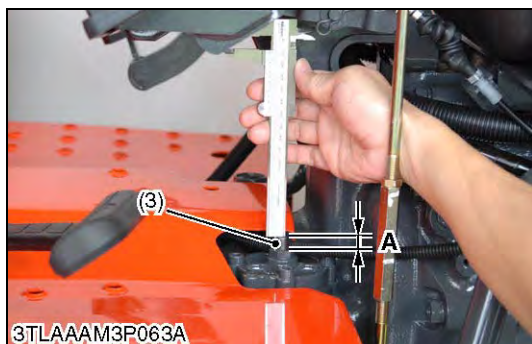
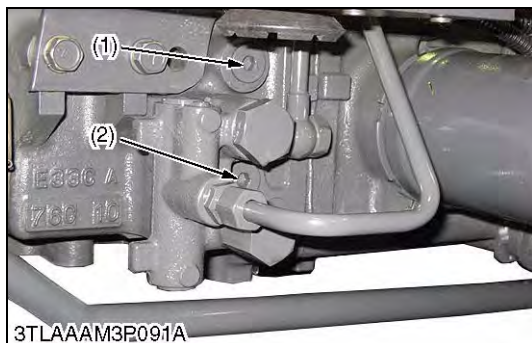
- When disassembling the servo piston, be sure to adjust the neutral position of the HST, following to "Adjusting Neutra" on page 3-S23.

Tightening torque	Servo piston and under cover mounting hex. head screw (M10)	61 to 71 N·m 6.2 to 7.2 kgf·m 44.7 to 52.1 lbf·ft
-------------------	---	---

- |   |   |
|---|---|
| (1) Servo Piston Mounting Hex. Head Screw (M10) | (4) Gasket  |
| (2) Servo Piston Assembly                       | (5) Servo Piston Under Cover                                |
| (3) Gasket                                      | (6) Servo Piston Under Cover Mounting Hex. Head Screw (M10) |

9Y1211012TRS0121US0





## 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 tractor rear axle and set the front drive lever to "2WD" position.
1. Remove the hex. head plug from the HST housing case.
  2. Install the adaptor C (PT3/8) (07916-50371) and the thread joint (07916-50341) to the check port of the HST housing case.
  3. Start the engine and measure the low and the high HST charge pressure.
  4. 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 (3).
  5. Start the engine and measure the low and the high charge pressures. Then adjust the piston neutral position so that the low-side pressure and the high-side pressure one be the same. Measure the charge pressure will setting the engine revolution at MAX. Move the servo valve lever (5) and watch the rear tires' movement to ensure the neutral positioning.
  6. Finally lock the servo piston adjusting nut.

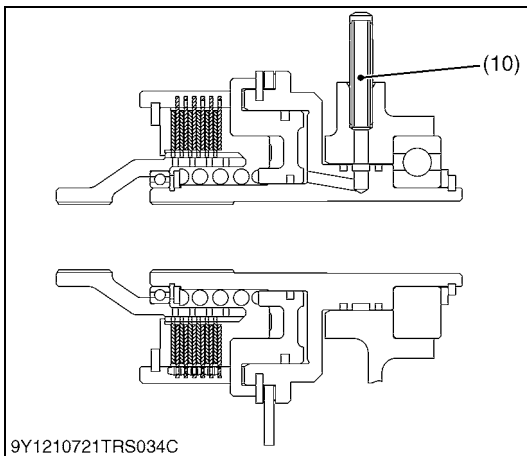
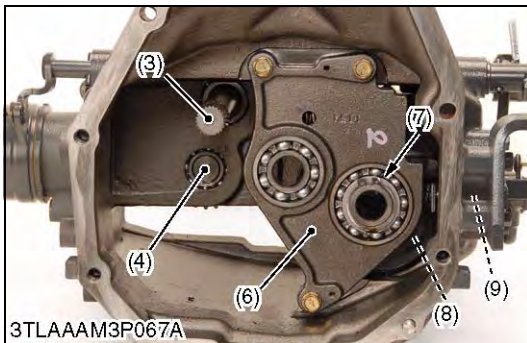
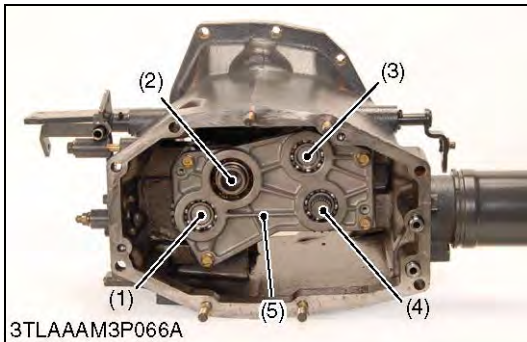
Charge pressure (Oil temperature 50 to 60 °C (122 to 140 °F))	Factory specification	2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm <sup>2</sup> 334 to 384 psi
---	-----------------------	--

### (Reference)

- Dimension "A": 10.55 mm (0.415 in.)

- |                              |                                  |
|------------------------------|----------------------------------|
| (1) Hex. Head Plug (Reverse) | <b>F:</b> Forward                |
| (2) Hex. Head Plug (Forward) | <b>N:</b> Neutral                |
| (3) Adjusting Screw          | <b>R:</b> Reverse                |
| (4) Adjusting Screw Cap      | <b>A:</b> Adjusting screw height |
| (5) Servo Valve Lever        |                                  |

9Y1211012TRS0122US0

**[B] Mid Case****Mid Case Bearing Holder and Gear Shafts**

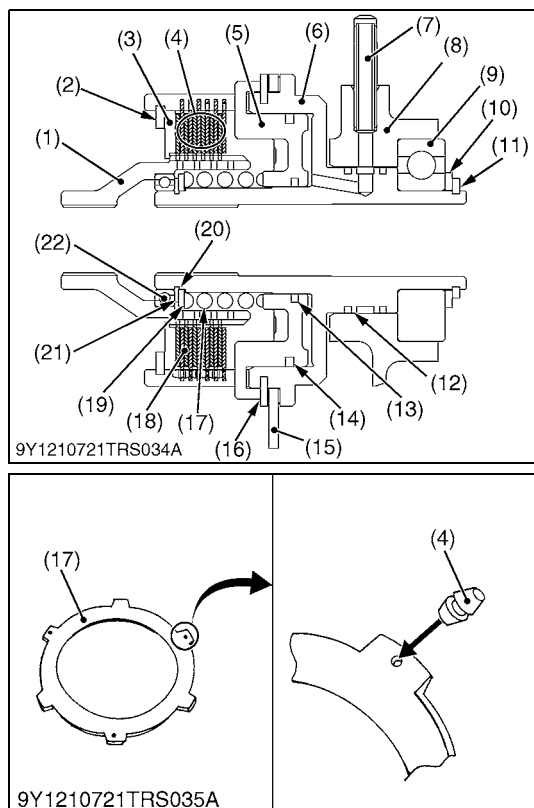
1. Remove the bearing holder mounting bolts.
2. Remove the mid case bearing holder (5).
3. Remove the shafts (1), (2), (3), (4).
4. Remove the PTO clutch valve (9) from the mid case.
5. Remove the independent PTO bearing holder mounting bolts.
6. Remove the independent PTO clutch bearing holder (6) with PTO clutch pack (8).

**(When reassembling)**

- Replace the oil pipe with a new one.

- |                             |                               |
|-----------------------------|-------------------------------|
| (1) 25T PTO Counter Shaft   | (6) PTO Clutch Bearing Holder |
| (2) 15T PTO Gear Shaft      | (7) Bearing                   |
| (3) 18T Counter Shaft       | (8) PTO Clutch Pack           |
| (4) 25T Gear Shaft          | (9) PTO Clutch Valve          |
| (5) Mid Case Bearing Holder | (10) Oil Pipe                 |

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### Disassembling PTO Clutch Assembly

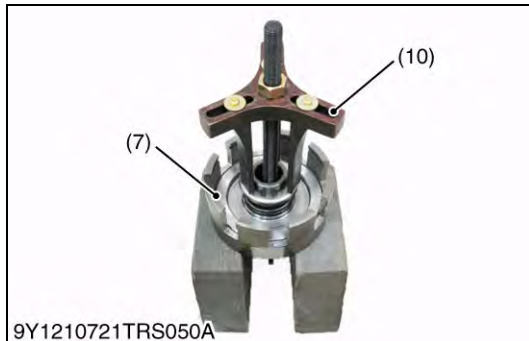
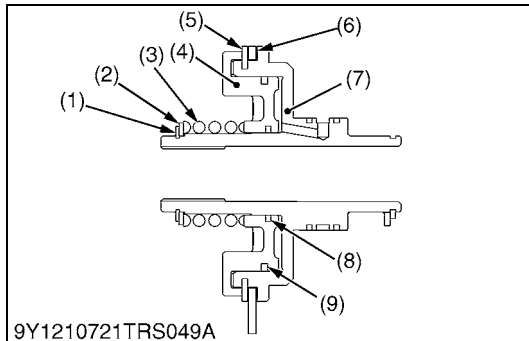
1. Remove the snap ring (2) and the back plate (3).
2. Remove the clutch hub (1), the plates (17) and the disks (18) from the PTO clutch case (6).
3. Remove the cir-clip (11).
4. Remove the hydraulic pipe (7) from the bearing case (8).

### (When reassembling)

- Install the clutch disks (18) and plates (17) mutually.
- Do not confuse the back plate (3) and the plates (17). The back plate (3) is thicker than the plates (17).
- Assemble the rubbers (4) portion of the plates (17) are same positions while assembling them.
- Replace the seal ring with new one.

- |                     |                   |
|---------------------|-------------------|
| (1) Clutch Hub      | (12) Seal Ring    |
| (2) Snap Ring       | (13) Inner D-ring |
| (3) Back Plate      | (14) Outer D-ring |
| (4) Rubber          | (15) Brake disk   |
| (5) Piston          | (16) Brake plate  |
| (6) PTO Clutch Case | (17) Plate        |
| (7) Hydraulic Pipe  | (18) Disk         |
| (8) Bearing Case    | (19) Washer       |
| (9) Ball Bearing    | (20) Snap Ring    |
| (10) Plate          | (21) Shim         |
| (11) Cir-clip       | (22) Ball Bearing |

9Y1211012TRS0124US0



### Removing Piston and PTO Brake Disk

1. Depress the return spring (3) by using a jig (10).
2. Remove the cir-clip (1) from the PTO clutch case (7).
3. Remove the piston (4).
4. Remove the brake plate (5) and the brake disk (6).

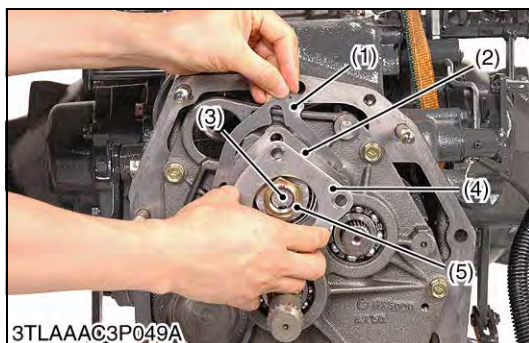
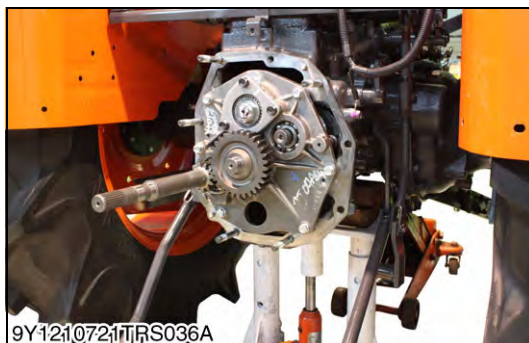
#### (When reassembling)

- Replace the inner D-ring with a new one.
- Replace the outer D-ring with a new one.

- |                   |                  |
|-------------------|------------------|
| (1) Cir-clip      | (6) Brake Disk   |
| (2) Washer        | (7) Clutch Case  |
| (3) Return Spring | (8) Inner D-ring |
| (4) Piston        | (9) Outer D-ring |
| (5) Brake Plate   | (10) Jig         |

9Y1211012TRS0098US0

## [C] Transmission Case



### Pinion Bearing Cover

1. Remove the stake of lock nut (5).
2. Fix the 37T-22T gear by pinion locking tool (Code No. 07916-52311) 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)

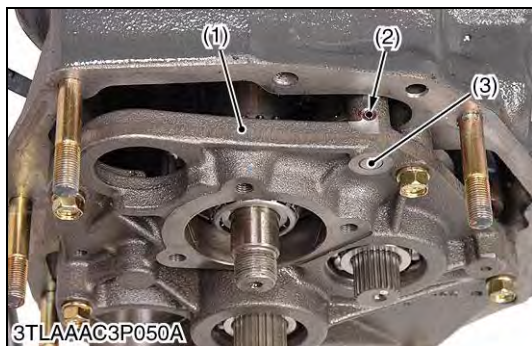
- Make sure of the number of shims in the pinion bearing case.
- Replace the lock nut (5) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

Tightening torque	Lock nut	147 to 196 N·m 15 to 20 kgf·m 109 to 145 lbf·ft
	Pinion bearing case mounting screw	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 lbf·ft

- |                                    |                          |
|------------------------------------|--------------------------|
| (1) Shim                           | (4) Pinion Bearing Cover |
| (2) Pinion Bearing Case            | (5) Lock Nut             |
| (3) Spiral Bevel Pinion Gear Shaft |                          |

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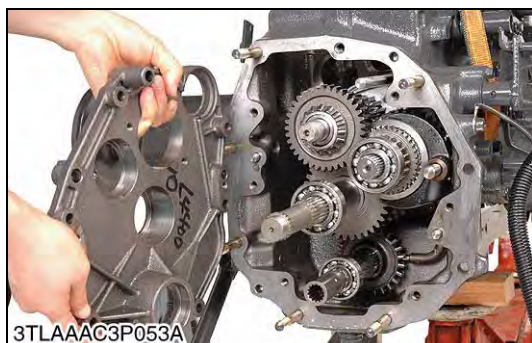
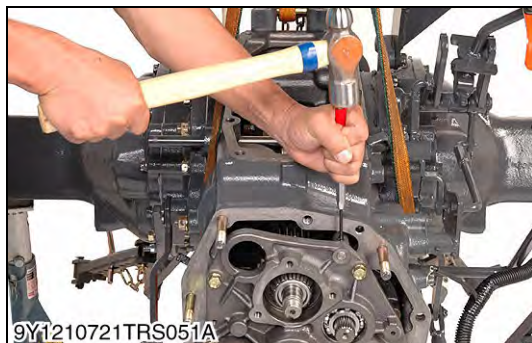
### **Transmission Bearing Holder**

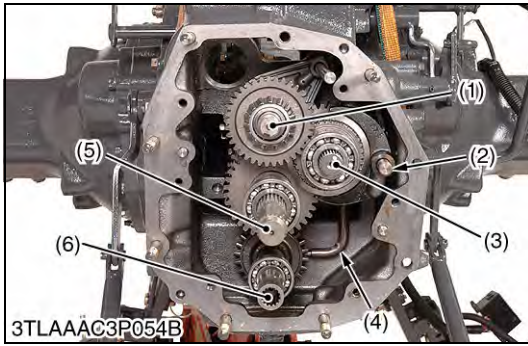
1. Remove spring pin (2) holding hi-shift fork rod (3) to transmission bearing holder (1).
2. Remove transmission bearing holder by using 2 jack screws M8 (4).

(1) Transmission Bearing Holder  
(2) Spring Pin

(3) Hi-Shift Fork Rod  
(4) Jack Screws M8

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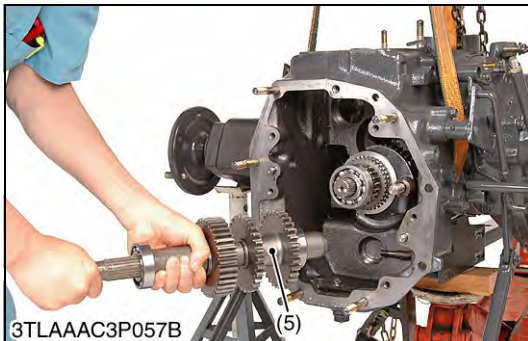
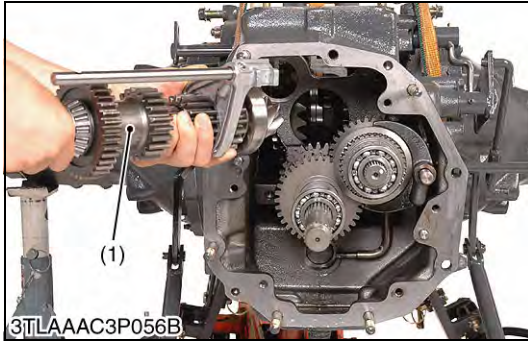


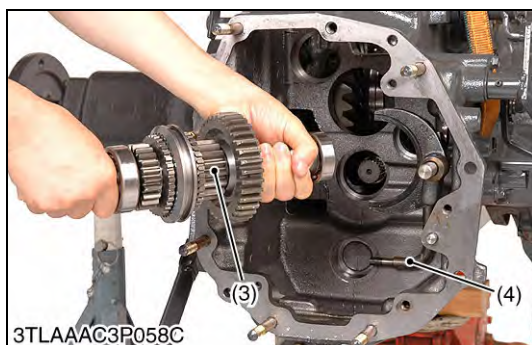
### Shaft Assemblies

1. Remove front wheel drive gear shaft assembly (6).
2. Remove pinion gear shaft assembly (1).
3. Remove PTO gear shaft assembly (5).

- |                                   |   |
|-----------------------------------|---|
| (1) Pinion Gear Shaft Assembly    | (5) PTO Gear Shaft Assembly               |
| (2) Hi-Lo Gear Shift Fork Rod     | (6) Front Wheel Drive Gear Shaft Assembly |
| (3) Hi-Lo Gear Shaft Assembly     |   |
| (4) Front Wheel Drive Shift Lever |   |

**(To be continued)**

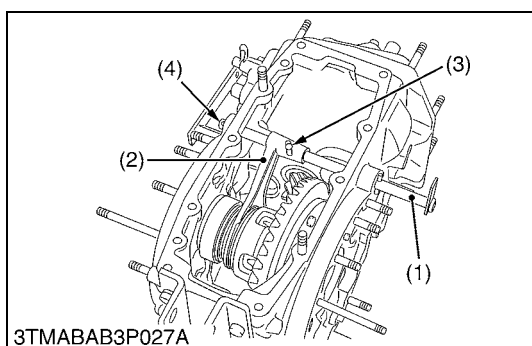
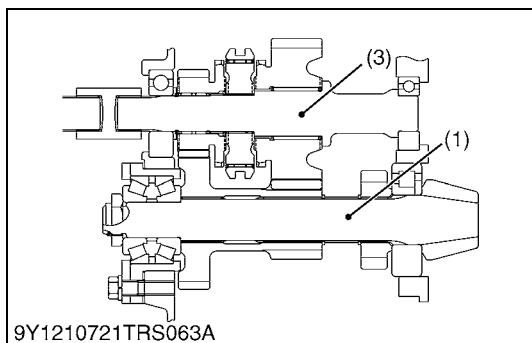


**(Continued)**

4. Remove the Hi-Lo gear shaft assembly (3).
5. Remove the Hi-Lo gear fork rod (2) and the front wheel drive shift lever (4).

- |                                |                                   |
|--------------------------------|-----------------------------------|
| (1) Pinion Gear Shaft Assembly | (3) Hi-Lo Gear Shaft Assembly     |
| (2) Hi-Lo Gear Shift Fork Rod  | (4) Front Wheel Drive Shift Lever |

9Y1211012TRS0101US0

**Differential Lock Shift Fork**

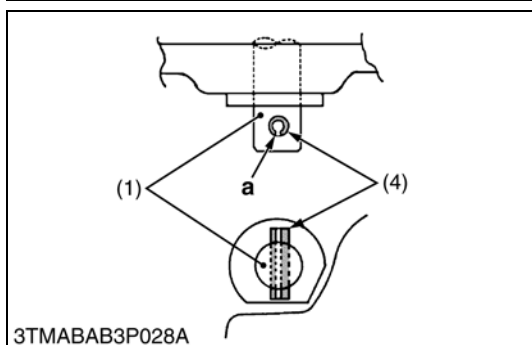
1. Tap out the left side spring pin (4).
2. Remove the cotter pin and remove the clevis pin (3).
3. Draw out the differential lock fork shaft (1) and remove the differential lock shift fork (2).

**(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 | <b>a: Split Portion</b> |
| (2) Differential Lock Shift Fork |                         |
| (3) Clevis Pin                   |                         |
| (4) Spring Pin                   |                         |

9Y1211012TRS0102US0

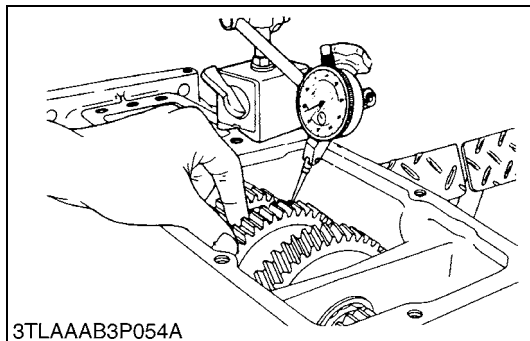


## 6. SERVICING

### [1] L3301/L3901

#### (1) Clutch Housing Case

#### [A] Manual Transmission Model

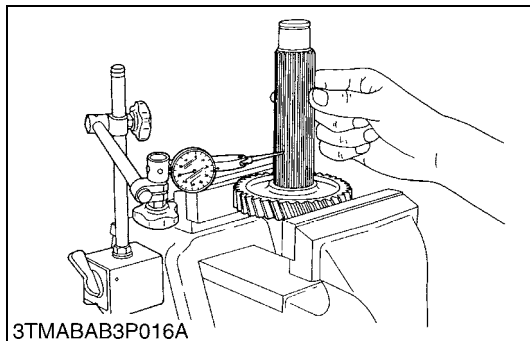


#### Gear Backlash

1. Set a dial indicator (lever type) on one of the tooth faces.
2. Clamp the mating gear.
3. Measure backlash by turning the gear to be measured.
4. If the reading exceeds the allowable limit, replace the gear.

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0

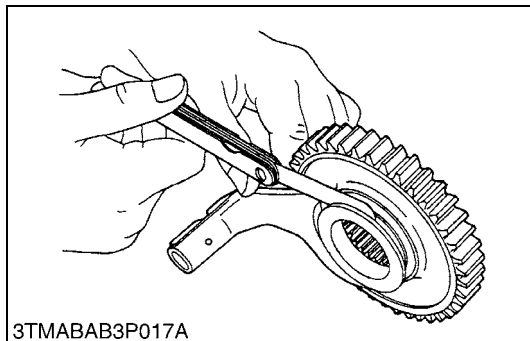


#### Clearance between Gear and Spline

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.

9Y1211012TRS0130US0

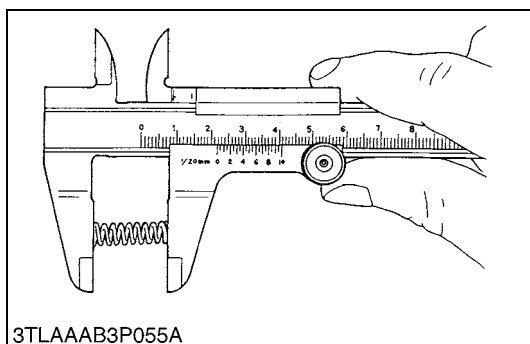


#### Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

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	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.
Clearance between shift fork and shifter groove	Factory specification	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

9Y1211012TRS0131US0



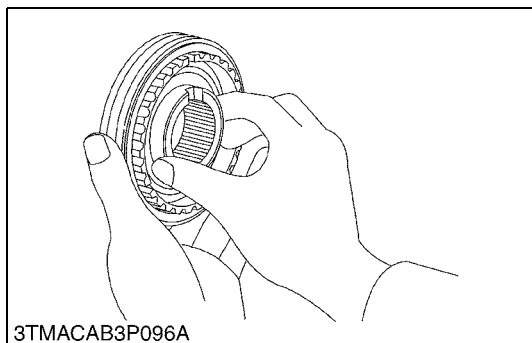
#### Free Length of the Shift Fork Spring

1. Measure free length of spring with vernier caliper.
2. If the free length is less than the allowable limit, replace.

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

9Y1211012TRS0132US0

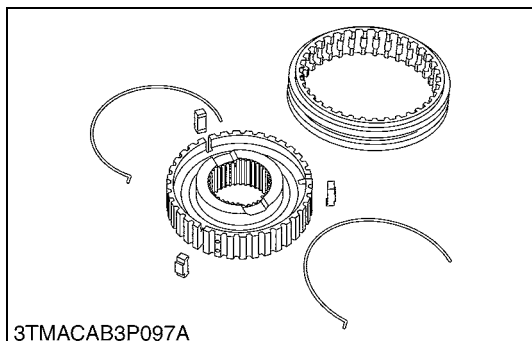




### Checking Contact between Coupling and Shifter

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.

9Y1211012TRS0133US0

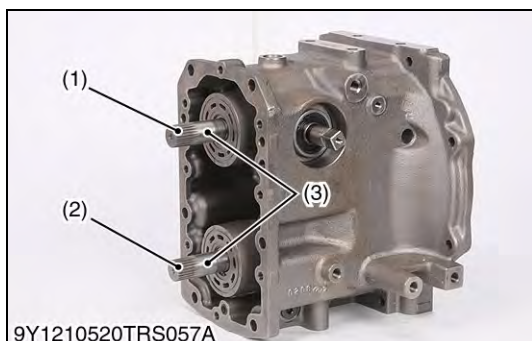


### Flaw on synchronizer Key and Spring

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.

9Y1211012TRS0134US0

## **[B] HST Model**



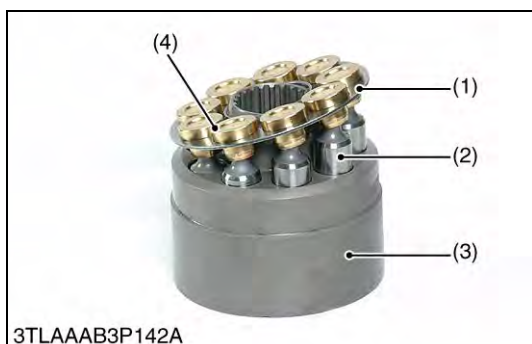
### Pump Shaft and Motor Shaft

1. Check the oil seal surface (3).
2. If the pump shaft (1) and motor shaft (2) are rough or groove, replace them.

(1) Pump Shaft  
(2) Motor Shaft

(3) Oil Seal Surface

9Y1211012TRS0135US0



### 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.
4. Check the slipper (4) for flatness.
5. If rounded, replace.

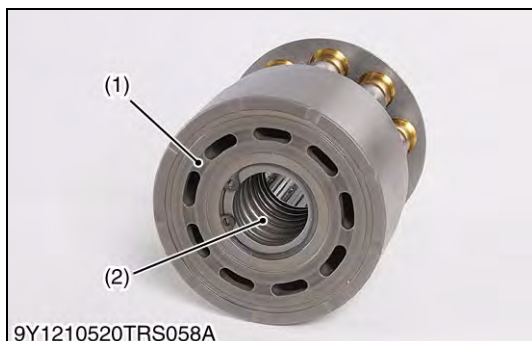
### **■ IMPORTANT**

- Do not interchange pistons between pump and motor cylinder block.

(1) Retainer Plate  
(2) Piston

(3) Cylinder Block  
(4) Piston Slipper

9Y1211012TRS0136US0



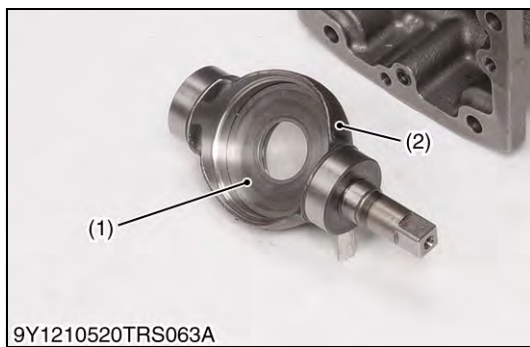
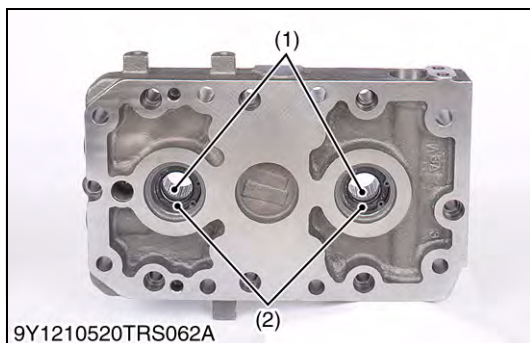
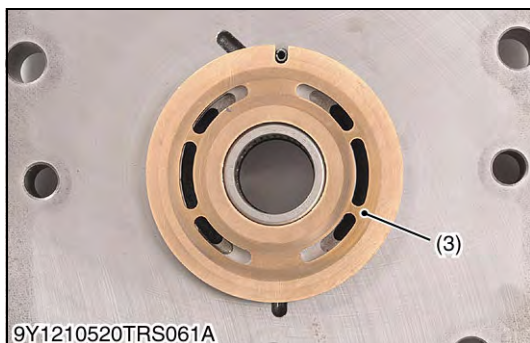
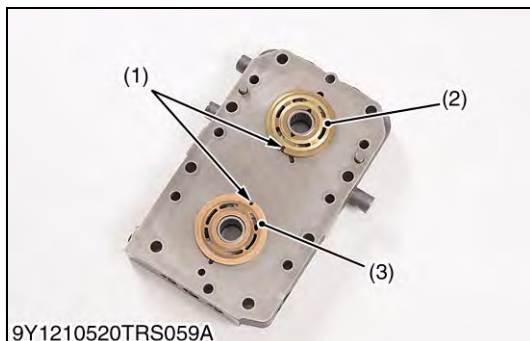
### Cylinder Block Face

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

9Y1211012TRS0137US0



### 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. (Operate 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 Side)

- (3) Valve Plate (Motor Side)

9Y1211012TRS0138US0

### 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

9Y1211012TRS0139US0

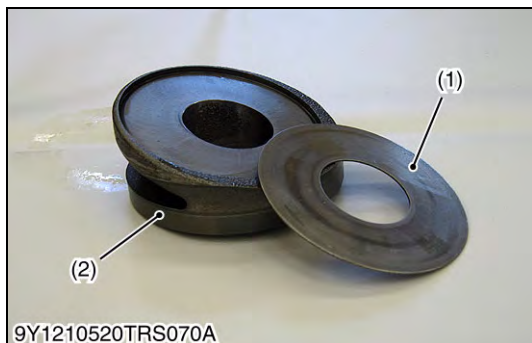
### Thrust Plate and Trunnion

1. Check the piston contact face of the thrust plate (1), and the thrust plate contact face of trunnion (2) for scratches and excessive wear.
2. If the thrust plate (1) and the trunnion (2) are worn and scored, replace them.

- (1) Thrust Plate

- (2) Trunnion

9Y1211012TRS0140US0



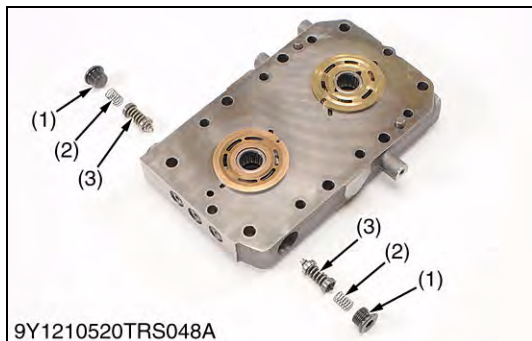
### Thrust Plate and Swashplate

1. Check the piston contact face of the thrust plate (1), and the thrust plate contact face of the swashplate (2) for scratches and excessive wear.
2. If the thrust plate (1) and the swashplate (2) are worn and scored, replace them.

(1) Thrust Plate

(2) Swashplate

9Y1211012TRS0141US0



### Check and High Pressure Relief Valve

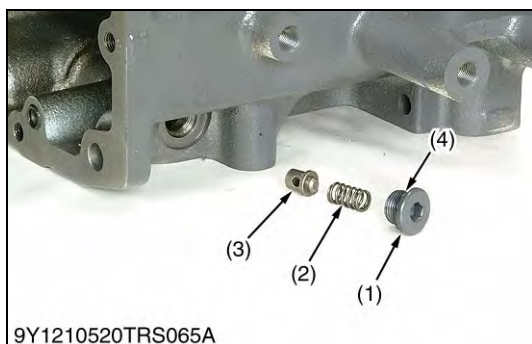
1. Check the spring (2) and check and high pressure relief valve (3) for scratches and damage.
2. Check the valve seal in the port block cover for damage.
3. If anything is unusual, replace the check and high pressure relief valve as an assembly.

(1) Hex. Head Plug

(3) Check and High Pressure Relief Valve

(2) Spring

9Y1211012TRS0142US0



### Charge Relief Valve

1. Check the plug (1), O-ring (4), the spring (2) and the valve poppet (3) for scratches, damage and breakage.
2. If anything is unusual, replace it.

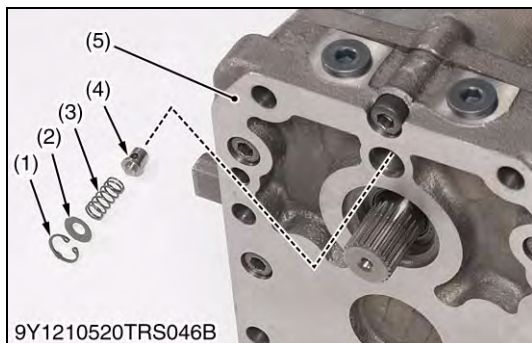
(1) Plug

(3) Valve Poppet

(2) Spring

(4) O-ring

9Y1211012TRS0143US0



### Case Relief Valve

1. Check the spring (3) and the poppet (4) for scratches, damage and breakage.
2. If anything is unusual, replace it.

(1) Internal Cir-clip

(4) Valve Poppet

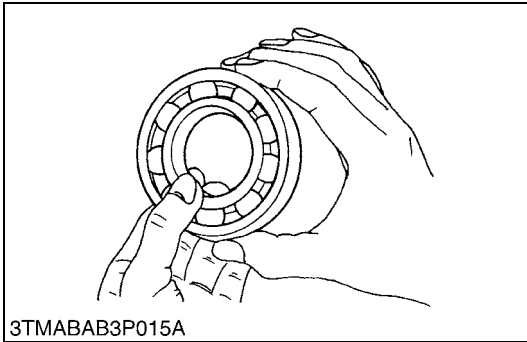
(2) Holder

(5) Port Block

(3) Spring

9Y1211012TRS0144US0

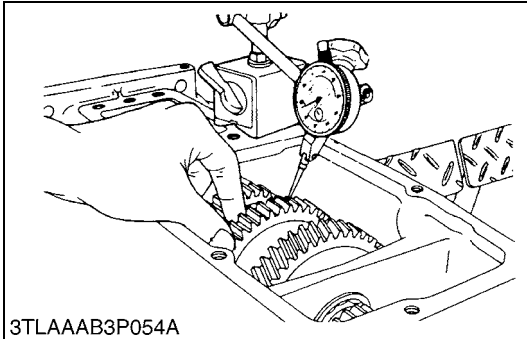
## (2) Transmission Case



### 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.

9Y1211012TRS0145US0

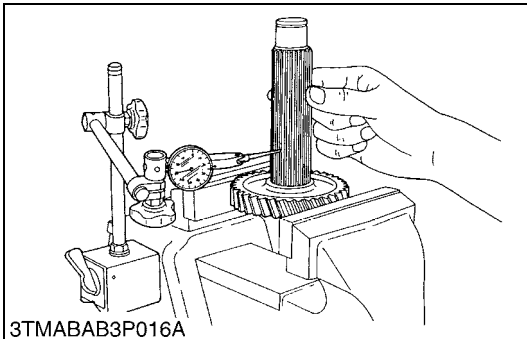


### Gear Backlash

1. Set a dial indicator (lever type) on one of the tooth faces.
2. Clamp the mating gear.
3. Measure backlash by turning the gear to be measured.
4. If the reading exceeds the allowable limit, replace the gear.

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0

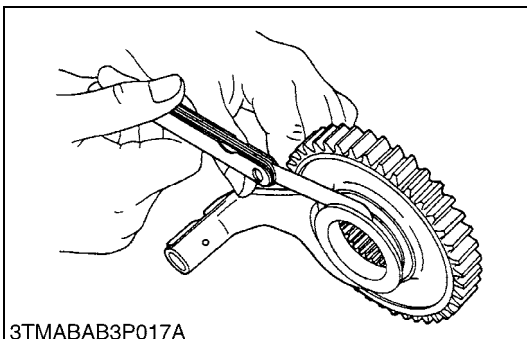


### Clearance between Gear and Spline

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.

9Y1211012TRS0130US0

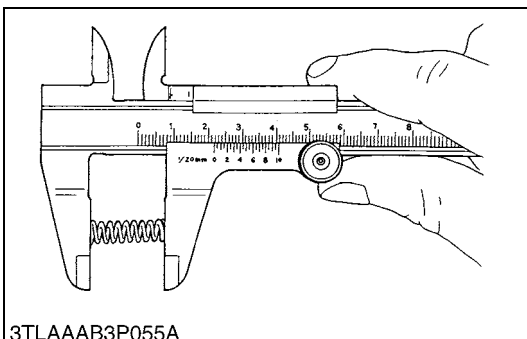


### Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

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	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

9Y1211012TRS0148US0

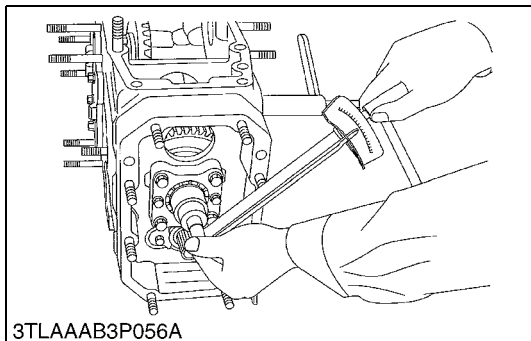


### Free Length of the Shift Fork Spring

1. Measure free length of spring with vernier caliper.
2. If the free length is less than the allowable limit, replace.

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

9Y1211012TRS0132US0

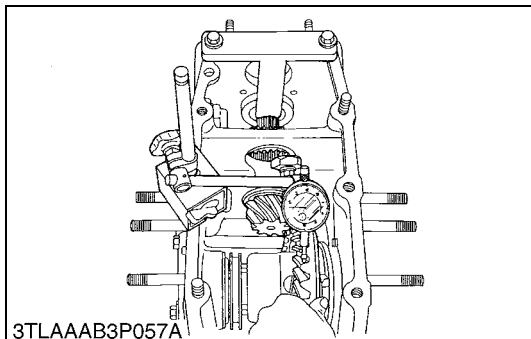


### **Spiral Bevel Pinion Turning Torque (with Differential Gear)**

1. Grip the spiral bevel pinion nut with a torque wrench and measure the turning torque.
2. If the turning torque is not within the factory specifications, check the differential gear turning force, backlash and tooth contact again.

Differential gear rotating torque (Combined)	Factory specification	3.9 to 6.3 N·m 0.40 to 0.6 kgf·m 2.9 to 4.6 lbf·ft
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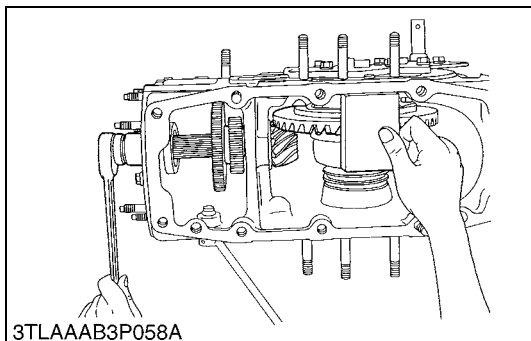
9Y1211012TRS0150US0



### **Backlash and Tooth Contact between Bevel Gear and 6T Spiral Bevel Pinion**

1. Set the dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the 6T spiral bevel pinion and moving the bevel gear by hand.
3. If the backlash exceeds the factory specification, decrease the number of shims at right bearing case (right) and insert the removed shims to the left bearing case (left).  
If the backlash is less than the factory specification, decrease the number of shims at left bearing case (left) and insert the removed shims to the right bearing case (right).
4. Adjust the backlash properly by repeating the above procedures.

Backlash between spiral bevel gear and 8T spiral bevel pinion	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
---	-----------------------	--



5. Apply red lead lightly over several teeth at three positions equally spaced on the bevel gear.
6. Turn the 6T spiral bevel pinion while pressing a wooden piece against the periphery of the bevel gear.
7. Check the tooth contact. If not proper, adjust according to the instructions below.

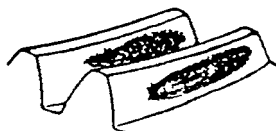
### **(Reference)**

- Thickness of differential side shims:  
0.1 mm (0.004 in.)  
0.2 mm (0.007 in.)  
0.5 mm (0.02 in.)
- Thickness of spiral bevel pinion shims:  
0.1 mm (0.004 in.)  
0.2 mm (0.007 in.)  
0.5 mm (0.02 in.)

9Y1211012TRS0151US0



(A)



3TLAAAB3P059A

**Proper Contact**

More than 35 % red lead contact area on the gear tooth surface.  
The center of tooth contact at 1/3 of the entire width from the small end.

(A) Proper Contact

9Y1211012TRS0152US0

(B)

(C)



3TLAAAB3P060A

**Heel Contact and Tip Contact**

Replace the adjusting shim with thicker one to move the bevel pinion shaft forward.

And place the left side shim to the right to move the bevel gear rightward.

Repeat above until the proper tooth contact and backlash are achieved.

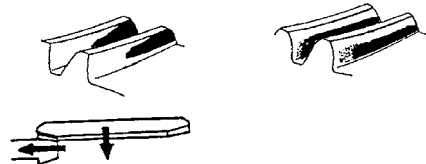
(B) Heel Contact

(C) Tip Contact

9Y1211012TRS0153US0

(D)

(E)



3TLAAAB3P061A

**Toe Contact and Base Contact**

Replace adjusting shim with thicker one to move the bevel pinion shaft forward.

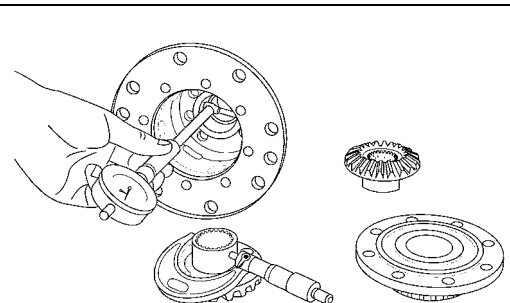
And place the right side shim to the left to move the bevel gear leftward.

Repeat above until the proper tooth contact and backlash are achieved.

(D) Toe Contact

(E) Base Contact

9Y1211012TRS0154US0



3TMABAB3P046A

**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.

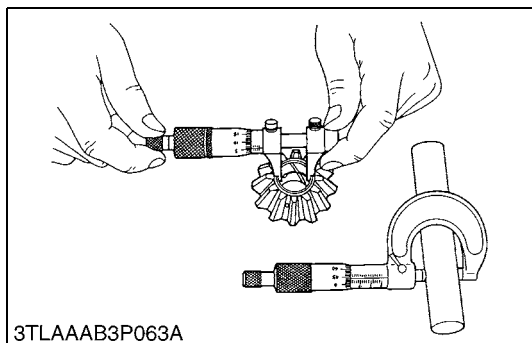
Clearance between differential case bore and differential side gear boss	Factory specification	0.0500 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case bore I.D.	Factory specification	40.500 to 40.562 mm 1.5945 to 1.5969 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

Clearance between differential case cover bore and differential side gear boss	Factory specification	0.090 to 0.169 mm 0.00355 to 0.00665 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case cover bore I.D.	Factory specification	40.540 to 40.580 mm 1.5961 to 1.5976 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

9Y1211012TRS0155US0



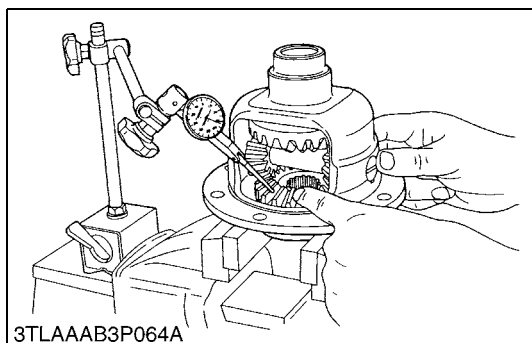
### **Clearance between Differential Pinion Shaft and Differential Pinion**

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	0.0800 to 0.122 mm 0.00315 to 0.00480 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	20.060 to 20.081 mm 0.78977 to 0.79059 in.

9Y1211012TRS0156US0



### **Backlash between Differential Pinion and Differential Side Gear**

1. Secure the differential case in a vise.
2. Set a dial indicator (lever type) on the tooth of the differential side gear.
3. Hold the differential pinion and move the differential side gear to measure the backlash.
4. If the measurement exceeds the allowable limit, 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)**

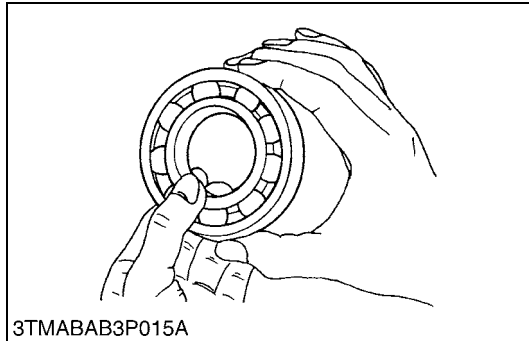
- Thickness of differential side gear washers:
  - 1.5 mm (0.059 in.)
  - 1.6 mm (0.062 in.)
  - 1.7 mm (0.067 in.)
  - 1.8 mm (0.071 in.)
  - 2.0 mm (0.074 in.)

9Y1211012TRS0157US0

## [2] L4701

### (1) Clutch Housing Case

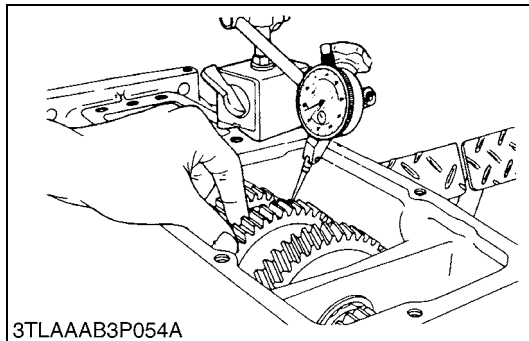
#### [A] Manual Transmission Model



#### 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.

9Y1211012TRS0145US0

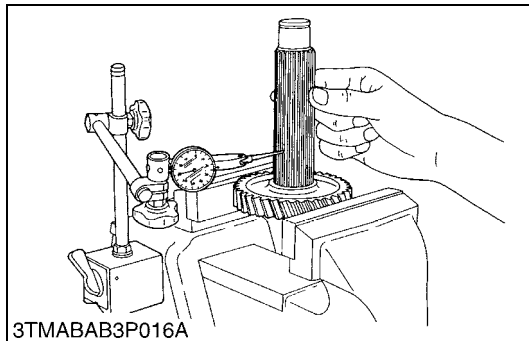


#### Gear Backlash

1. Set a dial indicator (lever type) on one of the tooth faces.
2. Clamp the mating gear.
3. Measure backlash by turning the gear to be measured.
4. If the reading exceeds the allowable limit, replace the gear.

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0

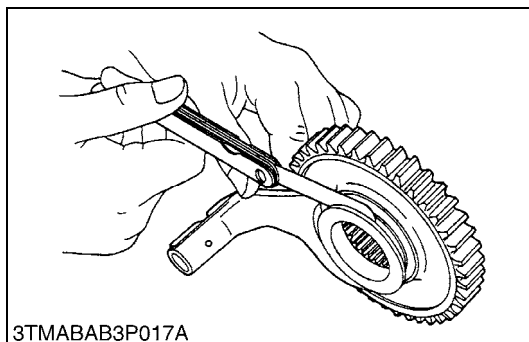


#### Clearance between Gear and Spline

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.

9Y1211012TRS0130US0

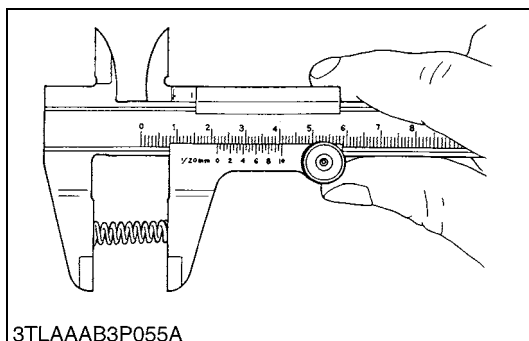


#### Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

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	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

9Y1211012TRS0148US0



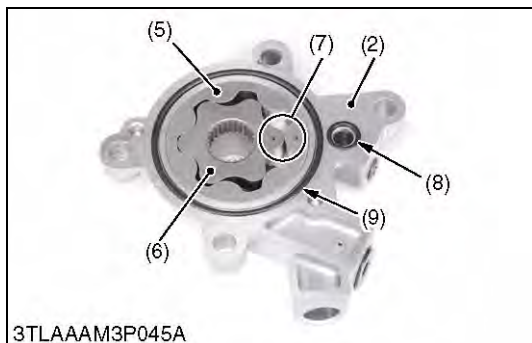
#### Free Length of the Shift Fork Spring

1. Measure free length of spring with vernier caliper.
2. If the free length is less than the allowable limit, replace.

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

9Y1211012TRS0132US0

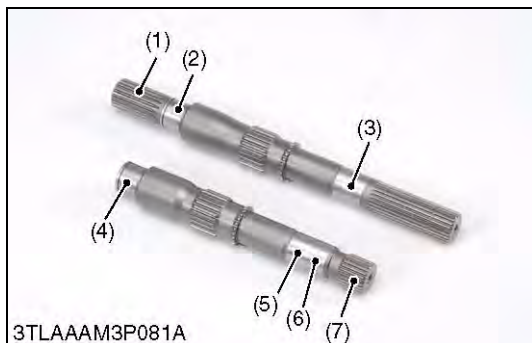


**[B] HST Model****Charge Pump**

1. Check the charge pump case (3), the inner rotor (2) and the outer rotor (1) for scratches and wear.
2. If scratch or wear are found, replace the charge pump as an assembly.

- |                 |                      |
|-----------------|----------------------|
| (1) Outer Rotor | (3) Charge Pump Case |
| (2) Inner Rotor | (4) O-ring           |

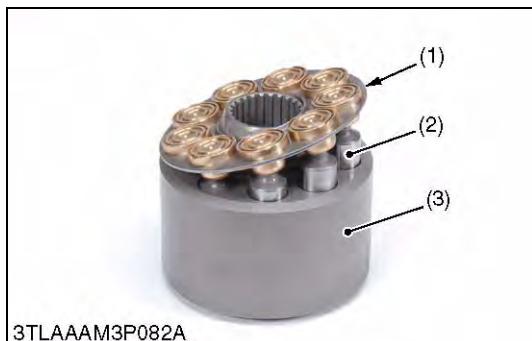
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**Pump Shaft and Motor Shaft**

1. Check the bearing surface (2), (3), (4), (5) and the oil seal surface (6).
2. If the shaft (1), (7) is rough or groove, replace it.

- |                            |                            |
|----------------------------|----------------------------|
| (1) Pump Shaft             | (5) Needle Bearing Surface |
| (2) Ball Bearing Surface   | (6) Oil Seal Surface       |
| (3) Needle Bearing Surface | (7) Motor Shaft            |
| (4) Ball Bearing Surface   |                            |

9Y1211012TRS0159US0

**Cylinder Block Bore and Pistons**

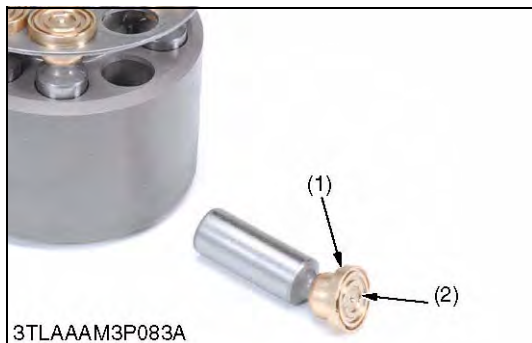
1. Lift the pistons (2) gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace the cylinder block assembly.

**■ IMPORTANT**

- **Do not interchange the pistons between the pump cylinder block and the motor cylinder block.**

- |                    |                    |
|--------------------|--------------------|
| (1) Retainer Plate | (3) Cylinder Block |
| (2) Piston         |                    |

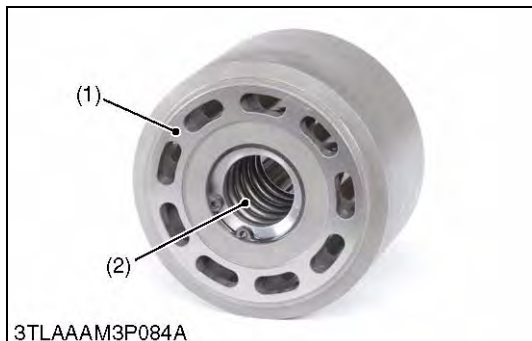
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**Piston Slipper**

1. Check the piston slipper (1) for flatness.
2. If the slipper is rounded, replace the cylinder block assembly.
3. Check the lubricant hole (2) for clogging.

- |                    |                    |
|--------------------|--------------------|
| (1) Piston Slipper | (2) Lubricant Hole |
|--------------------|--------------------|

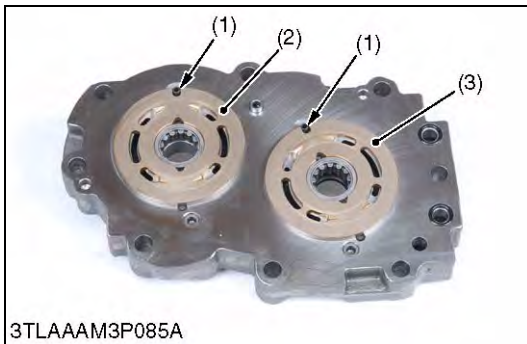
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**Cylinder Block Face**

1. Check the polished face (1) of cylinder block for scoring.
2. If the polished face (1) is scored, replace the cylinder block assembly.
3. Check the spring (2) for breakage.
4. If the spring (2) is broken, replace the cylinder block assembly.

- |                   |            |
|-------------------|------------|
| (1) Polished Face | (2) Spring |
|-------------------|------------|

9Y1211012TRS0162US0



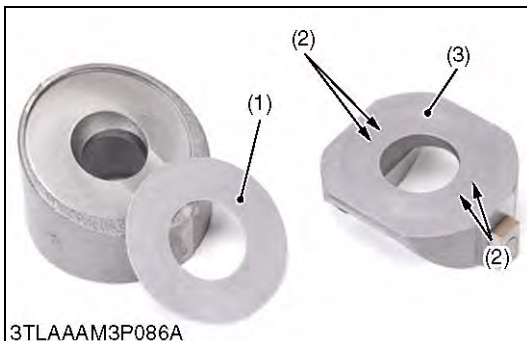
### Valve Plate

1. Check the engagement of the valve plate (2), (3) and the anchor pins (1).
2. Pushing the valve plate (2), (3) against the anchor pins (1), remove the valve plate (2), (3).
3. Check the valve plate (2), (3) for foreign particles.
4. Clean the valve plate (2), (3) and dry with compressed air.
5. Check the valve plate (2), (3) for scratches, wear and erosion. Operate a finger nail across the valve plate surface. If the surface is worn, it will be felt.
6. If the valve plate (2), (3) is worn or scored, replace the valve plate (2), (3).

- (1) Anchor Pin  
(2) Valve Plate (Pump)

- (3) Valve Plate (Motor)

9Y1211012TRS0163US0



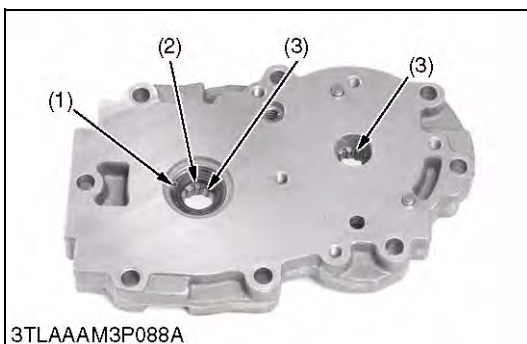
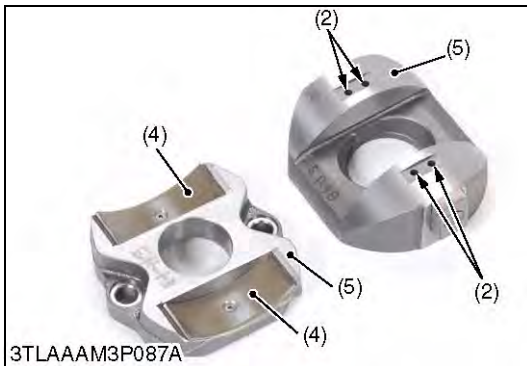
### Thrust Plate, Swashplate and Cradle Bearing

1. Check the piston contact face of the thrust plate (1), the swashplate (3) for scratches and excessive wear.
2. Check the holes (2) of swashplate (3) for clogged.
3. If the thrust plate (1) and the swashplate (3) is worn and scored, replace it. If the holes (2) are clogged, clean them.
4. Check the surface of the cradle bearing (4) for scratches and excessive wear.
5. If the cradle bearing (4) is worn or scored, replace it.

- (1) Thrust Plate  
(2) Hole  
(3) Swashplate

- (4) Cradle Bearing  
(5) Cradle Bearing Bracket

9Y1211012TRS0164US0



### Oil Seals and Needle Bearing for Shaft

1. Remove the needle bearing (3) for wear. If the needle bearing (3) is worn, replace it.
2. Remove the oil seal (2) for damage. If the oil seal is damaged, replace it.

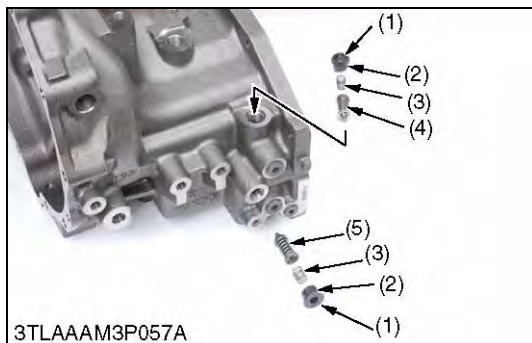
#### ■ NOTE

- After checking, coat the bearing with transmission oil and the oil seal lip with grease.

- (1) Internal Cir-clip  
(2) Oil Seal

- (3) Needle Bearing

9Y1211012TRS0165US0

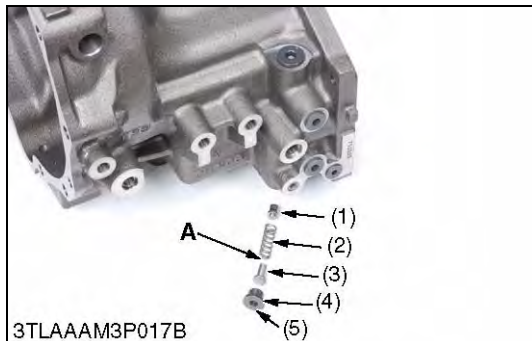


### Check and High Pressure Relief Valve

1. Check the valve plug (1) and the valve (4), (5) for scratches and damage.
2. Check the spring (3) for damage.
3. If anything is unusual, replace the check and high pressure relief valve as an assembly.

- |                |  |
|----------------|--|
| (1) Valve Plug | (4) Check and High Pressure Relief Valve (Reverse) |
| (2) O-ring     | (5) Check and High Pressure Relief Valve (Forward) |
| (3) Spring     |  |

9Y1211012TRS0166US0



### Charge Relief Valve

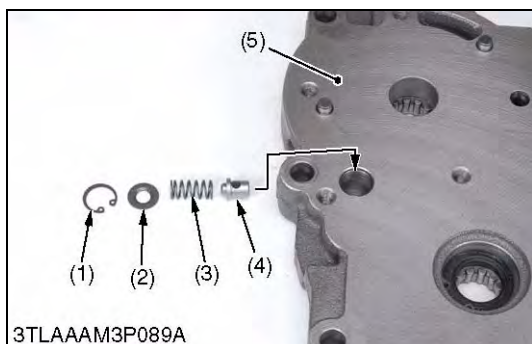
1. Check the spring guide (3), the spring (2) and the valve poppet (1) for scratches, damage and breakage.
2. If anything is unusual, replace it.

#### ■ NOTE

- When re-installing the charge relief valve, never change the number of shims.
- Adjusting shims are located at between the spring guide and the spring.
- When replacing with a new one, be sure to check and adjust the charge relief.

- |                  |                                       |
|------------------|---------------------------------------|
| (1) Valve Poppet | (4) O-ring                            |
| (2) Spring       | (5) Plug                              |
| (3) Spring Guide | <b>A: Shim (If shim is installed)</b> |

9Y1211012TRS0167US0

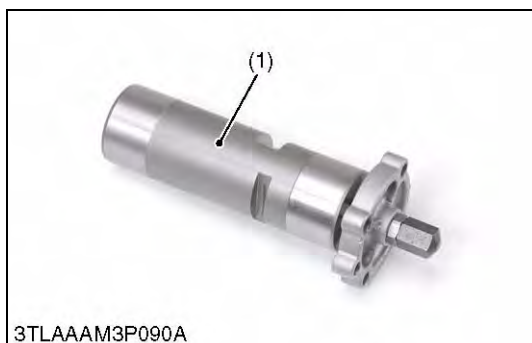


### Case Relief Valve

1. Check the spring (3) and the poppet (4) for scratches, damage and breakage.
2. If anything is unusual, replace it.

- |                       |                  |
|-----------------------|------------------|
| (1) Internal Cir-clip | (4) Valve Poppet |
| (2) Holder            | (5) Port Block   |
| (3) Spring            |                  |

9Y1211012TRS0168US0



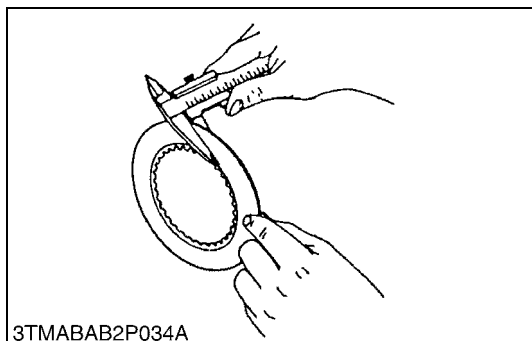
### Servo Piston

1. Check the surface of the servo piston (1) for scratches and excessive wear.
2. If the surface of the servo piston (1) is worn or scored, replace the servo piston as an assembly.

- (1) Servo Piston

9Y1211012TRS0169US0

## (2) Mid Case

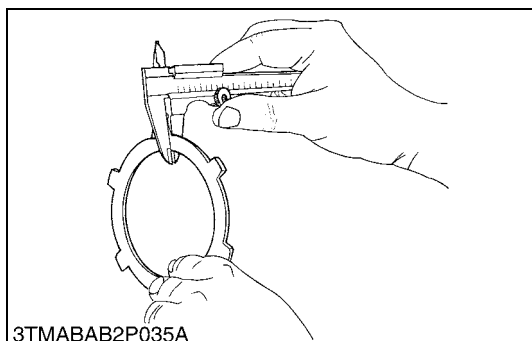


### Clutch Disc Wear

1. Measure the thickness of PTO clutch disc with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Clutch disc wear	Factory specification	1.70 to 1.90 mm 0.067 to 0.075 in.
	Allowable limit	1.55 mm 0.061 in.

9Y1211012TRS0170US0

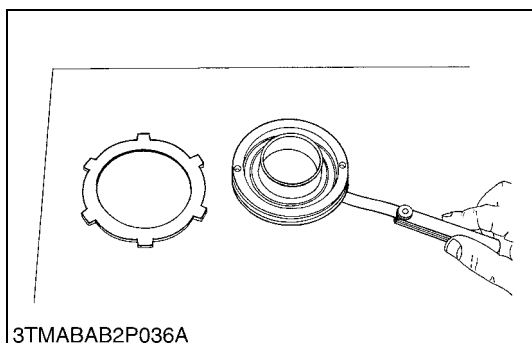


### PTO Steel Plate Wear

1. Measure the thickness of PTO steel plate with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

PTO steel plate wear	Factory specification	1.15 to 1.25 mm 0.045 to 0.049 in.
	Allowable limit	1.10 mm 0.043 in.

9Y1211012TRS0171US0

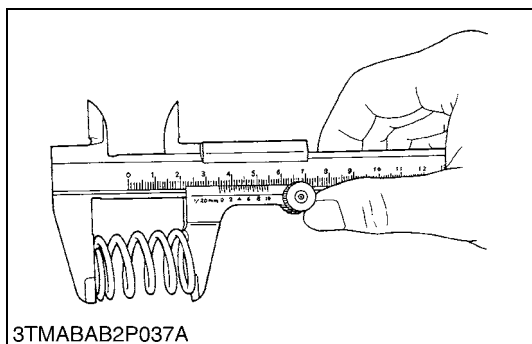


### Flatness of PTO Piston and PTO Steel Plate

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 0.006 in.
Flatness of PTO steel plate	Allowable limit	0.30 mm 0.012 in.

9Y1211012TRS0172US0

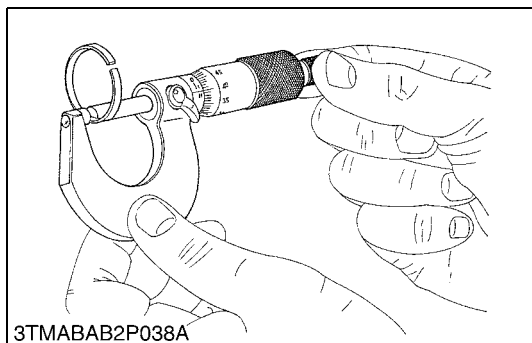


### Piston Return Spring Free Length

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 1.67 to 1.71 in.
	Allowable limit	38.3 mm 1.51 in.

9Y1211012TRS0173US0



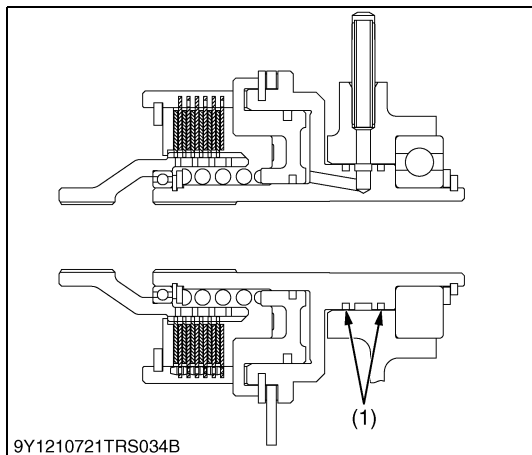
### Thickness of Seal Ring

1. Measure the thickness of seal rings (1) with an outside micrometer.
2. If the measurement is less than the allowable limit, replace it.

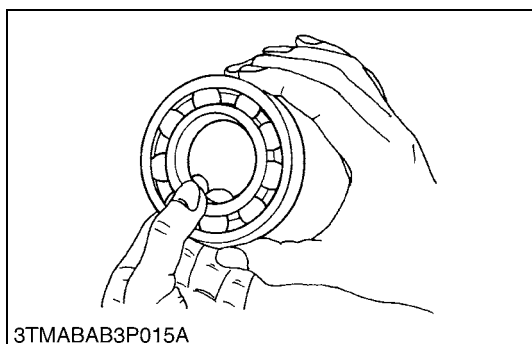
Thickness of seal ring	Factory specification	2.45 to 2.50 mm 0.096 to 0.098 in.
	Allowable limit	2.0 mm 0.079 in.

(1) Seal Ring

9Y1211012TRS0174US0



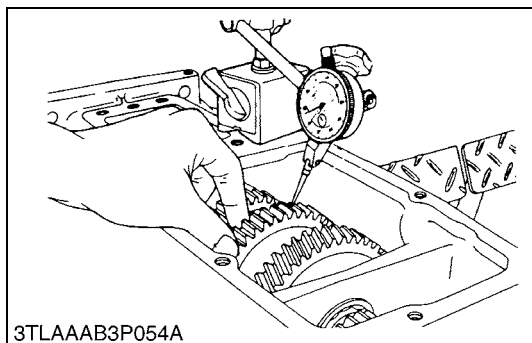
## (3) Transmission Case



### 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.

9Y1211012TRS0145US0

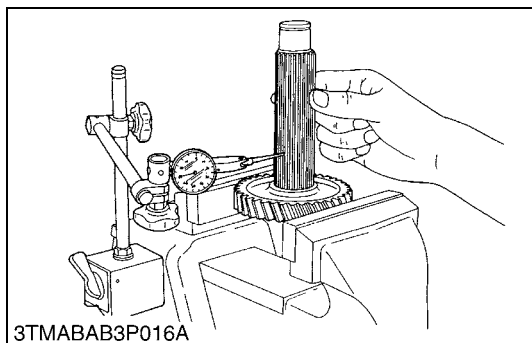


### Gear Backlash

1. Set a dial indicator (lever type) on one of the tooth faces.
2. Clamp the mating gear.
3. Measure backlash by turning the gear to be measured.
4. If the reading exceeds the allowable limit, replace the gear.

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0

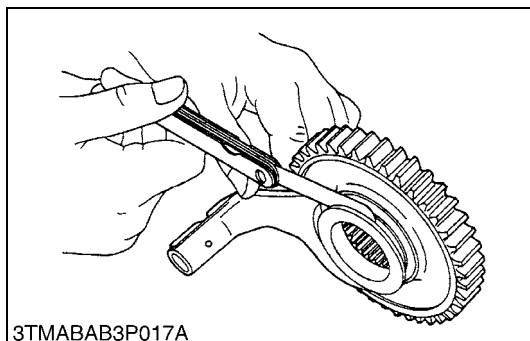


### Clearance between Gear and Spline

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.

9Y1211012TRS0130US0

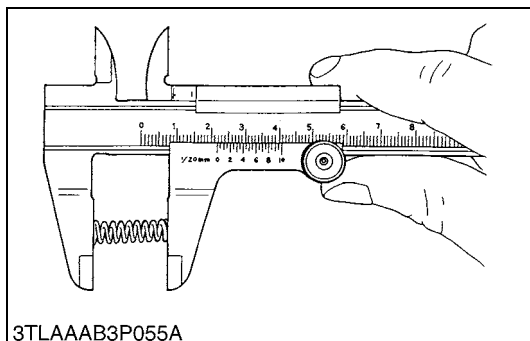


### **Clearance between Shift Fork and Shift Gear Groove or Shifter Groove**

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	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

9Y1211012TRS0148US0

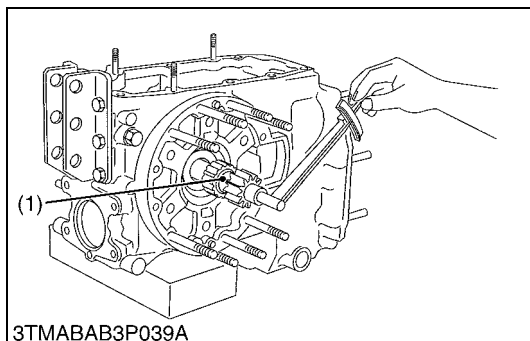


### **Free Length of the Shift Fork Spring**

1. Measure free length of spring with vernier caliper.
2. If the free length is less than the allowable limit, replace.

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

9Y1211012TRS0132US0



### **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.

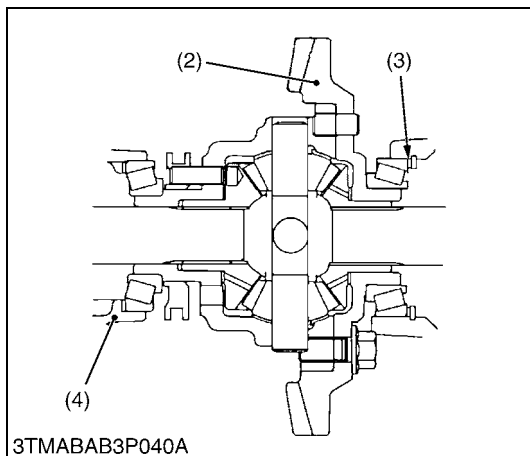
1. Assemble the differential gears to transmission case. At this time, install the some shims (3) to the spiral bevel gear side.
2. Check the turning torque by using turning torque tool (1).  
Turning Torque Tool: Weld socket on a brake shaft
3. Add or reduce the thickness of shims (3) to make the specified 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.

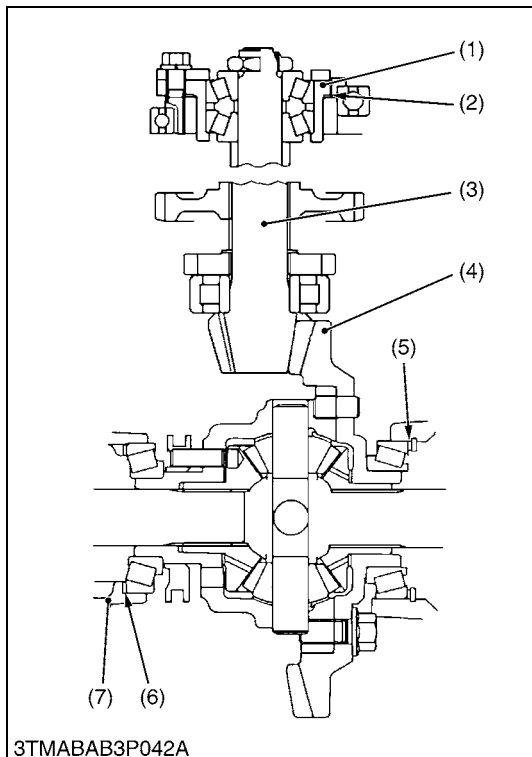
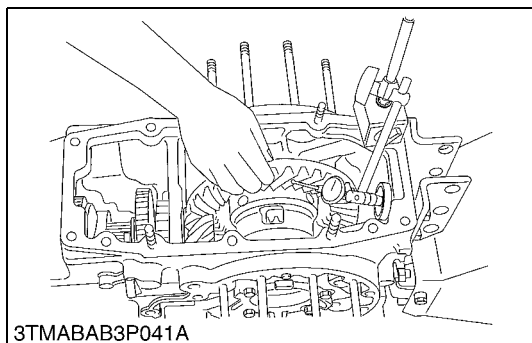
Tightening torque	37T spiral bevel gear	3.92 to 6.37 N·m 0.40 to 0.65 kgf·m 2.89 to 4.70 lbf·ft
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- (1) Turning Torque Tool  
(2) 37T Spiral Bevel Gear

- (3) Adjusting Shim  
(4) Differential Support

9Y1211012TRS0175US0





### **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 (5) in the side of the spiral bevel gear, and insert the shims (6) of the same thickness as the removed ones to the opposite side. When the backlash is too small, do the opposite way of exceed backlash.
4. Adjust the backlash properly 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 next page.

Backlash between spiral bevel gear and spiral bevel pinion shaft	Factory specification	0.15 to 0.30 mm 0.006 to 0.012 in.
	Allowable limit	0.4 mm 0.016 in.

#### **(Reference)**

- Thickness of shims (2):  
0.1 mm (0.004 in.)  
0.2 mm (0.008 in.)  
0.5 mm (0.020 in.)
- Thickness of shims (5):  
0.3 mm (0.012 in.)  
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.)  
1.4 mm (0.055 in.)

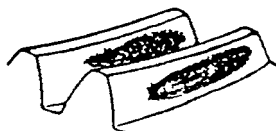
- (1) Pinion Bearing Case  
(2) Shim  
(3) Spiral Bevel Pinion Shaft  
(4) Spiral Bevel Gear

- (5) Shim  
(6) Shim  
(7) Differential Support

9Y1211012TRS0176US0



(A)



3TLAAAB3P059A

**Proper Contact**

More than 35 % red lead contact area on the gear tooth surface.  
The center of tooth contact at 1/3 of the entire width from the small end.

(A) Proper Contact

9Y1211012TRS0152US0

(B)

(C)



3TLAAAB3P060A

**Heel Contact and Tip Contact**

Replace the adjusting shim with thicker one to move the bevel pinion shaft forward.

And place the left side shim to the right to move the bevel gear rightward.

Repeat above until the proper tooth contact and backlash are achieved.

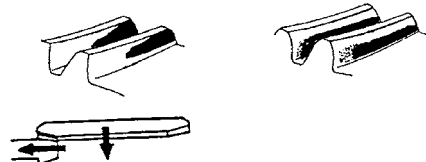
(B) Heel Contact

(C) Tip Contact

9Y1211012TRS0153US0

(D)

(E)



3TLAAAB3P061A

**Toe Contact and Base Contact**

Replace adjusting shim with thicker one to move the bevel pinion shaft forward.

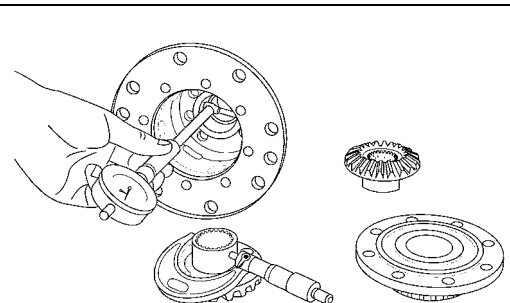
And place the right side shim to the left to move the bevel gear leftward.

Repeat above until the proper tooth contact and backlash are achieved.

(D) Toe Contact

(E) Base Contact

9Y1211012TRS0154US0



3TMABAB3P046A

**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	0.0500 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.014 in.

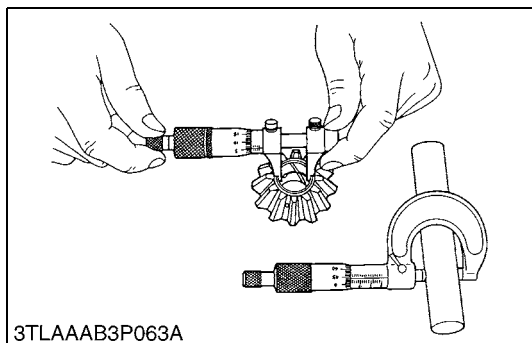
Differential case bore I.D.	Factory specification	40.500 to 40.562 mm 1.5945 to 1.5969 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

Clearance between differential case cover bore and differential side gear boss	Factory specification	0.090 to 0.169 mm 0.00355 to 0.00665 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case cover bore I.D.	Factory specification	40.540 to 40.580 mm 1.5961 to 1.5976 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

9Y1211012TRS0155US0





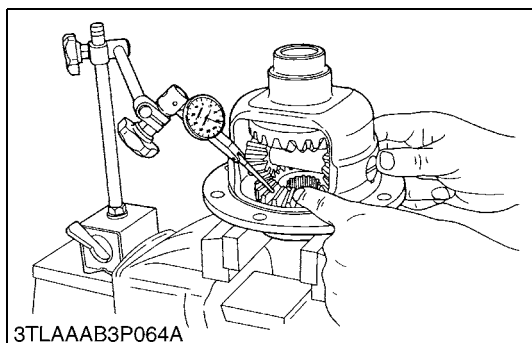
### **Clearance between Differential Pinion Shaft and Differential Pinion**

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	0.0800 to 0.122 mm 0.00315 to 0.00480 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	20.060 to 20.081 mm 0.78977 to 0.79059 in.

9Y1211012TRS0156US0



### **Backlash between Differential Pinion and Differential Side Gear**

1. Secure the differential case in a vise.
2. Set a dial indicator (lever type) on the tooth of the differential side gear.
3. Hold the differential pinion and move the differential side gear to measure the backlash.
4. If the measurement exceeds the allowable limit, 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 washers:
  - 1.5 mm (0.059 in.)
  - 1.6 mm (0.062 in.)
  - 1.7 mm (0.067 in.)
  - 1.8 mm (0.071 in.)
  - 2.0 mm (0.074 in.)

9Y1211012TRS0157US0

# **4 REAR AXLE**

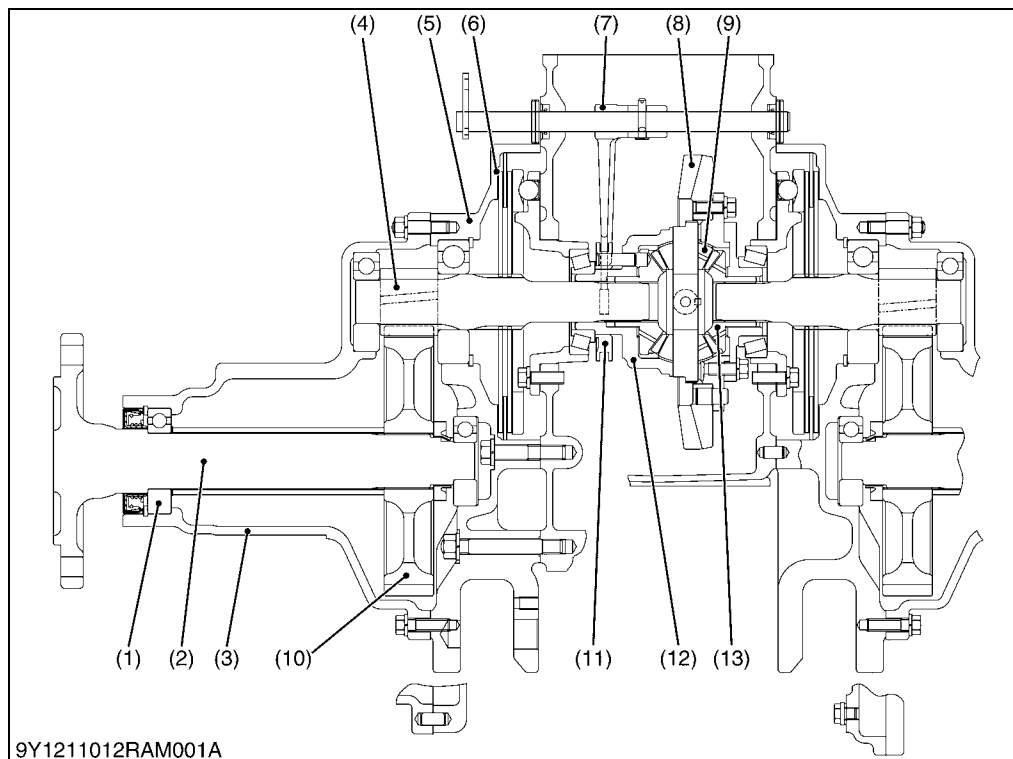
# MECHANISM

## CONTENTS

1. STRUCTURE.....	4-M1
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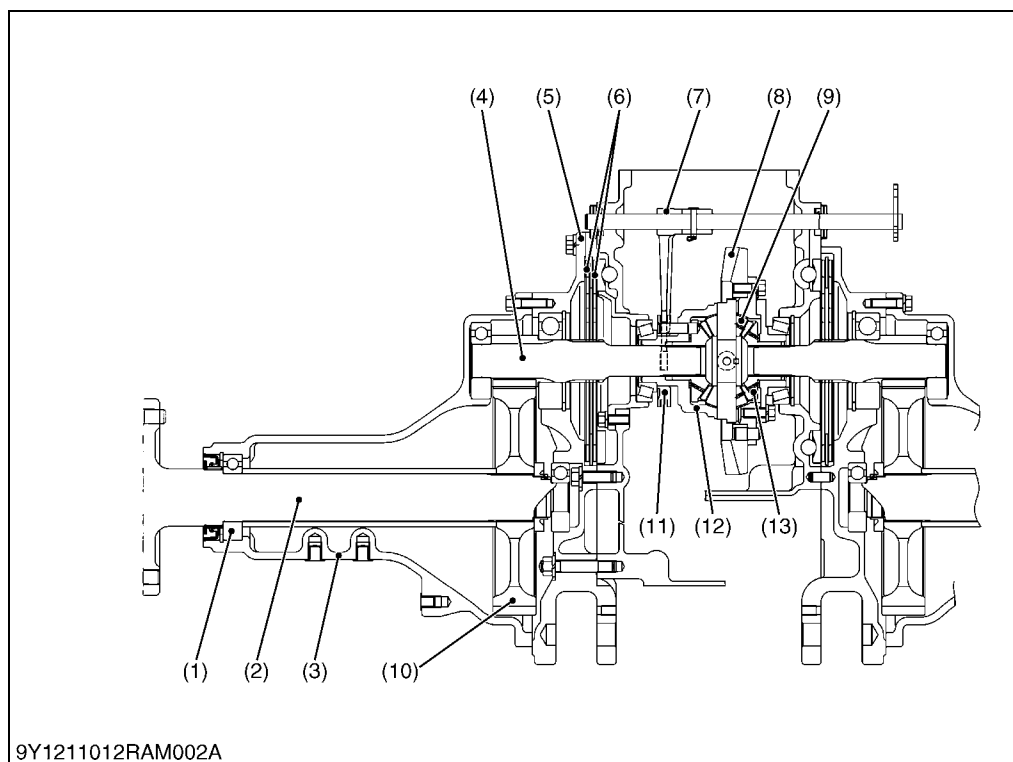
# 1. STRUCTURE

## L3301/L3901



- (1) Ball Bearing
  - (2) Rear Axle
  - (3) Rear Axle Case
  - (4) Differential Gear Shaft
  - (5) Brake Case
  - (6) Brake Disc
  - (7) Differential Lock Shift Fork
  - (8) 39T Bevel Gear
  - (9) Differential Pinion
  - (10) Final Gear
  - (11) Differential Lock Shifter
  - (12) Differential Case
  - (13) Differential Side Gear
- 9Y1211012RAM001US0

## L4701



- (1) Ball Bearing
  - (2) Rear Axle
  - (3) Rear Axle Case
  - (4) Differential Gear Shaft
  - (5) Brake Case
  - (6) Brake Disc
  - (7) Differential Lock Shift Fork
  - (8) 39T Bevel Gear
  - (9) Differential Pinion
  - (10) Final Gear
  - (11) Differential Lock Shifter
  - (12) Differential Case
  - (13) Differential Side Gear
- 9Y1211012RAM002US0

The final gear (10) is final reduction mechanism which further reduces the speed of rotation. The direction of power transmitted from the engine is changed by the differential gears.

The rear axle (2) is the final transmission mechanism which transmits the power from the transmission to the rear wheels. The rotation speed is reduced by the final gear (10) as explained above.

The rear axle (2) is 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 axle (2) also support the weight of the tractor.

# SERVICING

## CONTENTS

- 1. TROUBLESHOOTING.....4-S1
- 2. TIGHTENING TORQUES.....4-S2
- 3. DISASSEMBLING AND ASSEMBLING .....4-S3
  - [1] SEPARATING REAR AXLE CASE .....4-S3
  - [2] DISASSEMBLING REAR AXLE .....4-S8
- 4. SERVICING.....4-S9

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>Excessive or Unusual Noise at All Time</b>	Improper backlash between differential gear shaft and final gear	Replace	—
	Bearing worn	Replace	4-S9
	Insufficient or improper type of transmission fluid used	Fill or change	G-37, G-64
<b>Noise while Turning</b>	Differential gear shaft and final gear worn or damaged	Replace	4-S8

9Y1211012RAS0001US0

## 2. TIGHTENING TORQUES

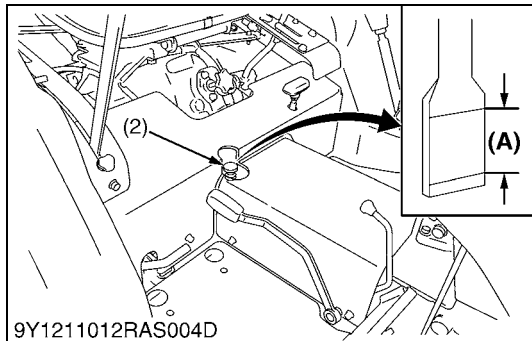
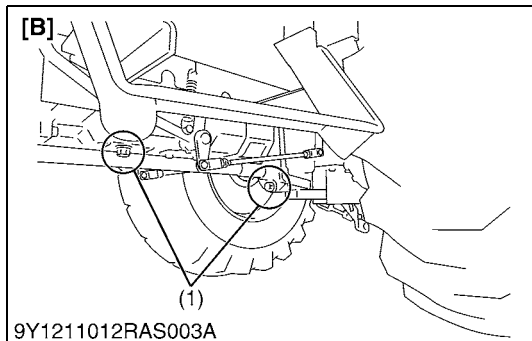
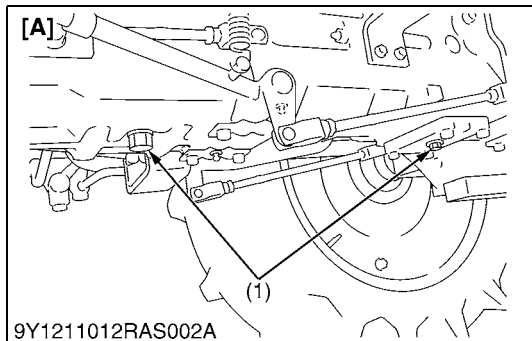
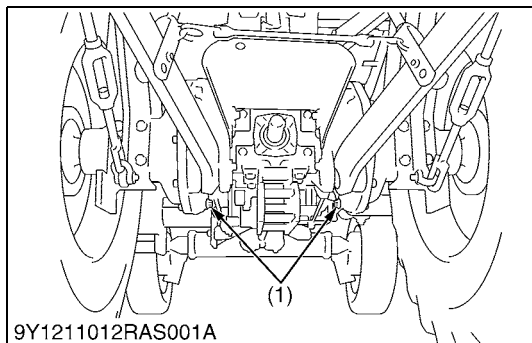
Tightening torques of screws, bolts and nuts on the table below are especially specified.  
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-13.)

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
ROPS fulcrum bolt and nut	118 to 137	12.0 to 14.0	86.8 to 101
Rear axle case mounting M10 bolts	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6	6.2 to 7.2	45 to 52
Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2	7.9 to 9.2	58 to 66
Lock nut	200 to 240	20 to 25	150 to 180

9Y1211012RAS0002US0

### 3. DISASSEMBLING AND ASSEMBLING

#### [1] SEPARATING REAR AXLE CASE



#### Draining Transmission Fluid (L3301/L3901)



#### **CAUTION** To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
  2. After draining reinstall the drain plugs.

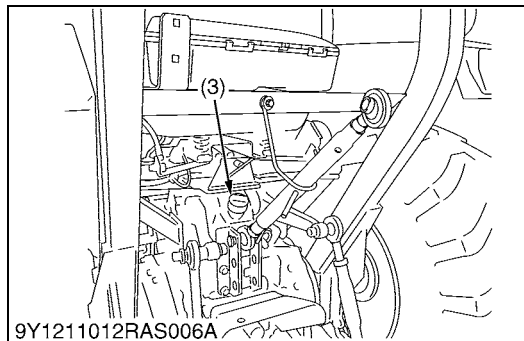
#### **(When reassembling)**

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### **IMPORTANT**

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	2WD	28.0 L 7.4 U.S.gals 6.1 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.2 Imp.gals
		HST	23.5 L 6.2 U.S.gals 5.2 Imp.gals



- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

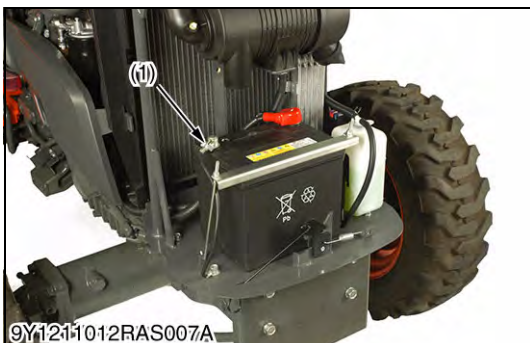
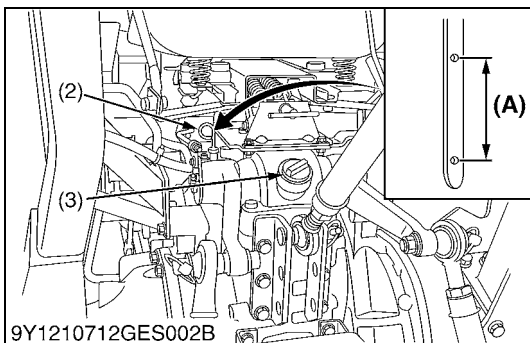
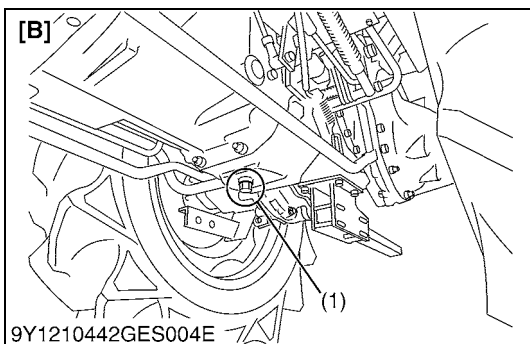
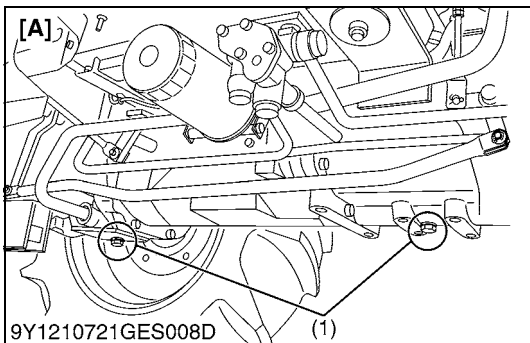
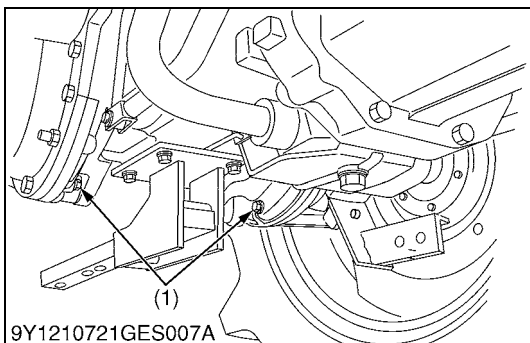
[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0003US0





### Draining Transmission Fluid (L4701)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	40.0 L 10.6 U.S.gals 8.8 Imp.gals
--------------------	----------	---

- (1) Drain Plug
- (2) Gauge
- (3) Oil Inlet Plug

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

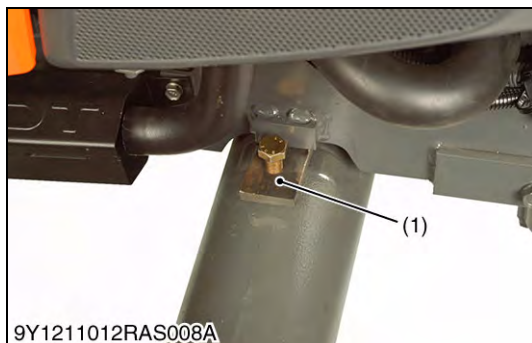
9Y1211012RAS0004US0

### Battery Negative Cable Connector

1. Open bonnet.
2. Disconnect battery negative cable connector (1).

- (1) Battery Negative Cable Connector

9Y1211012RAS0005US0

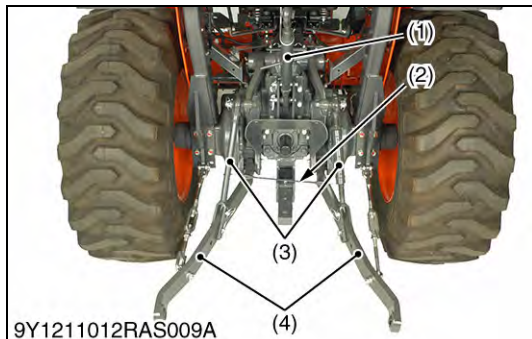


### Front Axle Rocking Restrictor

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-95.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0



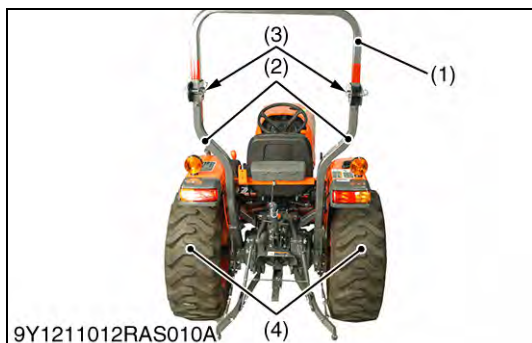
### Three Point Linkage

1. Remove top link (1).
2. Remove rubber spring (2), lift rod (3) and lower link (4).

(1) Top Link  
(2) Rubber Spring

(3) Lift Rod  
(4) Lower Link

9Y1211012RAS0007US0



### ROPS and Rear Wheel

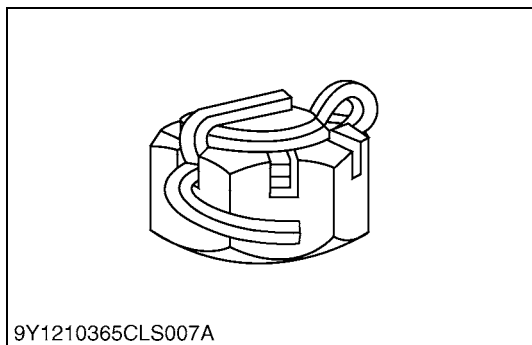
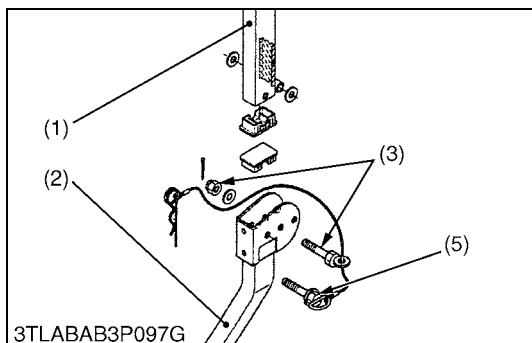
1. Place the disassembling stand under the transmission case.
2. Remove the ROPS upper frame (1).
3. Remove the ROPS lower frame (2).
4. Loosen and remove the rear wheel mounting bolts and nuts.
5. Remove the rear wheel (4).

#### (When reassembling)

- After tighten the ROPS lower frame mounting bolt and nut, install the cotter pin as shown in the figure.
- Tighten the ROPS upper frame mounting bolts and nuts so that the ROPS upper frame (1) does not fall down when the ROPS upper frame (1) is set at horizontal.

#### ■ NOTE

- Do not firmly tighten all upper frame mounting bolts until most components are attached.

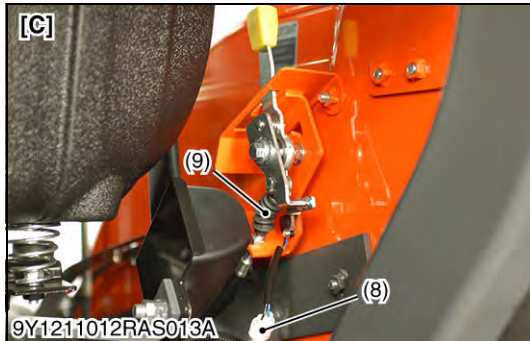
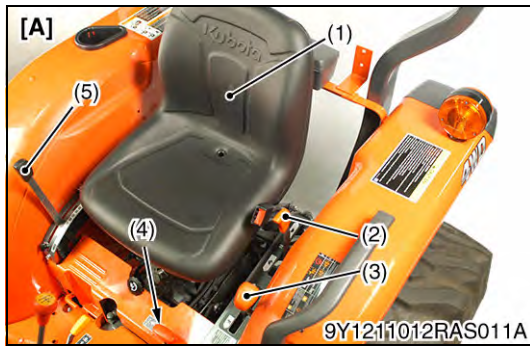


Tightening torque	Rear wheel mounting bolt and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	ROPS lower frame mounting bolt	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum bolt and nut	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft

(1) ROPS Upper Frame  
(2) ROPS Lower Frame  
(3) ROPS Fulcrum Bolt and Nut

(4) Rear Wheel  
(5) Lock Bolt

9Y1211012RAS0008US0



### Seat

1. Remove the seat (1).
2. Remove the grips (2) to (6).
3. Remove the PTO switch (7).
4. Remove the PTO switch (8) and the PTO wire (9).

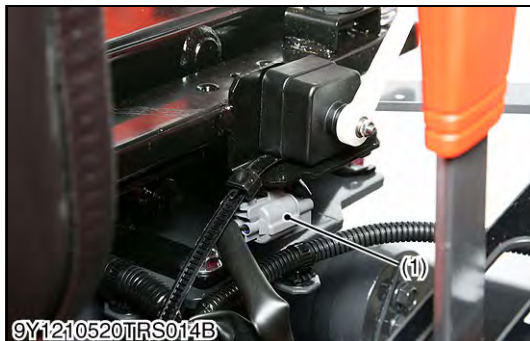
- |                                    |                              |
|------------------------------------|------------------------------|
| (1) Seat                           | (8) PTO Switch               |
| (2) Grip (Range Gear Shift Lever)  | (L3301/L3901 HST Model Only) |
| (3) Grip (Shuttle Shift Lever)     | (9) PTO Wire                 |
| (4) Grip (Front Wheel Drive Lever) | (L3301/L3901 HST Model Only) |
| (5) Grip (Position Control Lever)  |                              |
| (6) Grip                           |                              |
| (Cruise Control Lever: OPTION)     |                              |
| (7) PTO Switch (L4701 Only)        |                              |

**[A]: Manual Transmission Model**

**[B]: HST Model**

**[C]: L3301/L3901 HST Model**

9Y1211012RAS0009US0

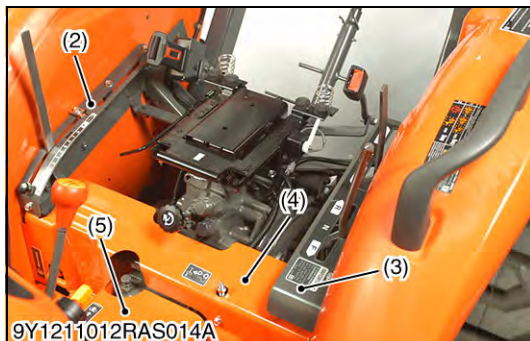


### Lever Guide

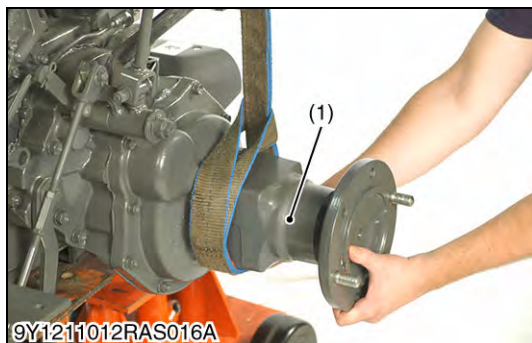
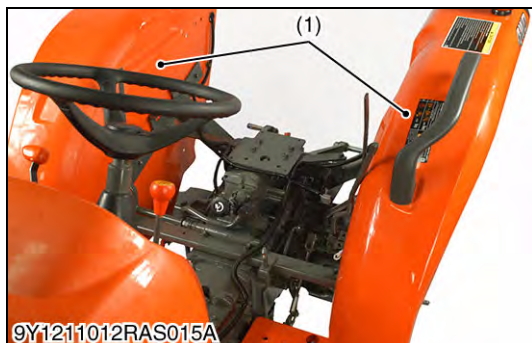
1. Disconnect seat switch connector (1).
2. Remove the position control lever guide (2).
3. Remove the lever guide (3).
4. Remove the floor seat cover (4).
5. Remove the center cover (5).

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| (1) Seat Switch Connector        | (4) Floor Seat Cover                |
| (2) Position Control Lever Guide | (5) Center Cover (L3301/L3901 Only) |
| (3) Lever Guide                  |                                     |

9Y1211012RAS0010US0







### **Fender**

1. Remove the fenders (1).

(1) Fender

9Y1211012RAS0011US0

### **Rear Axle Case**

1. Loosen and remove the rear axle case mounting screws and nuts.
2. Support the rear axle case (1) with the nylon lift strap and hoist.
3. Separate the rear axle case from brake case.
4. Follow the same procedure as above for the other side.

#### **(When reassembling)**

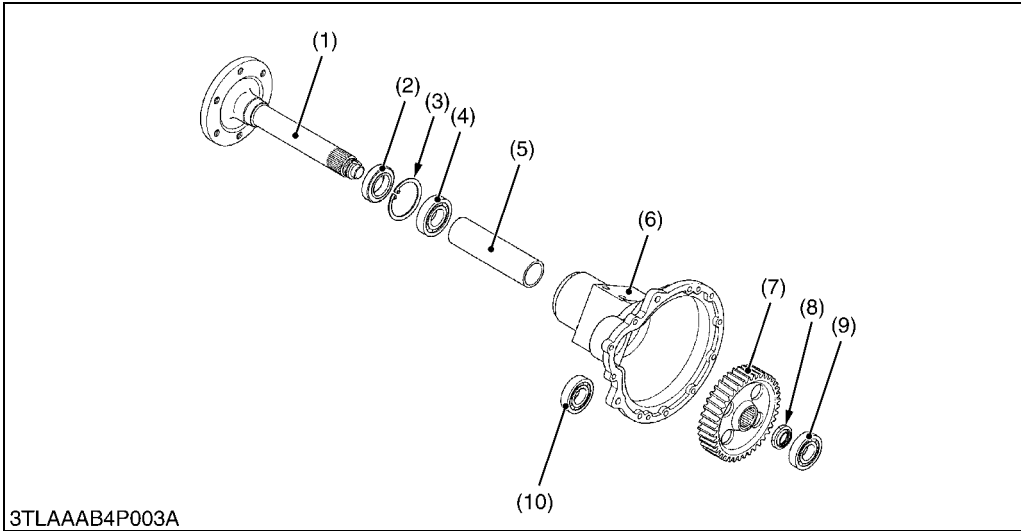
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting M10 bolts	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
	Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

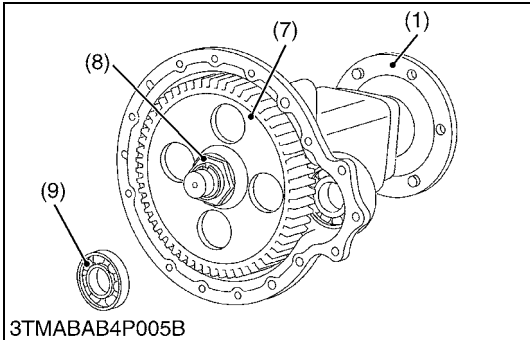
(1) Rear Axle Case

9Y1211012RAS0012US0

[2] DISASSEMBLING REAR AXLE



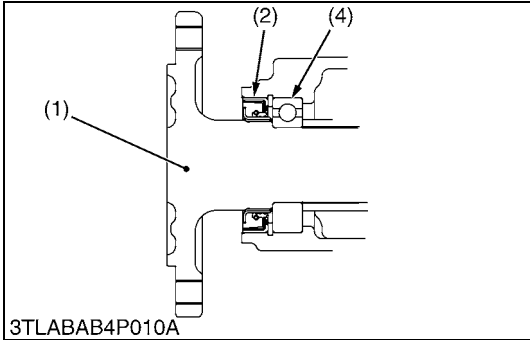
- (1) Rear Axle
- (2) Oil Seal
- (3) Internal Snap Ring
- (4) Ball Bearing
- (5) Spacer
- (6) Rear Axle Case
- (7) Gear
- (8) Lock Nut
- (9) Ball Bearing
- (10) Ball Bearing



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).

(When reassembling)

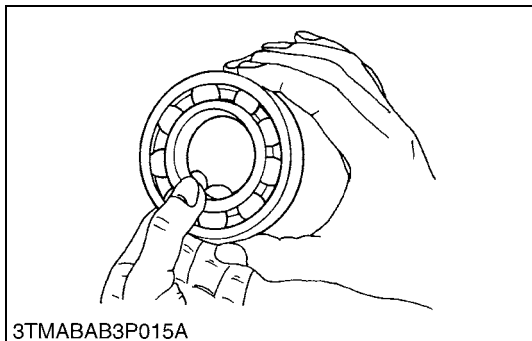
- Apply grease to the oil seal (2) and install it.
- Replace the lock nut with new one, and after tightening it to specified torque, stake it firmly.
- Assemble the oil seal (2) with correct direction. (See figure on the left.)



Tightening torque	Lock nut	200 to 240 N·m 20 to 25 kgf·m 150 to 180 lbf·ft
-------------------	----------	---

9Y1211012RAS0013US0

## 4. SERVICING



### 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.

9Y1211012RAS0014US0

# **5 BRAKES**

# MECHANISM

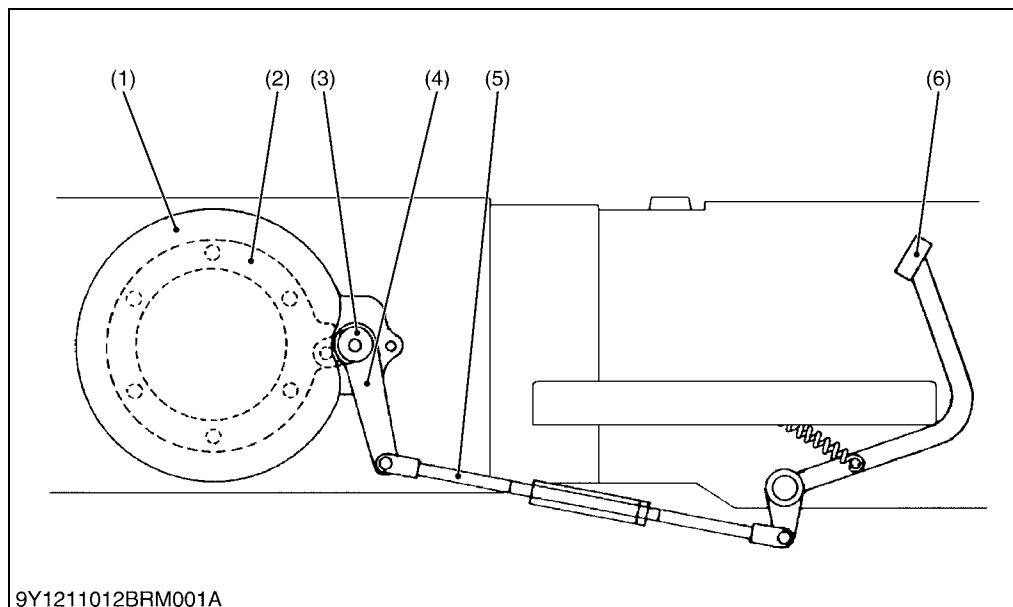
## CONTENTS

1. STRUCTURE.....	5-M1
2. OPERATION.....	5-M2



# 1. STRUCTURE

## L3301/L3901

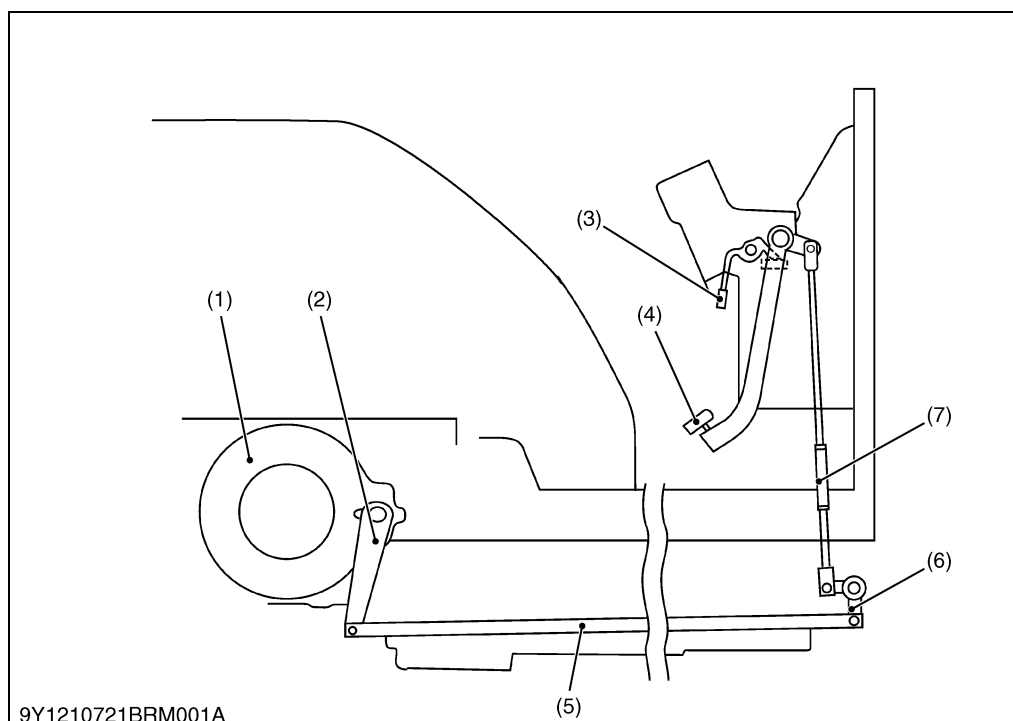


- (1) Brake Case
- (2) Cam Plate
- (3) Brake Cam
- (4) Brake Cam Lever
- (5) Brake Rod
- (6) Brake Pedal

9Y1211012BRM0001US0

9Y1211012BRM001A

## L4701



- (1) Brake Case
- (2) Brake Cam Lever
- (3) Parking Brake Lever
- (4) Brake Pedal
- (5) Brake Rod
- (6) Brake Lever Link
- (7) Turnbuckle

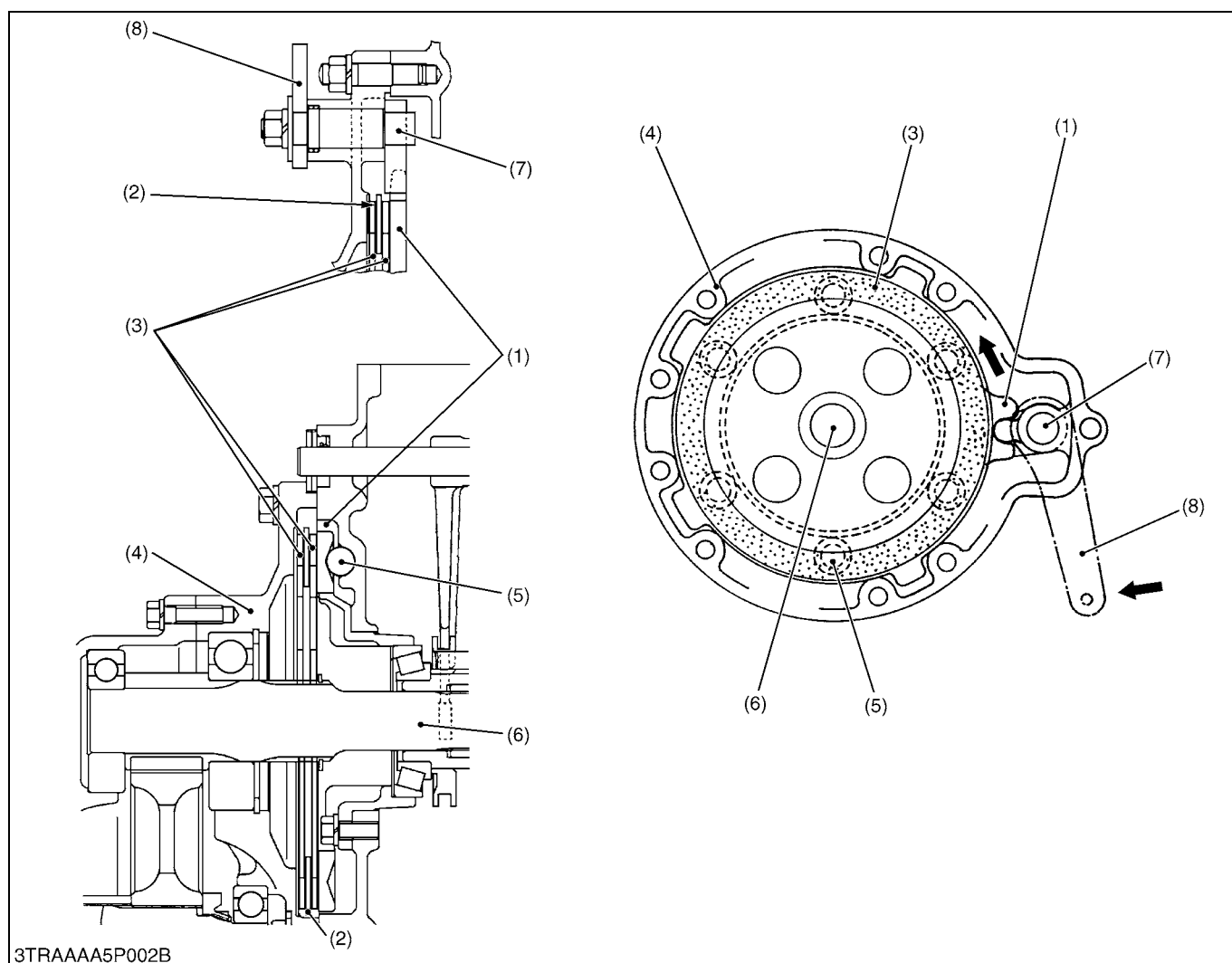
9Y1210721BRM001A

Independent mechanical wet disc brakes are used for the right and left traveling brakes. They are operated by the brake pedals through the mechanical linkages.

The parking brake is a mechanical type which is designed to actuate the traveling brakes. Pulling the parking brake lever (3) results in the same state as that obtained when the brake pedals are pressed.

9Y1211012BRM0003US0

## 2. OPERATION



- |                 |                |  |                     |
|-----------------|----------------|--|---------------------|
| (1) Cam Plate   | (4) Brake Case | (6) Brake Shaft<br>(Differential Gear Shaft) | (7) Brake Cam       |
| (2) Steel Plate | (5) Steel Ball |  | (8) Brake Cam Lever |
| (3) Brake Disc  |                |  |                     |

The brake body is incorporated in the brake case (4) filled with transmission oil and is designed to brake when the brake disc (3) splined with the differential gear shaft (6) is pressed against the cam plate (1) by means of the cam mechanism incorporating steel balls (5).

For greater braking force, two brake discs are provided at the right and left sides respectively, and the steel plate (2) fixed to the brake case is arranged between the brake discs.

### During Braking

When the brake pedal is pressed, the linkage causes the brake cam lever (8) and brake cam (7) to turn into the direction of arrow shown in the above figure.

Therefore, the cam plate (1) also moves the direction of arrow. At this time, since the cam plate (1) rides on the steel balls (5) set in the grooves of the transmission case to press the brake disc (3), the differential gear shaft (6) is braked by the frictional force generated by the cam plate (1) and brake disc (3).

9Y1211012BRM0004US0

# SERVICING

## CONTENTS

- 1. TROUBLESHOOTING.....5-S1
- 2. SERVICING SPECIFICATIONS .....5-S2
- 3. TIGHTENING TORQUES.....5-S3
- 4. CHECKING AND ADJUSTING .....5-S4
- 5. DISASSEMBLING AND ASSEMBLING .....5-S5
  - [1] SEPARATING BRAKE CASE .....5-S5
  - [2] DISASSEMBLING THE BRAKE CASE .....5-S11
- 6. SERVICING .....5-S12

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>Uneven Braking Force</b>	Brake pedal play unevenly adjusted	Adjust	5-S4
	Brake disc worn	Replace	5-S11, 5-S12
	Cam plate warped	Replace	5-S11, 5-S12
<b>Brake Drags</b>	Too little free play in the brake pedals	Adjust	5-S4
	Ball holes of cam plate for uneven wear	Replace	5-S11, 5-S12
	Brake pedal return spring weaken or broken	Replace	—
	Brake cam rusted	Repair	—
<b>Poor Braking Force</b>	Too much free play in the brake pedals	Adjust	5-S4
	Brake disc worn	Replace	5-S11, 5-S12
	Cam plate warped	Replace	5-S11, 5-S12
	Brake cam or lever damaged	Replace	5-S11

9Y1211012BRS0001US0

## 2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Brake Pedal	Free Travel	15 to 20 mm 0.6 to 0.8 in.	—
Cam Plate	Flatness	—	0.3 mm 0.01 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 0.182 to 0.188 in.	4.2 mm 0.17 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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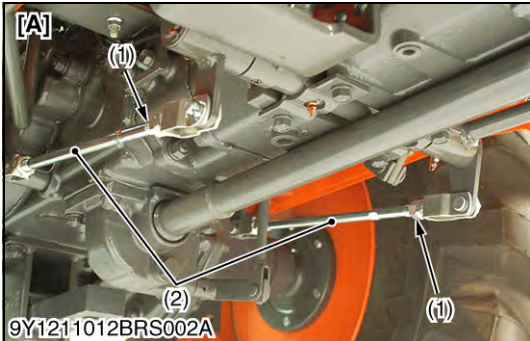
### 3. TIGHTENING TORQUES

Tightening torques of screws, 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-13.)

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
ROPS fulcrum bolt and nut	118 to 137	12.0 to 20.0	86.8 to 101
Rear axle case mounting M10 bolts	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6	6.2 to 7.2	45 to 52
Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2	7.9 to 9.2	58 to 66
Brake case mounting stud bolt (L3301/L3901)	35 to 49	3.5 to 5.0	26 to 36
Brake case mounting stud bolt (L4701 only)	38.2 to 45.1	3.9 to 4.6	28.2 to 33.3
Brake case mounting screws and nuts (L4701 only)	77.5 to 90.2	7.9 to 9.2	58 to 66
Brake case lever mounting screw (L4701 only)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5

9Y1211012BRS0003US0

# 4. CHECKING AND ADJUSTING



## Brake Pedal Free Travel



### CAUTION

- Stop the engine and remove the key, then chock the wheel before checking brake pedals.
1. Release the parking brake.
  2. Slightly depress the brake pedals and measure free travel "C" at top of pedal stroke.
  3. If the measurement is not within the factory specifications, loosen the lock nuts (1) and turn the brake rods (2) to adjust the rod length within the factory specifications.
  4. Retighten the lock nut (1).

Brake pedal free travel "C"	Factory specification	15 to 20 mm 0.6 to 0.8 in.
--------------------------------	-----------------------	-------------------------------

### ■ IMPORTANT

- Keep the free travel in the right and left brake pedals equal.

### ■ NOTE

- The difference between the right and left pedal free travels must be less than 5 mm (0.2 in.).
- After checking brake pedal free travel, be sure to engage the parking brake lock fully and check to see that the brake pedals are securely locked.

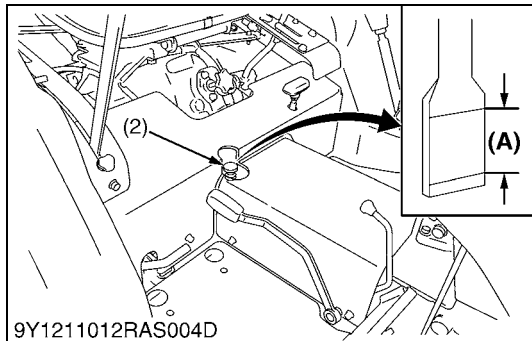
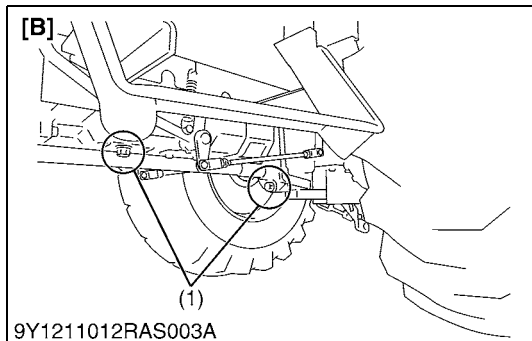
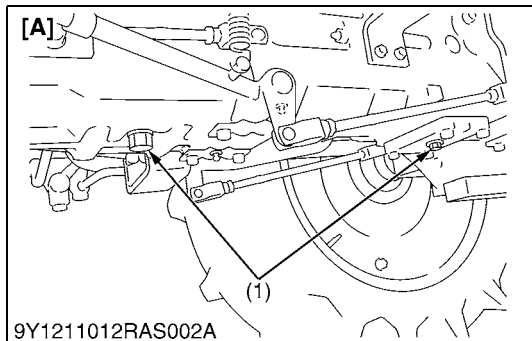
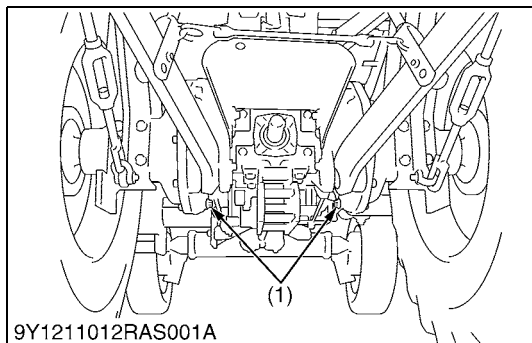
- (1) Lock Nut  
(2) Brake Rod

- [A] L3301/L3901  
[B] L4701 HST  
C: Free Travel

9Y1211012BRS0004US0

## 5. DISASSEMBLING AND ASSEMBLING

### [1] SEPARATING BRAKE CASE



#### Draining Transmission Fluid (L3301/L3901)



#### To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
  2. After draining reinstall the drain plugs.

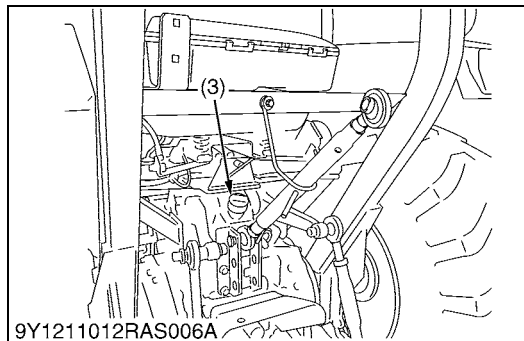
#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	2WD	28.0 L 7.4 U.S.gals 6.1 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.2 Imp.gals
		HST	23.5 L 6.2 U.S.gals 5.2 Imp.gals



- (1) Drain Plug  
(2) Gauge  
(3) Oil Inlet Plug

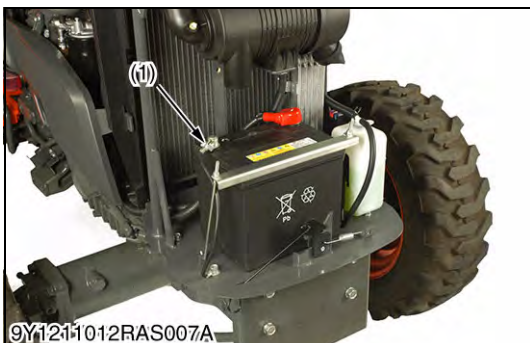
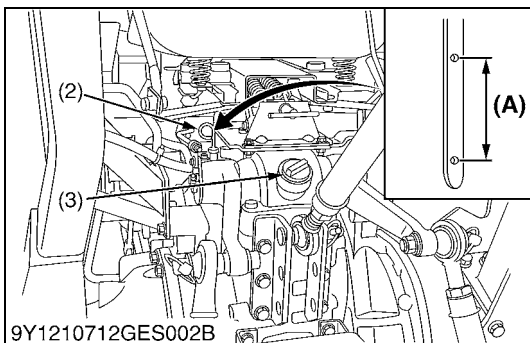
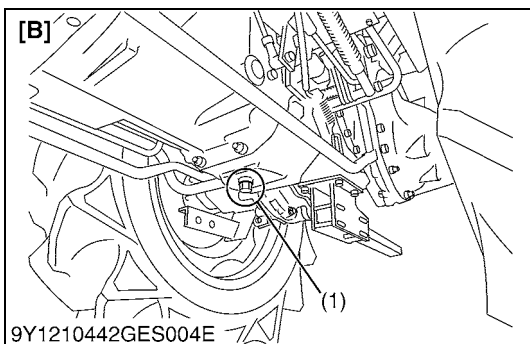
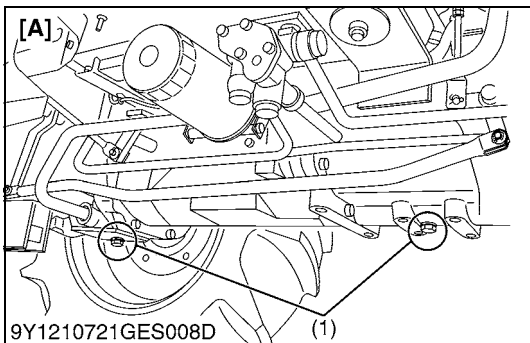
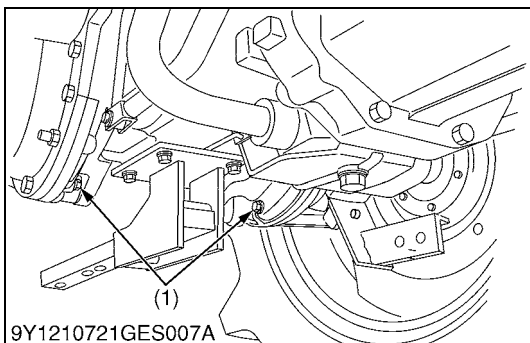
[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0003US0





### Draining Transmission Fluid (L4701)



#### CAUTION

To avoid personal injury:

- 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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plugs.

#### (When reassembling)

- Fill up new oil to the upper line of the gauge (2) from the oil inlet port after removing the oil inlet plug (3).
- Operate the engine at medium speed for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

#### ■ IMPORTANT

- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to prevent damage to the transmission.
- Do not mix different brands oil together.

Transmission fluid	Capacity	40.0 L 10.6 U.S.gals 8.8 Imp.gals
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- (1) Drain Plug
- (2) Gauge
- (3) Oil Inlet Plug

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

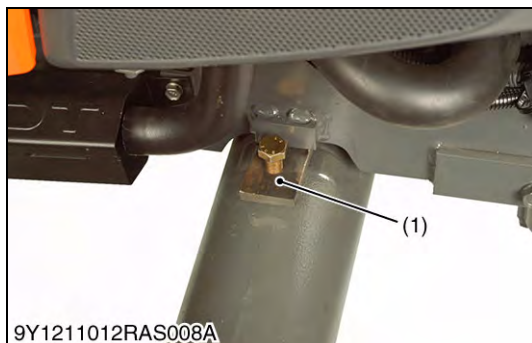
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### Battery Negative Cable Connector

1. Open bonnet.
2. Disconnect battery negative cable connector (1).

- (1) Battery Negative Cable Connector

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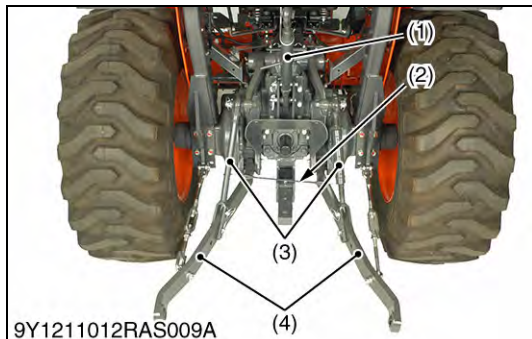


### Front Axle Rocking Restrictor

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-95.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0



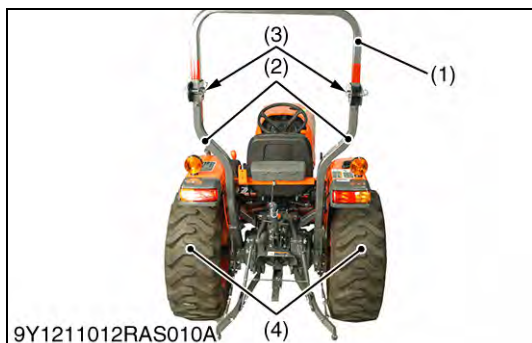
### Three Point Linkage

1. Remove top link (1).
2. Remove rubber spring (2), lift rod (3) and lower link (4).

(1) Top Link  
(2) Rubber Spring

(3) Lift Rod  
(4) Lower Link

9Y1211012RAS0007US0



### ROPS and Rear Wheel

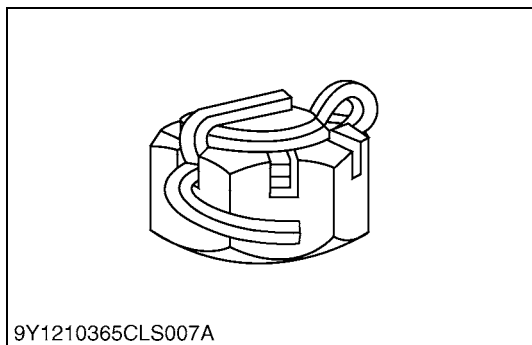
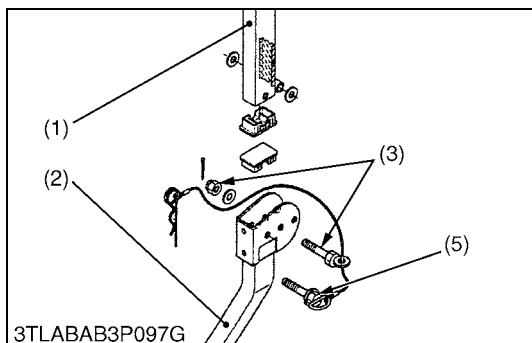
1. Place the disassembling stand under the transmission case.
2. Remove the ROPS upper frame (1).
3. Remove the ROPS lower frame (2).
4. Loosen and remove the rear wheel mounting bolts and nuts.
5. Remove the rear wheel (4).

#### (When reassembling)

- After tighten the ROPS lower frame mounting bolt and nut, install the cotter pin as shown in the figure.
- Tighten the ROPS upper frame mounting bolts and nuts so that the ROPS upper frame (1) does not fall down when the ROPS upper frame (1) is set at horizontal.

#### ■ NOTE

- Do not firmly tighten all upper frame mounting bolts until most components are attached.

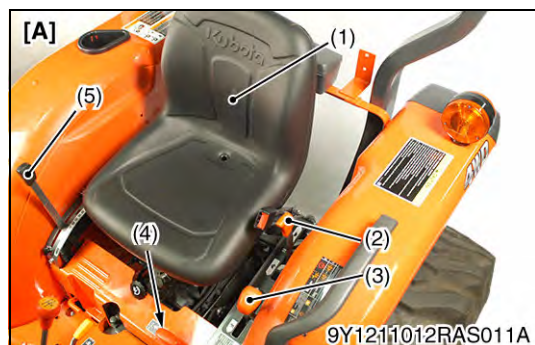


Tightening torque	Rear wheel mounting bolt and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	ROPS lower frame mounting bolt	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum bolt and nut	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft

(1) ROPS Upper Frame  
(2) ROPS Lower Frame  
(3) ROPS Fulcrum Bolt and Nut

(4) Rear Wheel  
(5) Lock Bolt

9Y1211012RAS0008US0



### Seat

1. Remove the seat (1).
2. Remove the grips (2) to (6).
3. Remove the PTO switch (7).
4. Remove the PTO switch (8) and the PTO wire (9).

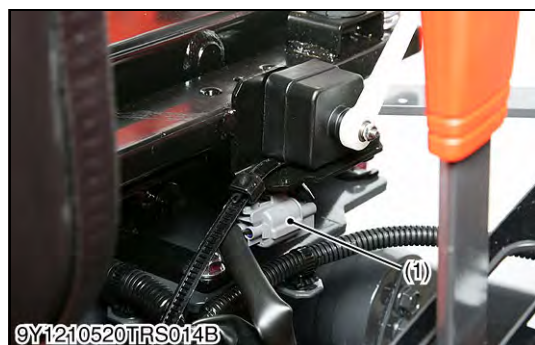
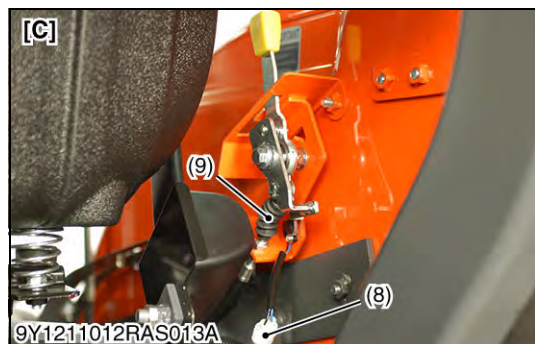
- |                                    |                              |
|------------------------------------|------------------------------|
| (1) Seat                           | (8) PTO Switch               |
| (2) Grip (Range Gear Shift Lever)  | (L3301/L3901 HST Model Only) |
| (3) Grip (Shuttle Shift Lever)     | (9) PTO Wire                 |
| (4) Grip (Front Wheel Drive Lever) | (L3301/L3901 HST Model Only) |
| (5) Grip (Position Control Lever)  |                              |
| (6) Grip                           |                              |
| (Cruise Control Lever: OPTION)     |                              |
| (7) PTO Switch (L4701 Only)        |                              |

**[A]: Manual Transmission Model**

**[B]: HST Model**

**[C]: L3301/L3901 HST Model**

9Y1211012RAS0009US0

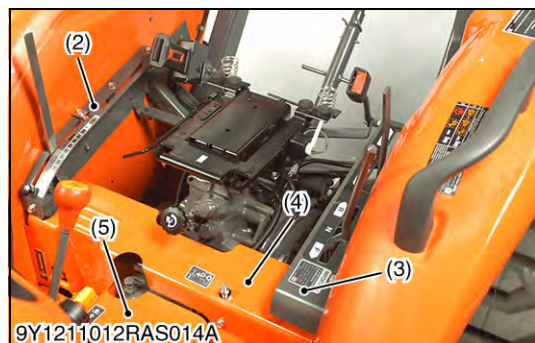


### Lever Guide

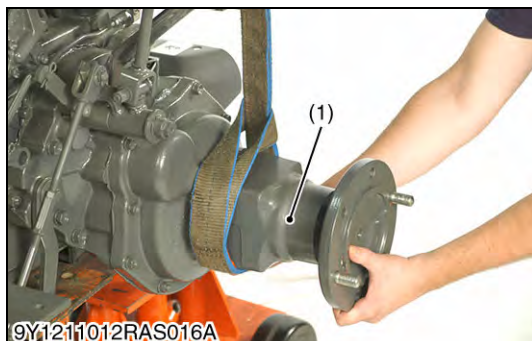
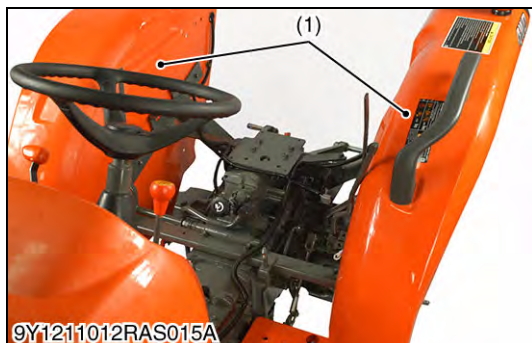
1. Disconnect seat switch connector (1).
2. Remove the position control lever guide (2).
3. Remove the lever guide (3).
4. Remove the floor seat cover (4).
5. Remove the center cover (5).

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| (1) Seat Switch Connector        | (4) Floor Seat Cover                |
| (2) Position Control Lever Guide | (5) Center Cover (L3301/L3901 Only) |
| (3) Lever Guide                  |                                     |

9Y1211012RAS0010US0







### **Fender**

1. Remove the fenders (1).

(1) Fender

9Y1211012RAS0011US0

### **Rear Axle Case**

1. Loosen and remove the rear axle case mounting screws and nuts.
2. Support the rear axle case (1) with the nylon lift strap and hoist.
3. Separate the rear axle case from brake case.
4. Follow the same procedure as above for the other side.

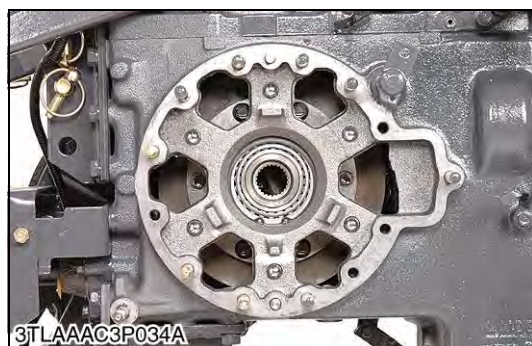
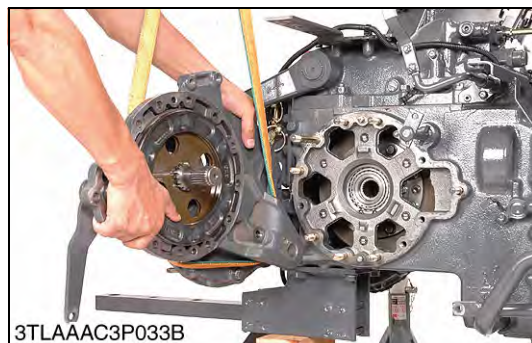
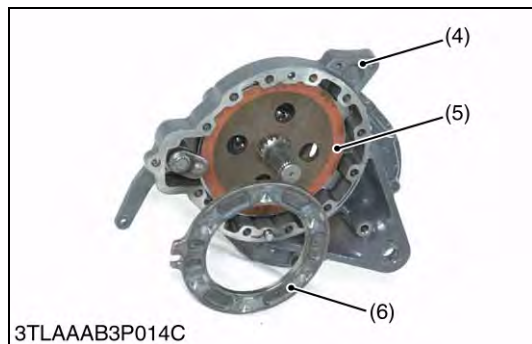
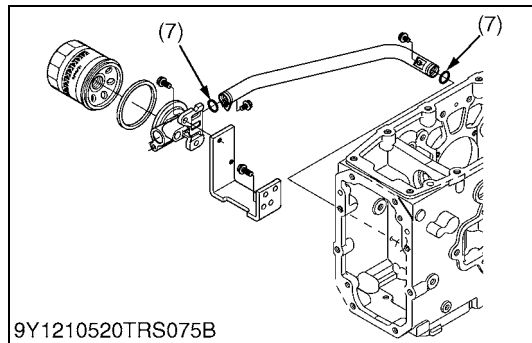
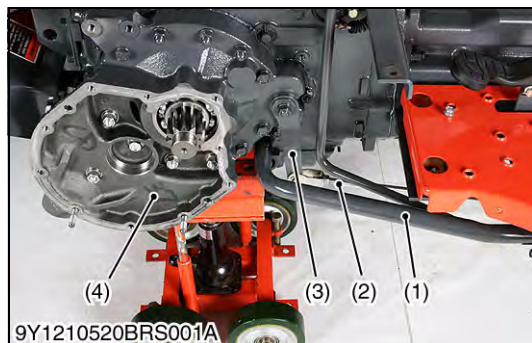
#### **(When reassembling)**

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting M10 bolts	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
	Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Rear Axle Case

9Y1211012RAS0012US0



### Brake Case (L3301/L3901)

1. Remove the suction pipe (1).
2. Remove the brake rod (2).
3. Separate the brake case (4), tapping the brake cam lever (3).

#### (When reassembling)

- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate around the four protrusions on the differential bearing case.
- Apply thread locker (Three Bond 1324 or equivalent) to the stud bolts.

#### ■ NOTE

- Be careful not to damage the O-rings (7).
- If the O-rings (7) are damaged, change them.
- Be sure to check there are 6 balls one side.

Tightening torque	Brake case mounting stud bolt	35 to 49 N·m 3.5 to 5.0 kgf·m 26 to 36 lbf·ft
-------------------	-------------------------------	---

- |                     |                |
|---------------------|----------------|
| (1) Suction Pipe    | (5) Brake Disc |
| (2) Brake Rod       | (6) Cam Plate  |
| (3) Brake Cam Lever | (7) O-ring     |
| (4) Brake Case      |                |

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### Brake Case (L4701)

1. Remove the brake case mounting screws and nuts.
2. Separate the brake case, tapping the brake case lever lightly.

#### (When reassembling)

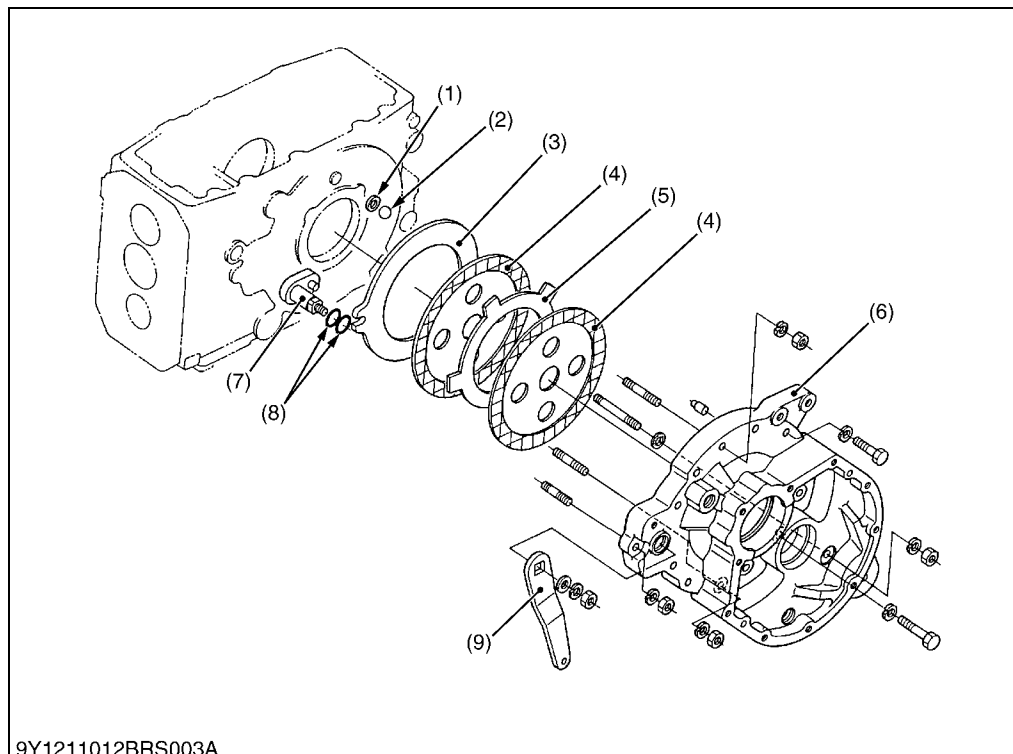
- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminate the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.

Tightening torque	Brake case mounting stud bolts	38.2 to 45.1 N·m 3.9 to 4.6 kgf·m 28.2 to 33.3 lbf·ft
	Brake case mounting screws and nuts	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 lbf·ft
	Brake case lever mounting screw	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft

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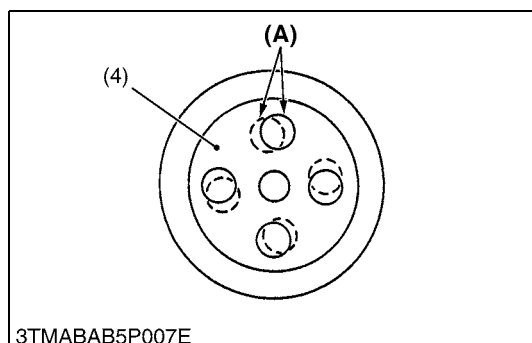
## [2] DISASSEMBLING THE BRAKE CASE

### Brake Case



- (1) Ball Seat
- (2) Ball
- (3) Cam Plate
- (4) Brake Disc
- (5) Plate
- (6) Brake Case
- (7) Brake Cam
- (8) O-ring
- (9) Brake Cam Lever

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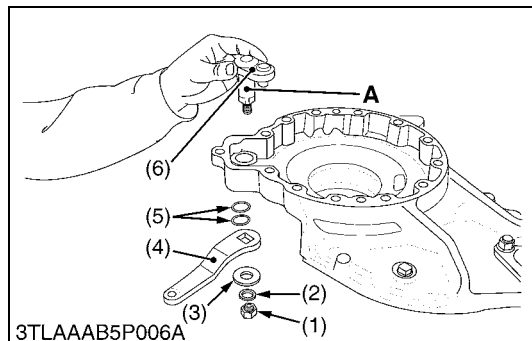


3TMABAB5P007E

■ It is possible to disassemble as shown in the figure above.  
(When reassembling)

- Place the brake discs (4) so that the hole (A) of the second disc should be overlapped 50 % or more.

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### Brake Cam

- Remove the nut (1) on the brake cam (6).
- Remove the brake cam (6) and brake cam lever (4).

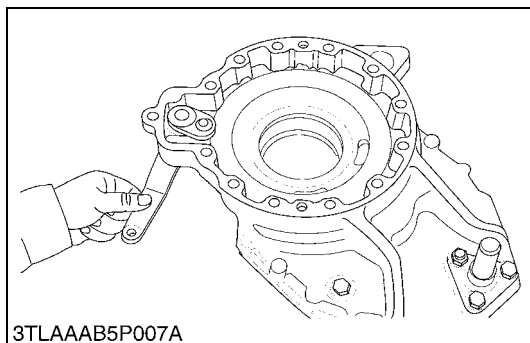
(When reassembling)

- Apply grease to the O-ring (5) and be careful not to damage them.
- Apply small amount of grease to the journal "A" to prevent rust problem that leads to lock up.

- (1) Nut
- (2) Spring Washer
- (3) Plain Washer
- (4) Brake Cam Lever
- (5) O-ring
- (6) Brake Cam

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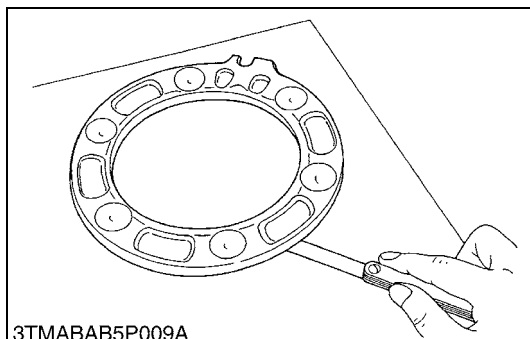
## 6. SERVICING



### Brake Cam Lever Movement

1. Move the brake cam lever by hand to check the movement.
2. If the movement is heavy, refine the brake cam with sandpaper.

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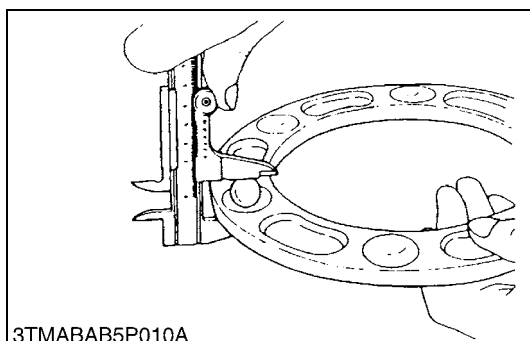


### Cam Plate Flatness

1. Place the cam plate on the surface plate.
2. Use a feeler gauge of 0.3 mm (0.012 in.) thick for judgement of the cam plate flatness. Measure the flatness diagonally at more than four locations.
3. If the measurement exceed the allowable limit, replace it.

Cam Plate Flatness	Allowable limit	0.3 mm 0.01 in.
--------------------	-----------------	--------------------

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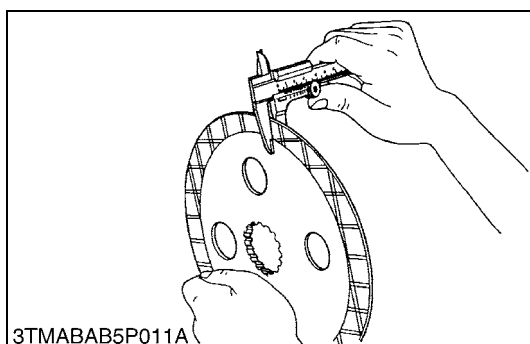


### Height of Brake Cam Plate and Ball

1. Measure the dimensions of the brake 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 brake 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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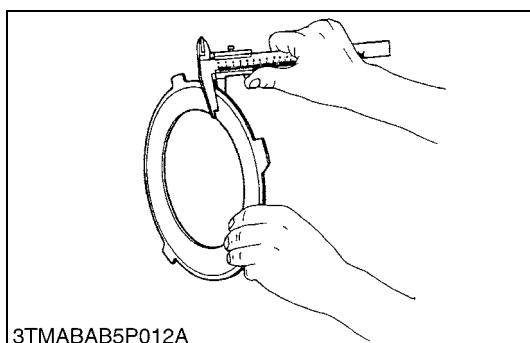


### Brake Disc Wear

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 0.182 to 0.188 in.
	Allowable limit	4.2 mm 0.17 in.

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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

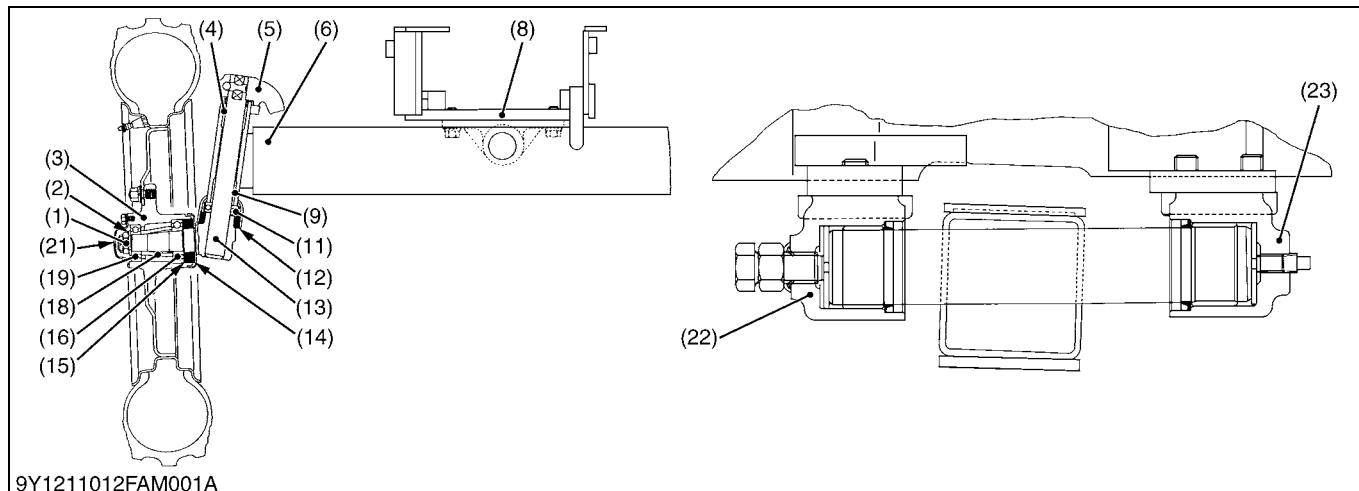
## CONTENTS

1. STRUCTURE.....	6-M1
[1] 2WD Model.....	6-M1
[2] 4WD Model.....	6-M2

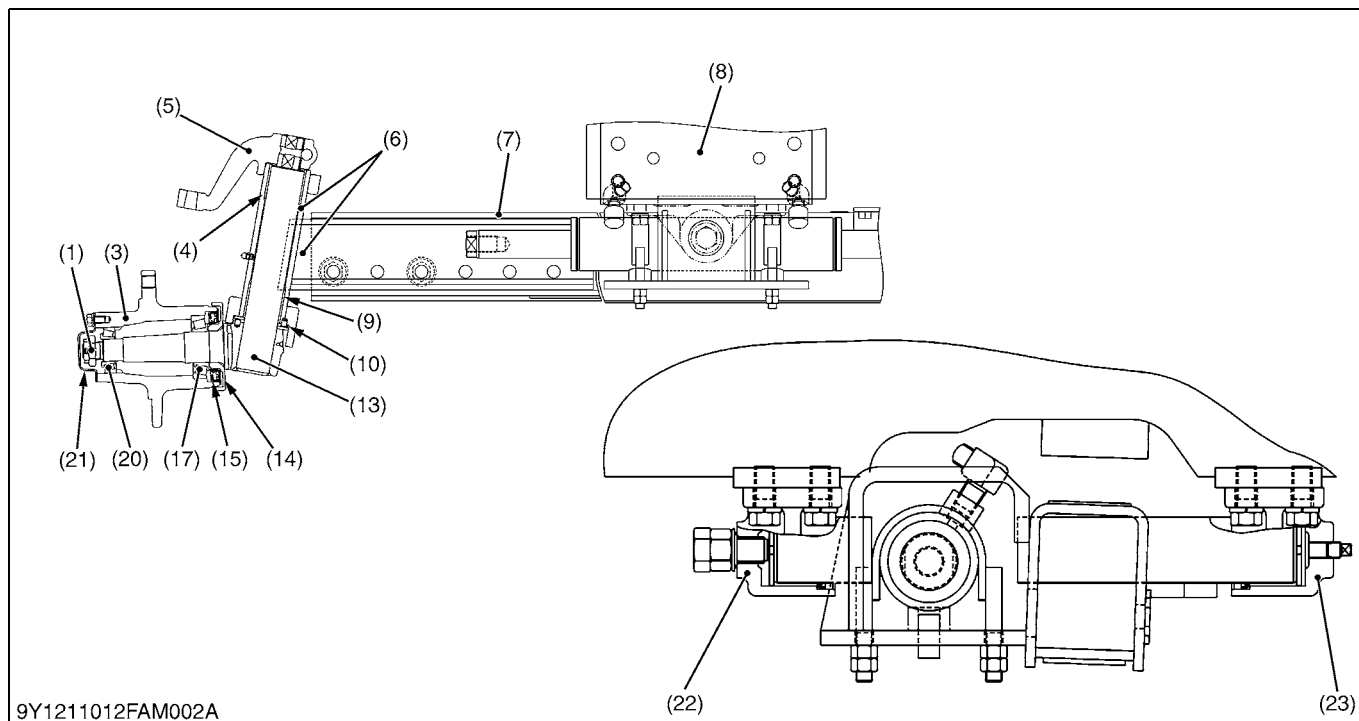
# 1. STRUCTURE

## [1] 2WD Model

### L3301/L3901



### L4701

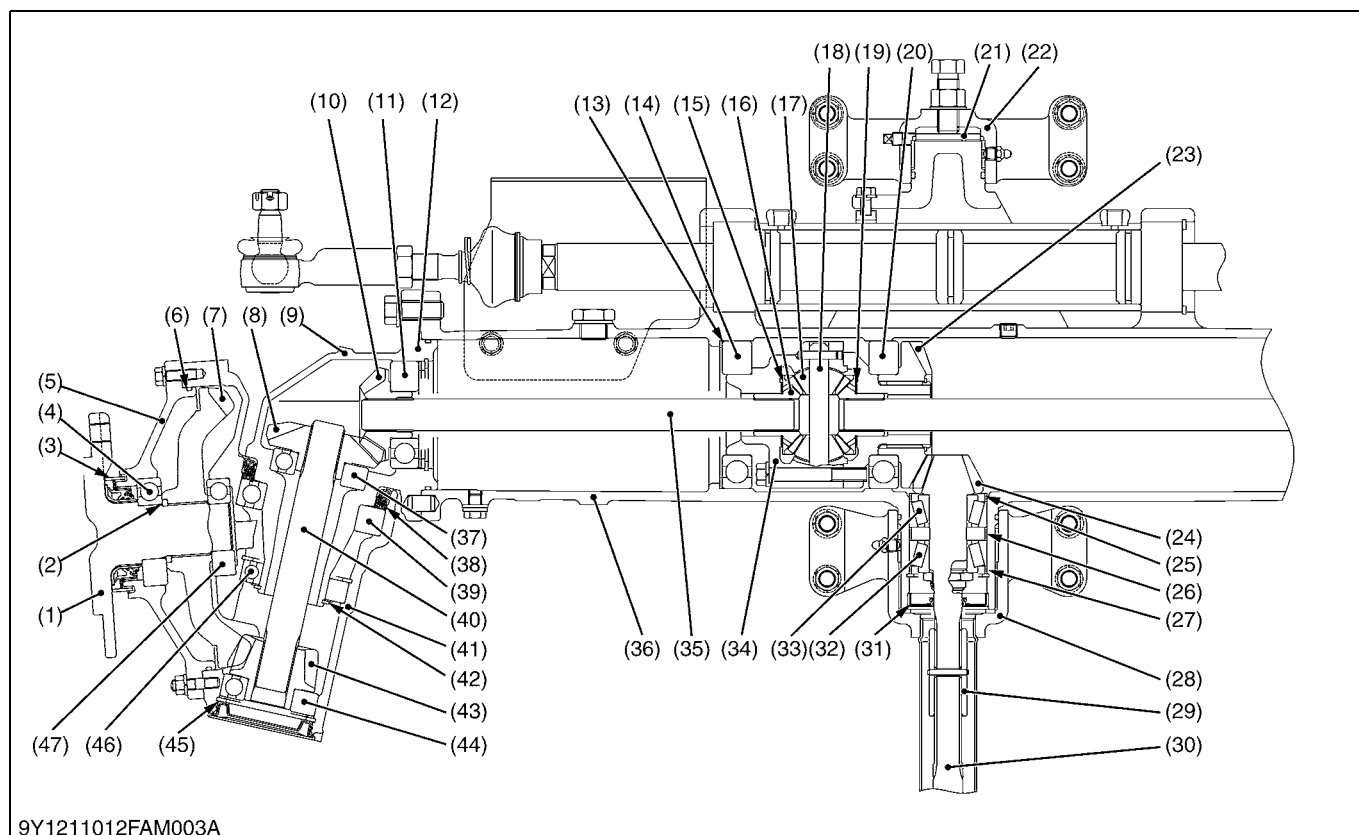


- |                        |                          |                           |                                      |
|------------------------|--------------------------|---------------------------|--------------------------------------|
| (1) Slotted Nut        | (8) Front Axle Frame     | (14) Dust Cover           | (20) Taper Roller Bearing            |
| (2) Plain Washer       | (9) Bushing              | (15) Oil Seal             | (21) Front Wheel Cap                 |
| (3) Front Wheel Hub    | (10) Thrust Collar       | (16) Ball Bearing         | (22) Front Axle Bracket (Front Side) |
| (4) Bushing            | (11) Thrust Ball Bearing | (17) Taper Roller Bearing | (23) Front Axle Bracket (Rear Side)  |
| (5) Knuckle Arm        | (12) Oil Seal            | (18) Spacer               |                                      |
| (6) Front Axle         | (13) Knuckle Shaft       | (19) Ball Bearing         |                                      |
| (7) Front Axle, Middle |                          |                           |                                      |

The front axle of the 2WD model is constructed as shown above. The shape of the front axle is relatively simple, and the axle is supported at its center with front axle bracket (22), (23) on the front axle frame (8), so that steering operation is stable even on an uneven grounds in a farm field.

2WD model of L4701 can change its front tread in 5 stages.

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**[2] 4WD Model**

- |                      |                                |                               |                       |
|----------------------|--------------------------------|-------------------------------|-----------------------|
| (1) Front Axle       | (13) Shim                      | (25) Collar                   | (37) Ball Bearing     |
| (2) Collar           | (14) Ball Bearing              | (26) Collar                   | (38) Oil Seal         |
| (3) Oil Seal         | (15) Shim                      | (27) Collar                   | (39) Ball Bearing     |
| (4) Ball Bearing     | (16) Differential Side Gear    | (28) Front Axle Bracket, Rear | (40) Bevel Gear Shaft |
| (5) Front Axle Cover | (17) Differential Pinion       | (29) Coupling                 | (41) Front Gear Case  |
| (6) O-Ring           | (18) Differential Pinion Shaft | (30) Propeller Shaft          | (42) Shim             |
| (7) Bevel Gear       | (19) Shim                      | (31) Oil Seal                 | (43) Bevel Gear       |
| (8) Bevel Gear       | (20) Ball Bearing              | (32) Taper Roller Bearing     | (44) Ball Bearing     |
| (9) Bevel Gear Case  | (21) Thrust Ball Bearing       | (33) Taper Roller Bearing     | (45) Shim             |
| (10) Bevel Gear Case | (22) Front Axle Bracket, Front | (34) Differential Case        | (46) Ball Bearing     |
| (11) Ball Bearing    | (23) Spiral Bevel Gear         | (35) Differential Yoke Shaft  | (47) Ball Bearing     |
| (12) Shim            | (24) Spiral Bevel Pinion Shaft | (36) Front Axle Case          |                       |

The front axle of the 4WD model is constructed as shown above. Power is transmitted from the transmission through the propeller shaft (30) and to the spiral bevel pinion shaft (24), then to the spiral bevel gear (23) after that to the differential gear.

The power through the differential is transmitted to the differential yoke shaft (35), and to the bevel gear shaft (40) in the bevel gear case (9).

The revolution is greatly reduced by the bevel gears (7), (43), 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.

9Y1211012FAM0002US0

# SERVICING

## CONTENTS

1. TROUBLESHOOTING.....	6-S1
2. SERVICING SPECIFICATIONS .....	6-S2
3. TIGHTENING TORQUES.....	6-S5
4. CHECKING AND ADJUSTING .....	6-S6
5. DISASSEMBLING AND ASSEMBLING .....	6-S9
[1] L3301/L3901 .....	6-S9
(1) Separating Front Axle from Front Axle Frame.....	6-S9
(2) Disassembling Front Axle.....	6-S12
[2] L4701 .....	6-S17
(1) Separating Front Axle from Front Axle Frame.....	6-S17
(2) Disassembling Front Axle.....	6-S19
6. SERVICING .....	6-S26
[1] 2WD MODEL.....	6-S26
[2] 4WD MODEL.....	6-S28

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>Front Wheels Wander to Right or Left</b>	Tire pressure uneven	Adjust	G-99
	Improper toe-in adjustment (improper alignment)	Adjust	6-S6
	Clearance between front axle middle boss and front axle shaft bracket bushing excessive [2WD]	Replace	6-S26
	Clearance between front axle case boss and front axle bracket (front, rear) bushing excessive [4WD]	Replace	6-S32
	Knuckle shaft bushings worn [2WD]	Replace	6-S27
	Front axle rocking force too small	Adjust	6-S7, 6-S7
	Front wheel sway excessive	Replace	6-S7
	Tie-rod end loose	Tighten	6-S10, 6-S19, 6-S21
	Air sucked in power steering circuit	Bleed	7-S10
<b>Front Wheels Can Not Be Driven [4WD]</b>	Propeller shaft broken	Replace	6-S9, 6-S17
	Front wheel drive gears in transmission broken	Replace	3-S36, 3-S43, 3-S71
	Front differential gear broken	Replace	6-S16, 6-S24
	Shift fork broken	Replace	3-S36, 3-S43, 3-S71
	Coupling displaced	Reassemble	6-S9, 6-S17
<b>Noise [4WD]</b>	Gear backlash excessive	Adjust or replace	6-S29, 6-S30, 6-S30, 6-S31
	Oil insufficient	Fill	G-40, G-67
	Bearings damaged or broken	Replace	—
	Gears damaged or broken	Replace	—
	Spiral bevel pinion shaft turn force improper	Adjust	6-S29

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## 2. SERVICING SPECIFICATIONS

[2WD]

Item		Factory Specification	Allowable Limit
Toe-in		2 to 8 mm 0.08 to 0.31 in.	—
Front Wheel	Axial Sway	Less than 5.0 mm 0.20 in.	—
Front Axle	Rocking Force	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft	—
Front Axle Middle Boss to Front Axle Shaft Bracket Bushing	Clearance	0.015 to 0.177 mm 0.0006 to 0.00696 in.	0.3 mm 0.01 in.
• Front Axle Middle Boss	O.D.	39.938 to 40.000 mm 1.5724 to 1.5748 in.	—
• Bushing	I.D.	40.015 to 40.115 mm 1.5754 to 1.5793 in.	—
Knuckle Shaft (Kingpin) to Bushing	Clearance (L3301/L3901)	0 to 0.285 mm 0 to 0.0112 in.	0.4 mm 0.02 in.
	Clearance (L4701)	0 to 190 mm 0 to 0.007482 in.	0.4 mm 0.02 in.
• Knuckle Shaft	O.D. (L3301/L3901)	27.880 to 27.900 mm 1.0977 to 1.0984 in.	—
	O.D. (L4701)	37.975 to 38.000 mm 1.4951 to 1.4960 in.	—
• Bushing	I.D. (L3301/L3901)	27.900 to 28.165 mm 1.0985 to 1.1088 in.	—
	I.D. (L4701)	38.000 to 38.165 mm 1.4961 to 1.15025 in.	—
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.

**[4WD]**

Item		Factory Specification	Allowable Limit
Toe-in		2 to 8 mm 0.08 to 0.3 in.	—
Front Wheel	Axial Sway	Less than 5.0 mm 0.20 in.	—
Front Axle	Rocking Force	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft	—
Bevel Gear Case to Stopper	Clearance	2.0 mm 0.079 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	—
Differential Case, Differential Case Cover to Differential Side Gear	Clearance	0.0500 to 0.151 mm 0.00197 to 0.00594 in.	0.20 mm 0.079 in.
• Differential Case	I.D.	32.000 to 32.062 mm 1.25984 to 1.26228 in.	—
• Differential Case Cover	I.D.	32.000 to 32.025 mm 1.25984 to 1.26083 in.	—
• Differential Side Gear	O.D.	31.911 to 31.950 mm 1.25634 to 1.25787 in.	—
Pinion Shaft to Differential Pinion	Clearance	0.064 to 0.100 mm 0.00252 to 0.00394 in.	0.25 mm 0.0096 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 0.55315 in.	—
Differential Pinion to Differential Side Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.01 in.	0.4 mm 0.016 in.
Spiral Bevel Pinion Shaft to Spiral Bevel Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	—
11T Bevel Gear to 16T Bevel Gear	Backlash	0.15 to 0.35 mm 0.006 to 0.012 in.	0.6 mm 0.024 in.
11T Bevel Gear to 42T Bevel Gear.	Backlash	0.15 to 0.35 mm 0.006 to 0.012 in.	0.6 mm 0.024 in.
Front Axle Case Boss (Front) to Bracket Bushing (Front)	Clearance	0.120 to 0.275 mm 0.00472 to 0.01083 in.	0.50 mm 0.01969 in.
• Front Axle Case Boss (Front)	O.D.	49.950 to 49.975 mm 1.96653 to 1.96752 in.	—
• Bushing	I.D.	50.095 to 50.225 mm 1.97224 to 1.97736 in.	—

Item		Factory Specification	Allowable Limit
Front Axle Case Boss (Rear) to Bracket Bushing	Clearance	0.100 to 0.292 mm 0.00394 to 0.01150 in.	1.0 mm 0.03937 in.
	O.D.	69.970 to 70.000 mm 2.75472 to 2.75590 in.	—
	I.D.	70.100 to 70.262 mm 2.75984 to 2.76622 in.	—
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-13.)

#### [2WD]

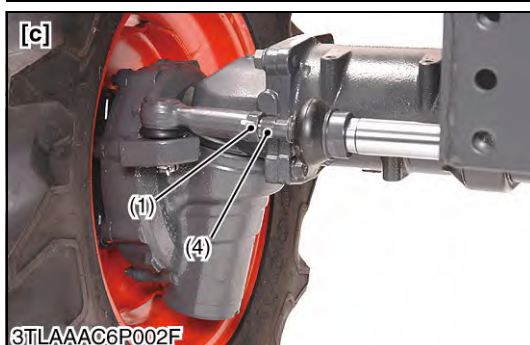
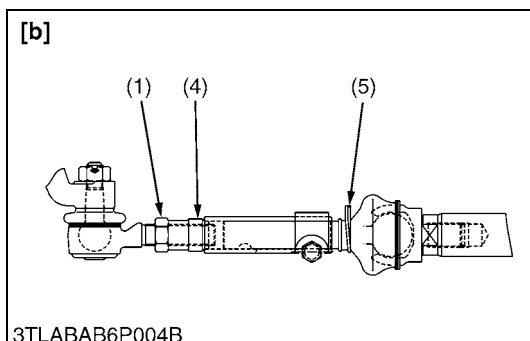
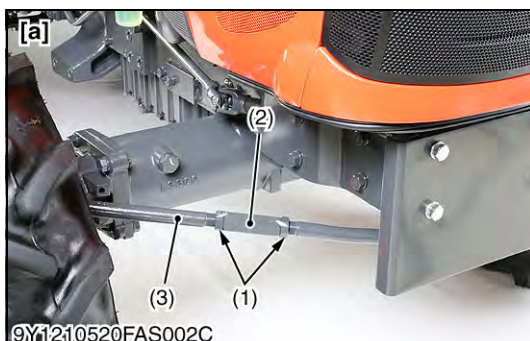
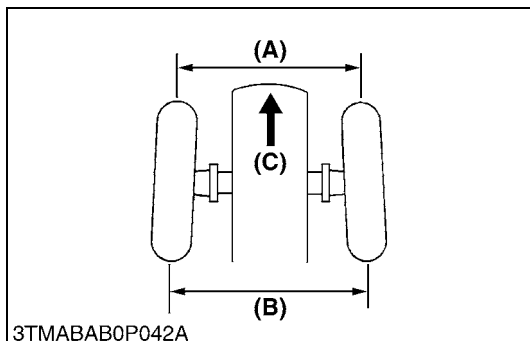
Item	N·m	kgf·m	lbf·ft
Tie-rod lock nut (L3301/L3901)	112.7 to 122.5	11.5 to 12.5	83.2 to 90.4
Tie-rod lock nut (L4701)	83.3 to 88.2	8.5 to 9.0	62 to 65
Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27	2.4 to 2.7	17 to 19
Lock nut (front axle rocking force) [L4701]	98 to 147	10.0 to 14.9	72.3 to 108
Tie-rod end nut (L3301/L3901)	49 to 68	5.0 to 7.0	37 to 50
Tie-rod end nut (L4701)	35 to 44	3.5 to 4.5	26 to 32
Shaft brackets (front) mounting bolt	166 to 196	17.0 to 20.0	123 to 144
Shaft bracket (rear) mounting bolt	103 to 118	10.5 to 12.0	76.0 to 86.7
Front wheel mounting lug nuts (L3301/L3901)	137	14.0	101
Front wheel mounting stud bolt (L4701)	64 to 73	6.5 to 7.5	47 to 54
Front wheel hub slotted nut	49 to 68	5.0 to 7.0	37 to 50
Front wheel hub slotted nut	29.4 to 39.2	3.0 to 4.0	21.7 to 28.9
Knuckle arm mounting bolt and nut	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Outer front axle mounting bolt and nut	124 to 147	12.6 to 15.0	91.1 to 108

#### [4WD]

Item	N·m	kgf·m	lbf·ft
Tie-rod lock nut (L4701)	166.7 to 196.1	17.0 to 20.0	123 to 144
Front axle adjusting bolt	49 to 117	5.00 to 12.0	36.2 to 86.7
Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27	2.4 to 2.7	17 to 19
Lock nut (front axle rocking force) [L4701]	98 to 147	10.0 to 14.9	72.3 to 108
Tie-rod end nut	35 to 44	3.5 to 4.5	26 to 32
Shaft bracket (front) mounting bolt	240 to 260	24.5 to 26.5	177 to 181
Shaft bracket (rear) mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Front wheel mounting lug nuts	137	14.0	101
Axle flange mounting stud bolt	12 to 15	1.2 to 1.6	8.7 to 11
Axle flange mounting screws and nuts	24 to 27	2.4 to 2.8	18 to 20
Power steering hose retaining nut	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Front wheel mounting nut	124 to 147	12.6 to 15.0	92 to 108
Bracket mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Bracket mounting nut	78 to 90	7.9 to 9.2	58 to 66
Bevel gear case mounting screw	166.7 to 196.1	17.0 to 20.0	122.9 to 144.6
Axle flange mounting bolts and nuts [L3301/L3901]	23.6 to 27.5	2.4 to 2.8	18 to 20
Axle flange mounting bolts [L4701]	29.4 to 34.3	3.0 to 3.5	22 to 25
Axle flange mounting nuts [L4701]	23.6 to 27.5	2.4 to 2.8	18 to 20
Tie-rod joint and steering cylinder mounting screw	166.7 to 196.1	17.0 to 20.0	122.9 to 144.6
Cylinder set bolt	16 to 17	1.6 to 1.8	12 to 13
Differential case cover mounting screw	48.0 to 58.8	4.9 to 6.0	35.4 to 43.4

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## 4. CHECKING AND ADJUSTING



### 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 0.31 in.
--------------------	-----------------------	-------------------------------

### ■ Adjusting (L3301/L3901)

1. Loosen the tie-rod lock nut (1) and turn the turnbuckle (2) to adjust the tie-rod length until the proper toe-in measurement is obtained.
2. Retighten the tie-rod lock nut (1).

### ■ Adjusting (L4701)

#### [2WD]

1. Remove the snap ring (5).
2. Loosen the tie-rod lock nut (1).
3. Turn the tie-rod joint (4) to adjust the tie-rod length until the proper toe-in measurement is obtained.
4. Retighten the tie-rod lock nut (1) and rod mounting screw.
5. Attach the snap ring (5).

#### [4WD]

1. Loosen the tie-rod lock nut (1).
2. Turn the tie-rod joint (4) to adjust the tie-rod length until proper toe-in measurement is obtained.

Tightening torque	Tie-rod lock nut	L3301/L3901		112.7 to 122.5 N·m 11.5 to 12.5 kgf·m 83.2 to 90.4 lbf·ft
		L4701	2WD Model	83.3 to 88.2 N·m 8.5 to 9.0 kgf·m 62 to 65 lbf·ft
			4WD Model	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

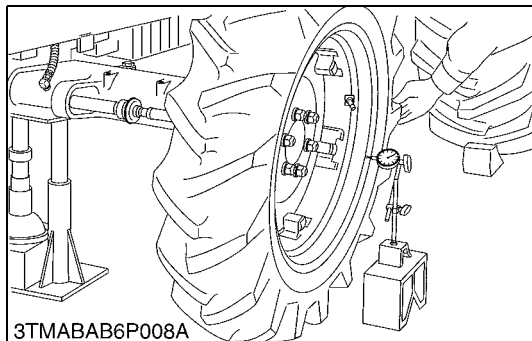
### ■ IMPORTANT

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

- (1) Tie-rod Lock Nut
- (2) Turnbuckle
- (3) Tie-rod
- (4) Tie-rod Joint
- (5) Snap Ring

- [A] Wheel to Wheel Distance at front  
[B] Wheel to Wheel Distance at rear  
[C] Front  
[a] L3301/L3901  
[b] L4701 2WD Model  
[c] L4701 4WD Model

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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 runout 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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### Front Axle Rocking Force [2WD]

1. Jack up the front side of tractor.
2. Set a spring balance to the front axle flange.
3. Measure the front axle rocking force.
4. If the measurement is not within the factory specifications, adjust with the adjusting screw (1).
5. Tighten the lock nut (2) firmly.

Front axle rocking force	Factory specification	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft
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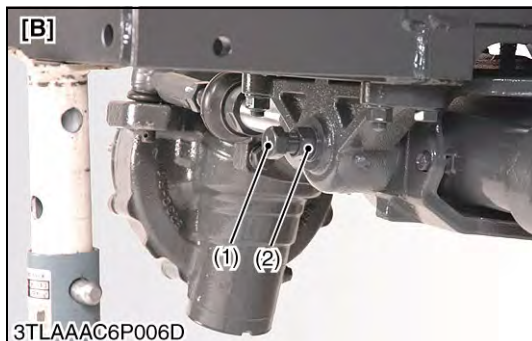
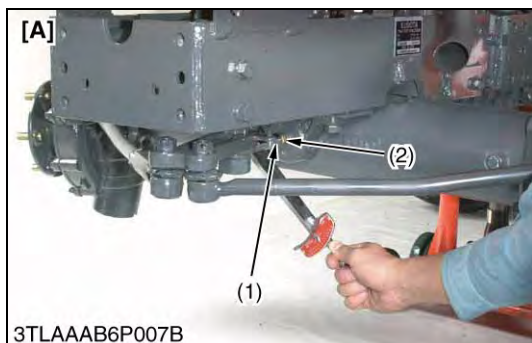
### (When reassembling)

Tightening torque	Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27 N·m 2.4 to 2.7 kgf·m 17 to 19 lbf·ft
	Lock Nut (front axle rocking force) [L4701]	98 to 147 N·m 10.0 to 14.9 kgf·m 72.3 to 108 lbf·ft

(1) Adjusting Screw

(2) Lock Nut

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### Adjusting Front Axle Pivot [4WD]

1. Jack up the tractor body, then loosen the lock nut (2).
2. Measure the adjusting screw tightening torque.
3. If tightening torque is not within the factory specifications, adjust the adjusting bolt (1).
4. After adjustment, tighten the lock nut (2) firmly.

Front axle rocking force	Factory specification	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft
--------------------------	-----------------------	---

### (When reassembling)

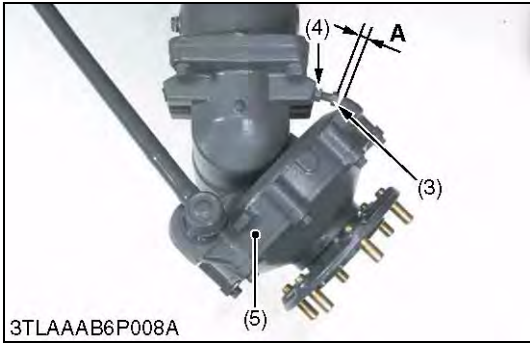
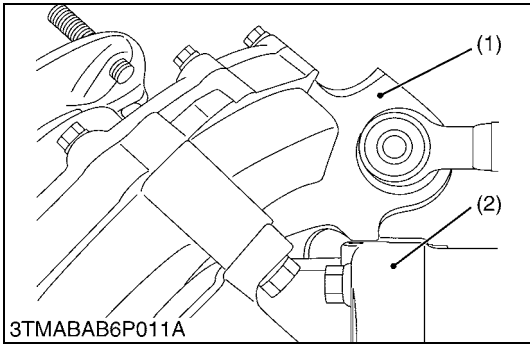
Tightening torque	Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27 N·m 2.4 to 2.7 kgf·m 17 to 19 lbf·ft
	Lock Nut (front axle rocking force) [L4701]	98 to 147 N·m 10.0 to 14.9 kgf·m 72.3 to 108 lbf·ft

(1) Adjusting Bolt

(2) Lock Nut

**[A] L3301/L3901****[B] L4701**

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**Front Wheel Steering Angle [4WD]**

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	2.0 mm 0.079 in.
---	-----------------------	---------------------

- (1) Front Gear Case
- (2) Bevel Gear Case
- (3) Stopper
- (4) Lock Nut
- (5) Front Gear Case

**A: Clearance**

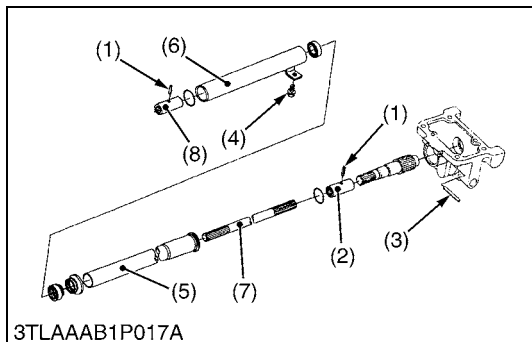
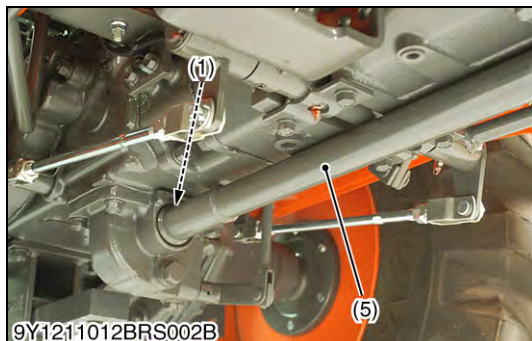
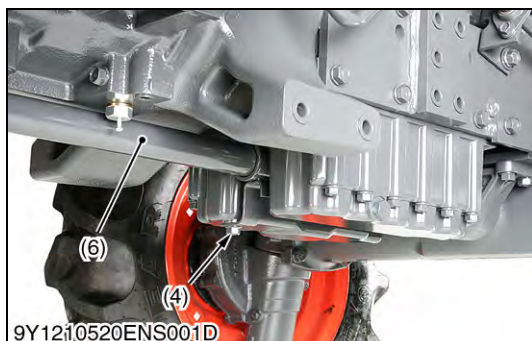
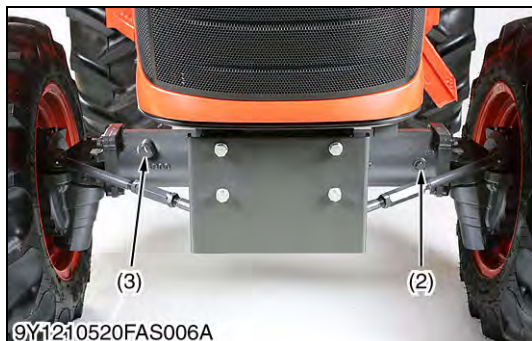
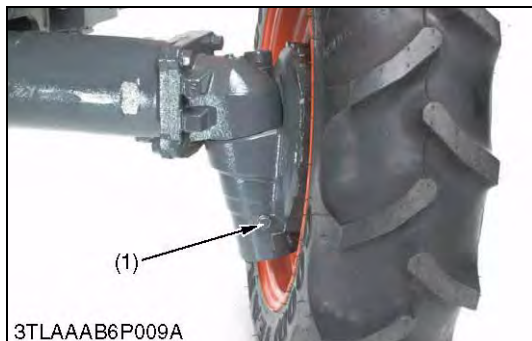
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## 5. DISASSEMBLING AND ASSEMBLING

### [1] L3301/L3901

#### (1) Separating Front Axle from Front Axle Frame



#### Draining Front Axle Case Oil [4WD]

1. Place the oil pans underneath the front axle case.
2. Remove the drain plug (1) both sides and filling port plug (3) to drain the oil.
3. After draining, reinstall the drain plugs (1) and filling port plug (3).

#### **(When refilling)**

- Remove the filling port plug (3) and check plug (2).
- Fill with the new oil up to the check plug port.
- After filling, reinstall the check plug (2) and filling port plug (3).

Front axle case oil	Capacity	4.5 L 4.8 U.S.qts 4.0 Imp.qts
---------------------	----------	-------------------------------------

#### ■ IMPORTANT

- Use KUBOTA SUPER UDT-2 fluid or SAE 80, 90 gear oil. Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.

- (1) Drain Plug  
(2) Check Plug

- (3) Filling Port Plug

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#### Propeller Shaft [4WD]

1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

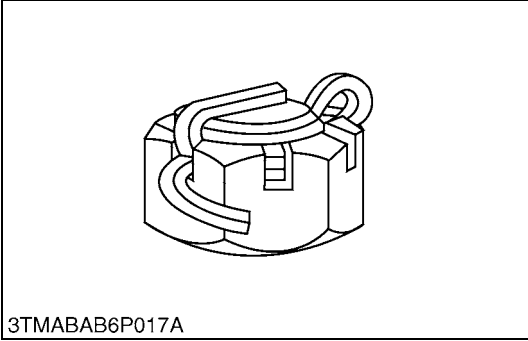
#### **(When reassembling)**

- Apply greasing to the splines of the propeller shaft (7) and pinion shaft.

- (1) Spring Pin  
(2) Coupling  
(3) Spring Pin  
(4) Screw

- (5) Propeller Shaft Cover 1  
(6) Propeller Shaft Cover 2  
(7) Propeller Shaft  
(8) Coupling

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**Bumper and Tie-rods**

1. Remove the bumper.
2. Remove the tie-rods with the tie-rod end lifter.  
In this case, take special care not to damage the tie-rod end nut (slotted nut). (It is preferable to replace it with an unrequired nut.)
3. Reinstall the bumper.

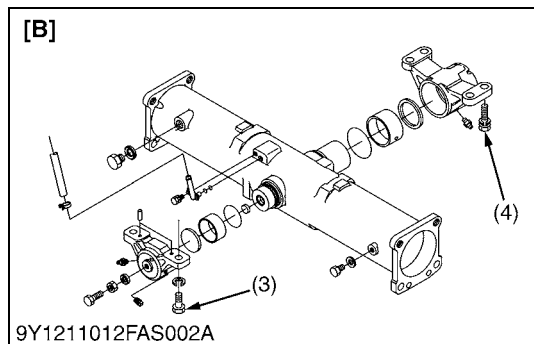
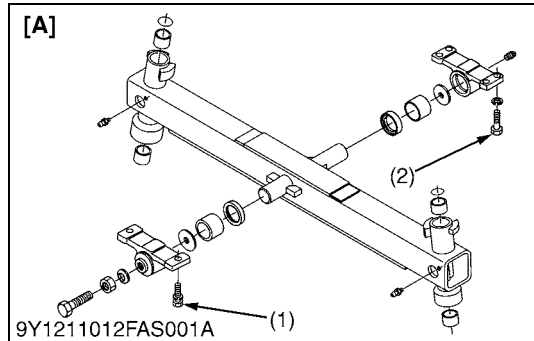
Tightening torque	Tie-rod end nut	2WD (L3301/L3901)	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
		2WD (L4701)	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft
		4WD	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft

- **IMPORTANT**
- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.

[A] 2WD

[B] 4WD

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### Front Axle Assembly

1. Place the disassembling stand under the front axle, and hang up the front bumper by the hoist to support it.
2. Remove the shaft bracket 1 mounting screws and shaft bracket 2 mounting screws.
3. Separate the front axle from the front axle support.
4. Remove the front wheels.

#### (When reassembling)

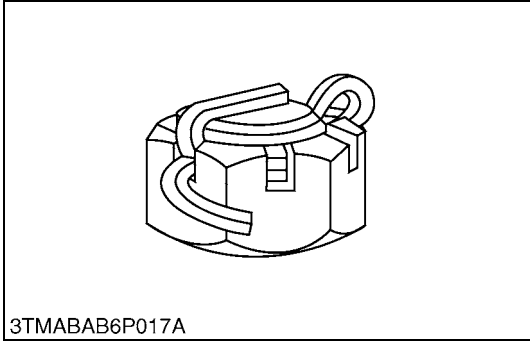
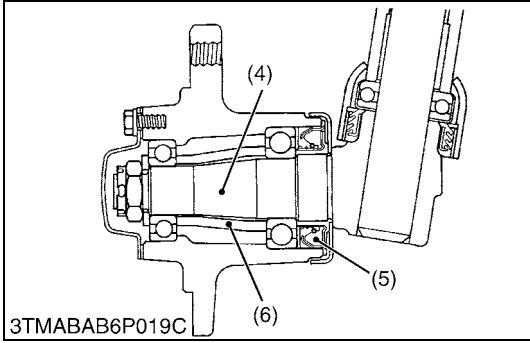
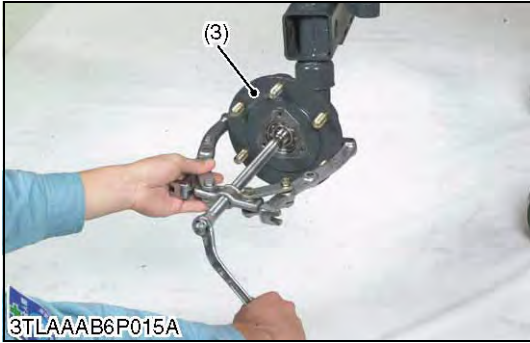
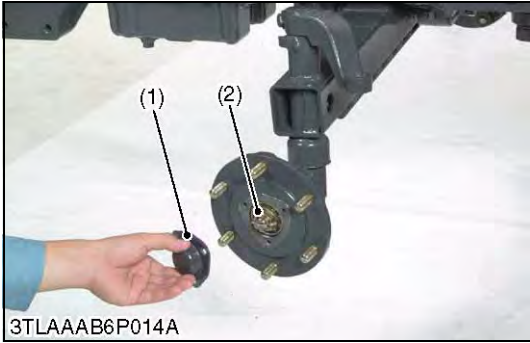
- Apply thread locker (Three Bond 1324 or equivalent) to shaft bracket (front) mounting bolt (3).
- When implant stud bolt, be sure to set flat end face of stud bolt toward front axle.
- Apply thread locker (Three Bond 1324 or equivalent) to stud bolt implant side.

Tightening torque	Shaft bracket (front) mounting bolt [2WD]	166 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Shaft bracket (rear) mounting bolt [2WD]	103 to 118 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Shaft bracket (front) mounting bolt [4WD]	240 to 260 N·m 24.5 to 26.5 kgf·m 177 to 191 lbf·ft
	Shaft bracket (rear) mounting bolt [4WD]	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Front wheel mounting lug nut	137 N·m 14.0 kgf·m 101 lbf·ft
	Front wheel mounting stud bolt [2WD]	64 to 73 N·m 6.5 to 7.5 kgf·m 47 to 54 lbf·ft

- (1) Shaft Bracket (Front) Mounting Bolt [A] 2WD Model  
[B] 4WD Model
- (2) Shaft Bracket (Rear) Mounting Bolt [2WD]
- (3) Shaft Bracket (Front) Mounting Bolt [4WD]
- (4) Shaft Bracket (Rear) Mounting Bolt [4WD]

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(2) Disassembling Front Axle  
[A] 2WD Model



**Front Wheel Hub**

1. Remove the front wheel hub cap (1).
2. Draw out the cotter pin.
3. Remove the slotted nut (2).
4. Remove the collar.
5. Remove the front wheel hub (3) with a puller.

**(When reassembling)**

- Replace cotter pin with a new one.
- Fill grease in the clearance between knuckle arm shaft (4) and spacer (6).
- Be sure to attach oil seal (5) pointing lip face outside.

**■ IMPORTANT**

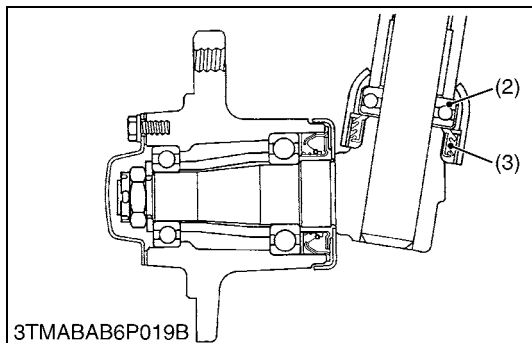
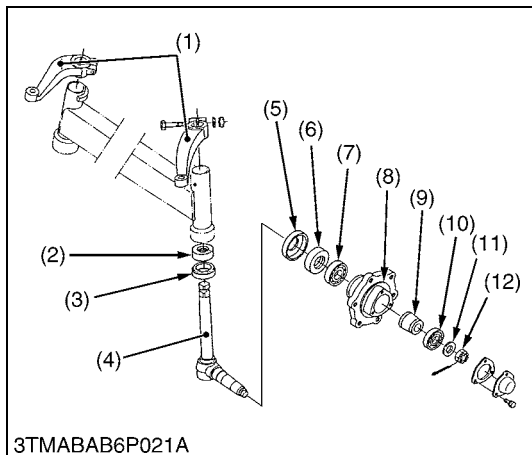
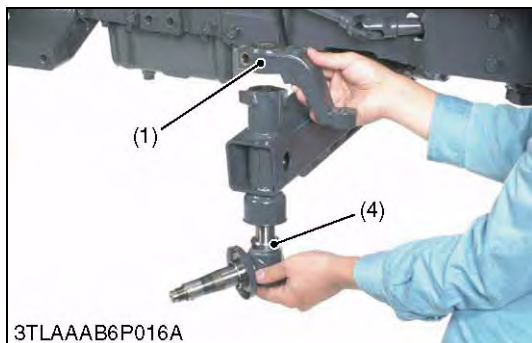
- After tightening the slotted nut to the specified torque, insert a cotter pin and bend it as shown in the figure.

Tightening torque	Front wheel hub slotted nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
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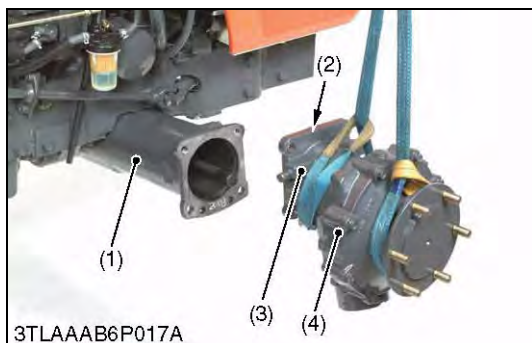
- |                         |                       |
|-------------------------|-----------------------|
| (1) Front Wheel Hub Cap | (4) Knuckle Arm Shaft |
| (2) Slotted Nut         | (5) Oil Seal          |
| (3) Front Wheel Hub     | (6) Spacer            |

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## [B] 4WD Model



### Knuckle Shaft

1. Remove the knuckle arm (1) and draw out the knuckle shaft (4) from the front axle.

#### (When reassembling)

- Insert the thrust ball bearing (2) and oil seal (3), noting its direction.
- Apply grease to the oil seals (3), (6).
- Do not interchange right and left knuckle arms.
- When lift the knuckle shaft, the knuckle arms must be mounted so that the clearance between the knuckle arms and front axle is 0.30 to 1.0 mm (0.012 to 0.039 in.).
- After reassembling, be sure to lubricate grease from grease fitting.

Tightening torque	Knuckle arm mounting bolt and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
-------------------	-----------------------------------	---

- |                         |                     |
|-------------------------|---------------------|
| (1) Knuckle Arm         | (7) Ball Bearing    |
| (2) Thrust Ball Bearing | (8) Front Wheel Hub |
| (3) Oil Seal            | (9) Spacer          |
| (4) Knuckle Shaft       | (10) Ball Bearing   |
| (5) Dust Cover          | (11) Washer         |
| (6) Oil Seal            | (12) Slotted Nut    |

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### Bevel Gear Case and Front Gear Case

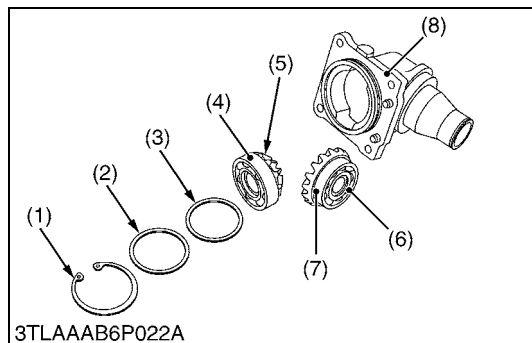
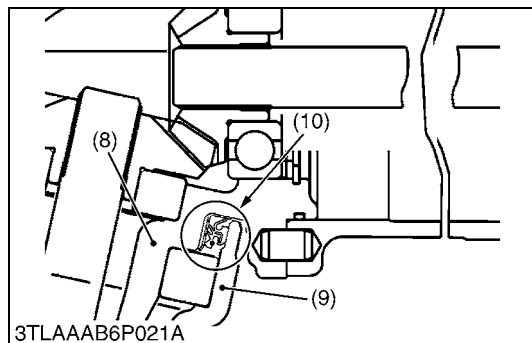
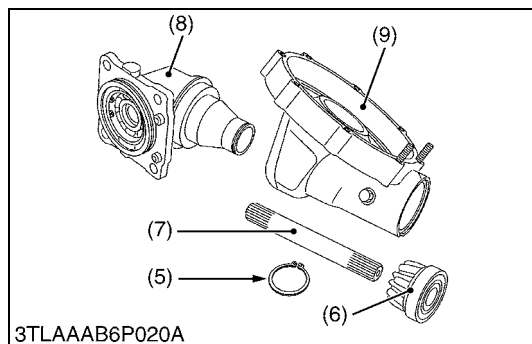
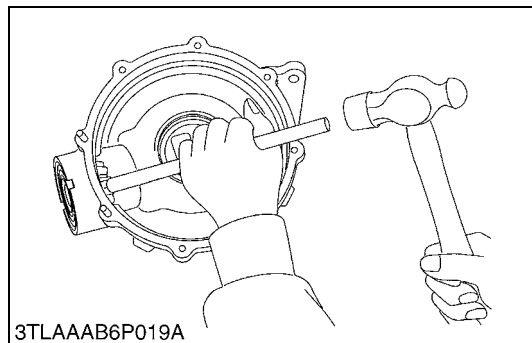
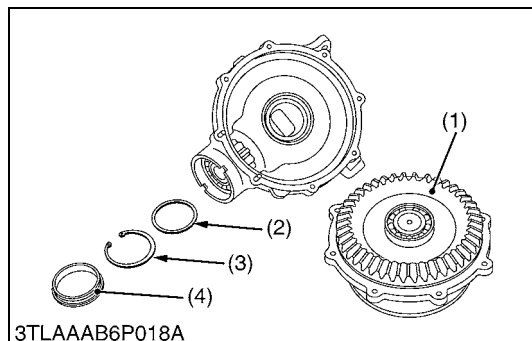
1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (3) and front gear case (4) as a unit from the front axle case (1).

#### (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 and front gear case assemblies.

- |                     |                     |
|---------------------|---------------------|
| (1) Front Axle Case | (3) Bevel Gear Case |
| (2) O-ring          | (4) Front Gear Case |

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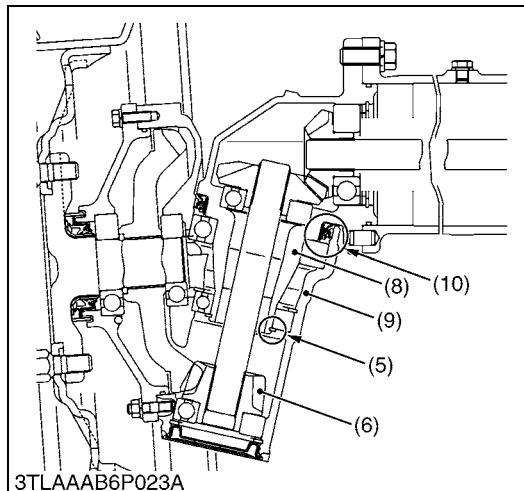
### Bevel Gear Case, Axle Flange and Front Gear Case

1. Remove the plug (4).
2. Remove the internal snap ring (3) and shim (2).
3. Remove the axle flange (1).
4. Tap out the bevel gear (6) and ball bearing.
5. Draw out the bevel gear shaft (7).
6. Remove the external snap ring (5).
7. Tap the bevel gear case (8), and separate it from the front gear case (9).

#### (When reassembling)

- Apply grease to the O-rings of axle flange (1).
- Tighten the axle flange mounting screws and nuts diagonally in several steps.
- Install the oil seal (10) of bevel gear case, noting its direction as shown in the figure below.

Tightening torque	Axle flange mounting stud bolt	12 to 15 N·m 1.2 to 1.6 kgf·m 8.7 to 11 lbf·ft
	Axle flange mounting bolts and nuts	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft



- |                        |                      |
|------------------------|----------------------|
| (1) Axle Flange        | (6) Bevel Gear       |
| (2) Shim               | (7) Bevel Gear Shaft |
| (3) Internal Snap Ring | (8) Bevel Gear Case  |
| (4) Plug               | (9) Front Gear Case  |
| (5) External Snap Ring | (10) Oil Seal        |

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### Bevel Gear Case Gears

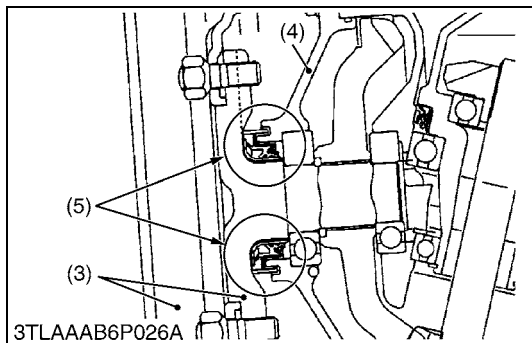
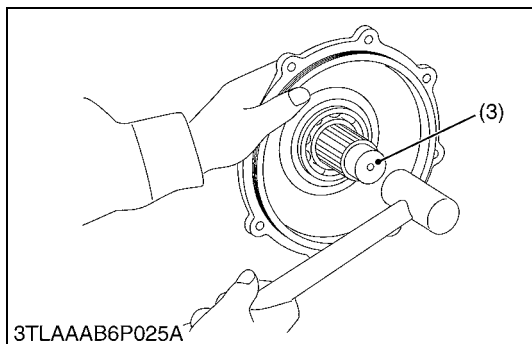
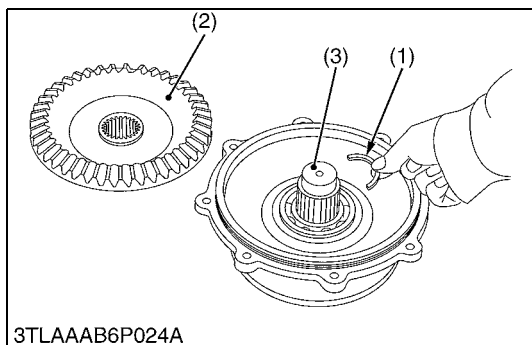
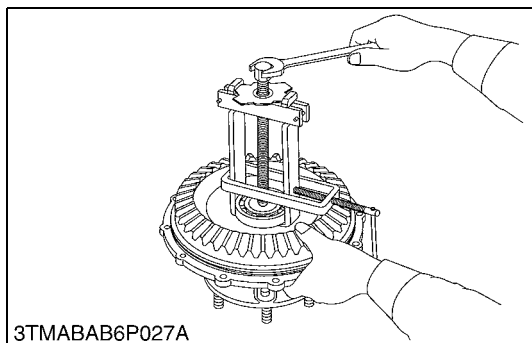
1. Remove the internal snap ring (1).
2. Remove the bevel gears (5), (7) with ball bearings (4), (6), collar (2) and shims (3).

#### (When reassembling)

- Install the same shims (3) have same thickness as before disassembling.

- |                        |                     |
|------------------------|---------------------|
| (1) Internal Snap Ring | (5) Bevel Gear      |
| (2) Collar             | (6) Ball Bearing    |
| (3) Shim               | (7) Bevel Gear      |
| (4) Ball Bearing       | (8) Bevel Gear Case |

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### Axle

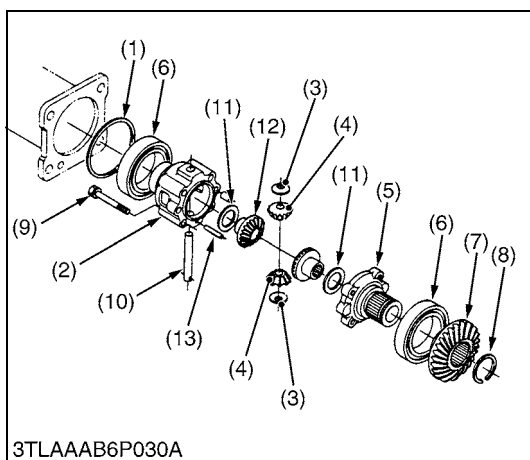
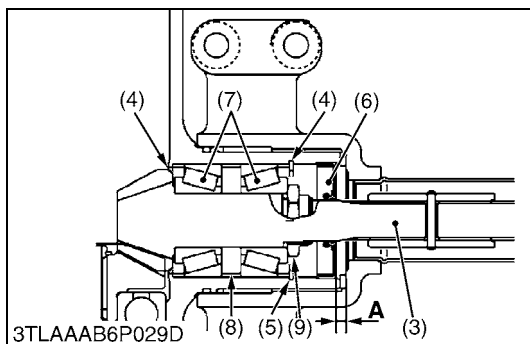
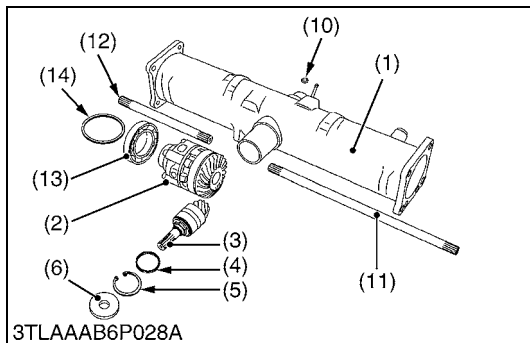
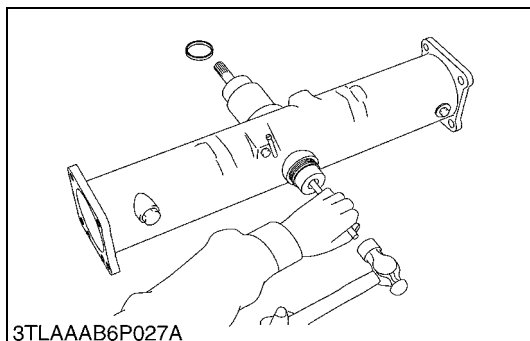
1. Remove the bearing with a special use puller set.
2. Remove the bevel gear (2).
3. Remove out the collar (1).
4. Tap out the axle (3).

### (When reassembling)

- Install the oil seal (5) of axle flange (4), noting its direction as shown in the figure below.

- |                |                 |
|----------------|-----------------|
| (1) Collar     | (4) Axle Flange |
| (2) Bevel Gear | (5) Oil Seal    |
| (3) Axle       |                 |

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### Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Remove the differential yoke shaft (11), (12) both sides.
2. Remove the oil seal (6) and internal snap ring (5).
3. Remove the plug (10), and then tap out the spiral bevel pinion shaft (3) by the brass rod and hammer.
4. Remove the differential gear assembly (2), ball bearing (13) and shim (14) from right side of front axle case (1).
5. Remove the stake of lock nut (9), and then remove the lock nut (9).
6. Remove the taper roller bearings (7).

#### (When reassembling)

- Replace the lock nut (9), oil seal (6) and plug (10) with new ones.
- Apply grease to the oil seal (6).
- Install the same shims and collars before they are removed.
- Install the taper roller bearings correctly, noting their direction, and apply gear oil to them.
- When press-fitting a oil seal (6), observe the dimension "A" described in the figure.
- Stake the lock nut (9) firmly.
- Tighten up the lock nut (9) until the turning force of the spiral bevel pinion shaft reaches the factory specifications.

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            | (9) Lock Nut                      |
| (2) Differential Gear Assembly | (10) Plug                         |
| (3) Spiral Bevel Pinion Shaft  | (11) Differential Yoke Shaft R.H. |
| (4) Adjusting Collar           | (12) Differential Yoke Shaft L.H. |
| (5) Internal Snap Ring         | (13) Ball Bearing                 |
| (6) Oil Seal                   | (14) Shim                         |
| (7) Taper Roller Bearing       |                                   |
| (8) Collar                     |                                   |

**A: 1 mm (0.04 in.)**

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### Differential Gear

1. Remove the differential case cover mounting screws (9) and then remove the differential case cover (5), ball bearing (6) and spiral bevel gear (7) as a unit.
2. Remove the external snap ring (8), and then remove the ball bearing (6) and spiral bevel gear (7) as a unit with a puller.
3. Remove the straight pin (13).
4. Pull out the pinion shaft (10) and remove the differential pinions (4) and differential side gears (12).

#### ■ NOTE

- Arrange the parts to know their original position.

#### (When reassembling)

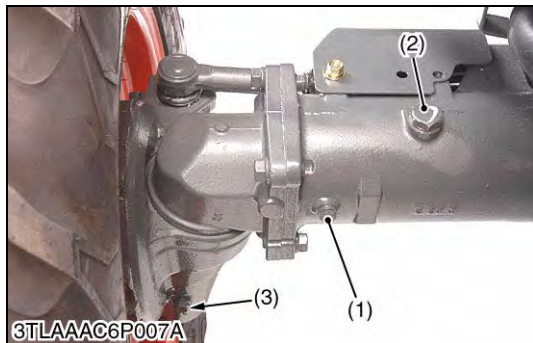
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gears (12) and differential pinions (4).
- Install the pinion shaft (10) so that the hole on it may align with the hole on differential case (2), and install the straight pin (13).

- |                             |                             |
|-----------------------------|-----------------------------|
| (1) Shim                    | (8) External Snap Ring      |
| (2) Differential Case       | (9) Screws                  |
| (3) Thrust Collar           | (10) Pinion Shaft           |
| (4) Differential Pinion     | (11) Shim                   |
| (5) Differential Case Cover | (12) Differential Side Gear |
| (6) Ball Bearing            | (13) Straight Pin           |
| (7) Spiral Bevel Gear       |                             |

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## [2] L4701

### (1) Separating Front Axle from Front Axle Frame



#### Draining Front Axle Case Oil [4WD]

1. Place the oil pans underneath the front axle case.
2. Remove the drain plug (3) both sides and filling port plug (2) to drain the oil.
3. After draining, reinstall the drain plugs (3) and filling port plug (2).

#### **(When refilling)**

- Remove the filling port plug (2) and right and left check plugs (1).
- Fill with the new oil up to the check plug port.
- After filling, reinstall the filling port plug (2) and the check plug (1).

Front axle case oil	Capacity	6.5 L 6.9 U.S.qts 5.7 Imp.qts
---------------------	----------	-------------------------------------

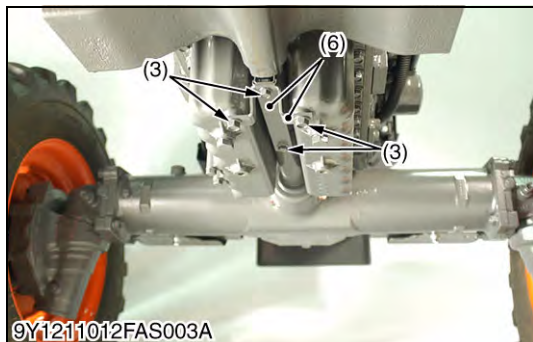
#### ■ **IMPORTANT**

- Use **KUBOTA SUPER UDT-2 fluid or SAE 80, 90 gear oil.** Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.

- (1) Check Plug  
(2) Filling Port Plug

- (3) Drain Plug

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#### Propeller Shaft (4WD Model Only)

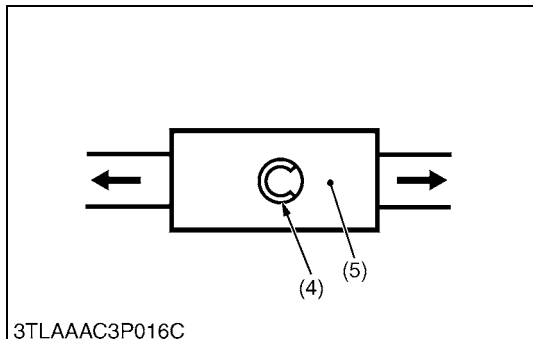
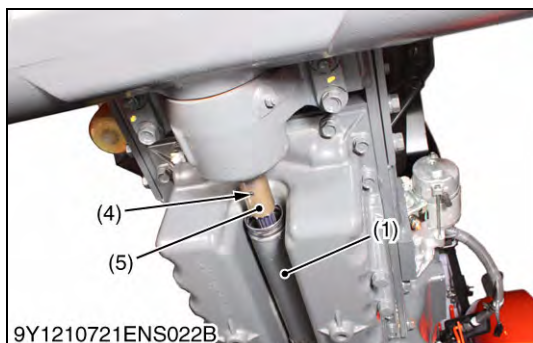
1. Remove bolts (3) and remove holder (6).
2. Slide propeller shaft front cover (2) and propeller shaft rear cover (1).
3. Tap out spring pins (4).
4. Slide coupling (5) and remove propeller shaft together with propeller shaft cover.

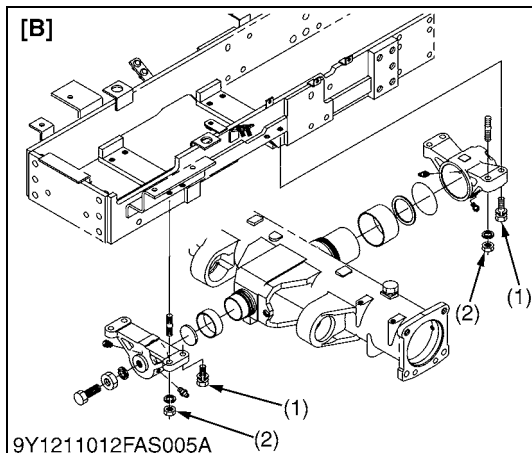
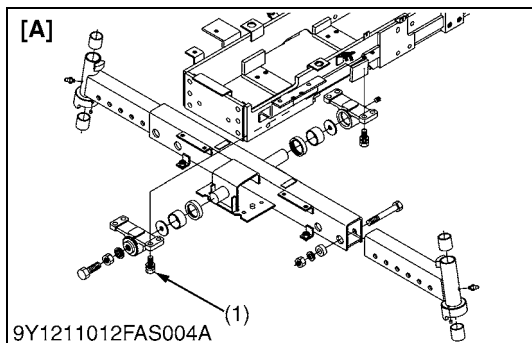
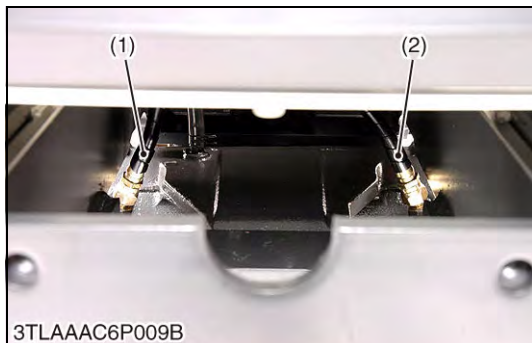
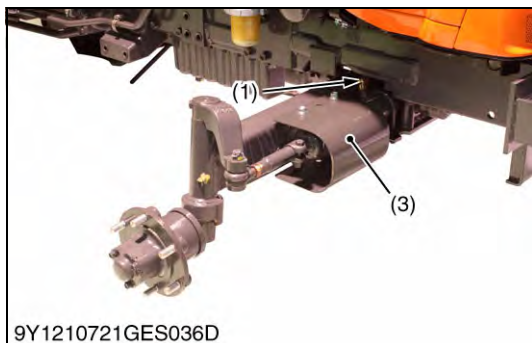
#### **(When reassembling)**

- Apply grease to splines of propeller shaft.
- Tap in spring pin (4) as shown in figure.

- (1) Propeller Shaft Rear Cover  
(2) Propeller Shaft Front Cover  
(3) Bolt  
(4) Spring Pin  
(5) Coupling  
(6) Holder

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### Power Steering Hoses

1. Remove cylinder covers (3).
2. Disconnect power steering hoses (1), (2) from steering cylinder.

#### (When reassembling)

- When connecting power steering hoses, hold joint with wrench not to turn the joint and tighten hoses.

Tightening torque	Power steering hose retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 lbf·ft
-------------------	-----------------------------------	---

- (1) Power Steering Hose, R.H.                      (3) Cylinder Cover  
(2) Power Steering Hose, L.H.

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### Front Axle Assembly

1. Check the front axle and engine are securely mounted on the disassembling 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)

#### ■ IMPORTANT

- Be sure to adjust the front axle rocking force. (See page 6-S7 and 6-S7.)

Tightening torque	Front wheel mounting nut	124 to 147 N·m 12.6 to 15.0 kgf·m 92 to 108 lbf·ft
	Bracket mounting bolt	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Bracket mounting nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

- (1) Bracket Mounting Bolt  
(2) Bracket mounting Nut

[A] 2WD Model

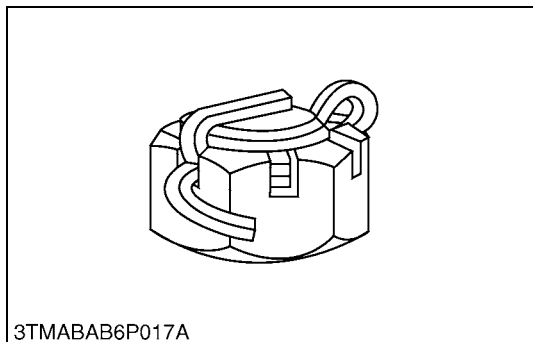
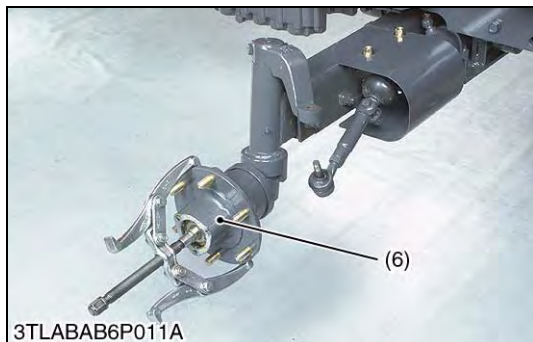
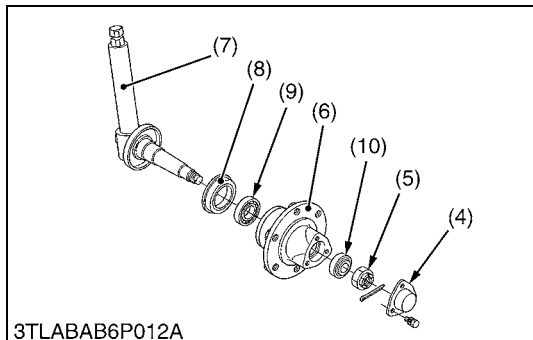
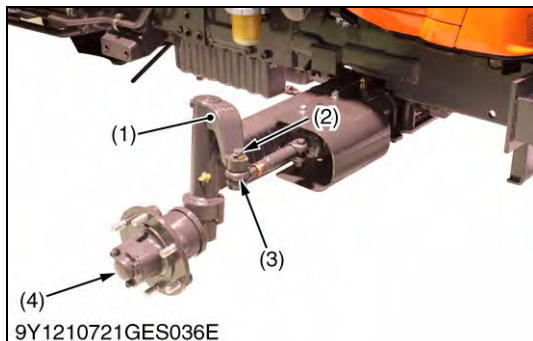
[B] 4WD Model

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## (2) Disassembling Front Axle

### [A] 2WD Model



#### Front Wheel Hub

1. Remove the cotter pin and remove the slotted nut (2).
2. Disconnect the knuckle arm (1) and tie-rod end (3).
3. Remove the front wheel cap (4).
4. Draw out the cotter pin.
5. Remove the slotted nut (5).
6. Remove the collar.
7. Remove the front wheel hub (6) with a puller.

#### (When reassembling)

- Replace cotter pin with a new one.
- Apply grease to the oil seal (8) in the front wheel hub.

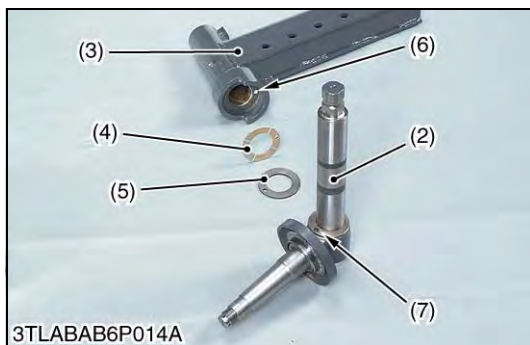
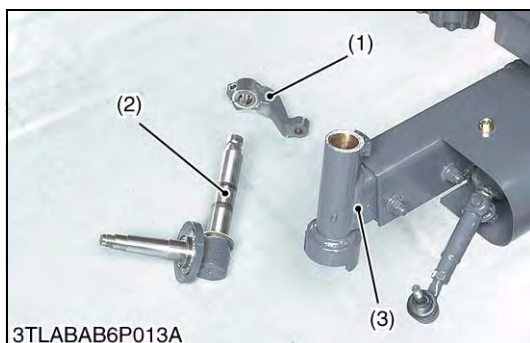
#### ■ IMPORTANT

- After tightening the slotted nut to the specified torque, insert a cotter pin and bend it as shown in the figure.
- Pack in the grease to the bearing in the front wheel hub.
- Apply liquid gasket (Three Bond 1206C or equivalent) to the front wheel hub.

Tightening torque	Front wheel hub slotted nut	29.4 to 39.2 N·m 3.0 to 4.0 kgf·m 21.7 to 28.9 lbf·ft
	Tie-rod end nut	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 28.9 to 36.2 lbf·ft

- |                                 |                           |
|---------------------------------|---------------------------|
| (1) Knuckle Arm                 | (6) Front Wheel Hub       |
| (2) Tie-rod End Slotted Nut     | (7) Knuckle Shaft         |
| (3) Tie-rod End                 | (8) Oil Seal              |
| (4) Front Wheel Cap             | (9) Taper Roller Bearing  |
| (5) Front Wheel Hub Slotted Nut | (10) Taper Roller Bearing |

9Y1211012FAS0025US0



### **Knuckle Shaft and Outer Front Axle**

1. Remove the knuckle arm (1) and draw out the knuckle shaft (2) from the front axle.
2. Remove the outer front axle (3).

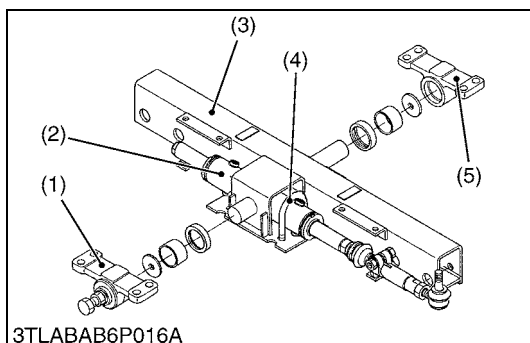
#### **(When reassembling)**

- Apply grease to the knuckle shaft (2) and thrust collar (4), (5).
- Do not interchange right and left knuckle arms.
- Be sure to install the thrust collars (4), (5) so that groove side is downward.
- Be sure to align the hole of thrust collars (4), (5) and knock pin (6), (7).
- A large size thrust collar (5) must be lower side.

Tightening torque	Knuckle arm mounting bolt and nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 lbf·ft
	Outer front axle mounting bolt and nut	123 to 147 N·m 12.6 to 15.0 kgf·m 91.1 to 108.5 lbf·ft

- |                      |                   |
|----------------------|-------------------|
| (1) Knuckle Arm      | (5) Thrust Collar |
| (2) Knuckle Shaft    | (6) Knock Pin     |
| (3) Outer Front Axle | (7) Knock Pin     |
| (4) Thrust Collar    |                   |

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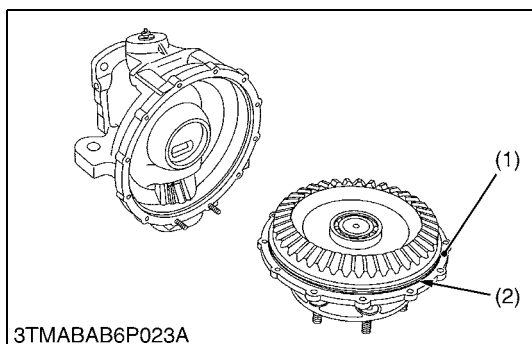
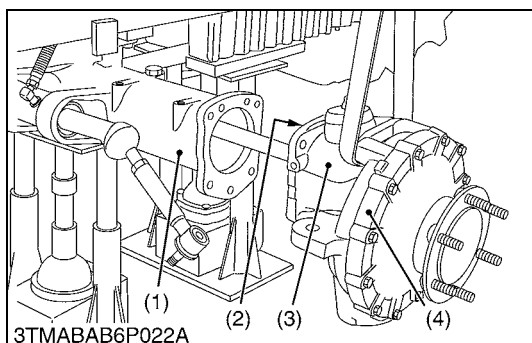
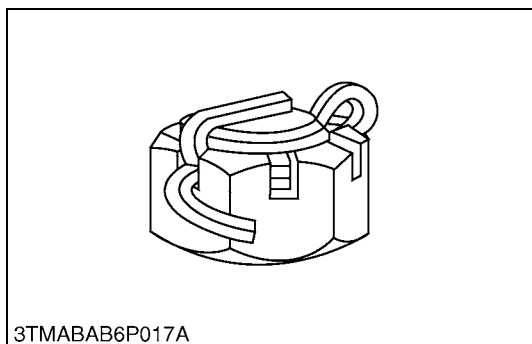
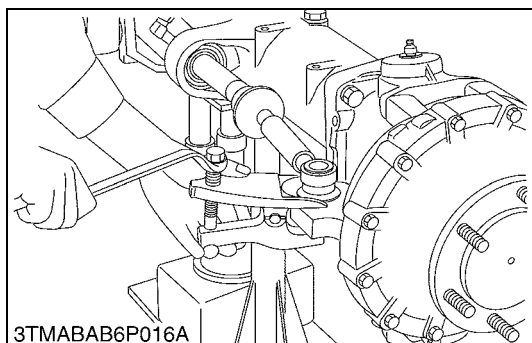
### **Steering Cylinder**

1. Remove the clamps (4) and remove the steering cylinder (2).

- |                       |                   |
|-----------------------|-------------------|
| (1) Bracket, Front    | (4) Clamp         |
| (2) Steering Cylinder | (5) Bracket, Rear |
| (3) Middle Front Axle |                   |

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**[B] 4WD Model****Tie-rods**

1. Pull out the cotter pin and remove the tie-rod end slotted nuts.
2. Remove the tie-rod with a tie-rod end lifter.

**(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	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft
-------------------	-----------------	---

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**Bevel Gear Case and Front Gear Case**

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	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 122.9 to 144.6 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 bolts and nuts.
2. Remove the axle flange (1).

**(When reassembling)**

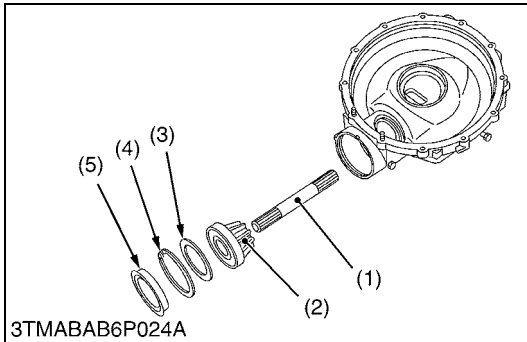
- Apply grease to the O-ring (2) of axle flange.
- Tighten the axle flange mounting bolts and nuts diagonally in several steps.

Tightening torque	Axle flange mounting bolts and nuts [L3301/L3901]	23.6 to 27.5 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Axle flange mounting bolts [L4701]	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
	Axle flange mounting nuts [L4701]	23.6 to 27.5 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Axle Flange

(2) O-ring

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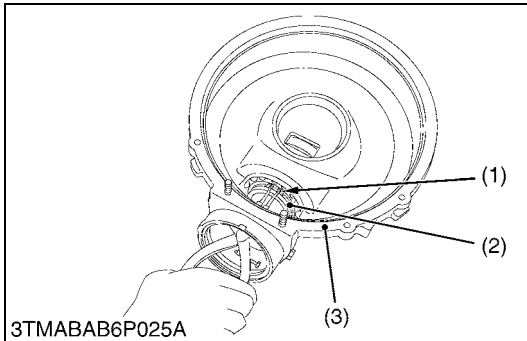


### **Bevel Gear and Bevel Gear Shaft**

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 | (4) Internal Snap Ring |
| (2) Bevel Gear       | (5) Plug               |
| (3) Shim             |                        |

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### **Bevel Gear Case Gears**

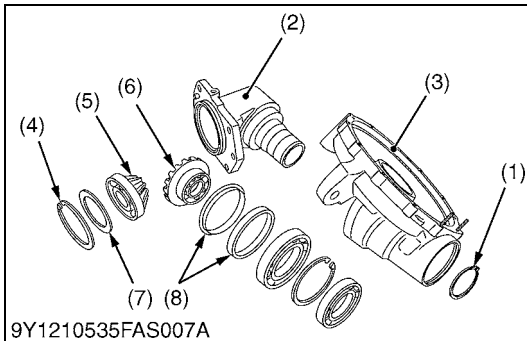
1. Remove the external snap ring (1).
2. Tap the bevel gear case (2) and separate it from the front gear case (3).
3. Remove the internal snap ring (4).
4. Remove the bevel gears (5), (6) with ball bearings, and shims (7).

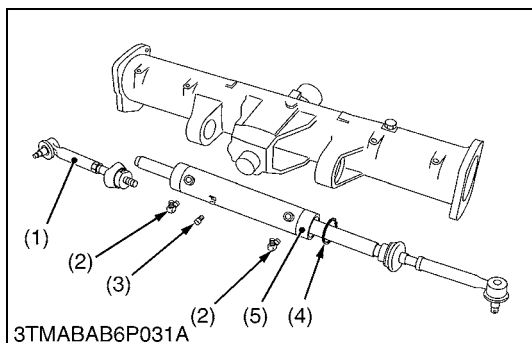
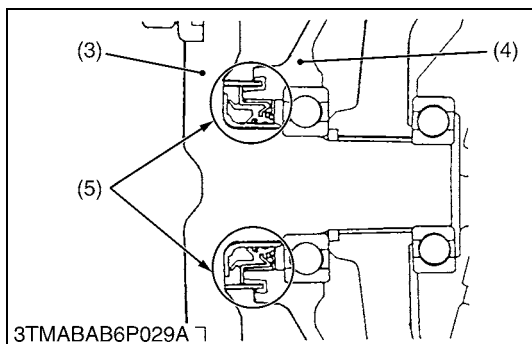
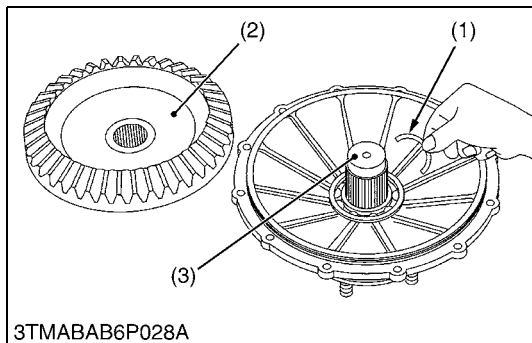
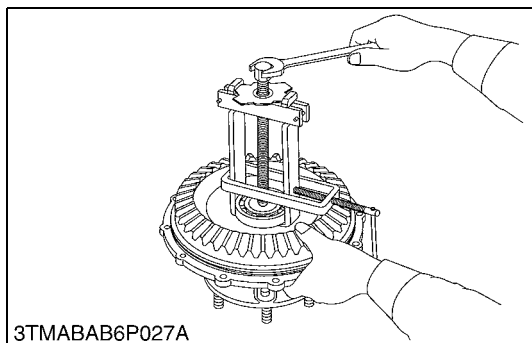
#### **(When reassembling)**

- Install the shims (7) to their original position.
- Install the oil seal (8) of bevel gear case, noting its direction.

- |                        |                |
|------------------------|----------------|
| (1) External Snap Ring | (5) Bevel Gear |
| (2) Bevel Gear Case    | (6) Bevel Gear |
| (3) Front Gear Case    | (7) Shim       |
| (4) Internal Snap Ring | (8) Oil Seal   |

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### Axle

1. Remove the bearing with a special use puller set.
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.
- Be sure to insert collar (1) into groove.

- |                |                 |
|----------------|-----------------|
| (1) Collar     | (4) Axle Flange |
| (2) Bevel Gear | (5) Oil Seal    |
| (3) Axle       |                 |

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### Steering Cylinder

1. Remove the tie-rod joint (1) (right side).
2. Remove the cylinder set screw (3).
3. Remove the joints (2) from steering cylinder.
4. Remove the internal snap ring (4).
5. Draw out the steering cylinder (5).

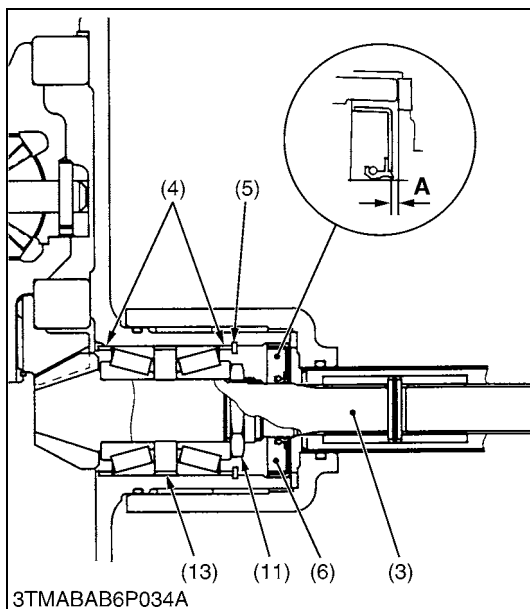
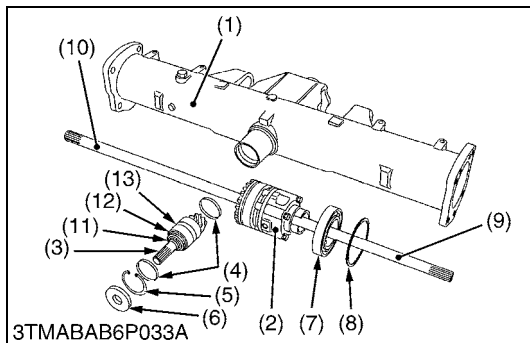
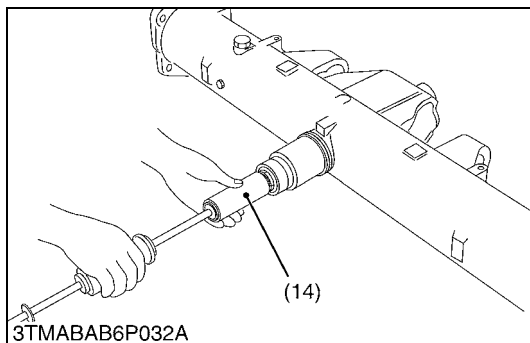
#### (When reassembling)

- Apply thread locker (Three Bond 1324 or equivalent) to the tie-rod joint.
- Wind seal tape on cylinder side of joint (2).

Tightening torque	Tie-rod joint and steering cylinder mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 122.9 to 144.6 lbf·ft
	Cylinder set bolt	16 to 17 N·m 1.6 to 1.8 kgf·m 12 to 13 lbf·ft

- |                        |                        |
|------------------------|------------------------|
| (1) Tie-rod Joint      | (4) Internal Snap Ring |
| (2) Joint              | (5) Steering Cylinder  |
| (3) Cylinder Set Screw |                        |

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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 (14).
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 specifications.
- When press-fitting the oil seal (6), observe the dimension "A" described in the figure.

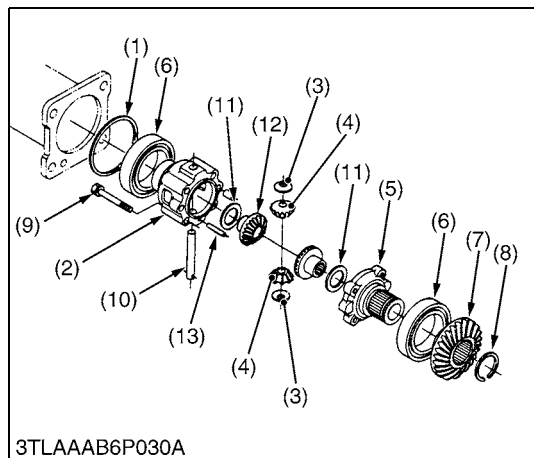
#### ■ IMPORTANT

- **After adjusting the turning torque stake the lock nut (11) firmly.**

Turning torque of spiral bevel pinion shaft	Factory specification	0.98 to 1.18 N·m 0.10 to 0.12 kgf·m 0.72 to 0.89 lbf·ft
---	-----------------------	---

- |                                  |                                       |
|----------------------------------|---------------------------------------|
| (1) Front Axle Case              | (10) Differential Yoke Shaft L.H.     |
| (2) Differential Gear Assembly   | (11) Lock Nut                         |
| (3) Spiral Bevel Pinion Shaft    | (12) Taper Roller Bearing             |
| (4) Adjusting Collar             | (13) Collar                           |
| (5) Internal Snap Ring           | (14) Pinion Shaft Remover             |
| (6) Oil Seal                     |                                       |
| (7) Ball Bearing                 | <b>A: Dimension, 1 mm (0.039 in.)</b> |
| (8) Shim                         |                                       |
| (9) Differential Yoke Shaft R.H. |                                       |

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### **Differential Gear**

1. Remove the differential case cover mounting screws (9) and then remove the differential case cover (5), ball bearing (6) and spiral bevel gear (7) as a unit.
2. Remove the external snap ring (8), and then remove the ball bearing (6) and spiral bevel gear (7) as a unit with a puller.
3. Remove the straight pin (13).
4. 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 the differential pinions (4).

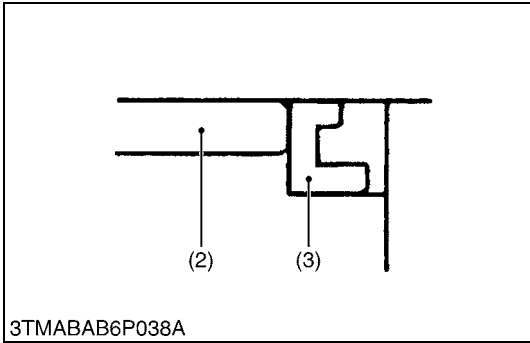
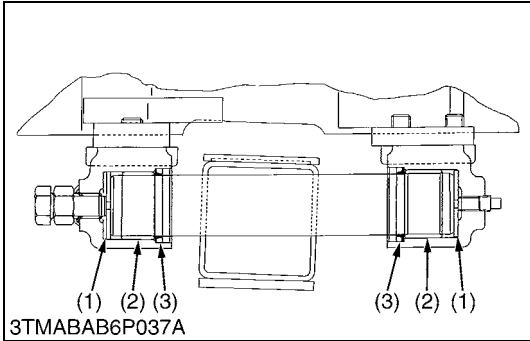
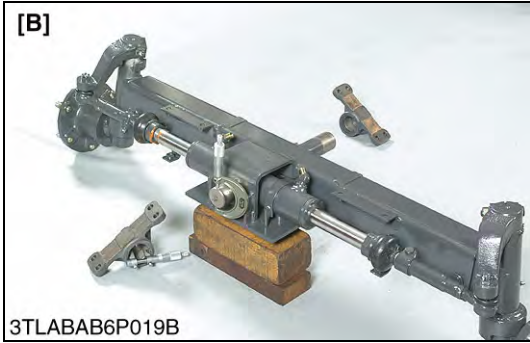
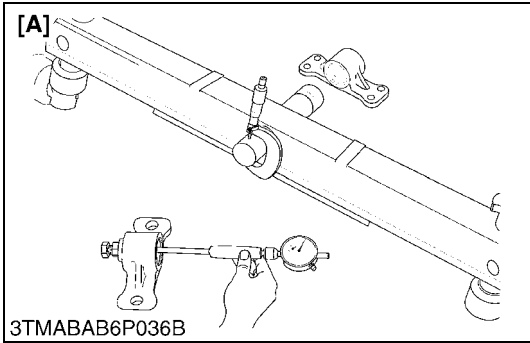
Tightening torque	Differential case cover mounting screw	48.0 to 58.8 N·m 4.9 to 6.0 kgf·m 35.4 to 43.4 lbf·ft
-------------------	--	---

- |                             |   |
|-----------------------------|---|
| (1) Shim                    | (8) External Snap Ring                      |
| (2) Differential Case       | (9) Differential Case Cover Mounting Screws |
| (3) Thrust Collar           | (10) Pinion Shaft                           |
| (4) Differential Pinion     | (11) Shim                                   |
| (5) Differential Case Cover | (12) Differential Side Gear                 |
| (6) Ball Bearing            | (13) Straight Pin                           |
| (7) Spiral Bevel Gear       |   |

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6. SERVICING

[1] 2WD MODEL



**Clearance between Front Axle Middle Boss and Shaft Bracket Bushing**

1. Measure the front axle middle boss O.D. at several points where it contacts with the bushing.
2. Measure the shaft bracket 1 bushing I.D. and bracket 2 bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

**(When reassembling)**

- Before press-fitting the bushing, install the new thrust collar.
- Install the oil seals, noting their direction. (Refer to figure.)

**■ IMPORTANT**

- After replacing the bushing, be sure to adjust the front axle rocking force. (See page 6-S7.)

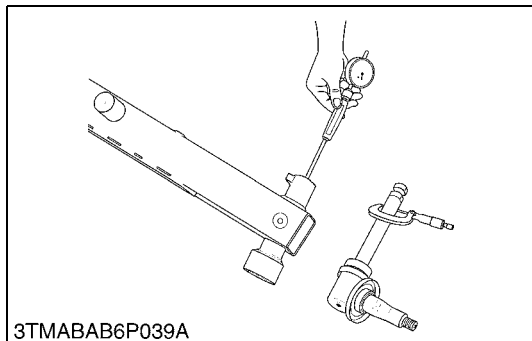
Clearance between front axle middle boss and bushing	Factory specification	0.015 to 0.177 mm 0.0006 to 0.00696 in.
	Allowable limit	0.3 mm 0.01 in.
Front axle middle boss O.D.	Factory specification	39.938 to 40.000 mm 1.5724 to 1.5748 in.
Bushing I.D.	Factory specification	40.015 to 40.115 mm 1.5754 to 1.5793 in.

- (1) Thrust Collar  
(2) Bushing  
(3) Oil Seal

[A] L3301/L3901

[B] L4701

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### **Clearance between Knuckle Shaft (Kingpin) and Bushing**

1. Measure the shaft O.D. at several points where it contacts with the bushings.
2. Measure the bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bushing.

#### **(When reassembling)**

- Remove the bushing with a bushing puller.

Clearance between knuckle shaft (kingpin) and bushing	Factory specification	L3301/ L3901	0 to 0.285 mm 0 to 0.0112 in.
	Allowable limit		0.4 mm 0.02 in.
	Factory specification	L4701	0 to 0.190 mm 0 to 0.00748 in.
	Allowable limit		0.4 mm 0.02 in.

Knuckle shaft O.D.	Factory specification	L3301/ L3901	27.880 to 27.900 mm 1.0977 to 1.0984 in.
			27.900 to 28.165 mm 1.0985 to 1.1088 in.
Bushing I.D.		L4701	37.975 to 38.000 mm 1.4951 to 1.4960 in.
			38.000 to 38.165 mm 1.4961 to 1.15025 in.

9Y1211012FAS0038US0



### **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.

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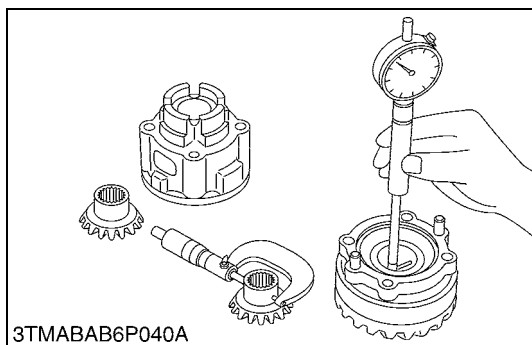
### **Clearance between Rod and Bushing**

1. Measure the bushing I.D. with a cylinder gauge.
2. Measure the rod O.D. with an 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.

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## [2] 4WD MODEL



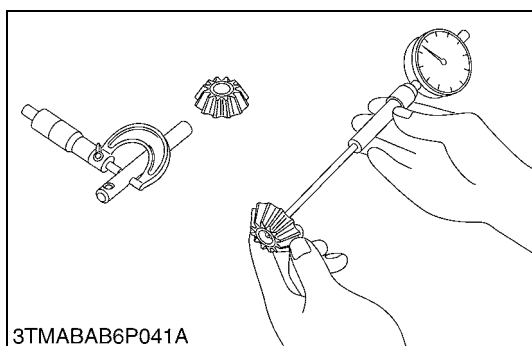
### Clearance between Differential Case (Differential Case Cover) and Differential Side Gear

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 damaged parts.

Clearance between differential case (differential case cover) and differential side gear	Factory specification	0.050 to 0.151 mm 0.00197 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 1.25984 to 1.26228 in.
Differential case cover bore I.D.	Factory specification	32.000 to 32.025 mm 1.25984 to 1.26083 in.
Differential side gear O.D.	Factory specification	31.911 to 31.950 mm 1.25634 to 1.25787 in.

9Y1211012FAS0041US0



### Clearance between Pinion Shaft and Differential Pinion

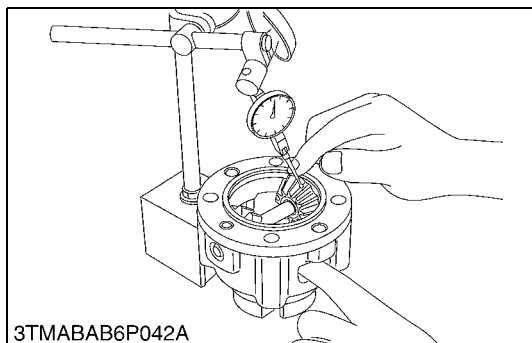
1. Measure the pinion shaft O.D..
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace damaged parts.

Clearance between pinion shaft and differential pinion	Factory specification	0.064 to 0.100 mm 0.00252 to 0.00394 in.
	Allowable limit	0.25 mm 0.0096 in.

Pinion shaft O.D.	Factory specification	13.950 to 13.968 mm 0.54921 to 0.54992 in.
Differential pinion I.D.	Factory specification	14.032 to 14.050 mm 0.55244 to 0.55315 in.

9Y1211012FAS0042US0





### Backlash between Differential Pinion and Differential Side Gear

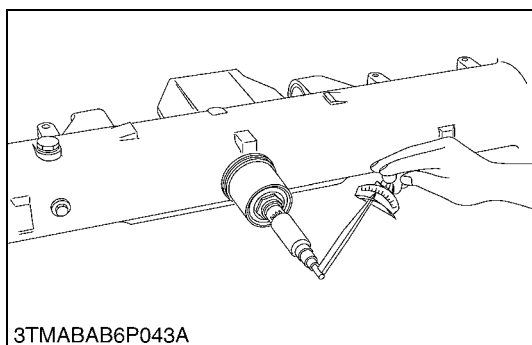
1. Set a dial gauge (lever type) on a tooth of the differential pinion.
2. Fix the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement exceeds the factory specifications, adjust with the differential side gears shims.

Backlash between differential pinion and differential side gear	Factory specification	0.1 to 0.3 mm 0.004 to 0.012 in.
	Allowable limit	0.4 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 %
- Center of tooth contact:  
1/3 to 1/2 of the entire width from the small end.

9Y1211012FAS0043US0



### Turning Force 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 can not be adjusted by the lock nut (2), change the thickness of the collar (1) and adjust with the lock nut (2) again.

### (Reference)

- Standard size of collar (1):  
10.0 mm (0.349 in.) of thickness

Turning torque of spiral bevel pinion shaft	Factory specification	0.98 to 1.18 N·m 0.10 to 0.12 kgf·m 0.72 to 0.87 lbf·ft
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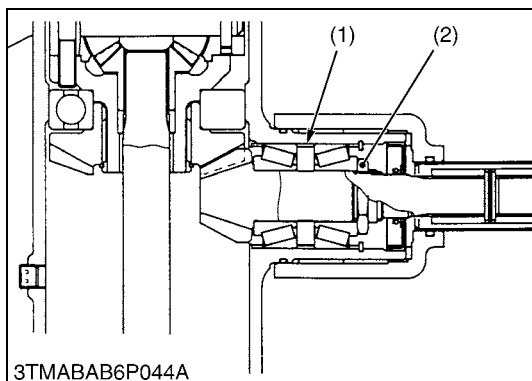
### ■ NOTE

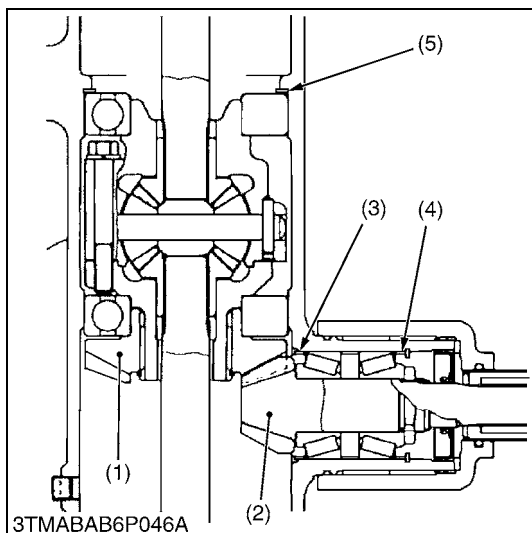
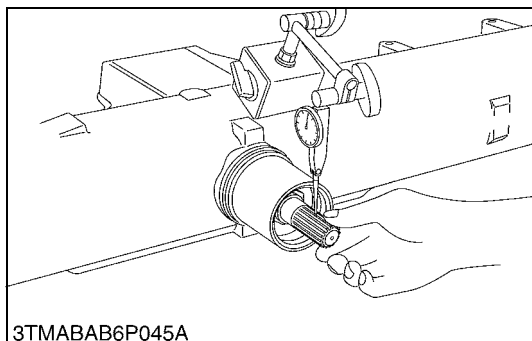
- After turning torque adjustment, be sure to stake the lock nut.

(1) Collar

(2) Lock Nut

9Y1211012FAS0044US0





### **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. If the backlash is not within the factory specifications, change the adjusting collars (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 1 mm, the collar (4) must be thickened by 1 mm.
4. Adjust the backlash properly by repeating the above procedures.

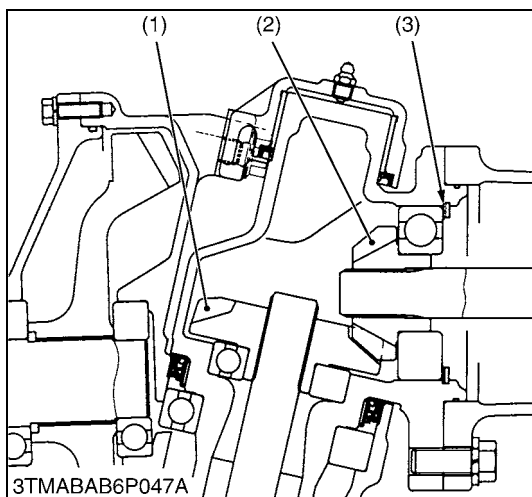
#### **(Reference)**

- 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
- Tooth Contact:  
More than 35 %
- Center of tooth contact:  
1/3 to 1/2 of the entire width from the small end.

Backlash between spiral bevel pinion shaft and spiral bevel gear	Factory specification	0.1 to 0.3 mm 0.004 to 0.012 in.
--	-----------------------	-------------------------------------

- (1) Spiral Bevel Gear (4) Adjusting Collar  
(2) Spiral Bevel Pinion Shaft (5) Shim  
(3) Adjusting Collar

9Y1211012FAS0045US0



### **Backlash between 11T Bevel Gear and 16T Bevel Gear**

1. Stick plastigauge or wire of solder 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 plastigauge with scale.
5. If the backlash is not within the factory specifications, adjust with shim (3).

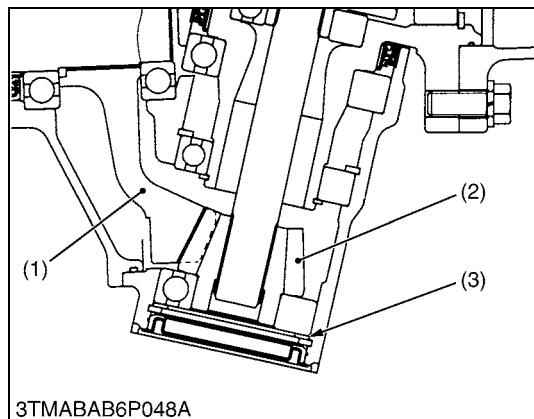
Backlash between bevel gear (2) and bevel gear	Factory specification	0.15 to 0.30 mm 0.006 to 0.012 in.
	Allowable limit	0.6 mm 0.024 in.

#### **(Reference)**

- Thickness of adjusting shims:  
0.4 mm (0.031 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 %
- Center of tooth contact:  
1/3 to 1/2 of the entire width from the small end.

- (1) Bevel Gear (3) Shim  
(2) Bevel Gear

9Y1211012FAS0046US0



### **Backlash between 11T Bevel Gear and 42T Bevel Gear**

1. Place plastigauge or wire of solder to three spots on the 42T 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 plastigauge with scale.
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	0.15 to 0.30 mm 0.006 to 0.012 in.
	Allowable limit	0.6 mm 0.024 in.

### **(Reference)**

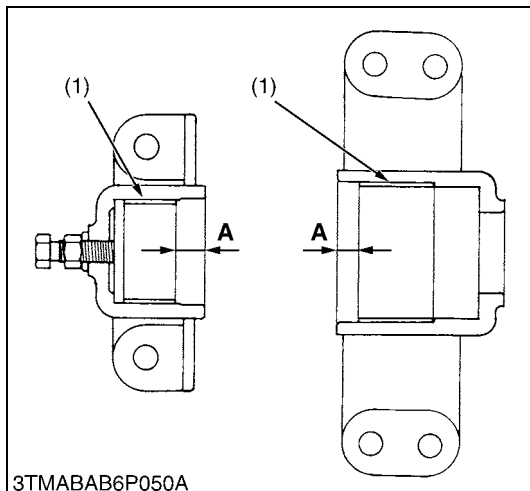
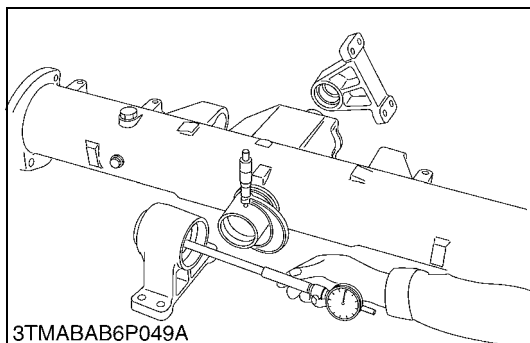
- Thickness of adjusting shims:
  - 1.0 mm (0.039 in.)
  - 1.2 mm (0.047 in.)
  - 1.4 mm (0.055 in.)
  - 1.6 mm (0.063 in.)
  - 1.8 mm (0.071 in.)
  - 2.0 mm (0.079 in.)
  - 2.2 mm (0.087 in.)
- Tooth contact:
  - More than 10 %
- Center of tooth contact:
  - 1/10 to 1/5 of the entire width from the small end.

(1) Bevel Gear

(3) Shim

(2) Bevel Gear

9Y1211012FAS0047US0



### 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 0.00472 to 0.01083 in.
	Allowable limit	0.50 mm 0.01969 in.

Front axle case boss (front) O.D.	Factory specification	49.950 to 49.975 mm 1.96653 to 1.96752 in.
Bracket bushing (front) I.D.	Factory specification	50.095 to 50.225 mm 1.97224 to 1.97736 in.

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory specification	0.100 to 0.292 mm 0.00394 to 0.01150 in.
	Allowable limit	1.0 mm 0.03937 in.

Front axle case boss (rear) O.D.	Factory specification	69.970 to 70.000 mm 2.75472 to 2.75590 in.
Bracket bushing (rear) I.D.	Factory specification	70.100 to 70.262 mm 2.75984 to 2.76622 in.

### ■ Press-fitting Bushing

- When press-fitting a new bushing, observe the dimension described in the figure.

Press-fit depth of bushing "A"	Reference value	12.0 to 13.0 mm 0.47 to 0.51 in.
--------------------------------	-----------------	-------------------------------------

### ■ NOTE

- After replacing the bushing, be sure to adjust the front axle rocking force. (See page 6-S7.)

(1) Bushing

A: Depth of Bushing

9Y1211012FAS0048US0



### 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.

9Y1211012FAS0039US0

### 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.

9Y1211012FAS0040US0

# **7 STEERING**

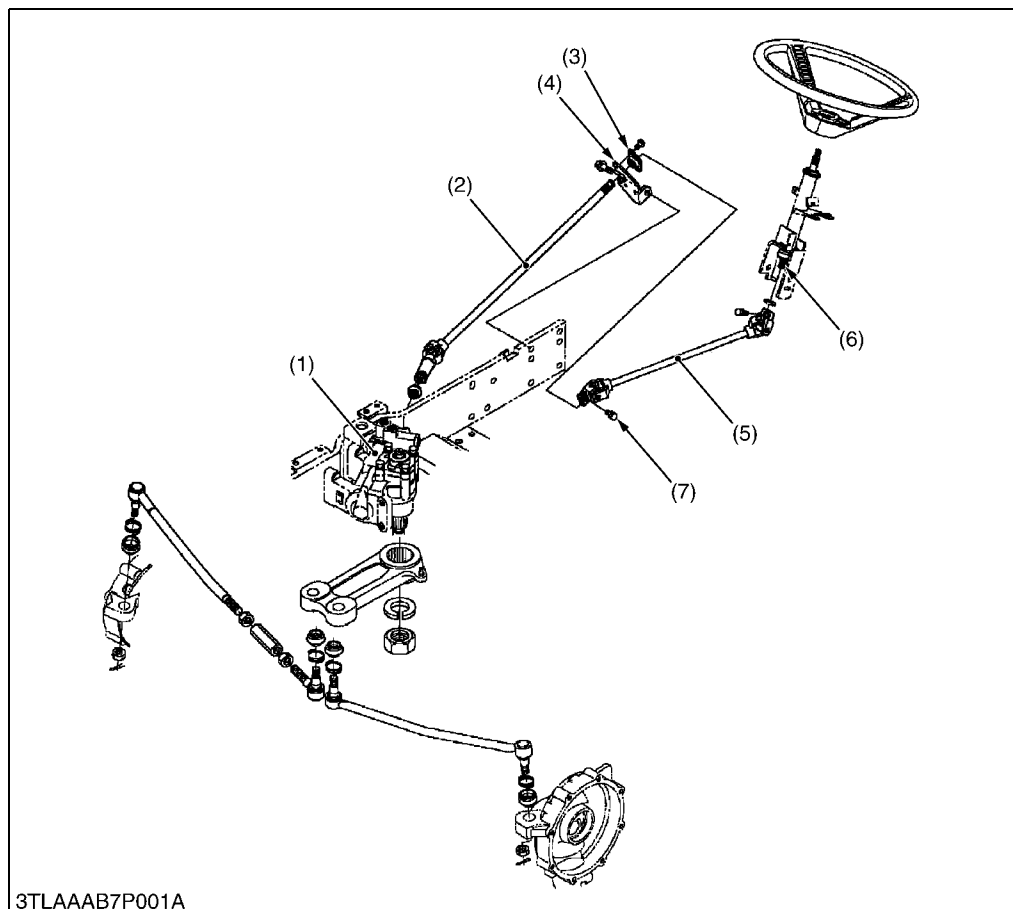
# MECHANISM

## CONTENTS

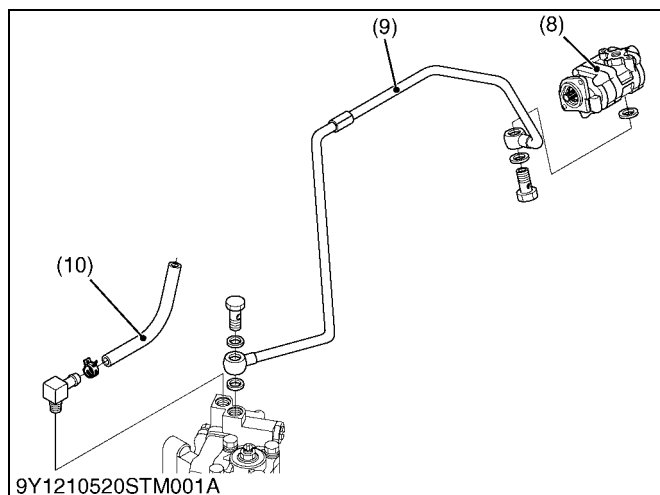
1. STRUCTURE (L3301/L3901) .....	7-M1
[1] LINKAGE .....	7-M1
[2] HYDRAULIC CIRCUIT .....	7-M2
[3] HYDRAULIC PUMP .....	7-M2
[4] STEERING GEAR BOX .....	7-M3
(1) STRUCTURE .....	7-M3
(2) OPERATION .....	7-M4
2. STRUCTURE (L4701) .....	7-M5
[1] LINKAGE .....	7-M5
[2] HYDRAULIC CIRCUIT .....	7-M6
[3] HYDRAULIC PUMP .....	7-M6
[4] STEERING CONTROLLER.....	7-M7
(1) Control Valve .....	7-M7
(2) Metering Device (Gerotor).....	7-M7
(3) Oil Flow.....	7-M8
[5] STEERING CYLINDER .....	7-M10

# 1. STRUCTURE (L3301/L3901)

## [1] LINKAGE



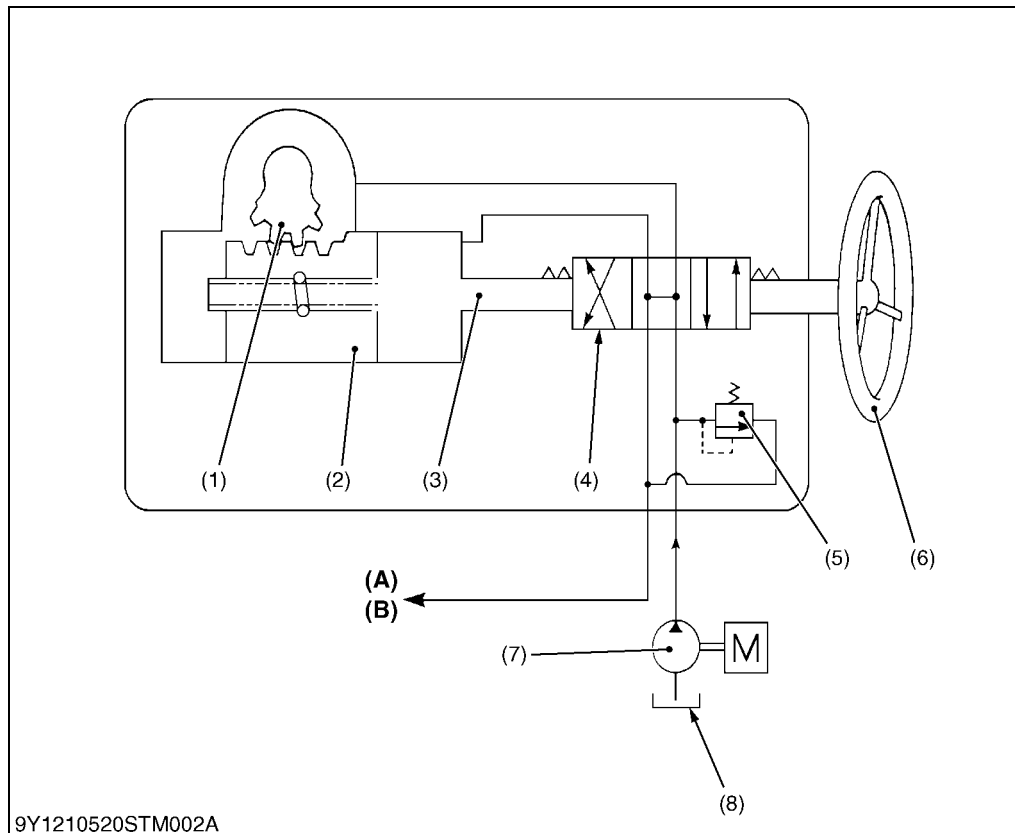
- (1) Power Steering Controller (Steering Gear Box)
- (2) Joint Shaft 2
- (3) Mini-Flange
- (4) Support
- (5) Joint Shaft
- (6) Steering Shaft
- (7) Bolt
- (8) Hydraulic Pump
- (9) Delivery Pipe
- (10) Return Hose (Manual Transmission Model)  
HST Delivery Pipe (HST Model)



The integral type power steering is used on these models. This steering system consists of steering wheel, steering joint shafts, steering gear box and other components shown in the figure.

9Y1211012STM0001US0

## [2] HYDRAULIC CIRCUIT



- (1) Sector Shaft
- (2) Ball Nut (Piston)
- (3) Worm Shaft
- (4) Control Valve
- (5) Relief Valve
- (6) Steering Wheel
- (7) Hydraulic Pump
- (8) Transmission Case

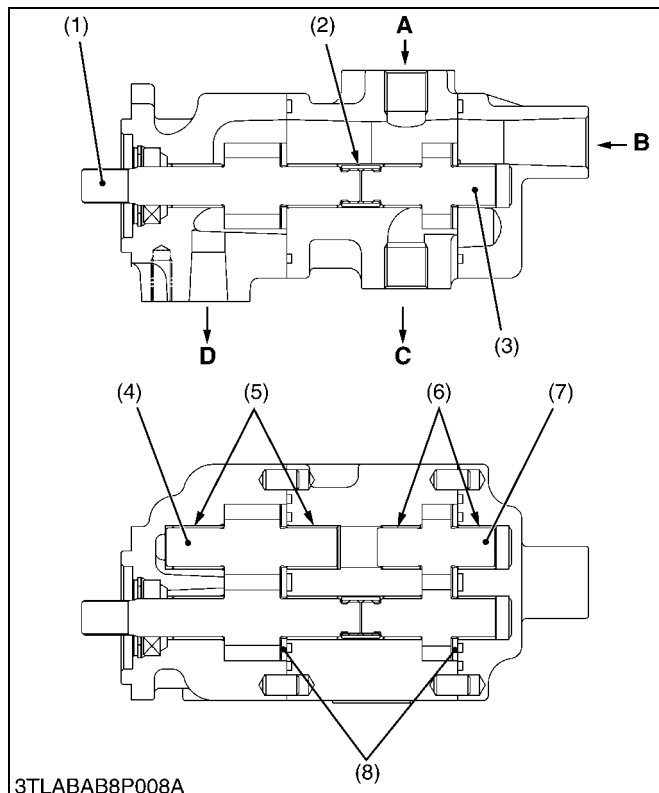
**(A) To Hydraulic Pump  
(Manual Transmission  
Model)**

**(B) To HST Unit (HST Model)**

Control valve (4) is main part of Integral type power steering. Oil sent from hydraulic pump (7) flows in gear case through control valve (4) and moves ball nut (piston) (2).

9Y1211012STM0002US0

## [3] HYDRAULIC PUMP



The gear type hydraulic pump is adopted for these models. This pump is called as tandem type and composed two pair of gears, side plates, bushings and other components as shown in the figure.

The hydraulic pump pressurize oil from transmission case through oil filter and send the oil 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

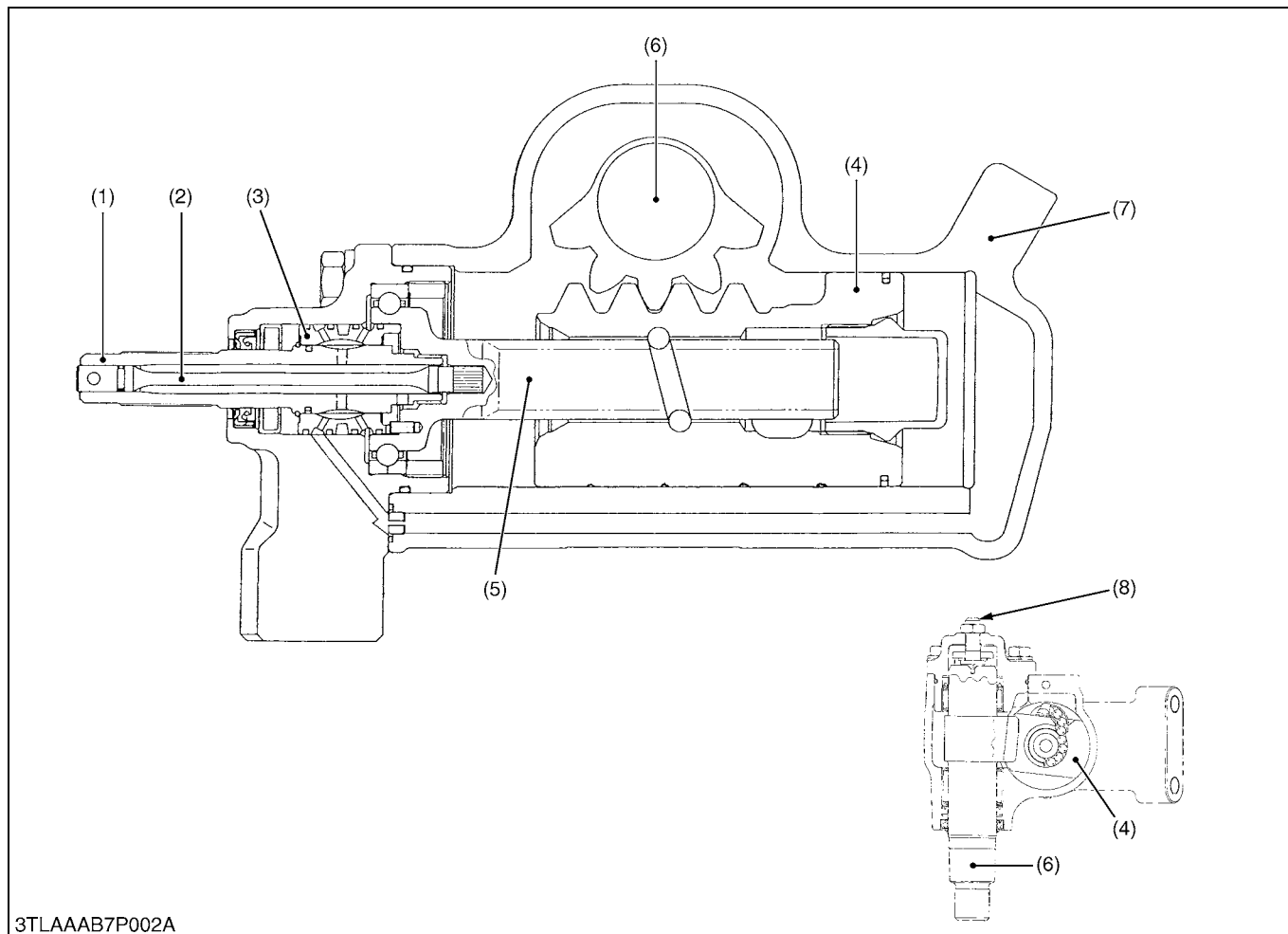
**A: From Power Steering  
Controller**  
**B: From Transmission Case**  
**C: To Power Steering  
Controller**  
**D: To Main Hydraulic Circuit**

9Y1211012STM0003US0



## [4] STEERING GEAR BOX

### (1) STRUCTURE



3TLAAB7P002A

(1) Input Shaft  
(2) Torsion Bar

(3) Sleeve  
(4) Ball Nut

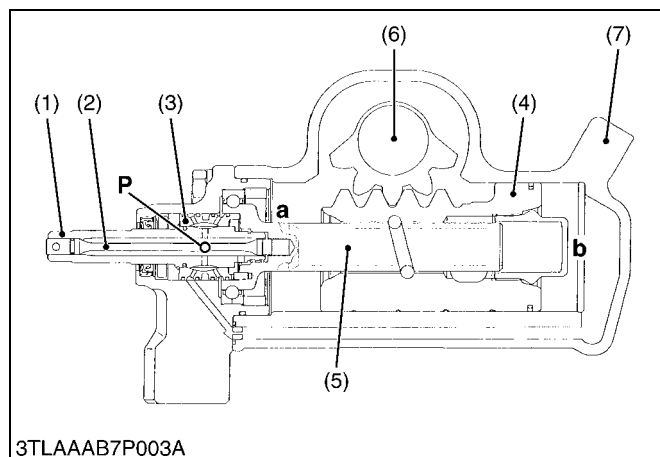
(5) Main Shaft  
(6) Sector Shaft

(7) Gear Box  
(8) Adjust Screw

This integral power steering mechanism consists of the following two major components as shown above: hydraulic control valve and steering force assist hydraulic cylinder. The control valve is housed in the casing and consists of sleeve (3), input shaft (1) and other parts. The hydraulic cylinder, on the other hand, consists of gear box (7) (cylinder tube), ball nut (4) (piston) and other parts. When the steering wheel is turned, the reaction force from the tires is exerted through the sector shaft (6) onto the main shaft (5). The torsion bar (2) is then twisted to make a gap between the input shaft (1) and sleeve (3). Such gap activates the valve to switch the oil flow direction. The sector shaft's pinion, which comes in mesh with the ball nut's rack, is tapered along the teeth. In this way, the sector shaft (6) that turns by the adjust screw (8) changes the clearance between the rack and pinion, adjusting the play of the steering wheel. (Tighten the adjust screw and the play becomes smaller, and vice versa.)

9Y1211012STM0004US0

## (2) OPERATION

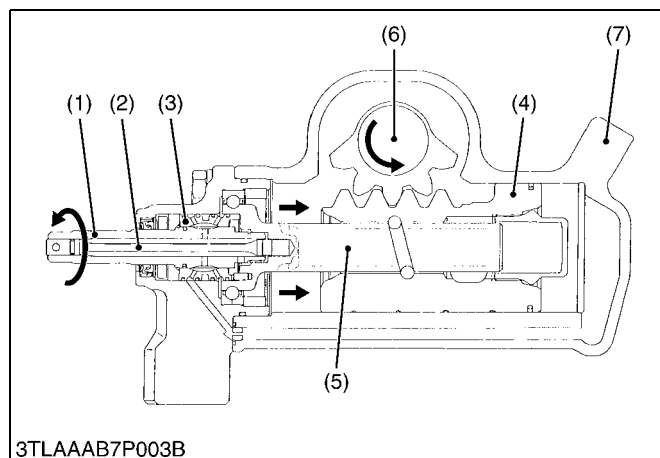


### Neutral Position

While the steering wheel is not moved, the torsion bar (2) is not twisted. There is no gap between the input shaft (1) and sleeve (3). This makes no pressure difference between the chambers "a" and "b" of the cylinder, which keeps the ball nut (4) and sector shaft (6) in their positions.

- |                  |                     |
|------------------|---------------------|
| (1) Input Shaft  | <b>a: Chamber</b>   |
| (2) Torsion Bar  | <b>b: Chamber</b>   |
| (3) Sleeve       | <b>P: Pump Port</b> |
| (4) Ball Nut     |                     |
| (5) Main Shaft   |                     |
| (6) Sector Shaft |                     |
| (7) Gear Box     |                     |

9Y1211012STM0005US0

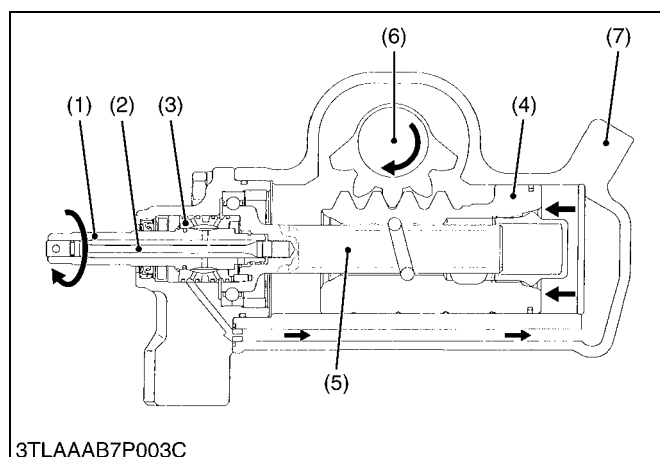


### Left Turn

When the steering wheel is turned left, the initial friction between the tires and the road surface keeps the ball nut (4) and sector shaft (6) in their positions. The torsion bar (2) alone is twisted to produce a gap between the input shaft (1) and sleeve (3) and to activate the valve. By so doing, the cylinder's chamber "a" comes under high pressure and the ball nut (4) is moved to the right. Finally the sector shaft (6) gets turned to turn the machine to the left.

- |                 |                  |
|-----------------|------------------|
| (1) Input Shaft | (5) Main Shaft   |
| (2) Torsion Bar | (6) Sector Shaft |
| (3) Sleeve      | (7) Gear Box     |
| (4) Ball Nut    |                  |

9Y1211012STM0006US0



### Right Turn

The operating principle is the same as with the left turn. For the right turn, however, the gap between the input shaft (1) and sleeve (3) is in the direction opposite to that of left turn. By so doing, the cylinder's chamber "b" comes under high pressure and the ball nut (4) is moved to the left. Finally the sector shaft (6) gets turned to turn the machine to the right.

- |                 |                  |
|-----------------|------------------|
| (1) Input Shaft | (5) Main Shaft   |
| (2) Torsion Bar | (6) Sector Shaft |
| (3) Sleeve      | (7) Gear Box     |
| (4) Ball Nut    |                  |

9Y1211012STM0007US0

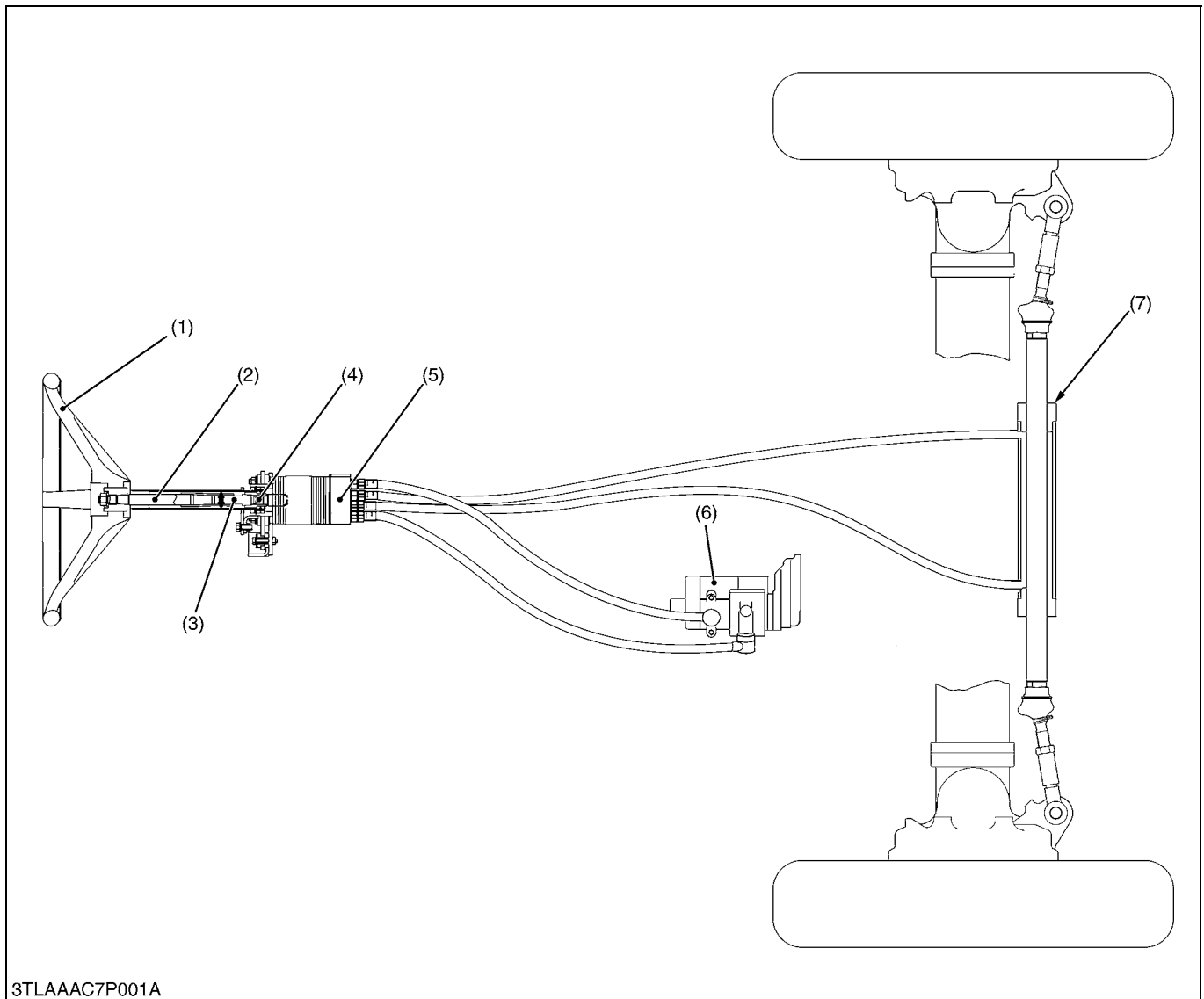
### Manual Operation in Case of Hydraulic System Failure

Let's suppose that the hydraulic system gets in trouble due to a damaged pump, damaged pipe or the like and that the steering resistance is too high to use the power steering system. In such case, the steering wheel can be in the manual mode. When the steering wheel is turned, the torsion bar is twisted for the valve's stroke and from now on the steering wheel functions in the manual mode. It should be noted that the steering wheel's play becomes larger than that in the power steering mode.

9Y1211012STM0008US0

## 2. STRUCTURE (L4701)

### [1] LINKAGE



3TLAAAC7P001A

(1) Steering Wheel  
(2) Steering Shaft 1

(3) Steering Shaft 2  
(4) Joint Shaft 2

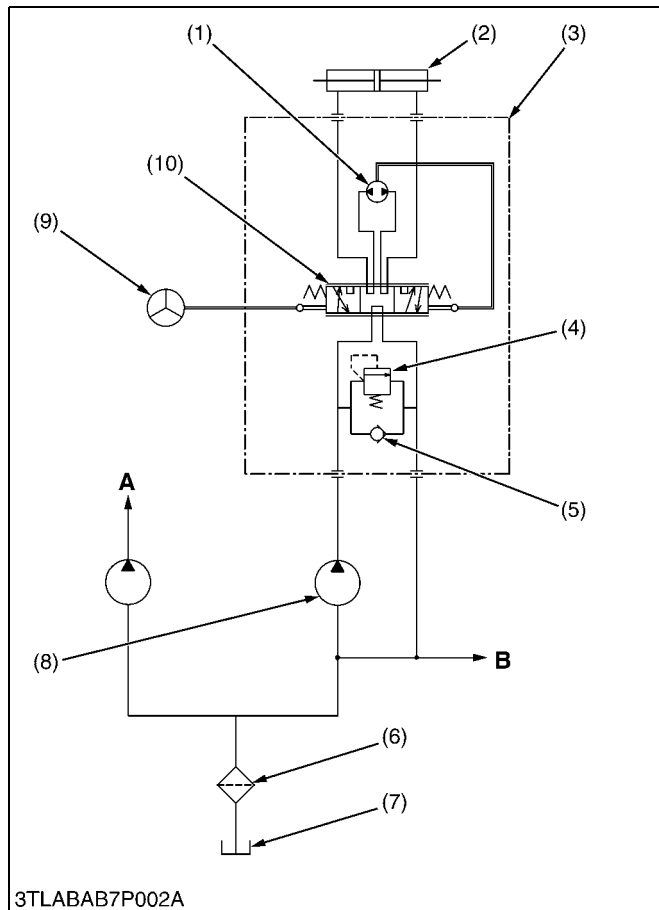
(5) Steering Controller  
(6) Hydraulic Pump

(7) Steering Cylinder

Full hydrostatic type power steering is used on this model. The steering system consists of steering wheel, steering controller, steering cylinder and other components shown in the figure.

9Y1211012STM0009US0

## [2] HYDRAULIC CIRCUIT



When the engine starts, the hydraulic pump (8) pressurize oil from transmission case (7) through oil filter (6) and send the oil, to the steering controller (3).

The oil which has entered steering controller (3) is directed to control valve (10).

When the steering wheel is turned, control valve (10) operates and send oil through gerotor (1) to steering cylinder (2). The cylinder rod of steering cylinder (2) moves the direction of front wheels.

Return oil from steering cylinder (2) passes through control valve (10) and is sent to the PTO clutch valve.

When the engine is not operating, and the steering wheel is turned, gerotor (1) rotates to supply oil to steering cylinder (2). Thus the direction of front wheel can be controlled manually.

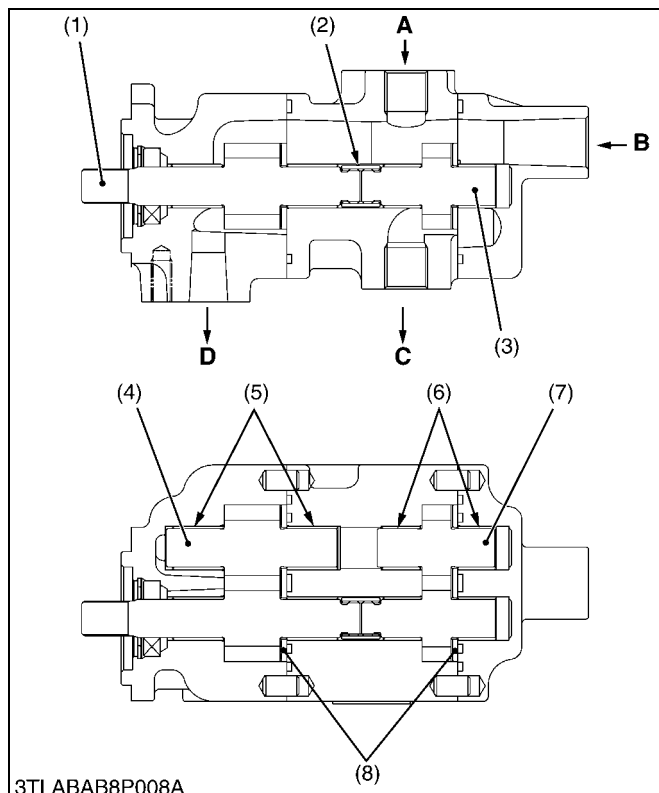
- |                         |                    |
|-------------------------|--------------------|
| (1) Gerotor             | (8) Hydraulic Pump |
| (2) Steering Cylinder   | (9) Steering Wheel |
| (3) Steering Controller | (10) Control Valve |
| (4) Relief Valve        |                    |
| (5) Check Valve         |                    |
| (6) Oil Filter          |                    |
| (7) Transmission Case   |                    |

**A: To Three Point Hydraulic System and Others**

**B: To PTO Clutch Valve**

9Y1211012STM0010US0

## [3] HYDRAULIC PUMP



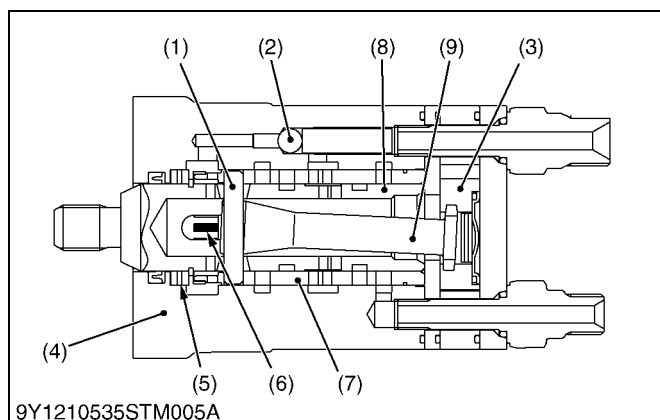
The gear type hydraulic pump is adopted for these models. This pump is called as tandem type and composed two pair of gears, side plates, bushings and other components as shown in the figure.

The hydraulic pump pressurize oil from transmission case through oil filter and send the oil to power steering circuit and main hydraulic circuit.

- |                   |  |
|-------------------|--|
| (1) Drive Gear 1  | <b>A: From Power Steering Controller</b> |
| (2) Coupling      | <b>B: From Transmission Case</b>         |
| (3) Drive Gear 2  | <b>C: To Power Steering Controller</b>   |
| (4) Driven Gear 1 | <b>D: To Main Hydraulic Circuit</b>      |
| (5) Bushing       |  |
| (6) Bushing       |  |
| (7) Driven Gear 2 |  |
| (8) Side Plate    |  |

9Y1211012STM0011US0

## [4] STEERING CONTROLLER



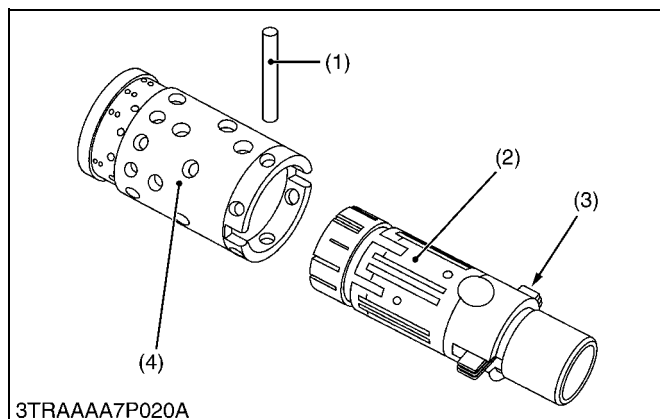
The steering controller mainly consists of a control valve, a metering device and a relief valve.

The metering device comprises a set of special gears called "**Gerotor**".

- |                      |                      |
|----------------------|----------------------|
| (1) Dowel Pin        | (6) Centering Spring |
| (2) Check Valve      | (7) Sleeve           |
| (3) Gerotor          | (8) Spool            |
| (4) Housing          | (9) Centering Spring |
| (5) Bearing Assembly |                      |

9Y1211012STM0012US0

### (1) Control Valve



The control valve is a rotating spool type. When the steering wheel is not turned, the valve is kept in the neutral position by the centering spring (3).

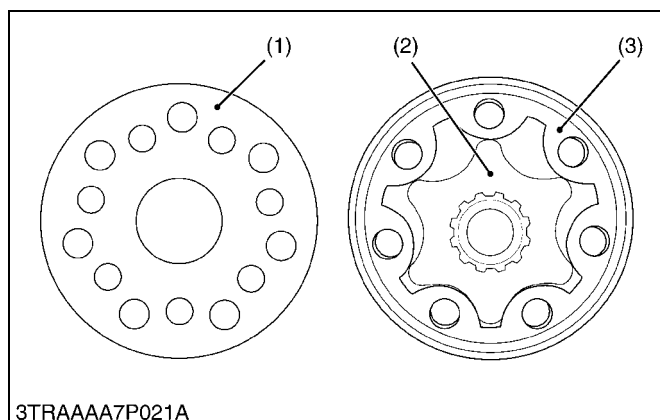
Then, the oil flow from the hydraulic pump to the steering cylinder and from the steering cylinder to the transmission case is stopped. Oil from the hydraulic pump is sent to the transmission case through the control valve.

When the steering wheel is turned clockwise or counterclockwise, the control valve, together with the gerotor, changes the direction of oil flow to the steering cylinder according to the direction, the steering wheel was turned.

- |               |                      |
|---------------|----------------------|
| (1) Dowel Pin | (3) Centering Spring |
| (2) Spool     | (4) Sleeve           |

9Y1211012STM0013US0

### (2) Metering Device (Gerotor)



All oil sent from the hydraulic pump to the steering cylinder, passes through the metering device (Gerotor). Namely, when the rotor is drive, three chambers suck in oil due to volumetric change in the pump chambers formed between the rotor (2) and the stator (3), while oil is discharged from other three chambers. On the other hand, rotation of the steering wheel is directly transmitted to the rotor through the steering shaft, spool, drive shaft, etc..

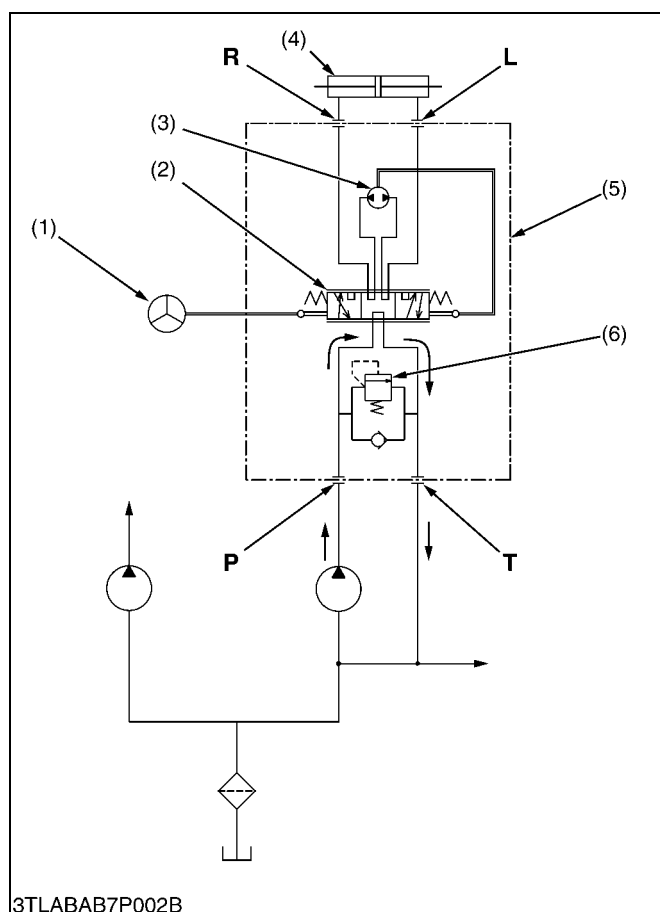
Accordingly, the gerotor serves to supply the steering cylinder with oil, amount of which corresponds to the rotation of the steering wheel. The wheels are thus turned by the angle corresponding to the rotation of the steering wheel.

When the engine stops or the hydraulic pump malfunctions, the gerotor functions as a manual trochoid pump, which makes manual steering possible.

- |                 |            |
|-----------------|------------|
| (1) Drive Plate | (3) Stator |
| (2) Rotor       |            |

9Y1211012STM0014US0

### (3) Oil Flow

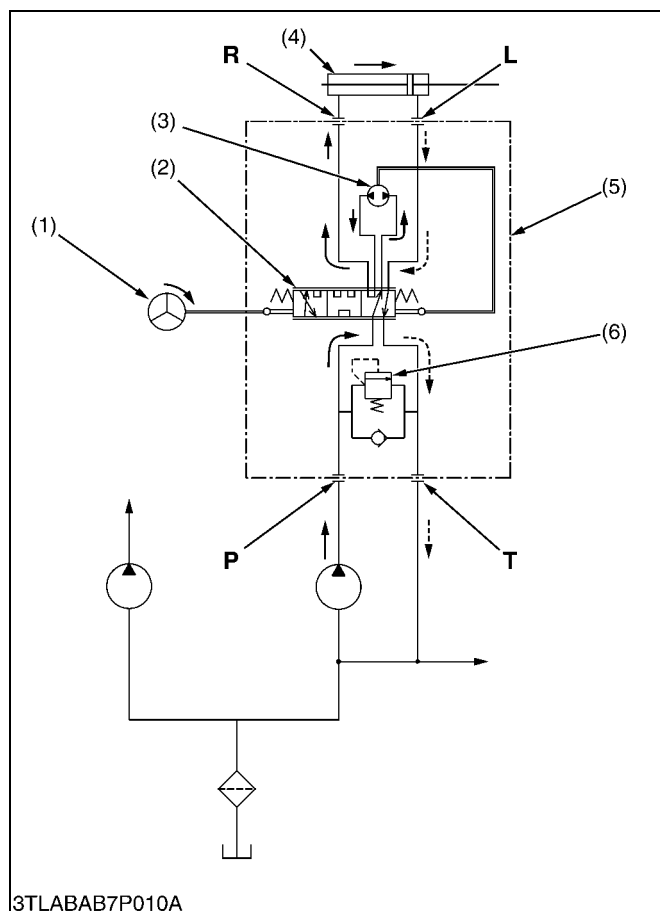


## Neutral Position

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      | <b>P: Pump Port</b>       |
| (2) Valve Plate         | <b>T: Tank Port</b>       |
| (3) Gerotor             | <b>R: Cylinder Port R</b> |
| (4) Steering Cylinder   | <b>L: Cylinder Port L</b> |
| (5) Steering Controller |                           |
| (6) Relief Valve        |                           |

9Y1211012STM0015US0



## Right Turn

When the steering wheel is turned to the right, the action is transmitted through the drive plate, gerotor, 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).

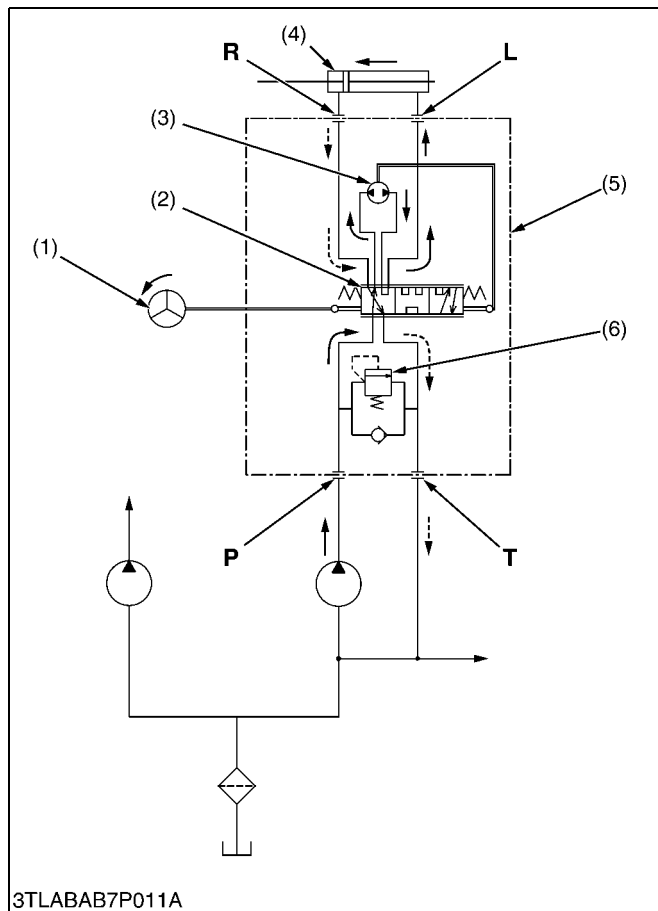
The stator of gerotor (3) turns by the amount corresponding to the turn of the steering wheel (1), and the gerotor performs the metering function and lets oil through it, the amount of which corresponds to the turn of the steering wheel (1).

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      | <b>P: Pump Port</b>       |
| (2) Valve Plate         | <b>T: Tank Port</b>       |
| (3) Gerotor             | <b>R: Cylinder Port R</b> |
| (4) Steering Cylinder   | <b>L: Cylinder Port L</b> |
| (5) Steering Controller |                           |
| (6) Relief Valve        |                           |

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### Left Turn

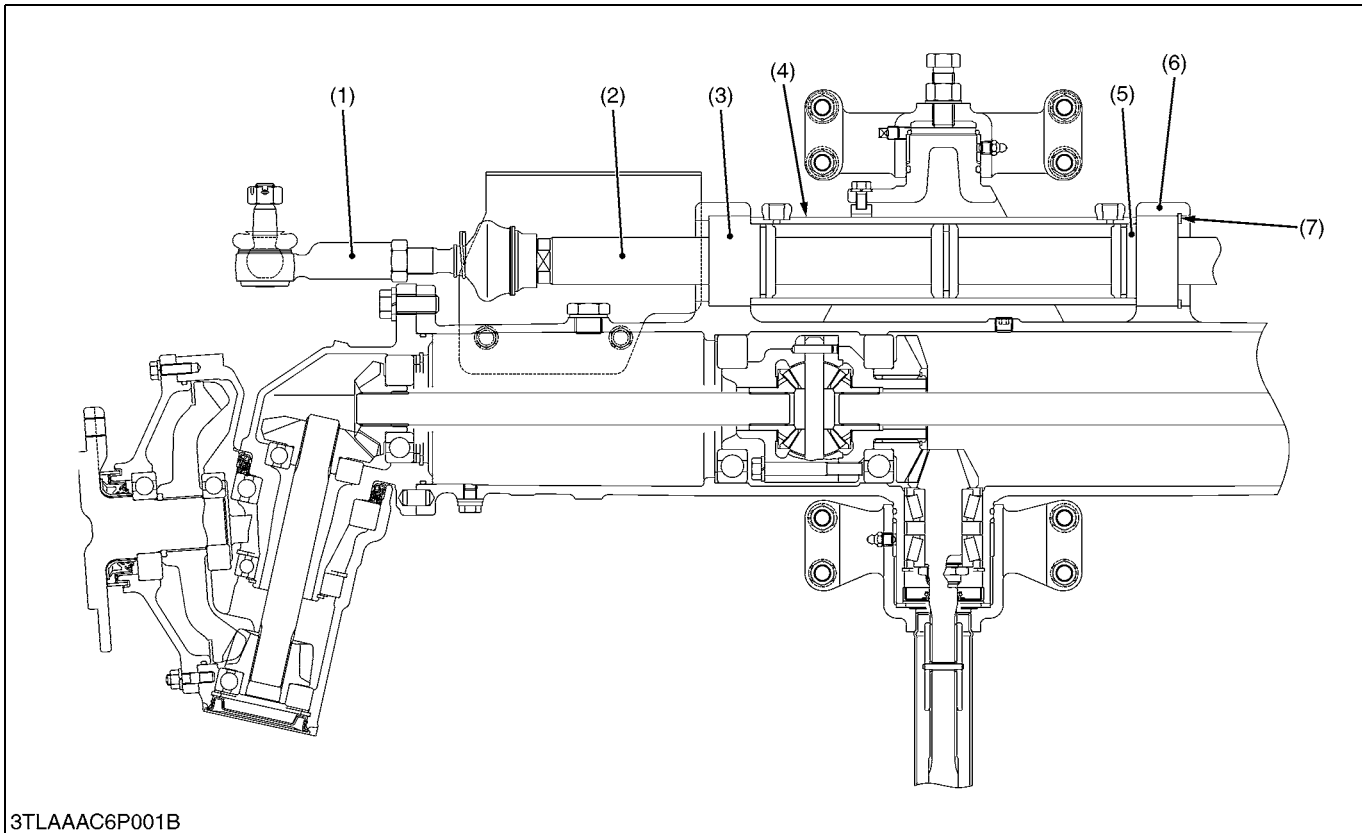
The steering system operates in the same way at a left-turn as well, except that oil flows into and out of steering cylinder in the directions opposite to those at a right-turn.

- (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**

9Y1211012STM0017US0

## [5] STEERING CYLINDER



3TLAAAC6P001B

- |                |                   |                     |                        |
|----------------|-------------------|---------------------|------------------------|
| (1) Tie-rod    | (3) Head Cover    | (5) Head Cover      | (7) Internal Snap Ring |
| (2) Piston Rod | (4) Cylinder Tube | (6) Front Axle Case |                        |

The steering cylinder is a single piston both rod double-acting type. This steering cylinder is installed parallel to the front axle and connected to tie-rods. (The above figure is shown for 4 wheel drive model. Refer to TRACTOR MECHANISM workshop manual for 2 wheel drive model.)

The tie-rods connected to both bevel gear cases guarantee an equal steering movement to both front wheels.

The steering cylinder provides force in both directions. Depending on turning direction of the steering wheel, pressure oil enters at one end of the cylinder to extend, or at the other end to retract to operate front wheels of the tractor.

9Y1211012STM0018US0



# SERVICING

## CONTENTS

1. TROUBLESHOOTING.....	7-S1
[1] L3301/L3901.....	7-S1
[2] L4701.....	7-S2
2. SERVICING SPECIFICATIONS.....	7-S3
3. TIGHTENING TORQUES.....	7-S5
4. CHECKING AND ADJUSTING.....	7-S6
[1] STEERING WHEEL PLAY (L3301/L3901).....	7-S6
[2] HYDRAULIC PUMP TEST USING FLOW-METER (POWER STEERING).....	7-S6
[3] RELIEF VALVE.....	7-S9
(1) L3301/L3901.....	7-S9
(2) L4701.....	7-S10
[4] BLEEDING.....	7-S10
5. DISASSEMBLING AND ASSEMBLING.....	7-S11
[1] L3301/L3901.....	7-S11
(1) Hydraulic Pump.....	7-S11
(2) Separating Steering Gear Box.....	7-S11
(3) Disassembling Steering Gear Box.....	7-S14
[2] L4701.....	7-S16
(1) Hydraulic Pump.....	7-S16
(2) Steering Controller.....	7-S18
6. SERVICING.....	7-S20
[1] L3301/L3901.....	7-S20
(1) Hydraulic Pump.....	7-S20
(2) Steering Gear Box.....	7-S21
[2] L4701.....	7-S22
(1) Hydraulic Pump.....	7-S22

# 1. TROUBLESHOOTING

## [1] L3301/L3901

Symptom	Probable Cause	Solution	Reference Page
<b>Excessive Steering Wheel Play</b>	Improper wheel play adjustment	Adjust	7-S6
	Backlash between sector gear shaft and rack (piston) too large	Adjust	7-S21
	Steering linkage worn	Replace	–
	Sector gear shaft worn	Replace	7-S14
<b>Tractor Pulls to Right or Left</b>	Tire pressure uneven	Adjust	G-99
	Steering wheel play too small	Adjust	7-S6
	Improper toe-in adjustment	Adjust	G-35
<b>Front Wheels Vibration</b>	Steering linkage worn	Replace	–
	Improper toe-in adjustment	Adjust	G-35
<b>Hard Steering</b>	Transmission fluid improper or insufficient	Change	G-37
	Oil leak from pipe joint	Retighten	–
	Hydraulic pump malfunctioning	Replace	7-S11
	Improper relief valve adjustment	Adjust	7-S9
	Relief valve malfunctioning	Replace	7-S15
	Valve housing and sleeve malfunctioning	Replace	7-S15
	Seals in the steering gear box damaged	Replace	7-S15
	Backlash between sector gear shaft and rack (piston) too small	Adjust	7-S6
	Air in the hydraulic pipes	Air vent	7-S10
<b>Low Operating Pressure</b>	Hydraulic pump malfunctioning	Replace	7-S11
	Improper relief valve adjustment	Adjust	7-S9
	Relief valve malfunctioning	Replace	7-S15
	Seals in the steering gear box damaged	Replace	7-S15
	Rack (piston) malfunctioning	Replace rack (piston) assembly	7-S15
	Oil leak from pipe or pipe broken	Replace	–
<b>Steering Wheel Does Not Return to Neutral Position</b>	Valve housing and sleeve jammed	Repair or replace	7-S15
	Valve housing oil seal damaged	Replace	7-S15
<b>Steering Force Fluctuates</b>	Insufficient oil	Fill	G-37, G-65
	Insufficient bleeding	Bleed	7-S10
	Control valve malfunctioning	Replace	7-S15
<b>Noise</b>	Insufficient oil	Fill	G-37, G-65
	Air sucked in pump from suction circuit	Repair	7-S10
	Pipe deformed	Replace	–

9Y1211012STS0001US0

**[2] L4701**

Symptom	Probable Cause	Solution	Reference Page
<b>Tractor Can Not Be Steered</b>	Steering controller broken	Replace	7-S19
	Pipe broken	Replace	7-S19
<b>Front Wheels Vibration</b>	Improper toe-in adjustment	Adjust	G-63
	Air in the hydraulic system	Bleed	7-S10
	Improperly mounted wheels	Change Wheels	–
	Tie-rod end loose or worn	Retighten or replace	6-S19, 6-S21
	Front wheel hub bearing worn	Replace	6-S19
	Clearance between front axle center pivots and bracket bushing excessive	Replace	6-S24
	Steering controller malfunctioning	Replace	7-S19
<b>Hard Steering</b>	Hydraulic pump malfunctioning	Replace	7-S16, 7-S17
	Overload	–	–
	Transmission fluid improper or insufficient	Change or fill	G-65
	Oil leak from pipe joint	Retighten	7-S16, 7-S17
	Insufficient tire pressure	Inflate	G-99
	Steering controller malfunctioning	Replace	7-S19
	Relief valve malfunctioning	Replace	7-S10
<b>Steering Force Fluctuates</b>	Air sucked in pump due to leaking or missing of oil	Fill or bleed	G-65, 7-S10
	Air sucked in pump from suction circuit	Bleed	7-S10
<b>Excessive Steering Wheel Free Play</b>	Steering controller malfunctioning	Replace	7-S19
<b>Front Wheels Wander to Right or Left</b>	Air sucked in pump due to leak of oil	Fill or bleed	G-65, 7-S10
	Air sucked in pump from suction circuit	Repair	7-S10
	Tire pressure uneven	Inflate	G-99
	Insufficient bleeding	Bleed	7-S10
	Improper toe-in adjustment	Adjust	G-63
	Clearance between front axle center pivots and brackets bushings excessive	Replace	6-S24
	Tie-rod end loose or worn	Retighten or replace	6-S19, 6-S21
	Steering controller malfunctioning	Replace	7-S19
<b>Noise</b>	Air sucked in pump due to lack of oil	Fill or bleed	G-65, 7-S10
	Air sucked in pump from suction circuit	Repair	7-S10
	Pipe deformed	Replace	–
<b>Wheel are Turned to a Direction Opposite to Steering Direction</b>	Power steering hoses are connected in reverse	Reconnect steering hoses	7-S19

## 2. SERVICING SPECIFICATIONS

### STEERING WHEEL PLAY

Item		Factory Specification	Allowable Limit
Steering Wheel [L3301/L3901]	Play	20 to 50 mm 0.79 to 1.9 in.	—

### POWER STEERING

Item		Factory Specification	Allowable Limit
Hydraulic Pump [L3301/L3901] <b>Condition</b> <ul style="list-style-type: none"><li>Engine Speed: approx. 2700 min<sup>-1</sup> (rpm)</li><li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li></ul>	Delivery at No Pressure	Above 14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 14.1 L/min. 3.72 U.S.gals/min. 3.10 U.S.gals/min.	11.9 L/min. 3.14 U.S.gals/min. 2.62 Imp.gals/min.
Hydraulic Pump [L4701] <b>Condition</b> <ul style="list-style-type: none"><li>Engine Speed: approx. 2600 min<sup>-1</sup> (rpm)</li><li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li></ul>	Delivery at No Pressure	Above 17.7 L/min. 4.68 U.S.gals/min. 3.89 Imp.gals/min.	—
	Delivery at Rated Pressure <sup>7</sup>	Above 17.4 L/min. 4.60 U.S.gals/min. 3.83 Imp.gals/min.	14.6 L/min. 3.86 U.S.gals/min. 3.21 Imp.gals/min.

### RELIEF VALVE

Item		Factory Specification	Allowable Limit
Relief Valve [L3301] <b>Condition</b> <ul style="list-style-type: none"><li>Engine Speed: Maximum</li><li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li></ul>	Steering Pressure [2WD]	8.3 to 9.3 MPa 85 to 95 kgf/cm <sup>2</sup> 1200 to 1300 psi	—
	Steering Pressure [4WD]	11.4 to 12.4 MPa 116 to 126 kgf/cm <sup>2</sup> 1650 to 1790 psi	—
Relief Valve [L3901] <b>Condition</b> <ul style="list-style-type: none"><li>Engine Speed: Maximum</li><li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li></ul>	Steering Pressure [2WD]	8.1 to 9.1 MPa 83 to 93 kgf/cm <sup>2</sup> 1200 to 1300 psi	—
	Steering Pressure [4WD]	11.1 to 12.1 MPa 113 to 123 kgf/cm <sup>2</sup> 1610 to 1740 psi	—
Relief Valve [L4701] <b>Condition</b> <ul style="list-style-type: none"><li>Engine Speed: Maximum</li><li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li></ul>	Steering Pressure [2WD]	8.0 to 9.0 MPa 81 to 91 kgf/cm <sup>2</sup> 1200 to 1300 psi	—
	Steering Pressure [4WD]	10.7 to 11.7 MPa 109 to 119 kgf/cm <sup>2</sup> 1550 to 1690 psi	—

**HYDRAULIC PUMP**

Item		Factory Specification	Allowable Limit
Housing Bore	Depth of scratch	0.09 mm 0.0035 in.	—
Bushing to Gear Shaft  • Gear shaft  • Bushing	Clearance	0.020 to 0.081 mm 0.0008 to 0.0032 in.	0.15 mm 0.0059 in.
	O.D.	14.970 to 14.980 mm 0.5894 to 0.5898 in.	—
	I.D.	15.000 to 15.051 mm 0.5906 to 0.5926 in.	—
Side Plate	Thickness	2.48 to 2.50 mm 0.0976 to 0.0984 in.	2.40 mm 0.0945 in.

**STEERING GEAR BOX**

Item		Factory Specification	Allowable Limit
Sector Gear to Ball Nut	Clearance	0.3 mm 0.01 in.	—
Valve Housing to Spool	Clearance	0.17 to 0.28 mm 0.0067 to 0.011 in.	0.04 mm 0.02 in.
Steering Gear Box and Ball Nut	Clearance	0.035 to 0.080 mm 0.0014 to 0.0031 in.	0.15 mm 0.0059 in.
Ball Nut Assembly	Axial Play	0.02 mm 0.0008 in.	0.04 mm 0.001 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-13.)

#### [L3301/L3901]

Item	N·m	kgf·m	lbf·ft
Joint shaft bolt	23.5 to 27.4	2.4 to 2.8	18 to 20
Power steering delivery pipe joint bolt	49 to 68	5.0 to 7.0	37 to 50
PS relief pressure adjusting screw lock nut	33 to 46	3.4 to 4.6	25 to 33
Delivery pipe (power steering) joint screw	49 to 68	5.0 to 7.0	37 to 50
Hydraulic pump assembly mounting screw and nut	24 to 27	2.4 to 2.8	18 to 20
Delivery pipe (3-point hitch) mounting bolt	24 to 27	2.4 to 2.8	18 to 20
Tie-rod end nut (2WD)	49 to 68	5.0 to 7.0	37 to 50
Tie-rod end nut (4WD)	35 to 44	3.5 to 4.5	26 to 32
Oil cooler hose clamp	2.0 to 2.4	0.20 to 0.25	1.5 to 1.8
Delivery pipe joint bolt	40 to 49	4.0 to 5.0	29 to 36
Return pipe retaining nut	30 to 49	3.0 to 5.0	22 to 36
Steering gear box mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Pitman arm mounting nut	147 to 196	15.0 to 20.0	109 to 144
Lock nut (Side cover)	59 to 78	6.0 to 8.0	44 to 57
Side cover mounting screw	20 to 29	2.0 to 3.0	15 to 21
Valve housing mounting screw	48 to 55	4.9 to 5.7	36 to 41
Lock nut (Ball nut assembly)	88.3 to 107	9.0 to 11.0	65.1 to 79.5
Lock nut (Relief valve)	49 to 78	5.0 to 8.0	37 to 57

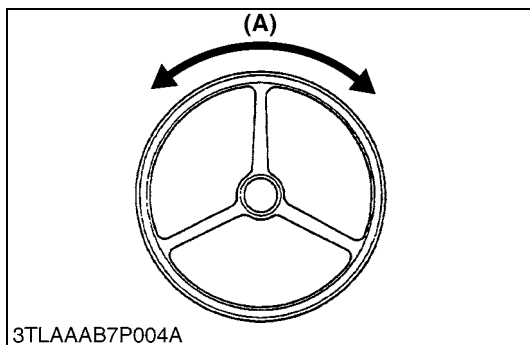
#### [L4701]

Item	N·m	kgf·m	lbf·ft
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
Delivery pipe (PTO) joint bolt	34.3 to 39.2	3.5 to 4.0	26 to 28
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
Delivery pipe (regulator) joint bolt	39.2 to 49.0	4.0 to 5.0	29 to 36
Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6	1.8 to 2.1	13 to 15
Regulator valve mounting screws	17.6 to 20.6	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
Steering wheel nut	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear bonnet mounting bolt	4 to 5	0.4 to 0.6	3 to 4
Main delivery hose retaining nut	46.6 to 50.9	4.8 to 5.2	35 to 37
Delivery hose retaining nut	24.5 to 29.4	2.5 to 3.0	18 to 21
Steering controller mounting nut	23.5 to 27.5	2.4 to 2.8	17.3 to 20.3

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## 4. CHECKING AND ADJUSTING

### [1] STEERING WHEEL PLAY (L3301/L3901)



#### Steering Wheel Play

1. Turn the front wheels straight ahead.
2. Rotate the steering wheel lightly by hand, and measure the play **(A)**.
3. If the play **(A)** is not within the factory specifications, turn the adjusting screw (1) to adjust.

Steering wheel play <b>(A)</b>	Factory specification	20 to 50 mm 0.79 to 1.9 in.
--------------------------------	-----------------------	--------------------------------

#### (Adjusting)

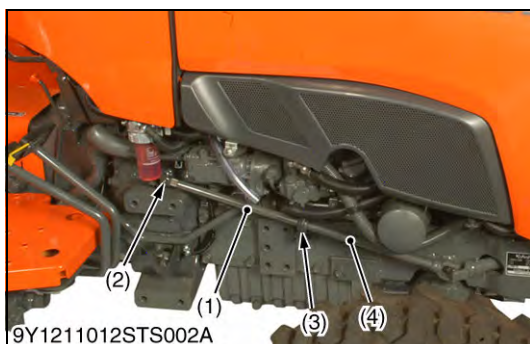
- Remove the battery.
- Loosen the lock nut (2) and turn the adjusting screw (1) with a screwdriver to adjust the play **(A)**.  
When the adjusting screw (1) is turned clockwise, the play **(A)** decreases.
- After adjustment, fix it with lock nut (2) while holding the adjusting screw (1).

- (1) Adjusting Screw  
(2) Lock Nut

**(A) Play**

9Y1211012STS0005US0

### [2] HYDRAULIC PUMP TEST USING FLOW-METER (POWER STEERING)



#### Preparation (L3301/L3901 Only)

1. Remove the bolt (2), (4).
2. Remove the joint shaft (1).

#### (When reassembling)

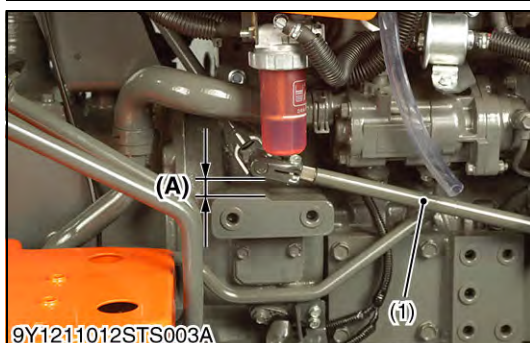
- Lift the joint shaft (1) so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the joint shaft (1) and flywheel housing.  
Then fit the support (3) in position.
- Be sure to insert the bolt (2) into cut-out of joint shaft (1).
- Apply grease to spline part of joint shaft (1).

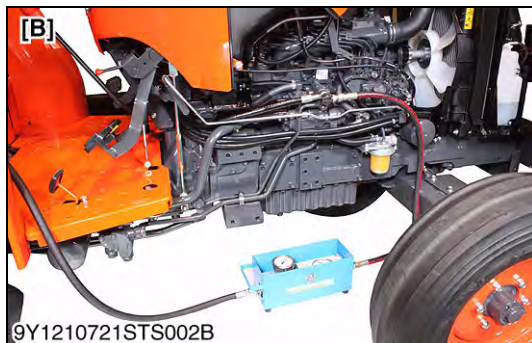
Tightening torque	Bolt (Joint shaft)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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- (1) Joint Shaft  
(2) Bolt (Joint Shaft)  
(3) Support  
(4) Bolt (Support)

**(A) Clearance**

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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. Remove the power steering delivery pipe or delivery hose joint bolt and install the pump adaptor **2** to the pump discharge port.
  2. Connect the hydraulic test hose to the pump adaptor **2** 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<sup>-1</sup> (rpm).
  6. Slowly close the loading valve to generate pressure approx. 9.81 MPa (100 kgf/cm<sup>2</sup>, 1420 psi). Hold in this condition until oil temperature reached approx. 40 °C (104 °F).
  7. Open the loading valve completely.
  8. Set the engine speed. (Refer to **Condition**.)
  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.

#### (When reassembling)

- Install the copper washers firmly.

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft

#### Condition

- Engine speed:
  - [L3301/L3901]**  
approx. 2700 min<sup>-1</sup> (rpm)
  - [L4701]**  
approx. 2600 min<sup>-1</sup> (rpm)
- Rated pressure:
  - [L3301/L3901]**  
11.1 to 12.0 MPa (113 to 123 kgf/cm<sup>2</sup>, 1640 to 1740 psi)
  - [L4701]**  
10.7 to 11.7 MPa (109 to 119 kgf/cm<sup>2</sup>, 1552 to 1697 psi)
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

[A] L3301/L3901

[B] L4701

(To be continued)



**(Continued)****[L3301/L3901]**

Hydraulic pump delivery at no pressure	Factory specification	Above 14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 14.1 L/min. 3.72 U.S.gals/min. 3.10 U.S.gals/min.
	Allowable limit	11.9 L/min. 3.14 U.S.gals/min. 2.62 Imp.gals/min.

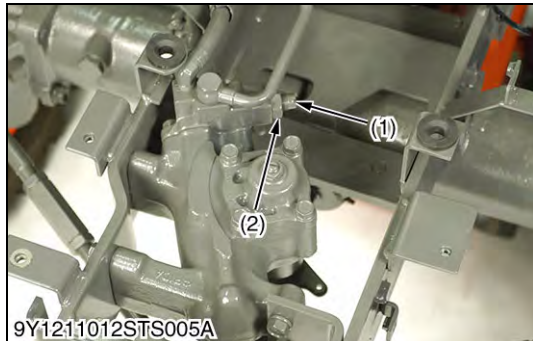
**[L4701]**

Hydraulic pump delivery at no pressure	Factory specification	Above 17.7 L/min. 4.68 U.S.gals/min. 3.89 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 17.4 L/min. 4.60 U.S.gals/min. 3.83 Imp.gals/min.
	Allowable limit	14.6 L/min. 3.86 U.S.gals/min. 3.21 Imp.gals/min.

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### [3] RELIEF VALVE

#### (1) L3301/L3901



#### Relief Valve Setting Pressure

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, and adjust relief valve setting pressure by turning adjusting screw (1).

#### [L3301]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.3 to 9.3 MPa 85 to 95 kgf/cm <sup>2</sup> 1200 to 1300 psi
		4WD	11.4 to 12.4 MPa 116 to 126 kgf/cm <sup>2</sup> 1650 to 1790 psi

#### [L3901]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.1 to 9.1 MPa 83 to 93 kgf/cm <sup>2</sup> 1200 to 1300 psi
		4WD	11.1 to 12.1 MPa 113 to 123 kgf/cm <sup>2</sup> 1610 to 1740 psi

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	PS relief pressure adjusting screw lock nut	33 to 46 N·m 3.4 to 4.6 kgf·m 25 to 33 lbf·ft

#### Condition

- Engine speed:  
Maximum
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

#### (Reference)

- Setting pressure change approx. 1.27 MPa (13 kgf/cm<sup>2</sup>, 180 psi) per adjusting screw 1/4 turn.
- When turn the adjusting screw clockwise, setting pressure increase.

(1) Adjusting Screw

(2) PS Relief Pressure Adjusting Screw  
Lock Nut

9Y1211012STS0008US0

## (2) L4701



### Relief Valve Setting Pressure

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, or replace the power steering controller.

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.0 to 9.0 MPa 81 to 91 kgf/cm <sup>2</sup> 1200 to 1300 psi
		4WD	10.7 to 11.7 MPa 109 to 119 kgf/cm <sup>2</sup> 1550 to 1690 psi

Tightening torque	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
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### Condition

- Engine speed:  
Maximum
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

[A] Manual Transmission Model

[B] HST Model

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## [4] BLEEDING

If disassembling hydraulic pipe for power steering, power steering hoses or hydraulic pump, operation of bleeding (air bent) is needed.

The procedure is below.

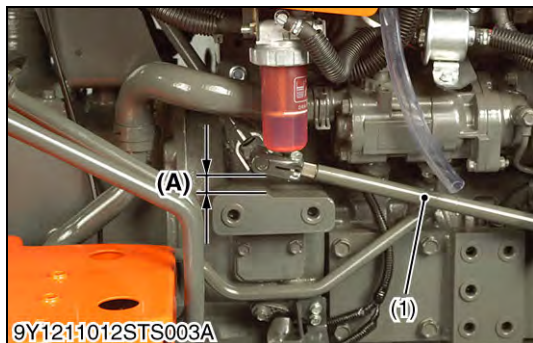
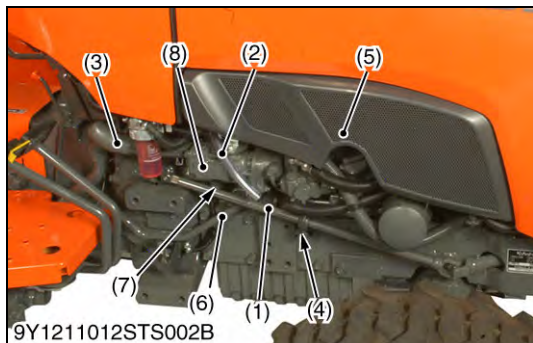
1. START THE ENGINE.
2. Turn the steering wheel slowly in both directions all the way alternately several times and stop the engine.

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## 5. DISASSEMBLING AND ASSEMBLING

### [1] L3301/L3901

#### (1) Hydraulic Pump



#### Hydraulic Pump Assembly

1. Remove the side cover (5).
2. Remove the steering joint shaft (1).
3. Disconnect the suction hose (3).
4. Disconnect the return hose (8).
5. Remove the delivery pipe (6), (7).
6. Remove the hydraulic pump (2).

#### (When reassembling)

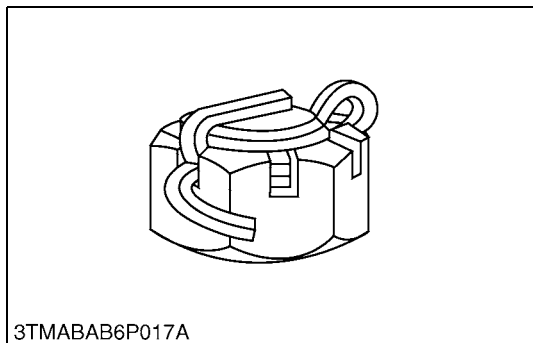
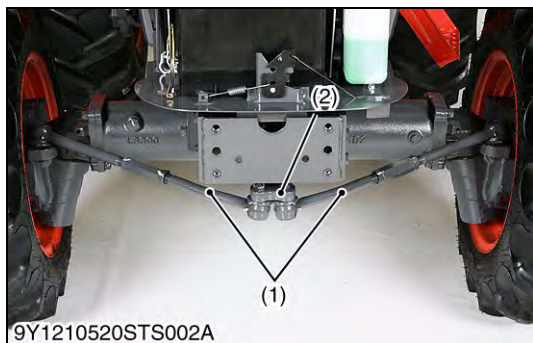
- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the universal joint and flywheel housing.
- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Delivery pipe (power steering) joint screw	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- |                    |                                    |
|--------------------|------------------------------------|
| (1) Joint Shaft    | (6) Delivery Pipe (3-point Hitch)  |
| (2) Hydraulic Pump | (7) Delivery Pipe (Power Steering) |
| (3) Suction Hose   | (8) Return Hose                    |
| (4) Support        |                                    |
| (5) Side Cover     | <b>(A) Clearance</b>               |

9Y1211012STS0011US0

#### (2) Separating Steering Gear Box



#### Bumper and Tie-rods

1. Place the disassembling stand under the transmission case.
2. Remove the bumper.
3. Remove the tie-rods with the tie-rod end lifter from pitman arm (2).  
In this case, take special case not to damage the tie-rod end nut (slotted nut). (It is preferable to replace it with an unrequired nut.).
4. Reinstall the bumper.

Tightening torque	Tie-rod end nut	2WD	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
		4WD	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft

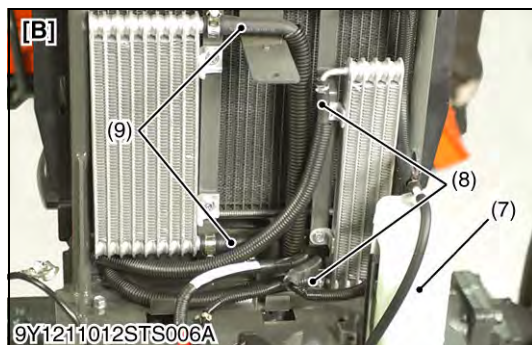
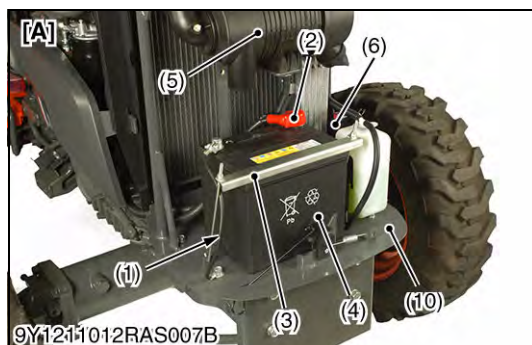
#### ■ IMPORTANT

- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.

- |             |                |
|-------------|----------------|
| (1) Tie-rod | (2) Pitman Arm |
|-------------|----------------|

9Y1211012STS0012US0





### Reserve Tank, Battery and Front Support

1. Remove battery negative cable (1).
2. Disconnect battery plus connector (2).
3. Remove battery stay (3).
4. Remove battery (4).
5. Remove air cleaner assembly (5).
6. Remove slow blow fuse boxes (6).
7. Disconnect reserve tank hoses and remove reserve tank (7).
8. Disconnect fuel cooler hoses (8) from fuel cooler.
9. Disconnect oil cooler hoses (9) from oil cooler.
10. Remove front support (10).

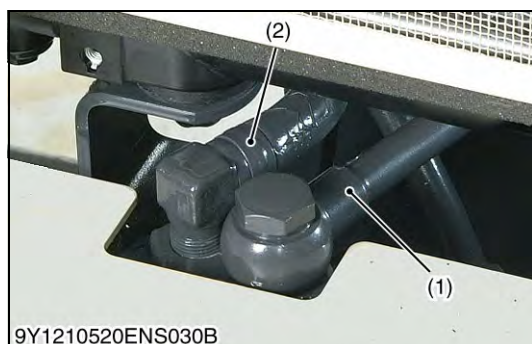
#### (When reassembling)

Tightening torque	Oil cooler hose clamp	2.0 to 2.4 N·m 0.20 to 0.25 kgf·m 1.5 to 1.8 lbf·ft
-------------------	-----------------------	---

- |                            |                      |
|----------------------------|----------------------|
| (1) Battery Negative Cable | (8) Fuel Cooler Hose |
| (2) Battery Plus Connector | (9) Oil Cooler Hose  |
| (3) Battery Stay           | (10) Front Support   |
| (4) Battery                |                      |
| (5) Air Cleaner Assembly   |                      |
| (6) Slow Blow Fuse Box     |                      |
| (7) Reserve Tank           |                      |

[A] Manual Transmission Model  
[B] HST Model

9Y1211012STS0013US0



### Delivery Pipe and Return Hose [Manual Transmission Model]

1. Disconnect the power steering delivery pipe (1) and return hose (2).

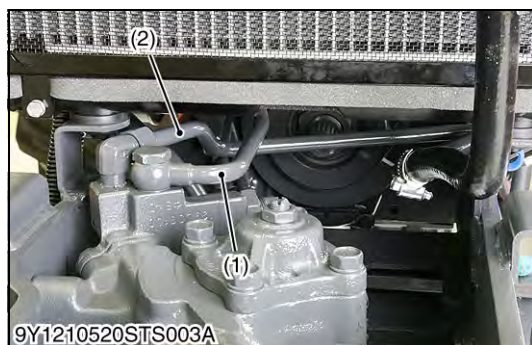
#### (When reassembling)

- Install the new copper washers to the delivery pipe joint screw securely.
- Wind seal tape on joint elbow part of return hose (2).

Tightening torque	Delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
-------------------	--------------------------	---

- |                   |                 |
|-------------------|-----------------|
| (1) Delivery Pipe | (2) Return Hose |
|-------------------|-----------------|

9Y1211012STS0014US0



### Delivery Pipe [HST Model]

1. Disconnect the return pipe (2).
2. Remove the joint screw and disconnect the delivery pipe (1).

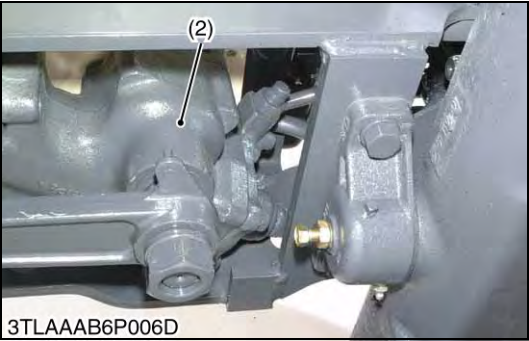
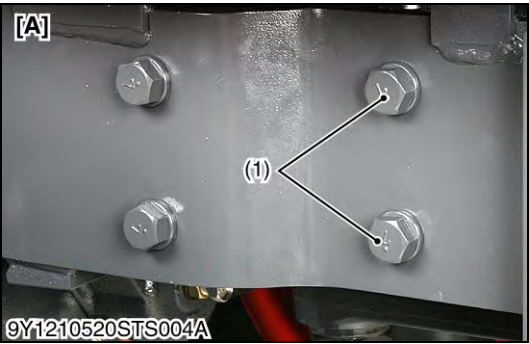
#### (When reassembling)

- Install the new copper washers to the delivery pipe joint screw securely.

Tightening torque	Delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Return pipe retaining nut	30 to 49 N·m 3.0 to 5.0 kgf·m 22 to 36 lbf·ft

- |                   |                 |
|-------------------|-----------------|
| (1) Delivery Pipe | (2) Return Pipe |
|-------------------|-----------------|

9Y1211012STS0015US0



**Steering Gear Box Assembly**

- 1. Remove the bolts (1).
- 2. Remove the steering gear box (2).

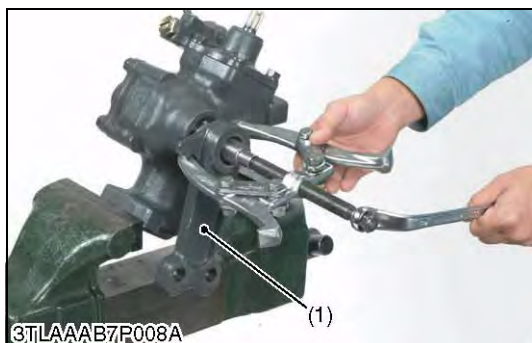
**(When reassembling)**

Tightening torque	Steering gear box mounting bolt	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
-------------------	---------------------------------	---

- (1) Steering Gear Box Mounting Bolt      [A] Right Side
- (2) Steering Gear Box                      [B] Left Side

9Y1211012STS0016US0

### (3) Disassembling Steering Gear Box



#### Pitman Arm

1. Turn the input shaft clockwise and counterclockwise several times to drain oil from gear box.
2. Secure the power steering gear box with a vise.
3. Remove the nut and spring washer.
4. Remove the pitman arm (1) with puller.

#### **(When reassembling)**

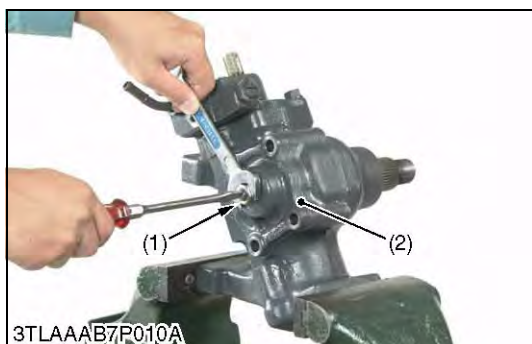
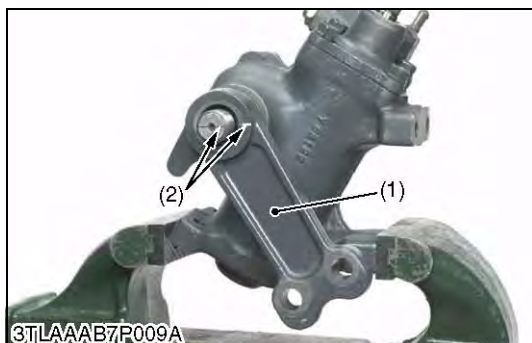
- Install the pitman arm to the sector shaft, aligning their aligning marks (2).

Tightening torque	Pitman arm mounting nut	147 to 196 N·m 15.0 to 20.0 kgf·m 109 to 144 lbf·ft
-------------------	-------------------------	---

(1) Pitman Arm

(2) Aligning Mark

9Y1211012STS0017US0



#### Side Cover

1. Loosen the lock nut (1).
2. Remove the side cover mounting screws, turn the adjusting screw clockwise, and remove the side cover (2).

#### **(When reassembling)**

Tightening torque	Lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft
	Side cover mounting screw	20 to 29 N·m 2.0 to 3.0 kgf·m 15 to 21 lbf·ft

(1) Lock Nut

(2) Side Cover

9Y1211012STS0018US0



#### Sector Gear Shaft

1. Remove the sector gear shaft (1) from the side cover.

(1) Sector Gear Shaft

9Y1211012STS0019US0





### Valve Assembly

1. Remove the valve housing mounting screws.
2. Remove the valve assembly (1) and ball nut (2).

#### (When reassembling)

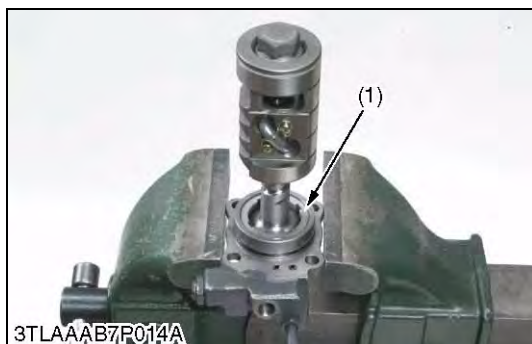
- Apply oil to O-ring and oil seal.

Tightening torque	Valve housing mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	------------------------------	---

(1) Valve Assembly

(2) Ball Nut

9Y1211012STS0020US0



### Ball Nut Assembly

1. Remove the lock nut (1).
2. Remove the ball nut assembly (2).

#### (When reassembling)

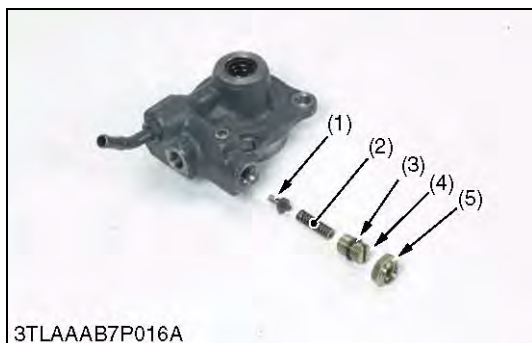
- Apply oil to sleeve.

Tightening torque	Lock nut	88.3 to 107 N·m 9.0 to 11.0 kgf·m 65.1 to 79.5 lbf·ft
-------------------	----------	---

(1) Lock Nut

(2) Ball Nut Assembly

9Y1211012STS0021US0



### Relief Valve

1. Loosen the lock nut (5) and remove the adjusting screw (4).
2. Remove the spring (2) and poppet (1).

#### (When reassembling)

- Apply grease to O-ring (3).
- Be sure to adjust the relief valve pressure. (See page 7-S9.)

Tightening torque	Lock nut	49 to 78 N·m 5.0 to 8.0 kgf·m 37 to 57 lbf·ft
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(1) Poppet

(4) Adjusting Screw

(2) Spring

(5) Lock Nut

(3) O-ring

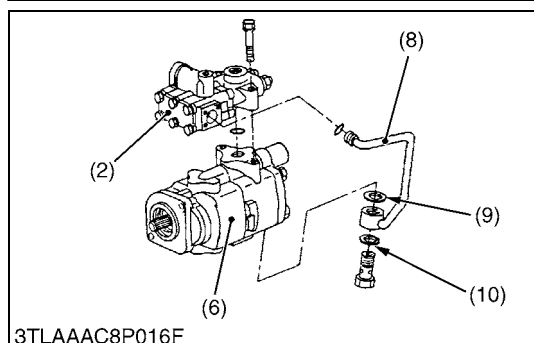
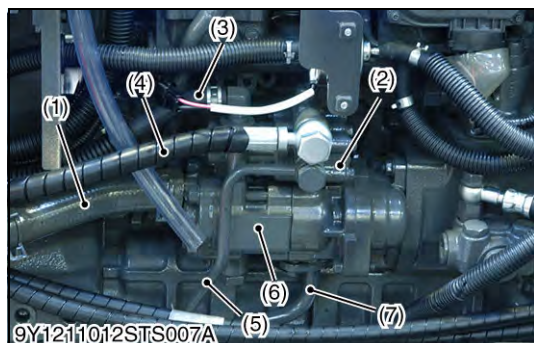
9Y1211012STS0022US0



## [2] L4701

### (1) Hydraulic Pump

#### [A] Manual Transmission Model



#### Preparation

1. Remove the side cover (R.H.).
2. Disconnect the delivery pipe (PTO) (5), power steering delivery hose (4) and power steering return hose (3) from the regulator valve (2).
3. Remove the delivery pipe (regulator) (8).
4. Disconnect the delivery pipe (3-point hitch) (7) from the hydraulic pump (6).
5. Disconnect the suction hose (1).

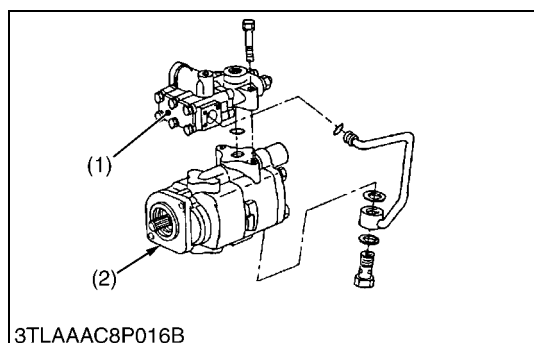
#### (When reassembling)

- Apply grease to the O-rings and be careful not to damage them.
- Be sure to wrap a seal tape to thread part of power steering return hose (3).
- There are 2 types of washer for power steering delivery hose. Thicker one should be attached engine side.

Tightening torque	Delivery pipe (PTO) joint bolt	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
	Delivery pipe (regulator) joint bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| (1) Suction Hose                 | (6) Hydraulic Pump                |
| (2) Regulator Valve              | (7) Delivery Pipe (3-point Hitch) |
| (3) Power Steering Return Hose   | (8) Delivery Pipe (Regulator)     |
| (4) Power Steering Delivery Hose | (9) Copper Washer                 |
| (5) Delivery Pipe (PTO)          | (10) Copper Washer (Thicker)      |

9Y1211012STS0023US0



#### Regulator Valve and Hydraulic Pump Assembly

1. Loosen and remove the regulator valve mounting screws.
2. Remove the regulator valve (1).
3. Loosen and remove the hydraulic pump assembly mounting screws and nuts, then remove the hydraulic pump assembly.

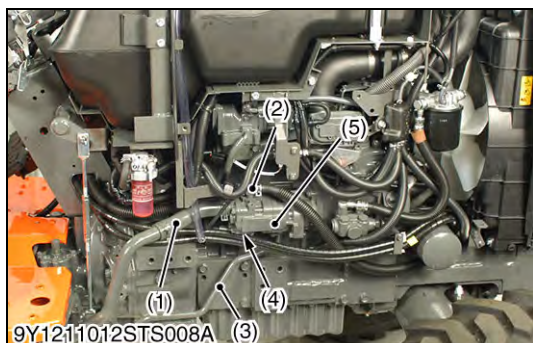
#### (When reassembling)

- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Regulator valve mounting screws	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	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) Regulator Valve | (2) Hydraulic Pump Assembly |
|---------------------|-----------------------------|

9Y1211012STS0024US0

**[B] HST Model****Hydraulic Pump Assembly**

1. Remove the side cover.
2. Disconnect the suction hose (1).
3. Disconnect the power steering return hose (2).
4. Disconnect the delivery pipe (3-point hitch) (3).
5. Disconnect the power steering delivery hose (4).
6. Remove the hydraulic pump (5).

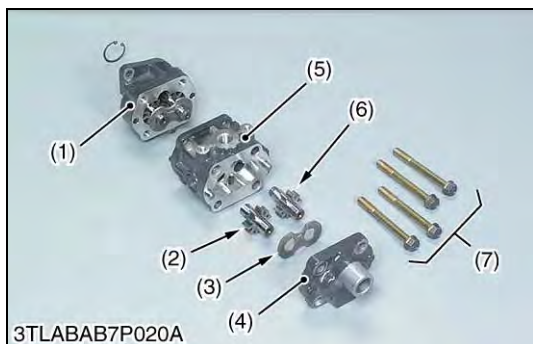
**(When reassembling)**

- Apply grease to the O-ring and be careful not to damage it.
- Be sure to wrap a seal tape to thread part of power steering return hose (2).

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
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- |                                   |                                  |
|-----------------------------------|----------------------------------|
| (1) Suction Hose                  | (4) Power Steering Delivery Hose |
| (2) Power Steering Return Hose    | (5) Hydraulic Pump               |
| (3) Delivery Pipe (3-point Hitch) |                                  |

9Y1211012STS0025US0

**Hydraulic Pump Assembly**

1. Remove the pump cover mounting screw (7).
2. Remove the drive gear (6), driven gear (2) and side plate (3) from the casing.

**(When reassembling)**

- Be careful no to damage the gasket.
- Align the hole of the pump cover (4) and casing 2 (5).
- 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    | (5) Casing 2   |
| (2) Driven Gear | (6) Drive Gear |
| (3) Side Plate  | (7) Screw      |
| (4) Pump Cover  |                |

9Y1211012STS0026US0

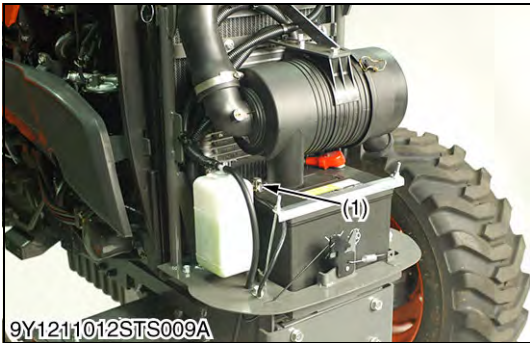
**Hydraulic Pump Running-in**

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 mm<sup>-1</sup> (rpm), and operate the hydraulic pump at no load for about 10 minutes.
3. Set the engine speed at 2000 to 2200 mm<sup>-1</sup> (rpm), and with the hydraulic pump applied with 2.9 MPa (30 kgf/cm<sup>2</sup>, 430 psi) to 4.9 MPa (50 kgf/cm<sup>2</sup>, 710 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).

9Y1211012STS0027US0

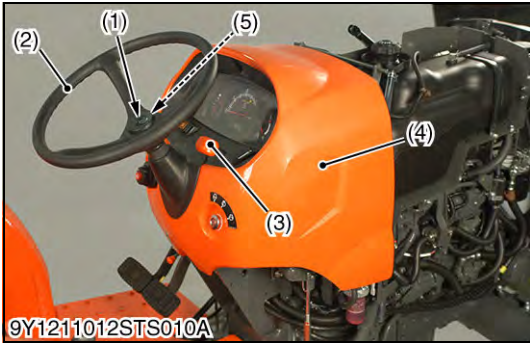
(2) Steering Controller



Battery Negative Cable Terminal

- 1. Open the bonnet.
  - 2. Disconnect the battery negative cable terminal connector (1).
- (1) Battery Negative Terminal Connector

9Y1211012STS0035US0



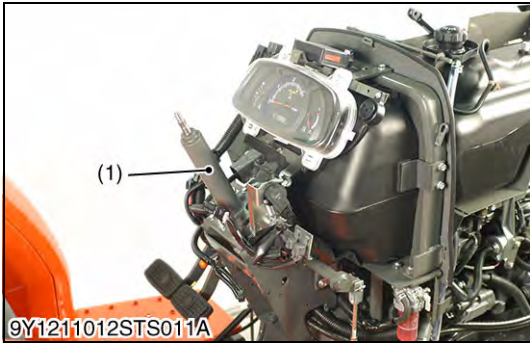
Steering Wheel and Rear Bonnet

- 1. Remove steering wheel cap (1).
- 2. Remove steering wheel nut (5).Remove steering wheel (2) with steering puller.
- 3. Remove the throttle grip (3).
- 4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

- (1) Steering Wheel Cap
- (2) Steering Wheel
- (3) Throttle Grip
- (4) Rear Bonnet
- (5) Steering Wheel Nut

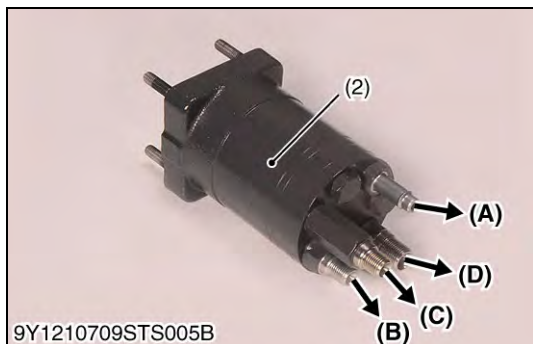
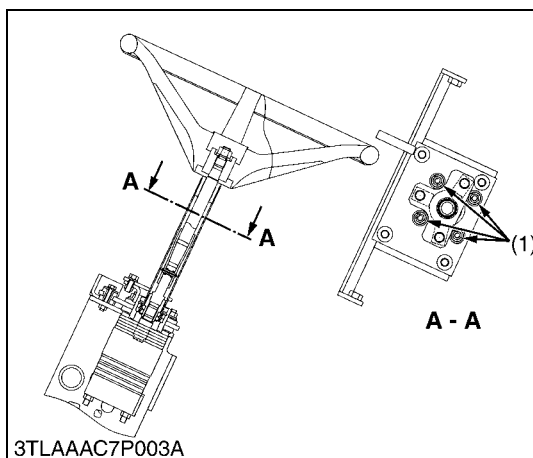
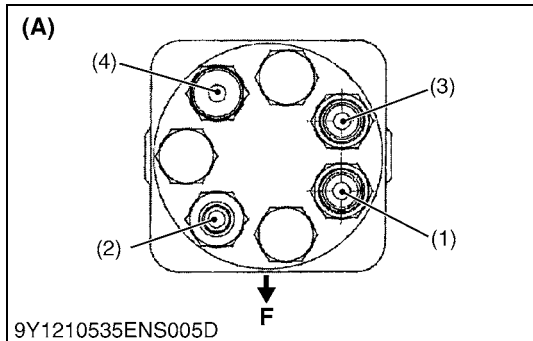
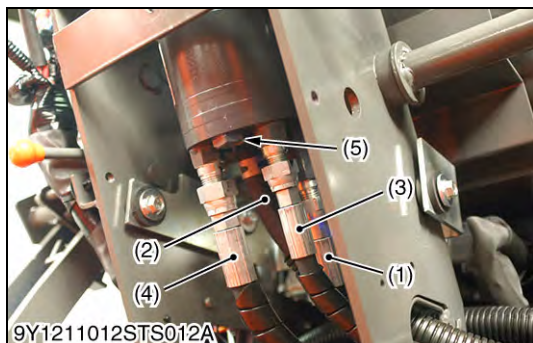
9Y1211012STS0036US0



Steering Post Assembly

- 1. Remove steering post assembly (1).
- (1) Steering Post Assembly

9Y1211012STS0037US0



### Power Steering Controller Hoses

1. Mark the hoses to identify which port the hoses are connected shown in figure.
2. Remove the hoses.

#### (When reassembling)

- Be sure to connect the both delivery hoses to original position.

Tightening torque	Main delivery hose retaining nut	46.6 to 50.9 N·m 4.8 to 5.2 kgf·m 35 to 37 lbf·ft
	Delivery hose retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

- (1) Delivery Hose (R.H.)
- (2) Return Hose
- (3) Delivery Hose (L.H.)
- (4) Main Delivery Hose
- (5) Plug

(A) Steering Controller View From the Bottom Side

F: Front

9Y1211012STS0038US0

### Steering Controller Assembly

1. Remove steering controller mounting nuts (1) and then remove steering controller assembly.

#### (When reassembling)

Tightening torque	Steering controller mounting nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.3 to 20.3 lbf·ft
-------------------	----------------------------------	---

- (1) Steering Controller Mounting Nut
- (2) Steering Controller

A: Upper View

(A) Connected to return hose

(B) Connected to right turning delivery hose

(C) Connected to left turning delivery hose

(D) Connected to main hose

9Y1211012STS0039US0



## 6. SERVICING

### [1] L3301/L3901

#### (1) Hydraulic Pump



#### Housing Bore (Depth of Scratch)

1. Check for the scratch on the interior surface of the housing caused by the gear.
2. If the scratch reaches more than half the area of the interior surface of the housing, replace at pump assembly.
3. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
4. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
------------------	-----------------	-----------------------

#### (Reference)

- Use a cylinder gauge to measure the housing I.D.

9Y1211012STS0028US0



#### 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 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory specification	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory specification	15.000 to 15.051 mm 0.5906 to 0.5926 in.

9Y1211012STS0029US0



#### 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 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

9Y1211012STS0030US0

## (2) Steering Gear Box



### Backlash between Sector Gear and Ball Nut

1. Set a dial indicator with its finger on the pitman arm.
2. Move the pitman arm lightly, and measure the pitman arm deflection.
3. If the measurement is not within the factory specifications, adjust the backlash with the adjusting screw.

Backlash between sector gear and ball nut	Factory specification	0.3 mm 0.01 in.
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9Y1211012STS0031US0



### Clearance between Valve Housing and Sleeve

1. Measure the sleeve O.D. with an outside micrometer.
2. Measure the valve housing I.D. with a caliper gauge.
3. If the clearance exceeds the allowable limit, replace the steering gear box assembly.

Clearance between valve housing and spool	Factory specification	0.17 to 0.28 mm 0.0067 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012STS0032US0



### Clearance between Gear Box and Ball Nut

1. Measure the gear box cylinder I.D. with a cylinder gauge.
2. Measure the ball nut O.D. with an outside micrometer.
3. If the clearance exceeds the factory specifications, replace the steering gear box assembly.

Clearance between gear box and ball nut	Factory specification	0.035 to 0.080 mm 0.0014 to 0.0031 in.
	Allowable limit	0.15 mm 0.0059 in.

9Y1211012STS0033US0



### Axial Play of Ball Nut Assembly

1. Set a dial indicator with its finger on the worm shaft of the ball nut assembly.
2. Move the worm shaft axially and measure the play.
3. If the play exceeds the allowable limit, replace the steering gear box assembly.

#### ■ NOTE

- Check ball nut assembly for smooth rotation by holding the ball nut horizontally, and slowly rotating the worm shaft. If rotation is not smooth, replace the steering gear box assembly.

Axial play of ball nut assembly	Factory specification	0.02 mm 0.0008 in.
	Allowable limit	0.04 mm 0.001 in.

9Y1211012STS0034US0

## [2] L4701

### (1) Hydraulic Pump



#### Housing Bore (Depth of Scratch)

1. Check for the scratch on the interior surface of the housing caused by the gear.
2. If the scratch reaches more than half the area of the interior surface of the housing, replace at pump assembly.
3. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
4. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
------------------	-----------------	-----------------------

#### (Reference)

- Use a cylinder gauge to measure the housing I.D.

9Y1211012STS0028US0



#### 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 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory specification	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory specification	15.000 to 15.051 mm 0.5906 to 0.5926 in.

9Y1211012STS0029US0



#### 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 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

9Y1211012STS0030US0

# **8 HYDRAULIC SYSTEM**



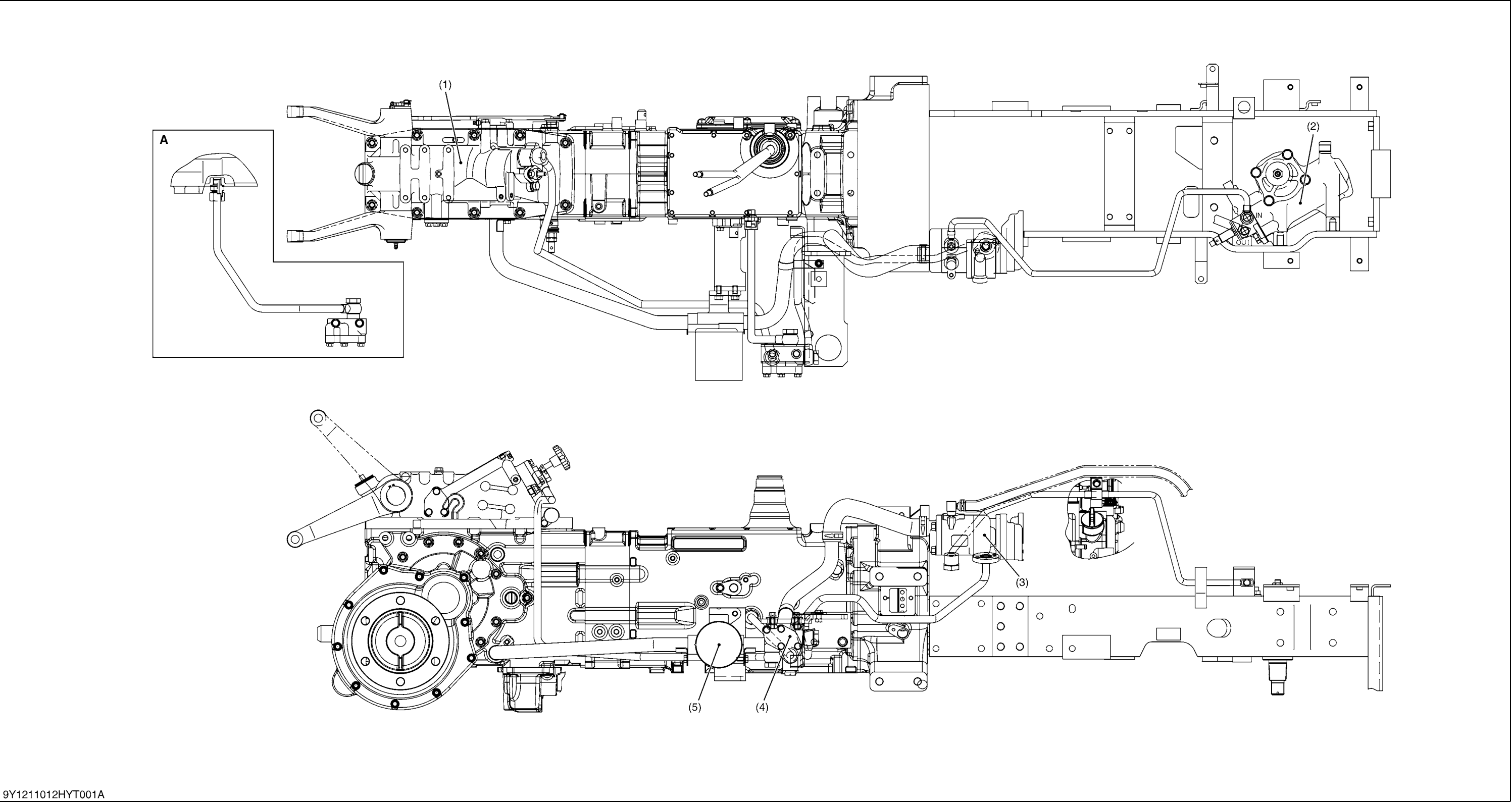
# MECHANISM

## CONTENTS

1. STRUCTURE.....	8-M1
[1] L3301/L3901.....	8-M1
[2] L4701.....	8-M2
(1) Manual Transmission Model.....	8-M2
(2) HST Model.....	8-M3
2. HYDRAULIC CIRCUIT .....	8-M4
[1] L3301/L3901.....	8-M4
(1) Manual Transmission Model.....	8-M4
(2) HST Model.....	8-M5
[2] L4701.....	8-M6
(1) Manual Transmission Model.....	8-M6
(2) HST Model.....	8-M7
3. THREE POINT HITCH HYDRAULIC SYSTEM.....	8-M8
[1] THREE POINT HITCH HYDRAULIC CIRCUIT .....	8-M8
[2] HYDRAULIC CYLINDER.....	8-M9
[3] LINKAGE MECHANISM .....	8-M10
[4] POSITION CONTROL VALVE .....	8-M12
[5] HYDRAULIC PUMP .....	8-M14
[6] SAFETY VALVE .....	8-M14
4. FRONT HYDRAULIC BLOCK .....	8-M15
[1] STRUCTURE .....	8-M15
[2] HYDRAULIC CIRCUIT .....	8-M15
[3] RELIEF VALVE .....	8-M16

1. STRUCTURE

[1] L3301/L3901



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(1) Hydraulic Block

(2) Power Steering Controller

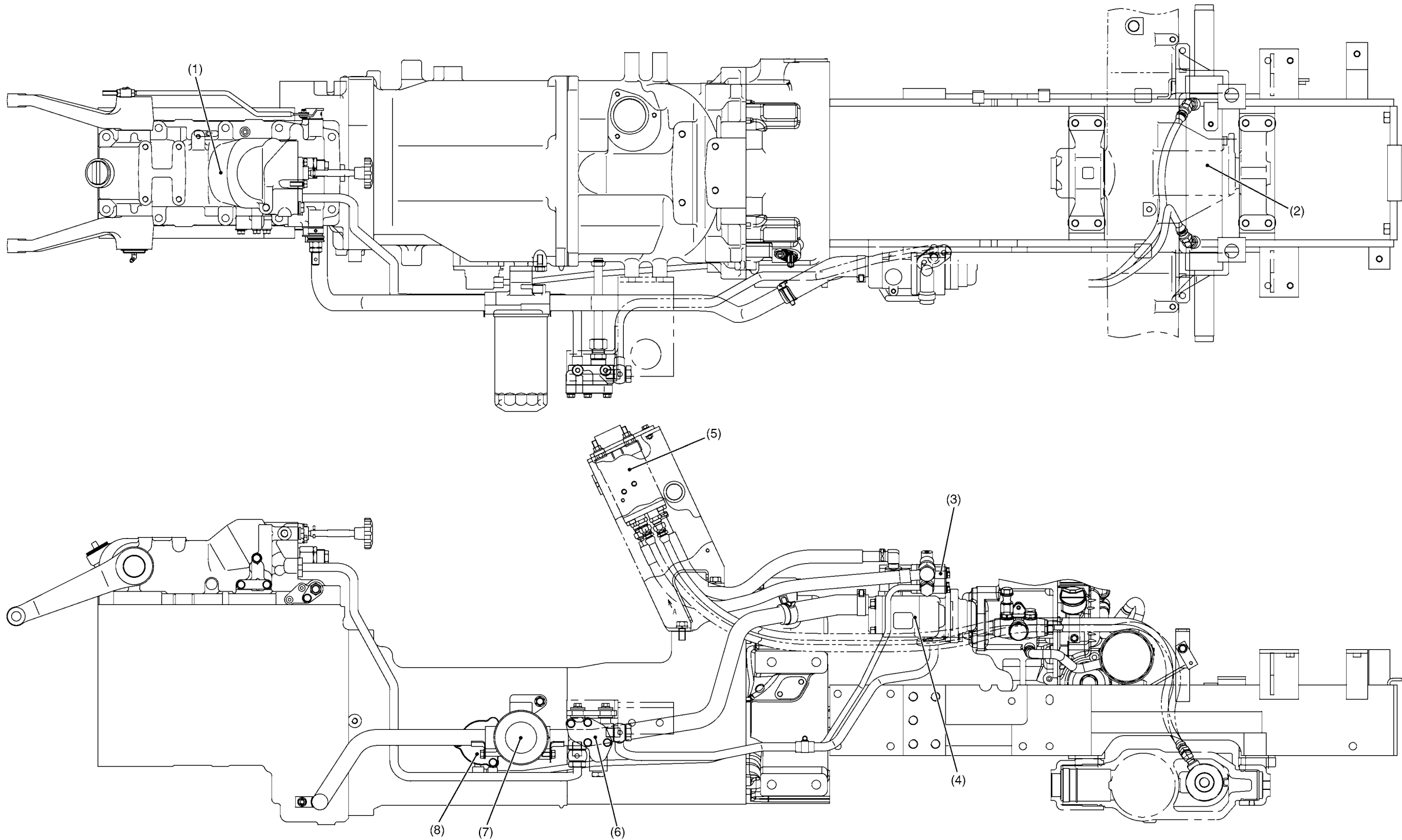
(3) Hydraulic Pump

(4) Front Hydraulic Block

(5) Hydraulic Oil Filter

A: HST Model

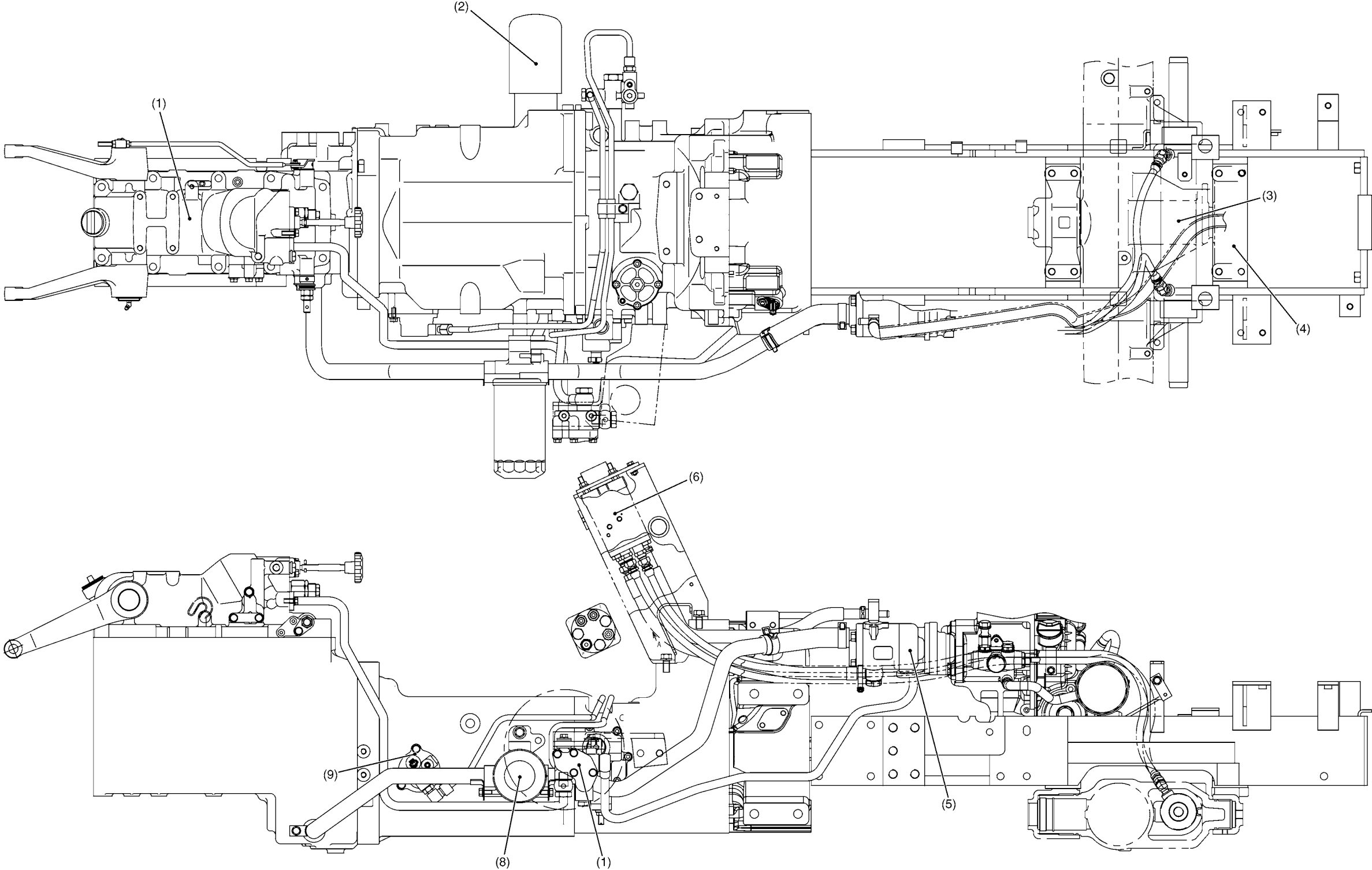
[2] L4701  
(1) Manual Transmission Model



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- |                             |                     |                               |                           |                          |                      |
|-----------------------------|---------------------|-------------------------------|---------------------------|--------------------------|----------------------|
| (1) Hydraulic Block         | (3) Regulator Valve | (5) Power Steering Controller | (6) Front Hydraulic Block | (7) Hydraulic Oil Filter | (8) PTO Clutch Valve |
| (2) Power Steering Cylinder | (4) Hydraulic Pump  |                               |                           |                          |                      |

(2) HST Model



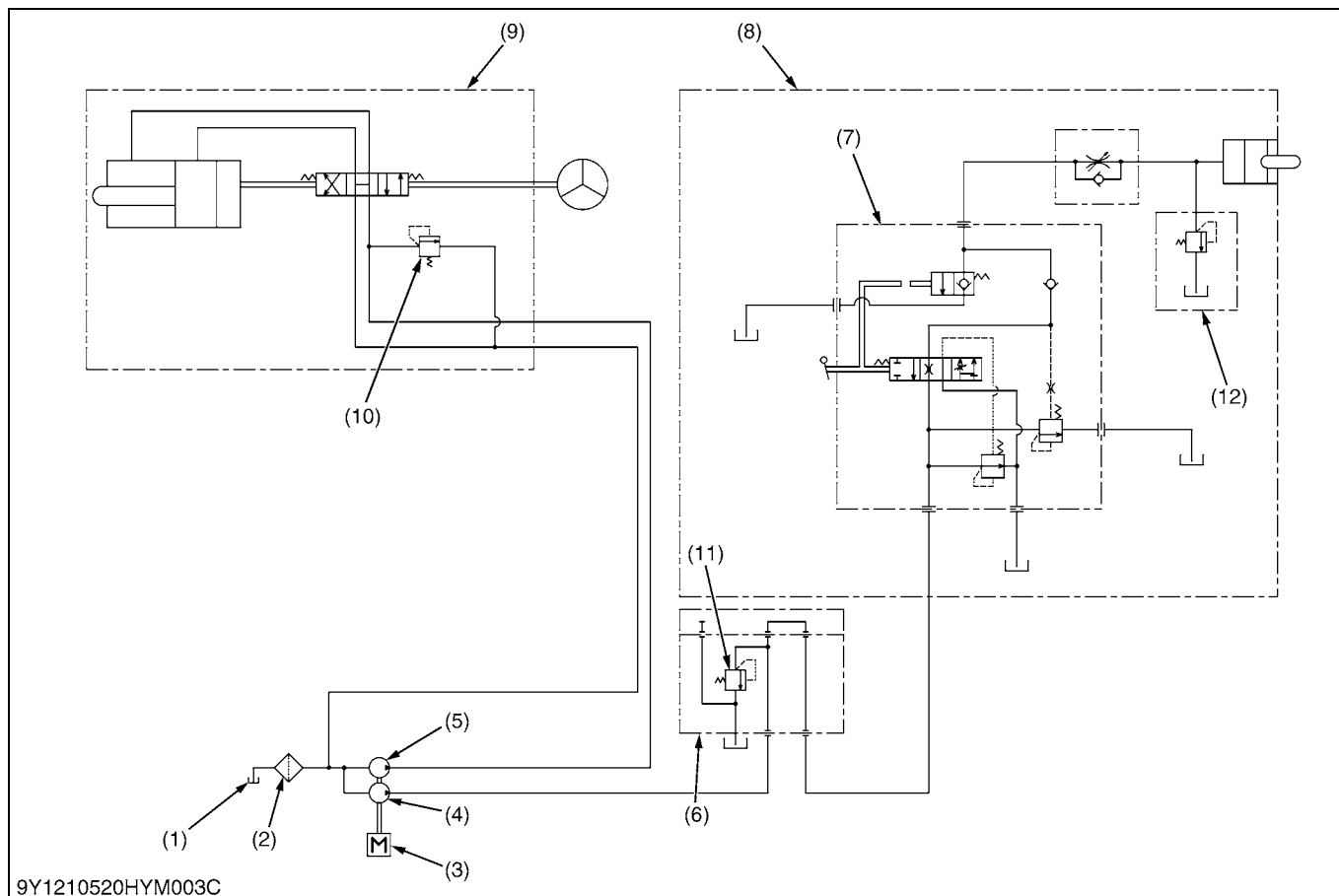
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- (1) Hydraulic Block
- (2) Hydraulic Oil Filter (HST)
- (3) Power Steering Cylinder
- (4) Oil Cooler
- (5) Hydraulic Pump
- (6) Power Steering Controller
- (7) Front Hydraulic Block
- (8) Hydraulic Oil Filter
- (9) PTO Clutch Valve

## 2. HYDRAULIC CIRCUIT

### [1] L3301/L3901

#### (1) Manual Transmission Model



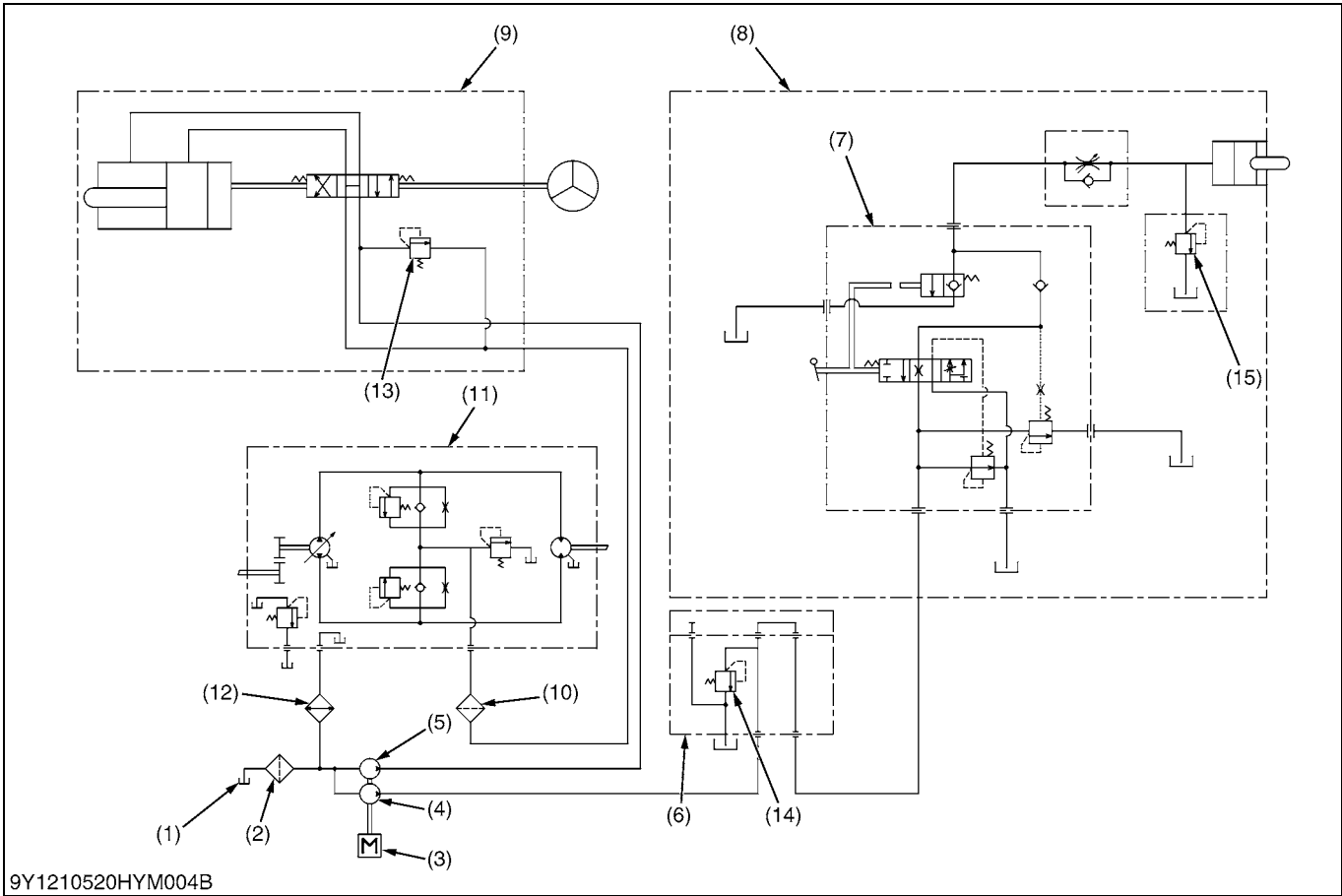
- |                                  |  |                               |                                       |
|----------------------------------|--|-------------------------------|---------------------------------------|
| (1) Oil Tank (Transmission Case) | (4) Hydraulic Pump (Three Point Hitch) | (6) Front Hydraulic Block     | (10) Relief Valve (Power Steering)    |
| (2) Hydraulic Oil Filter         | (5) Hydraulic Pump (Power Steering)    | (7) Position Control Valve    | (11) Relief Valve (Three Point Hitch) |
| (3) Engine                       |  | (8) Hydraulic Cylinder Block  | (12) Cylinder Safety Valve            |
|                                  |  | (9) Power Steering Controller |                                       |

#### Specification of Hydraulic Parts

(4)	Above. 16.5 L/min. (4.36 U.S.gals/min., 3.63 Imp.gals/min.)	(11)	15.7 to 16.7 MPa (160 to 170 kgf/cm <sup>2</sup> , 2280 to 2410 psi)
(5)	Above. 27.2 L/min. (7.19 U.S.gals/min., 5.98 Imp.gals/min.)	(12)	19.7 to 22.5 MPa (200 to 230 kgf/cm <sup>2</sup> , 2850 to 3270 psi)
(10)	<b>[L3301]</b> 2WD Model: 8.3 to 9.3 MPa (85 to 95 kgf/cm <sup>2</sup> , 1200 to 1300 psi) 4WD Model: 11.4 to 12.4 MPa (116 to 126 kgf/cm <sup>2</sup> , 1650 to 1790 psi)		
	<b>[L3901]</b> 2WD Model: 8.1 to 9.1 MPa (83 to 93 kgf/cm <sup>2</sup> , 1200 to 1300 psi) 4WD Model: 11.1 to 12.1 MPa (113 to 123 kgf/cm <sup>2</sup> , 1610 to 1740 psi)		

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(2) HST Model



- (1) Oil Tank (Transmission Case)

(2) Hydraulic Oil Filter

(3) Engine

(4) Hydraulic Pump (Three Point Hitch)
- (5) Hydraulic Pump (Power Steering)

(6) Front Hydraulic Block

(7) Position Control Valve

(8) Hydraulic Cylinder Block
- (9) Power Steering Controller

(10) Hydraulic Oil Filter (HST)

(11) HST Unit

(12) Oil Cooler
- (13) Relief Valve (Power Steering)

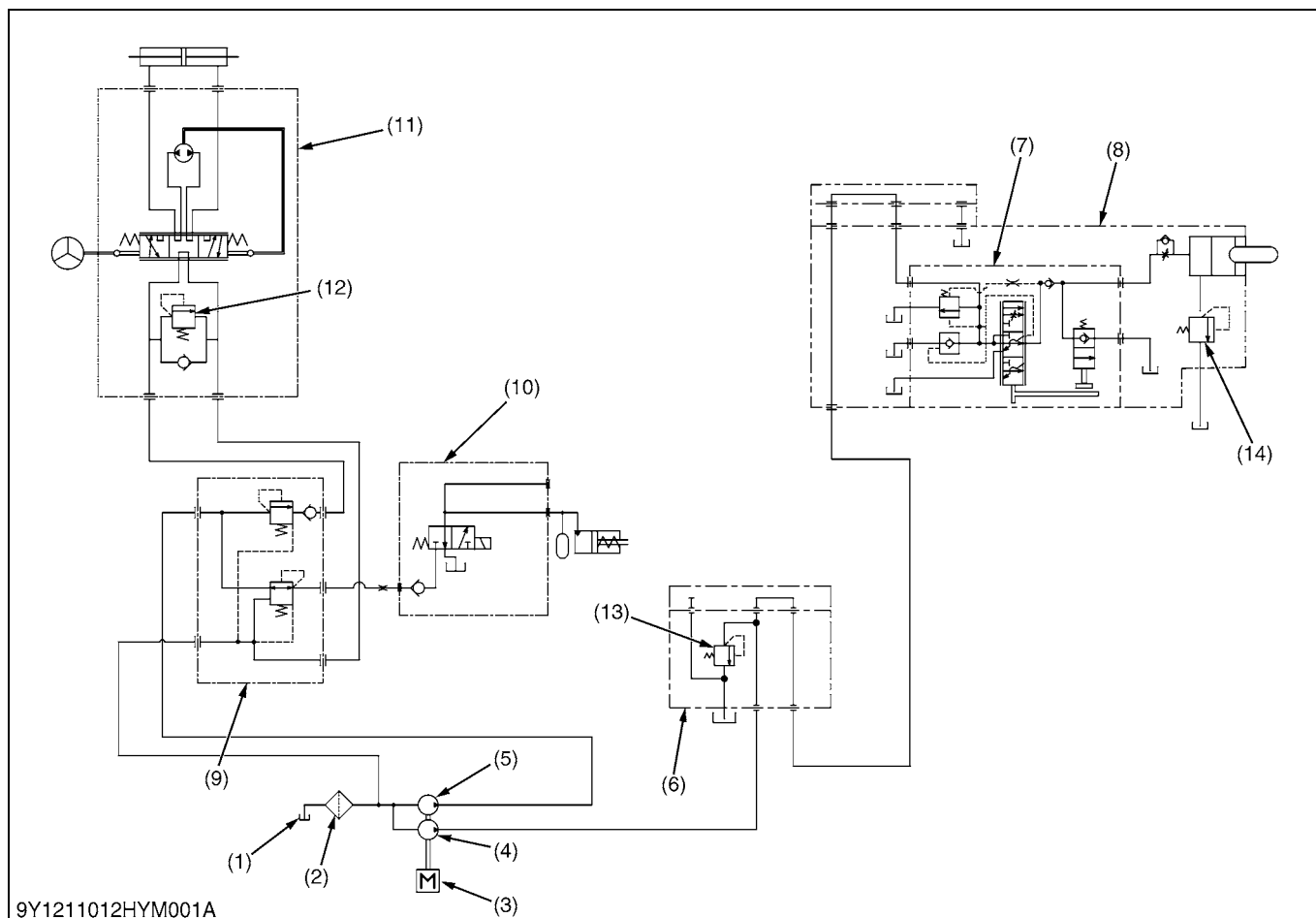
(14) Relief Valve (Three Point Hitch)

(15) Cylinder Safety Valve

Specification of Hydraulic Parts

(4)	Above. 27.2 L/min. (7.19 U.S.gals/min., 5.98 Imp.gals/min.)	(14)	15.7 to 16.7 MPa (160 to 170 kgf/cm <sup>2</sup> , 2280 to 2410 psi)
(5)	Above. 16.5 L/min. (4.36 U.S.gals/min., 3.63 Imp.gals/min.)	(15)	19.7 to 22.5 MPa (200 to 230 kgf/cm <sup>2</sup> , 2850 to 3270 psi)
(13)	[L3301] 11.4 to 12.4 MPa (116 to 126 kgf/cm <sup>2</sup> , 1650 to 1790 psi)		
	[L3901] 11.1 to 12.1 MPa (113 to 123 kgf/cm <sup>2</sup> , 1610 to 1740 psi)		

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**[2] L4701****(1) Manual Transmission Model**

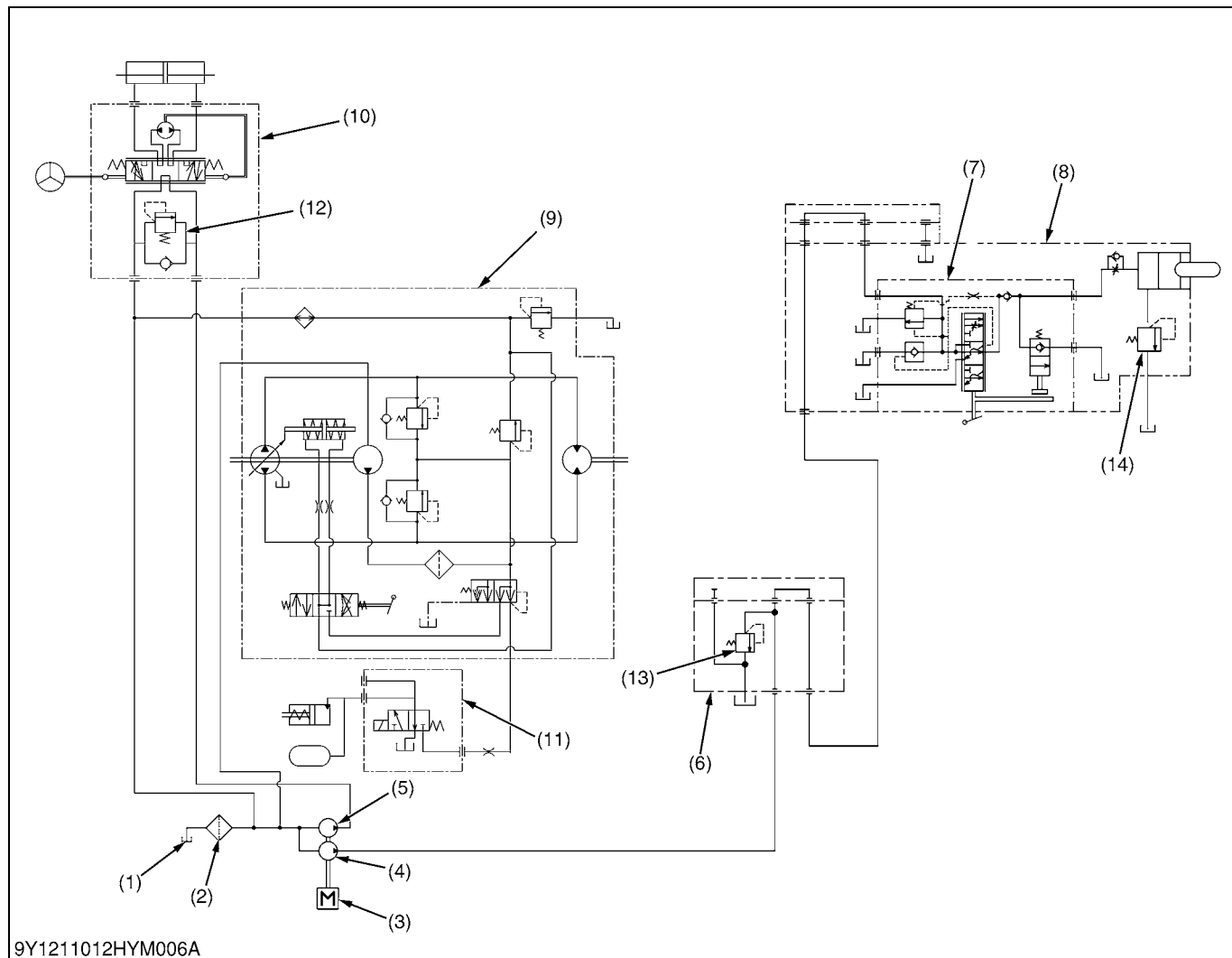
- |  |                                     |                                    |                                       |
|--|-------------------------------------|------------------------------------|---------------------------------------|
| (1) Oil Tank (Transmission Case)       | (5) Hydraulic Pump (Power Steering) | (9) Regulator Valve                | (13) Relief Valve (Three Point Hitch) |
| (2) Hydraulic Oil Filter               | (6) Front Hydraulic Block           | (10) PTO Clutch Valve              | (14) Cylinder Safety Valve            |
| (3) Engine                             | (7) Position Control Valve          | (11) Power Steering Controller     |                                       |
| (4) Hydraulic Pump (Three Point Hitch) | (8) Hydraulic Cylinder Block        | (12) Relief Valve (Power Steering) |                                       |

**Specification of Hydraulic Parts**

(4)	Above. 26.2 L/min. (6.92 U.S.gals/min., 5.76 Imp.gals/min.)	(13)	17.1 to 18.1 MPa (174 to 185 kgf/cm <sup>2</sup> , 2480 to 2630 psi)
(5)	Above. 15.9 L/min. (4.20 U.S.gals/min., 3.50 Imp.gals/min.)	(14)	19.7 to 22.5 MPa (200 to 230 kgf/cm <sup>2</sup> , 2850 to 3270 psi)
(12)	2WD Model: 8.0 to 9.0 MPa (81 to 91 kgf/cm <sup>2</sup> , 1200 to 1300 psi) 4WD Model: 10.7 to 11.7 MPa (109 to 119 kgf/cm <sup>2</sup> , 1550 to 1690 psi)		

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## (2) HST Model



- |  |                                     |                                |                                       |
|--|-------------------------------------|--------------------------------|---------------------------------------|
| (1) Oil Tank (Transmission Case)       | (5) Hydraulic Pump (Power Steering) | (8) Hydraulic Cylinder         | (12) Relief Valve (Power Steering)    |
| (2) Hydraulic Oil Filter               | (6) Front Hydraulic Block           | (9) HST Unit                   | (13) Relief Valve (Three Point Hitch) |
| (3) Engine                             | (7) Power Steering Controller       | (10) Power Steering Controller | (14) Cylinder Safety Valve            |
| (4) Hydraulic Pump (Three Point hitch) |                                     | (11) PTO Clutch Valve          |                                       |

### Specification of Hydraulic Parts

(4)	Above. 26.2 L/min. (6.92 U.S.gals/min., 5.76 Imp.gals/min.)	(13)	17.1 to 18.1 MPa (174 to 185 kgf/cm <sup>2</sup> , 2480 to 2630 psi)
(5)	Above. 15.9 L/min. (4.20 U.S.gals/min., 3.50 Imp.gals/min.)	(14)	19.7 to 22.5 MPa (200 to 230 kgf/cm <sup>2</sup> , 2850 to 3270 psi)
(12)	2WD Model: 8.0 to 9.0 MPa (81 to 91 kgf/cm <sup>2</sup> , 1200 to 1300 psi) 4WD Model: 10.7 to 11.7 MPa (109 to 119 kgf/cm <sup>2</sup> , 1550 to 1690 psi)		

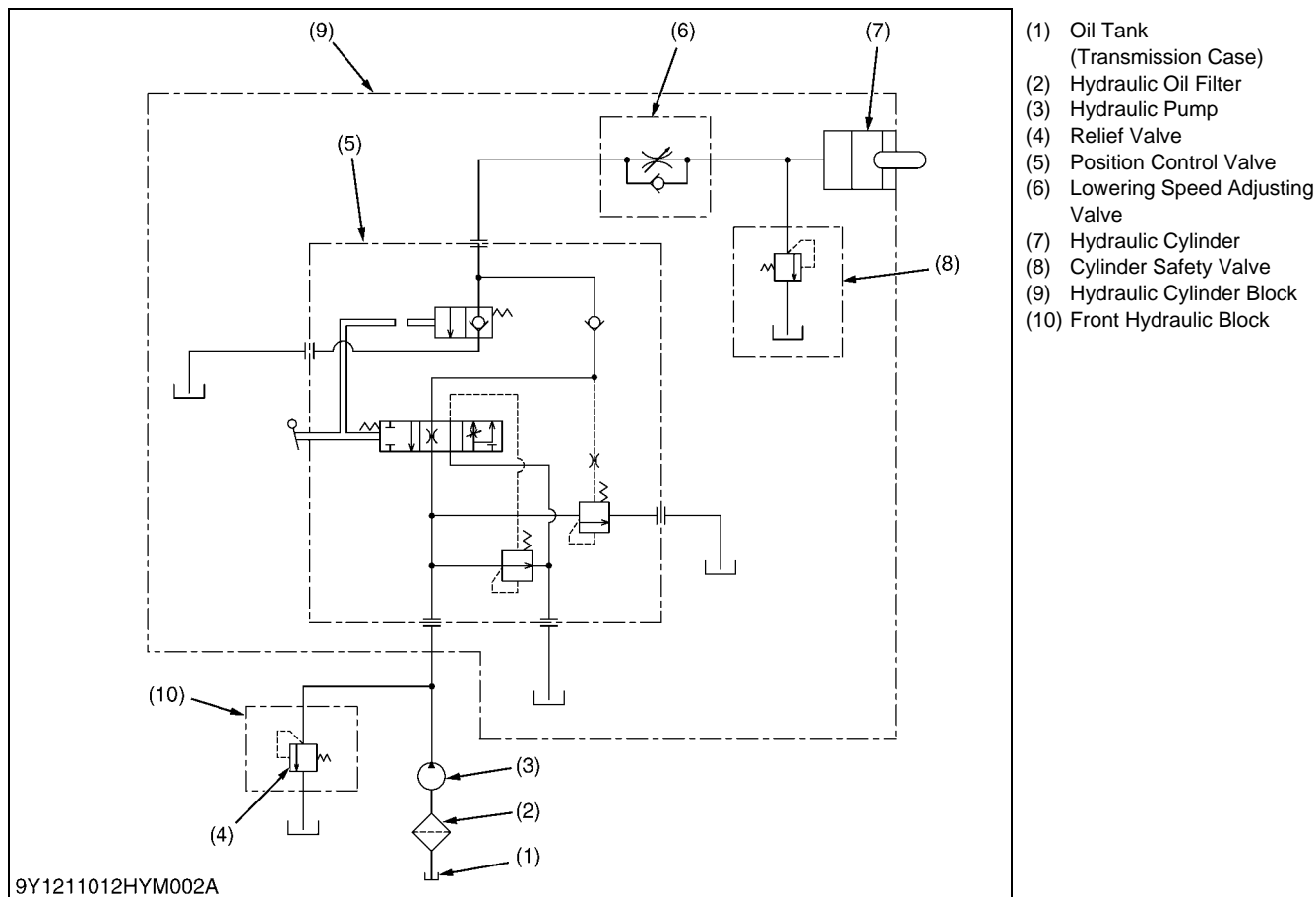
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### 3. THREE POINT HITCH HYDRAULIC SYSTEM

#### [1] THREE POINT HITCH HYDRAULIC CIRCUIT

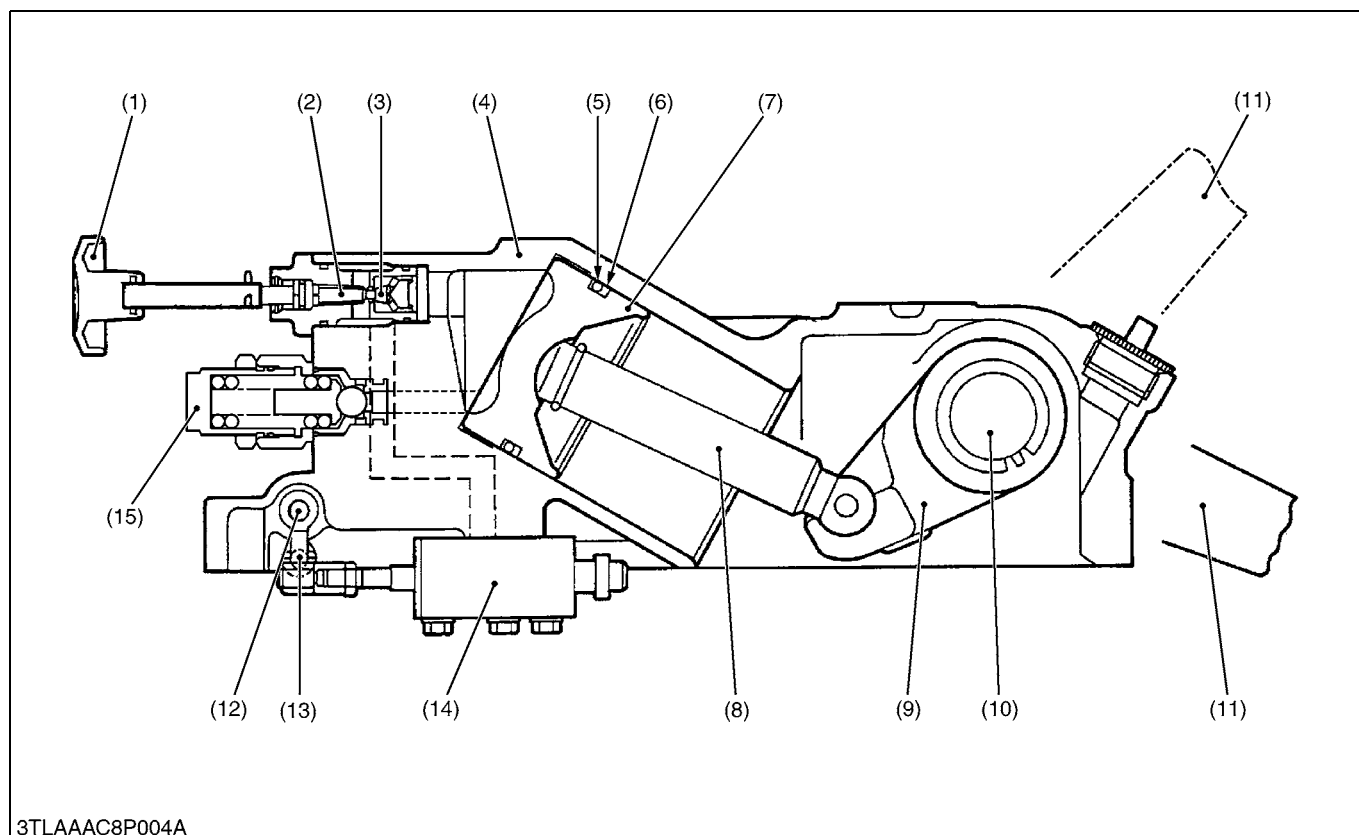
##### Hydraulic Oil Flow



1. When the engine is started, the hydraulic pump (3) is rotated to draw oil from the transmission case (1) through the suction pipe. Supplied oil is filtered by the hydraulic oil filter (2).
  2. Filtered oil is forced out by the hydraulic pump to the position control valve (5) through the delivery pipe.
  3. The position control valve (5) switches the oil flow, and oil is channelled to the hydraulic cylinder (7) for the three-point hydraulic system or returned to the oil tank (1).
- The hydraulic system has a relief valve (4) which restricts the maximum pressure in the circuit.

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## [2] HYDRAULIC CYLINDER



- |                                    |                        |                          |                             |
|------------------------------------|------------------------|--------------------------|-----------------------------|
| (1) Lowering Speed Adjusting Knob  | (4) Hydraulic Cylinder | (8) Hydraulic Rod        | (12) Position Control Arm   |
| (2) Lowering Speed Adjusting Shaft | (5) O-ring             | (9) Hydraulic Arm        | (13) Spool Drive Lever      |
| (3) Lowering Speed Adjusting Valve | (6) Back-up Ring       | (10) Hydraulic Arm Shaft | (14) Position Control Valve |
|                                    | (7) Hydraulic Piston   | (11) Lift Arm            | (15) Cylinder Safety Valve  |

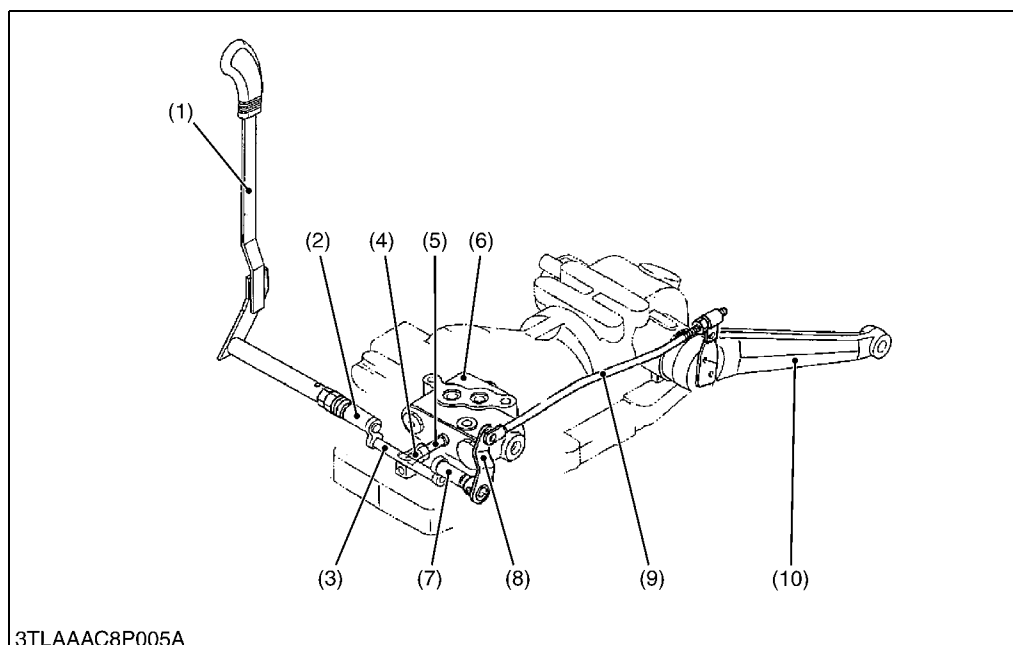
The main components of the hydraulic cylinder are shown in the figure above.

While the lift arm (11) is rising, oil from the hydraulic pump flows into the hydraulic cylinder through the position control valve (14). Then oil pushes out the hydraulic piston (7).

While the lift arm (11) is lowering, oil in the hydraulic cylinder is discharge to the transmission case through the position control valve (14) by the weight of the implement. At this time, the lowering speed of the implement can be controlled by the lowering speed adjusting valve (3) attached to the hydraulic cylinder (4). Turning the lowering speed adjusting knob (1) clockwise decreases the lowering speed, and counterclockwise increases lowering speed. When the lowering speed adjusting valve (3) is completely closed, the lift arm (11) is held at its position since oil in the hydraulic cylinder is sealed between the hydraulic piston (7) and lowering speed adjusting valve (3).

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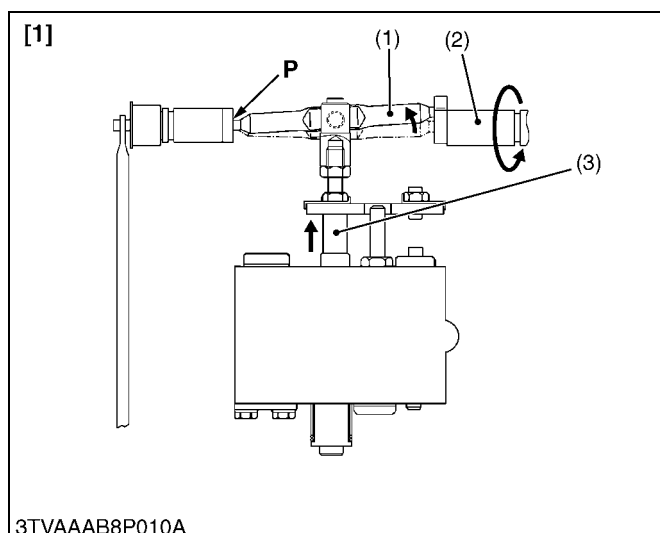
### [3] LINKAGE MECHANISM



- (1) Position Control Lever
- (2) Control Arm
- (3) Spool Drive Lever
- (4) Spool Joint 1
- (5) Spool Head
- (6) Position Control Valve
- (7) Feedback Lever Shaft
- (8) Feedback Lever
- (9) Feedback Rod
- (10) Lift Arm

Position control is a mechanism to raise or lower the implement attached to the tractor in proportion to the movement of the position control lever (1). The implement can be set at any height by moving the position control lever.

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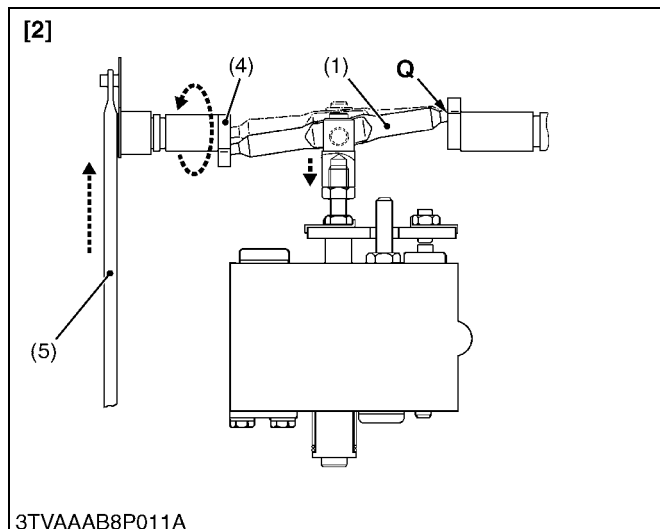


#### Lifting

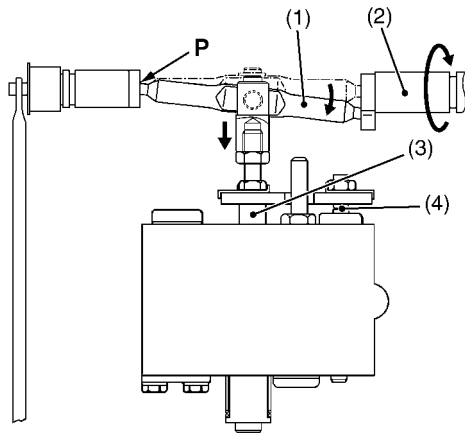
1. When the position control lever is moved to the **LIFT** position, the control arm (2) rotates to the arrow. Therefore, the spool drive lever (1) moves around the fulcrum **P** and pull the spool (3) opening the **LIFT** circuit.
2. When the lift arm moves upward, the feedback lever shaft (4) is rotated to the arrow, since the feedback rod (5) is actuated. Therefore, the spool drive lever (1) moves around the fulcrum **Q** and pushes the spool (3).
3. The lift arm stops when the spool returns to the neutral position.

- (1) Spool Drive Lever
- (2) Control Arm
- (3) Spool
- (4) Feedback Lever Shaft
- (5) Feedback Rod

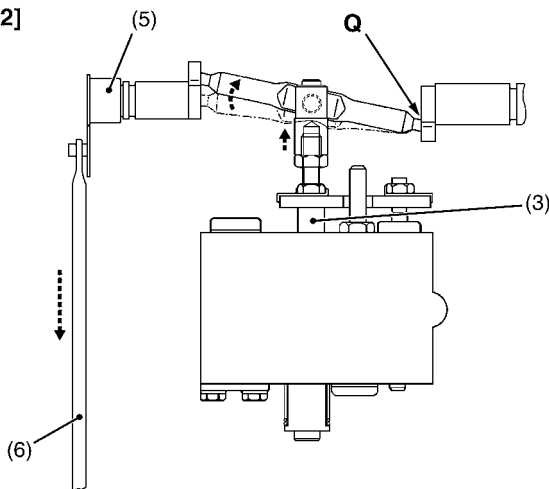
- [1] **Lifting**
- [2] **Lifting to Neutral**



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**[1]**

3TVAAAB8P012A

**[2]**

3TVAAAB8P013A

**Lowering**

1. When the position control lever is moved to the **Lowering** position, the control arm (2) rotates to the arrow. Therefore, the spool drive lever (1) moves around the fulcrum **P** and push the spool (3) and poppet 2 (4) opening the Lowering circuit.
2. When the lift arm moves downward, the feedback lever shaft (5) is rotated to the arrow, since the feedback rod (6) is actuated. Therefore, the spool drive lever (1) moves around the fulcrum **Q** and pull the spool (3).
3. The lift arm stops when the spool (3) returns to the neutral position.

(1) Spool Drive Lever

(2) Control Arm

(3) Spool

(4) Poppet 2

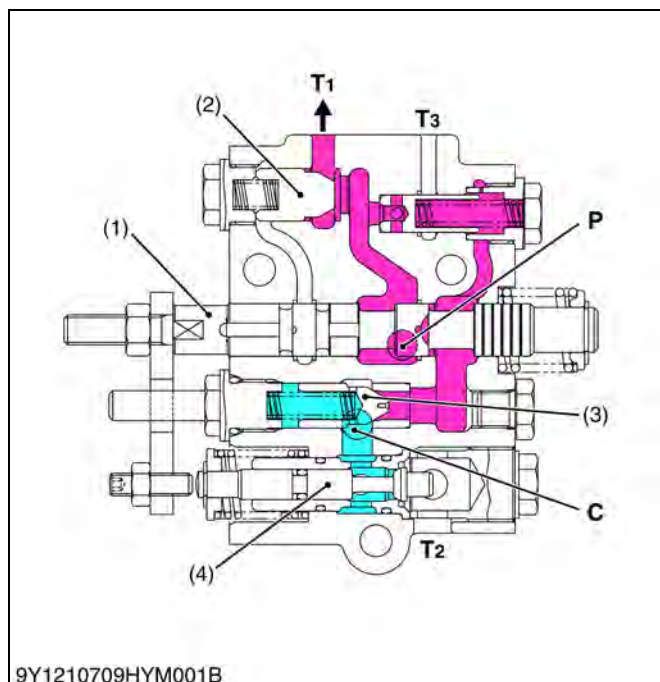
(5) Feedback Lever Shaft

(6) Feedback Rod

**[1] Lowering****[2] Lowering to Neutral**

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## [4] POSITION CONTROL VALVE



### ■ Neutral

Pressurized oil delivered from the **P** port, pushes the unload poppet (2) and returns to the transmission case from **T<sub>1</sub>** port.

Since the poppet 1 (3) is closed by the spring located behind the poppet 1 (3), the oil in the hydraulic cylinder is not drained to the transmission case.

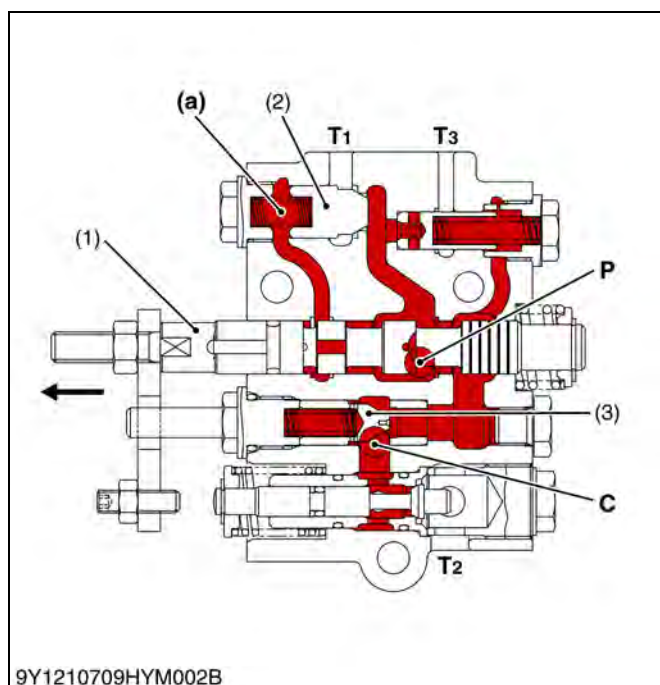
At this condition, position control is kept at **"NEUTRAL"**.

The oil in the hydraulic cylinder is cut off by the actions of poppet 1 (3) and poppet 2 (4).

- (1) Spool
- (2) Unload Poppet
- (3) Poppet 1
- (4) Poppet 2

- C:** C (Cylinder) Port
- P:** P (Pump) Port
- T<sub>1</sub>:** T<sub>1</sub> Port  
(To Transmission Case)
- T<sub>2</sub>:** T<sub>2</sub> Port  
(To Transmission Case)
- T<sub>3</sub>:** T<sub>3</sub> Port  
(To Transmission Case)

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### ■ Lifting

When the control lever is moved to **"UP"** position, the spool (1) is pulled out from the position control valve body as shown in the figure.

The high-pressure oil delivered from **P** port flows through the oil passage of the spool (1) into the **A** chamber (a).

Since the spring behind the unload poppet (2) and the pressured oil entered to the **A** chamber (a) push and close the unload poppet (2).

At this condition, the pressured oil flows to the **C** port.

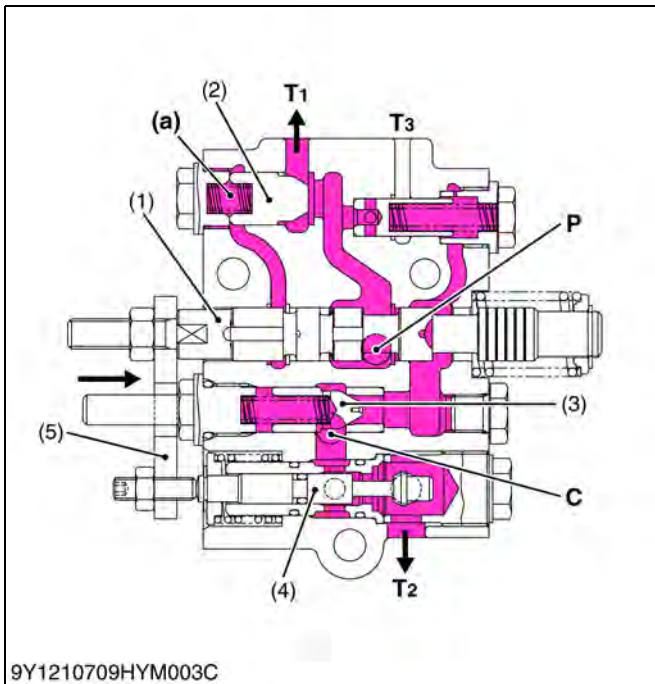
Since the poppet 1 (3) is opened by the pressured oil, the pressured oil flows through **C** port to the hydraulic cylinder, lifting a implement.

- (1) Spool
- (2) Unload Poppet
- (3) Poppet 1

- (a)** A Chamber

- C:** C (Cylinder) Port
- P:** P (Pump) Port
- T<sub>1</sub>:** T<sub>1</sub> Port  
(To Transmission Case)
- T<sub>2</sub>:** T<sub>2</sub> Port  
(To Transmission Case)
- T<sub>3</sub>:** T<sub>3</sub> Port  
(To Transmission Case)

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### ■ Lowering

When the control lever is moved to **"DOWN"** position, the spool (1) is pushed into the position control valve body as shown in the figure.

Since the spool (1) blocks the oil entering to **A** chamber (a), pressured oil from **P** port opens the unload poppet (2) and drains to **T<sub>1</sub>** port.

The oil remaining in the **A** chamber (a) returns to the transmission case through the clearance between spool (1) and the control valve body.

Since the poppet 2 (4) is pushed by the plate connected to the spool (1), the oil circuit between **C** port and **T<sub>2</sub>** port is formed.

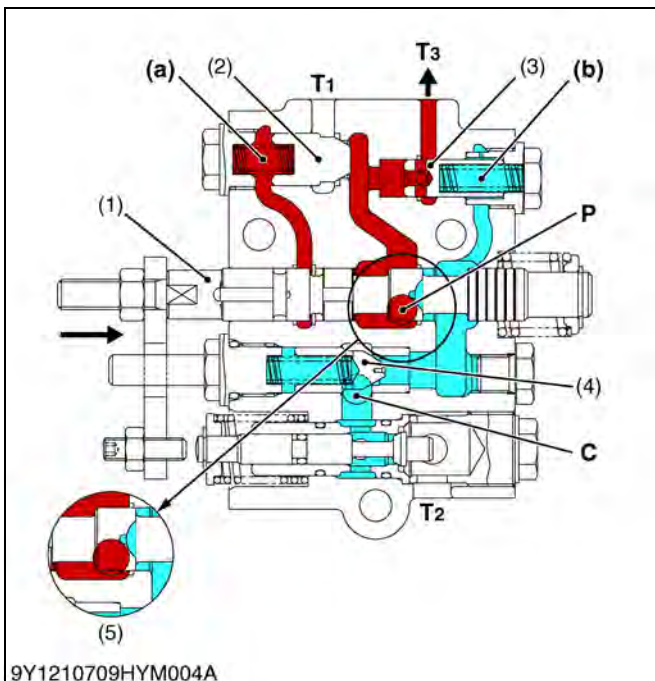
The oil in the hydraulic cylinder is forced out by the weight of the implement, and returns to the transmission case through **T<sub>2</sub>** port, lowering the implement.

### <Floating>

When the control lever is moved all the way to the bottom, the spool (1) and the poppet 2 (4) remain in the positions described for **"Lowering"**. The oil flows freely between the hydraulic cylinder and the transmission case.

- |                      |   |
|----------------------|---|
| (1) Spool            | <b>C:</b> <b>C (Cylinder) Port</b>              |
| (2) Unload Poppet    | <b>P:</b> <b>P (Pump) Port</b>                  |
| (3) Poppet 1         | <b>T<sub>1</sub>:</b> <b>T<sub>1</sub> Port</b> |
| (4) Poppet 2         | <b>(To Transmission Case)</b>                   |
| (5) Plate            | <b>T<sub>2</sub>:</b> <b>T<sub>2</sub> Port</b> |
|                      | <b>(To Transmission Case)</b>                   |
| <b>(a) A Chamber</b> | <b>T<sub>3</sub>:</b> <b>T<sub>3</sub> Port</b> |
|                      | <b>(To Transmission Case)</b>                   |

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### ■ Lifting to Neutral

When moving the position control lever from **"LIFTING"** to **"NEUTRAL"**, the spool (1) is pushed back as shown in the figure.

When the **"NEUTRAL"** position comes near, the tapered portion (5) of the spool (1) makes the pressure difference at the **P** port and **C** port.

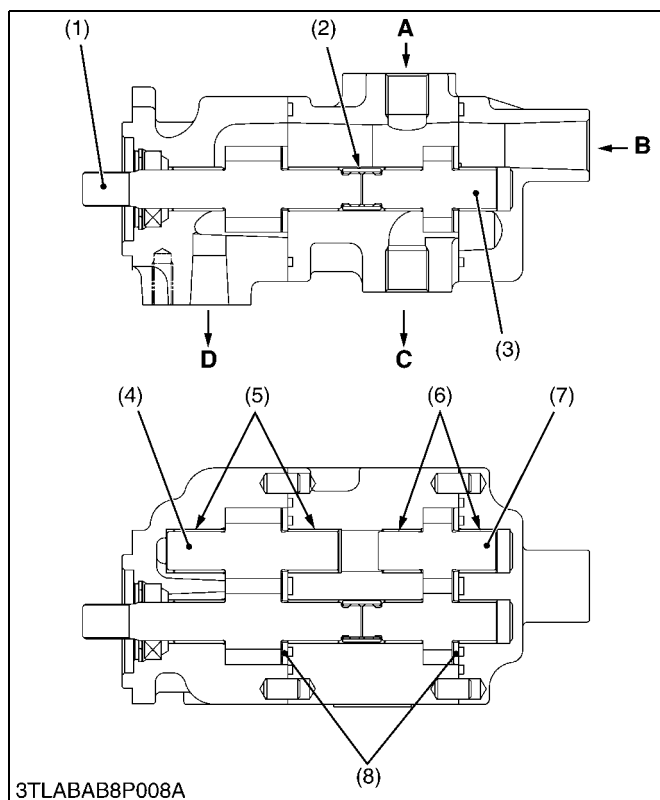
Therefore, the poppet 2 (4) gradually closes, and absorbs any shock at the **A** chamber (a) behind the unload poppet (2), the unload poppet (2) does not open.

However, the poppet 1 (3) opens because of the low pressure in **B** chamber (b), and then the oil from the pump returns to the transmission case through **T<sub>3</sub>** port.

- |                      |   |
|----------------------|---|
| (1) Spool            | <b>C:</b> <b>C (Cylinder) Port</b>              |
| (2) Unload Poppet    | <b>P:</b> <b>P (Pump) Port</b>                  |
| (3) Poppet 1         | <b>T<sub>1</sub>:</b> <b>T<sub>1</sub> Port</b> |
| (4) Poppet 2         | <b>(To Transmission Case)</b>                   |
| (5) Tapered Portion  | <b>T<sub>2</sub>:</b> <b>T<sub>2</sub> Port</b> |
|                      | <b>(To Transmission Case)</b>                   |
| <b>(a) A Chamber</b> | <b>T<sub>3</sub>:</b> <b>T<sub>3</sub> Port</b> |
| <b>(b) B Chamber</b> | <b>(To Transmission Case)</b>                   |

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## [5] HYDRAULIC PUMP



The gear type hydraulic pump is adopted for these models. This pump is called as tandem type and composed two pair of gears, side plates, bushings and other components as shown in the figure.

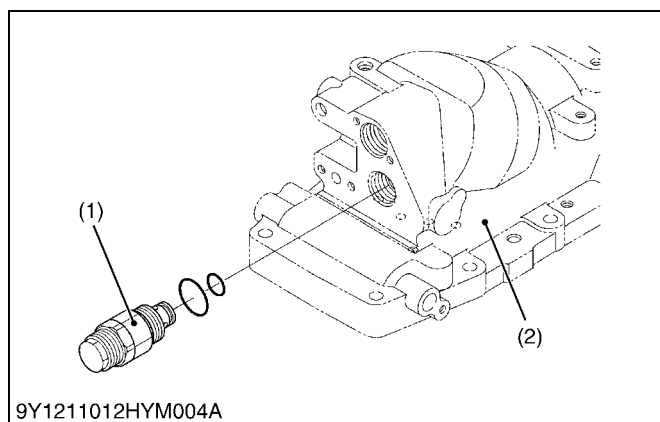
The hydraulic pump pressurize oil from transmission case through oil filter and send the oil to power steering circuit and main hydraulic circuit.

- (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 (Manual Transmission Type) From Oil Cooler (HST Type)**
- B: From Transmission Case**
- C: To Power Steering Controller**
- D: To Main Hydraulic Circuit**

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## [6] SAFETY VALVE

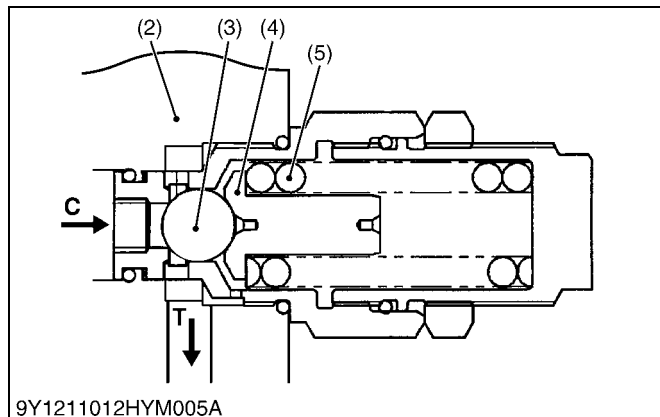


The cylinder safety valve (1) is equipped on the hydraulic cylinder assembly (2).

These models use a direct acting safety valve which is suitable for less frequent operation.

This valve operates to prevent damage to three point hydraulic system components only in case shock pressure is caused. For example, bouncing of heavy implements.

If pressure in the hydraulic cylinder (2) becomes too large, oil pressure pushes ball (3), valve seat (4) and compress the spring (5). The oil in the hydraulic cylinder flows to transmission case through the T port.



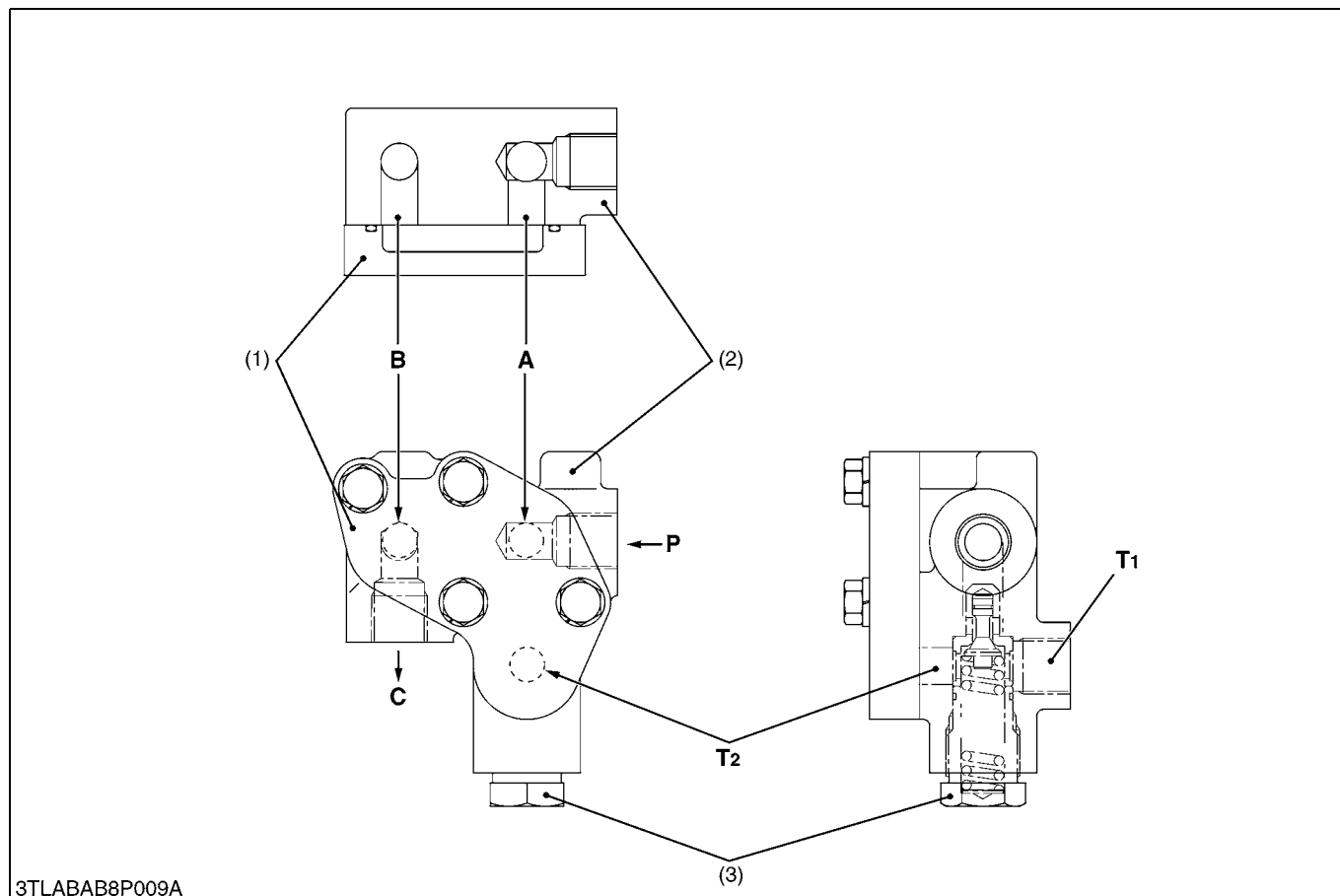
- (1) Cylinder Safety Valve
- (2) Hydraulic Cylinder Assembly
- (3) Ball
- (4) Valve Seat
- (5) Spring

- C: C port (From Hydraulic Cylinder)**
- T: T port (To Transmission Case)**

9Y1211012HYM0018US0

## 4. FRONT HYDRAULIC BLOCK

### [1] STRUCTURE



(1) Cap

(2) Front Hydraulic Block

(3) Relief Valve

**A: To Implement Control Valve** **C: To Position Control Valve**

**B: From Implement Control Valve**

**P: From Hydraulic Pump**

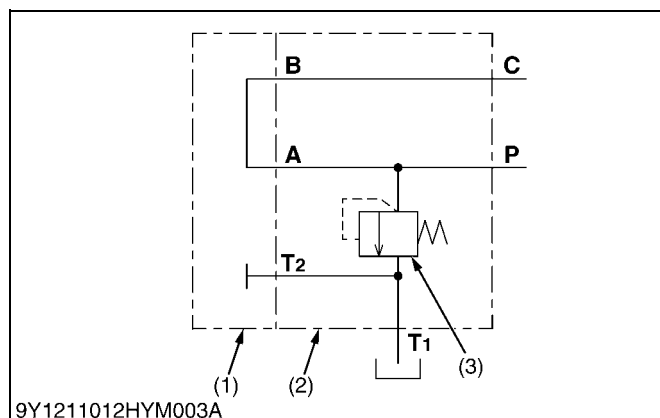
**T<sub>1</sub>: To Transmission Case**

**T<sub>2</sub>: From Implement Control Valve**

The front hydraulic block (2) is provided to take power out from the tractor to operate the hydraulic cylinders on the implement, such as front loader, front blade and so on.

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### [2] HYDRAULIC CIRCUIT



(1) Cap

(2) Front Hydraulic Block

(3) Relief Valve

**A: To Implement Control Valve**

**B: From Implement Control Valve**

**C: To Position Control Valve**

**P: From Hydraulic Pump**

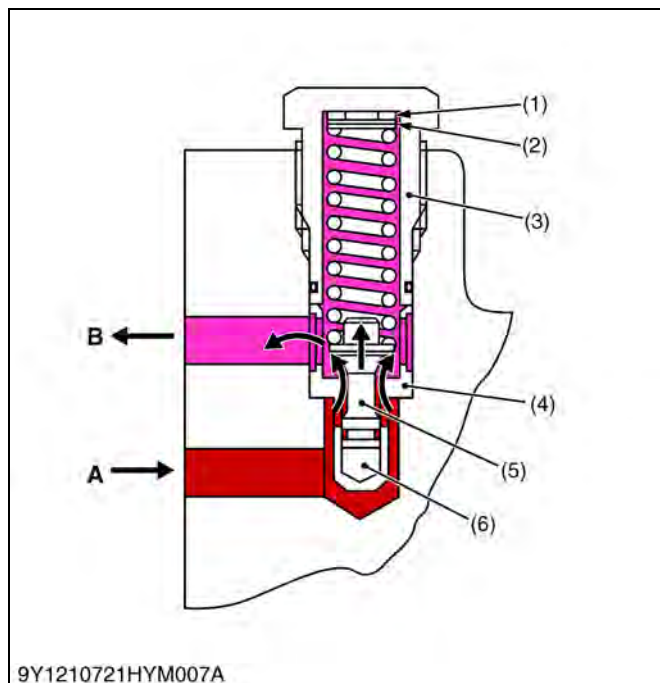
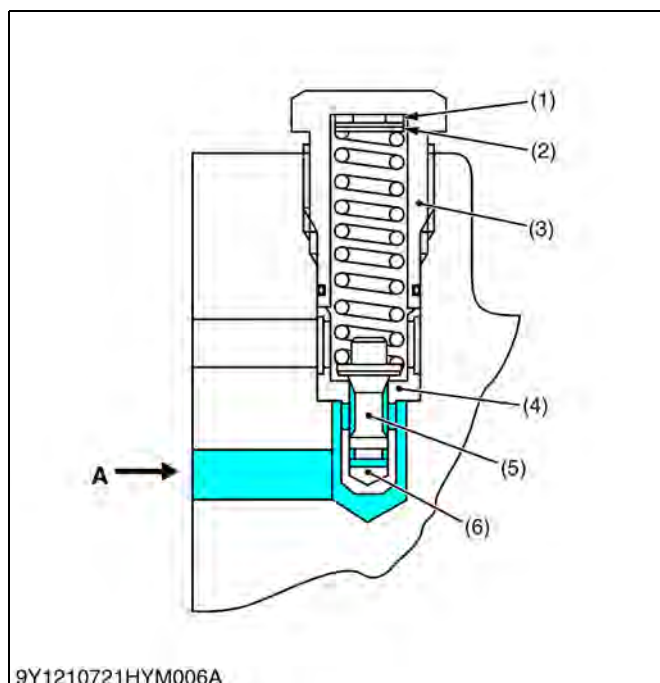
**T<sub>1</sub>: To Transmission Case**

**T<sub>2</sub>: From Implement Control Valve**

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### [3] RELIEF VALVE



The 3-point hydraulic circuit has a relief valve to restrict the maximum pressure in its circuit.

This is a guide piston relief valve with damper, a direct acting relief valve suitable for relatively high pressure and capacity, and constructed so as to prevent chattering and other unstableness associated with direct acting relief valves. As shown in the figure, the poppet (5) has a guide, and there is a valve chamber called a damping chamber (6) in the base of this guide piston.

The valve inlet is connected to this chamber through the clearance between the guide surface and the seat so that the chamber provides a damping effect, controlling valve vibration.

When the pressure in the circuit rises, the pressure in the damping chamber also rises, and when it exceeds the relief pressure setting the spring is compressed, making a clearance between the poppet and the seat.

The hydraulic oil can escape to the transmission case through this clearance, controlling the pressure rise.

- (1) Washer
- (2) Shim
- (3) Plug
- (4) Seat

- (5) Poppet
- (6) Damping Chamber
- A: From Pump**
- B: To Transmission Case**

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# SERVICING

## CONTENTS

1. TROUBLESHOOTING.....	8-S1
2. SERVICING SPECIFICATIONS .....	8-S2
3. TIGHTENING TORQUES.....	8-S5
4. CHECKING AND ADJUSTING .....	8-S6
[1] HYDRAULIC PUMP (POWER STEERING) .....	8-S6
(1) Test Using Flow-meter .....	8-S6
[2] HYDRAULIC PUMP (THREE POINT HITCH HYDRAULIC SYSTEM) .....	8-S8
(1) Test Using Flow-meter .....	8-S8
[3] RELIEF VALVE .....	8-S11
(1) Three Point Hitch Hydraulic System.....	8-S11
(2) Power Steering System .....	8-S12
[4] SAFETY VALVE .....	8-S14
[5] POSITION CONTROL ROD .....	8-S15
(1) L3301/L3901.....	8-S15
(2) L4701.....	8-S16
5. DISASSEMBLING AND ASSEMBLING .....	8-S17
[1] HYDRAULIC PUMP .....	8-S17
(1) L3301/L3901.....	8-S17
(2) L4701.....	8-S18
[2] HYDRAULIC CYLINDER.....	8-S20
[3] POSITION CONTROL VALVE .....	8-S24
[4] RELIEF VALVE .....	8-S25
6. SERVICING .....	8-S26
[1] HYDRAULIC PUMP .....	8-S26
[2] HYDRAULIC CYLINDER.....	8-S27

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>Implement Does Not Rise (Not Noise)</b>	Control linkage improperly adjusted	Adjust	8-S15, 8-S16
	Control linkage improperly assembled or damaged	Repair or replace	8-S24
	Position control valve malfunctioning (unload poppet, spool, poppet 1, 2)	Repair or replace	8-S24
	Relief valve spring weaken or broken	Replace	8-S25
<b>Implement Does Not Rise (Noise)</b>	Hydraulic piston O-ring, cylinder damaged	Replace	8-S22
	Hydraulic oil filter clogged	Replace	G-37, G-65
	Relief valve setting pressure too low	Adjust	8-S11
	Hydraulic pump malfunctioning	Repair or replace	8-S26
<b>Implement Does Not Reach Maximum Height</b>	Position control improperly adjusted	Adjust	8-S15, 8-S16
	Position control valve spool joint 1 improperly adjusted	Adjust	8-S24
	Hydraulic arm shaft, hydraulic arm, lift arm improperly assembled	Adjust	8-S22
<b>Implement Does Not Lower</b>	Control valve malfunctioning (Spool damaged)	Replace	8-S24
	Poppet valve adjusting nut improperly adjusted	Adjust	8-S24
<b>Implement Drops by Weight</b>	Hydraulic cylinder worn or damaged	Replace	8-S27
	Hydraulic piston and O-ring worn or damaged	Replace	8-S22
	Poppet 1 seat surface damaged (control valve)	Replace	8-S24
	Poppet 1 O-ring damaged (control valve)	Replace	8-S24
	Poppet 2 seat surface damaged (control valve)	Replace	8-S24
	Poppet 2 O-ring damaged (control valve)	Replace	8-S24
<b>Implement Hunts (Moves Up and Down)</b>	Poppet 1, poppet 2, poppet 3 seat surface damaged	Replace	8-S24
	Control valve O-rings worn or damaged	Replace	8-S24
<b>Oil Temperature Increases Rapidly</b>	Relief valve operating	Adjust	8-S11
	Hydraulic pump leak or damaged	Replace or repair	8-S26
	Oil leaks from valves	Replace or repair	8-S24
	Gear or bearing damaged in the transmission case	Replace	—

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## 2. SERVICING SPECIFICATIONS

### POWER STEERING

Item		Factory Specification	Allowable Limit
Hydraulic Pump [L3301/L3901] <b>Condition</b> <ul style="list-style-type: none"> <li>Engine Speed: approx. 2700 min<sup>-1</sup> (rpm)</li> <li>Rated Pressure: 11.1 to 12.0 MPa (113 to 123 kgf/cm<sup>2</sup>, 1640 to 1740 psi)</li> <li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li> </ul>	Delivery at No Pressure	Above 16.1 L/min. 4.25 U.S.gals/min. 3.54 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 15.0 L/min. 3.96 U.S.gals/min. 3.30 U.S.gals/min.	13.5 L/min. 3.57 U.S.gals/min. 2.97 Imp.gals/min.
Hydraulic Pump [L4701] <b>Condition</b> <ul style="list-style-type: none"> <li>Engine Speed: approx. 2600 min<sup>-1</sup> (rpm)</li> <li>Rated Pressure: 10.7 to 11.7 MPa (109 to 119 kgf/cm<sup>2</sup>, 1552 to 1697 psi)</li> <li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li> </ul>	Delivery at No Pressure	Above 17.9 L/min. 4.73 U.S.gals/min. 3.94 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 17.6 L/min. 4.65 U.S.gals/min. 3.87 Imp.gals/min.	15.7 L/min. 4.15 U.S.gals/min. 3.45 Imp.gals/min.
Relief Valve [L3301] <b>Condition</b> <ul style="list-style-type: none"> <li>Engine Speed: Maximum</li> <li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li> </ul>	Setting Pressure [2WD]	8.3 to 9.3 MPa 85 to 95 kgf/cm <sup>2</sup> 1200 to 1300 psi	—
	Setting Pressure [4WD]	11.4 to 12.4 MPa 116 to 126 kgf/cm <sup>2</sup> 1650 to 1790 psi	—
Relief Valve [L3901] <b>Condition</b> <ul style="list-style-type: none"> <li>Engine Speed: Maximum</li> <li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li> </ul>	Setting Pressure [2WD]	8.1 to 9.1 MPa 83 to 93 kgf/cm <sup>2</sup> 1200 to 1300 psi	—
	Setting Pressure [4WD]	11.1 to 12.1 MPa 113 to 123 kgf/cm <sup>2</sup> 1610 to 1740 psi	—
Relief Valve [L4701] <b>Condition</b> <ul style="list-style-type: none"> <li>Engine Speed: Maximum</li> <li>Oil Temperature: 40 to 60 °C (104 to 140 °F)</li> </ul>	Setting Pressure [2WD]	8.0 to 9.0 MPa 81 to 91 kgf/cm <sup>2</sup> 1200 to 1300 psi	—
	Setting Pressure [4WD]	10.7 to 11.7 MPa 109 to 119 kgf/cm <sup>2</sup> 1550 to 1690 psi	—

**THREE POINT HITCH HYDRAULIC SYSTEM)**

Item		Factory Specification	Allowable Limit
Hydraulic Pump [L3301/L3901] <b>Condition</b> <ul style="list-style-type: none"><li>• Engine Speed: approx. 2700 min<sup>-1</sup> (rpm)</li><li>• Rated Speed: 15.7 to 16.1 MPa (160 to 165 kgf/cm<sup>2</sup>, 2280 to 2340 psi)</li><li>• Oil Temperature: 40 to 60 °C (104 to 140 °F)</li></ul>	Delivery at No Pressure	Above 23.7 L/min. 6.26 U.S.gals/min. 5.21 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 23.2 L/min. 6.13 U.S.gals/min. 5.10 Imp.gals/min.	19.5 L/min. 5.15 U.S.gals/min. 4.29 Imp.gals/min.
Hydraulic Pump [L4701] <b>Condition</b> <ul style="list-style-type: none"><li>• Engine Speed: approx. 2600 min<sup>-1</sup> (rpm)</li><li>• Rated Pressure: 17.1 to 18.1 MPa (175 to 185 kgf/cm<sup>2</sup>, 2489 to 2631 psi)</li><li>• Oil Temperature: 40 to 60 °C (104 to 140 °F)</li></ul>	Delivery at No Pressure	Above 29.2 L/min. 7.71 U.S.gals/min. 6.42 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 28.6 L/min. 7.56 U.S.gals/min. 6.29 Imp.gals/min.	24.0 L/min. 6.34 U.S.gals/min. 5.28 Imp.gals/min.
Relief Valve [L3301/L3901]	Setting Pressure	15.7 to 16.6 MPa 160 to 170 kgf/cm <sup>2</sup> 2280 to 2410 psi	—
Relief Valve [L4701]	Setting Pressure	17.1 to 18.1 MPa 174 to 185 kgf/cm <sup>2</sup> 2480 to 2630 psi	—

**SAFETY VALVE**

Item		Factory Specification	Allowable Limit
Safety Valve	Operating Pressure	19.7 to 22.5 MPa 200 to 230 kgf/cm <sup>2</sup> 2850 to 3270 psi	—

**POSITION CONTROL ROD**

Item		Factory Specification	Allowable Limit
Lift Arm	Free Play	10 to 15 mm 0.40 to 0.59 in.	—

**HYDRAULIC PUMP**

Item		Factory Specification	Allowable Limit
Housing Bore	Depth of Scratch	0.09 mm 0.0035 in.	—
Bushing to Gear Shaft <ul style="list-style-type: none"><li>• Gear Shaft</li><li>• Bushing</li></ul>	Clearance	0.020 to 0.081 mm 0.0008 to 0.0032 in.	0.15 mm 0.0059 in.
	O.D.	14.970 to 14.980 mm 0.5894 to 0.5898 in.	—
	I.D.	15.000 to 15.051 mm 0.5906 to 0.5926 in.	—
Side Plate	Thickness	2.48 to 2.50 mm 0.0976 to 0.0984 in.	2.40 mm 0.0945 in.

**HYDRAULIC CYLINDER**

<b>Item</b>		<b>Factory Specification</b>	<b>Allowable Limit</b>
Bushings	Press-fit Location (Right Side)	11.3 to 11.7 mm 0.445 to 0.460 in.	—
	(Left Side)	16.8 to 17.2 mm 0.662 to 0.677 in.	—
Cylinder Bore [L3301/L3901]	I.D.	75.300 to 75.500 mm 2.9646 to 2.9724 in.	75.600 mm 2.9764 in.
Cylinder Bore [L4701]	I.D.	90.000 to 90.050 mm 3.5433 to 3.5452 in.	90.150 mm 3.5492 in.
Hydraulic Arm Shaft to Bushing  • Hydraulic Arm Shaft   • Bushing	Clearance (Right)	0.125 to 0.220 mm 0.0049 to 0.0086 in.	0.50 mm 0.020 in.
	(Left)	0.125 to 0.230 mm 0.00493 to 0.00905 in.	0.50 mm 0.020 in.
	O.D. (Right)	39.920 to 39.950 mm 1.5717 to 1.5728 in.	—
	(Left)	44.920 to 44.950 mm 1.7685 to 1.7696 in.	—
	I.D. (Right)	40.075 to 40.140 mm 1.5778 to 1.5803 in.	—
	(Left)	45.075 to 45.150 mm 1.7746 to 1.7775 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-13.)

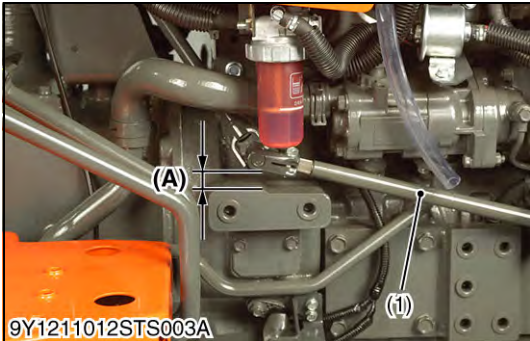
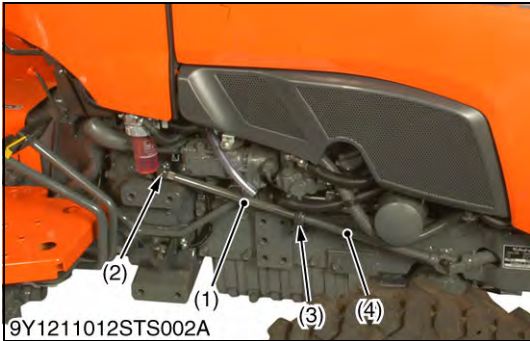
Item	N·m	kgf·m	lbf·ft
Joint shaft bolt [L3301/L3901]	23.5 to 27.4	2.4 to 2.8	18 to 20
Power steering delivery pipe joint bolt	49 to 68	5.0 to 7.0	37 to 50
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6	1.8 to 2.1	13 to 15
PS relief pressure adjusting screw lock nut	33 to 46	3.4 to 4.6	25 to 33
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
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
Delivery Pipe (Power steering) joint screw	49 to 68	5.0 to 7.0	37 to 50
Hydraulic pump assembly mounting screw and nut	24 to 27	2.4 to 2.8	18 to 20
Delivery pipe (PTO) joint bolt	34.3 to 39.2	3.5 to 4.0	26 to 28
Delivery pipe (regulator) joint bolt	39.2 to 49.0	4.0 to 5.0	29 to 36
Regulator valve mounting screws	17.6 to 20.6	1.8 to 2.1	13 to 15
Pump cover mounting screw	40 to 44	4.0 to 4.5	29 to 32
Delivery pipe (hydraulic block) joint bolt	49 to 69	5.0 to 7.0	37 to 50
Hydraulic cylinder assembly mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Position control valve mounting screws	20 to 24	2.0 to 2.5	15 to 18
Plug 1	39.2 to 58.8	4.0 to 6.0	28.9 to 43.4
Plug 2	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Unload plug	39.2 to 58.8	4.0 to 6.0	28.9 to 43.4
Relief valve plug	35 to 44	3.5 to 4.5	26 to 32

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# 4. CHECKING AND ADJUSTING

## [1] HYDRAULIC PUMP (POWER STEERING)

### (1) Test Using Flow-meter



**Preparation (L3301/L3901 Only)**

- 1. Remove the bolt (2), (4).
- 2. Remove the joint shaft (1).

**(When reassembling)**

- Lift the joint shaft (1) so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the joint shaft (1) and flywheel housing.
- Then fit the support (3) in position.
- Be sure to insert the bolt (2) into cut-out of joint shaft (1).
- Apply grease to spline part of joint shaft (1).

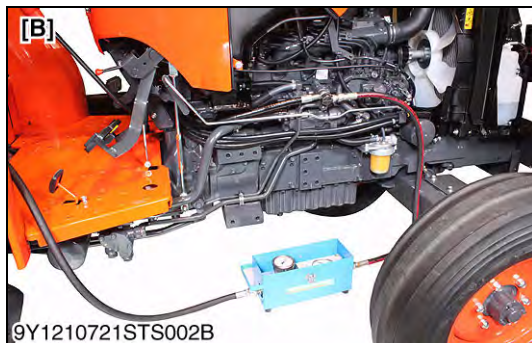
Tightening torque	Bolt (Joint shaft)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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- (1) Joint Shaft
- (2) Bolt (Joint Shaft)
- (3) Support
- (4) Bolt (Support)

**(A) Clearance**

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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. Remove the power steering delivery pipe or delivery hose joint bolt and install the pump adaptor **2** to the pump discharge port.
  2. Connect the hydraulic test hose to the pump adaptor **2** 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<sup>-1</sup> (rpm).
  6. Slowly close the loading valve to generate pressure approx. 9.81 MPa (100 kgf/cm<sup>2</sup>, 1420 psi). Hold in this condition until oil temperature reached approx. 40 °C (104 °F).
  7. Open the loading valve completely.
  8. Set the engine speed. (Refer to **Condition**.)
  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.

#### (When reassembling)

- Install the copper washers firmly.

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft

#### Condition

- Engine speed:
  - [L3301/L3901]**  
approx. 2700 min<sup>-1</sup> (rpm)
  - [L4701]**  
approx. 2600 min<sup>-1</sup> (rpm)
- Rated pressure:
  - [L3301/L3901]**  
11.1 to 12.0 MPa (113 to 123 kgf/cm<sup>2</sup>, 1640 to 1740 psi)
  - [L4701]**  
10.7 to 11.7 MPa (109 to 119 kgf/cm<sup>2</sup>, 1552 to 1697 psi)
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

[A] L3301/L3901

[B] L4701

(To be continued)

(Continued)

**[L3301/L3901]**

Hydraulic pump delivery at no pressure	Factory specification	Above 14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 14.1 L/min. 3.72 U.S.gals/min. 3.10 U.S.gals/min.
	Allowable limit	11.9 L/min. 3.14 U.S.gals/min. 2.62 Imp.gals/min.

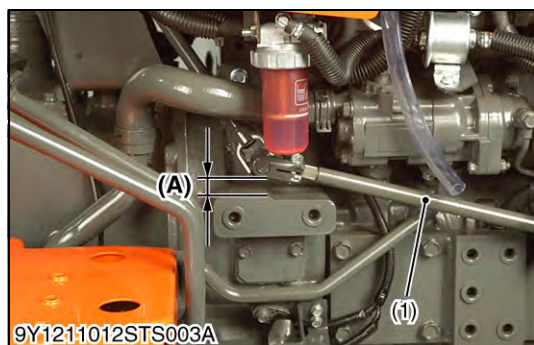
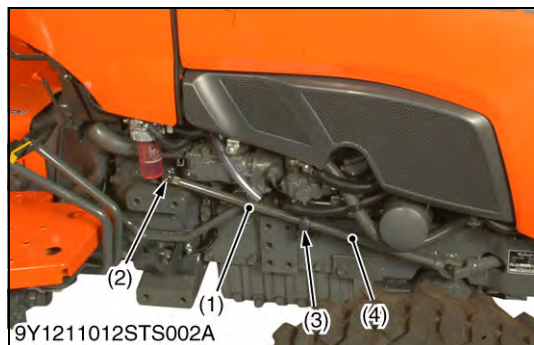
**[L4701]**

Hydraulic pump delivery at no pressure	Factory specification	Above 17.7 L/min. 4.68 U.S.gals/min. 3.89 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 17.4 L/min. 4.60 U.S.gals/min. 3.83 Imp.gals/min.
	Allowable limit	14.6 L/min. 3.86 U.S.gals/min. 3.21 Imp.gals/min.

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## [2] HYDRAULIC PUMP (THREE POINT HITCH HYDRAULIC SYSTEM)

### (1) Test Using Flow-meter

**Preparation (L3301/L3901 Only)**

1. Remove the bolt (2), (4).
2. Remove the joint shaft (1).

**(When reassembling)**

- Lift the joint shaft (1) so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the joint shaft (1) and flywheel housing.
- Then fit the support (3) in position.
- Be sure to insert the bolt (2) into cut-out of joint shaft (1).
- Apply grease to spline part of joint shaft (1).

Tightening torque	Bolt (Joint shaft)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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- (1) Joint Shaft
- (2) Bolt (Joint Shaft)
- (3) Support
- (4) Bolt (Support)

**(A) Clearance**

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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. Remove the delivery pipe and install the pump adaptor (see page G-93) 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<sup>-1</sup> (rpm).
  6. Slowly close the loading valve to generate pressure approx. 14.7 MPa (150 kgf/cm<sup>2</sup>, 2130 psi). Hold in this condition until oil temperature reached approx. 40 °C (104 °F).
  7. Open the loading valve completely.
  8. Set the engine speed. (Refer to **Condition**.)
  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.

Tightening torque	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
-------------------	---	---

#### Condition

- Engine speed:
  - [L3301/L3901]**  
approx. 2700 min<sup>-1</sup> (rpm)
  - [L4701]**  
approx. 2600 min<sup>-1</sup> (rpm)
- Rated speed:
  - [L3301/L3901]**  
15.7 to 16.1 MPa (160 to 165 kgf/cm<sup>2</sup>, 2280 to 2340 psi)
  - [L4701]**  
17.1 to 18.1 MPa (175 to 185 kgf/cm<sup>2</sup>, 2489 to 2631 psi)
- Oil temperature:
  - 40 to 60 °C (104 to 140 °F)

(To be continued)

**(Continued)****[L3301/L3901]**

Hydraulic pump delivery at no pressure	Factory specification	Above 23.7 L/min. 6.26 U.S.gals/min. 5.21 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 23.2 L/min. 6.13 U.S.gals/min. 5.10 Imp.gals/min.
	Allowable limit	19.5 L/min. 5.15 U.S.gals/min. 4.29 Imp.gals/min.

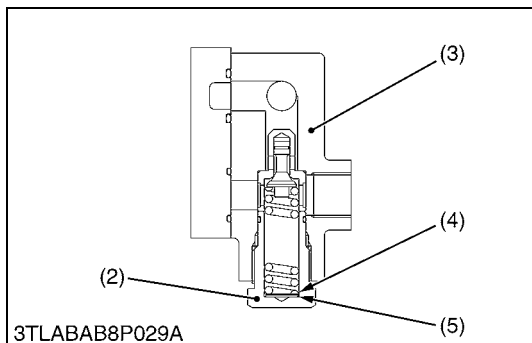
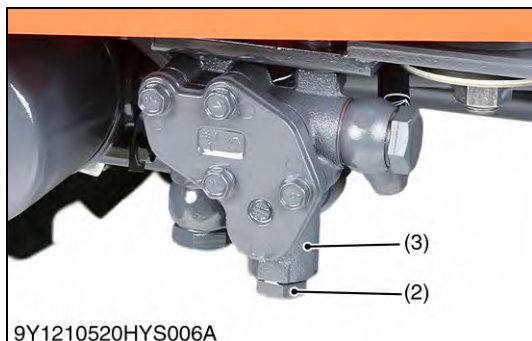
**[L4701]**

Hydraulic pump delivery at no pressure	Factory specification	Above 29.2 L/min. 7.71 U.S.gals/min. 6.42 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 28.6 L/min. 7.56 U.S.gals/min. 6.29 Imp.gals/min.
	Allowable limit	24.0 L/min. 6.34 U.S.gals/min. 5.28 Imp.gals/min.

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## [3] RELIEF VALVE

### (1) Three Point Hitch Hydraulic System



#### Relief Valve Setting Pressure

##### ■ IMPORTANT

- When removing the plug from hydraulic cylinder, be sure to lower the three point hitch.
1. Remove the plug from hydraulic cylinder.
  2. Connect the cable and pressure gauge to hydraulic cylinder.
  3. Remove the position control lever stopper (1).
  4. Start the engine and set at maximum speed.
  5. Move the position control lever all way up to operate the relief valve and read the gauge.
  6. If the pressure is not within the factory specifications, remove the relief plug (2) of front hydraulic block (3) and adjust with the adjusting shims (4).
  7. After the relief valve setting pressure test, reset the position control lever stopper firmly.

Relief valve (3-point hitch) setting pressure	Factory specification	L3301/ L3901	15.7 to 16.6 MPa 160 to 170 kgf/cm <sup>2</sup> 2280 to 2410 psi
		L4701	17.1 to 18.1 MPa 174 to 185 kgf/cm <sup>2</sup> 2480 to 2630 psi

#### Condition

- Engine speed:  
Maximum
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

#### (Reference)

- Thickness of shims (4):  
0.1 mm (0.004 in.)  
0.2 mm (0.008 in.)  
0.4 mm (0.02 in.)
- Pressure change per 0.1 mm (0.004 in.) shim:  
Approx. 260 kPa (2.7 kgf/cm<sup>2</sup>, 38 psi)
- When shims are added, the pressure increases.

- (1) Stopper  
(2) Relief Plug  
(3) Front Hydraulic Block

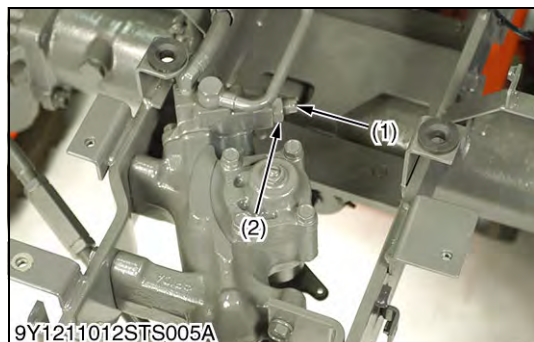
- (4) Adjusting Shim  
(5) Washer

9Y1211012HYS0005US0



## (2) Power Steering System

### [A] L3301/L3901



#### Relief Valve Setting Pressure

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, and adjust relief valve setting pressure by turning adjusting screw (1).

#### [L3301]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.3 to 9.3 MPa 85 to 95 kgf/cm <sup>2</sup> 1200 to 1300 psi
		4WD	11.4 to 12.4 MPa 116 to 126 kgf/cm <sup>2</sup> 1650 to 1790 psi

#### [L3901]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.1 to 9.1 MPa 83 to 93 kgf/cm <sup>2</sup> 1200 to 1300 psi
		4WD	11.1 to 12.1 MPa 113 to 123 kgf/cm <sup>2</sup> 1610 to 1740 psi

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	PS relief pressure adjusting screw lock nut	33 to 46 N·m 3.4 to 4.6 kgf·m 25 to 33 lbf·ft

#### Condition

- Engine speed:  
Maximum
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

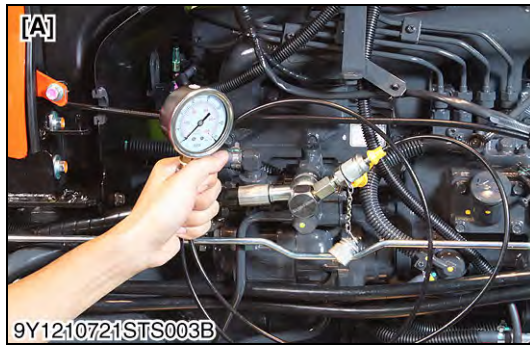
#### (Reference)

- Setting pressure change approx. 1.27 MPa (13 kgf/cm<sup>2</sup>, 180 psi) per adjusting screw 1/4 turn.
- When turn the adjusting screw clockwise, setting pressure increase.

(1) Adjusting Screw

(2) PS Relief Pressure Adjusting Screw  
Lock Nut

9Y1211012STS0008US0

**[B] L4701****Relief Valve Setting Pressure**

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, or replace the power steering controller.

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.0 to 9.0 MPa 81 to 91 kgf/cm <sup>2</sup> 1200 to 1300 psi
		4WD	10.7 to 11.7 MPa 109 to 119 kgf/cm <sup>2</sup> 1550 to 1690 psi
Tightening torque	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft	

**Condition**

- Engine speed:  
Maximum
- Oil temperature:  
40 to 60 °C (104 to 140 °F)

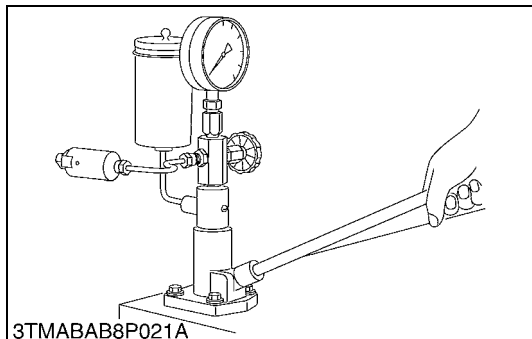
**[A] Manual Transmission Model****[B] HST Model**

9Y1211012STS0009US0

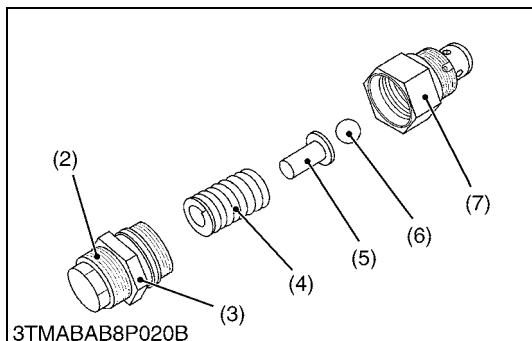
## [4] SAFETY VALVE



9Y1211012HYS004A



3TMABAB8P021A



3TMABAB8P020B

### Safety Valve Setting Pressure Test Using Injection Nozzle Tester

1. Remove the safety valve assembly (1).
2. Attach the safety valve to an injection nozzle tester with a safety valve setting adaptor. (Refer to "SPECIAL TOOLS" (see page G-94.).)
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)**

- Install the safety valve to the rear hydraulic block, being 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	19.7 to 22.5 MPa 200 to 230 kgf/cm <sup>2</sup> 2850 to 3270 psi

#### ■ NOTE

- Use specified transmission fluid (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-10.) to test the operating pressure of the cylinder safety valve.

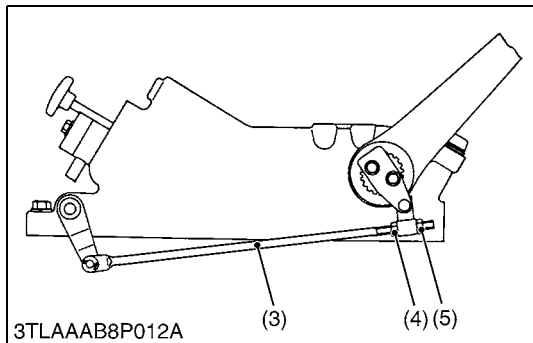
- |                           |             |
|---------------------------|-------------|
| (1) Safety Valve Assembly | (5) Seat    |
| (2) Adjusting Screw       | (6) Ball    |
| (3) Lock Nut              | (7) Housing |
| (4) Spring                |             |

9Y1211012HYS0006US0



## [5] POSITION CONTROL ROD

### (1) L3301/L3901



#### Feedback Rod Adjustment

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and set the engine revolution to idling.
3. Move the position control lever (1) to uppermost position.
4. While pushing feedback rod (3) forward, turn the adjusting nut (5) counterclockwise until the relief valve starts working.
5. When relief valve starts operation, turn the adjusting nut (5) clockwise 2 turns.
6. Tighten the lock nut (4) as holding the adjusting nut (5) not to turn.
7. Set the engine revolution to maximum.
8. Move the position control lever (1) to lowest position.
9. Move the position control lever (1) to uppermost position.
10. Check the relief valve does not operate. If operates, adjust the feedback rod again.
11. Measure the lift arm free play.
12. If measurement is not within the factory specification, adjust the feedback rod length.
  - When lift arm free play is large
    - Lengthen the feedback rod (3)
  - When lift arm free play is small
    - Shorten the feedback rod (3)

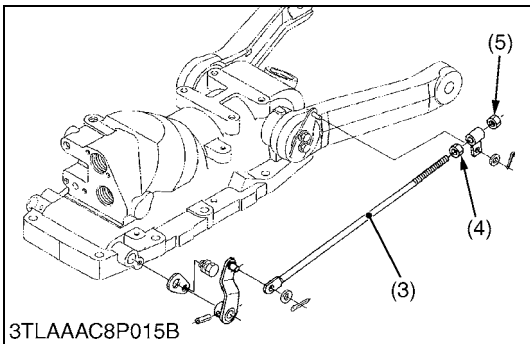
Lift arm free play at maximum raising position	Factory specification	10 to 15 mm 0.40 to 0.59 in.
--	-----------------------	---------------------------------

- (1) Position Control Lever
- (2) Stopper
- (3) Feedback Rod
- (4) Lock Nut
- (5) Adjusting Nut

**A: Lift Arm Free Play**

9Y1211012HYS0007US0

(2) L4701



**Feedback Rod Adjustment**

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and set the engine revolution to idling.
3. Move the position control lever (1) to uppermost position.
4. While pushing feedback rod (3) backward, turn the adjusting nut (4) clockwise until the relief valve starts working.
5. When relief valve starts operation, turn the adjusting nut (4) counterclockwise 2 turns.
6. Tighten the lock nut (5) as holding the adjusting nut (4) not to turn.
7. Set the engine revolution to 1500 min<sup>-1</sup> (rpm).
8. Move the position control lever (1) to lowest position.
9. Move the position control lever (1) to uppermost position.
10. Check the relief valve does not operate. If operates, adjust the feedback rod again.
11. Measure the lift arm free play.
12. If measurement is not within the factory specification, adjust the feedback rod length.
  - When lift arm free play is large
    - Shorten the feedback rod (3)
  - When lift arm free play is small
    - Lengthen the feedback rod (3)

Lift arm free play at maximum raising position	Factory specification	10 to 15 mm 0.40 to 0.59 in.
--	-----------------------	---------------------------------

- (1) Position Control Lever
- (2) Stopper
- (3) Feedback Rod
- (4) Adjusting Nut
- (5) Lock Nut

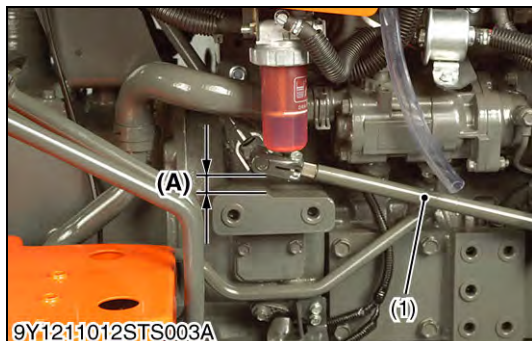
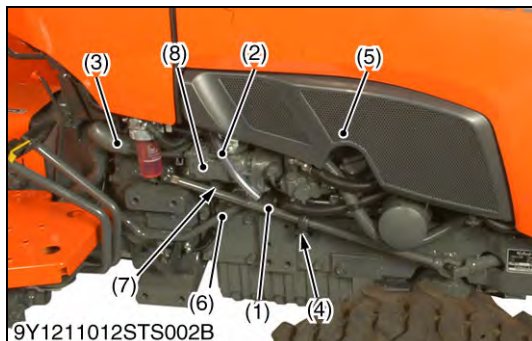
**A: Lift Arm Free Play**

9Y1211012HYS0008US0

## 5. DISASSEMBLING AND ASSEMBLING

### [1] HYDRAULIC PUMP

#### (1) L3301/L3901



#### Hydraulic Pump Assembly

1. Remove the side cover (5).
2. Remove the steering joint shaft (1).
3. Disconnect the suction hose (3).
4. Disconnect the return hose (8).
5. Remove the delivery pipe (6), (7).
6. Remove the hydraulic pump (2).

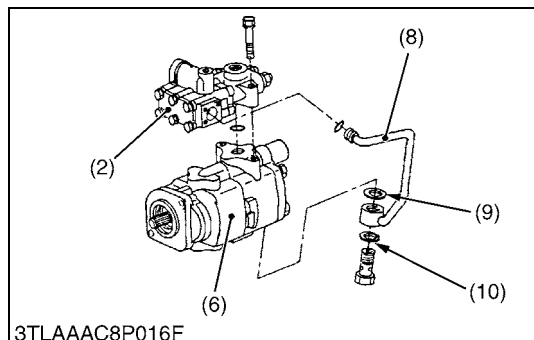
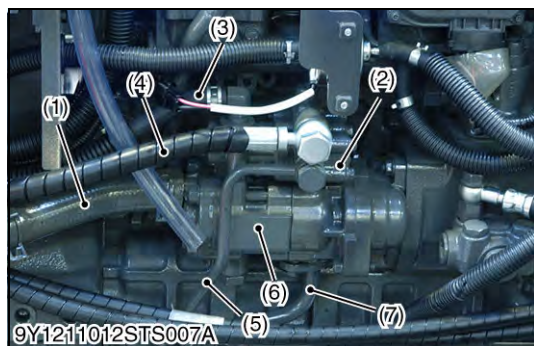
#### (When reassembling)

- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the universal joint and flywheel housing.
- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Delivery pipe (power steering) joint screw	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- |                    |                                    |
|--------------------|------------------------------------|
| (1) Joint Shaft    | (6) Delivery Pipe (3-point Hitch)  |
| (2) Hydraulic Pump | (7) Delivery Pipe (Power Steering) |
| (3) Suction Hose   | (8) Return Hose                    |
| (4) Support        |                                    |
| (5) Side Cover     |                                    |
- (A) Clearance**

9Y1211012STS0011US0

**(2) L4701****[A] Manual Transmission Model****Preparation**

1. Remove the side cover (R.H.).
2. Disconnect the delivery pipe (PTO) (5), power steering delivery hose (4) and power steering return hose (3) from the regulator valve (2).
3. Remove the delivery pipe (regulator) (8).
4. Disconnect the delivery pipe (3-point hitch) (7) from the hydraulic pump (6).
5. Disconnect the suction hose (1).

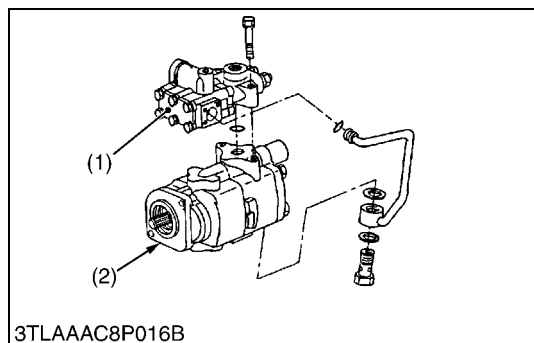
**(When reassembling)**

- Apply grease to the O-rings and be careful not to damage them.
- Be sure to wrap a seal tape to thread part of power steering return hose (3).
- There are 2 types of washer for power steering delivery hose. Thicker one should be attached engine side.

Tightening torque	Delivery pipe (PTO) joint bolt	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
	Delivery pipe (regulator) joint bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| (1) Suction Hose                 | (6) Hydraulic Pump                |
| (2) Regulator Valve              | (7) Delivery Pipe (3-point Hitch) |
| (3) Power Steering Return Hose   | (8) Delivery Pipe (Regulator)     |
| (4) Power Steering Delivery Hose | (9) Copper Washer                 |
| (5) Delivery Pipe (PTO)          | (10) Copper Washer (Thicker)      |

9Y1211012STS0023US0

**Regulator Valve and Hydraulic Pump Assembly**

1. Loosen and remove the regulator valve mounting screws.
2. Remove the regulator valve (1).
3. Loosen and remove the hydraulic pump assembly mounting screws and nuts, then remove the hydraulic pump assembly.

**(When reassembling)**

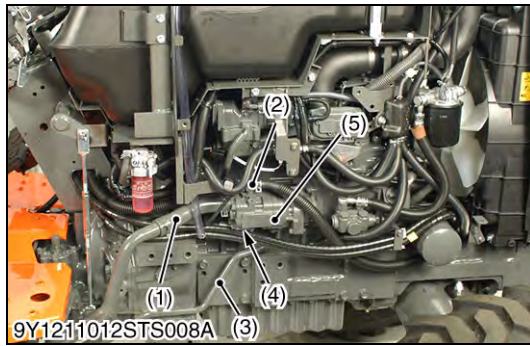
- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Regulator valve mounting screws	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	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) Regulator Valve | (2) Hydraulic Pump Assembly |
|---------------------|-----------------------------|

9Y1211012STS0024US0



**[B] HST Model****Hydraulic Pump Assembly**

1. Remove the side cover.
2. Disconnect the suction hose (1).
3. Disconnect the power steering return hose (2).
4. Disconnect the delivery pipe (3-point hitch) (3).
5. Disconnect the power steering delivery hose (4).
6. Remove the hydraulic pump (5).

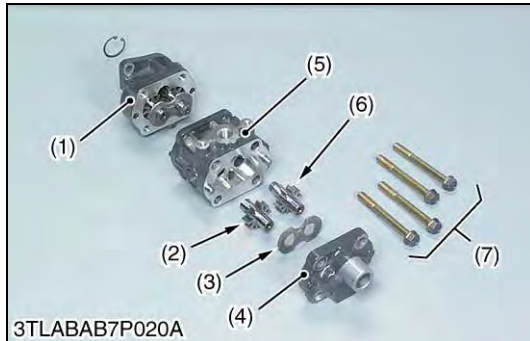
**(When reassembling)**

- Apply grease to the O-ring and be careful not to damage it.
- Be sure to wrap a seal tape to thread part of power steering return hose (2).

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
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- |                                   |                                  |
|-----------------------------------|----------------------------------|
| (1) Suction Hose                  | (4) Power Steering Delivery Hose |
| (2) Power Steering Return Hose    | (5) Hydraulic Pump               |
| (3) Delivery Pipe (3-point Hitch) |                                  |

9Y1211012STS0025US0

**Hydraulic Pump Assembly**

1. Remove the pump cover mounting screw (7).
2. Remove the drive gear (6), driven gear (2) and side plate (3) from the casing.

**(When reassembling)**

- Be careful no to damage the gasket.
- Align the hole of the pump cover (4) and casing 2 (5).
- 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    | (5) Casing 2   |
| (2) Driven Gear | (6) Drive Gear |
| (3) Side Plate  | (7) Screw      |
| (4) Pump Cover  |                |

9Y1211012STS0026US0

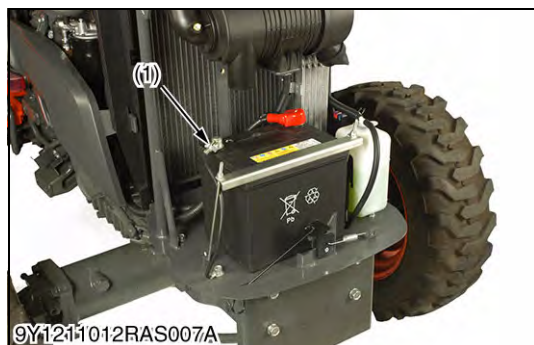
**Hydraulic Pump Running-in**

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 mm<sup>-1</sup> (rpm), and operate the hydraulic pump at no load for about 10 minutes.
3. Set the engine speed at 2000 to 2200 mm<sup>-1</sup> (rpm), and with the hydraulic pump applied with 2.9 MPa (30 kgf/cm<sup>2</sup>, 430 psi) to 4.9 MPa (50 kgf/cm<sup>2</sup>, 710 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] HYDRAULIC CYLINDER

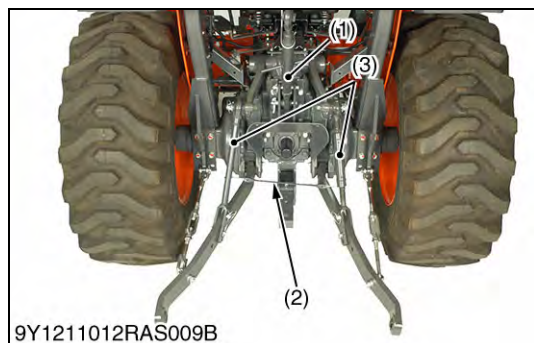


### Battery Negative Cable

1. Open the bonnet.
2. Remove the battery negative cable (1).

(1) Battery Negative Cable

9Y1211012HYS0009US0



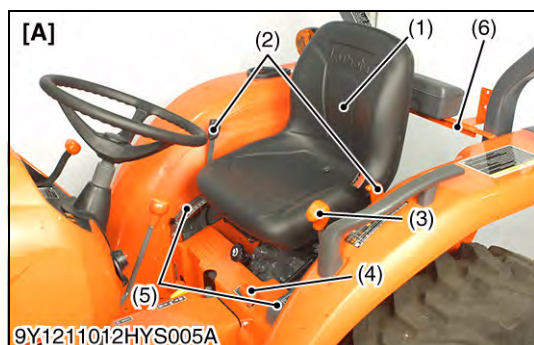
### Lift Rod

1. Remove the top link (1).
2. Remove the rubber spring (2).
3. Remove the lift rods (3).

(1) Top Link  
(2) Rubber Spring

(3) Lift Rod

9Y1211012HYS0010US0



### Outer Components

1. Remove the seat (1).
2. Remove the grips (2), (3), (4), (7).
3. Remove the lever guides (5).
4. Remove the PTO switch (6).

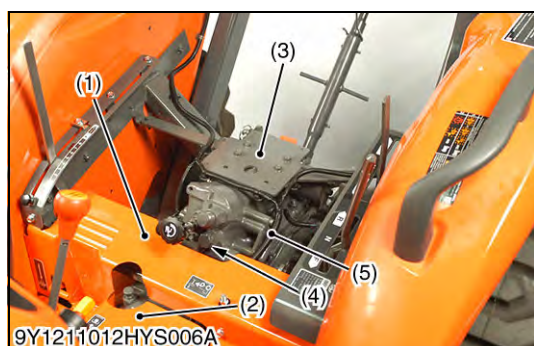
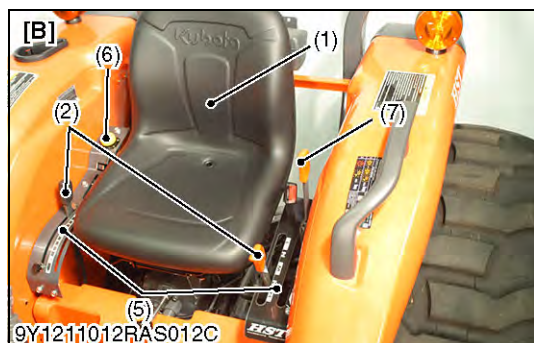
(1) Seat  
(2) Grip  
(3) Grip (Shuttle Lever)  
[Manual Transmission Model Only]  
(4) Grip (4WD Lever)  
[4WD Model Only]  
(5) Lever Guide

(6) PTO Switch [L4701 Only]  
(7) Grip (Cruise Lever)  
[L4701 HST Model Only]

[A] L3301/L3901

[B] L4701

9Y1211012HYS0011US0



### Suspension Seat

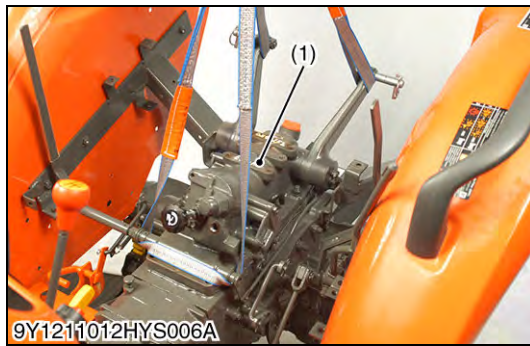
1. Remove the floor seat cover (1).
2. Remove the center cover (2).
3. Remove the suspension seat (3).
4. Remove the joint bolt (4).
5. Remove the wiring (5).

Tightening torque	Delivery pipe (hydraulic block) joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
-------------------	--	---

(1) Floor Seat Cover  
(2) Center Cover  
(3) Suspension Seat

(4) Joint Bolt  
(5) Wiring

9Y1211012HYS0012US0



### Hydraulic Cylinder

1. Loosen and remove the hydraulic cylinder assembly mounting bolts and nuts.
2. Support the hydraulic cylinder assembly with nylon strap and crane and remove it.

#### (When reassembling)

Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket (L4701 only).

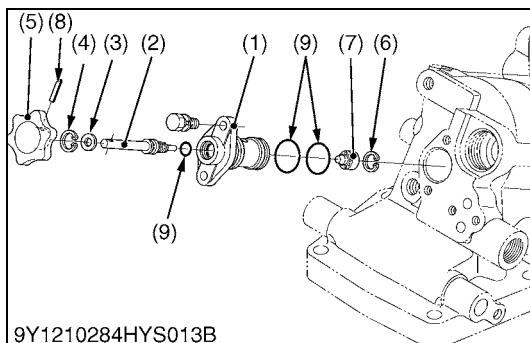
#### ■ NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the feedback rod (See page 8-S15).

Tightening torque	Hydraulic cylinder assembly mounting bolt	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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(1) Hydraulic Cylinder Assembly

9Y1211012HYS0013US0



### Lowering Speed Adjusting Valve (L3301/L3901)

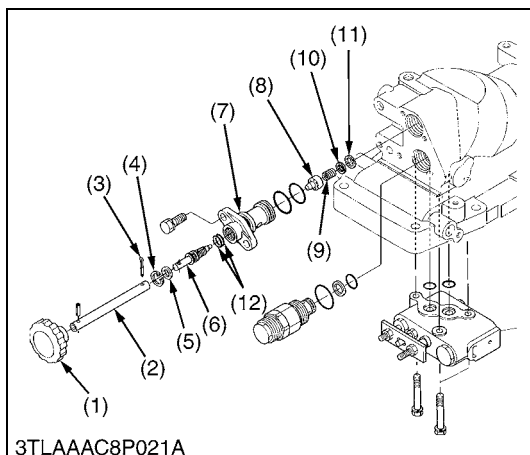
1. Remove the lowering speed adjusting valve from hydraulic cylinder block.
2. Tap out the spring pin (8), and remove the grip (5).
3. Remove the internal cir-clip (4), and remove the hydraulic adjusting shaft (2).
4. Remove the internal cir-clip (6) and draw out the adjusting collar (7).

#### (When reassembling)

- Install the hydraulic adjusting shaft (2) and valve body (1), noting O-ring (9).

- |                               |                       |
|-------------------------------|-----------------------|
| (1) Valve Body                | (6) Internal Cir-clip |
| (2) Hydraulic Adjusting Shaft | (7) Adjusting Collar  |
| (3) Washer                    | (8) Spring Pin        |
| (4) Internal Cir-clip         | (9) O-ring            |
| (5) Grip                      |                       |

9Y1211012HYS0014US0



### Lowering Speed Adjusting Valve (L4701)

1. Remove the lowering speed adjusting valve assembly from hydraulic cylinder block.
2. Remove the internal snap ring (4), and remove the hydraulic adjusting shaft (6).
3. Remove the internal snap ring (11), and draw out the spring (9) and adjusting collar (8).

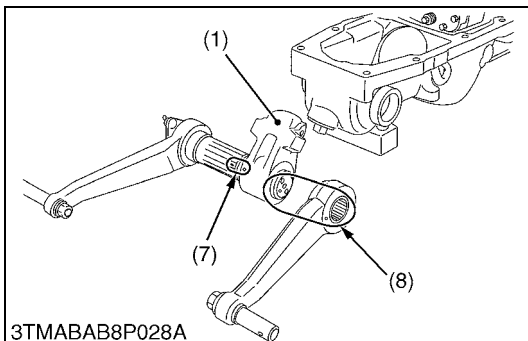
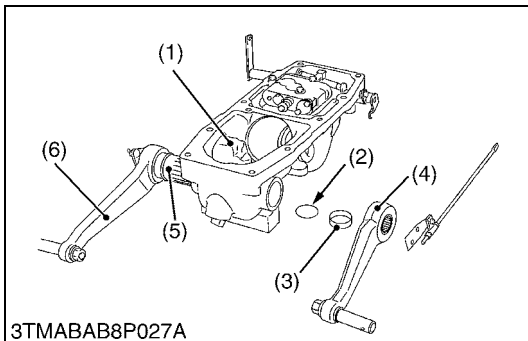
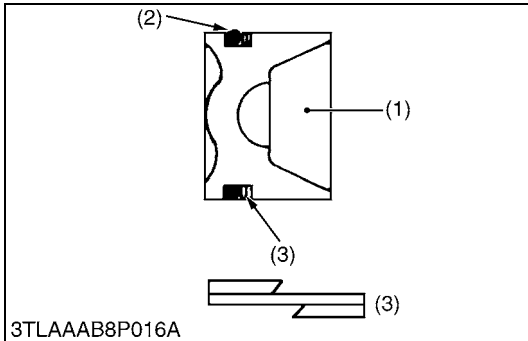
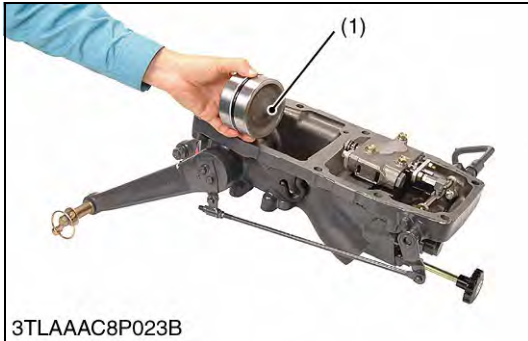
#### (When reassembling)

- Install the hydraulic adjusting shaft (6) to valve body (7), noting two O-rings (12).

- |                               |                         |
|-------------------------------|-------------------------|
| (1) Grip                      | (7) Valve Body          |
| (2) Extension Shaft           | (8) Adjusting Collar    |
| (3) Cotter Pin                | (9) Spring              |
| (4) Internal Snap Ring        | (10) Washer             |
| (5) Washer                    | (11) Internal Snap Ring |
| (6) Hydraulic Adjusting Shaft | (12) O-ring             |

9Y1211012HYS0015US0





### Hydraulic Rod and Hydraulic Piston

1. Tap out the spring pin.
2. Remove the hydraulic rod.
3. Remove the plug (screw head size: 17 mm) from front of hydraulic cylinder.
4. Inject the compressed air through the plug hole, and remove the hydraulic piston.



#### CAUTION

- Do not put your hand into the hydraulic cylinder block because the hydraulic piston jumps out with a strong force, which is dangerous.

#### (When reassembling)

- Install the piston, noting O-ring and back-up ring (3). (See figure).
- Apply grease to the piston bottom contacts with hydraulic rod.
- Apply transmission fluid to the cylinder, and then install the hydraulic piston (1).

(1) Hydraulic Piston

(3) Back-up Ring

(2) O-ring

9Y1211012HYS0020US0

### Lift Arm, Hydraulic Arm and Hydraulic Arm Shaft

1. Disconnect the feedback rod from feedback lever.
2. Remove the lift arm setting screws.
3. Remove the lift arm L.H. (4).
4. Draw out the hydraulic arm shaft (5) and lift arm R.H. (6) as a unit.
5. Remove the hydraulic arm (1).
6. Remove the collar (3) and O-ring (2).

#### (When reassembling)

- Align the alignment marks (7) of the hydraulic arm (1) and hydraulic arm shaft (5).
- Align the alignment marks (8) of the lift arms (6), (4) and hydraulic arm shaft (5).
- Apply grease to the right and left bushings of hydraulic cylinder block and O-ring (2).
- Be careful not to damage the O-ring (2).

(1) Hydraulic Arm

(7) Alignment Mark (Hydraulic Arm Shaft and Hydraulic Arm)

(2) O-ring

(8) Alignment Mark (Hydraulic Arm Shaft and Lift Arm)

(3) Collars

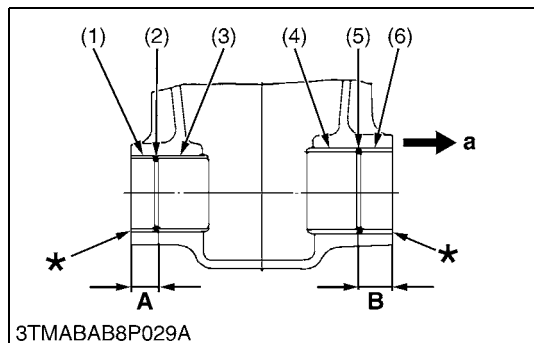
(4) Lift Arm L.H.

(5) Hydraulic Arm Shaft

(6) Lift Arm R.H.

9Y1211012HYS0021US0





### Bushings

1. Remove the bushings (3) and (4).

#### (When reassembling)

- When press-fitting new bushings (3), (4) with a press-fitting tool (see page G-91) observe the dimensions described in the figure.
- Apply transmission fluid to the hydraulic cylinder boss and bushing.
- Press- fit the bushing so that each seam face upward.

Press-fit location of bushings	Factory specification	<b>A</b> (Left side)	16.8 to 17.2 mm 0.662 to 0.677 in.
		<b>B</b> (Right side)	11.3 to 11.7 mm 0.445 to 0.460 in.

- (1) Collar (Left)
- (2) O-ring
- (3) Bushing (Left)
- (4) Bushing
- (5) O-ring
- (6) Collar (Right)

**a: Right Side \*Flush the End of Collar with the End of Hydraulic Cylinder Body.**

9Y1211012HYS0022US0

### [3] POSITION CONTROL VALVE



#### Position Control Valve

1. Loosen and remove the position control valve mounting screws.
2. Remove the position control valve (1).

#### (When reassembling)

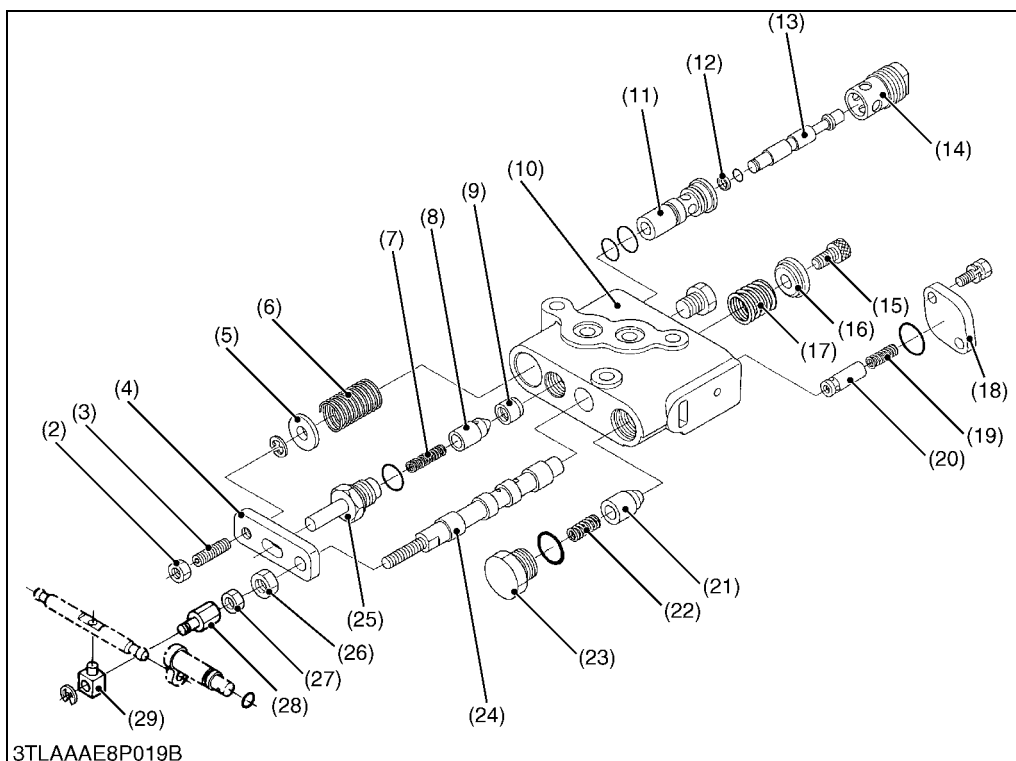
- Be careful not to damage the O-rings.

Tightening torque	Position control valve mounting screws	20 to 24 N·m 2.0 to 2.5 kgf·m 15 to 18 lbf·ft
-------------------	--	---

#### ■ IMPORTANT

- Measure the distance between the spool edge and spool joint 2 edge before disassembling.

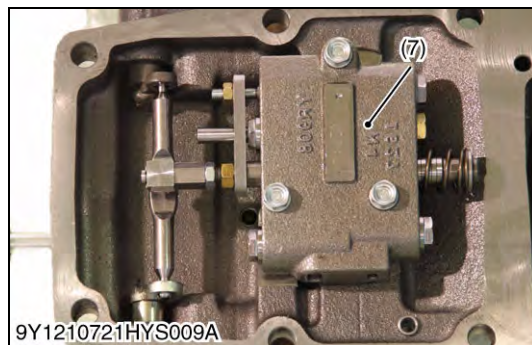
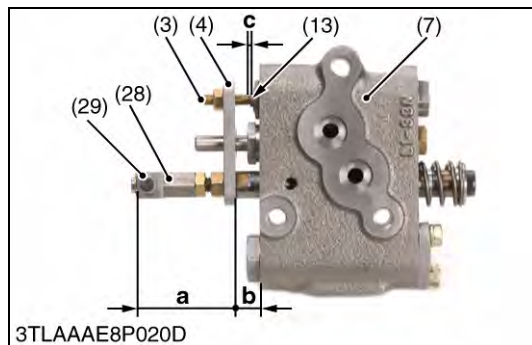
(1) Position Control Valve



- (2) Nut 1
- (3) Set Screw
- (4) Plate 1
- (5) Washer
- (6) Spring
- (7) Spring
- (8) Poppet 1
- (9) Valve Seat
- (10) Valve Body
- (11) Sleeve
- (12) Backup Ring
- (13) Poppet 2
- (14) Plug 1
- (15) Screw
- (16) Spring Holder
- (17) Spring
- (18) Plate 2
- (19) Spring
- (20) Poppet 3
- (21) Unload Poppet
- (22) Spring
- (23) Unload Plug
- (24) Spool
- (25) Plug 2
- (26) Nut
- (27) Lock Nut
- (28) Spool Joint 1
- (29) Spool Joint 2

(To be continued)

(Continued)

**■ IMPORTANT**

- **Set screw (3) and spool joint 1 (28) are adjusted to very close accuracy. Do not disassemble them unless necessary.**

**If disassembled due to unavoidable reasons, be sure to make the following adjustments before assembling.**

**■ Spool joint 1 (2)**

1. Turn and adjust the spool joint 1 (28) so that the dimension "a" between the spool joint 2 (29) and the plate 1 (4) is 48.0 mm (1.89 in.).
2. After adjustment, be sure to adjust the position control feedback rod.

**■ Set screw (3)**

1. Turn and adjust the set screw (3) so that the clearance "c" between the set screw (3) and the poppet 2 (13) becomes 0.1 to 0.2 mm (0.0039 to 0.0079 in.).

**(When reassembling)**

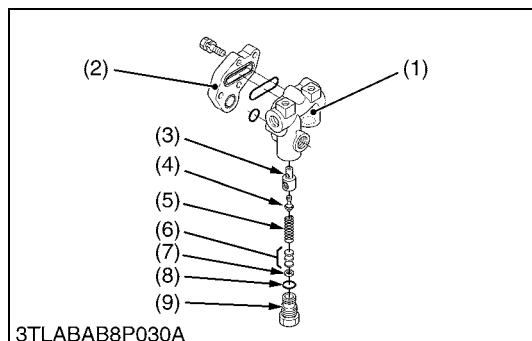
- Assemble the control valve to the hydraulic cylinder as shown in the picture.

Tightening torque	Plug 1	39.2 to 58.8 N·m 4.0 to 6.0 kgf·m 28.9 to 43.4 lbf·ft
	Plug 2	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft
	Unload plug	39.2 to 58.8 N·m 4.0 to 6.0 kgf·m 28.9 to 43.4 lbf·ft

- (3) Set Screw  
(4) Plate 1  
(7) Valve Body  
(13) Poppet 2  
(28) Spool Joint 1  
(29) Spool Joint 2

- a: Dimension**  
**b: Dimension**  
**c: Clearance**

9Y1211012HYS0016US0

**[4] RELIEF VALVE****Relief Valve**

1. Remove the plug (9), and draw out the spring (5) and the poppet (4).
2. Remove the valve seat (3).

**(When reassembling)**

- Be careful not to damage the O-rings.

Tightening torque	Relief valve plug	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft
-------------------	-------------------	---

**■ IMPORTANT**

- **After disassembling and assembling the relief valve, be sure to adjust the relief valve setting pressure.**

- (1) Front Hydraulic Block (6) Adjusting Shim  
(2) Cap (7) Washer  
(3) Valve Seat (8) O-ring  
(4) Poppet (9) Plug  
(5) Spring

9Y1211012HYS0017US0

## 6. SERVICING

### [1] HYDRAULIC PUMP



#### Housing Bore (Depth of Scratch)

1. Check for the scratch on the interior surface of the housing caused by the gear.
2. If the scratch reaches more than half the area of the interior surface of the housing, replace at pump assembly.
3. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
4. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
------------------	-----------------	-----------------------

#### (Reference)

- Use a cylinder gauge to measure the housing I.D.

9Y1211012STS0028US0



#### Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with and outside micrometer.
2. Measure the bushing I.D. with and 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 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory specification	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory specification	15.000 to 15.051 mm 0.5906 to 0.5926 in.

9Y1211012STS0029US0



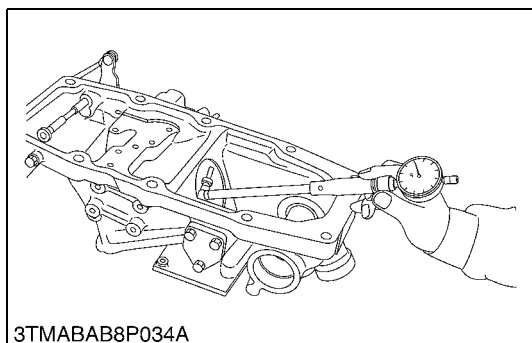
#### Side Plate Thickness

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 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

9Y1211012STS0030US0

## [2] HYDRAULIC CYLINDER



3TMABAB8P034A

### Hydraulic Cylinder Bore

1. Check the cylinder internal surface for scoring or damage.
2. Measure the cylinder I.D. with a cylinder gauge.
3. If the measurement exceeds the allowable limit, replace the hydraulic cylinder block.

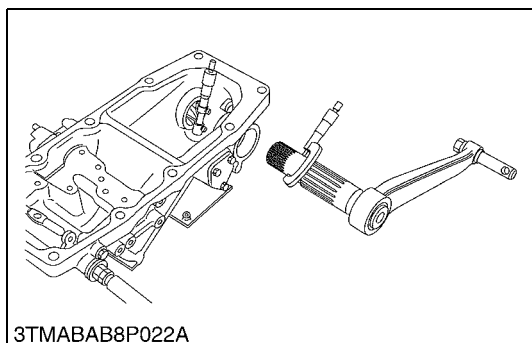
#### [L3301/L3901]

Cylinder I.D.	Factory specification	75.300 to 75.500 mm 2.9646 to 2.9724 in
	Allowable limit	75.600 mm 2.9764 in

#### [L4701]

Cylinder I.D.	Factory specification	90.000 to 90.050 mm 3.5433 to 3.5452 in.
	Allowable limit	90.150 mm 3.5492 in.

9Y1211012HYS0018US0



3TMABAB8P022A

### Clearance between Hydraulic Arm Shaft and Bushing

1. Measure the hydraulic arm shaft O.D. with an outside micrometer.
2. Measurement the bushing I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bushing.

Clearance between hydraulic arm shaft and bushing	Factory specification	Right	0.125 to 0.220 mm 0.0049 to 0.0086 in.
		Left	0.125 to 0.230 mm 0.00493 to 0.00905 in.
	Allowable limit	Right	0.50 mm 0.020 in.
		Left	0.50 mm 0.020 in.

Hydraulic arm shaft O.D.	Factory specification	Right	39.920 to 39.950 mm 1.5717 to 1.5728 in.
		Left	44.920 to 44.950 mm 1.7685 to 1.7696 in.

Bushing I.D. (after press fitted)	Factory specification	Right	40.075 to 40.140 mm 1.5778 to 1.5803 in.
		Left	45.075 to 45.150 mm 1.7746 to 1.7775 in.

9Y1211012HYS0019US0

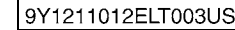
# **9 ELECTRICAL SYSTEM**

# MECHANISM

## CONTENTS

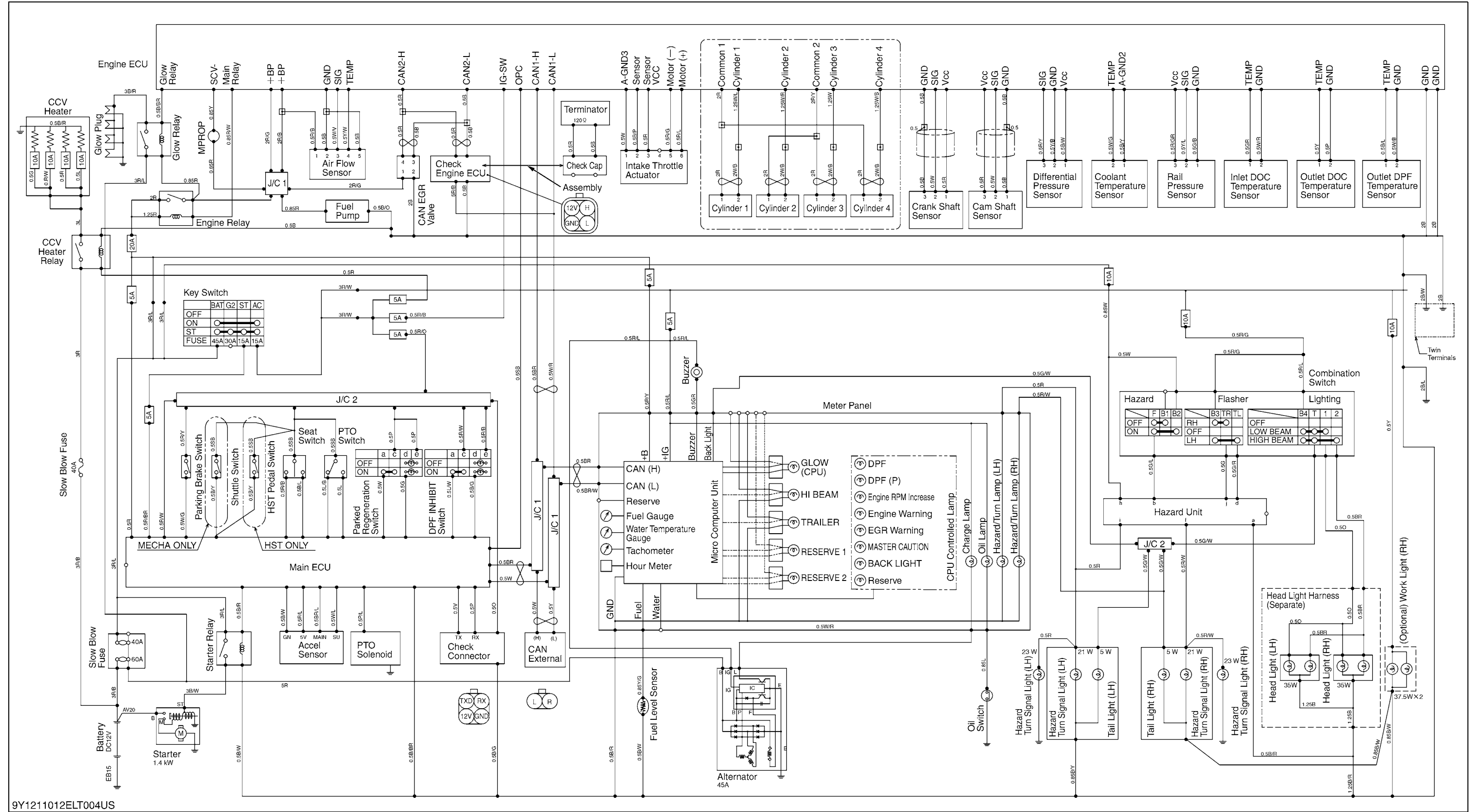
1. ELECTRICAL CIRCUIT .....	9-M1
[1] L3301/L3901 .....	9-M1
[2] L4701 .....	9-M2
2. INSTRUMENT PANEL .....	9-M3
[1] SYSTEM OUTLINE .....	9-M3
[2] CONSTRUCTION AND FUNCTION OF COMPONENTS .....	9-M3
(1) Instrument Panel .....	9-M3
(2) Electric Control Unit (ECU) .....	9-M3
(3) Switches .....	9-M4
(4) Sensors .....	9-M8
(5) Others .....	9-M8
[3] BASIC CONTROL SYSTEM .....	9-M10
(1) Indication Items of Meter Panel .....	9-M10
(2) Easy Checker™ .....	9-M11
[4] ASSISTANT CONTROL SYSTEM .....	9-M12
(1) Self-diagnosis Function .....	9-M12
(2) Testing, Setting and Adjusting Function .....	9-M12
3. ENGINE STARTING SYSTEM AND STOPPING .....	9-M13
[1] STARTING CIRCUIT .....	9-M13
[2] RELATED PARTS .....	9-M14
[3] ENGINE STARTING CONDITIONS .....	9-M16
[4] OPERATOR PRESENCE CONTROL (OPC) .....	9-M17
4. CAN (CONTROLLER AREA NETWORK) .....	9-M18

**[1] L3301/L3901**



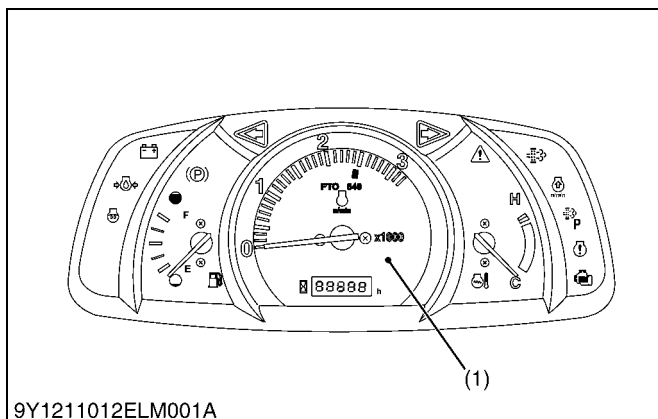


9Y1211012ELT004US



## 2. INSTRUMENT PANEL

### [1] SYSTEM OUTLINE



Instrument panel uses CAN (Controller Area Network) communication with main ECU (Electronic Control Unit) and engine ECU to share information from various sensors and switches. Mainly Instrument panel acts as an indicator to inform various information such as engine speed, warning lamp and so on. If tractor gets in a certain trouble, a sign is displayed on Instrument panel. This function helps servicing.

The Instrument panel displays following items.

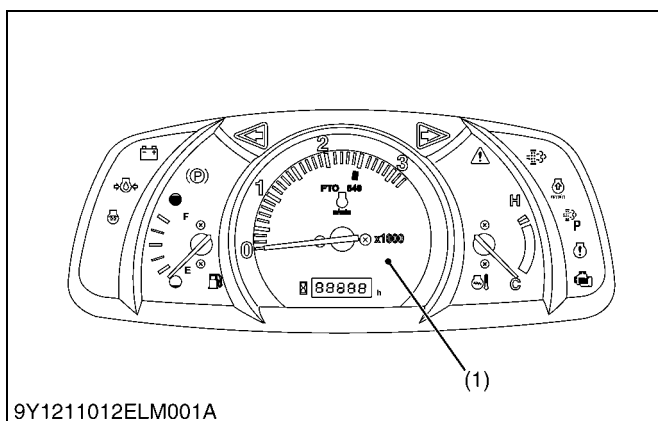
- **Hourmeter**
- **Error Display**
  - Displays the occurrence of DTC (Diagnosis Trouble Code) on the display with the sign.
- **Model Setting, Clear error message, Acceleration Setting, Test Function**
  - The function such as input of some data, fine-adjustment for acceleration sensor and testing of each sensor can be done by using display and switch operation.

(1) Electronic Instrument Panel

9Y1211012ELM0004US0

### [2] CONSTRUCTION AND FUNCTION OF COMPONENTS

#### (1) Instrument Panel



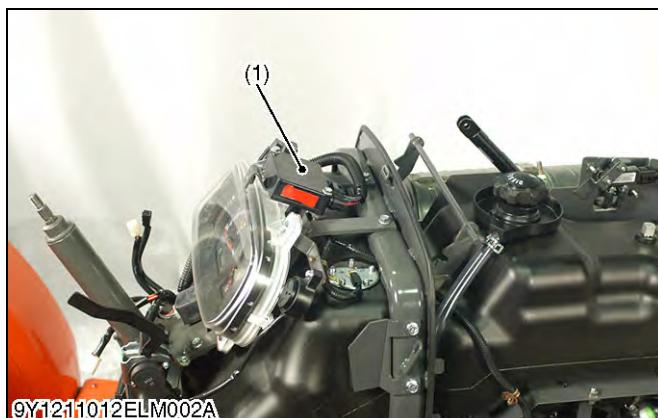
#### Electronic Instrument Panel

Electronic instrument panel (1) has functions as tachometer, fuel gauge, coolant temperature gauge and hourmeter. Also, this panel has various indicator shows operator useful information.

(1) Electronic Instrument Panel

9Y1211012ELM0005US0

#### (2) Electric Control Unit (ECU)



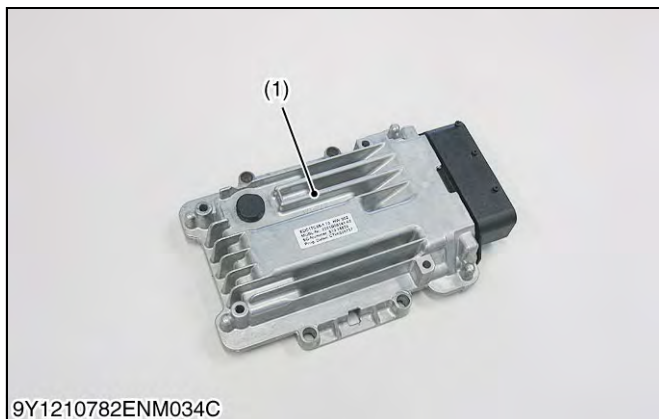
#### Main Electric Control Unit (ECU)

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)

9Y1211012ELM0006US0



9Y1210782ENM034C

### 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) Main Electric Control Unit  
(ECU)

9Y1211012ELM0007US0

## (3) Switches



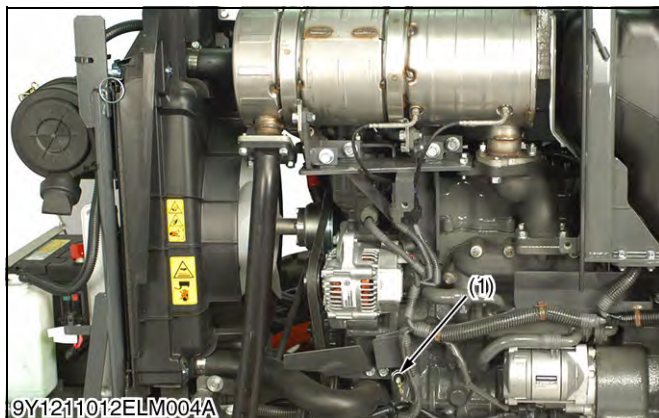
9Y1211012ELM003A

### Key Switch

The key switch (1) transmits a main switch "ON" signal and a "ST" signal to the electronic instrument panel at the time of engine starts. 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 start safely.

- (1) Key Switch

9Y1211012ELM0008US0



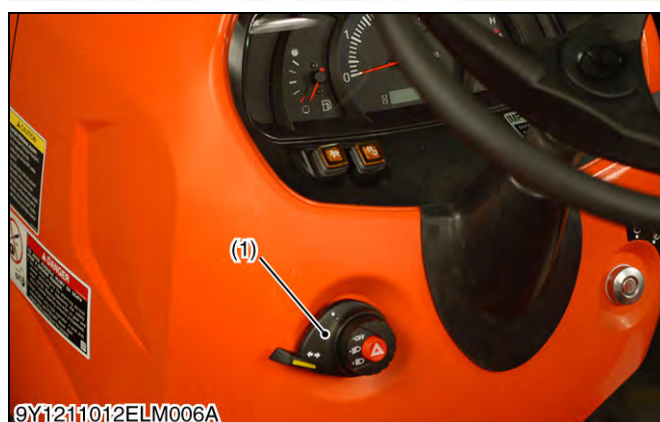
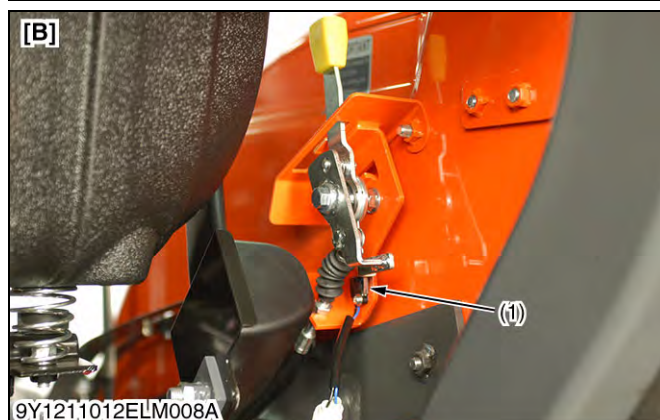
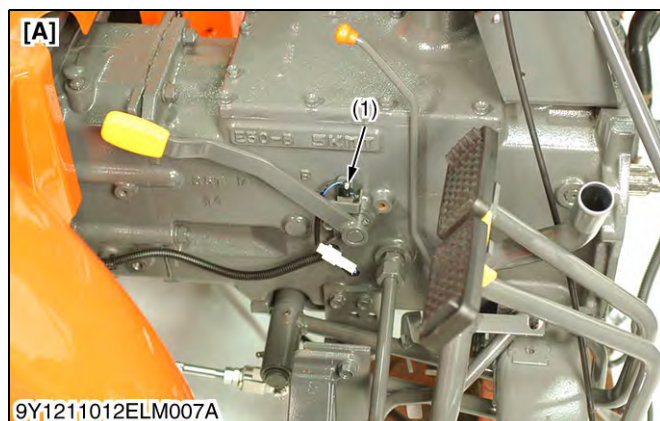
9Y1211012ELM004A

### Engine Oil Pressure Switch

Engine oil pressure switch (1) is turned on when the engine oil pressure is lower than 50 kPa (0.5 kgf/cm<sup>2</sup>, 7 psi). When the engine starts oil pump starts operating. Then the oil pressure rises and the engine oil switch (1) turns off.

- (1) Engine Oil Pressure Switch

9Y1211012ELM0009US0



### PTO Switch (L3301/L3901 Only)

PTO switch (1) is attached to detect the position of PTO gear shift lever.

This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

(1) PTO Switch

[A] Manual Transmission Model

[B] HST Model

9Y1211012ELM0010US0

### PTO Switch (L4701 Only)

PTO switch (1) is attached to choose PTO on/off. By using signal from this switch, main ECU decide to send oil to PTO clutch or not. This switch also has a function as a safety switch. If this switch is in **ON** position, starter motor does not rotate.

(1) PTO Switch

9Y1211012ELM0011US0

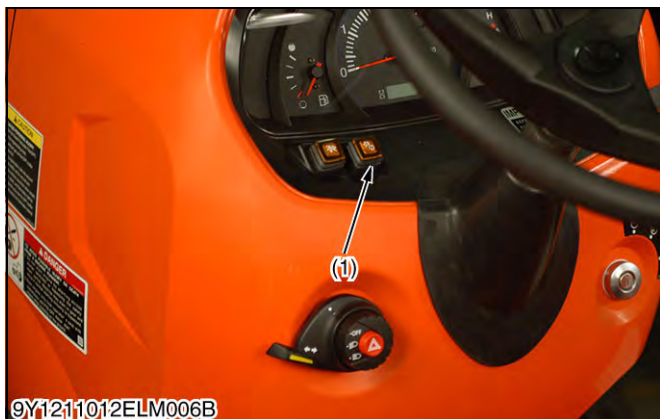
### Combination Light Switch

Combination light switch (1) is a switch to operate head light, turn signal and hazard light.

(1) Combination Light Switch

9Y1211012ELM0012US0





### Parked Regeneration Switch

Press the parked regeneration switch (1) under the specified condition, and the parked regeneration starts.

When specified amount of PM (Particulate Matter) has built up in the DPF, it is possible to do the parked regeneration.

- (1) Parked Regeneration Switch

9Y1211012ELM0013US0

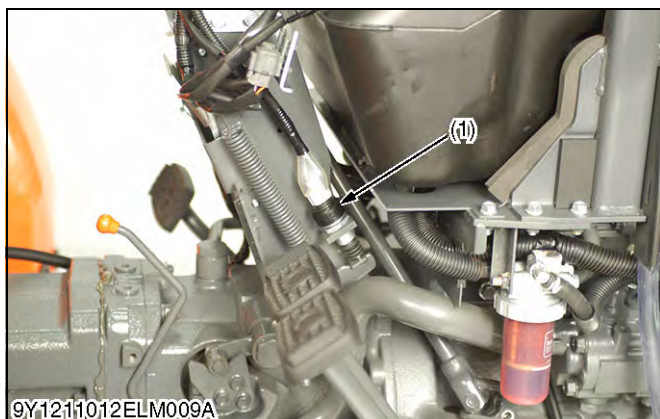


### DPF INHIBIT Switch

Press the DPF INHIBIT switch (1), and the Auto Regeneration Mode and Regeneration Inhibit Mode are activated alternately. When the key switch is turned **ON**, Auto Regeneration Mode is automatically activated as a default.

- (1) DPF INHIBIT Switch

9Y1211012ELM0014US0

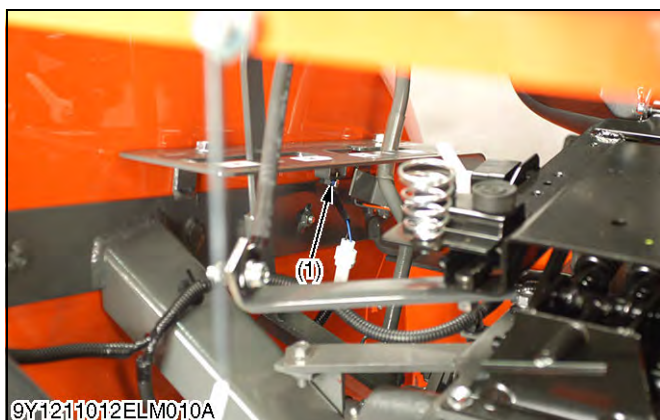


### Parking Brake Switch

The parking brake switch (1) is attached near brake pedals. When parking brake is applied, this switch is turned **ON**. When the main ECU (Electric Control Unit) receives **ON** signal from this switch, the main ECU lights up the parking brake indicator on the meter panel.

- (1) Parking Brake Switch

9Y1211012ELM0015US0

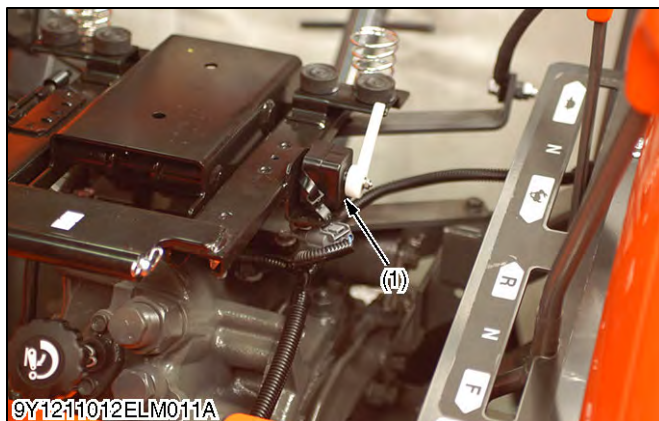


### Shuttle Switch (Manual Transmission Model Only)

Shuttle switch (1) is attached at the bottom of shuttle lever. This switch is turned on when the shuttle lever is in "**NEUTRAL**" position. This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

- (1) Shuttle Switch

9Y1211012ELM0016US0

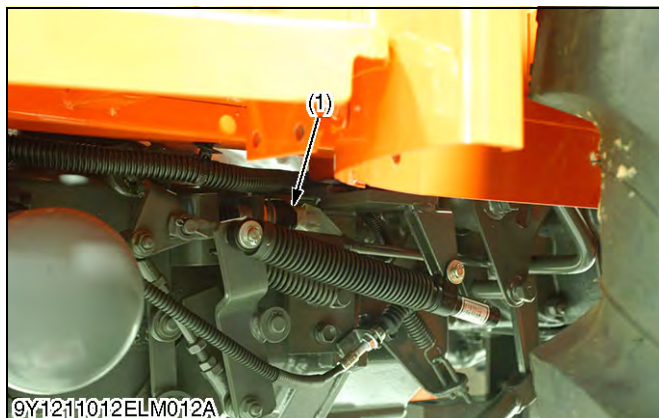


### Seat Switch

This switch is attached under the seat. When sitting 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 electrical circuit is opened. This switch is adopted to achieve OPC (operator presence control) function.

(1) Seat Switch

9Y1211012ELM0017US0



### HST Pedal Switch

The HST pedal switch (1) is attached to detect whether the HST pedal is in neutral position. When the HST pedal is in "**NEUTRAL**" position, this switch is **ON** position.

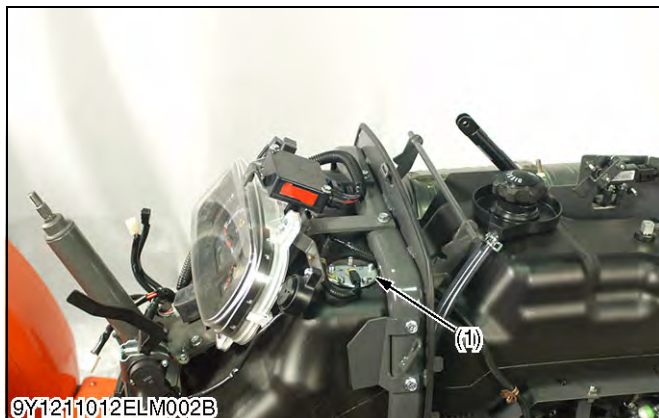
This switch also has a function as a safety switch. If this switch is **OFF** position, starter motor does not rotate.

(1) HST Pedal Switch

9Y1211012ELM0018US0



## (4) Sensors

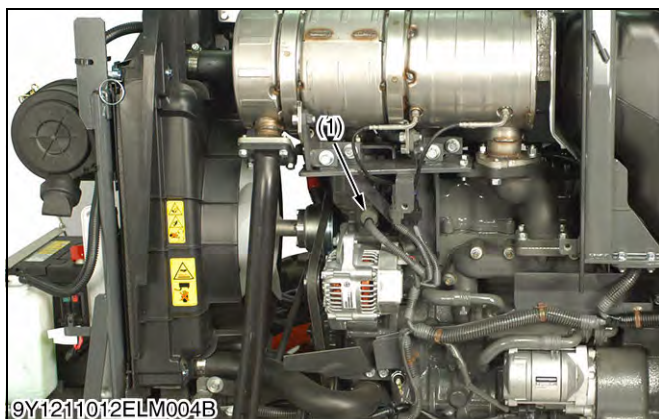


### Fuel Level Sensor

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 electronic instrument panel.

- (1) Fuel Level Sensor

9Y1211012ELM0019US0



### 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 coolant temperature on the electronic instrument panel.

- (1) Coolant Temperature Sensor

9Y1211012ELM0020US0



### Acceleration Sensor

The acceleration sensor (1) detects the amount of hand throttle lever and foot throttle operation.

- (1) Acceleration Sensor

9Y1211012ELM0021US0

## (5) Others



### Glow Relay

This tractor has a glow circuit to improve performance of engine starting in cold conditions. Engine ECU controls the time current flows into glow plugs by controlling current flows into glow relay.

- (1) Glow Relay

9Y1211012ELM0022US0



### Flusher Unit

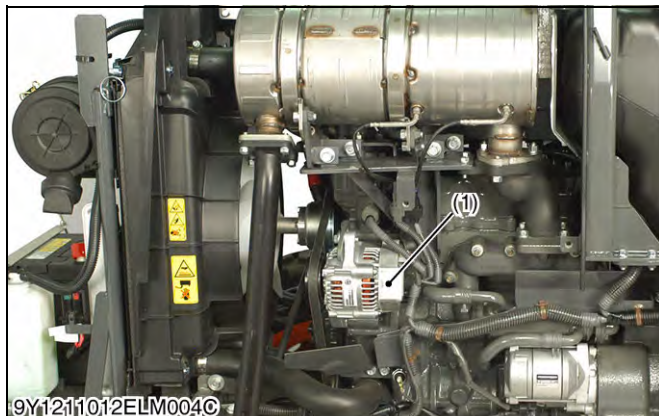
Flusher unit controls the blinking frequency of turn signal and hazard signal.

As a only one side of lamp blinking of turn signal and both right and left side lamps blinking hazard signal.

The blinking frequency is about 60 to 80 times per minutes.

(1) Flusher Unit

9Y1211012ELM0023US0



### Alternator

The alternator (1) has a function as a charging device.

The terminal **L** of this alternator detects a signal from the battery charge circuit and send a signal for making the electrical charge warning indicator at the electronic instrument panel to light up when the electricity charge system becomes abnormal.

(1) Alternator

9Y1211012ELM0024US0

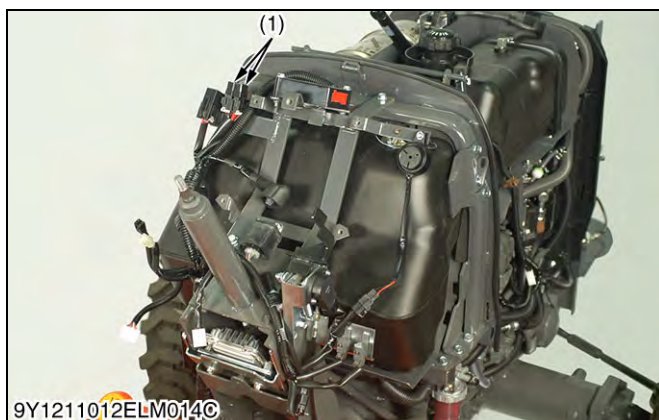


### PTO Solenoid Valve (L4701 Only)

The PTO solenoid valve (1) is attached on the right side of mid-case. This valve controls oil flow to the PTO clutch based on signals from main ECU.

(1) PTO Solenoid Valve

9Y1211012ELM0025US0



### Starter Relay, Engine Relay

These relays are attached inside the rear bonnet. These relays are same parts. When servicing, be careful not to confuse with another relay. Be sure to check the color of wiring harness.

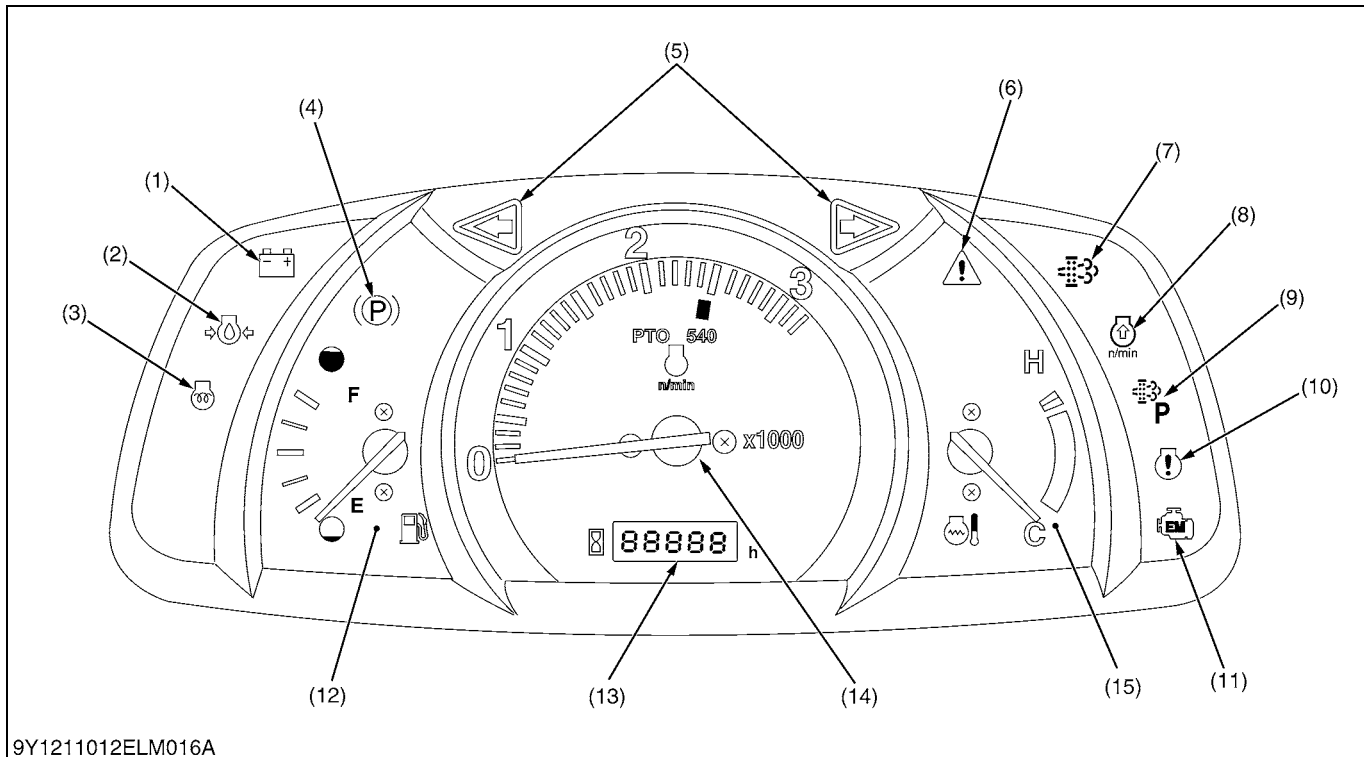
(1) Starter Relay, Engine Relay

9Y1211012ELM0026US0



### [3] BASIC CONTROL SYSTEM

#### (1) Indication Items of Meter Panel

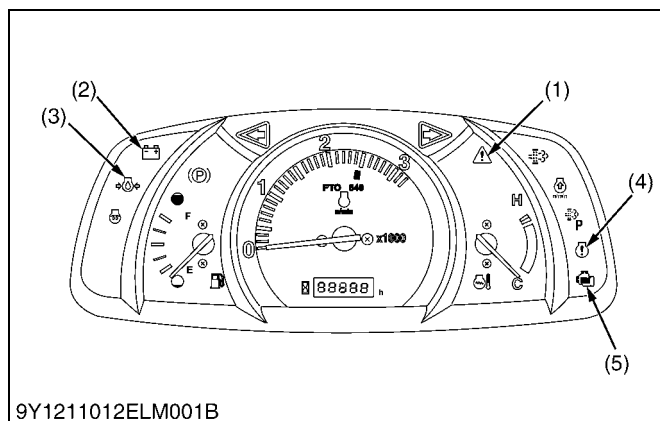


9Y1211012ELM016A

- |   |                                     |                                   |                                |
|---|-------------------------------------|-----------------------------------|--------------------------------|
| (1) Electrical Charge Warning Indicator   | (4) Parking Brake Warning Indicator | (7) Regeneration Indicator        | (10) Engine Warning Indicator  |
| (2) Engine Oil Pressure Warning Indicator | (5) Turn Signal / Hazard Indicator  | (8) Engine RPM Increase Indicator | (11) Emission Indicator        |
| (3) Glow Plug Indicator                   | (6) Master System Warning Indicator | (9) Parked Regeneration Indicator | (12) Fuel Gauge                |
|   |                                     |                                   | (13) Hourmeter                 |
|   |                                     |                                   | (14) Tachometer                |
|   |                                     |                                   | (15) Coolant Temperature Gauge |

9Y1211012ELM0027US0

## (2) Easy Checker™



9Y1211012ELM001B

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.

### (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.

### (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.

#### ■ 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

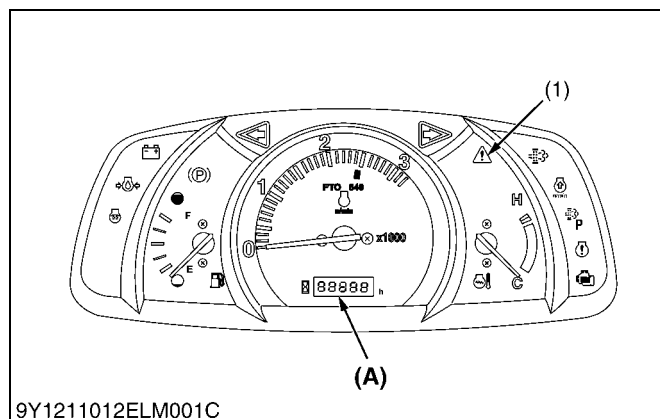
If emission indicator lights up, take the steps to lower the water temperature. This helps keep the emission clean.

- |                           |                        |
|---------------------------|------------------------|
| (1) Master System Warning | (4) Engine Warning     |
| (2) Electrical Charge     | (5) Emission Indicator |
| (3) Engine Oil Pressure   |                        |

9Y1211012ELM0028US0

## [4] ASSISTANT CONTROL SYSTEM

### (1) Self-diagnosis Function



When the instrumental panel detects something wrong, the master system warning indicator (1) starts blinking and the error code indicating the location of the trouble. showed in below is displayed on the liquid crystal display.

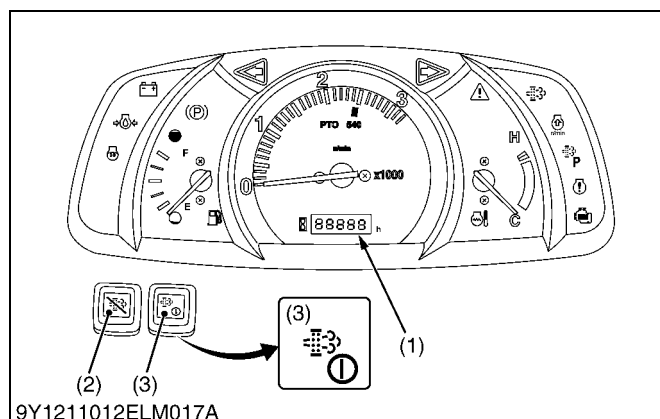
Displayed error code	Trouble
<b>E-20</b>	Communication trouble
<b>E-31</b>	Meter's part code and ECU model setting not compatible
<b>E-40</b>	Input voltage of lever sensor from ECU is in trouble.
<b>E-75</b>	Acceleration sensor output out of spec
<b>E-84</b>	Acceleration sensor maladjusted
<b>E-93</b>	Relay for engine starter motor is in trouble
<b>E-94</b>	Relay for engine stop is in trouble
<b>E-95</b>	Solenoid (PTO) is in trouble

(1) Master System Warning Indicator

**(A) The error message is displayed here.**

9Y1211012ELM0029US0

### (2) Testing, Setting and Adjusting Function



The instrumental panel 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 DPF INHIBIT switch (2) and the parked regeneration switch (3) together, the service inspect display is indicated. And then, a target mode is selected, the data input and the fine adjustment, etc. can be done. To select target mode, press the parked regeneration switch (3) and the displayed mode is changed. To decide, press the parked regeneration switch (3) for few second while target mode is displayed.

The following table shows the content of each mode display by the alphabet.

(1) Liquid Crystal Display

(3) Parked Regeneration Switch

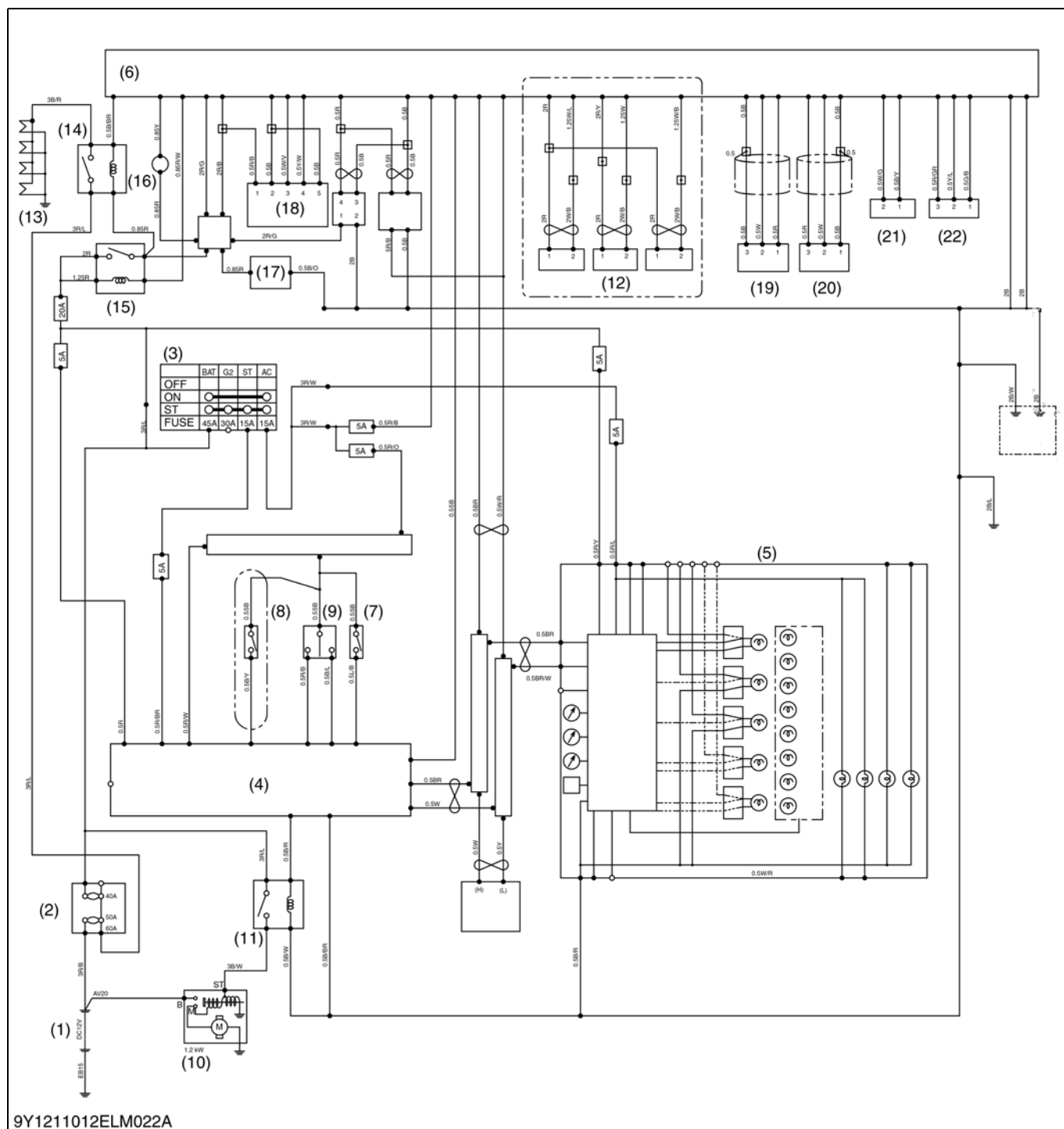
(2) DPF INHIBIT Switch

Mode	Details of Mode	Contents
<b>A</b>	Test Mode	For the checking the voltages from various sensors
<b>b</b>	Error Information Clear Mode	For the deleting the error information after servicing is finished
<b>c</b>	Acceleration Sensor Fine-adjustment Mode	For setting the position of acceleration sensor (Input the sensor information to main ECU)
<b>d</b>	Tractor Model Select Mode	For inputting the model of tractor to ECU

9Y1211012ELM0030US0

### 3. ENGINE STARTING SYSTEM AND STOPPING

#### [1] STARTING CIRCUIT

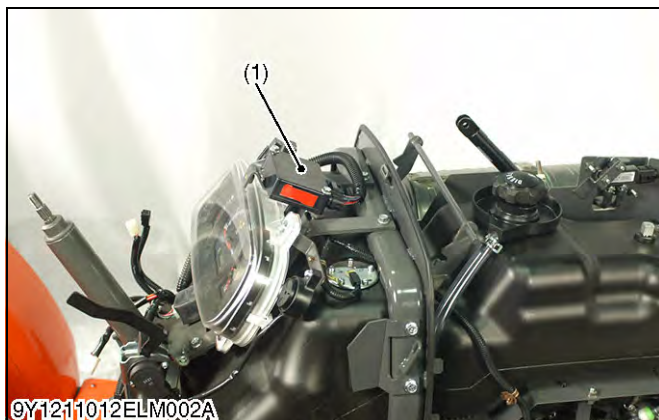


9Y1211012ELM022A

- |                      |                                |                                |                                 |
|----------------------|--------------------------------|--------------------------------|---------------------------------|
| (1) Battery          | (7) PTO Switch                 | (12) Injectors                 | (18) Air Flow Sensor            |
| (2) Slow Blow Fuse   | (8) Shuttle Switch / HST Pedal | (13) Glow Plug                 | (19) Crank Shaft Sensor         |
| (3) Key Switch       | (9) Seat Switch                | (14) Glow Relay                | (20) Cam Shaft Sensor           |
| (4) Main ECU         | (10) Starter                   | (15) Engine Relay              | (21) Coolant Temperature Sensor |
| (5) Instrument Panel | (11) Starter Relay             | (16) Supply Pump               | (22) Rail Pressure Sensor       |
| (6) Engine ECU       |                                | (17) Electromagnetic Fuel Pump |                                 |

9Y1211012ELM0031US0

## [2] RELATED PARTS



9Y1211012ELM002A

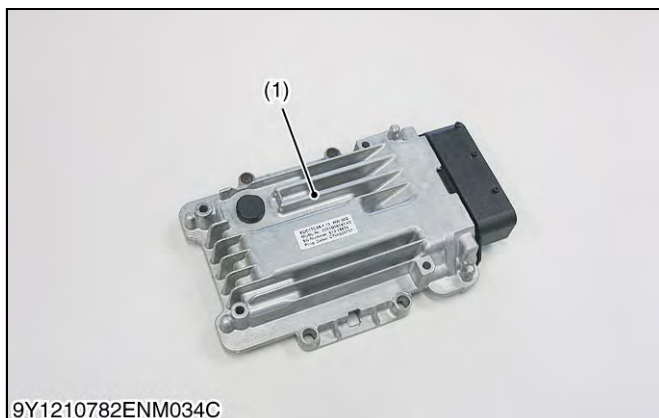
### Main Electric Control Unit (ECU)

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)

9Y1211012ELM0006US0



9Y1210782ENM034C

### Engine Electric Control Unit (ECU)

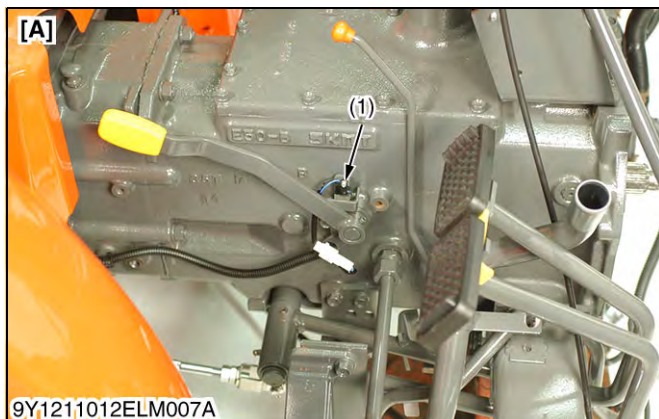
The ECU (1) function to operate in accordance with information coming from various sensors.

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) Main Electric Control Unit (ECU)

9Y1211012ELM0007US0



9Y1211012ELM007A

### PTO Switch (L3301/L3901 Only)

PTO switch (1) is attached to detect the position of PTO gear shift lever.

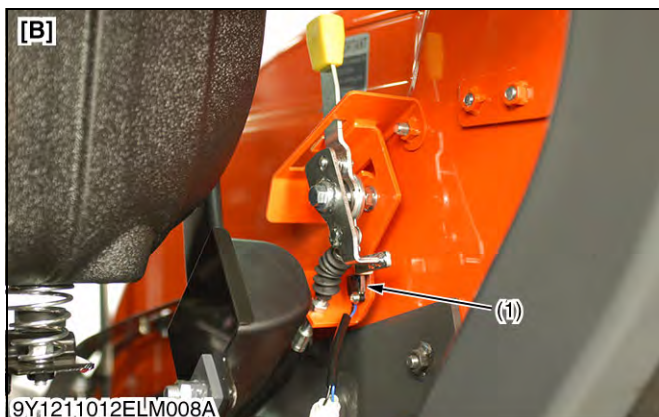
This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

- (1) PTO Switch

[A] Manual Transmission Model

[B] HST Model

9Y1211012ELM0010US0



9Y1211012ELM008A



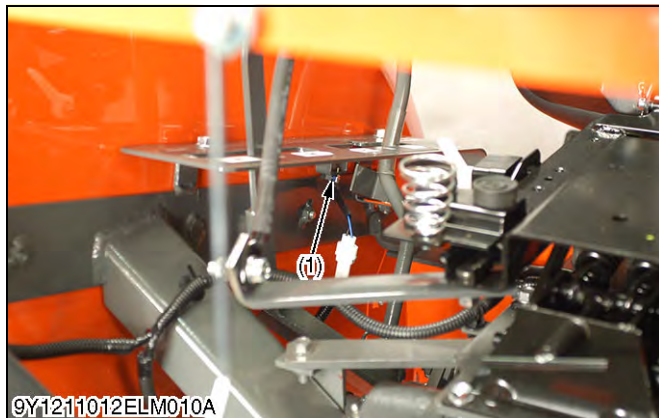


### PTO Switch (L4701 Only)

PTO switch (1) is attached to choose PTO on/off. By using signal from this switch, main ECU decide to send oil to PTO clutch or not. This switch also has a function as a safety switch. If this switch is in **ON** position, starter motor does not rotate.

(1) PTO Switch

9Y1211012ELM0011US0

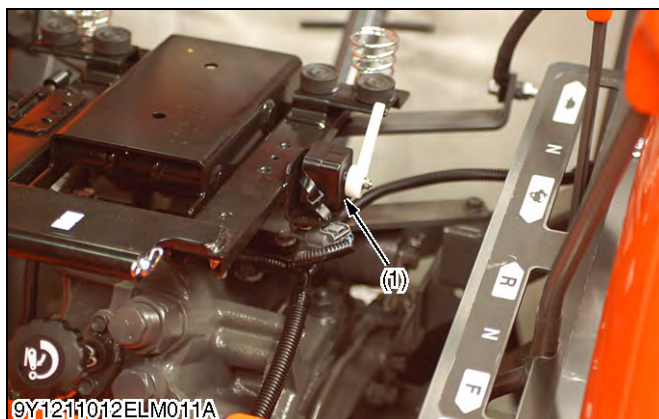


### Shuttle Switch (Manual Transmission Model Only)

Shuttle switch (1) is attached at the bottom of shuttle lever. This switch is turned on when the shuttle lever is in "**NEUTRAL**" position. This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

(1) Shuttle Switch

9Y1211012ELM0016US0

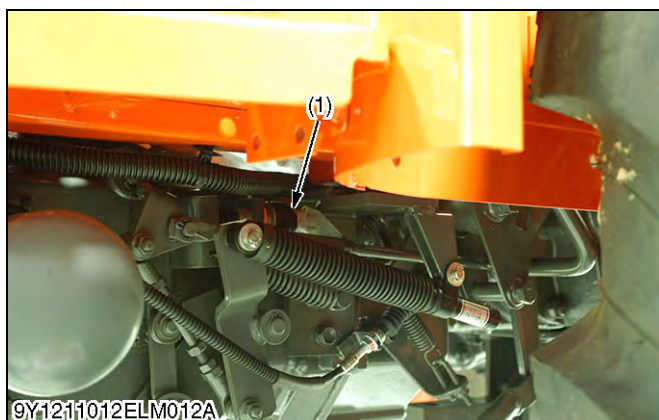


### Seat Switch

This switch is attached under the seat. When sitting 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 electrical circuit is opened. This switch is adopted to achieve OPC (operator presence control) function.

(1) Seat Switch

9Y1211012ELM0017US0



### HST Pedal Switch

The HST pedal switch (1) is attached to detect whether the HST pedal is in neutral position. When the HST pedal is in "**NEUTRAL**" position, this switch is **ON** position.

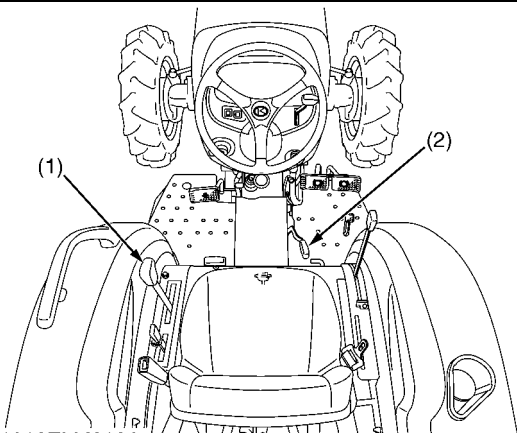
This switch also has a function as a safety switch. If this switch is **OFF** position, starter motor does not rotate.

(1) HST Pedal Switch

9Y1211012ELM0018US0

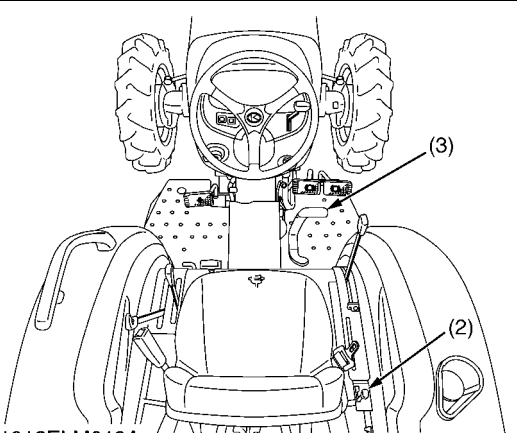
### [3] ENGINE STARTING CONDITIONS

[A]



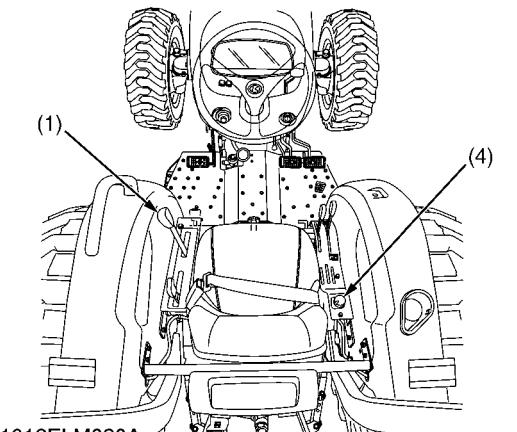
9Y1211012ELM018A

[B]



9Y1211012ELM019A

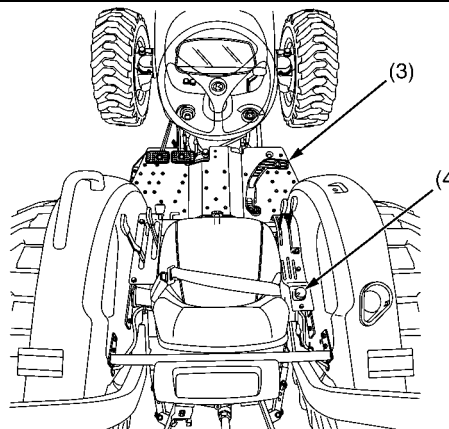
[C]



9Y1211012ELM020A

When the following conditions become complete, the engine can be started by turning key switch to **START** position.

[D]



9Y1211012ELM021A

- (1) Shuttle Shift Lever
- (2) PTO Gear Shift Lever
- (3) Speed Control Pedal
- (4) PTO Switch

- [A] L3301/L3901 Manual Transmission Model
- [B] L3301/L3901 HST Model
- [C] L4701 Manual Transmission Model
- [D] L4701 HST Model

9Y1211012ELM0032US0

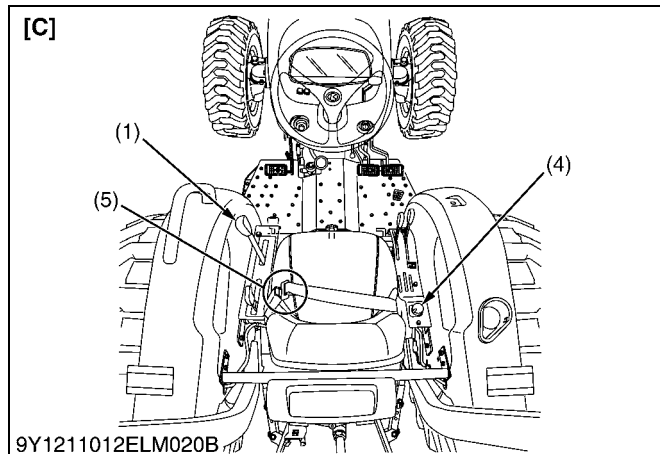
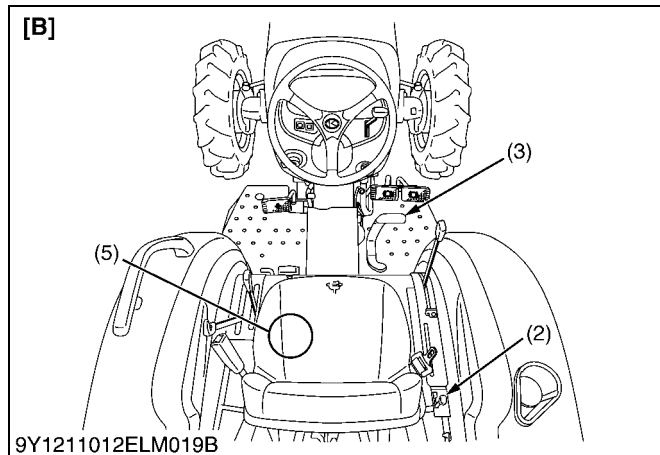
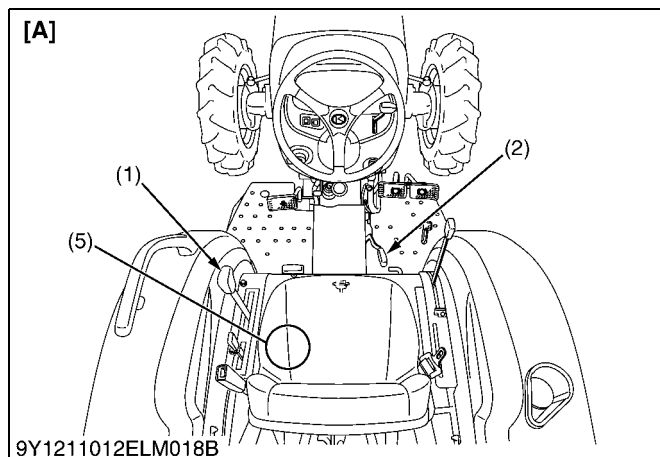
#### Engine Starting Condition

Transmission Type	Shuttle Switch (Neutral: ON) (F or R position: OFF)	HST Pedal Switch (Neutral: ON) (Forward or Reverse position: OFF)	PTO Switch (Neutral: ON) (Engaged: OFF)
Manual Transmission Model	ON	—	ON
HST Model	—	ON	ON

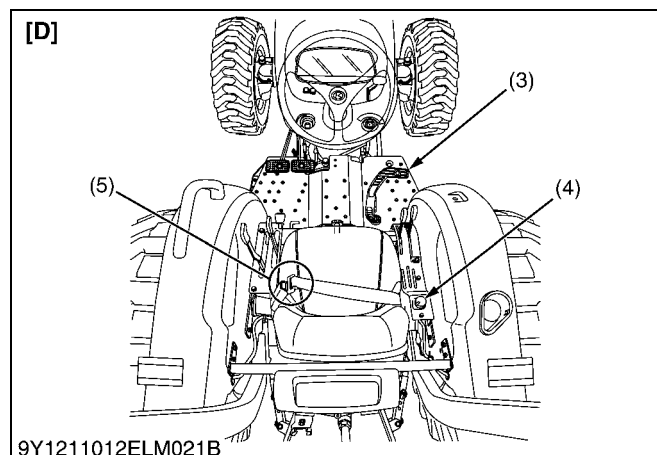
9Y1211012ELM0033US0



## [4] OPERATOR PRESENCE CONTROL (OPC)



This tractor is equipped with Operator Presence Control (OPC) system. The engine stops automatically when the operator stands from the seat while engaging PTO, depressing speed control pedal or engaging shuttle lever.



- (1) Shuttle Shift Lever
- (2) PTO Gear Shift Lever
- (3) Speed Control Pedal
- (4) PTO Switch
- (5) Seat Switch

- [A] L3301/L3901 Manual Transmission Model**
- [B] L3301/L3901 HST Model**
- [C] L4701 Manual Transmission Model**
- [D] L4701 HST Model**

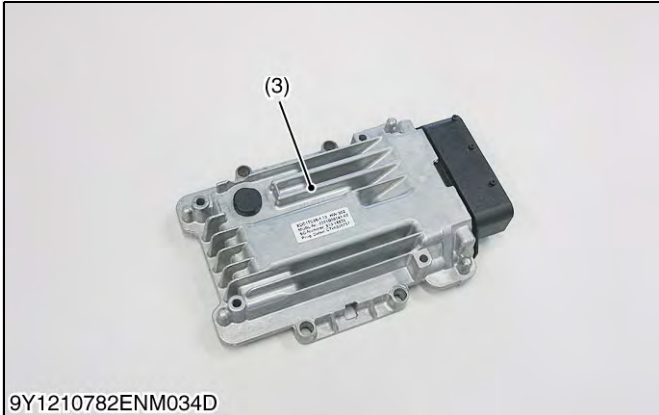
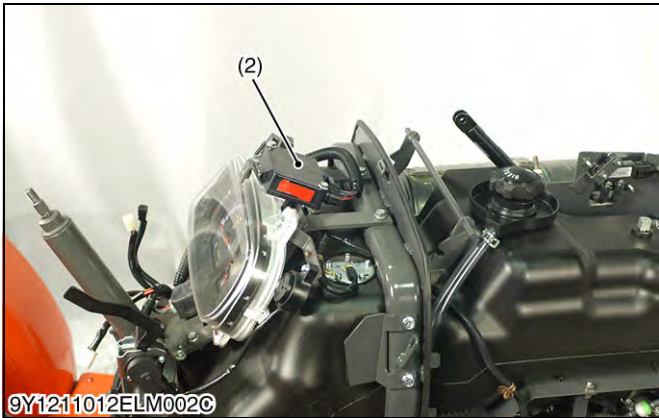
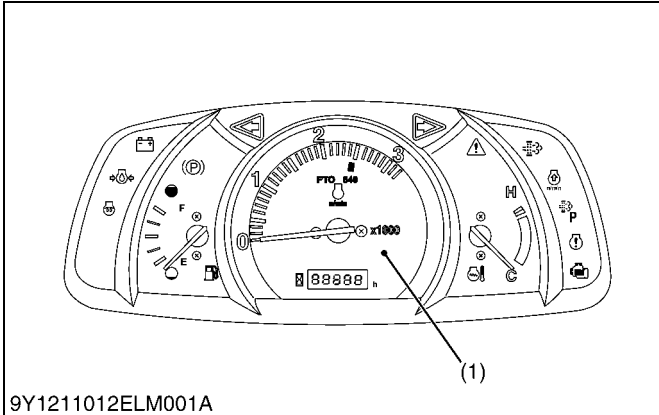
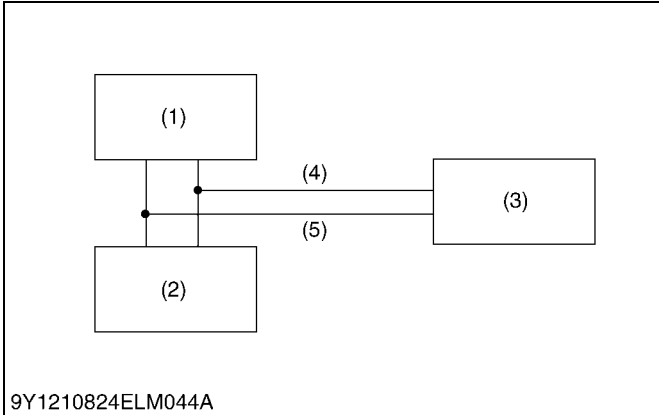
9Y1211012ELM0034US0

### Operator Presence Control Operating Condition

Transmission Type	Seat Switch (Occupied: ON) (Vacant: OFF)	Shuttle Switch (Neutral: ON) (F or R position: OFF)	HST Pedal Switch (Neutral: ON) (Forward or Reverse position: OFF)	PTO Switch (Neutral: ON) (Engaged: OFF)
Manual Transmission Model	OFF	OFF	—	ON
		ON	—	OFF
HST Model		—	OFF	ON
		—	ON	OFF

9Y1211012ELM0035US0

# 4. CAN (CONTROLLER AREA NETWORK)



The Controller Area Network (CAN) specification defines the Data Link Layer, ISO 11898 defines the Physical Layer.

The CAN bus [CAN bus] 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 CAN bus is that the wiring harness becomes simplified.

The second merit of the CAN bus 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)

9Y1211012ELM0036US0

# SERVICING

## CONTENTS

1. TROUBLESHOOTING.....	9-S1
2. SERVICING SPECIFICATIONS .....	9-S8
3. TIGHTENING TORQUES.....	9-S9
4. CHECKING AND ADJUSTING .....	9-S10
[1] BATTERY .....	9-S10
[2] TESTING, SETTING AND ADJUSTING BY ELECTRONIC INSTRUMENT PANEL .....	9-S12
(1) Mode Selection.....	9-S12
(2) Mode "A" (Test Mode) .....	9-S13
(3) Mode "b" (Error Information Clear Mode) .....	9-S13
(4) Mode "c" (Acceleration Sensor fine-adjustment Mode) .....	9-S14
(5) Mode "d" (Tractor Model Select Mode) .....	9-S15
[3] FUSES AND GROUND CABLE .....	9-S16
(1) Checking Fuse and Connector.....	9-S16
[4] ELECTRONIC INSTRUMENT PANEL .....	9-S18
(1) Checking Electronic Instrument Panel Connector .....	9-S19
[5] MAIN ELECTRIC CONTROL UNIT (MAIN ECU) .....	9-S21
(1) Checking Main Electrical Control Unit Connector.....	9-S22
[6] ENGINE ELECTRIC CONTROL UNIT (ENGINE ECU) .....	9-S23
(1) Checking Electric Control Unit Connector .....	9-S24
[7] STARTING SYSTEM.....	9-S26
(1) Key Switch.....	9-S26
(2) Safety Switches .....	9-S27
(3) Starter.....	9-S29
(4) Relays.....	9-S30
(5) Glow Control System.....	9-S31
[8] OPC (OPERATOR PRESENCE CONTROL) SYSTEM .....	9-S32
(1) L3301/L3901.....	9-S32
(2) L4701.....	9-S33
(3) Safety Switch.....	9-S34
[9] CHARGING SYSTEM .....	9-S35
[10] LIGHTING SYSTEM.....	9-S36
(1) Combination Light Switch .....	9-S36
(2) Flasher Unit .....	9-S38
[11] WARNING LAMP .....	9-S39
[12] MONITOR LAMP .....	9-S40
[13] GAUGES .....	9-S41
[14] ENGINE CONTROL SYSTEM .....	9-S42
(1) Injector.....	9-S42
(2) SCV (Suction Control Valve) .....	9-S43
(3) Rail Pressure Sensor.....	9-S44
(4) Fuel Pump .....	9-S45
(5) EGR Valve.....	9-S46
(6) Crankshaft Position Sensor .....	9-S46
(7) Camshaft Position Sensor .....	9-S47
(8) Air Flow Sensor .....	9-S48
(9) Intake Throttle Valve.....	9-S49
(10) Exhaust Temperature Sensor .....	9-S50
(11) Differential Pressure Sensor .....	9-S51
(12) Parked Regeneration Switch.....	9-S52

(13)DPF INHIBIT Switch .....	9-S53
(14)Acceleration Sensor .....	9-S54
[15]CCV HEATER.....	9-S55
(1) CCV Relay .....	9-S55
(2) CCV Heater .....	9-S55
5. DISASSEMBLING AND ASSEMBLING.....	9-S56
[1] STARTER .....	9-S56
[2] ALTERNATOR.....	9-S57
6. SERVICING .....	9-S59
[1] STARTER .....	9-S59
[2] ALTERNATOR.....	9-S61

# 1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>All Electrical Equipment Do Not Operate</b>	Battery discharged or damaged	Recharge or replace	9-S11
	Battery positive cable disconnected or improperly connected	Repair or replace	9-S10
	Battery negative cable disconnected or improperly connected	Repair or replace	9-S10
	Slow blow fuse blown	Replace	9-S17
	Ground cable disconnected or improperly connected	Connect	9-S17
<b>Fuse Blown Frequently</b>	Short-circuited	Repair or replace	—

## BATTERY

Symptom	Probable Cause	Solution	Reference Page
<b>Battery Discharges Too Quickly</b>	Battery damaged	Recharge or replace	9-S11
	Alternator damaged	Replace	9-S35
	Wiring harness disconnected or improperly connected (between battery positive terminal and alternator <b>B</b> terminal)	Repair or replace	9-S35
	Cooling fan belt slipping	Adjust	G-29, G-58

## STARTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
<b>Starter Motor Does Not Operate</b>	Battery discharged or damaged	Recharge or replace	9-S11
	Slow blow fuse blown	Replace	9-S17
	Safety switch improperly adjusted or damaged	Adjust or replace	9-S27
	Wiring harness disconnected or improperly connected	Repair or replace	—
	Starter motor damaged	Repair or replace	9-S29
	Key switch damaged	Replace	9-S26
	Starter relay damaged	Replace	9-S30
	Fuse blown	Replace	9-S16
<b>Glow Lamp Does Not Light</b>	Coolant temperature sensor damaged	Replace	9-S41
	Key switch damaged	Replace	9-S26
	Electronic instrument panel damaged	Replace	9-S18

**CHARGING SYSTEM**

Symptom	Probable Cause	Solution	Reference Page
<b>Charging Lamp Does Not Light when Main Switch Is Turned ON</b>	Fuse blown	Replace	9-S16
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Alternator damaged	Repair or replace	9-S35
<b>Charging Lamp Does Not Go OFF When Engine Is Operating</b>	Short circuit between alternator L terminal lead and chassis	Repair or replace	–
	Alternator damaged	Repair or replace	9-S35

**LIGHTING SYSTEM**

Symptom	Probable Cause	Solution	Reference Page
<b>Head Light Does Not Light</b>	Fuse blown	Replace	9-S16
	Bulb blown	Replace	G-48, G-76
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Combination switch damaged	Replace	9-S36
<b>Tail Light Does Not Light</b>	Fuse blown	Replace	9-S16
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Combination switch damaged	Replace	9-S36
<b>Hazard and Turn Signal Light Does Not Light</b>	Fuse blown	Replace	9-S16
	Bulb blown	Replace	G-48, G-76
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Hazard unit damaged	Replace	9-S38
	Combination Switch damaged	Replace	9-S36
<b>Hazard and Turn Signal Light Does Not Blink</b>	Hazard unit damaged	Replace	9-S38
<b>Work Light Does Not Light</b>	Fuse blown	Replace	9-S16
	Bulb blown	Replace	G-48, G-76
	Wiring harness disconnected or improperly connected	Repair or replace	–

**EASY CHECKER™**

Symptom	Probable Cause	Solution	Reference Page
<b>Engine Oil Pressure Lamp Lights Up When Engine Is Operating</b>	Engine oil pressure too low	Repair engine	1-S80
	Engine oil insufficient	Fill	G-36, G-64
	Engine oil pressure switch damaged	Replace	1-S42
	Short circuit between engine oil pressure switch lead and chassis	Repair	1-S42
	Electrical instrument panel damaged	Replace	9-S18
<b>Engine Oil Pressure Lamp Does Not Light When Key Switch Is Turned ON and Engine Is Not Operating</b>	Engine oil pressure switch damaged	Replace	1-S42
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S18

**GAUGES**

Symptom	Probable Cause	Solution	Reference Page
<b>Fuel Gauge Does Not Function</b>	Fuel level sensor damaged	Replace	1-S44
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S18
<b>Coolant Temperature Gauge Does Not Function</b>	Coolant temperature sensor damaged	Replace	9-S41
	wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S18

**ELECTRONIC INSTRUMENT PANEL**

Symptom	Probable Cause	Solution	Reference Page
<b>Nothing Is Displayed in LCD</b>	Battery discharged or damaged	Recharge or replace	9-S11
	Slow blow fuse blown	Replace	9-S17
	Fuse blown	Replace	9-S16
	Electronic instrument panel connector disconnect	Connect	9-S20
	Electronic instrument panel damaged	Replace	9-S18
	Ground cable disconnected or improperly connected	Connect	9-S17



**Error Display (TRACTOR)**

Display on LCD	Trouble Item	Probable Cause	Solution	Reference Page
E-20	CAN Communication	<ul style="list-style-type: none"><li>• CANbus wiring is disconnected or short-circuited</li><li>• No signals from main ECU</li><li>• Main ECU damaged</li></ul>	Check the communication line	—
			Check the main ECU connector	9-S22
E-31	—	<ul style="list-style-type: none"><li>• The pair of instrument panel and main ECU is not correct</li></ul>	Reselect tractor model	9-S15
E-40	Input voltage to Acceleration Sensor	<ul style="list-style-type: none"><li>• Power source from main ECU is dropped</li><li>• Wiring for the sensor is short-circuited</li></ul>	Check the output voltage at main ECU connector	9-S22
			Check the sensor connector	9-S54
			Check the ground cable	9-S17
E-75	Acceleration Sensor	<ul style="list-style-type: none"><li>• Output of the sensor (main, sub) is out of range</li></ul>	Check the output voltage by test mode	9-S13
Check the sensor wiring connector			9-S54	
E-84			Check the sensor resistance	9-S54
			Replace the sensor	9-S54
E-93	Starter Relay	<ul style="list-style-type: none"><li>• Starter relay error</li></ul>	Check the relay	9-S30
E-94	OPC Output	<ul style="list-style-type: none"><li>• Wiring for OPC is disconnected or short-circuited</li></ul>	Check related parts	9-S32
E-95	PTO Solenoid	<ul style="list-style-type: none"><li>• PTO solenoid value failure</li><li>• Wiring for PTO solenoid is disconnected or short-circuited</li><li>• Grounding plate of solenoid is poor contact with chassis</li></ul>	Check the wiring connector of PTO solenoid valve	3-S78
			Check PTO solenoid valve	3-S78

**Error Display (Engine)**

ISO 14229 P-Code	J1939-73		Name	Reference Page
	SPN	FMI		
P0016	636	7	NE-G phase shift	See Diagnosis Manual (*)
P0072	171	4	Intake air temperature built-in MAF sensor abnormality	
P0073	171	3		
P0087	633	7	Pressure limiter emergency open	
P0088	157	0	High rail pressure	
P0089	1347	7	SCV (MPROP) stuck	
P0093	1239	1	Fuel leak (in high pressured fuel system)	
P0101	132	1	Intake air volume: Low	
P0102	132	4	MAF sensor abnormality	
P0103	132	3		
P0112	172	4	Intake air temperature error	
P0113	172	3		
P0117	110	4	Coolant temperature sensor abnormality	
P0118	110	3		
P0192	157	4	Rail pressure sensor abnormality	
P0193	157	3		
P0200	523535	0	Injector charge voltage: High	
P0201	651	3	Open circuit of harness/coil	
P0202	653	3		
P0203	654	3		
P0204	652	3		
P0217	110	0	Engine overheat	
P0219	190	0	Engine overrun	
P0237	102	4	Boost pressure sensor abnormality	
P0238	102	3		
P0335	636	8	Crankshaft position sensor (NE sensor) abnormality	
P0336	636	2		
P0340	723	8	Camshaft position sensor (G sensor) abnormality	
P0341	723	2		
P0380	676	5	Glow relay abnormality	
P0380	523544	3		
P0380	523544	4		
P0381	676	0		
P0403	523574	3	EGR actuator abnormality	
P0404	523574	4		
P0409	523572	4		
P0524	100	1	Oil pressure error	
P0543	3242	4	Exhaust gas temperature sensor 1 (T1) abnormality	
P0544	3242	3		

ISO 14229 P-Code	J1939-73		Name	Reference Page
	SPN	FMI		
P0546	4765	4	Exhaust gas temperature sensor 0 (T0) abnormality	See Diagnosis Manual (*)
P0547	4765	3		
P0562	168	4	Battery voltage abnormality	
P0563	168	3		
P0602	523538	2	QR (IQA) data abnormality	
P0602	523538	7		
P0605	628	2	ECU FLASH ROM and CPU abnormality	
P0606	1077	2		
P0606	523527	2		
P0611	523525	1	Injector charge voltage abnormality	
P0628	1347	4	SCV (MPROP) drive system abnormality	
P0629	1347	3		
P062D	523605	6	Internal injector drive circuit short	
P0642	3509	4	Sensor supply voltage 1 abnormality	
P0643	3509	3		
P0652	3510	4	Sensor supply voltage 2 abnormality	
P0653	3510	3		
P0662	3511	4	Sensor supply voltage 3 abnormality	
P0663	3511	3		
P0687	1485	2	Main relay is locked in closed position	
P1990	523700	13	EEPROM check sum error	
P1991	523701	13		
P1992	523702	13		
P2108	523580	2	Intake throttle feedback error	
P2122	91	4	Accelerator position sensor 1 abnormality	
P2123	91	3		
P2127	29	4	Accelerator position sensor 2 abnormality	
P2128	29	3		
P2131	523543	2	Accelerator position sensor error (CAN)	
P2135	91	2	Accelerator position sensor correlation error	
P2147	523523	4	Injector short	
P2148	523523	3		
P2150	523524	4		
P2151	523524	3		
P2228	108	4	Barometric pressure sensor error	
P2229	108	3		
P2293	679	7	Pressure limiter abnormality	
P2293	679	16		
P2413	523575	7	EGR (DC motor) abnormality	
P2414	523576	2		
P2415	523577	2		

ISO 14229 P-Code	J1939-73		Name	Reference Page
	SPN	FMI		
P242C	3246	4	Exhaust gas temperature sensor 2 (T2) abnormality	See Diagnosis Manual (*)
P242D	3246	3		
P2454	3251	4	Differential pressure sensor 1 abnormality	
P2455	3251	3		
P2621	523582	4	Intake throttle lift sensor abnormality	
P2622	523582	3		
P3001	3252	0	Emission deterioration	
P3002	4765	0	Exhaust gas temperature sensor 0: Emergency high	
P3003	3242	0	Exhaust gas temperature sensor 1: Emergency high	
P3004	3246	0	Exhaust gas temperature sensor 2: Emergency high	
P3006	3701	15	Excessive PM3	
P3007	3701	16	Excessive PM4	
P3008	3701	0	Excessive PM5	
P3011	132	15	Boost pressure low	
P3012	523589	17	Low coolant temperature in parked regeneration	
P3013	523590	16	Parked regeneration time out	
P3018	523599	0	All exhaust gas temperature sensor failure	
P3023	523601	0	High exhaust gas temperature after emergency high temperature DTC	
P3024	523602	0	High frequency of regeneration	
P3025	523603	15	Over heat pre-caution	
U0075	523547	2	CAN2 Bus off	
U0076	523578	2	No communication with EGR	
U0077	523604	2	CAN1 Bus off	
U0081	523548	2	CAN2 frame error	
U0082	523591	2		
U0083	523592	2		
U0086	523595	2		
U0087	523596	2		
U0089	523598	2		

(\*): Because some of engine error display is disappeared by turning the key switch to "**OFF**", before referring to the Diagnosis Manual, be sure to perform Mode "**b**" adjustment to clear error information (see page 9-S13).

If the error code is still displayed, refer to the Diagnosis Manual.

9Y1211012ELS0001US0

## 2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Glow Plug	Resistance	Approx. 0.9 $\Omega$	—
Fuel Level Sensor			
• Float at Upper-most Position	Resistance	1.0 to 5.0 $\Omega$	—
• Float at Middle Position	Resistance	32.5 $\Omega$	—
• Float at Lower-most Position	Resistance	103 to 117 $\Omega$	—
Coolant Temperature Sensor			
• at -20 °C (-4 °F)	Resistance	15.04 k $\Omega$	—
• at 0 °C (32 °F)	Resistance	5.74 k $\Omega$	—
• at 20 °C (68 °F)	Resistance	2.45 k $\Omega$	—
• at 40 °C (104 °F)	Resistance	1.15 k $\Omega$	—
• at 60 °C (140 °F)	Resistance	0.58 k $\Omega$	—
• at 80 °C (176 °F)	Resistance	0.32 k $\Omega$	—
• at 100 °C (212 °F)	Resistance	0.18 k $\Omega$	—
• at 120 °C (248 °F)	Resistance	0.11 k $\Omega$	—
Starter			
• Commutator	O.D.	30.0 mm 1.181 in.	29.0 mm 1.142 in.
• Mica	Under Cut	0.50 to 0.80 mm 0.020 to 0.031 in.	0.20 mm 0.0008 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 $\Omega$	—
• Rotor	Resistance	2.9 $\Omega$	12.8 mm 0.504 in.
• Slip Ring	O.D.	14.4 mm 0.567 in.	14.0 mm 0.551 in.
• Brush	Length	10.5 mm 0.413 in.	8.4 mm 0.331 in.

9Y1211012ELS0002US0

### 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-13.)

Item	N·m	kgf·m	lbf·ft
Steering wheel nut	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear bonnet mounting bolt	4 to 5	0.4 to 0.6	3 to 4
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

9Y1211012ELS0003US0

## 4. CHECKING AND ADJUSTING

### CAUTION

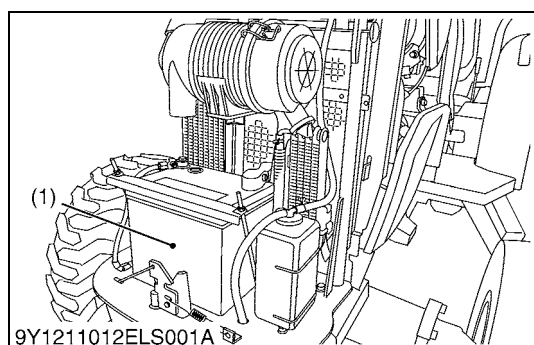
- To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.
- Never remove the battery cap while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are splattered with 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.

### 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.

9Y1211012ELS0004US0

## [1] BATTERY



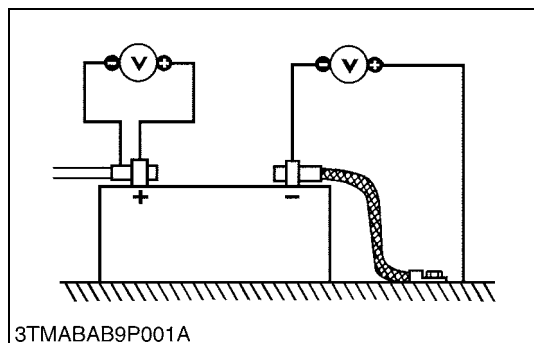
### Battery Voltage

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

9Y1211012ELS0005US0

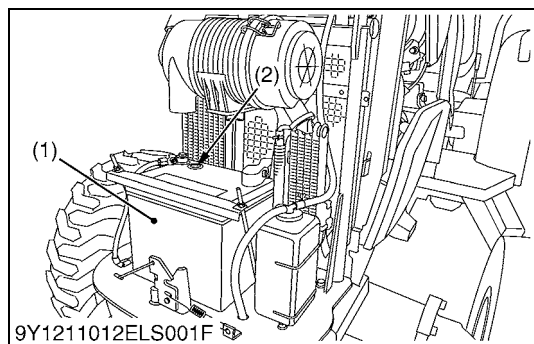


### Battery Terminal Connection

1. Turn the main switch on, and turn on the head light.
2. Measure the voltage with a voltmeter across the battery's positive terminal post and the cable terminal, and 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
----------------------	-----------------	-----------------

WSM000001ELS0001US0



### 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

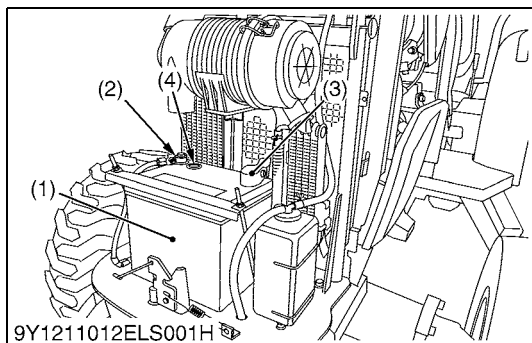
- The factory installed battery is of non-refillable type. If the indicator turns white, do not charge the battery but replace it with new one.

(1) Battery

(2) Indicator

9Y1211012ELS0006US0





## 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**

Model	Battery Type	Volt (V)	Reserve at (min.)	Cold Cranking Amps	Normal Charging Rate (A)
L3301/ L3901	75D23R	12	110	580	6.5
L4701	80D26R	12	120	600	7.5

CCA: Cold Cranking Ampere

- (1) Battery  
(2) Negative Terminal

- (3) Positive Terminal  
(4) Indicator

9Y1211012ELS0007US0

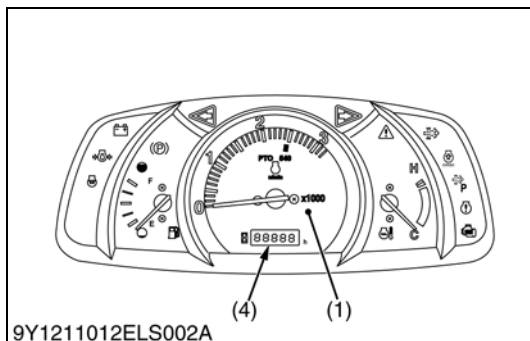
## [2] TESTING, SETTING AND ADJUSTING BY ELECTRONIC INSTRUMENT PANEL

The following setting, adjustments and testing can be done by using the electronic instrumental panel.

- Testing: Check a voltage from various sensors or rotation of engine.
- Setting: Input various data to electronic instrumental panel or main ECU.
- Error Information: Check or clear the error information.

9Y1211012ELS0008US0

### (1) Mode Selection



#### ⚠ WARNING

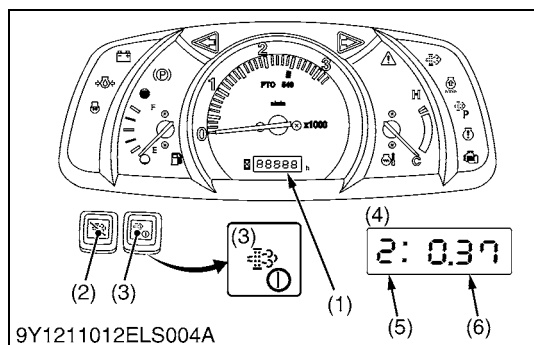
- To perform the testing of the electronic instrument panel, operator must be seated on the tractor.
  - When performing this testing, be sure to change gears to neutral and apply parking brake.
1. While holding down both DPF INHIBIT switch (2) and Parked regeneration switch (3), turn key switch to "ON" or "START" position.
  2. Mode selection display is indicated on the LCD (4).
  3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
  4. The code of desired mode is indicated, press the parked regeneration switch (3) for more than 2 seconds.

Mode	Detail of Mode
A	Test Mode
b	Error Information Clear Mode
c	Acceleration Sensor Fine-adjustment Mode
d	Tractor Model Select Mode

- |                        |                                  |
|------------------------|----------------------------------|
| (1) Instrument Panel   | (3) Parked Regeneration Switch   |
| (2) DPF INHIBIT Switch | (4) LCD (Liquid Crystal Display) |

9Y1211012ELS0009US0

## (2) Mode "A" (Test Mode)



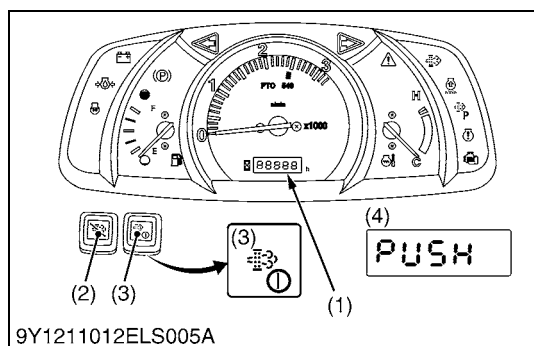
1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "A" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Test mode is selected.
6. If parked regeneration switch (3) is pressed, the displayed item is changed.
7. Turn off the key switch to finish test mode.

Item Number	Contents	Unit	Digit Number
1	coolant temperature	F	integer
2	voltage from fuel sensor	V	the second decimal place
3	engine revolution	rpm	integer
4	voltage from acceleration sensor (main)	V	the second decimal place
5	voltage from acceleration sensor (sub)	V	the second decimal place
6	DOC inlet exhaust temperature (T0)	F	integer
7	DPF inlet exhaust temperature (T1)	F	integer
8	DPF outlet exhaust temperature (T2)	F	integer
9	Software version No.	—	integer triple digit

- (1) LCD (Liquid Crystal Display) (4) Display Example  
 (2) DPF INHIBIT Switch (5) Item Number  
 (3) Parked Regeneration Switch (6) Value of item

9Y1211012ELS0010US0

## (3) Mode "b" (Error Information Clear Mode)



1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "b" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Error Information Clear mode is selected and the expression "PUSH" is displayed.
6. Press the parked regeneration switch (3) for more than 2 seconds.
7. The expression "OFF" is displayed.
8. Turn off the key switch.

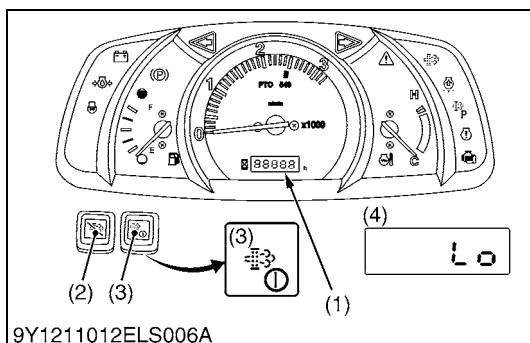
### ■ NOTE

- Be sure to clear error information by performing this procedure after servicing is finished.

- (1) LCD (Liquid Crystal Display) (3) Parked Regeneration Switch  
 (2) DPF INHIBIT Switch (4) Display Example

9Y1211012ELS0011US0

## (4) Mode "c" (Acceleration Sensor fine-adjustment Mode)



1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "c" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Acceleration sensor fine-adjustment mode is selected and the expression "Lo" is displayed.
6. Set the hand throttle lever to "IDLING" position. If voltage from acceleration sensor is within proper range, the expression "Lo" and "PUSH" is displayed alternately.
7. Press the parked regeneration switch (3) for more than 2 seconds.
8. If buzzer sounds shortly, the memorization for idling position is successfully completed.
9. The expression "HI" is displayed.
10. Set the hand throttle lever to "MAX" position. If voltage from acceleration sensor is within proper range, the expression "HI" and "PUSH" is displayed alternately.
11. Press the parked regeneration switch (3) for more than 2 seconds.
12. If buzzer sounds shortly, the memorization for max position is successfully completed.
13. The expression "OFF" is displayed.
14. Turn off the key switch.

### ■ NOTE

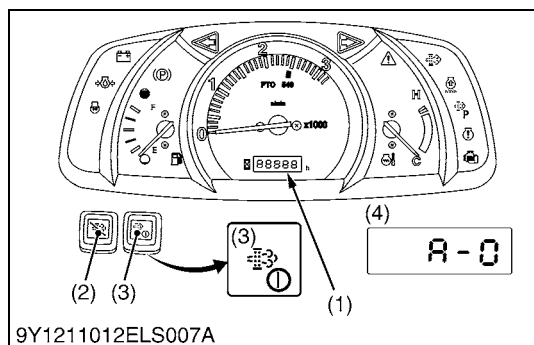
- If the error code E-75 is displayed, the voltage from acceleration sensor is not within proper range. Be sure to set hand throttle lever to "IDLING" or "MAX" position.
- In case although the hand throttle lever is in "NEUTRAL" or "MAX" position, the error code E-75 is displayed, readjust acceleration sensor attachment. (See page 1-S17.)

(1) LCD (Liquid Crystal Display)  
(2) DPF INHIBIT Switch

(3) Parked Regeneration Switch  
(4) Display Example

9Y1211012ELS0012US0

## (5) Mode "d" (Tractor Model Select Mode)



1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "d" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Tractor model select mode is selected.
6. Press the parked regeneration switch (3) to change the displayed code.  
The order is [A-0], [b-0], [A-1], [b-1].....
7. While desired code is displayed on LCD, press the parked regeneration switch (3) for more than 2 seconds.
8. The expression "OFF" is displayed.
9. Turn off the key switch.

Code	Detail
A-0	L3301 HST Model
b-0	L3301 Manual Transmission Model
A-1	L3901 HST Model
b-1	L3901 Manual Transmission Model
A-2	L4701 HST Model
b-2	L4701 Manual Transmission Model

### ■ IMPORTANT

- Choose proper code for the tractor by referring table above.

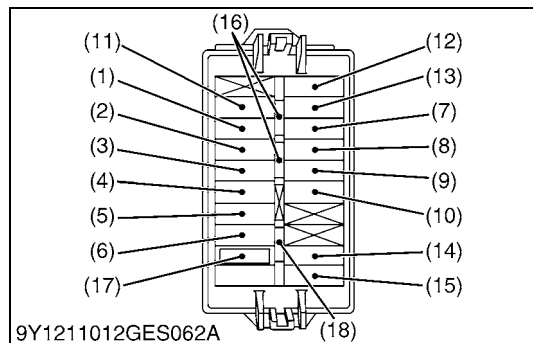
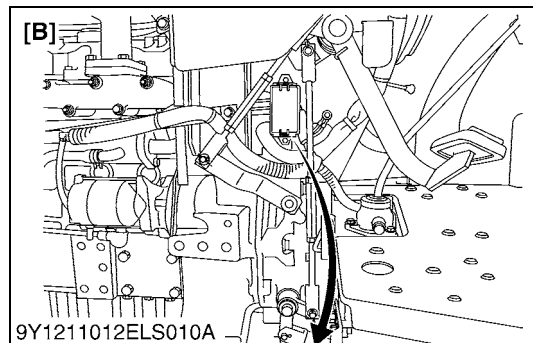
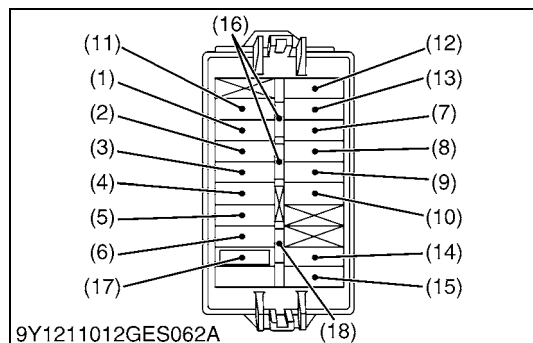
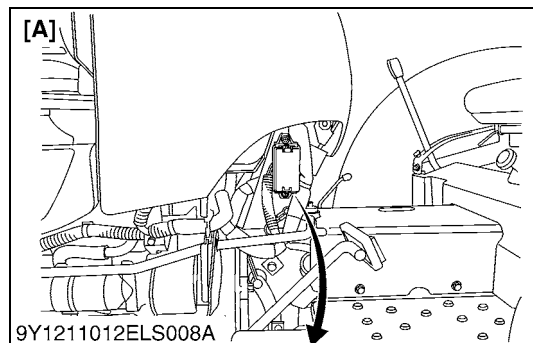
- (1) LCD (Liquid Crystal Display)  
(2) DPF INHIBIT Switch

- (3) Parked Regeneration Switch  
(4) Display Example

9Y1211012ELS0013US0

### [3] FUSES AND GROUND CABLE

#### (1) Checking Fuse and Connector



#### 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

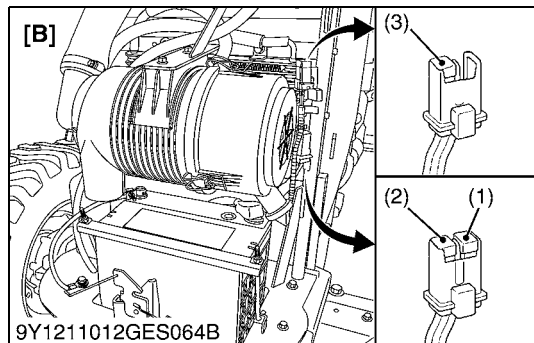
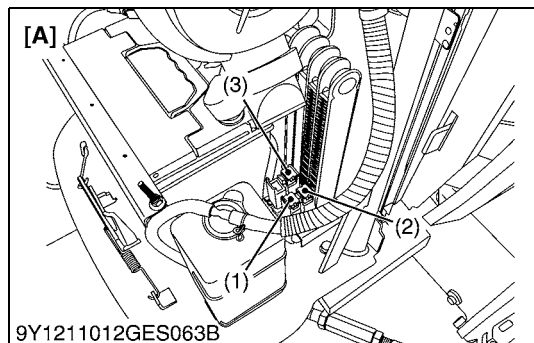
Fuse No.	Capacity (A)	Protected circuit
(1)	5	Engine ECU (Ignition key)
(2)	5	Main ECU (Ignition key)
(3)	5	Meter panel (Ignition key)
(4)	10	Combination switch
(5)	10	Work light
(6)	5	Starter relay
(7)	20	Engine ECU (Battery)
(8)	5	Main ECU (Battery)
(9)	5	Meter panel (Battery)
(10)	10	Hazard
(11)	5	Heater relay (if equipped)
(12)	10	Heater (Oil separator, IN 1) (if equipped)
(13)	10	Heater (Oil separator, IN 2) (if equipped)
(14)	10	Heater (Oil separator, OUT 1) (if equipped)
(15)	10	Heater (Oil separator, OUT 2)(if equipped)

(16) Spare Fuse  
(17) Fuse Puller  
(18) Spare Fuse

[A] L3301/L3901

[B] L4701

9Y1211012ELS0014US0



### 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.

#### [L3301/L3901]

No.	Capacity (A)	Protected circuit
(1)	40	Load
(2)	50	Battery
(3)	40	Heater (Oil separator) (if equipped)

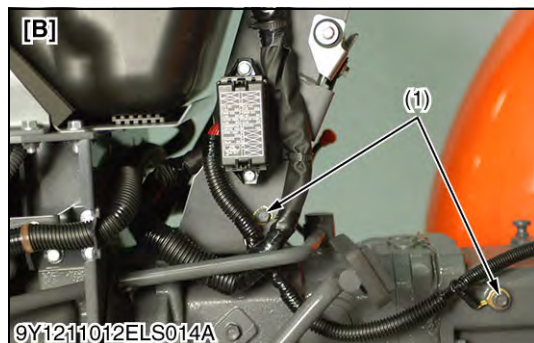
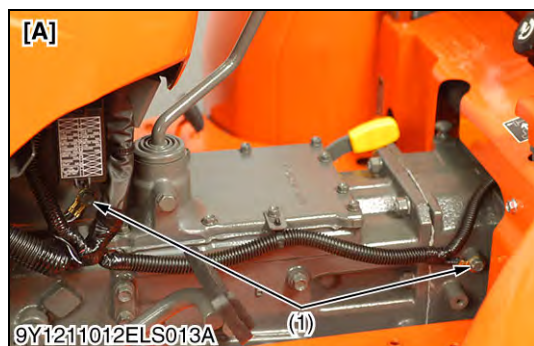
#### [L4701]

No.	Capacity (A)	Protected circuit
(1)	40	Load
(2)	60	Battery
(3)	40	Heater (Oil separator) (if equipped)

[A] L3301/L3901

[B] L4701

9Y1211012ELS0015US0



### 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

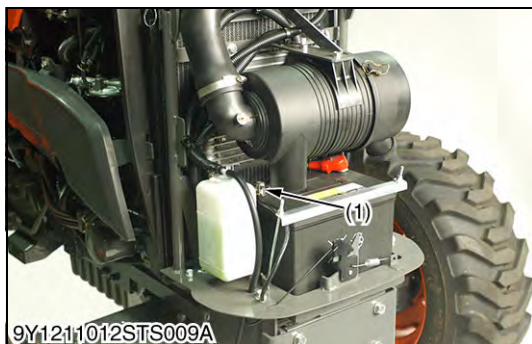
[A] Manual Transmission Model

[B] HST Model

9Y1211012ELS0016US0



## [4] ELECTRONIC INSTRUMENT PANEL

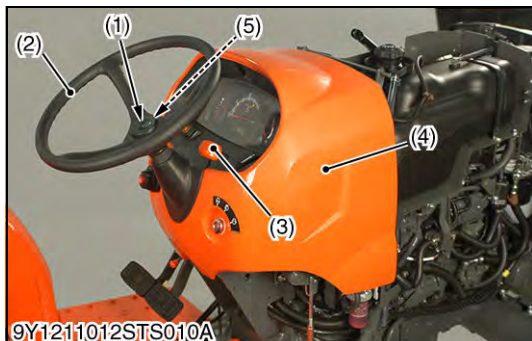


### Battery Negative Cable Terminal

1. Open the bonnet.
2. Disconnect the battery negative cable terminal connector (1).

- (1) Battery Negative Terminal Connector

9Y1211012STS0035US0



### Steering Wheel and Rear Bonnet

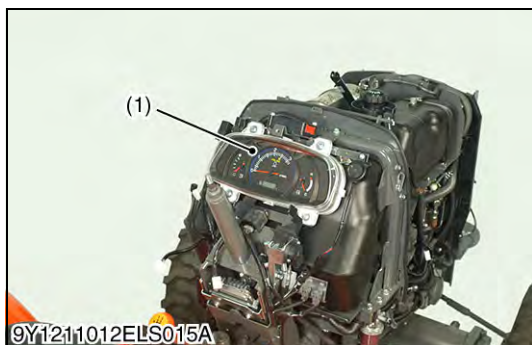
1. Remove steering wheel cap (1).
2. Remove steering wheel nut (5). Remove steering wheel (2) with steering puller.
3. Remove the throttle grip (3).
4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

- (1) Steering Wheel Cap  
(2) Steering Wheel  
(3) Throttle Grip

- (4) Rear Bonnet  
(5) Steering Wheel Nut

9Y1211012STS0036US0



### Electronic Instrument Panel

1. Remove electronic instrument panel (1).
2. Disconnect connector for electronic instrument panel (1).

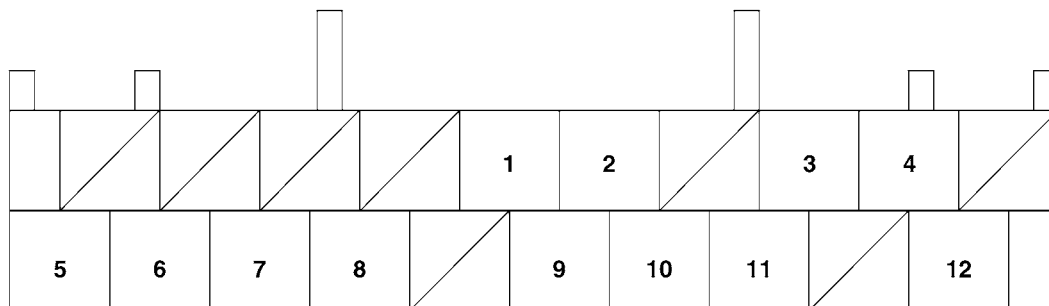
#### ■ NOTE

- When replacing the electronic instrument panel, perform the mode "d" adjustment. (See page 9-S15.)

- (1) Electronic Instrument Panel

9Y1211012ELS0017US0

## (1) Checking Electronic Instrument Panel Connector



9Y1211012ELS016A

### Connector of Wire Harness Side

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
1	L	Engine Oil Pressure Switch	7	GR	Buzzer
2	W/R	Alternator L Terminal	8	G/W	Head Light (Meter Panel Back Light)
3	R	Hazard/Turn Signal (LH)	9	R/L	IGN
4	R/W	Hazard/Turn Signal (RH)	10	Y/G	Fuel Lever Sensor
5	BR/W	CAN (L)	11	B/R	GND
6	BR	CAN (H)	12	R/Y	+12V (Power Source from Battery)

9Y1211012ELS0018US0



9Y1211012ELS017A

### Connector Voltage

#### ■ Main Voltage

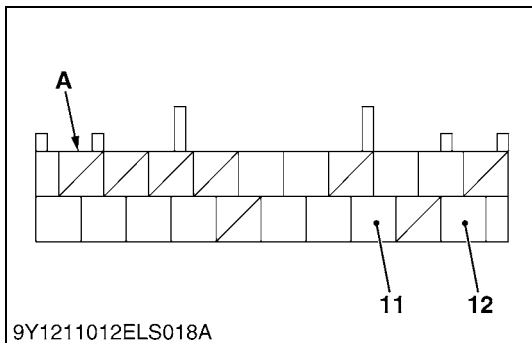
1. Measure the voltage between the terminal 12 (+) and terminal 11 (-).
2. If the voltage differs from the battery voltage (11 to 14 V), the battery, slow blow fuse, fuse or wiring harness is damaged.

Voltage	Terminal 12 – Terminal 11	Approx. battery voltage
---------	---------------------------	-------------------------

(1) Connector

**A: Connector of Wire Harness Side**

9Y1211012ELS0019US0



9Y1211012ELS018A

**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.

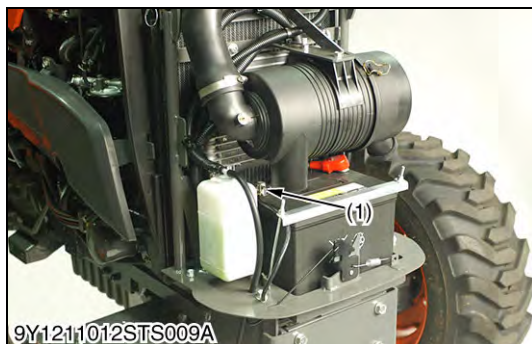
**■ IMPORTANT**

- **Connect connectors surely after checking.**

(1) Connector

9Y1211012ELS0020US0

## [5] MAIN ELECTRIC CONTROL UNIT (MAIN ECU)



### Battery Negative Cable Terminal

1. Open the bonnet.
2. Disconnect the battery negative cable terminal connector (1).

- (1) Battery Negative Terminal Connector

9Y1211012STS0035US0



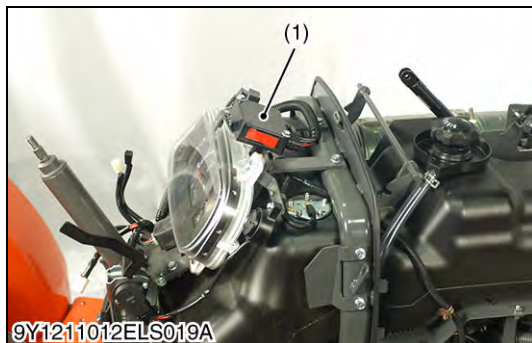
### Steering Wheel and Rear Bonnet

1. Remove steering wheel cap (1).
2. Remove steering wheel nut (5). Remove steering wheel (2) with steering puller.
3. Remove the throttle grip (3).
4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

- (1) Steering Wheel Cap                      (4) Rear Bonnet  
(2) Steering Wheel                        (5) Steering Wheel Nut  
(3) Throttle Grip

9Y1211012STS0036US0



### Main Electric Control Unit (Main ECU)

1. Remove electronic instrument unit (1).
2. Disconnect connector for main ECU (1).

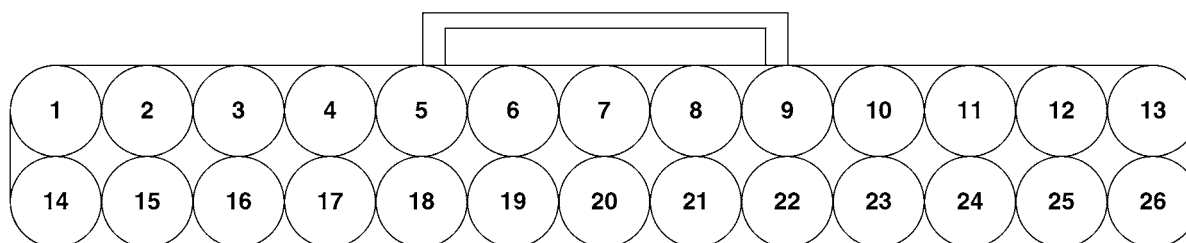
#### ■ NOTE

- When replacing the main ECU, perform mode "d" adjustment. (See page 9-S15.)

- (1) Main Electronic Control Unit

9Y1211012ELS0021US0

## (1) Checking Main Electrical Control Unit Connector

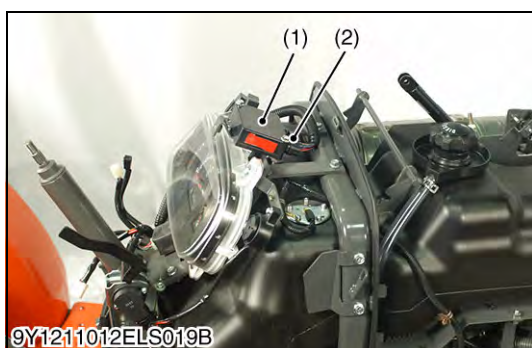


9Y1211012ELS020A

### Connector of Wire Harness Side

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
1	R/BR	Key Switch	14	W	DPF Regeneration Switch
2	L/W	DPF INHIBIT Switch	15	W/G	Parking Brake Sensor
3	B/Y	Shuttle Switch (Manual Transmission Model) HST Pedal Switch (HST Model)	16	B/R	Starter Relay
4	L/B	PTO Switch	17	V	RXD (for Check)
5	B/L	Seat Switch	18	P	TXD (for Check)
6	R/B	Seat Switch	19	SB	OPC Signal
7	BR/L	Acceleration Sensor (Main)	20	W/L	Acceleration Sensor (Sub)
8	G	DPF Regeneration Switch Lamp	21	B/G	DPF INHIBIT Switch Lamp
9	–	–	22	W	CAN (L)
10	L	PTO Switch	23	BR	CAN (H)
11	B/BR	GND	24	B/W	Acceleration Sensor (GND)
12	R/L	Acceleration Sensor (Power Supply)	25	R/W	IGN
13	P/L	PTO Solenoid (L4701 Only)	26	R	+12 V (Power Source from Battery)

9Y1211012ELS0022US0



9Y1211012ELS019B

### Connector Voltage

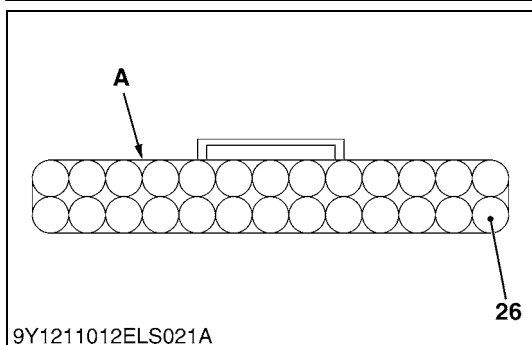
1. Disconnect the connector (2).
2. Measure the voltage between terminal **26** of the connector and chassis.
3. If the voltage differs from the battery voltage (11 to 14 V), battery, slow blow fuse, fuse or wiring harness is damaged.

Voltage	Terminal <b>26</b> – Chassis	Approx. battery voltage
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- (1) Main ECU
- (2) Main ECU Connector

**A: Connector of Wire Harness side**

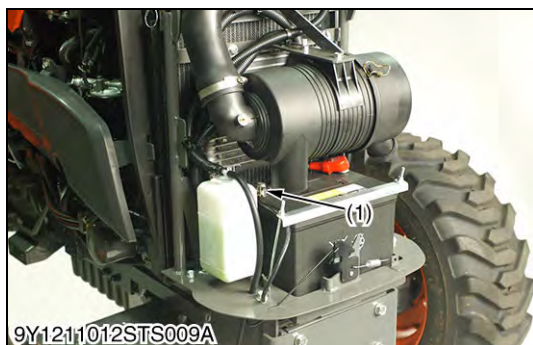
9Y1211012ELS0023US0



9Y1211012ELS021A



## [6] ENGINE ELECTRIC CONTROL UNIT (ENGINE ECU)

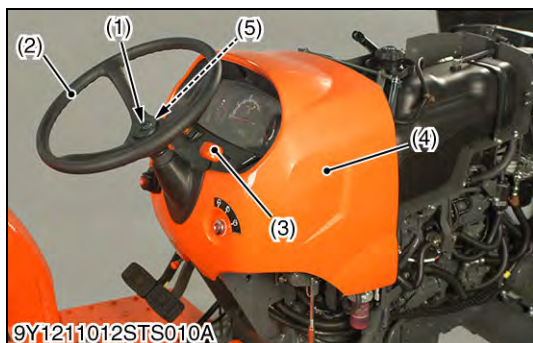


### Battery Negative Cable Terminal

1. Open the bonnet.
2. Disconnect the battery negative cable terminal connector (1).

(1) Battery Negative Terminal  
Connector

9Y1211012STS0035US0



### Steering Wheel and Rear Bonnet

1. Remove steering wheel cap (1).
2. Remove steering wheel nut (5). Remove steering wheel (2) with steering puller.
3. Remove the throttle grip (3).
4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

(1) Steering Wheel Cap

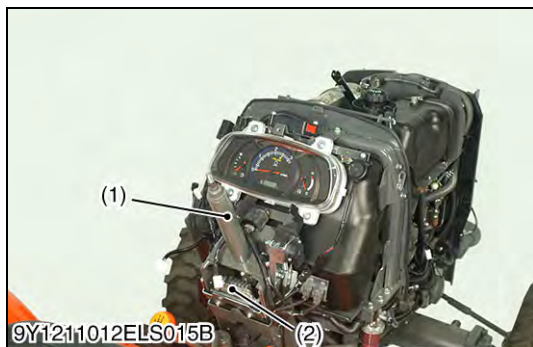
(4) Rear Bonnet

(2) Steering Wheel

(5) Steering Wheel Nut

(3) Throttle Grip

9Y1211012STS0036US0



### Engine Electric Control Unit (Engine ECU)

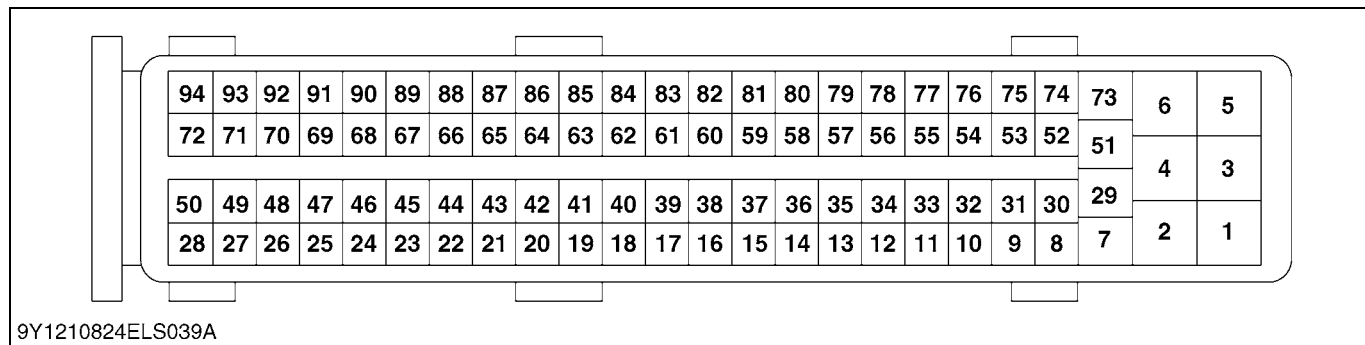
1. Remove steering post assembly (1).
2. Disconnect connector for engine electric control unit (2).
3. Remove engine ECU (2).

(1) Steering Post Assembly

(2) Main Electronic Control Unit

9Y1211012ELS0024US0

## (1) Checking Electric Control Unit Connector



No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
1	B	GND	48	—	—
2	B	GND	49	—	—
3	R	Injector #1 and #4 (+)	50	R/W	Engine ECU Main Relay (Coil Side)
4	R/G	Engine ECU Main Relay (Switch Side)	51	W/R	Injector #2 (-)
5	R/Y	Injector #2 and #3 (+)	52	—	—
6	R/B	Engine ECU Main Relay (Switch Side)	53	B	Air Flow Sensor (-)
7	W/B	Injector #4 (-)	54	Y/L	Rail Pressure Sensor (Signal)
8	B	Crankshaft Position Sensor (-)	55	W/B	Exhaust Gas Temperature Sensor T2 (-)
9	—	—	56	—	—
10	—	—	57	Y	Exhaust Gas Temperature Sensor T1
11	B/Y	Coolant Temperature Sensor (-)	58	—	—
12	—	—	59	GR	Exhaust Gas Temperature Sensor T0
13	B/W	DPF Differential Pressure Sensor (+)	60	—	—
14	—	—	61	W/V	Air Flow Sensor (Signal)
15	—	—	62	R	CAN2 (H)
16	—	—	63	B	CAN2 (L)
17	—	—	64	—	—
18	R	Intake Throttle Valve Position Sensor (+)	65	W/R	CAN1 (L)
19	—	—	66	BR	CAN1 (H)
20	S/B	OPC Signal	67	—	—
21	—	—	68	—	—
22	—	—	69	—	—
23	—	—	70	B/BR	Glow Relay (Coil Side)
24	—	—	71	R/B	Ignition Switch
25	—	—	72	—	—
26	—	—	73	W/L	Injector #1 (-)
27	—	—	74	—	—
28	—	—	75	W	Crankshaft Position Sensor (Signal)
29	W	Injector #3 (-)	76	G/B	Rail Pressure Sensor (-)
30	—	—	77	B/L	Exhaust Gas Temperature Sensor T2
31	—	—	78	—	—
32	R/GR	Rail Pressure Sensor (+)	79	P	Exhaust Gas Temperature Sensor T1 (-)
33	W/G	Coolant Temperature Sensor (Signal)	80	—	—
34	—	—	81	W/R	Exhaust Gas Temperature Sensor T0 (-)
35	—	—	82	W	Intake Throttle Valve Position Sensor (-)
36	Y/B	DPF Differential Pressure Sensor (-)	83	—	—
37	B/P	Intake Throttle Valve Position Sensor (Signal)	84	R/L	Intake Throttle Valve Motor (DC Motor +)

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
38	R/Y	DPF Differential Pressure Sensor (Signal)	85	R/G	Intake Throttle Valve Motor (DC Motor -)
39	R	Crankshaft Position Sensor (+)	86	Y/W	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	-	-

9Y1211012ELS0025US0



### Battery Voltage

1. Disconnect the connector of engine ECU (1).
2. Measure the voltage between terminal 50 of connector and chassis.
3. If the measurement is not approximately battery voltage, check the relating electric circuit.

Voltage	Terminal 50 – Chassis	Approx. battery voltage
9Y1210824ELS040B		

(1) Engine ECU

A: Connector of Harness Side

9Y1211012ELS0026US0



## [7] STARTING SYSTEM

### (1) Key Switch



#### Key Switch

1. Remove the steering wheel and rear bonnet.
2. Disconnect connector of key switch (1).
3. Performer following checking.

(1) Key Switch

9Y1211012ELS0027US0

#### 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), battery, slow blow fuse or wiring harness is damaged.

Voltage	Connector <b>B</b> terminal – Chassis	Approx. battery voltage
---------	---------------------------------------	-------------------------

A: Wire Harness Side Connector 4C

9Y1211012ELS0028US0

#### Key Switch at ON Position

1. Turn the key switch "ON" position.
2. Measure the resistance across the **B** terminal and the **AC** terminal.
3. If 0 ohm is not indicated, renew the key switch.

Resistance	<b>B</b> terminal – <b>AC</b> terminal	0 Ω
------------	--	-----

A: Key Switch Side Connector 4C

9Y1211012ELS0029US0

#### Key Switch at START Position

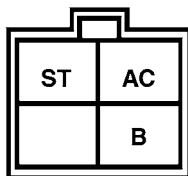
1. Turn and hold the key switch at the "START" position.
2. Measure the resistances across the **B** terminal and the **AC** terminal, and across the **B** terminal, and the **ST** terminal.
3. If 0 ohm is not indicated, renew the key switch

Resistance	<b>B</b> terminal – <b>AC</b> terminal	0 Ω
	<b>B</b> terminal – <b>ST</b> terminal	0 Ω

A: Key Switch Side Connector 4C

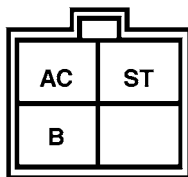
9Y1211012ELS0030US0

A



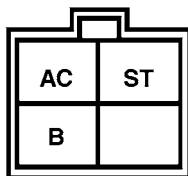
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A



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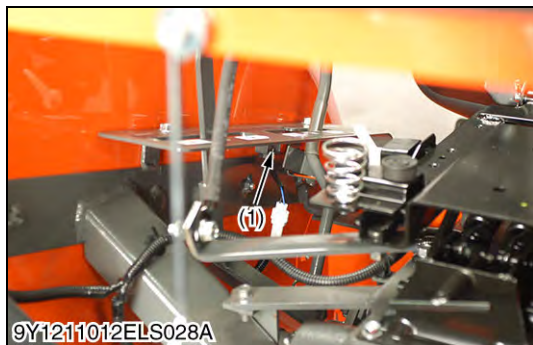
A



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## (2) Safety Switches

### [A] Shuttle Switch (Manual Transmission Model)



#### Shuttle Switch (Manual Transmission Model)

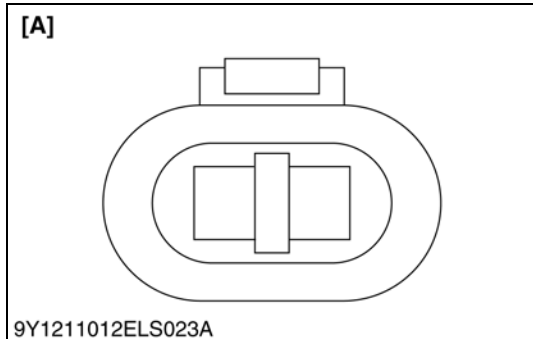
1. Remove connector of shuttle switch (1).
2. Measure the resistance across two terminals of the connector.
3. If measurement is different from following table, replace it.

Resistance (Across switch terminal)	When switch is pushed	0 $\Omega$
	When switch is released	Infinity

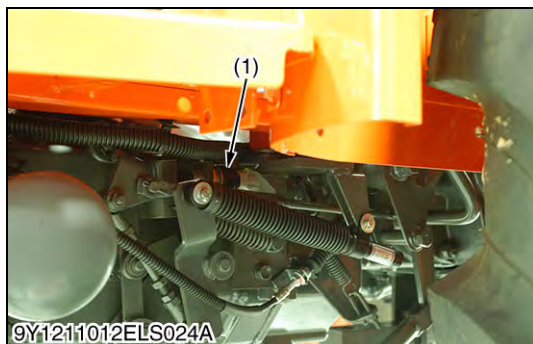
(1) Shuttle Switch

**[A] Shuttle Switch Side Connector 2P**

9Y1211012ELS0031US0



### [B] HST Pedal Switch (HST Model)



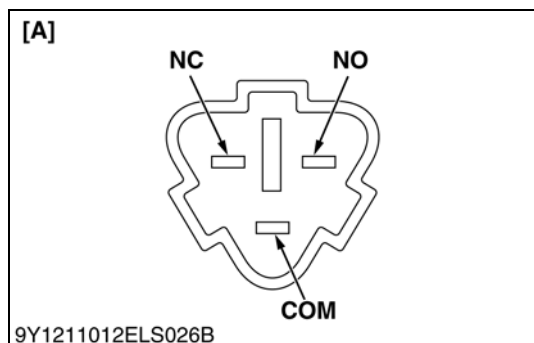
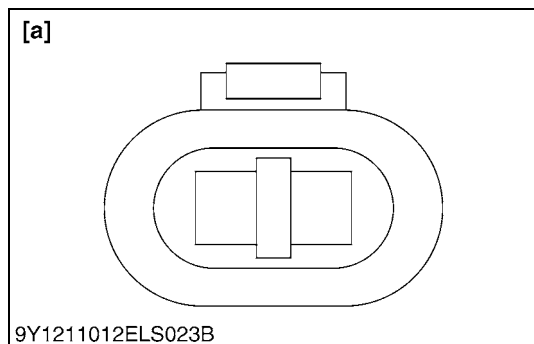
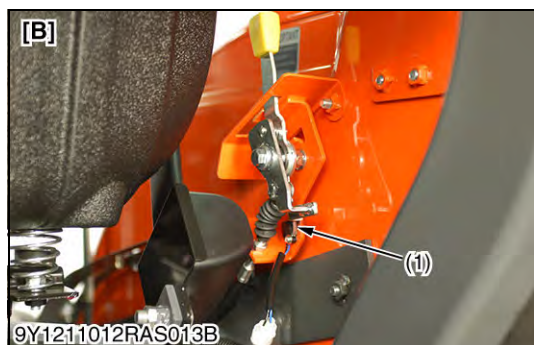
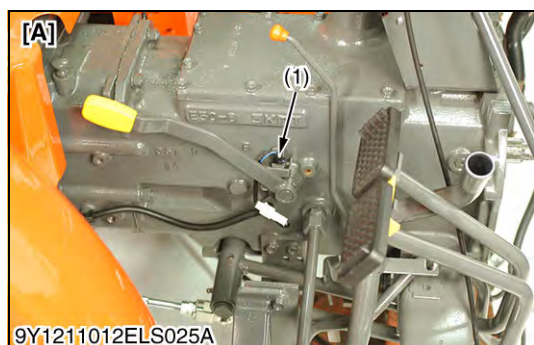
#### HST Pedal Switch (HST Model)

1. Remove connector of HST pedal switch (1).
2. Measure the resistance across two terminals of the connector.
3. If measurement is different from following table, replace it.

Resistance (Across switch terminal)	When switch is pushed	0 $\Omega$
	When switch is released	Infinity

(1) HST Switch

9Y1211012ELS0032US0

**[C] PTO Switch****PTO Switch (L3301/L3901)**

1. Remove connector of PTO switch (1).
2. Measure the resistance across two terminals of the connector.
3. If measurement is different from following table, replace it.

Resistance (Across switch terminal)	When switch is pushed	0 $\Omega$
	When switch is released	Infinity

(1) PTO Switch

**[A] Manual Transmission Model****[B] HST Model****[a] PTO Switch Side Connector 2P**

9Y1211012ELS0033US0

**PTO Switch (L4701)**

1. Remove connector of PTO switch (1).
2. Measure the resistance across two terminals of the connector referring table.
3. If measurement is different from following table, replace it.

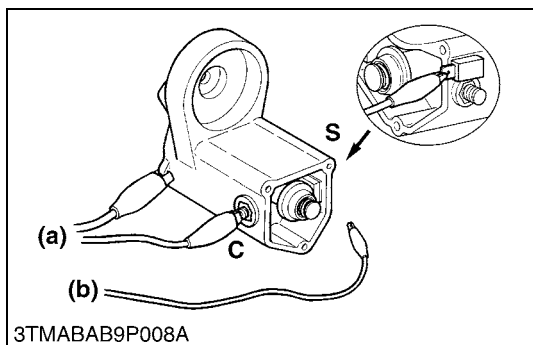
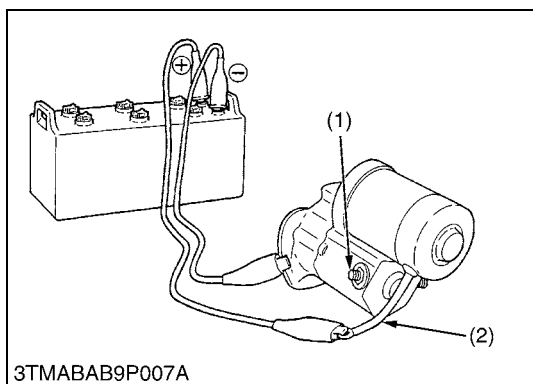
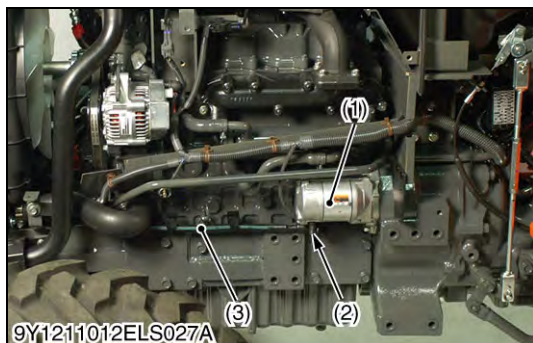
Resistance (Across switch terminal)	When switch is released	<b>NO</b> Terminal – <b>COM</b> Terminal	Infinity
		<b>NC</b> Terminal – <b>COM</b> Terminal	0 $\Omega$
	When switch is pushed	<b>NO</b> Terminal – <b>COM</b> Terminal	0 $\Omega$
		<b>NC</b> Terminal – <b>COM</b> Terminal	Infinity

(1) PTO Switch

**[A] PTO Switch Side Connector 2P**

9Y1211012ELS0034US0

### (3) 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 battery cable or battery ground cable.

Voltage	Factory specification	Approx. battery voltage
---------	-----------------------	-------------------------

- (1) Starter Motor  
(2) Starter **B** Terminal

- (3) Battery Cable

9Y1211012ELS0035US0

#### 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 operate, check the motor.

- (1) **C** Terminal

- (2) Connecting Lead

9Y1211012ELS0036US0

#### 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

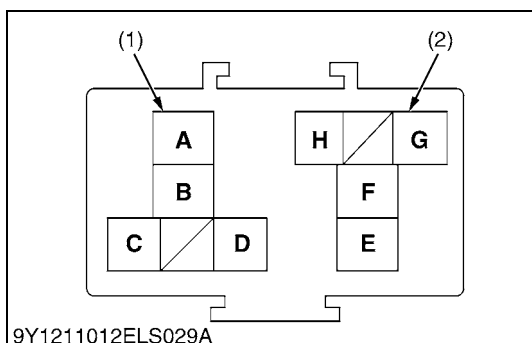
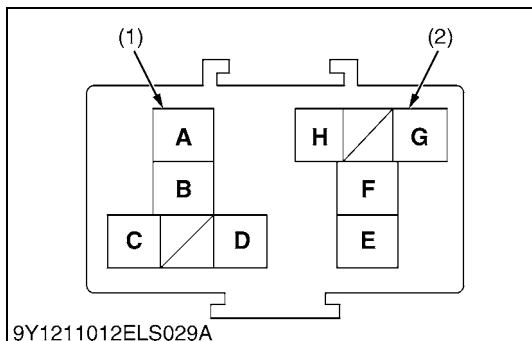
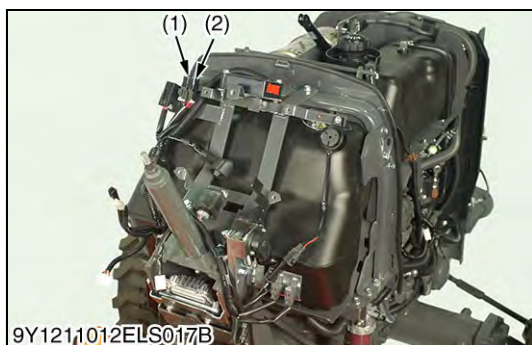
- **Testing time must be 3 to 5 seconds.**

- (a) To Negative Terminal

- (b) To Positive Terminal

9Y1211012ELS0037US0

## (4) Relays



### Starter Relay and Engine Relay

1. Remove relays (1), (2).

Relay	Terminal	Color of Wiring
Starter Relay	A	R
	B	B/W
	C	B/R
	D	B/W
Engine Relay	E	R
	F	R
	G	R/W
	H	R

#### NOTE

- Starter relay and engine relay are using same relay. When checking, be sure to check the color of wiring harness.

(1) Starter Relay

(2) Engine Relay

9Y1211012ELS0038US0

### Checking Connector Voltage

1. Measure the voltage with a voltmeter across the terminals following table below.
2. If the voltage is different from the battery voltage, battery, slow blow fuse, fuse or wiring harness is damaged.

#### Starter Relay

Voltage	A Terminal – Chassis	Approx. battery voltage
---------	----------------------	-------------------------

#### Engine Relay

Voltage	F Terminal – Chassis	Approx. battery voltage
	H Terminal – Chassis	

(1) Starter Relay

(2) Engine Relay

9Y1211012ELS0039US0

### Checking Coil Resistance of Relay

1. Measure the resistance with a ohmmeter across the terminal 1 and terminal 2.
2. If the resistance is remarkably different from the following table or there is no resistance, the relay is damaged.

#### Starter Relay

Resistance	1 terminal – 2 terminal	Approx. 120 $\Omega$
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(1) Relay

9Y1211012ELS0040US0

### Functional Check

#### NOTE

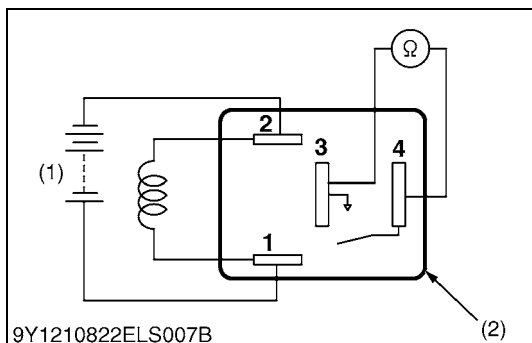
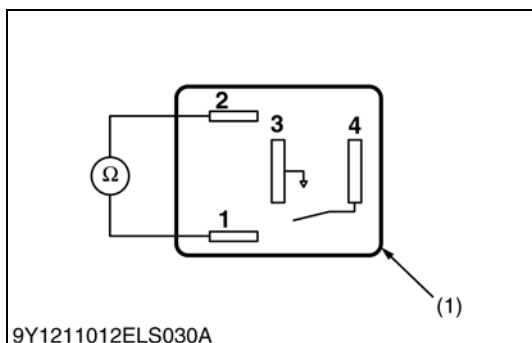
- The relays described here are used same ones so that these are interchangeable.

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

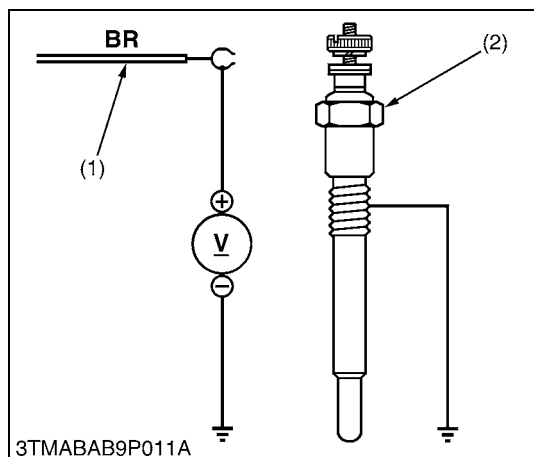
(2) Connector (Relay)

9Y1211012ELS0041US0





## (5) Glow Control System



### Glow Plug Lead Terminal Voltage

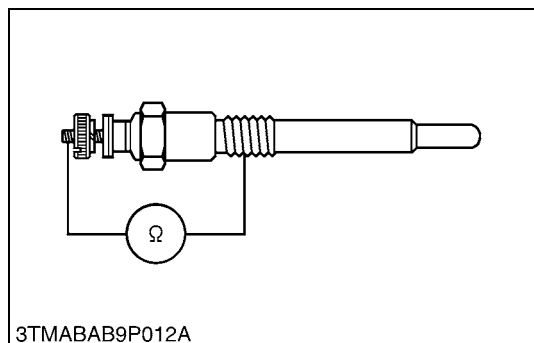
1. Disconnect the wiring lead (1) from the glow plug (2) after turning the main switch off.
2. Turn the main switch key to the "ON" position, and measure the voltage between the lead terminal and the chassis.
3. If the voltage is different from the battery voltage, some parts in the glow circuit is damaged.

Voltage (Lead terminal – Chassis	Main switch key at "ON"	Approx. battery voltage
--	-------------------------	-------------------------

(1) Wiring Lead (Positive)

(2) Glow Plug

9Y1211012ELS0042US0



### 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 damaged.

Glow plug resistance	Factory specification	Approx. 0.9 Ω
----------------------	-----------------------	---------------

9Y1211012ELS0043US0

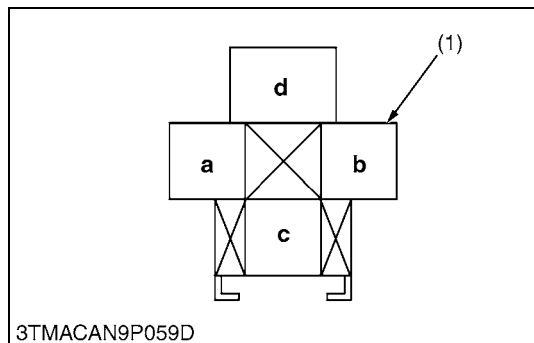


### Glow Relay

1. Remove the glow relay (1).

(1) Glow Relay

9Y1211012ELS0044US0



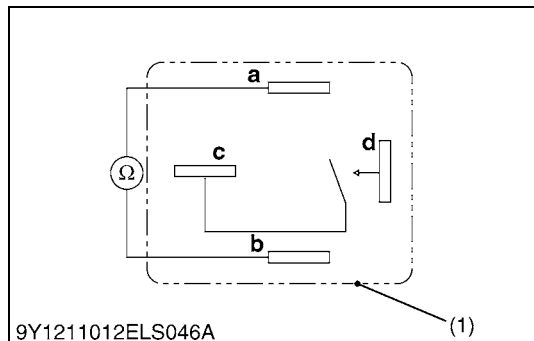
### Checking Connector Voltage

1. Measure the voltage with a voltmeter across the terminals following table below.
2. If the voltage is different from the battery voltage, battery, slow blow fuse, fuse, engine relay or wiring harness is damaged.

Voltage	d terminal – Chassis	Approx. battery voltage
---------	----------------------	-------------------------

(1) Connector (Wiring Harness Side)

9Y1211012ELS0045US0



### Checking Coil Resistance of Relay

1. Measure the resistance with a ohmmeter across the terminal **a** and terminal **b**.
2. If the resistance is remarkably different from the following table or there is no resistance, the relay is damaged

Resistance	a terminal – b terminal	Approx. 100 Ω
------------	-------------------------	---------------

(1) Glow Relay

9Y1211012ELS0046US0

## [8] OPC (OPERATOR PRESENCE CONTROL) SYSTEM

### (1) L3301/L3901

#### <Manual Transmission Model>

##### ■ Preparation before checking

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the main gear shift lever and the synchro shuttle shift lever to **"NEUTRAL"** position.
4. Shift the PTO gear shift lever to **"OFF"** position.
5. Fully depress the clutch pedal and start the engine.
6. Check the OPC system by following four steps listed in the table below.

##### ■ IMPORTANT

- Be sure to set main gear shift lever to **"NEUTRAL"** position.

#### Checking System

Step	PTO Gear Shift Lever	Synchro Shuttle Shift Lever	Operator	OPC System is "NORMAL" If
1	<b>"OFF"</b> (Switch: <b>ON</b> )	<b>"FORWARD"</b> or <b>"REVERSE"</b> (Switch: <b>OFF</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
2	<b>"ON"</b> (Switch: <b>OFF</b> )	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
3	<b>"OFF"</b> (Switch: <b>ON</b> )	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine does not stop
4	<b>"OFF"</b> (Switch: <b>ON</b> )	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets off the tractor, tilts the seat forward, and then place PTO gear shift lever to <b>ON</b> position (Seat switch: <b>ON</b> )	Engine does not stop

9Y1211012ELS0047US0

#### <HST Model>

##### ■ Preparation before checking

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the range gear shift lever and release the HST pedal to **"NEUTRAL"** position.
4. Shift the PTO gear shift lever to **"OFF"** position.
5. Fully depress the clutch pedal and start the engine.
6. Check the OPC system by following four steps listed in the table below.

##### ■ IMPORTANT

- Be sure to set range gear shift lever to **"NEUTRAL"** position.

#### Checking System

Step	PTO Gear Shift Lever	HST Pedal	Operator	OPC System is "NORMAL" If
1	<b>"OFF"</b> (Switch: <b>ON</b> )	<b>"FORWARD"</b> or <b>"REVERSE"</b> (Switch: <b>OFF</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
2	<b>"ON"</b> (Switch: <b>OFF</b> )	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
3	<b>"OFF"</b> (Switch: <b>ON</b> )	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine does not stop
4	<b>"OFF"</b> (Switch: <b>ON</b> )	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets off the tractor, tilts the seat forward, and then place PTO gear shift lever to <b>ON</b> position (Seat switch: <b>ON</b> )	Engine does not stop

9Y1211012ELS0048US0

**(2) L4701****<Manual Transmission Model>****■ Preparation before checking**

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the main gear shift lever and the synchro shuttle shift lever to **"NEUTRAL"** position.
4. Shift the PTO clutch control switch to **"OFF"** position.
5. Fully depress the clutch pedal and start the engine.
6. Check the OPC system by following four steps listed in the table below.

**■ IMPORTANT**

- Be sure to set main gear shift lever to **"NEUTRAL"** position.

**Checking System**

Step	PTO Clutch Control Switch	Synchro Shuttle Shift Lever	Operator	OPC System is "NORMAL" If
1	<b>"OFF"</b>	<b>"FORWARD"</b> or <b>"REVERSE"</b> (Switch: <b>OFF</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
2	<b>"ON"</b>	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
3	<b>"OFF"</b>	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine does not stop
4	<b>"OFF"</b>	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets off the tractor, tilts the seat forward, and then place PTO clutch control switch in <b>ON</b> position (Seat switch: <b>ON</b> )	Engine does not stop

9Y1211012ELS0049US0

**<HST Model>****■ Preparation before checking**

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the range gear shift lever and release the HST pedal to **"NEUTRAL"** position.
4. Shift the PTO clutch control switch to **"OFF"** position.
5. Start the engine.
6. Check the OPC system by following four steps listed in the table below.

**■ IMPORTANT**

- Be sure to set range gear shift lever to **"NEUTRAL"** position.

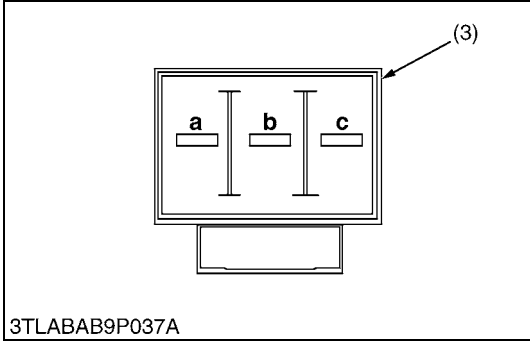
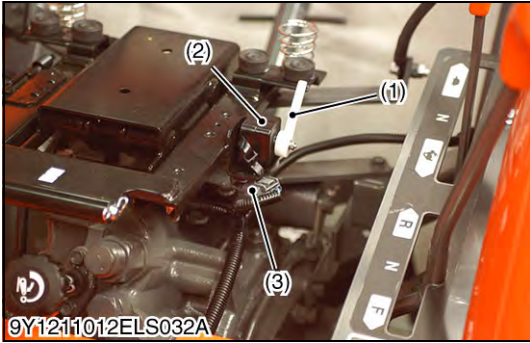
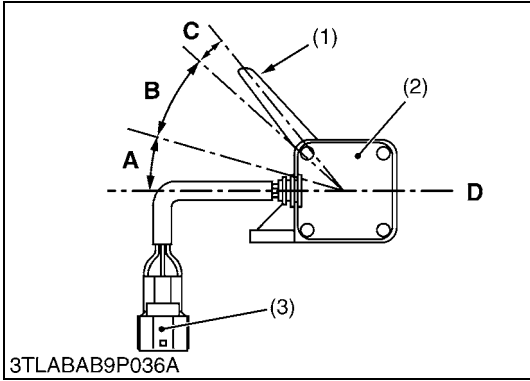
**Checking System**

Step	PTO Clutch Control Switch	HST Pedal	Operator	OPC System is "NORMAL" If
1	<b>"OFF"</b>	<b>"FORWARD"</b> or <b>"REVERSE"</b> (Switch: <b>OFF</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
2	<b>"ON"</b>	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine stops
3	<b>"OFF"</b>	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets up from the seat (Seat switch: <b>OFF</b> )	Engine does not stop
4	<b>"OFF"</b>	<b>"NEUTRAL"</b> (Switch: <b>ON</b> )	Gets off the tractor, tilts the seat forward, and then place PTO clutch control switch in <b>ON</b> position (Seat switch: <b>ON</b> )	Engine does not stop

9Y1211012ELS0050US0



(3) Safety Switch  
[A] Seat Switch



Checking Seat Switch

1. Remove the seat.
2. Disconnect the seat switch connector (3).
3. Change the sensor bar angle (1) and measure the resistance between connector terminals, referring to the table below.
4. If the measurement does not between as table, switch is damaged.

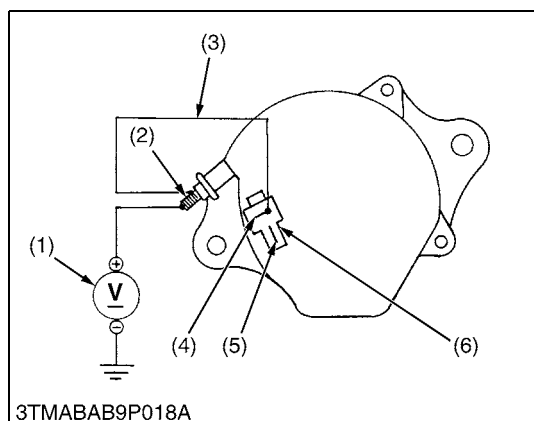
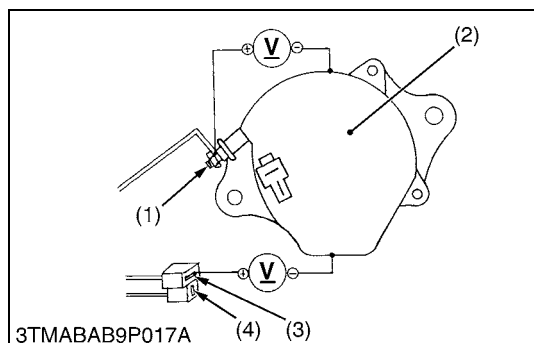
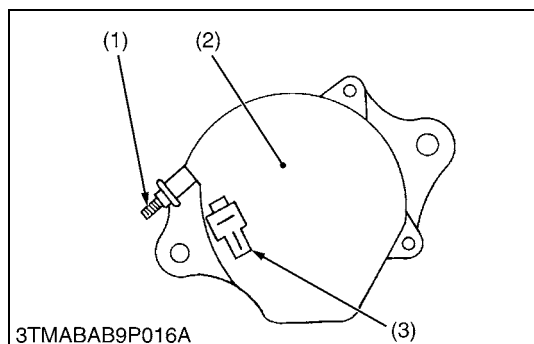
Sensor bar angle	Measuring terminal	Resistance
Approx. 18 ° (Angle A)	a – c	0 Ω
	a – b, b – c	Infinity
Approx. 25 ° (Angle B)	a – b, a – c, b – c	Infinity
Approx. 5 ° (Angle C)	b – c	0 Ω
	a – b, a – c	Infinity

- (1) Sensor Bar  
(2) Seat Switch  
(3) Seat Switch Connector

D: Reference Line  
(Seat Suspension Plate Line)

9Y1211012ELS0051US0

## [9] CHARGING SYSTEM



### Alternator

1. Disconnect the **2P** connector (3) from alternator after turning the key switch "**OFF**".
2. Perform the following checkings.

- (1) **B** Terminal (3) **2P** Connector  
(2) Alternator

9Y1211012ELS0052US0

### Connector Voltage

1. Turn the key switch "**OFF**". Measure the voltage between the **B** terminal (1) and the chassis.
2. Turn the key switch "**ON**". Measure the voltage between the **IG** terminal (3) and the chassis.

Voltage (Key switch at <b>OFF</b> )	<b>B</b> terminal – Chassis	Approx. battery voltage
Voltage (Key switch at <b>ON</b> )	<b>IG</b> terminal – Chassis	Approx. battery voltage

- (1) **B** Terminal (3) **IG** Terminal  
(2) Alternator (4) **L** Terminal

9Y1211012ELS0053US0

### No-Load Test

1. Connect the **2P** connector (6) to previous positions of the alternator after turning the key 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
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### (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 (4) **IG** Terminal  
(2) **B** Terminal (5) **L** Terminal  
(3) Jumper Lead (6) **2P** Connector

9Y1211012ELS0054US0

# [10] LIGHTING SYSTEM

## (1) Combination Light Switch

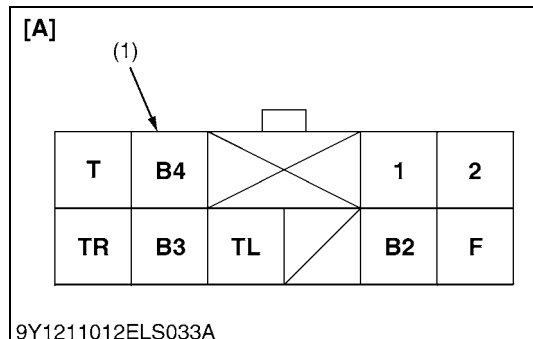


### Combination Light Switch

1. Remove steering wheel and rear bonnet.
2. Disconnect connector of combination light switch (1).
3. Perform following checking.

- (1) Combination Light Switch

9Y1211012ELS0055US0



### Connector Voltage

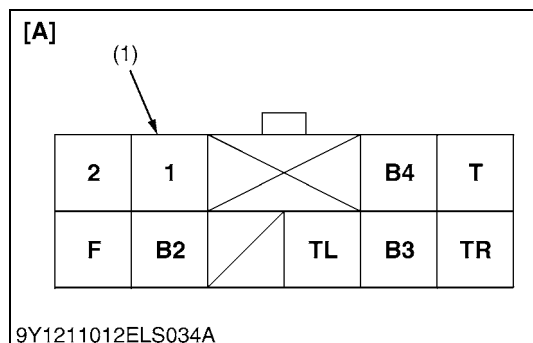
1. Measure the voltage with a voltmeter across the connector **B2** terminal and chassis when key switch is at **"OFF"** position.
2. Measure the voltage with a voltmeter across the connector **B3** and chassis, **B4** terminal and chassis when key switch is at **"ON"** position.
3. If the voltage is different from battery voltage, battery, slow blow fuse, fuse, key switch or wiring harness is damaged.

Voltage	Key switch at <b>"OFF"</b> position	<b>B2</b> terminal – Chassis	Approx. battery voltage
	Key switch at <b>"ON"</b> position	<b>B3</b> terminal – Chassis <b>B4</b> terminal – Chassis	

- (1) **10P** Connector  
(Combination Light Switch)

### [A] Connector (Wiring Harness Side)

9Y1211012ELS0056US0



### Checking Hazard Light Function

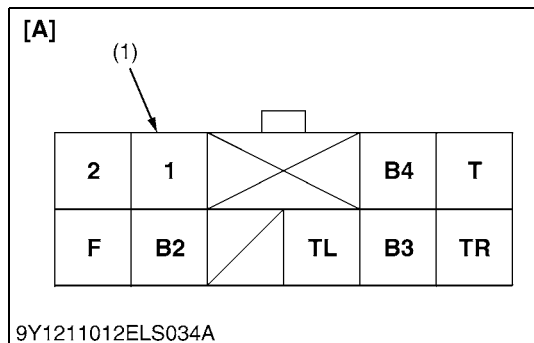
1. Measure the resistance with an ohmmeter across **B2** terminal and **F** terminal when hazard switch is at **"OFF"** position.
2. Measure the resistance with an ohmmeter across **B2** terminal and **F** terminal when hazard switch is in **"ON"** position.
3. If measured value is different from table below, the combination light switch is damaged.

Resistance	Hazard switch at <b>"OFF"</b> position	<b>B2</b> terminal – <b>F</b> terminal	Infinity
	Hazard switch at <b>"ON"</b> position		0 $\Omega$

- (1) **10P** Connector  
(Combination Light Switch)

### [A] Connector (Switch Side)

9Y1211012ELS0057US0



### Checking Turn Signal Function

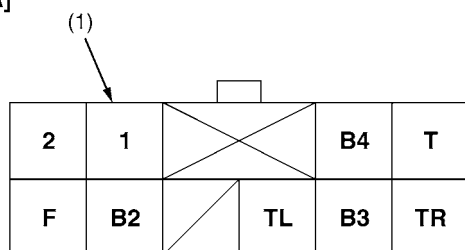
1. Measure the resistance with an ohmmeter across **B3** terminal and **TR** terminal, **B3** terminal and **TL** terminal when turn signal light switch is at "**OFF**" position.
2. Measure the resistance with an ohmmeter across **B3** terminal and **TR** terminal, **B3** terminal and **TL** terminal when turn signal light switch is at "**RIGHT**" position.
3. Measure the resistance with an ohmmeter across **B3** terminal and **TR** terminal, **B3** terminal and **TL** terminal when turn signal light switch is at "**LEFT**" position.
4. If measured value is different from table below, the combination light switch is damaged.

Resistance	Turn signal light switch at " <b>OFF</b> " position	<b>B3</b> terminal – <b>TR</b> terminal	Infinity
		<b>B3</b> terminal – <b>TL</b> terminal	Infinity
	Turn signal light switch at " <b>RIGHT</b> " position	<b>B3</b> terminal – <b>TR</b> terminal	0 Ω
		<b>B3</b> terminal – <b>TL</b> terminal	Infinity
	Turn signal light switch at " <b>LEFT</b> " position	<b>B3</b> terminal – <b>TR</b> terminal	Infinity
		<b>B3</b> terminal – <b>TL</b> terminal	0 Ω

(1) **10P** Connector  
(Combination Light Switch)

**[A] Connector (Switch Side)**

9Y1211012ELS0058US0

**[A]**

9Y1211012ELS034A

**Checking Head Light Function**

1. Measure the resistance with an ohmmeter across **B4** terminal and **T** terminal, **B4** terminal and **1** terminal, **B4** terminal and **2** terminal when head light switch is at "**OFF**" position.
2. Measure the resistance with an ohmmeter across **B4** terminal and **T** terminal, **B4** terminal and **1** terminal, **B4** terminal and **2** terminal when head light switch is at "**ON (LOW)**" position.
3. Measure the resistance with an ohmmeter across **B4** terminal and **T** terminal, **B4** terminal and **1** terminal, **B4** terminal and **2** terminal when head light switch is at "**ON (HIGH)**" position.
4. If measured value is different from table below, the combination light switch is damaged.

Resistance	Head light switch at " <b>OFF</b> " position	<b>B4</b> terminal – <b>T</b> terminal	Infinity
		<b>B4</b> terminal – <b>1</b> terminal	Infinity
		<b>B4</b> terminal – <b>2</b> terminal	Infinity
	Head light switch at " <b>ON (LOW)</b> " position	<b>B4</b> terminal – <b>T</b> terminal	0 Ω
		<b>B4</b> terminal – <b>1</b> terminal	0 Ω
		<b>B4</b> terminal – <b>2</b> terminal	Infinity
	Head light switch at " <b>ON (HIGH)</b> " position	<b>B4</b> terminal – <b>T</b> terminal	0 Ω
		<b>B4</b> terminal – <b>1</b> terminal	Infinity
		<b>B4</b> terminal – <b>2</b> terminal	0 Ω

(1) **10P** Connector  
(Combination Light Switch)

**[A] Connector (Switch Side)**

9Y1211012ELS0059US0

**(2) Flasher Unit**

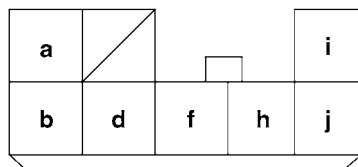
9Y1211012ELS017D

**Flasher Unit**

1. Remove steering wheel and rear bonnet.
2. Disconnect connector of flasher unit (1).
3. Perform following checking.

(1) Flasher Unit

9Y1211012ELS0060US0

**[A]**

9Y1211012ELS035A

**Connector Voltage**

1. Measure the voltage with a voltmeter across the connector **h** terminal and chassis.
2. Measure the resistance with a ohmmeter across the connector **a** terminal and chassis.
3. If the measurement value is different from table below, battery, slow blow fuse, fuse or wiring harness is damaged.

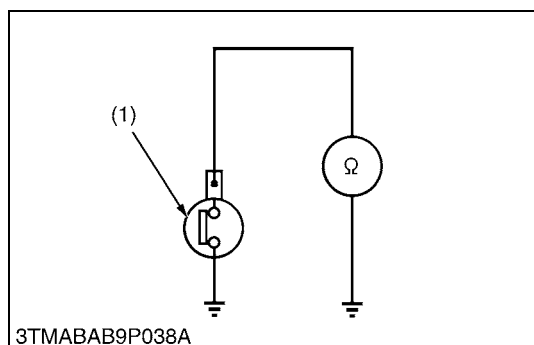
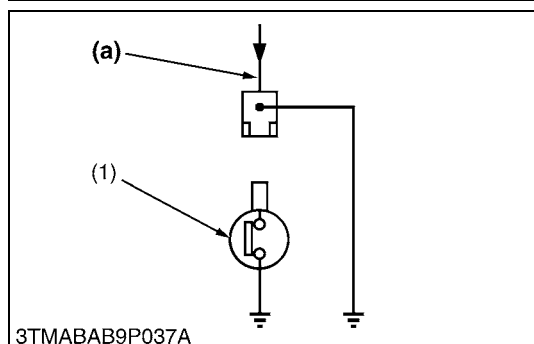
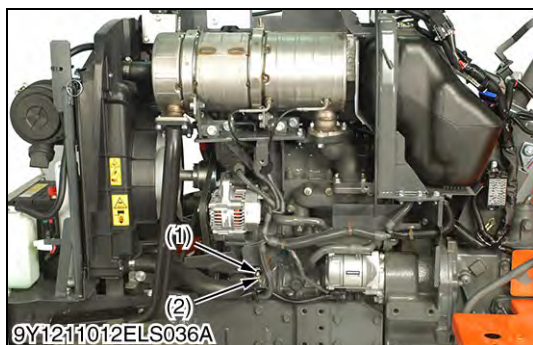
Voltage	<b>h</b> terminal – Chassis	Approx. battery voltage
Resistance	<b>a</b> terminal – Chassis	0 Ω

(1) **8P** Connector (Flasher Unit)

**[A] Connector (Wiring Harness Side)**

9Y1211012ELS0061US0

## [11] WARNING LAMP



### 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 damaged.

- (1) Engine Oil Pressure Switch  
(2) Switch Lead

(a) From Oil Pressure Lamp

9Y1211012ELS0062US0

### 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 damaged.
3. If infinity is not indicated at pressure over 50 kPa (0.5 kgf/cm<sup>2</sup>, 7 psi), the switch is damaged.

Resistance (Switch terminal – Chassis)	In normal state	0 Ω
	At pressure over approx. 50 kPa (0.5 kgf/cm <sup>2</sup> , 7 psi)	Infinity

- (1) Engine Oil Pressure Switch

9Y1211012ELS0063US0

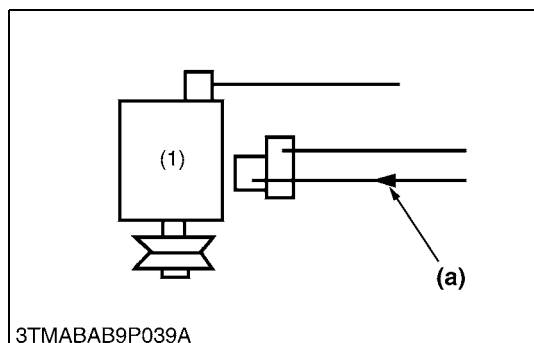
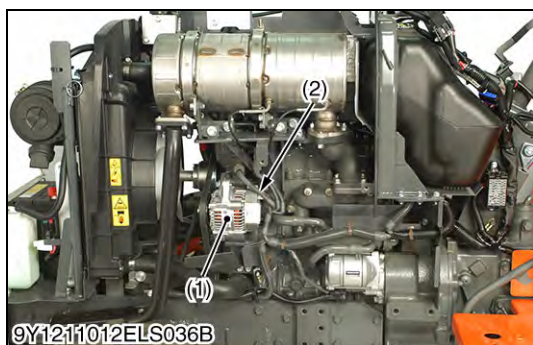
### Charging Circuit (Panel Board and Wiring Harness)

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 damaged.

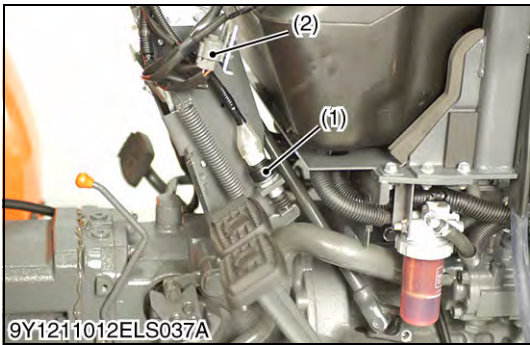
- (1) Alternator  
(2) 2P Connector

(a) From Charge Lamp

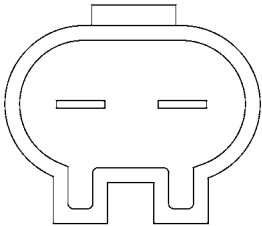
9Y1211012ELS0064US0



[12] MONITOR LAMP

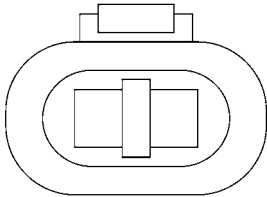


[A]

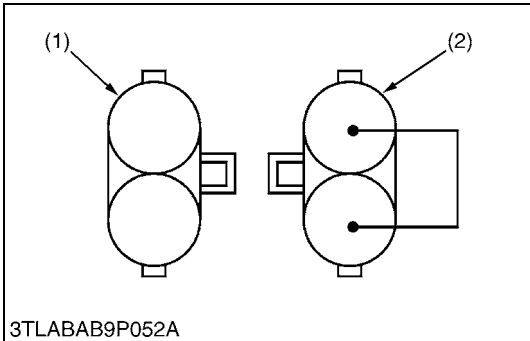


9Y1211012ELS038A

[B]



9Y1211012ELS039A



**Parking Brake Switch**

- 1. Disconnect the connector from the parking brake switch (1) after turning the main switch "OFF".
- 2. Measure the resistance across the two terminals of parking brake switch following table below.
- 3. If measurement value is different from table, the parking switch is damaged.

Resistance	When switch is released	0 Ω
	When switch is pushed	Infinity

- (1) Parking Brake Switch [A] L3301/L3901
- (2) Connector of Parking Brake Switch [B] L4701

9Y1211012ELS0065US0

**Parking Brake Switch and Wiring Harness**

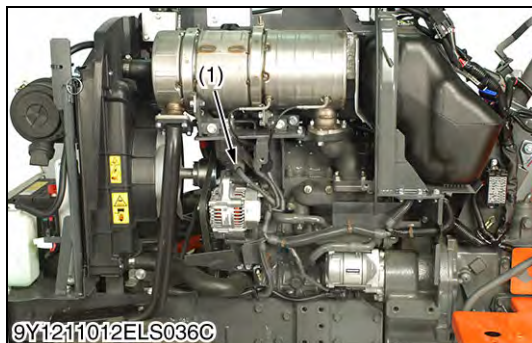
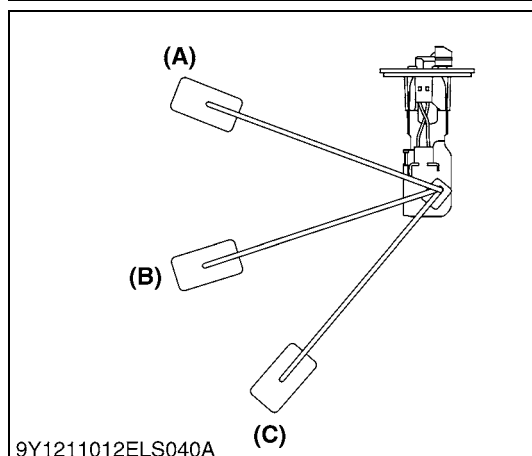
- 1. Disconnect the connector from the parking brake switch after turning the main switch "OFF".
- 2. Turn the main switch "ON" and connect a jumper lead between the connector terminals of wiring harness.
- 3. If the parking brake indicator lamp does not light, the panel circuit or wiring harness is damaged.

- (1) Connector of Parking Brake Switch (2) Connector of Wiring Harness

9Y1211012ELS0066US0



## [13] GAUGES



### Checking Fuel Level Sensor

1. Remove fuel level sensor from fuel tank.
2. Measure the resistance with an ohmmeter across the terminal of fuel level sensor and chassis.
3. If the measurement is remarkably different from table below, the fuel level sensor is damaged.

Resistance (Across sensor terminal and chassis)	Factory specifica- tion	Float at uppermost position	1.0 to 5.0 $\Omega$
		Float at middle position	32.5 $\Omega$
		Float at lowermost position	103 to 117 $\Omega$

(1) Fuel Unit

(A) Float at Uppermost Position

(B) Float at Middle Position

(C) Float at Lowermost Position

9Y1211012ELS0067US0

### 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 damaged.

Resistance (sensor Terminal 1 – Terminal 2)	Reference value	Temperature	Resistance
		-20 °C (-4 °F)	15.04 k $\Omega$
		0 °C (32 °F)	5.74 k $\Omega$
		20 °C (68 °F)	2.45 k $\Omega$
		40 °C (104 °F)	1.15 k $\Omega$
		60 °C (140 °F)	0.58 k $\Omega$
		80 °C (176 °F)	0.32 k $\Omega$
		100 °C (212 °F)	0.18 k $\Omega$
		120 °C (248 °F)	0.11 k $\Omega$

(1) Coolant Temperature Sensor

9Y1211012ELS0068US0



[14] ENGINE CONTROL SYSTEM

(1) Injector

■ IMPORTANT

- When replacing the engine ECU, be sure to do injector correction. (Refer to the "DIAGNOSIS MANUAL" (9Y110-02420))

9Y1211012ELS0069US0



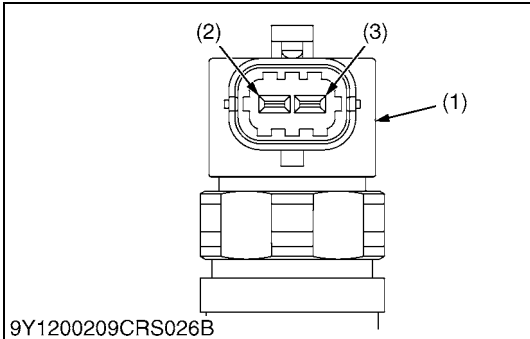
Injector Resistance

- Measure the resistance with an ohmmeter across the terminals shown in the table below.
- If the reference value is not indicated, the injector wire harness or injector is damaged.

Resistance	Terminal 1 – 2	0.215 to 0.295 Ω
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- (1) Injector
- (3) Terminal 2
- (2) Terminal 1

9Y1211012ELS0070US0

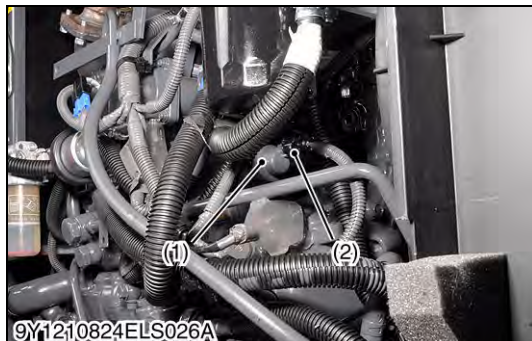


## (2) SCV (Suction Control Valve)

### ■ NOTE

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the SCV resistance.

9Y1211012ELS0071US0



### Connector Voltage

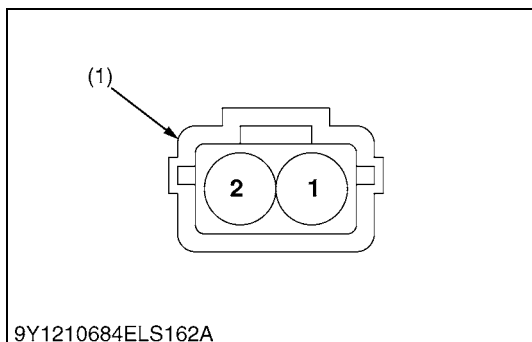
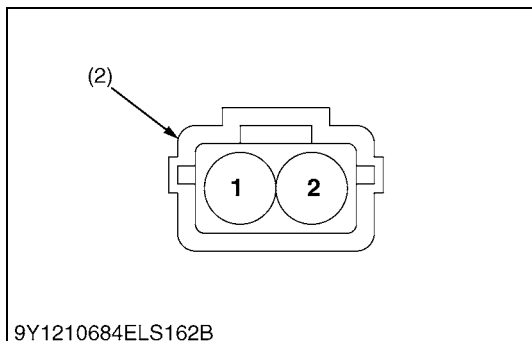
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 2 – Chassis	Approx. battery voltage
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(1) SCV (Suction Control Valve)

(2) Connector (Harness Side)

9Y1211012ELS0072US0



### SCV Resistance

- Measure the resistance with an ohmmeter across the terminals shown in the table below.
- If the reference value is not indicated, the SCV is damaged.

Resistance	at 20 °C (68 °F)	Terminal 1 – 2	2.60 to 3.15 Ω
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(1) Connector (SCV Side)

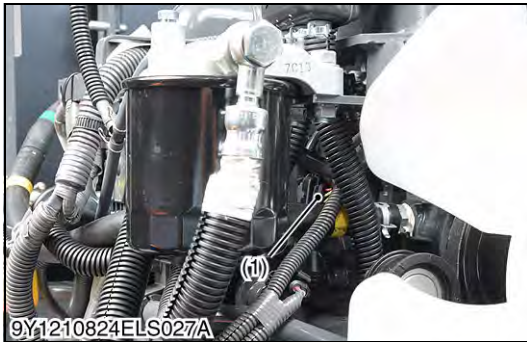
9Y1211012ELS0073US0

### (3) Rail Pressure Sensor

**NOTE**

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0074US0



## Connector Voltage

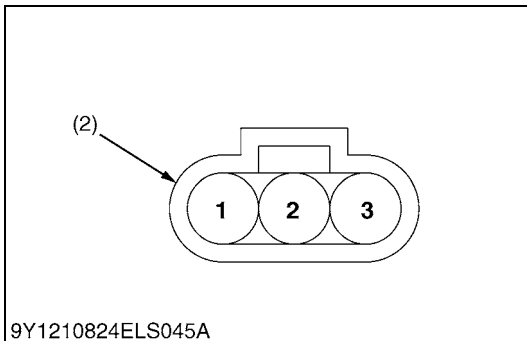
1. Disconnect the connector, and turn the main key switch "**ON**" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal <b>3</b> – Chassis	Approx. 5 V
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(1) Rail Pressure Sensor

(2) Connector (Harness Side)

9Y1211012ELS0075US0



## (4) Fuel Pump

### ■ NOTE

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the pump resistance.

9Y1211012ELS0076US0



### Connector Voltage

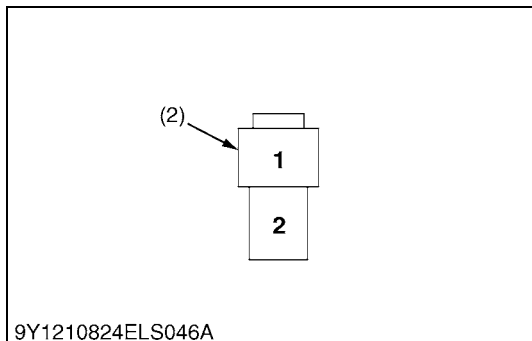
- Disconnect the connector, and turn the main key switch "**ON**" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at " <b>ON</b> "	Terminal 1 – Chassis	Approx. battery voltage
---------	------------------------------	----------------------	-------------------------

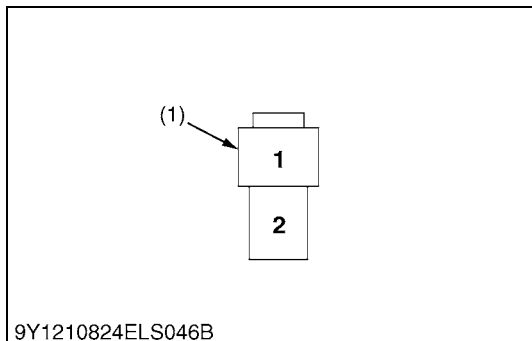
(1) Fuel Pump

(2) Connector (Harness Side)

9Y1211012ELS0077US0



9Y1210824ELS046A



9Y1210824ELS046B

### Pump Actuation Test

- Connect a jumper lead from the terminal 1 to the battery positive terminal post.
- Connect a jumper lead from the terminal 2 to the battery negative terminal post.
- If the pump does not work, pump is damaged.

(1) Connector (Pump Side)

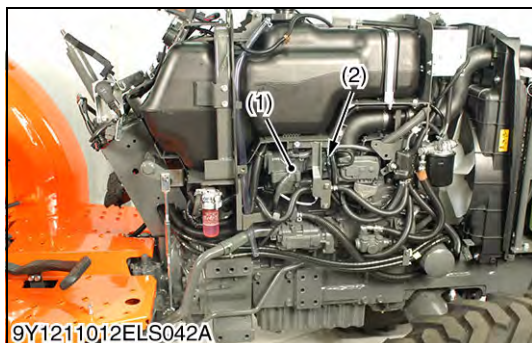
9Y1211012ELS0078US0

## (5) EGR Valve

### ■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0079US0



### Connector Voltage

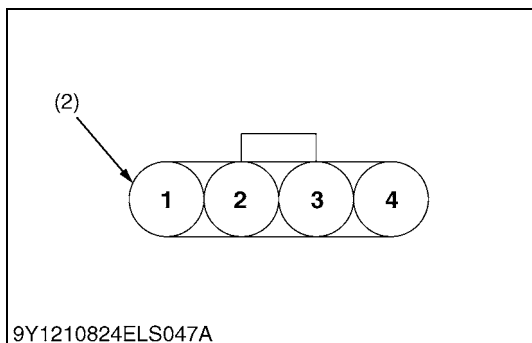
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. battery voltage
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(1) EGR Valve

(2) Connector (Harness Side)

9Y1211012ELS0080US0



## (6) Crankshaft Position Sensor

### ■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0081US0



### Connector Voltage

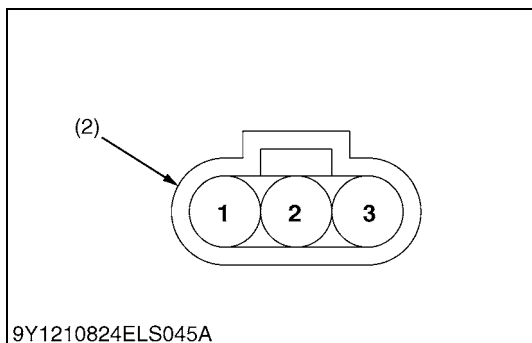
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. 5 V
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(1) Crankshaft Position Sensor

(2) Connector (Harness Side)

9Y1211012ELS0082US0

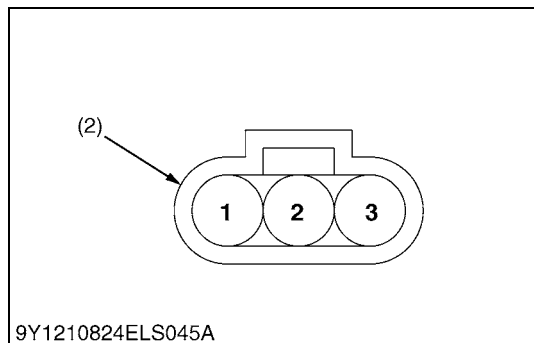


## (7) Camshaft Position Sensor

### NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0083US0



### Connector Voltage

- Disconnect the connector, and turn the main key switch "**ON**" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at " <b>ON</b> "	Terminal <b>3</b> – Chassis	Approx. battery voltage
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(1) Camshaft Position Sensor

(2) Connector (Harness Side)

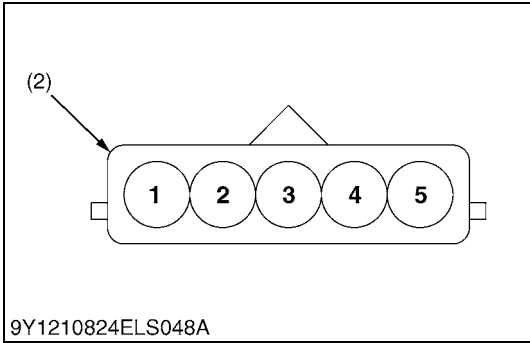
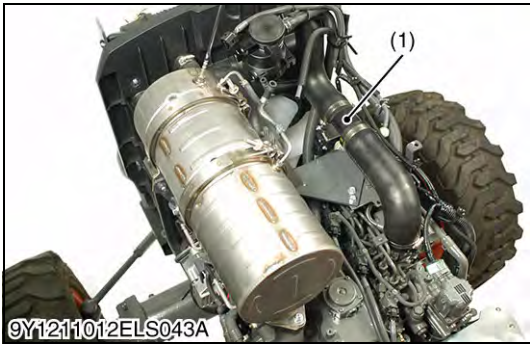
9Y1211012ELS0084US0

(8) Air Flow Sensor

■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0085US0



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
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(1) Air Flow Sensor

(2) Connector (Harness Side)

9Y1211012ELS0086US0



## (9) Intake Throttle Valve

### ■ NOTE

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the sensor resistance.

9Y1211012ELS0087US0



### Connector Voltage

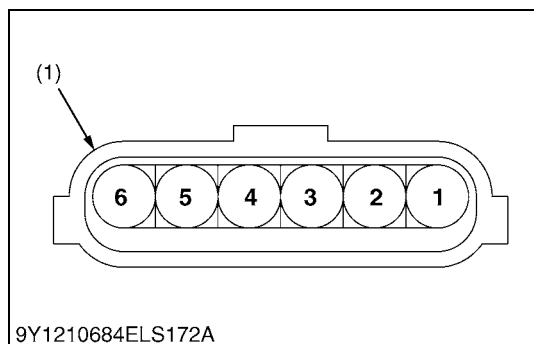
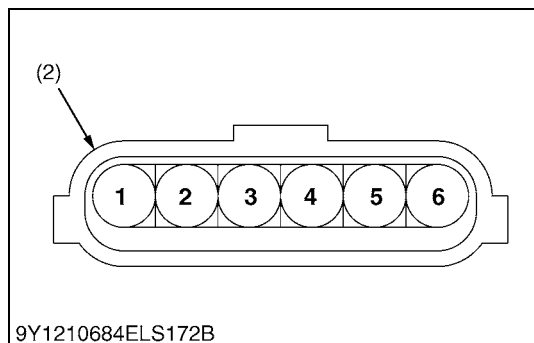
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 3 – Chassis	Approx. battery voltage
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(1) Intake Throttle Valve

(2) Connector (Harness Side)

9Y1211012ELS0088US0



### Motor Resistance

- Disconnect the throttle valve connector.
- Measure the resistance with an ohmmeter across the terminal 5 and 6.
- If the measured value is remarkably different from the value written in the table below, DC motor is damaged.

Resistance	Terminal 5 – Terminal 6	Approx. 12 Ω
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(1) Connector (Sensor Side)

9Y1211012ELS0089US0

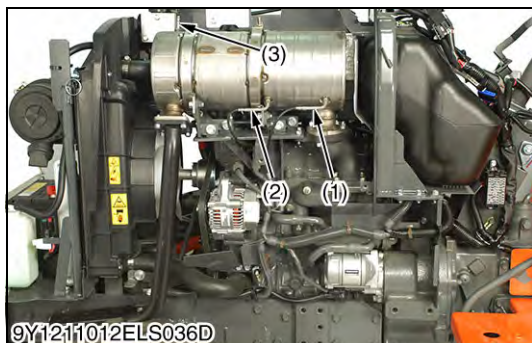


## (10) Exhaust Temperature Sensor

### ■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0090US0



9Y1211012ELS036D

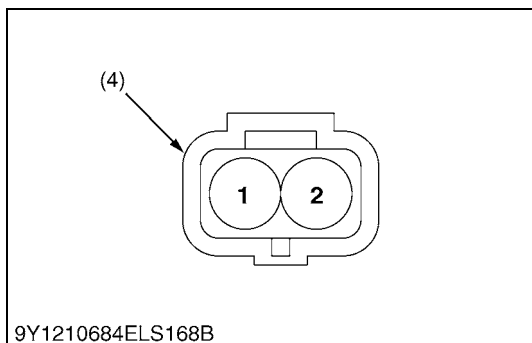
### Connector Voltage

- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

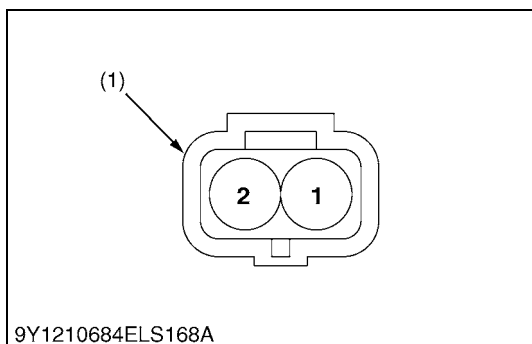
Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. 5 V
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- (1) Exhaust Temperature Sensor T0      (3) Exhaust Temperature Sensor T2  
(2) Exhaust Temperature Sensor T1      (4) Connector (Harness Side)

9Y1211012ELS0091US0



9Y1210684ELS168B



9Y1210684ELS168A

### Sensor Resistance (for Reference)

- Measure the resistance with an ohmmeter across the terminals shown in the table below.
- If the reference value is not indicated, the exhaust temperature sensor is damaged.

Resistance	at 200 °C (140 °F)	Approx. 4.00 kΩ
	at 650 °C (212 °F)	Approx. 0.164 kΩ

- (1) Connector (Sensor Side)

9Y1211012ELS0092US0

## (11) Differential Pressure Sensor

### ■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0093US0



9Y1211012ELS041D

### Connector Voltage

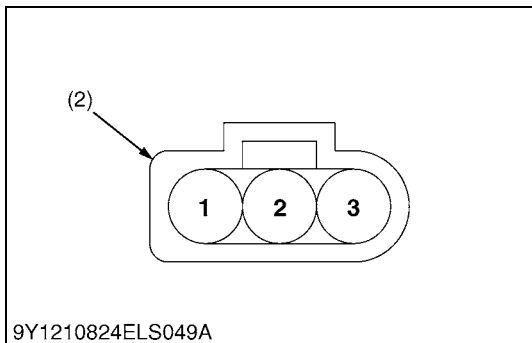
1. Disconnect the connector, and turn the main key switch "**ON**" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at " <b>ON</b> "	Terminal 1 – Chassis	Approx. 5 V
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(1) Differential Pressure Sensor

(2) Connector (Harness Side)

9Y1211012ELS0094US0



9Y1210824ELS049A

## (12) Parked Regeneration Switch



### Connector Voltage

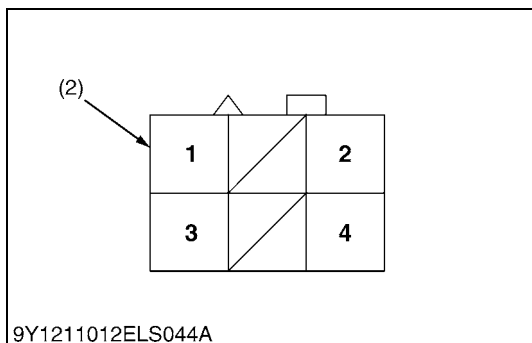
1. Disconnect connector of parked regeneration switch (1).
2. Measure voltage with a voltmeter across the terminals shown in the table below.
3. If measurement value is different from the table, check relating electrical circuit.

Resistance	Key Switch at "ON" position	Terminal 3 – Chassis	Approx. battery voltage
		Terminal 4 – Chassis	

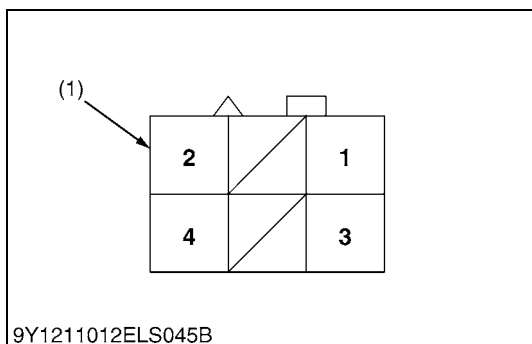
(1) Parked Regeneration Switch

(2) Connector (Wiring Harness Side)

9Y1211012ELS0096US0



9Y1211012ELS044A



9Y1211012ELS045B

### Switch Continuity

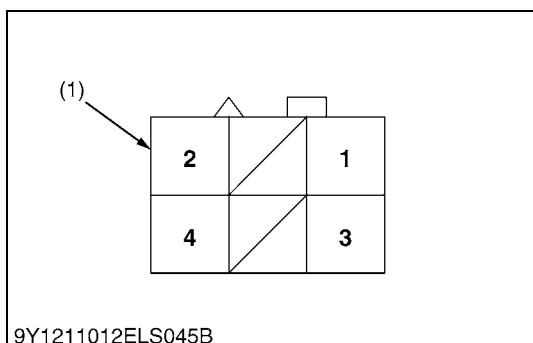
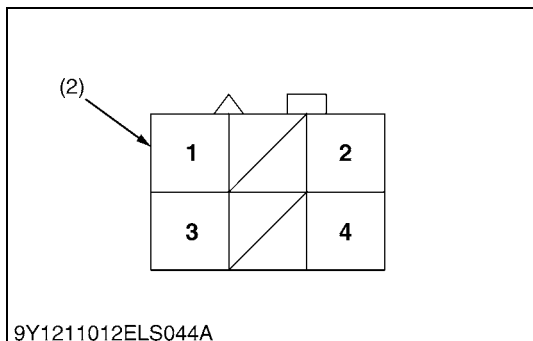
1. Measure resistance with a ohmmeter across the terminals shown in the table below.
2. If measurement value is different from the table, the parked regeneration switch is damaged.

Resistance	When switch is released	Terminal 2 – Terminal 4	Infinity
	When switch is pushed		0 Ω

(1) Connector  
(Parked Regeneration Switch Side)

9Y1211012ELS0097US0

## (13) DPF INHIBIT Switch



### Connector Voltage

1. Disconnect connector of DPF INHIBIT switch (1).
2. Measure voltage with a voltmeter across the terminals shown in the table below.
3. If measurement value is different from the table, check relating electrical circuit.

Resistance	Key switch at "ON" position	Terminal 3 – Chassis	Approx. battery voltage
		Terminal 4 – Chassis	

(1) DPF INHIBIT Switch

(2) Connector (Wiring Harness Side)

9Y1211012ELS0098US0

### Switch Continuity

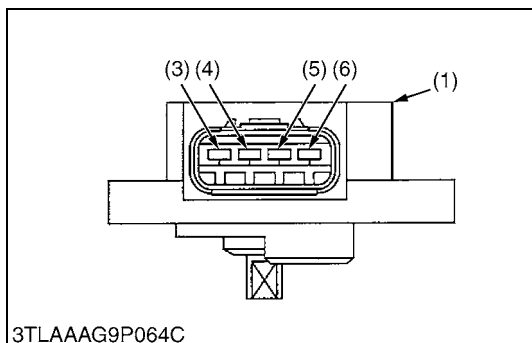
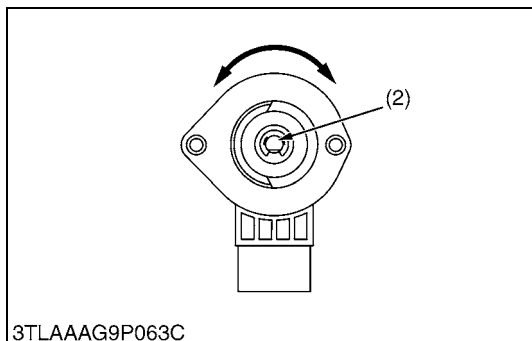
1. Measure resistance with a ohmmeter across the terminals shown in the table below.
2. If measurement value is different from the table, the DPF INHIBIT switch is damaged.

Resistance	When switch is released	Terminal 2 – Terminal 4	Infinity
	When switch is pushed		0 Ω

(1) Connector (DPF INHIBIT Switch Side)

9Y1211012ELS0099US0

## (14) Acceleration Sensor



### Acceleration Sensor

1. Disconnect connector of acceleration sensor (1).
2. Measure resistance with a ohmmeter across the terminals following table below.
3. If measurement value is different from the table, the acceleration sensor is damaged.

#### ■ NOTE

- If replacing the acceleration sensor, be sure to perform mode "c" adjustment.

#### (Reference)

- Change of resistance is easily found by using an analog ohmmeter.

Resistance	Reference Value	Terminal <b>c</b> – Terminal <b>GND</b>	Approx. 1 kΩ
		Terminal <b>a</b> – Terminal <b>GND</b>	smoothly changing approx. 1 kΩ to 0 Ω
		Terminal <b>b</b> – Terminal <b>GND</b>	smoothly changing approx. 0 Ω to 1 kΩ

(1) Acceleration Sensor

(2) Sensor Shaft

(3) Terminal **a**

(4) Terminal **b**

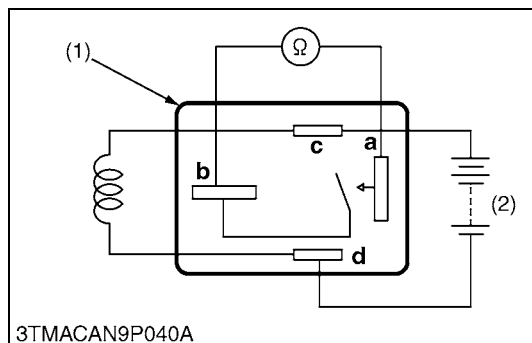
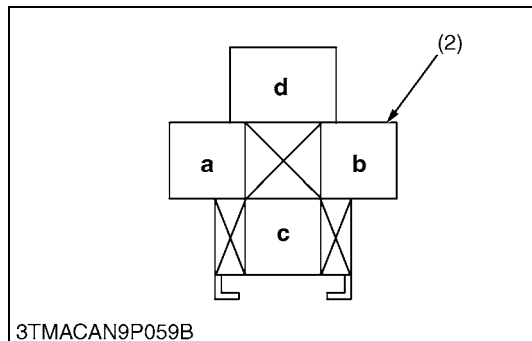
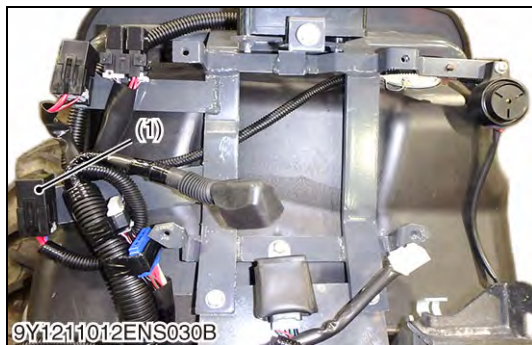
(5) Terminal **c**

(6) Terminal **GND**

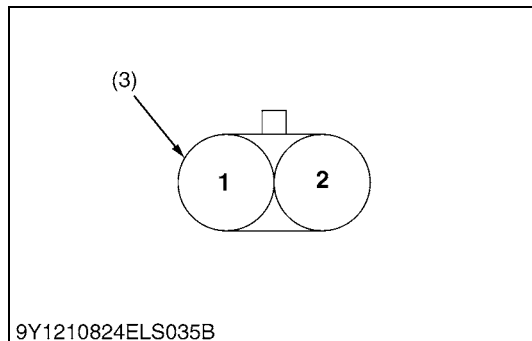
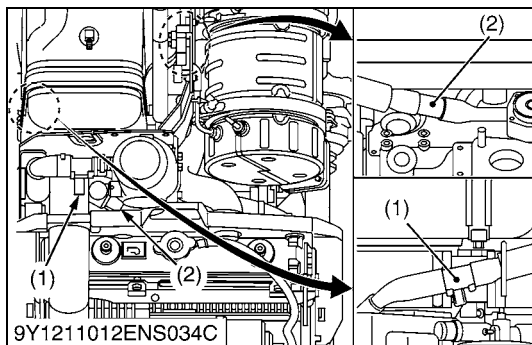
9Y1211012ELS0100US0

## [15] CCV HEATER

### (1) CCV Relay



### (2) CCV Heater



#### 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
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(1) CCV Relay

(2) Connector (Wire Harness side)

9Y1211012ELS0101US0

#### 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.

9Y1211012ELS0102US0

#### 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
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(1) CCV Heater (OUT)

[A] Left Side

(2) CCV Heater (IN)

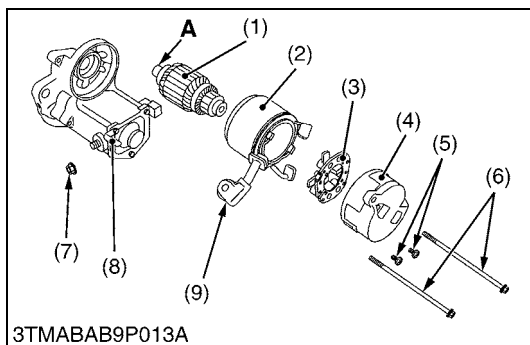
[B] Right Side

(3) Connector of Switch Side

9Y1211012ELS0103US0

## 5. DISASSEMBLING AND ASSEMBLING

### [1] STARTER



#### 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).

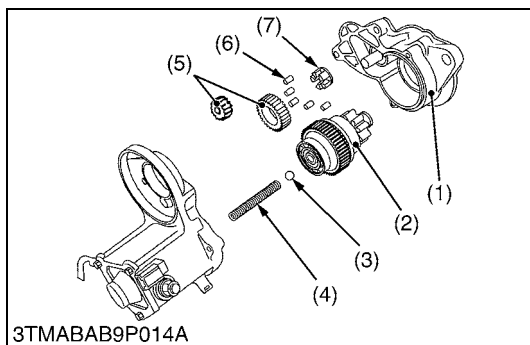
#### (When reassembling)

- 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     | (7) Nut                |
| (2) Yoke         | (8) Magnet Switch      |
| (3) Brush Holder | (9) Connecting Lead    |
| (4) End Frame    |                        |
| (5) Screw        | <b>A: Spline Teeth</b> |
| (6) Screw        |                        |

9Y1211012ELS0095US0



#### Disassembling Magnet Switch

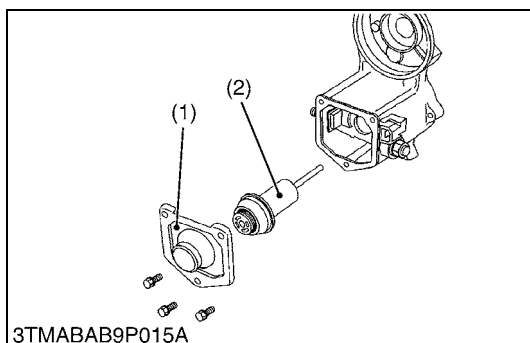
1. Remove the drive end frame (1) mounting screws.
2. Remove the overrunning clutch (2), ball (3), spring (4), gears (5), rollers (6) and retainer (7).

#### (When reassembling)

- Apply grease to the gear teeth of the gears (5) and overrunning clutch (2), and ball (3).

- |                        |              |
|------------------------|--------------|
| (1) Drive End Frame    | (5) Gear     |
| (2) Overrunning Clutch | (6) Roller   |
| (3) Ball               | (7) Retainer |
| (4) Spring             |              |

WSM000001ELS0021US0



#### Plunger

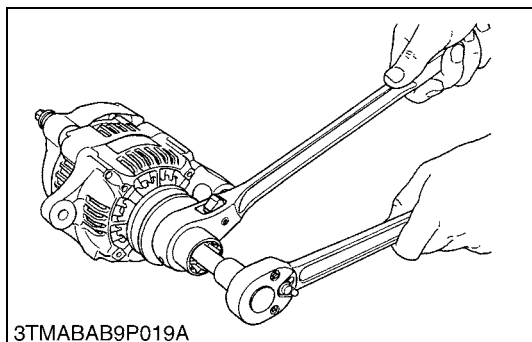
1. Remove the end cover (1).
2. Remove the plunger (2).

- |               |             |
|---------------|-------------|
| (1) End Cover | (2) Plunger |
|---------------|-------------|

WSM000001ELS0022US0



## [2] ALTERNATOR



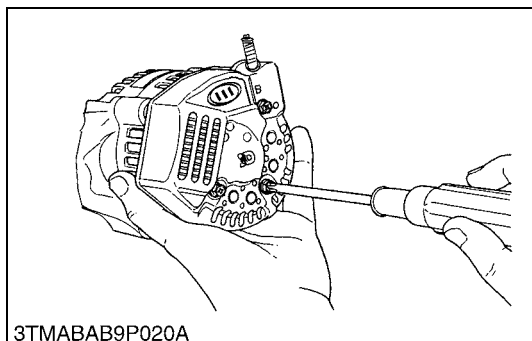
### Pulley

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
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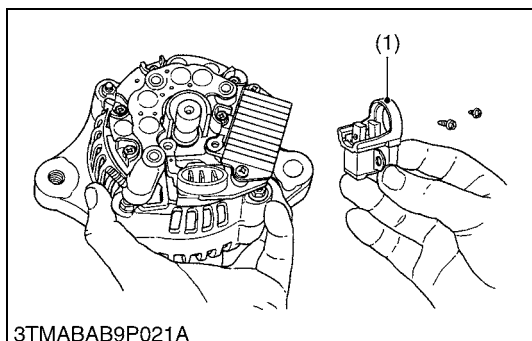
WSM000001ELS0023US0



### Rear End Cover

1. Remove the three rear end cover screws and the **B** terminal nut, and remove the rear end cover.

WSM000001ELS0024US0

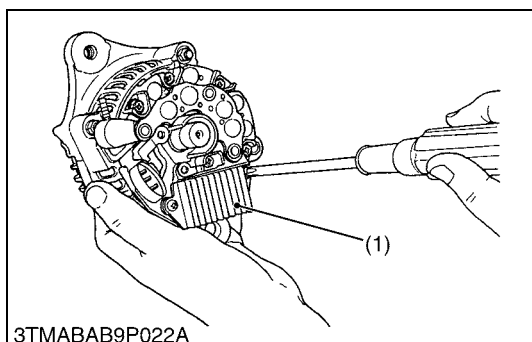


### Brush Holder

1. Remove the two screws holding the brush holder, and remove the brush holder (1).

(1) Brush Holder

WSM000001ELS0025US0

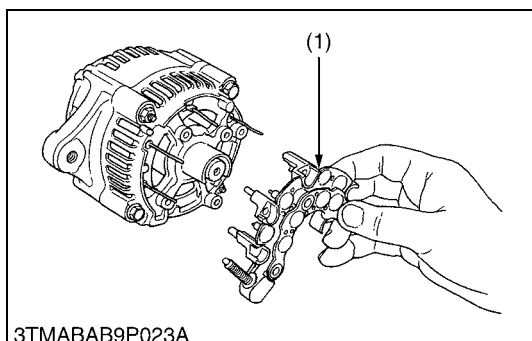


### IC Regulator

1. Remove the three screws holding the IC regulator, and remove the IC regulator (1).

(1) IC Regulator

WSM000001ELS0026US0

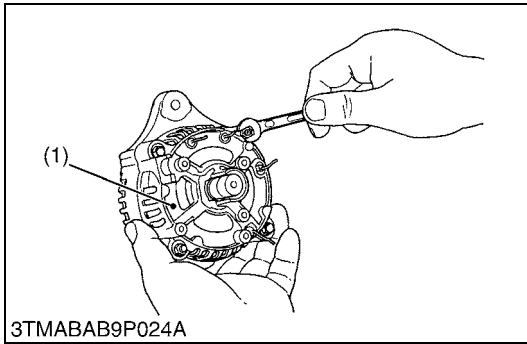


### Rectifier

1. Remove the four screws holding the rectifier and the stator lead wires.
2. Remove the rectifier (1).

(1) Rectifier

WSM000001ELS0027US0

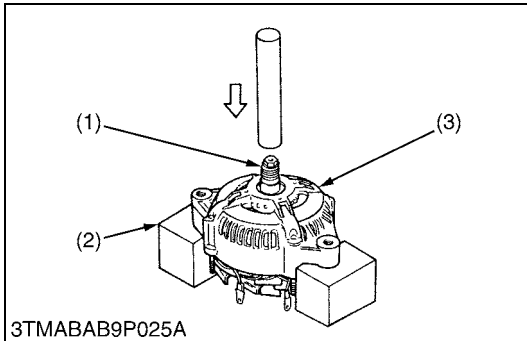


### Rear End Frame

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

WSM000001ELS0028US0



### Rotor

1. Press out the rotor (1) from drive end frame (3).

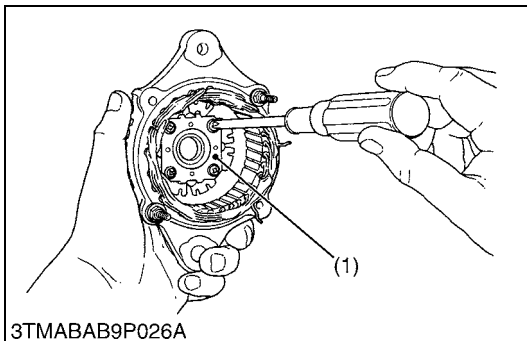
#### ■ IMPORTANT

- Be very careful not to drop the rotor and damage the slip ring or fan, etc..

(1) Rotor  
(2) Block

(3) Drive End Frame

WSM000001ELS0029US0

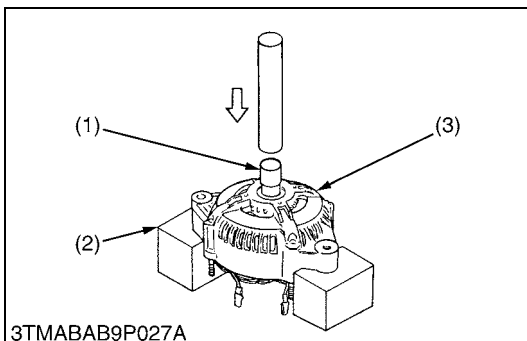


### Retainer Plate

1. Remove the four screws holding the retainer plate, and remove the retainer plate (1).

(1) Retainer Plate

WSM000001ELS0030US0



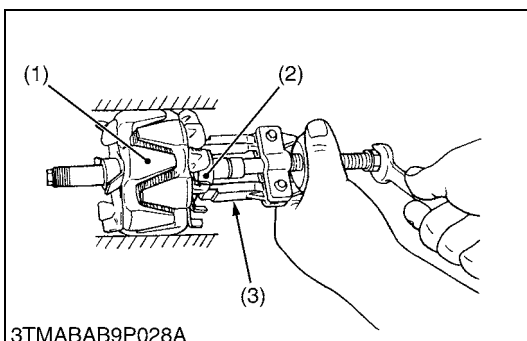
### Bearing on Drive End Side

1. Press out the bearing from drive end frame (3) with a press and jig (1).

(1) Jig  
(2) Block

(3) Drive End Frame

WSM000001ELS0031US0



### 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).

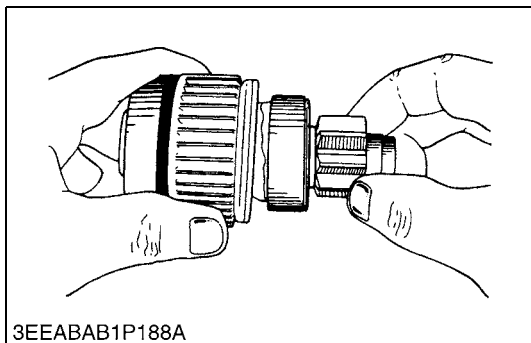
(1) Rotor  
(2) Bearing

(3) Puller

WSM000001ELS0032US0

## 6. SERVICING

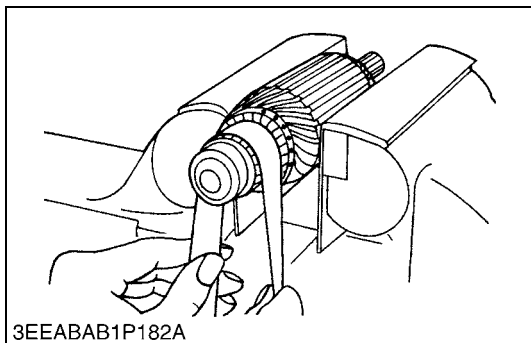
### [1] STARTER



#### 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.

WSM000001ELS0033US0



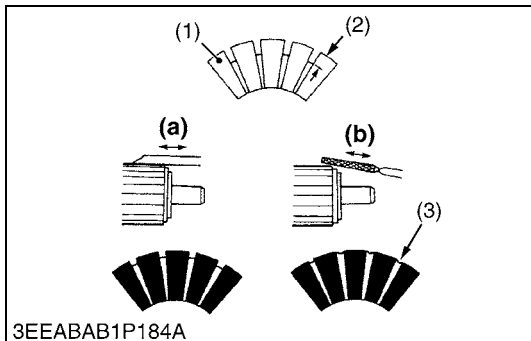
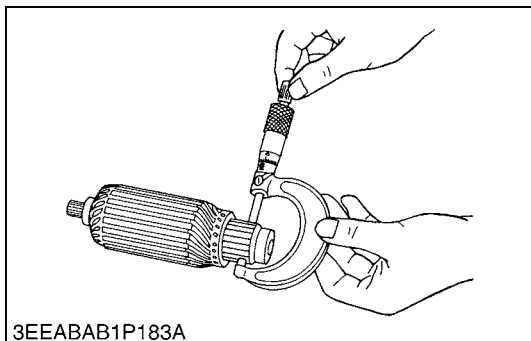
#### Commutator and Mica

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.

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.

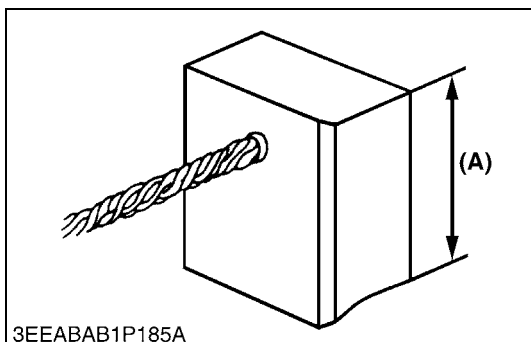
Mica undercut	Factory specification	0.50 to 0.80 mm 0.020 to 0.031 in.
	Allowable limit	0.2 mm 0.008 in.



- (1) Segment
- (2) Undercut
- (3) Mica

- (a) Correct
- (b) Incorrect

WSM000001ELS0034US0

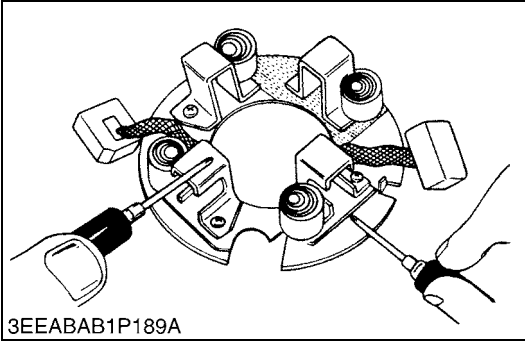


#### Brush Wear

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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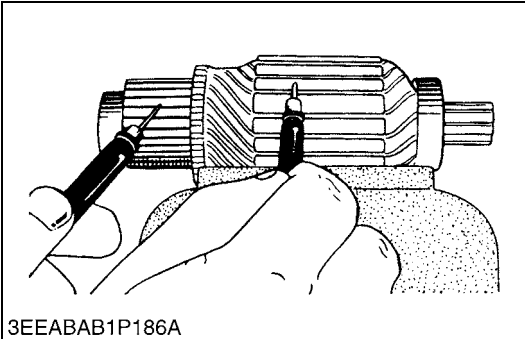


### Brush Holder

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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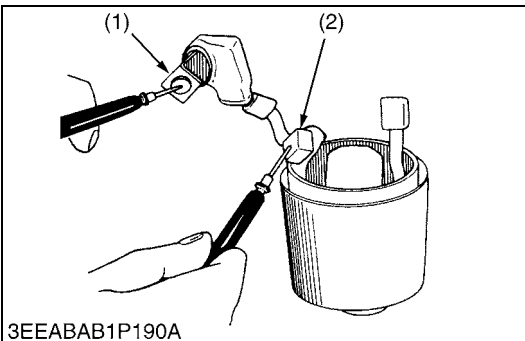
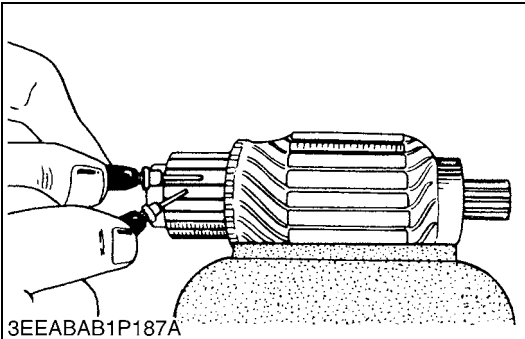
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### Armature Coil

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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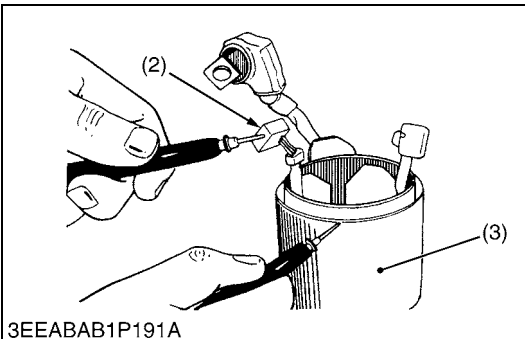
### Field Coil

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.

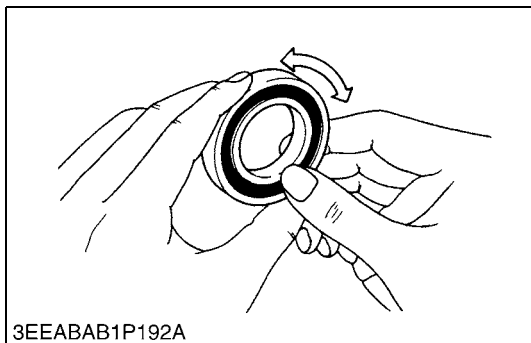
(1) Lead  
(2) Brush

(3) Yoke

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## [2] ALTERNATOR

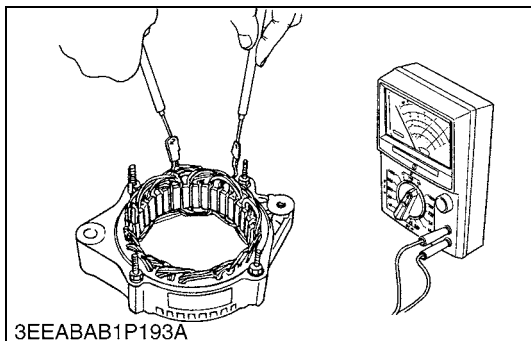


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### Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

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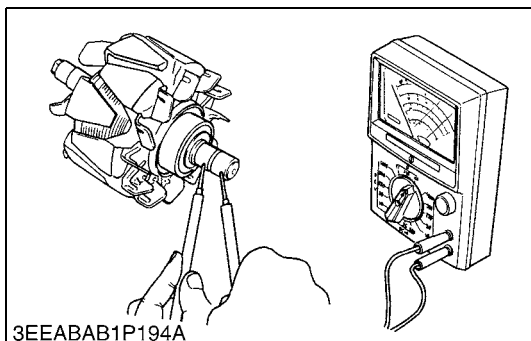
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### Stator

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 $\Omega$
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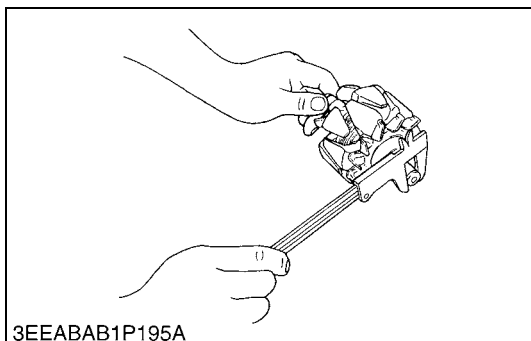
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### Rotor

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 $\Omega$
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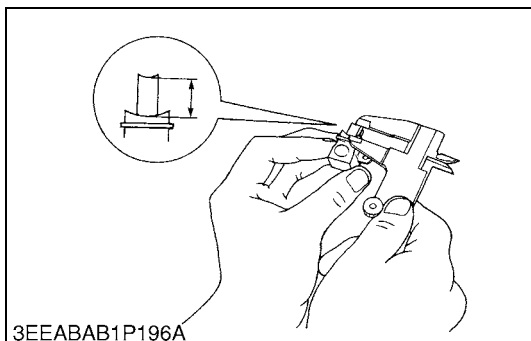
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### Slip Ring

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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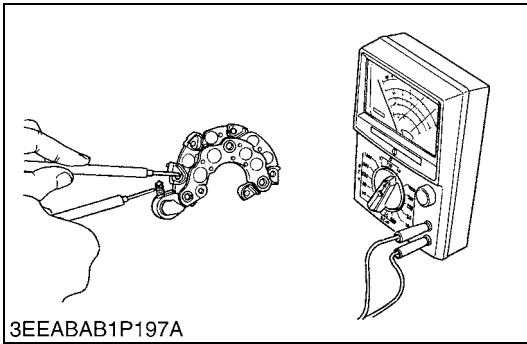
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### Brush Wear

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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### 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.

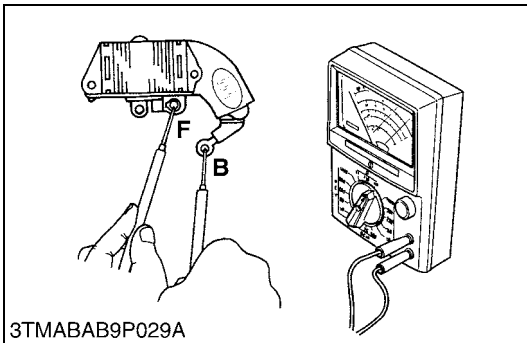
#### ■ IMPORTANT

- 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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### 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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