WSM

WORKSHOP MANUAL

TRACTOR,MOWER, FRONT LOADER

BX1870,BX2370,BX2670, RCK48-18BX,RCK54-23BX, RCK60B-23BX, RCK48P-18BX,RCK54P-23BX, LA203A,LA243A

Kubota

KiSC issued 12, 2012 A

TO THE READER

This Workshop Manual tells the servicing personnel about the mechanism, servicing and maintenance of KUBOTA Tractor BX1870D, BX2370D, BX2670D, KUBOTA Rotary Mower RCK48-18BX, RCK54-23BX, RCK60B-23BX, RCK48P-18BX, RCK54P-23BX and KUBOTA Front Loader LA203A, LA243A. 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.

December, 2012

I INFORMATION

INFORMATION

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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.**

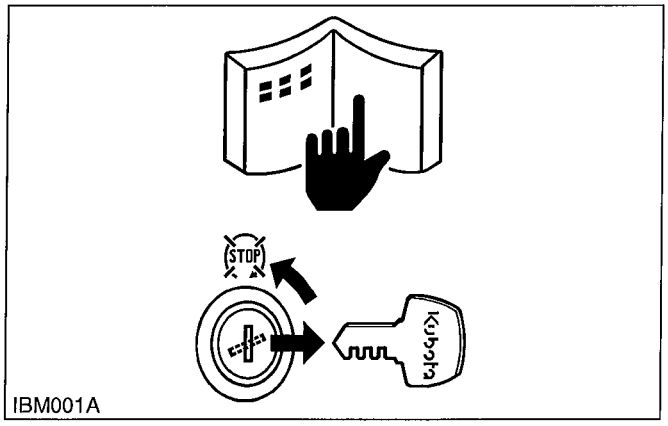
⚠ WARNING
- **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

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

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

■ NOTE
- **Gives helpful information.**

WSM000001INI0001US1



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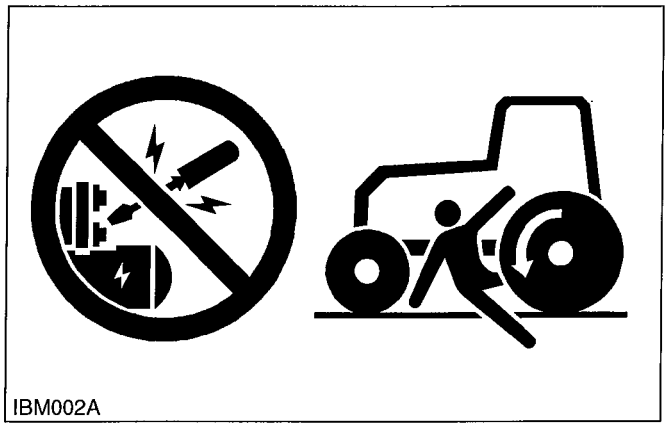
IBM002A

BEFORE YOU START SERVICE

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

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START SAFELY

- Do not do the procedures below when you start the engine.
  - short across starter terminals
  - bypass the safety start switch
- Do not 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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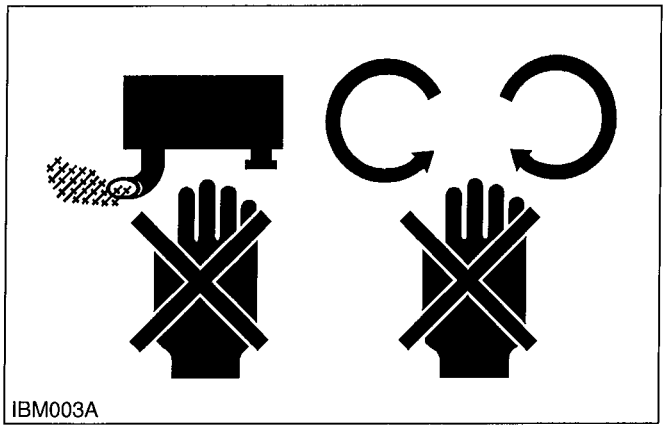
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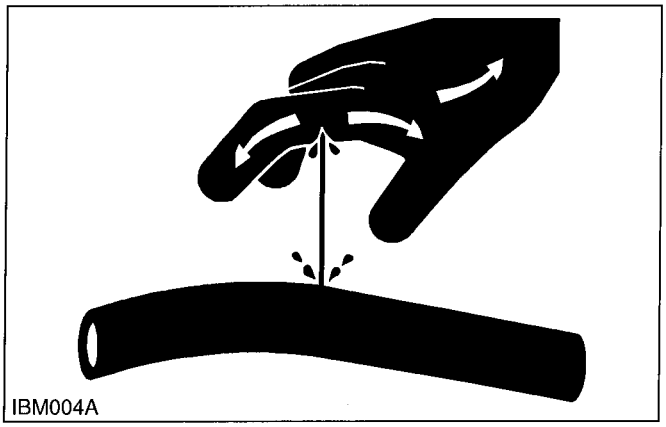
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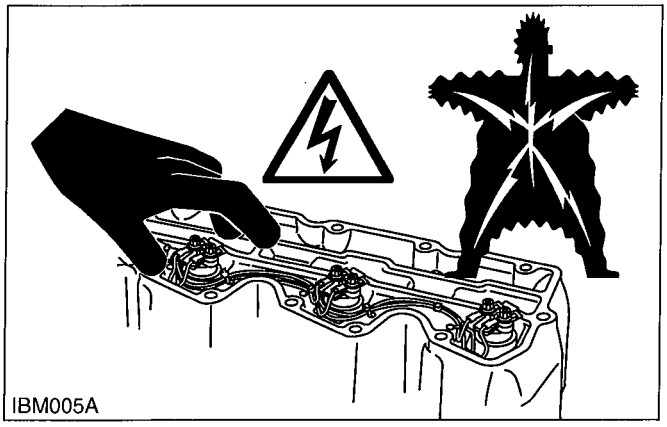
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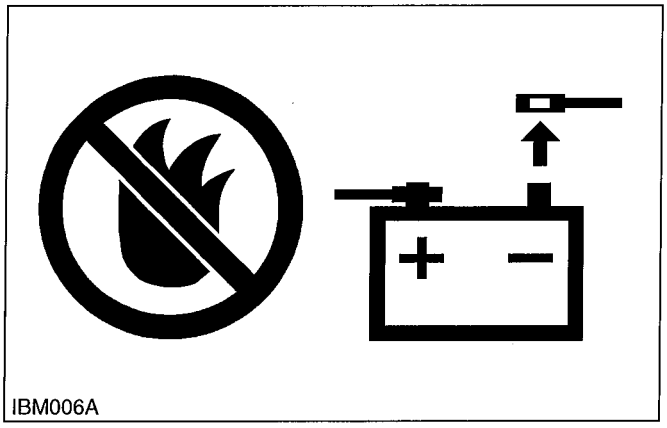
IBM006A

OPERATE SAFELY

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

WSM000001INI0012US1

PREVENT A FIRE

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

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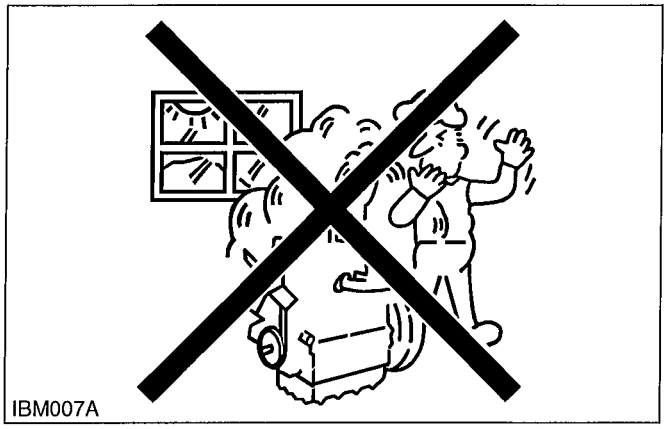
IBM007A

KEEP A GOOD AIRFLOW IN THE WORK AREA

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

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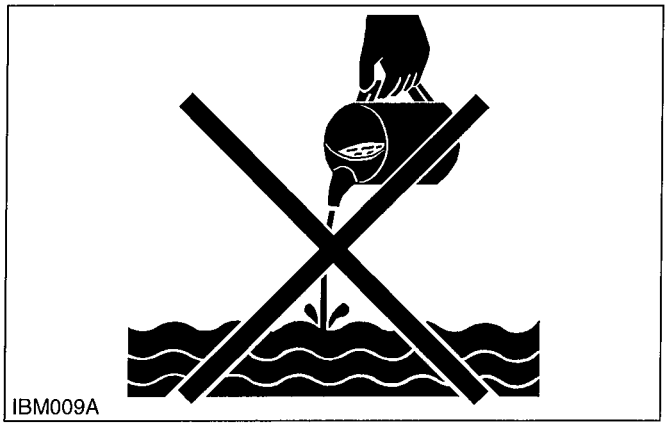
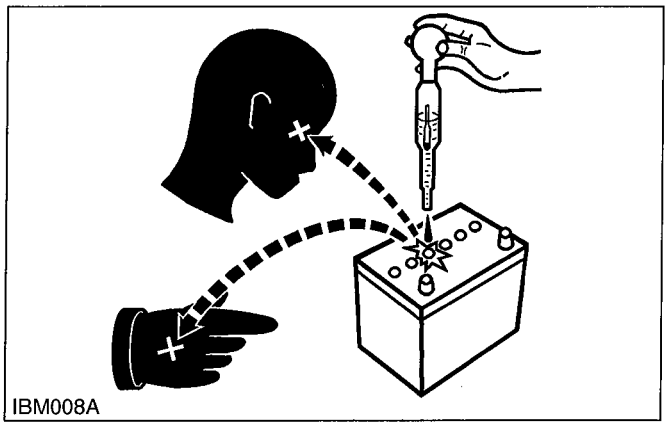

IBM009A

DISCARD FLUIDS CORRECTLY

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

WSM000001INI0007US1


IBM008A

PREVENT ACID BURNS

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

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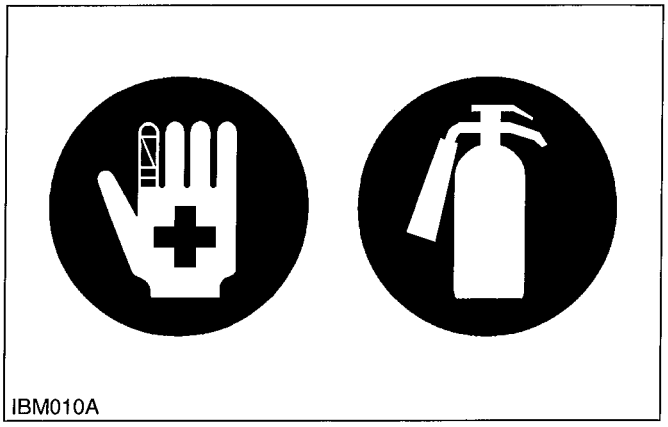
IBM010A

PREPARE FOR EMERGENCIES

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

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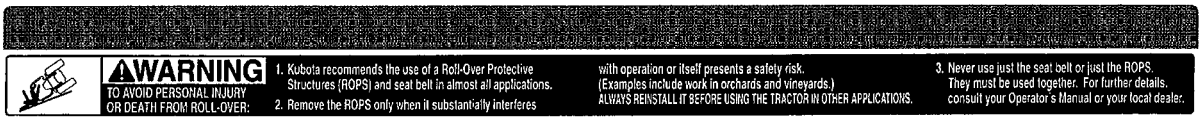
2. SAFETY DECALS

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.

WSM000001INI0013US0

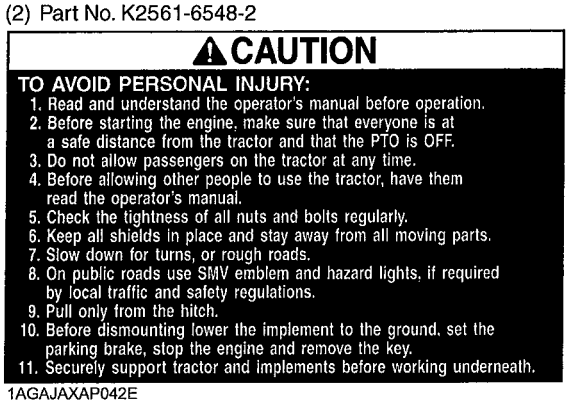
[1] BX TRACTOR

(1) Part No. K2651-6557-2



1AGAJAXAP041E

(2) Part No. K2561-6548-2



1AGAJAXAP042E

(3) Part No. K2561-6552-2

Do not put hands under the rear fender.

1AGAJAXAP047E

(4) Part No. K1272-6585-2

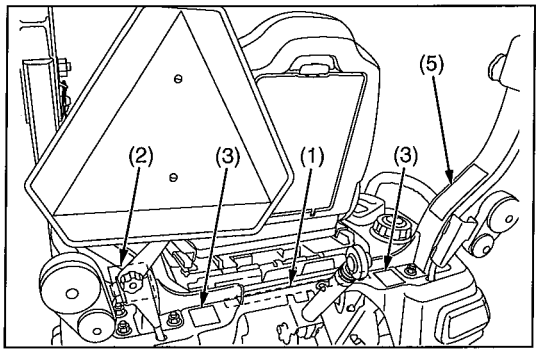
Diesel fuel only

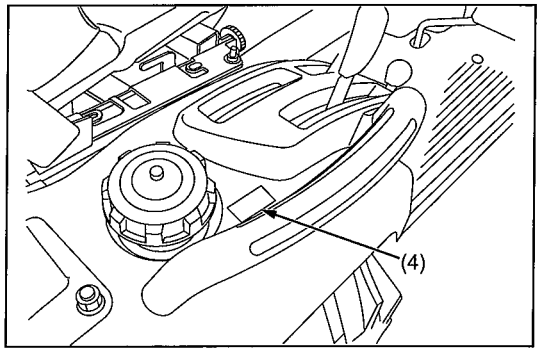
No fire

1BDAHAOAP002A

(5) Part No. K2591-6557-2

1HNAAACAP014E

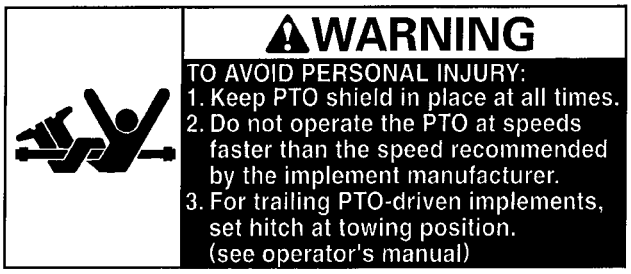




9Y1210855ICI001US

9Y1210855INI0001US0

(1) Part No. K2581-6554-1



1AGAJAXAP044E

(2) Part No. K2581-6555-1

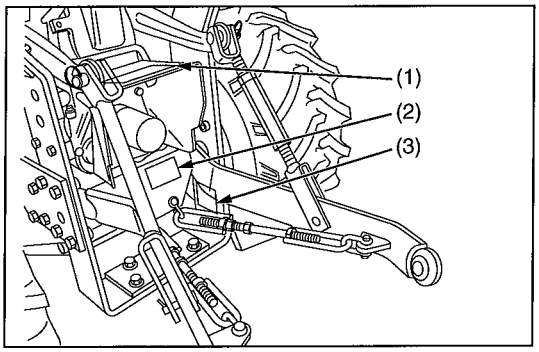
1AGAJAXAP043E

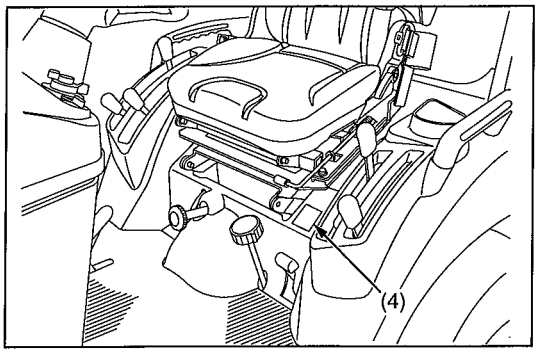
(3) Part No. K2581-6556-1

1AGAJAXAP046E

(4) Part No. K2651-6568-1

1AYAACAAP1000





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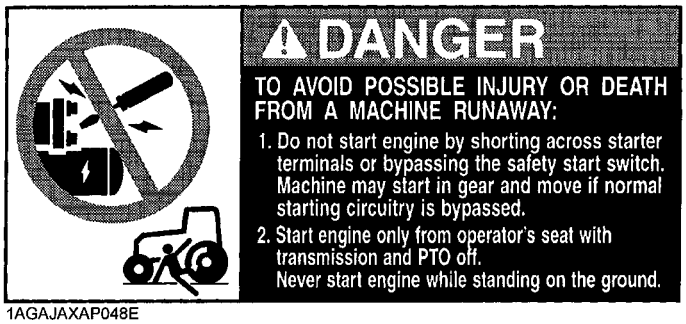
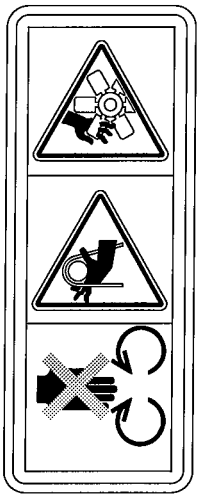
9Y1210855INI0002US0

(1) Part No. K2581-6541-1



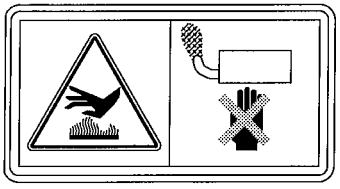
1AGAJAXAP048E

(2) **[BX1870D, BX2370D]**
Part No. K2581-6547-1
Stay clear of engine fan and fan belt.



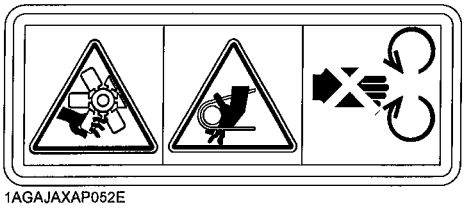
1AGAJAXAP049E

(3) Part No. K2581-6542-1
Do not touch hot surface like muffler, etc..



1AGAJAXAP050E

(4) Part No. K2581-6543-1
Stay clear of engine fan and fan belt.



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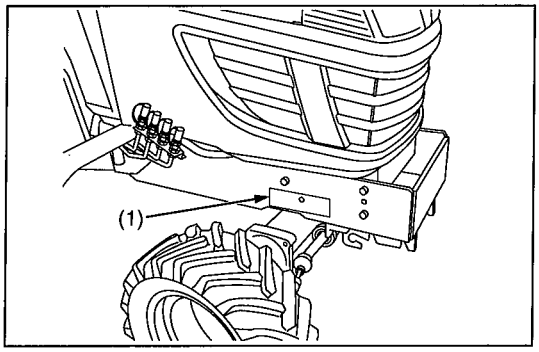
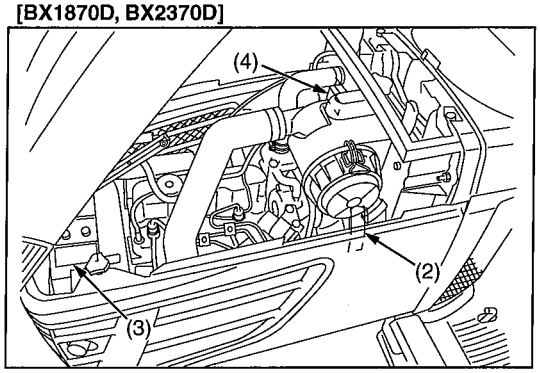
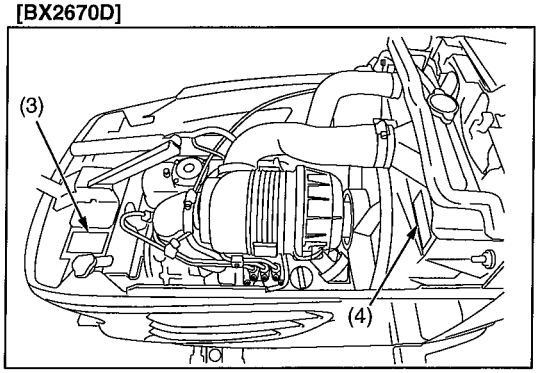


[BX1870D, BX2370D]



[BX2670D]



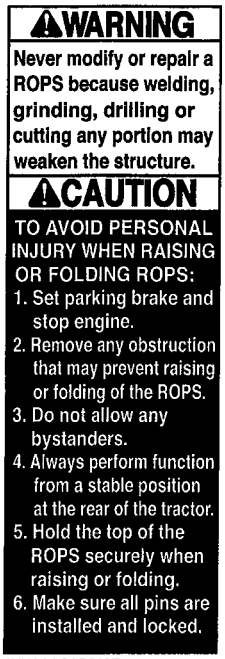
9Y1210855ICI003US

9Y1210855INI0003US0

(1) Part No. K1221-6118-1

1BDABDMAP013A

(2) Part No. K2591-6564-2



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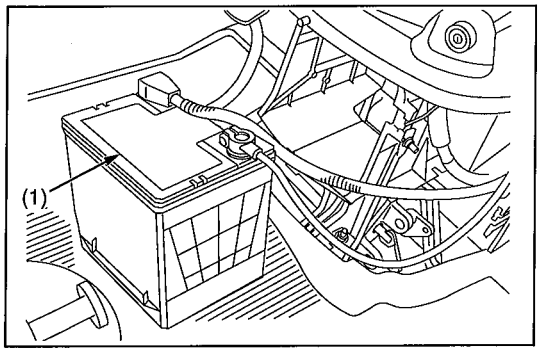
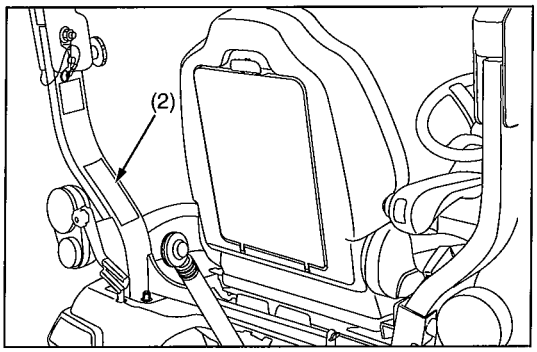




9Y1210855ICI004US

9Y1210855INI0004US0

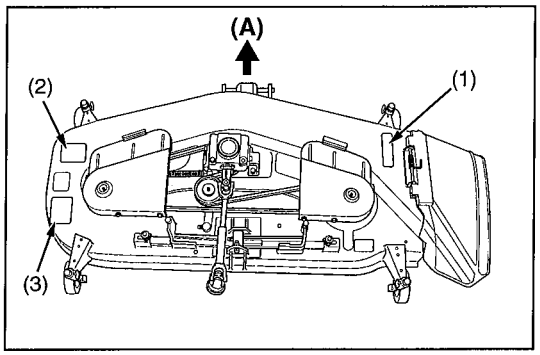
CARE OF DANGER, WARNING AND CAUTION LABELS

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 replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

9Y1210855INI0005US0

[2] MOWER

[RCK60B-23BX, RCK54-23BX, RCK48-18BX]



(A) Forward

(1) Part No. K5112-7311-1

1BDACADAP003E

(2) Part No. K5112-7312-1

1BDACADAP004E

(3) Part No. K5763-4715-1

1BDACADAP002E

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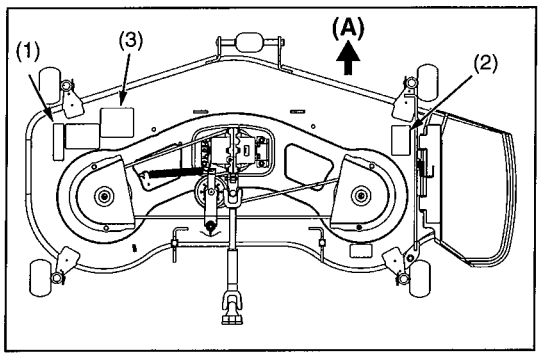
9Y1210855INI0006US0

[RCK54P-23BX]



(A) Forward

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1BDABBSAP0030

(2) Part No. K5617-7312-1

1BDABBSAP0020

(3) Part No. K5763-4715-1

1BDACADAP002E

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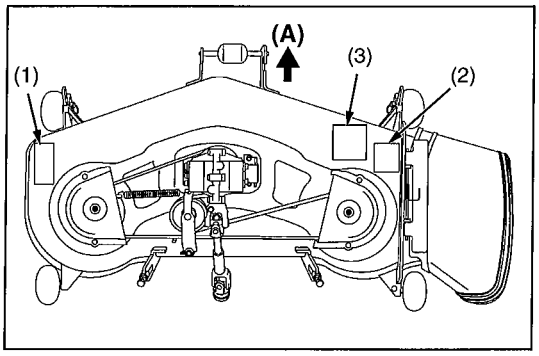
9Y1210855INI0007US0

[RCK48P-18BX]



(A) Forward

(1) Part No. K5617-7311-1

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(2) Part No. K5617-7312-1

1BDABBSAP0020

(3) Part No. K5763-4715-1

1BDACADAP002E

9Y1210855ICI007US

9Y1210855INI0008US0

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 replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

9Y1210855INI0005US0

[3] FRONT LOADER

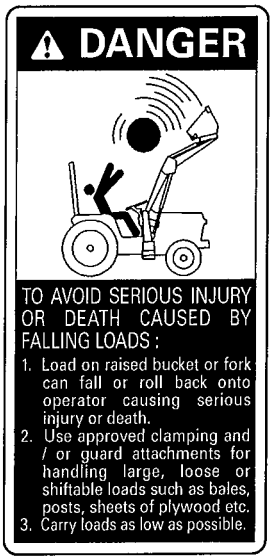
(1) Part No. 7J246-5645-1

1AIABAHAP019A

(2) Part No. 7J246-5641-1

1AIABAHAP017A

(3) Part No. 7J246-5643-1



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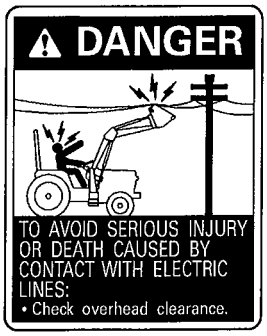
(4) Part No. 7J246-5642-1



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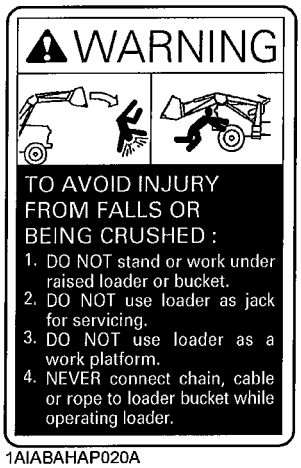
(5) Part No. 7J246-5644-2



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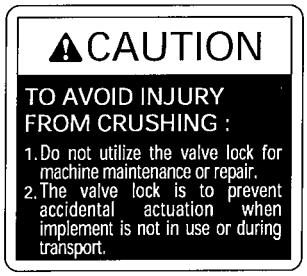
(6) Part No. 7J266-5649-2



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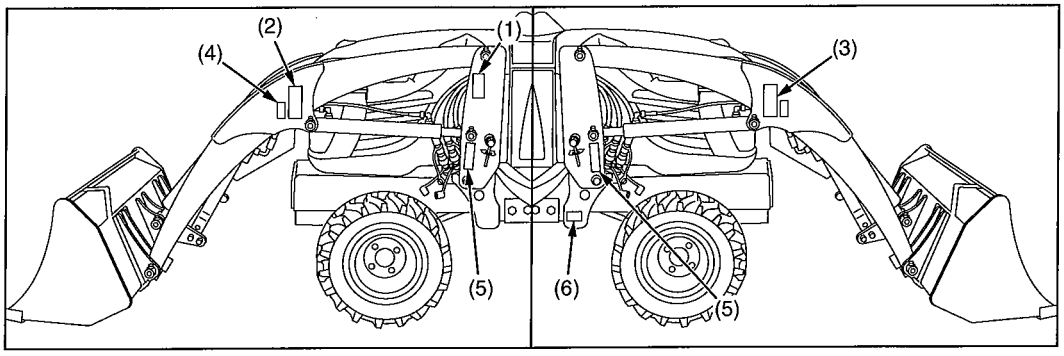
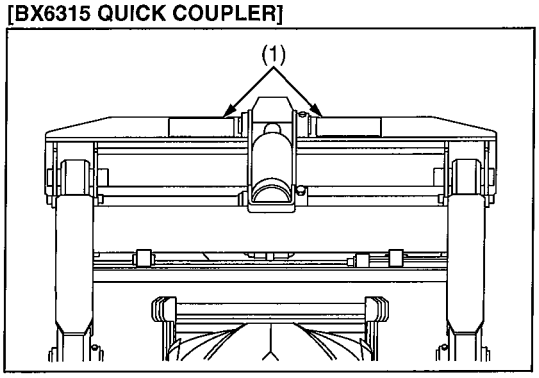


***The labels (2), (3), (4) are attached to inside of the boom.**

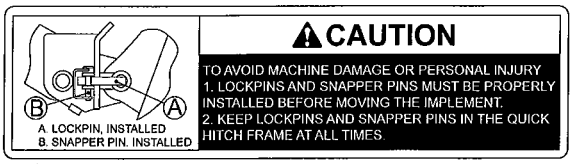
9Y1210855ICI008US

9Y1210855INI0009US0

[BX6315 QUICK COUPLER]



(1) Part No. 7J619-3616-1



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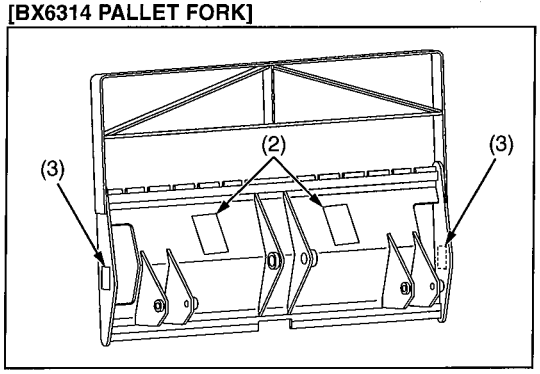
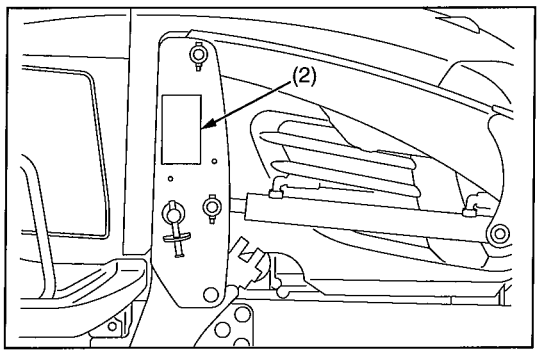
[BX6314 PALLET FORK]





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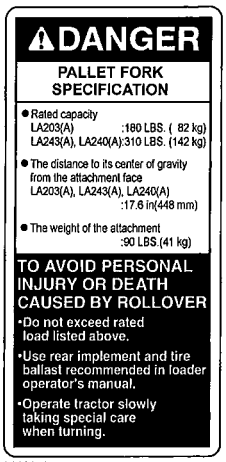

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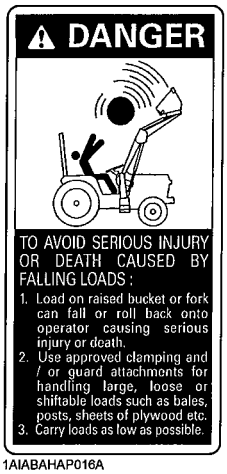

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CARE OF DANGER, WARNING AND CAUTION LABELS

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 replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

9Y1210855INI0005US0

3. SPECIFICATIONS

[1] BX TRACTOR

Model			BX1870D	BX2370D	BX2670D
PTO power			10.2 kW (13.7 HP)*	13.2 kW (17.7 HP)*	14.5 kW (19.5 HP)*
Engine	Maker		KUBOTA		
	Model		D722-E4-BX-1	D902-E4-BX-1	D1005-E4-BX-1
	Type		Indirect Injection, vertical, water-cooled, 4-cycle diesel		
	Number of cylinders		3		
	Bore and stroke		67 × 68 mm (2.64 × 2.68 in.)	72 × 73.6 mm (2.83 × 2.90 in.)	76 × 73.6 mm (2.99 × 2.90 in.)
	Total displacement		719 cm^3 (43.9 cu.in.)	898 cm^3 (54.8 cu.in.)	1001 cm^3 (61.1 cu.in.)
	Engine gross power		13.4 kW (18.0 HP)**	17.1 kW (23.0 HP)**	19.0 kW (25.5 HP)**
	Rated revolution		3200 min^{-1} (rpm)		
	Maximum torque		44.9 N·m (4.6 kgf·m, 33.1 lbf·ft)	56.1 N·m (5.7 kgf·m, 41.4 lbf·ft)	60.2 N·m (6.1 kgf·m, 44.4 lbf·ft)
	Battery		12 V, RC: 55 min., CCA: 450 A	12 V, RC: 80 min., CCA: 540 A	
	Fuel		Diesel fuel No. 1 [below −10 °C (14 °F)], Diesel fuel No. 2 [above −10 °C (14 °F)]		
Capacities	Fuel tank		25 L (6.6 U.S.gals, 5.5 Imp.gals)		
	Engine crankcase (with filter)		2.9 L (3.1 U.S.qts, 2.6 Imp.qts)	3.1 L (3.3 U.S.qts, 2.7 Imp.qts)	3.5 L (3.7 U.S.qts, 3.1 Imp.qts)
	Engine coolant		2.5 L (2.6 U.S.qts, 2.2 Imp.qts)	2.7 L (2.8 U.S.qts, 2.4 Imp.qts)	2.9 L (3.1 U.S.qts, 2.6 Imp.qts)
	Recovery tank		0.4 L (0.4 U.S.qts, 0.4 Imp.qts)		
	Transmission case		11.6 L (3.06 U.S.gals, 2.55 Imp.gals)		
Dimensions	Overall length (without 3P)		2035 mm (80.1 in.)	2120 mm (83.5 in.)	
	Overall length (with 3P)		2340 mm (92.1 in.)	2425 mm (95.5 in.)	
	Overall width (min. tread)		1145 mm (45.1 in.)		
	Overall height (with ROPS)		2190 mm (86.2 in.)	2215 mm (87.2 in.)	
	Overall height (Top of seat)		1230 mm (48.4 in.)	1255 mm (49.4 in.)	1330 mm (52.4 in.)
	Wheel base		1340 mm (52.8 in.)	1400 mm (55.1 in.)	
	Minimum ground clearance		150 mm (5.9 in.)	175 mm (6.9 in.)	
	Tread	Front	880 mm (34.6 in.)	930 mm (36.3 in.)	
		Rear	820 mm (32.2 in.)		
Weight (with ROPS)			610 kg (1345 lbs)	640 kg (1410 lbs)	665 kg (1466 lbs)
Clutch			N / A		
Travelling system	Tires	Front	16 × 7.50 – 8	18 × 8.50 – 10	
		Rear	24 × 12.00 – 12	26 × 12.00 – 12	
	Steering		Hydrostatic type power steering		
	Transmission		Main: hydrostatic transmission, High-Low gear shift (2 forward and 2 reverse)		
	Brake		Wet disk type		
	Min. turning radius (without brake)		2.18 m (7.15 feet)	2.3 m (7.5 feet)	

Model			BX1870D	BX2370D	BX2670D
Hydraulic unit	Hydraulic control system		Directional control, auto-return lever system		
	Pump capacity		23.5 L/min. (6.2 U.S.gals/min., 5.2 Imp.gals/min.)		
	System pressure		12.3 to 12.8 MPa (126 to 130 kgf/cm^2, 1790 to 1850 psi)		
	Three point hitch		SAE Category I		
	Three point hitch. Max.lift force	At lift points	5390 N (1210 lbs)***		
		24 in. behind lift points	3040 N (680 lbs)***		
	Remote control valve coupler (Rear: Option)	System	2 valves		
		Coupler	ISO 7341 series A		
	Remote control valve coupler (Front: Option)	System	2 valves		
		Coupler	ISO 7341-1 series B		
PTO	Rear	PTO shaft	SAE 1-3/8, 6 splines		
		Revolution	1 speed (540 min^{-1} (rpm) at engine 3142 min^{-1} (rpm))		
	Mid	PTO shaft	USA No. 5 (KUBOTA 10-tooth) involute spline		
		Revolution	1 speed (2500 min^{-1} (rpm) at engine 3043 min^{-1} (rpm))		

■ **NOTE**

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

*** Manufacture's estimate:**
**** SAE J 1995**
***** See and check "IMPLEMENT LIMITATIONS".**

9Y1210855INI0011US0

[2] MOWER

Model		RCK48-18BX	RCK54-23BX	RCK60B-23BX	RCK48P-18BX	RCK54P-23BX
Suitable tractor		BX1870D	BX1870D BX2370D	BX2370D BX2670D	BX1870D	BX2370D
Mounting method		Quick-Joint, Parallel linkage				
		Suspended linkage		Self-balance suspended linkage	Suspended linkage	
Adjustment of cutting height		Dial gauge				
Cutting width		1219 mm (48 in.)	1372 mm (54 in.)	1524 mm (60 in.)	1225 mm (48 in.)	1375 mm (54 in.)
Cutting height		25 to 102 mm (1.0 to 4.0 in.)				
Weight (Approx.)		75 kg (165 lbs)	95 kg (210 lbs)	115 kg (250 lbs)	82 kg (181 lbs)	86 kg (190 lbs)
Blade spindle speed		54.7 r/s (3281 rpm)	49.5 r/s (2969 rpm)	44.1 r/s (2647 rpm)	54.7 r/s (3281 rpm)	49.5 r/s (2969 rpm)
Blade tip velocity		72.8 m/s (14331 fpm)	73.8 m/s (14527 fpm)	72.5 m/s (14271 fpm)	72.8 m/s (14331 fpm)	73.8 m/s (14527 fpm)
Blade length		424 mm (16.7 in.)	475 mm (18.7 in.)	523 mm (20.6 in.)	424 mm (16.7 in.)	475 mm (18.7 in.)
Number of blades		3				
Dimensions	Overall length	895 mm (35.2 in.)	928 mm (36.5 in.)	1000 mm (39.4 in.)	881 mm (34.7 in.)	908 mm (35.7 in.)
	Overall width	1544 mm (60.8 in.)	1780 mm (66.5 in.)	1930 mm (76.0 in.)	1550 mm (61.0 in.)	1700 mm (67.0 in.)
	Overall height (Min.)	268 mm (10.5 in.)	281 mm (11.0 in.)	281 mm (11.0 in.)	291 mm (11.5 in.)	291 mm (11.5 in.)

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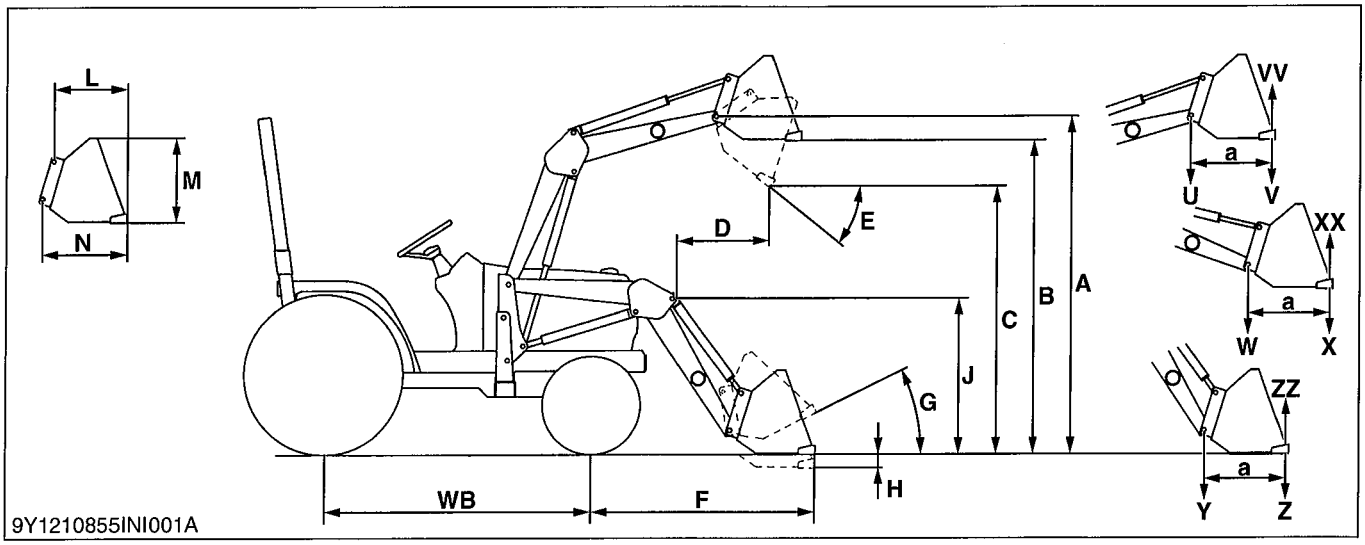
[3] FRONT LOADER



Loader Specifications

Loader Model		LA203A	LA243A
Tractor Model		**BX1870D (BX1860)**	**BX2370D and BX2670D (BX2360 and BX2660)**
Wheel Base (WB)		1340 mm (52.8 in.)	1400 mm (55.1 in.)
Front Tires		16 × 7.5-8	18 × 8.5-10
Rear Tires		24 × 12-12	26 × 12-12
Boom Cylinder	Bore	40 mm (1.57 in.)	
	Stroke	281 mm (11.1 in.)	326 mm (12.8 in.)
Bucket Cylinder	Bore	65 mm (2.56 in.)	
	Stroke	204 mm (8.03 in.)	
Control Valve		One detente float position, two stage bucket dump, power beyond circuit	
Rated Flow		14 L/min. (3.7 U.S.gals/min., 3.1 Imp.gals/min.)	
Maximum Pressure		12.3 MPa (125 kgf/cm^2, 1778 psi)	
Net Weight (Approximate)		157 kg (346 lbs)	170 kg (375 lbs)

Bucket Specifications

Loader Model		LA203A	LA243A
Model		SQUARE 48"	
Type		Rigid	
Width		1219 mm (48.0 in.)	
Depth **L**		455 mm (17.9 in.)	495 mm (19.5 in.)
Height **M**		445 mm (17.5 in.)	465 mm (18.3 in.)
Length **N**		498 mm (19.6 in.)	538 mm (21.2 in.)
Capacity	Struck	0.12 m^3 (4.2 cu.ft.)	0.14 m^3 (4.9 cu.ft.)
	Heaped	0.14 m^3 (4.9 cu.ft.)	0.17 m^3 (6.1 cu.ft.)
Weight		56 kg (123 lbs)	60 kg (132 lbs)

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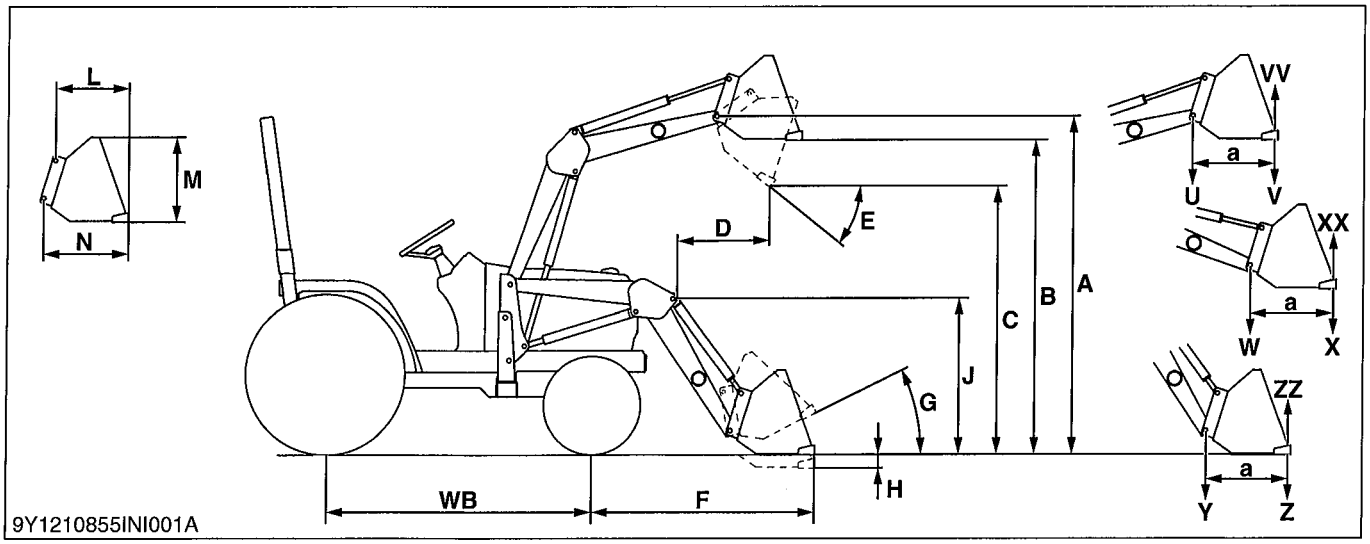

Dimensional Specifications

Loader Model		LA203A	LA243A
Tractor Model		BX1870D (BX1860)	BX2370D and BX2670D (BX2360 and BX2660)
A	Maximum lift height (To bucket pivot pin)	1810 mm (71.3 in.)	
B	Maximum lift height under level bucket	1680 mm (66.1 in.)	
C	Clearance with bucket dumped	1350 mm (53.1 in.)	1330 mm (52.4 in.)
D	Reach at maximum lift height (Dumping Reach)	720 mm (28.3 in.)	735 mm (28.9 in.)
E	Maximum dump angle	0.784 rad (40 °)	0.785 rad (45 °)
F	Reach with bucket on ground	1330 mm (52.4 in.)	1390 mm (54.7 in.)
G	Bucket roll-back angle	0.59 rad (30 °)	0.51 rad (29 °)
H	Digging depth	100 mm (3.9 in.)	120 mm (4.7 in.)
J	Overall height in carry position	970 mm (38.2 in.)	990 mm (39.0 in.)

Operational Specifications

Loader Model		LA203A	LA243A
Tractor Model		BX1870D (BX1860)	BX2370D and BX2670D (BX2360 and BX2660)
U	Lift capacity (Bucket pivot pin, maximum height)	280 kg (617 lbs)	340 kg (750 lbs)
V	Lift capacity (500 mm forward, maximum height)	185 kg (408 lbs)	235 kg (518 lbs)
W	Lift capacity (Bucket pivot pin, 1500 mm (59 in.) height)	315 kg (694 lbs)	375 kg (827 lbs)
X	Lift capacity (1500 mm height)	220 kg (485 lbs)	270 kg (595 lbs)
Y	Breakout force (Bucket pivot pin)	5720 N (1287 lbs)	6290 N (1415 lbs)
Z	Breakout force (500 mm forward)	3920 N (882 lbs)	4410 N (992 lbs)
VV	Bucket roll-back force at maximum height	4460 N (1003 lbs)	4750 N (1069 lbs)
XX	Bucket roll-back force at 1500 mm	5380 N (1210 lbs)	5600 N (1260 lbs)
ZZ	Bucket roll-back force at ground level	5580 N (1255 lbs)	5490 N (1235 lbs)
a	Length	500 mm (19.7 in.)	500 mm (19.7 in.)
Raising time (Rated flow)		2.8 seconds	3.5 seconds
Lowering time (Rated flow)		2.0 seconds	2.7 seconds
Bucket dumping time (Rated flow)		1.8 seconds	1.7 seconds
Bucket roll-back time (Rated flow)		2.1 seconds	2.4 seconds

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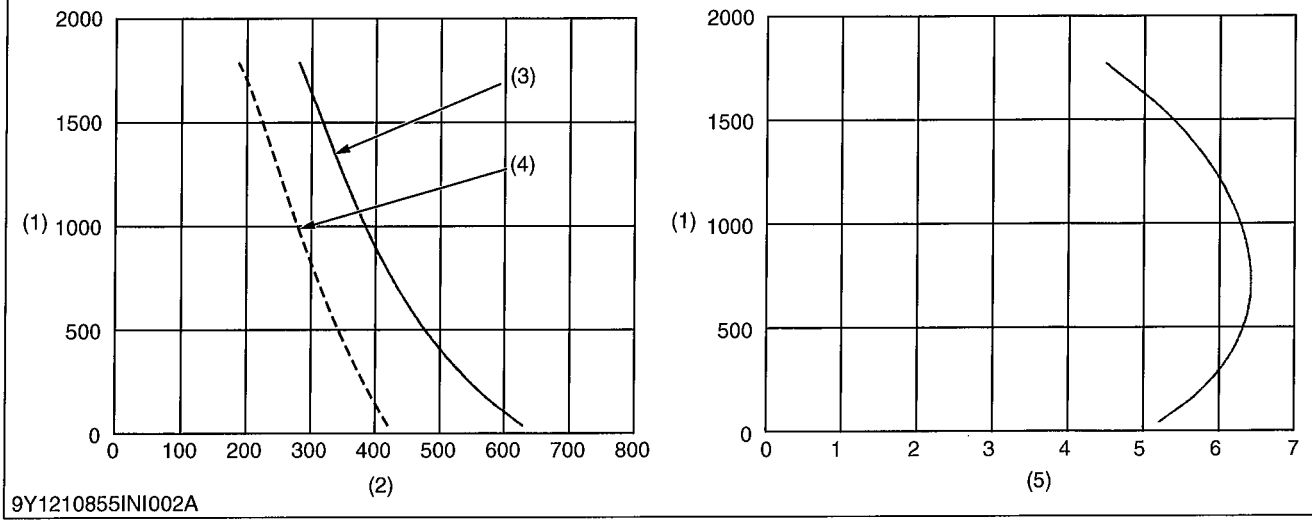
[A]



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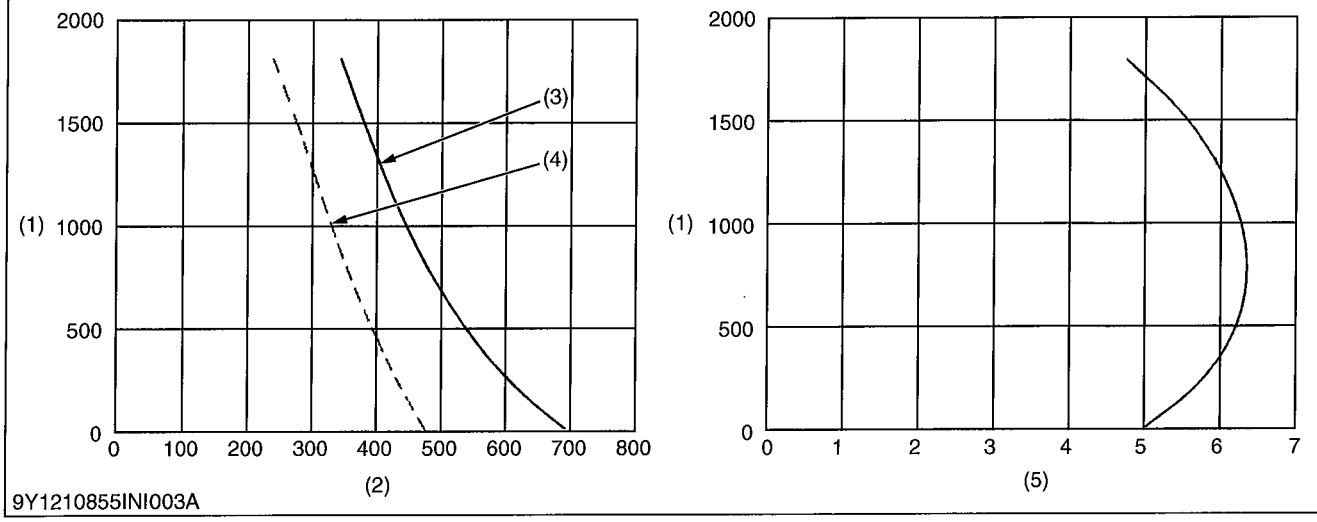
[B]



9Y1210855INI003A

(1) Height (mm)
(2) Lift Capacity (kg)
(3) At Pivot Pin
(4) 500 mm Forward of Pivot Pin
(5) Rollback Force (kN)

[A] LA203A
[B] LA243A

9Y1210855INI0015US0

4. TRAVELING SPEEDS

(At rated engine rpm)

Model		BX1870D		BX2370D and BX2670D	
Tire size (Rear)		24 × 12.00 – 12		26 × 12.00 – 12	
	Range gear shift lever	km/h	mph	km/h	mph
Forward	Low	0 to 6.0	0 to 3.7	0 to 6.5	0 to 4.0
	High	0 to 12.5	0 to 7.8	0 to 13.5	0 to 8.4
Reverse	Low	0 to 4.5	0 to 2.8	0 to 5.0	0 to 3.1
	High	0 to 9.5	0 to 5.9	0 to 10.5	0 to 6.5

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

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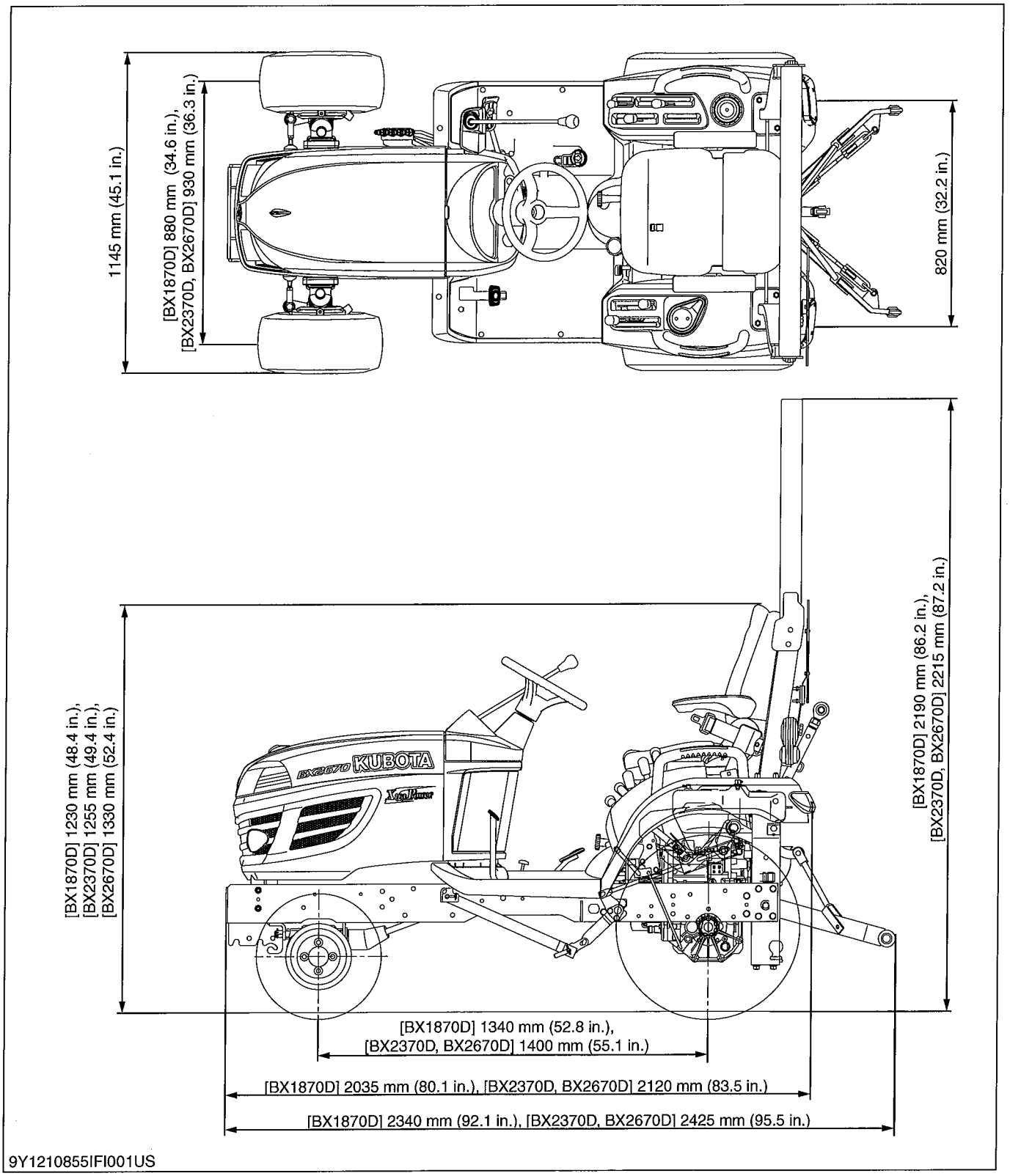
5. DIMENSIONS



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9Y1210855INI0017US0

G GENERAL

GENERAL

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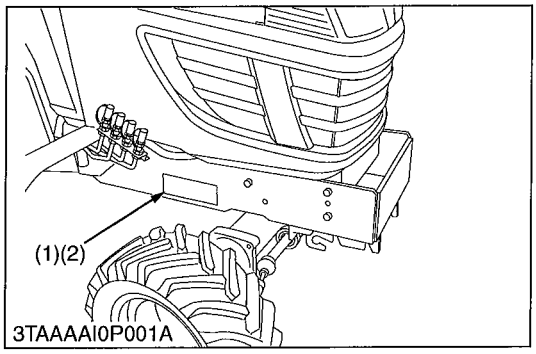
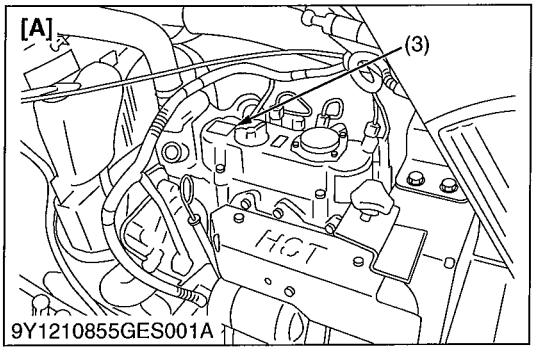
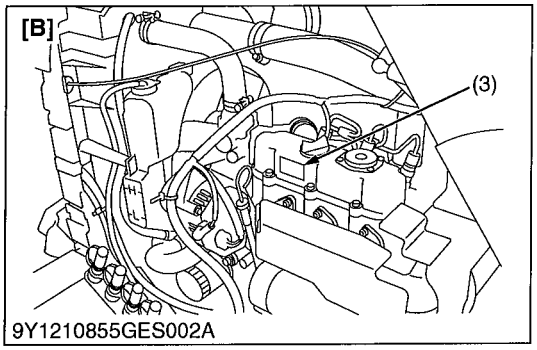
1. IDENTIFICATION

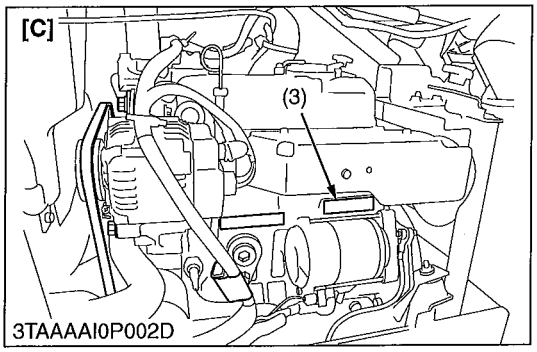
[1] TRACTOR IDENTIFICATION

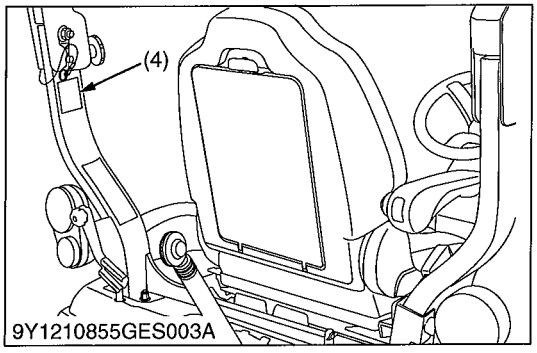
(1) Serial Number and Hour Meter



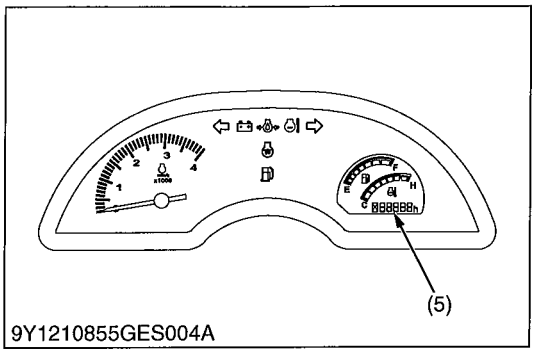








When contacting your local KUBOTA distributor, always specify engine serial number, tractor serial number and hour meter reading.



(1) Tractor Identification Plate
(2) Tractor Serial Number
(3) Engine Serial Number
(4) ROPS Serial Number
(5) Hour Meter

[A] BX1870D
[B] BX2370D
[C] BX2670D

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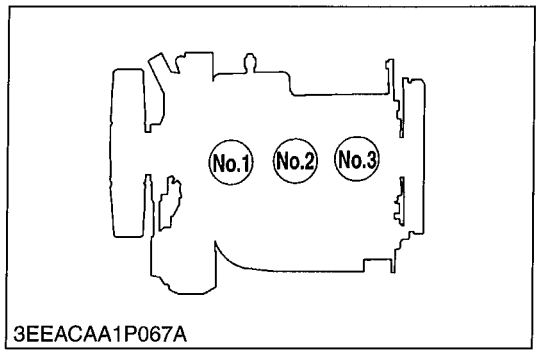
(2) Cylinder Number



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 and No.3 starting from the gear case side.

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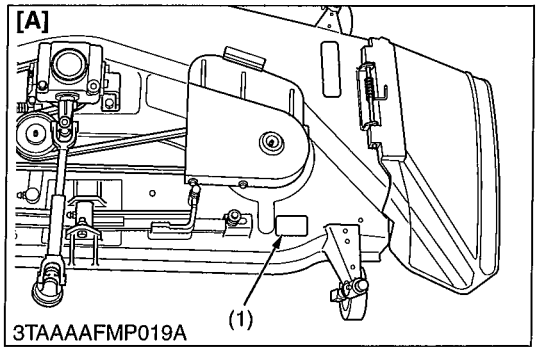
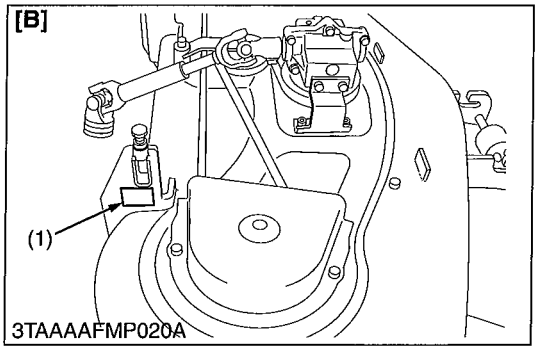
[2] MOWER IDENTIFICATION





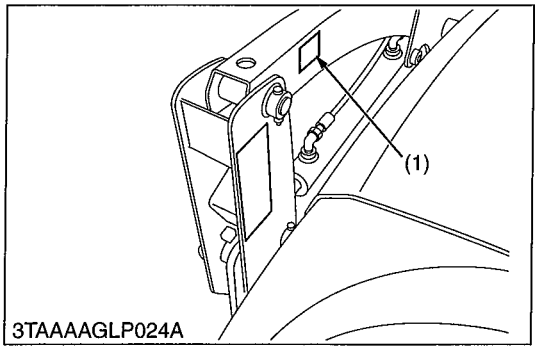
When contacting your local KUBOTA distributor, always specify mower serial number.

(1) Mower Serial Number

[A] RCK60B-23BX, RCK54P-23BX, RCK54-23BX and RCK48-18BX
[B] RCK48P-18BX

9Y1210855GEG0003US0

[3] FRONT LOADER IDENTIFICATION

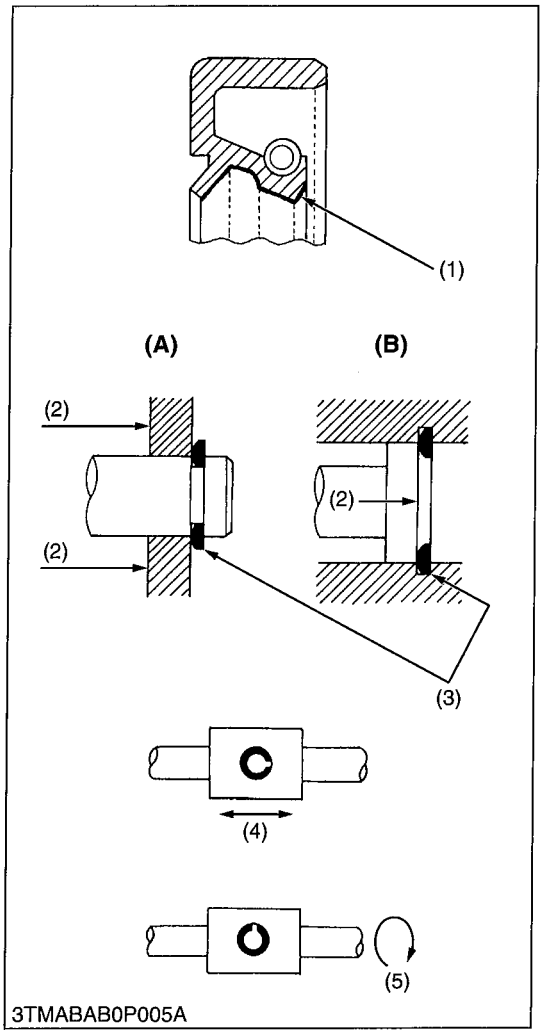


When contacting your local KUBOTA distributor, always specify front loader model and serial number.

(1) Model / Serial Number

9Y1210855GEG0004US0

2. GENERAL PRECAUTIONS



3TMABAB0P005A

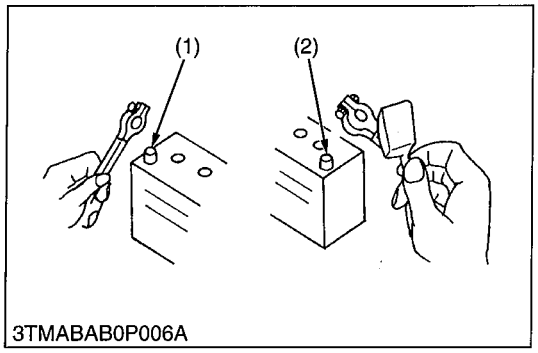
- When you disassemble, carefully put the parts in a clean area to make it easy to find the parts. You must install the screws, bolts and nuts in their initial position to prevent the reassembly errors.
- When it is necessary to use special tools, use KUBOTA special tools. Refer to the drawings when you make special tools that you do not use frequently.
- Before you disassemble or repair machine, make sure that you always disconnect the ground cable from the battery first.
- Remove oil and dirt from parts before you measure.
- Use only KUBOTA genuine parts for replacement to keep the machine performance and to make sure of safety.
- You must replace the gaskets and O-rings when you assemble again. Apply grease (1) to new O-rings or oil seals before you assemble.
- When you assemble the external or internal snap rings, make sure that the sharp edge (3) faces against the direction from which force (2) is applied.
- When inserting spring pins, their splits must face the direction from which a force is applied. See the figure 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 examine oil leakage.

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

(A) External Circlip
(B) Internal Circlip

WSM000001GEG0106US1

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



3TMABAB0P006A

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

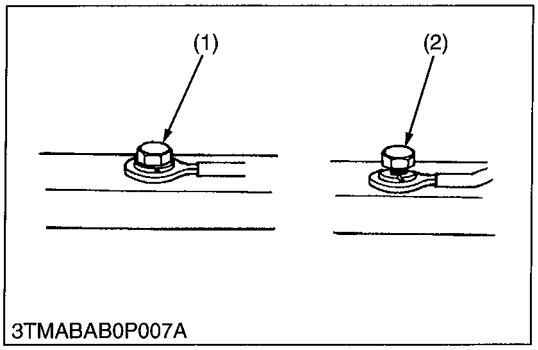
■ **IMPORTANT**

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

(1) Negative Terminal (2) Positive Terminal

WSM000001GEG0062US1

[1] WIRING

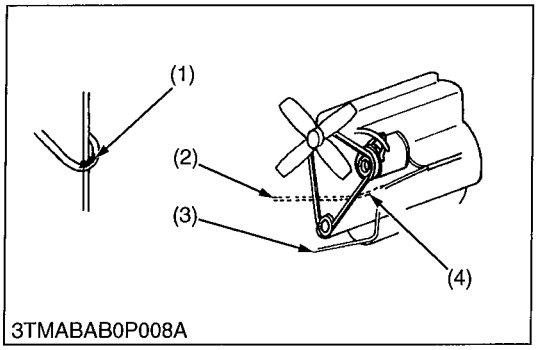


3TMABAB0P007A

- Securely tighten wiring terminals.

(1) Correct (Securely Tighten) (2) Incorrect (Loosening Leads to Faulty Contact)

WSM000001GEG0063US1

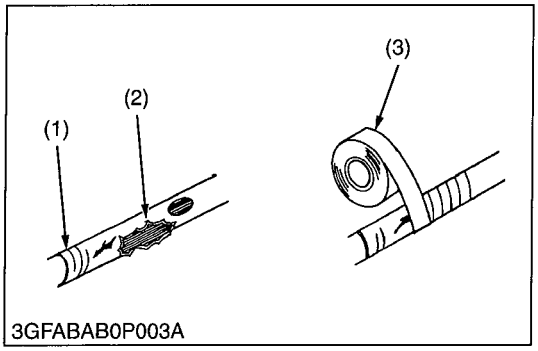


3TMABAB0P008A

- Do not let wiring contact dangerous part.

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

WSM000001GEG0064US1

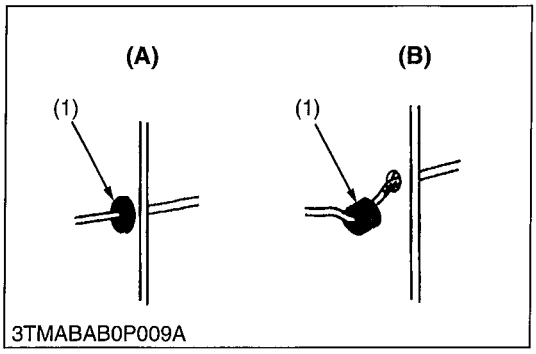


3GFABAB0P003A

- Repair or change torn or aged wiring immediately.

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

WSM000001GEG0065US1



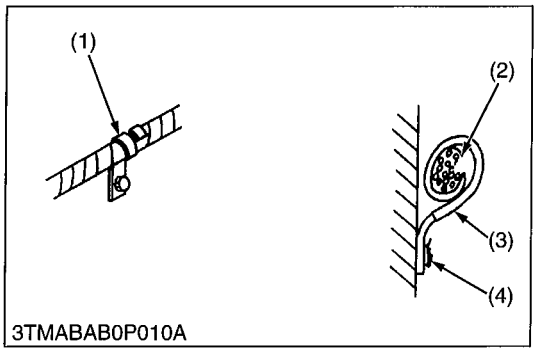
3TMABAB0P009A

- Securely insert grommet.

(1) Grommet

(A) Correct
(B) Incorrect

WSM000001GEG0066US1

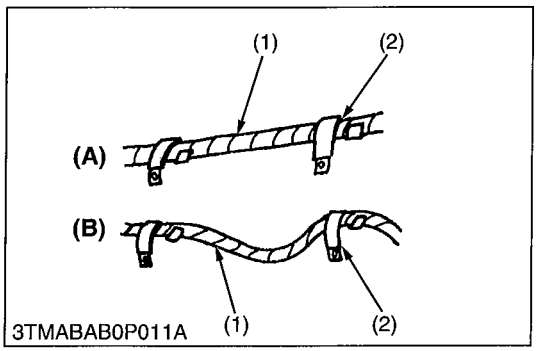


3TMABAB0P010A

- Securely clamp, being careful not to damage wiring.

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

WSM000001GEG0067US1



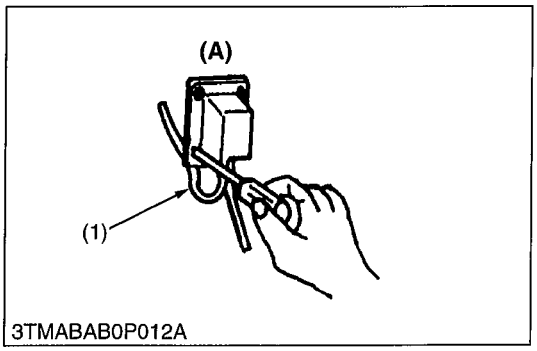
3TMABAB0P011A

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

(1) Wiring
(2) Clamp

(A) Correct
(B) Incorrect

WSM000001GEG0068US1



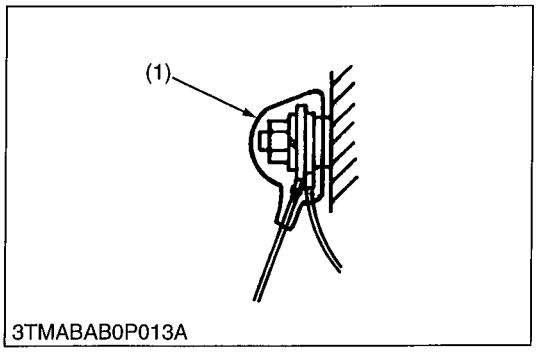
3TMABAB0P012A

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

(1) Wiring

(A) Incorrect

WSM000001GEG0069US1



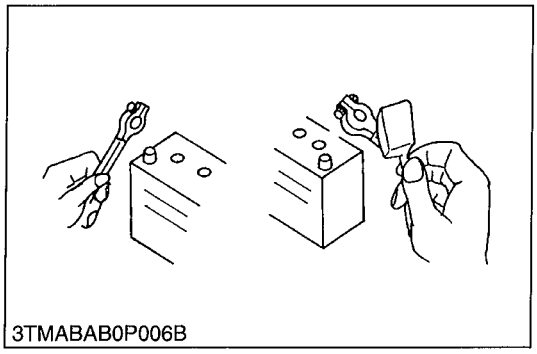
3TMABAB0P013A

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

(1) Cover
(Securely Install Cover)

WSM000001GEG0070US1

[2] BATTERY


3TMABAB0P006B

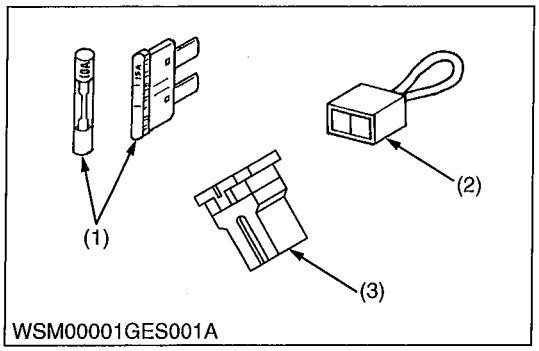
- Be careful not to confuse positive and negative terminal posts.
- When you remove battery cables, disconnect negative cable first. When you install battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After you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

CAUTION

- **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.**

WSM000001GEG0071US1

[3] FUSE



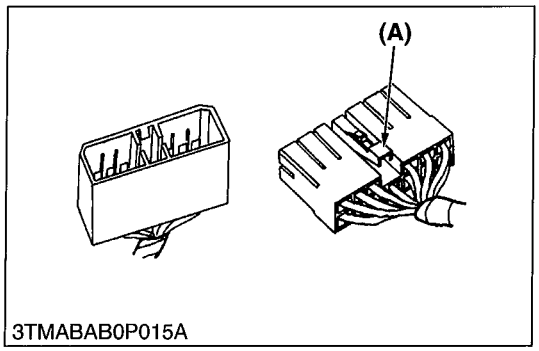
WSM00001GES001A

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

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

WSM000001GEG0072US1

[4] CONNECTOR

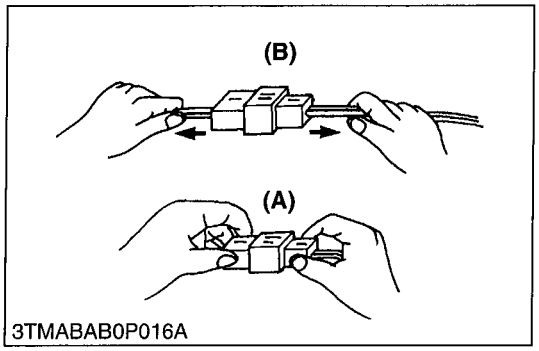


3TMABAB0P015A

- For connector with lock, push lock to separate.

(A) Push

WSM000001GEG0073US1

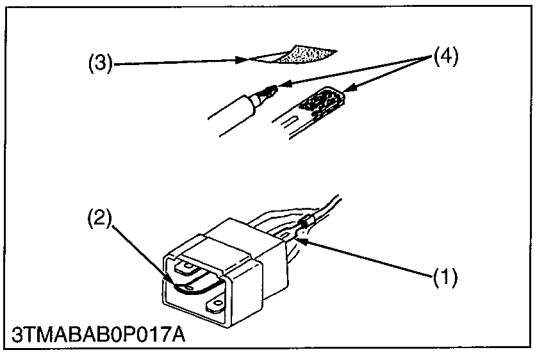


3TMABAB0P016A

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

(A) Correct
(B) Incorrect

WSM000001GEG0074US1

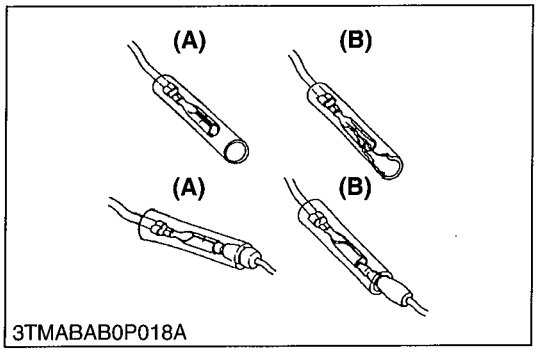


3TMABAB0P017A

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

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

WSM000001GEG0075US1

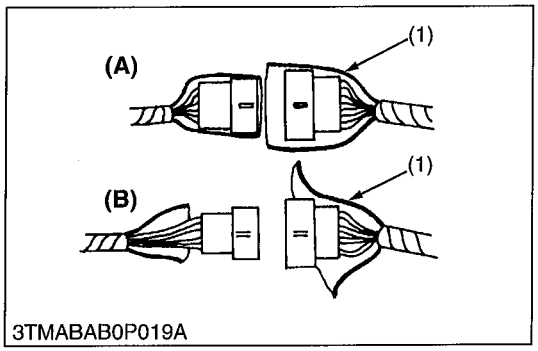


3TMABAB0P018A

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

(A) Correct
(B) Incorrect

WSM000001GEG0076US1



3TMABAB0P019A

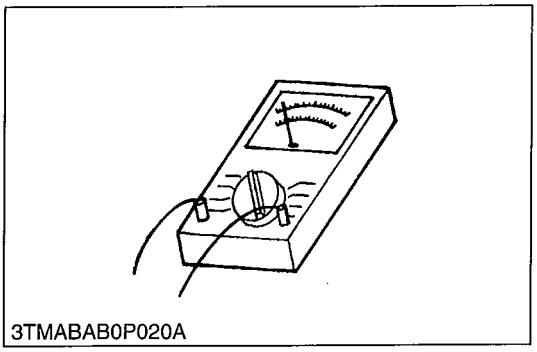
- Make sure that plastic cover is large enough to cover whole connector.

(1) Cover

(A) Correct
(B) Incorrect

WSM000001GEG0077US1

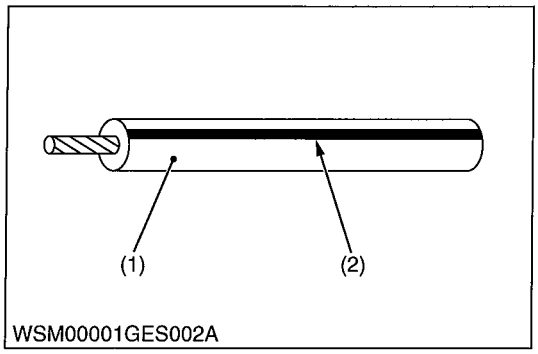
[5] HANDLING OF CIRCUIT TESTER


3TMABAB0P020A

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

WSM000001GEG0078US1

[6] COLOR OF WIRING



WSM00001GES002A

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

(An example)

Red stripe on white color: W/R

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

(1) Wire Color (2) Stripe

WSM000001GEG0079US0

4. LUBRICANTS, FUEL AND COOLANT

[1] BX Tractor

(1) Capacity Table

No.	Place	Capacity			Lubricants, fuel and coolant
		BX1870D	BX2370D	BX2670D	
1	Fuel	25.0 L 6.6 U.S.gals 5.5 Imp.gals			• No. 2-D diesel fuel • No. 1-D diesel fuel if temperature is below –10 °C (14 °F)
2	Cooling system with recovery tank	2.9 L 3.1 U.S.qts 2.6 Imp.qts	3.1 L 3.3 U.S.qts 2.7 Imp.qts	3.3 L 3.5 U.S.qts 2.9 Imp.qts	Fresh clean water anti-freeze
3	Engine crankcase*	2.9 L 3.1 U.S.qts 2.6 Imp.qts	3.1 L 3.3 U.S.qts 2.7 Imp.qts	3.5 L 3.7 U.S.qts 3.1 Imp.qts	**Engine oil** API Service Classification CF or higher • Below 0 °C (32 °F) SAE10W, SAE10W-30 or 15W-40 • 0 to 25 °C (32 to 77 °F) SAE20, SAE10W-30 or 15W-40 • Above 25 °C (77 °F) SAE30, SAE10W-30 or 15W-40
4	Transmission case	11.6 L 3.1 U.S.gals 2.6 Imp.gals			KUBOTA SUPER UDT fluid**
5	Front differential case	2.3 L 2.4 U.S.qts 2.0 Imp.qts	4.7 L 5.0 U.S.qts 4.1 Imp.qts		KUBOTA SUPER UDT fluid** or SAE80, SAE90 gear oil

Greasing				
No.	**Place**	**No. of greasing point**	**Capacity**	**Type of grease**
6	Battery terminal	2	Moderate amount	Multipurpose type Grease EP2 Grease (NLGI Grade No.2)
7	Speed control pedal	1	Until grease overflows	

*: Oil amount when the oil level is at the upper level of the oil level gauge.

**: The product name of KUBOTA genuine UDT fluid may be different from that in the Operator's Manual depending on countries or territories. Consult your local KUBOTA Dealer for further detail.

■ **IMPORTANT**

- **To prevent serious damage to hydraulic systems, use only KUBOTA genuine fluid or its equivalent.**

9Y1210855GEG0005US0

(2) Engine Oil, Fuel and Transmission Oil

[A] For North American Market

■ **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 internal EGR, external EGR or non-EGR) and the fuel.**

Fuel used	Engine oil classification (API classification)	
	Oil class of engines except external EGR	Oil class of engines with external EGR
Ultra Low Sulfur Fuel [< 0.0015 % (15 ppm)]	**CF**, **CF-4**, **CG-4**, **CH-4** or **CI-4**	**CF** or **CI-4** (Class CF-4, CG-4 and CH-4 engine oils cannot be used on EGR type engines)

EGR: Exhaust Gas Re-circulation

- The CJ-4 engine oil is intended for DPF (Diesel Particulate Filter) type engines, and cannot be used on this tractor.

	except external EGR	with external EGR
Models	BX1870D, BX2370D and BX2670D	–

Fuel

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

Transmission oil

- KUBOTA Super UDT-2: For an enhanced ownership experience, we highly recommend Super UDT-2 to be used instead of standard hydraulic/transmission fluid.
  Super UDT-2 is a proprietary KUBOTA formulation that deliveries superior performance and protection in all operating conditions.
  Regular UDT is also permitted for use in this machine.

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

9Y1210855GEG0006US0

[B] For Other Than North American Market

■ **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:**
- **With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low sulfur fuel on on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the "CF or better" lubricating oil with a high Total Base Number (TBN of 10 minimum).**
- **Refer to the following table for the suitable API classification engine oil according to the engine type (with internal EGR, external EGR or non-EGR) and the fuel (low-sulfur or high-sulfur fuel).**

Fuel used	Engine oil classification (API classification)	
	Oil class of engines except external EGR	Oil class of engines with external EGR
High Sulfur Fuel [≥ 0.05 % (500 ppm)]	**CF** (If the "CF-4, CG-4, CH-4 or CI-4" lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals. (approximately half))	–
Low Sulfur Fuel [< 0.05 % (500 ppm)] or Ultra Low Sulfur Fuel [< 0.0015 % (15 ppm)]	**CF**, **CF-4**, **CG-4**, **CH-4** or **CI-4**	**CF** or **CI-4** (Class CF-4, CG-4 and CH-4 engine oils cannot be used on EGR type engines)

EGR: Exhaust Gas Re-circulation

- The CJ-4 engine oil is intended for DPF (Diesel Particulate Filter) type engines, and cannot be used on this tractor.

	except external EGR	with external EGR
Models	–	–

Fuel

- Cetane number of 45 is minimum. Cetane number greater than 50 is preferred, especially for temperatures below −20 °C (−4 °F) or elevations above 1500 m.
- If diesel fuel with sulfur content greater than 0.5 % (5000 ppm) sulfur content is used, reduce the service interval for engine oil and filter by 50 %.
- NEVER use diesel fuel with sulfur content greater than 0.05 % (500 ppm) for EXTERNAL EGR type engine.
- DO NOT use diesel fuel with sulfur content greater than 1.0 % (10000 ppm).
- 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

- The oil used to lubricate the transmission is also used as hydraulic fluid. To ensure proper operation of the hydraulic system and to complete lubrication of the transmission, it is important that a multi-grade transmission fluid is used in this system. We recommend the use of **KUBOTA UDT** or **SUPER UDT fluid** for optimum protection and performance. (Consult your local KUBOTA Distributor for further detail.) Do not mix different brands together.

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

9Y1210855GEG0007US0

[2] MOWER

(1) Lubricants

No.	Place	Capacity		Lubricant
	Model	RCK60B-23BX RCK54-23BX RCK48-18BX	RCK54P-23BX RCK48P-18BX	
1	Gear Box	0.36 L 0.38 U.S.qts 0.32 Imp.qts	0.15 L 0.16 U.S.qts 0.13 Imp.qts	• SAE 90 gear oil (API Service GL-5 gear oil)

Greasing			
No.	Place	Capacity	Type of grease
2	Universal joint	Until grease overflows	SAE multi-purpose type grease NLGI-2 or NLGI-1 (GC-LB)
3	Three spindle shafts		
4	Belt tension pulley		
5	Belt tension pivot		
6	Balance shaft (RCK60B-23BX only)		
7	Front and rear anti-scalp roller		

9Y1210855GEG0008US0

[3] FRONT LOADER

(1) Lubricants

To prevent serious damage to hydraulic system, use only specified fluid or its equivalent.

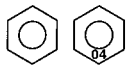
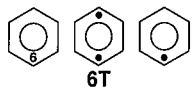
Place	Greasing	Lubricants
Grease fitting	Until grease overflows	Moly Ep Type grease

9Y1210855GEG0009US0

5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS (TRACTOR AND MOWER)

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

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

WSM000001GEG0001US1

[2] GENERAL USE SCREWS, BOLTS AND NUTS (FRONT LOADER)

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	⬡ 4 No-grade or 4T						⬡ 7 8.8 7T or Property class 8.8						⬡ 9 10.9 9T or Property class 10.9		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6 (6 mm, 0.24 in.)	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10 (10 mm, 0.39 in.)	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12 (12 mm, 0.47 in.)	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	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

WSM000001GEG0006US0

[3] STUD BOLTS

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

WSM000001GEG0002US1

[4] METRIC SCREWS, BOLTS AND NUTS

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

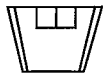
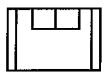
WSM000001GEG0003US1

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

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

WSM000001GEG0008US1

[6] PLUGS

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

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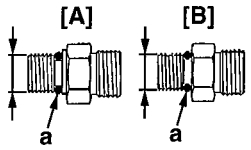
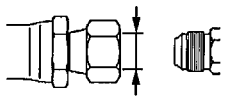
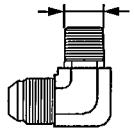
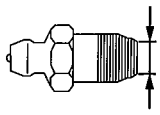
[7] HYDRAULIC FITTINGS

(1) Adaptors, Elbows and Others

Item	Shape	Thread size	Tightening torque		
			N·m	kgf·m	lbf·ft
Adjustable elbow, Adapter (O-ring port) (UNF)	 [A] Nut Type [B] No Nut Type a: O-ring	9/16	37 to 44	3.8 to 4.4	28 to 32
		3/4	48 to 54	4.9 to 5.5	36 to 39
		7/8	77 to 85	7.9 to 8.6	57 to 62
Hose fitting, Flare nut (UNF)		9/16	25 to 28	2.6 to 2.8	19 to 20
		3/4	36 to 40	3.7 to 4.0	27 to 29
		7/8	43 to 50	4.4 to 5.0	32 to 36
Adapter (NPT)		1/4	30 to 50	3.1 to 5.0	23 to 36
		3/8	39 to 60	4.0 to 6.1	29 to 44
		1/2	49 to 58	5.0 to 5.9	37 to 42
Grease Fitting		1/8-27	4.1 to 6.7	0.42 to 0.69	3.0 to 5.0
		1/4-18	4.1 to 6.7	0.42 to 0.69	3.0 to 5.0

■ **NOTE**

- **When connecting a hose with flare nut, after tightening the nut with specified torque, return it approximately 45 degrees (0.79 rad) and re-tighten it to specified torque.**

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6. MAINTENANCE CHECK LIST

[1] BX TRACTOR

No.	Item		Service Interval														Since then	Reference page	important	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
1	Engine oil	Change	★			☆				☆				☆			every 200 Hr	G-21		
2	Engine oil filter	Replace	★			☆				☆				☆			every 200 Hr	G-21		
3	Transmission oil filter	Replace	★			☆				☆				☆			every 200 Hr	G-22		
4	Transmission fluid	Change								☆							every 400 Hr	G-32		
5	Transmission strainer	Clean								☆							every 400 Hr	G-32		
6	Front axle case oil	Change								☆							every 400 Hr	G-33		
7	Front axle pivot	Adjust								☆							every 400 Hr	G-33		
8	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-23		
9	OPC system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-23		
10	Greasing	–	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-24		
11	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-24		
12	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-25	*4	
13	Air cleaner element	Clean		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-27	*1	@
		Replace															every 1 year	G-35	*2	
14	Fuel filter element	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-28		@
		Replace										☆					every 500 Hr	G-34		
15	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-28		
16	HST neutral spring	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-28		
17	Brake pedal	Adjust		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-29		
18	Radiator hose and clamp	Check				☆				☆				☆			every 200 Hr	G-30		
		Replace															every 2 years	G-35		
19	Power steering oil line	Check				☆				☆				☆			every 200 Hr	G-30		
		Replace															every 2 years	G-35		
20	Fuel line	Check		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-28		@
		Replace															every 2 years	G-35		
21	Intake air line	Check				☆				☆				☆			every 200 Hr	G-31		@
		Replace															every 2 years	G-35	*3	
22	Engine breather hose	Replace															every 2 years	G-38	*4	
23	Toe-in	Adjust				☆				☆				☆			every 200 Hr	G-31		

No.	Item		Service Interval													Since then	Reference page	important	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700				
24	Engine valve clearance	Adjust															every 800 Hr	1-S18		
25	Fuel injection nozzle injection pressure	Check															every 1500 Hr	1-S24		@
26	Injection pump	Check															every 3000 Hr	1-S23		@
27	Cooling system	Flush															every 2 years	G-36		
28	Coolant	Change															every 2 years	G-36		
29	Fuel system	Bleed															Service as required	G-39		
30	Fuse	Replace																G-39		
31	Light bulb	Replace																G-40		

■ **IMPORTANT**

- **The jobs indicated by ★ must be done after the first 50 hours of operation.**
- ***1: Air cleaner should be cleaned more often in dusty conditions than in normal conditions.**
- ***2: Every year or every 6 times of cleaning.**
- ***3: Replace only if necessary.**
- ***4: When the battery is used for less than 100 hours per year, check the fluid level annually.**
- **The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the 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. Please see the Warranty Statement in detail.**

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[2] MOWER

To keep the mower working in good condition as well as to avoid any accident and trouble, do periodic inspection and maintenance. Check the following points before use.

No.	Item	Service Interval				Reference page
		Daily check	Every 50 hrs	Every 150 hrs	Every 2 years	
1	Oil leakage check	☆				–
2	Make sure blade bolts are tight	☆				G-41
3	Blade wear check	☆				7-S11
4	All hardware check	☆				–
5	Make sure all pins are in place	☆				–
6	Mower deck cleaning	☆				–
7	Greasing universal joint	☆				G-41
8	Greasing three spindle shafts	☆				G-42
9	Greasing belt tension pulley	☆				G-42
10	Greasing balance shaft	☆				G-42
11	Greasing front and rear anti-scalp rollers	☆				G-42
12	Gear box oil check	☆				G-41
13	Gear box oil change		★	☆		G-43
14	Gear box oil seal charge				☆	G-43

■ **IMPORTANT**

- **The jobs indicated by ★ must be done after the first 50 hours of operation.**

9Y1210855GEG0011US0

[3] FRONT LOADER

To keep the machine working in good condition as well as to avoid any accident and trouble, do the periodic inspection and maintenance. Check the following points before use.

Service Interval	Check Points	Reference page
Daily (Each use)	Check the transmission fluid level	G-44
	Check the hydraulic hoses	G-44
Every 10 hours	Grease all grease fitting	G-44
	Lubricate joints of control lever linkage	G-44

9Y1210855GEG0012US0

7. CHECK AND MAINTENANCE

[1] BX TRACTOR

⚠ 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.**

9Y1210855GEG0013US0

(1) Daily Check

For your own safety and maximum service life of the machine, make a thorough daily inspection before operating the machine to start the engine.

■ **Walk Around Inspection**

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

9Y1210855GEG0014US0

Checking

1. Check and refueling.
2. Check the engine oil level.
3. Check the transmission fluid level.
4. Check the coolant level.
5. Clean panel and radiator screen.
6. Check the brake pedal.
7. Check the gauge, the meters and Easy Checker™.
8. Check the head light, the hazard lamp etc..
9. Check and clean the electrical wiring and the battery cables.
10. Check the seat belt and ROPS.
11. Check the movable parts.

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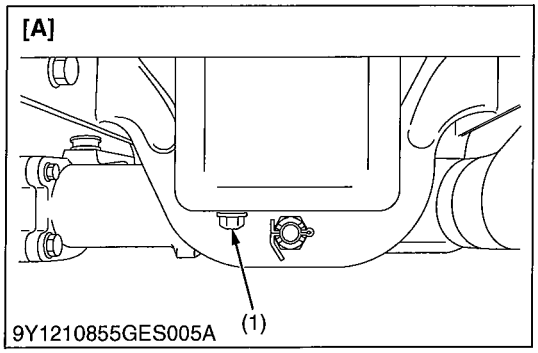
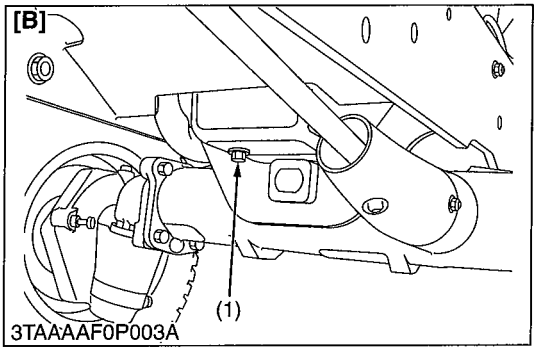
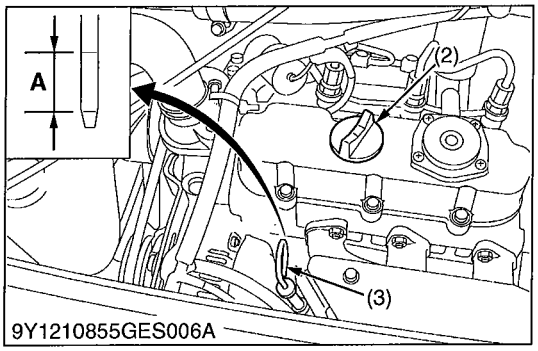
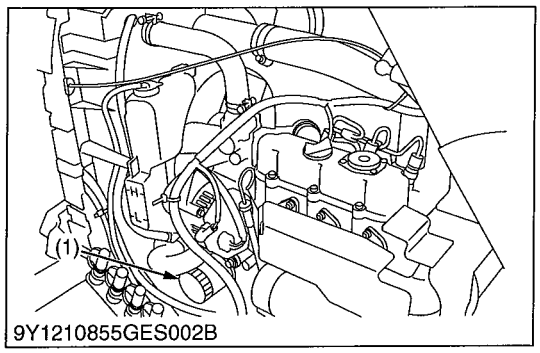
(2) Check Points of Initial 50 Hours









Changing Engine Oil

CAUTION

To avoid personal injury:

- **Be sure to stop the engine and remove the key 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.
4. Properly dispose of used oil.

Engine oil	Capacity	BX1870D	2.9 L 3.1 U.S.qts 2.6 Imp.qts
		BX2370D	3.1 L 3.3 U.S.qts 2.7 Imp.qts
		BX2670D	3.5 L 3.7 U.S.qts 3.1 Imp.qts

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

A: Oil level is acceptable within this range.
[A] BX1870D
[B] BX2370D and BX2670D

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Replacing Engine Oil Filter

CAUTION

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

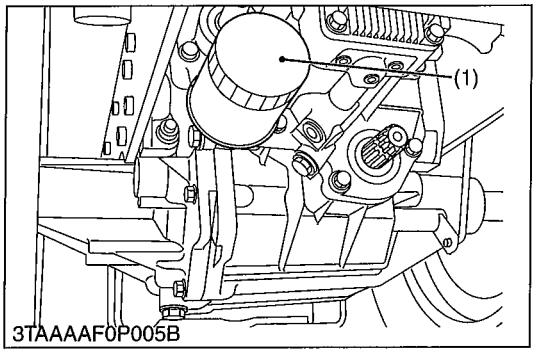
1. Remove the oil filter.
2. Put a film of clean engine oil on the rubber seal of the new filter.
3. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
4. After the new filter has been replaced, the engine oil normally decrease a little.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

■ IMPORTANT

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

(1) Engine Oil Filter Cartridge

9Y1210855GEG0017US0



Replacing Transmission Oil Filter

CAUTION

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

1. Remove the oil filter.
2. Put a film of clean transmission 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 transmission fluid level will decrease a little. Make sure that the transmission fluid does not leak through the seal, and check the fluid level. Top off if necessary.
5. Properly dispose of used oil.

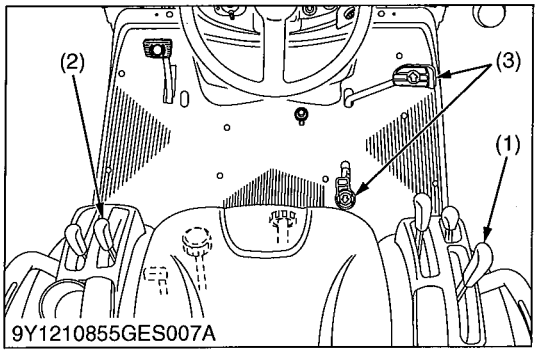
IMPORTANT

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

(1) Transmission Oil Filter

9Y1210855GEG0018US0

(3) Check Points of Every 50 Hours



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. Sit on the operator's seat.
2. Set the parking brake and stop the engine.
3. Shift the range gear shift lever (1) to **"NEUTRAL"** position.
4. Check the speed control pedal **"NEUTRAL"** position.
5. Shift the PTO clutch control lever (2) to **"OFF"** position.

■ **Test 1: Switch for the speed control pedal**

1. Make sure that the range gear shift lever (1) is set in **"NEUTRAL"** position.
2. Depress the speed control pedal (3).
3. Turn the key to **"START"** position.
4. The engine must not crank.

■ **Test 2: Switch for the PTO clutch lever**

1. Make sure that the range gear shift lever (1) is set in **"NEUTRAL"** position.
2. Make sure that the speed control pedal (3) is set in **"NEUTRAL"** position.
3. Shift the PTO clutch control lever (2) to **"ON"** position.
4. Turn the key to **"START"** position.
5. The engine must not crank.

(1) Range Gear Shift Lever
(2) PTO Clutch Control Lever
(3) Speed Control Pedal

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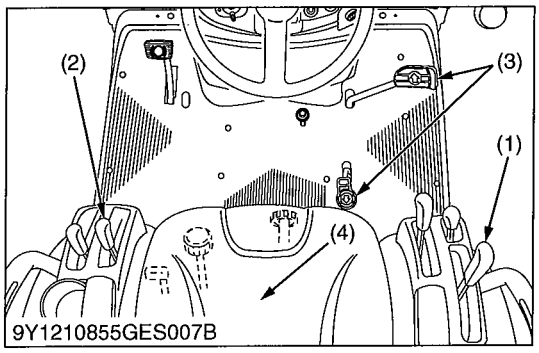

Checking OPC System

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. Sit on the operator's seat.
2. Set the parking brake and stop the engine.
3. Shift the range gear shift lever (1) to **"NEUTRAL"** position.
4. Check the speed control pedal **"NEUTRAL"** position.
5. Shift the PTO clutch control lever (2) to **"OFF"** position.

■ **Test 1: Switch for the operator's seat and speed control pedal**

1. Start the engine.
2. Depress the speed control pedal (3).
3. Stand up. (Do not get off the machine.)
4. The engine must shut off after approximately 1 second.

■ **Test 2: Switches for the operator's seat and the PTO clutch lever**

1. Start the engine.
2. Engage the PTO clutch control lever (2).
3. Stand up. (Do not get off the machine.)
4. The engine must shut off after approximately 1 second.

(1) Range Gear Shift Lever
(2) PTO Clutch Control Lever
(3) Speed Control Pedal
(4) Operator's Seat

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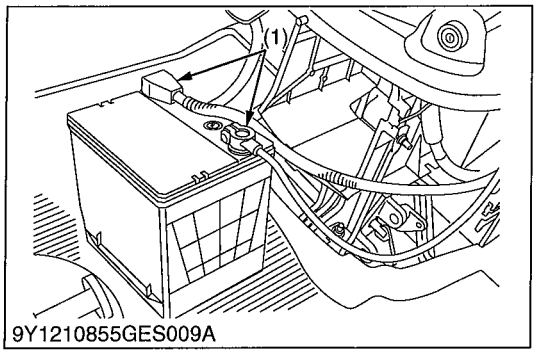

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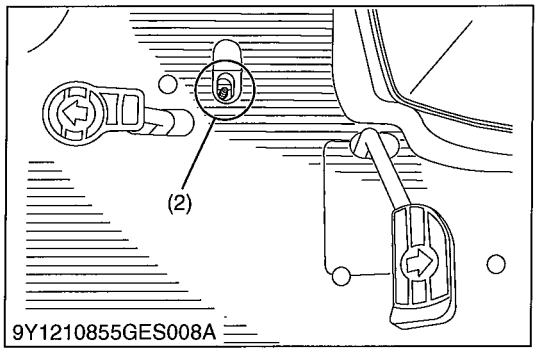

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Greasing

1. Apply a small amount of multipurpose grease to the following points.

(1) Battery Terminal (2) Speed Control Pedal

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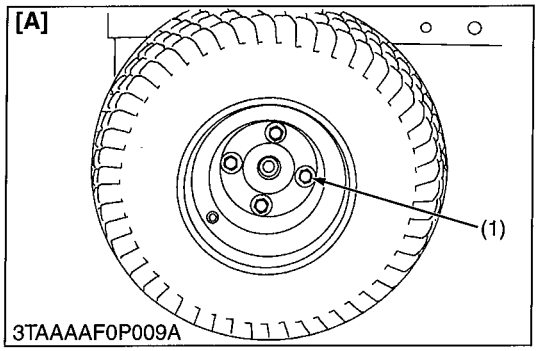

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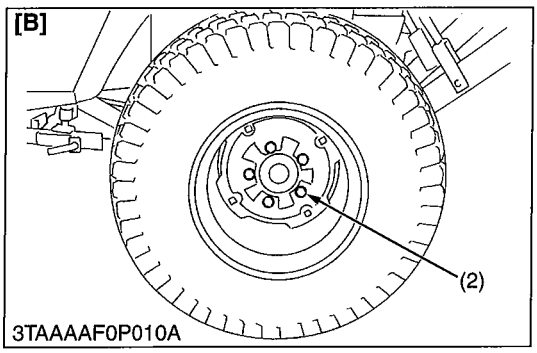

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Checking Wheel Mounting Screws Tightening Torque

CAUTION

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

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

Tightening torque	Front wheel mounting screws	149.2 to 179.0 N·m 15.2 to 18.3 kgf·m 110 to 132 lbf·ft
	Rear wheel mounting screws	108.5 to 130.2 N·m 11.1 to 13.3 kgf·m 80 to 96 lbf·ft

(1) Front Wheel Mounting Screw **[A] Front**
(2) Rear Wheel Mounting Screw **[B] Rear**

9Y1210855GEG0023US0

(4) Check Points of Every 100 Hours

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.**

IMPORTANT

- **Mishandling the battery shortens the service life and adds to maintenance costs.**
- **The original battery is maintenance free type battery, but need 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.
- **When exchanging an old battery for new one, use battery of equal specification in table below.**

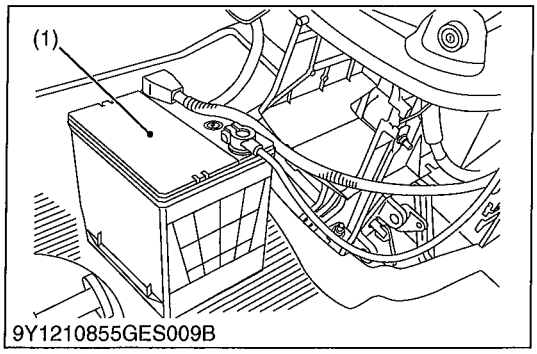
Tractor Type	Battery Type	Volts (V)	Reserve Capacity (min.)	Cold Cranking Amps	Normal Charging Rate (A)
BX1870D	426RMF	12	55	450	6.5
BX2370D BX2670D	526RFM	12	80	540	6.5

(For non-accessible maintenance-free type batteries.) Maintenance-free, non-accessible batteries are designed to eliminate the need to add water. Yet the volume of electrolyte above plates may eventually become depleted due to abnormal conditions such as high heat or improper regulator setting. Use a voltmeter to check the state of change. (See reference chart below to determine if charging is necessary.)

Battery voltage	Reference state of charge
12.6	100 % (Full charge)
12.4	75 %
12.2	50 %
12.0	25 %
11.8	0 %

(To be continued)

(Continued)



■ 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 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 charge for at least 1 hour at 6.5 amperes.
2. A boost charge is only for emergencies. It will partially charges 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. When the specific gravity of electrolyte become between 1.27 and 1.29 charge has completed.

■ Battery for storage

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

(1) Battery

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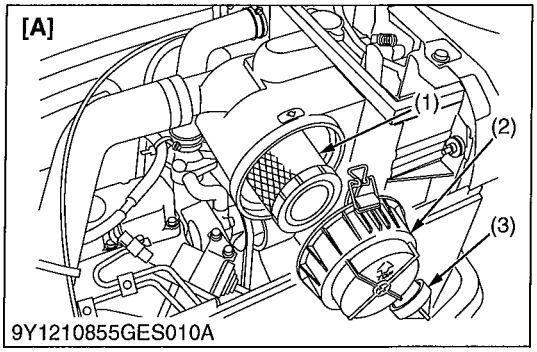

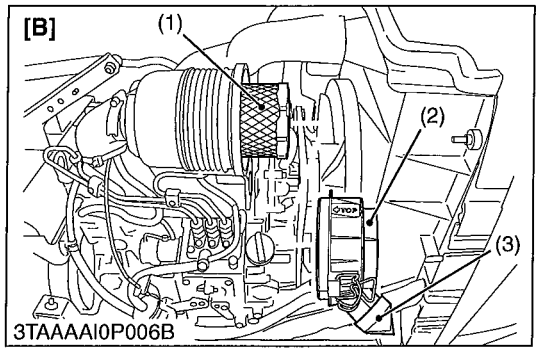

Cleaning Air Cleaner Element

CAUTION

- **Be sure to stop the engine and remove the key before cleaning air cleaner element.**

1. Remove the air cleaner cover (2) and the element (1).
   - Undo the hook.
   - Turn the cover clockwise and detach it.
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^2, 30 psi).
   - When carbon or oil adheres to the element, soak the element in detergent for 15 minutes then wash it several times in water, rinse with clean water and dry it naturally. After element is fully dried, inspect inside of the element with a light and check if it is damaged or not. (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.**
- **Align the arrow marks when reinstalling the cover. If the cover is improperly fitted, dust passes 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) Element
(2) Cover
(3) Evacuator Valve

[A] BX1870D and BX2370
[B] BX2670D

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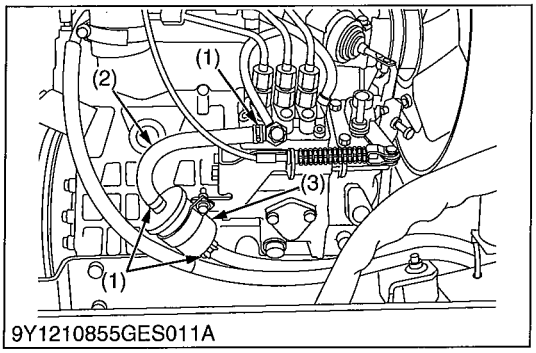

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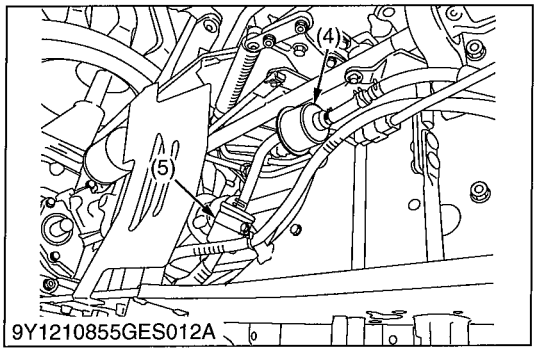

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Checking Fuel Line and Fuel Filter

⚠ CAUTION

- **Stop the engine and remove the key before checking fuel lines and fuel filter.**
- **Check the fuel lines periodically. The fuel lines are subject to wear and aging. Fuel may leak out onto the running engine, causing a fire.**

The fuel line connections should be checked annually or every 100 service hours, whichever occurs first.

1. The fuel line is made of rubber and ages regardless of service period.
2. After inspection, if the fuel line and clamps are found damaged or deteriorated, replace them.
3. Check fuel filter, if it is clogged by debris or contaminated by water, replace it.

■ IMPORTANT

- **When the fuel line is disconnected for maintenance or repair, plug both ends of the fuel line with a clean plug of suitable size to prevent dust and dirt from entering. Particular care must be taken not to admit dust and dirt into the fuel system. Entrance of dust and dirt causes malfunction of the fuel pump.**

■ NOTE

- **If the fuel line is removed, be sure to properly bleed the fuel system (see "Bleeding Fuel System" in service as required).**

(1) Pipe Clamp
(2) Fuel Line
(3) Fuel Filter
(4) Fuel Pump
(5) Fuel Filter

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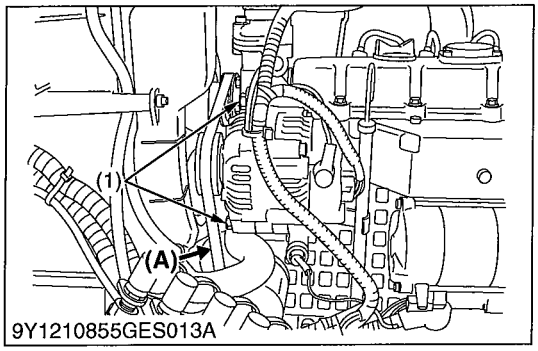


9Y1210855GES013A

Adjusting Fan Belt Tension

⚠ CAUTION

- **Be sure to stop engine and remove the key 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 of between 7 to 9 mm (0.28 to 0.34 in.) when the belt is pressed in the middle of the span.

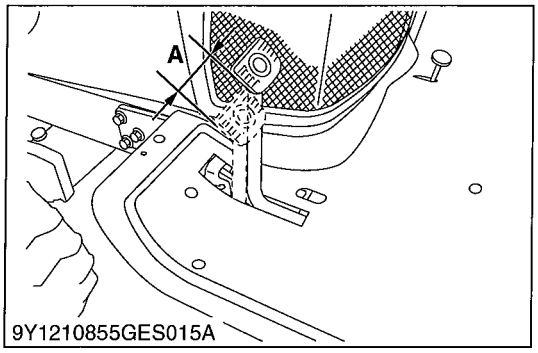
(1) Mounting Bolt
(A) Check the belt tension.

9Y1210855GEG0027US0

Adjusting HST Neutral Spring (for Dynamic Braking)

1. See page 2-S11.

9Y1210855GEG0028US0



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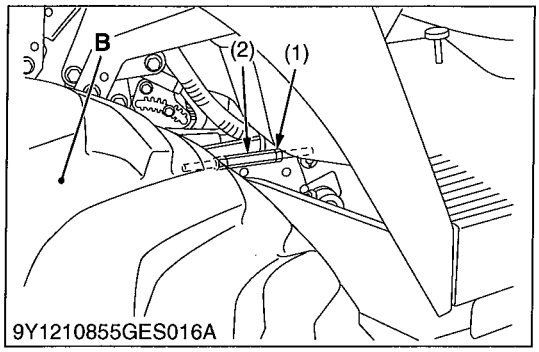

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Adjusting Brake Pedal Free Travel

CAUTION

- **Stop the engine, remove the key, lower the implement to the ground, and chock the wheels before checking brake pedal.**
- **Even if the brake pedal free travel is within the limitation, adjust the brake pedal following the procedure below.**

1. Release the parking brake.
2. Loosen the lock nut and turn the turnbuckle to adjust the rod length so that the brake pedal free travel is 10 mm (0.4 in.).
3. Extend the turnbuckle one additional turn.
4. Retighten the lock nut.
5. Depress the brake pedal several times and make sure the brake pedal free travel is from 25 to 35 mm (1.0 to 1.4 in.).

Brake pedal free travel	Factory specification	25 to 35 mm 1.0 to 1.4 in.

(1) Lock Nut
(2) Turnbuckle

A: Free Travel
B: Right Rear Tire

9Y1210855GEG0029US0

(5) Check Points of Every 200 hours

Changing Engine Oil

1. See page G-21.

9Y1210855GEG0030US0

Replacing Transmission Oil Filter

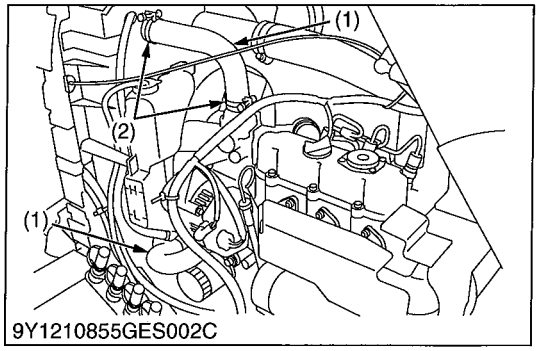
1. See page G-22.

9Y1210855GEG0031US0

Replacing Engine Oil Filter

1. See page G-21.

9Y1210855GEG0032US0



9Y1210855GES002C

Checking Radiator Hoses and Hose Clamps

CAUTION

- **Be sure to stop the engine and remove the key before checking radiator hose and clamp.**

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

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

■ **Precaution at Overheating**

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

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

(1) Radiator Hose (2) Hose Clamp

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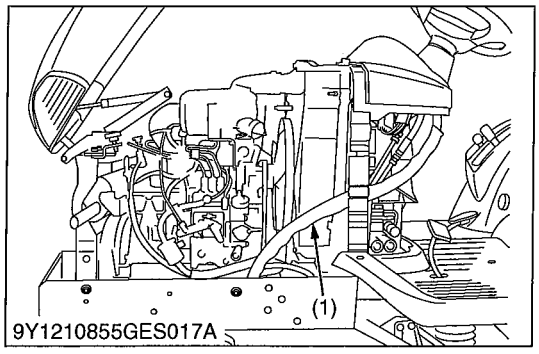

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Checking Power Steering Line

CAUTION

- **Be sure to stop the engine and remove the key before checking power steering line.**

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

(1) Power Steering Hose

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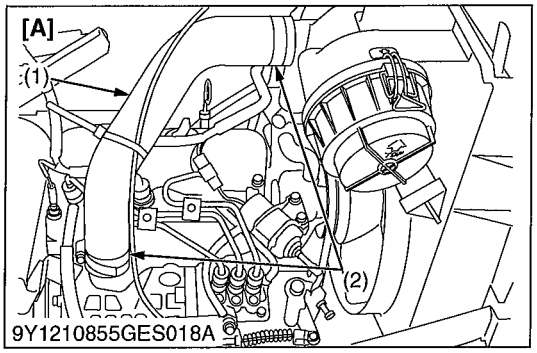
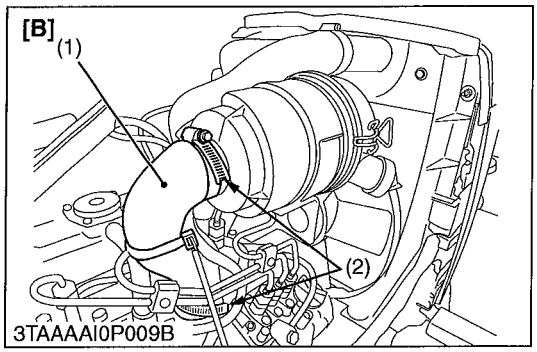
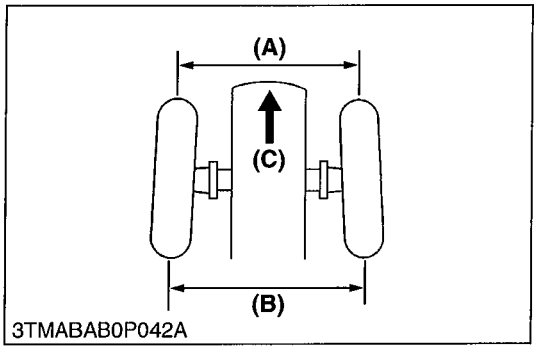
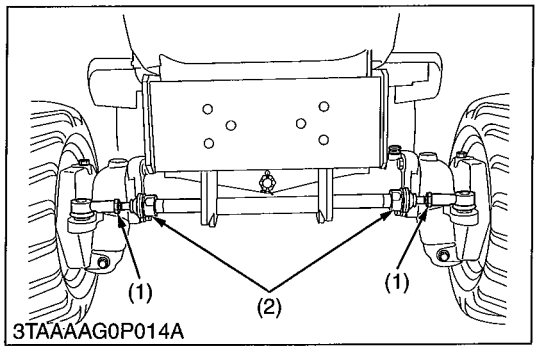








Checking Intake Air Line

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

(1) Hose
(2) Clamp

[A] BX1870D and BX2370D
[B] BX2670D

9Y1210855GEG0035US0

Adjusting Toe-in

1. Park tractor on a firm, flat and level place.
2. Turn steering wheel so front wheels are in the straight ahead position.
3. Lower the implement to the ground, lock the parking brake, stop the engine and remove the key.
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 0 to 5.0 mm (0 to 0.2 in.) less that rear distance. If not, adjust tie rod length.

Toe-in ((B) – (A))	Factory specification	0 to 5.0 mm 0 to 0.2 in.

■ Adjusting

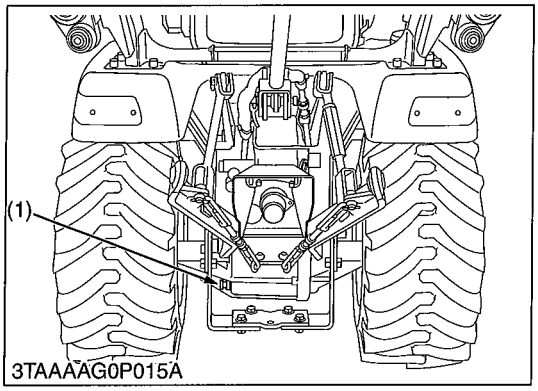
1. Loosen the lock nuts and turn the tie-rod to adjust the rod length until the proper toe-in measurement is obtained.
2. Retighten the lock nuts.

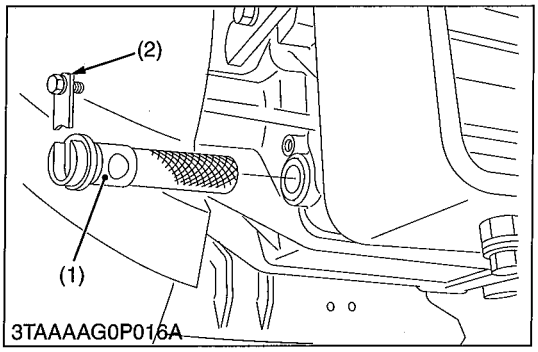
(1) Lock Nut
(2) Tie-rod

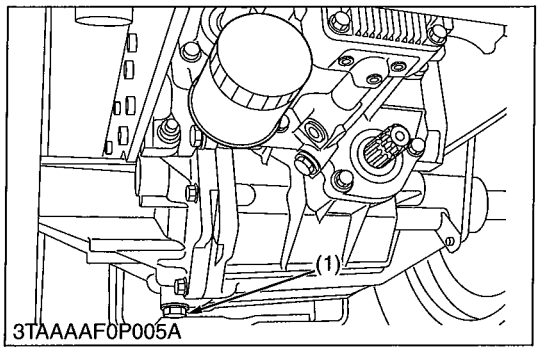
(A) Wheel to Wheel Distance at Front
(B) Wheel to Wheel Distance at Rear
(C) Front

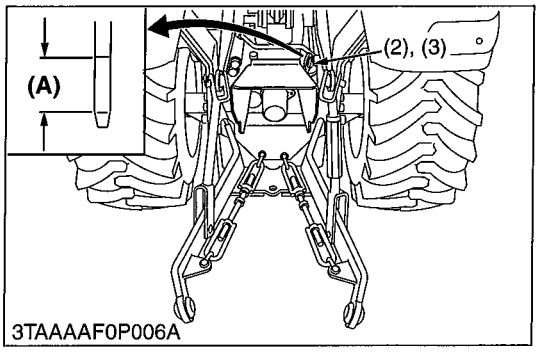
9Y1210855GEG0036US0

(6) Check Points of Every 400 Hours









Cleaning Transmission Oil Strainer

1. When changing the transmission fluid, disassemble and rinse the strainer with nonflammable solvent to completely clean off fillings.
2. When reassembling, be careful not to damage the parts.

■ **NOTE**

- **Since the fine fillings in the oil can damage the precision component parts of the hydraulic system, the end of the suction line is provided with an oil strainer.**

(1) Strainer (2) Filter Plate

9Y1210855GEG0019US0

Changing Transmission Fluid

⚠ CAUTION

- **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 transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plug.
3. Clean the transmission strainer.
4. Fill with new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick.
5. After running the engine for a few minutes, stop it and check the oil level again, add oil to prescribed level.
6. Properly dispose of used oil.

■ **IMPORTANT**

- **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 fluid	Capacity	11.6 L 3.1 U.S.gals 2.6 Imp.gals

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

(A) Oil level is acceptable within this range.

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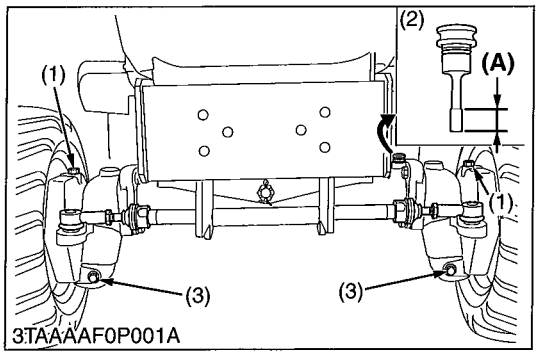

Changing Front Axle Case Oil

1. Park the machine on a firm, flat and level surface.
2. To drain the used oil, remove the right and left drain plugs and oil gauge at the front axle case and drain the oil completely into the oil pan.
3. After draining, reinstall the drain plugs.
4. Remove the right and left breather plugs.
5. Fill with new oil up to the upper notch on the dipstick.

■ **IMPORTANT**

- **After ten minutes, check the oil level again; add oil to prescribed level.**

6. After filling, reinstall the oil gauge and breather plugs.

Front axle case oil	Capacity	BX1870D	2.3 L 2.4 U.S.qts 2.0 Imp.qts
		BX2370D BX2670D	4.7 L 5.0 U.S.qts 4.1 Imp.qts

(1) Breather Plug
(2) Oil Gauge with Dipstick
(3) Drain Plug

(A) Oil level is acceptable within this range.

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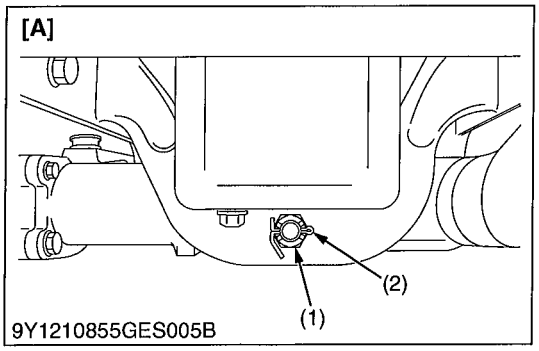
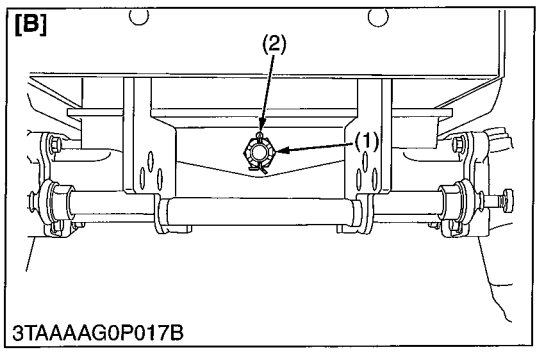




Adjusting Front Axle Pivot

1. Remove the split pin (2), tighten the adjusting nut (1).
2. Make sure that one of the nut slots aligns with the split pin hole, tighten the nut slightly if necessary to align.
3. Replace the split pin.

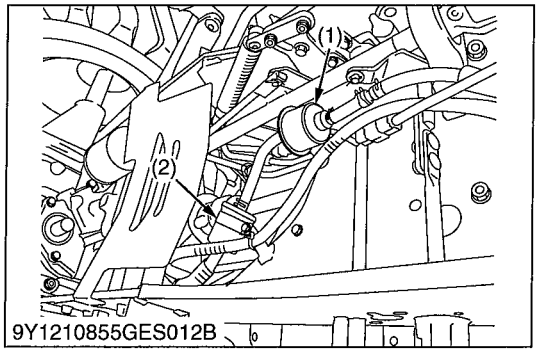
Tightening torque	Adjusting nut	20 N·m 2.0 kgf·m 14 lbf·ft

(1) Adjusting Nut
(2) Split Pin

[A] BX1870D and BX2370D
[B] BX2670D

9Y1210855GEG0040US0

(7) Check Point of Every 500 Hours



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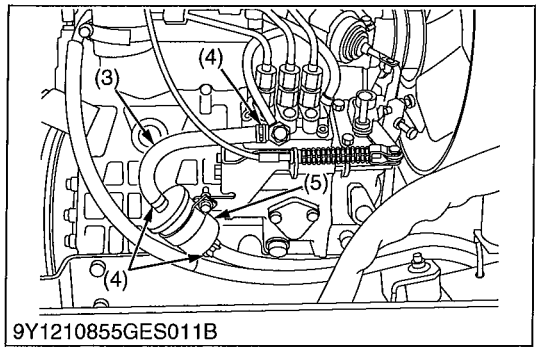


9Y1210855GES011B

Replacing Fuel Filter Element

1. Disconnect the fuel hoses and replace the fuel filter (2).
2. Disconnect the fuel hoses and loosen the pipe clamp to replace the fuel filter (5).

■ **NOTE**

- **If the fuel line is removed, be sure to properly bleed the fuel system. (See page G-39.)**

(1) Fuel Pump
(2) Fuel Filter
(3) Fuel Line
(4) Hose Clamp
(5) Fuel Filter

9Y1210855GEG0041US0

(8) Check Point of Every 800 Hours

Adjusting Engine Valve Clearance

1. See page 1-S18.

9Y1210855GEG0042US0

(9) Check Point of Every 1500 Hours

Checking Fuel Injection Nozzle Injection Pressure

1. See page 1-S24.

9Y1210855GEG0043US0

(10) Check Point of Every 3000 Hours

Checking Injection Pump

1. See page 1-S23.

9Y1210855GEG0044US0

(11) Check Point of Every 1 Year

Replacing Air Cleaner Element

1. See page G-27.

9Y1210855GEG0045US0

(12) Check Points of Every 2 Years

Replacing Radiator Hoses (Water Pipes)

1. Replace the hoses and clamps.
   Refer to **"Checking Radiator Hoses and Hose Clamps"**.
   (See page G-30.)

9Y1210855GEG0046US0

Replacing Power Steering Hoses

1. Replace the hoses.
   Refer to **"Checking Power Steering Line"**.
   (See page G-30.)

9Y1210855GEG0047US0

Replacing Fuel Line

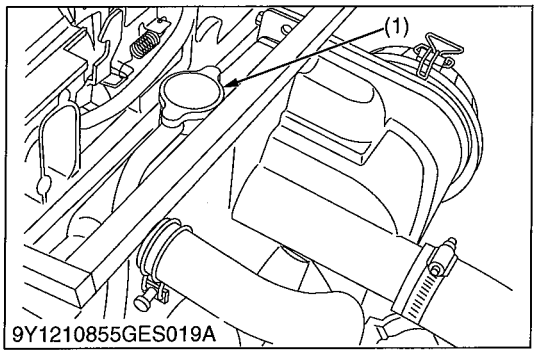
1. Replace the hoses and clamps.
   Refer to **"Checking Fuel Line and Fuel Filter"**.
   (See page G-28.)

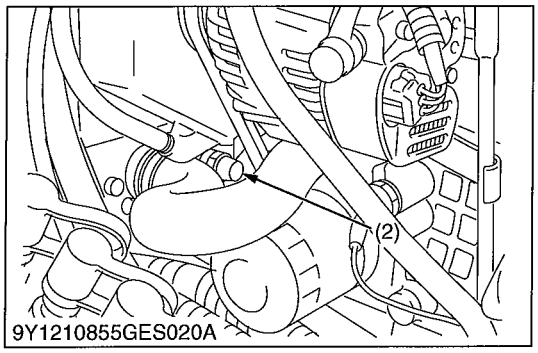
9Y1210855GEG0048US0

Replacing Intake Air Line

1. Replace the intake hose.
2. Refer to **"Checking Intake Air Line"**.
   (See page G-31.)

9Y1210855GEG0049US0





Flush Cooling System and Changing Coolant

CAUTION

- **Be sure to stop the engine and remove the key before checking coolant level.**
- **Do not remove the radiator cap when the engine is hot. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.**

1. Stop the engine, remove the key and let 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, close the drain plug.
4. Fill with clean water and cooling system cleaner.
5. Follow directions of the cleaner instruction.
6. After flushing, fill with clean 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 **"H"** mark on the 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.

IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh water and anti-freeze to fill the radiator.**
- **When the anti-freeze is mixed 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.**

Coolant (with recovery tank)	Capacity	BX1870D	2.9 L 3.1 U.S.qts 2.6 Imp.qts
		BX2370D	3.1 L 3.3 U.S.qts 2.7 Imp.qts
		BX2670D	3.3 L 3.5 U.S.qts 2.9 Imp.qts

(1) Radiator Cap (2) Drain Plug

(To be continued)

(Continued)

■ Anti-Freeze

⚠ CAUTION

- **When using antifreeze, put on some protection such as rubber gloves (Antifreeze contains position.).**
- **If should drink antifreeze, throw up at once and take medical attention.**
- **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.**

If it freezes, coolant can damage the cylinders and radiator. If the ambient temperature falls below 0 °C (32 °F) or before a long-term storage, let out coolant completely, or mix fresh water with long-life coolant and fill the radiator and reserve tank with the mixture.

1. Long-life coolant (hereafter LLC) comes in several types. Use ethylene glycol (EG) type for this engine.
2. Before employing LLC-mixed coolant, 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.
   Put the LLC in coolant in the percentage (%) for a target temperature. 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 SAE J814c.

■ IMPORTANT

- **When the antifreeze is mixed with water, thee antifreeze mixing ratio is 50 %.**

Vol % Anti-freeze	Freezing Point		Boiling Point*	
	°C	°F	°C	°F
40	−24	−12	106	222
50	−37	−34	108	226

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

(To be continued)

(Continued)

5. Adding the LLC.
   - Add only water if the mixture reduces in amount by evaporation.
   - If there is a mixture leak, add the LLC of the same manufacture and type in the same mixture percentage.
     * Never add any long-life coolant of different manufacture.

   (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.**
- **When the coolant level drops due to evaporation, add water only to keep the antifreeze mixing ratio less than 50 %. In case of leakage, add antifreeze and water in the specified mixing ratio before filling in to the radiator.**

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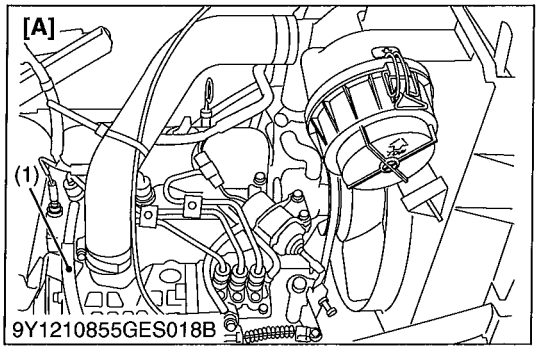
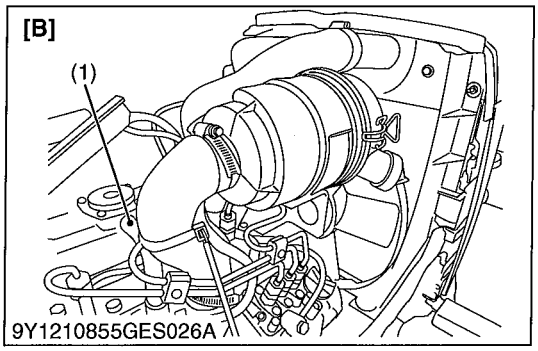




Replacing Engine Breather Hose

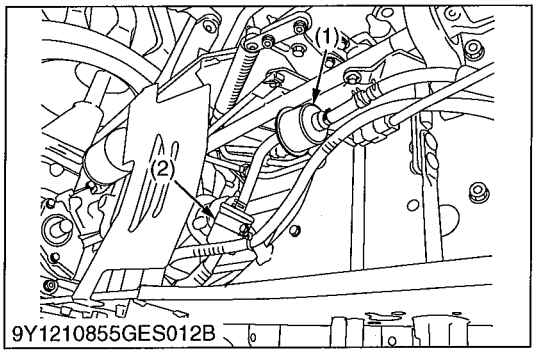
1. Check to see that hose is not damaged.
2. If the hose is found worn or damaged, replace it.

(1) Breather Hose

[A] BX1870D and BX2370D
[B] BX2670D

9Y1210855GEG0057US0

(13) Others



Bleeding Fuel System

Air must removed:

1. When the fuel filter (2) or lines are removed.
2. When tank is completely empty.
3. 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.
2. Turn the key switch to **"ON"** position for about 30 seconds. Doing so allows fuel pump (1) to work and pump air out of the fuel system.
3. Start the engine and run for about 30 seconds, and then stop the engine.

(1) Fuel Pump (2) Fuel Filter

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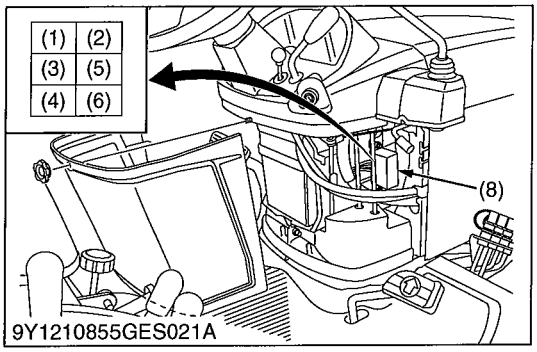

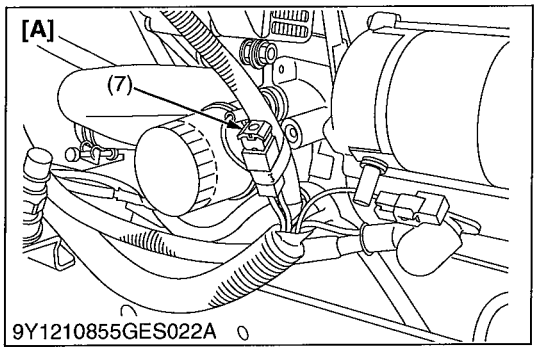

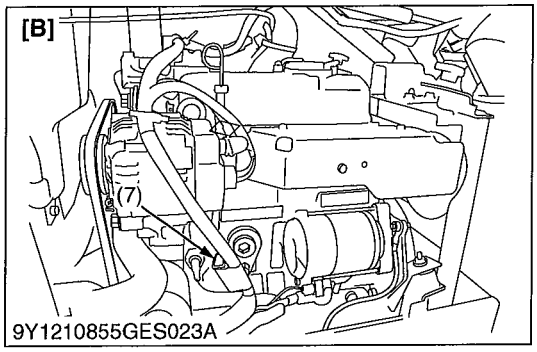

Replacing Fuse

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

■ **IMPORTANT**

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

■ **Protected Circuit**

[Fuse Box]

Fuse No.	Capacity (A)	Protected circuit
(1)	15	Solenoid
(2)	15	Hazard
(3)	15	ACC
(4)	20	Working Light
(5)	10	DC Outlet
(6)	10	Timer Relay

Fuse No.	Capacity (A)	Protected circuit
(7)	Slow Blow Fuse (50 A)	Check circuit against wrong battery connection

(8) Fuse Box

[A] BX1870D and BX2370D
[B] BX2670D

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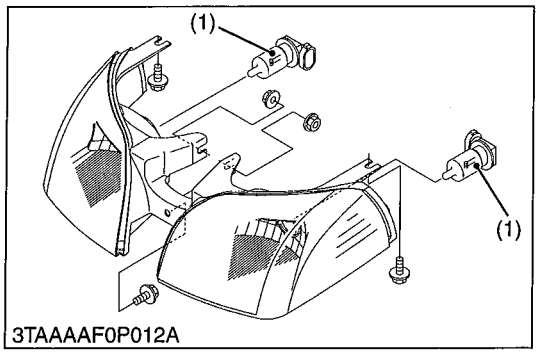

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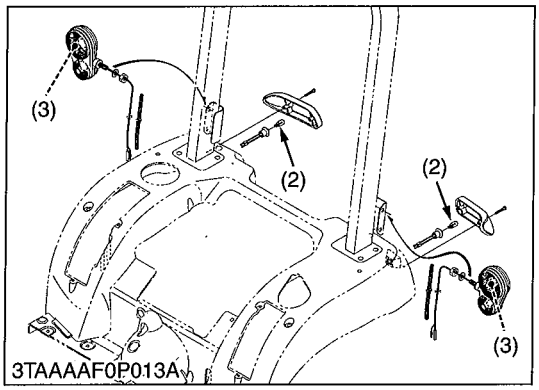

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Replacing Light Bulb

1. Head lights:
   Take the bulb out of the light body and replace with a new one.
2. Other lights:
   Detach the lens and replace the bulb.

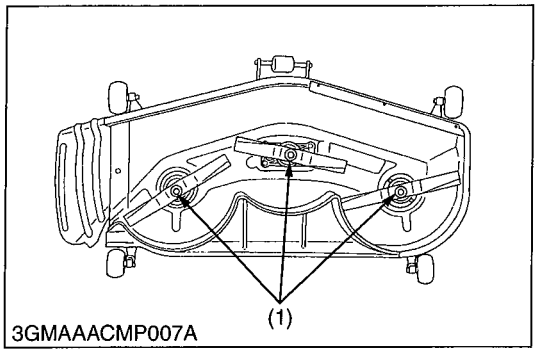
Light	Capacity
Head light	37.5 W
Tail light	12.8 W
Hazard lamp	23 W

(1) Head Light
(2) Tail Light
(3) Hazard Lamp

9Y1210855GEG0053US0

[2] MOWER

(1) Check Points of Daily or Each Use



Retightening Mower Blade Screw

CAUTION

- **To avoid injury, always handle the mower blade with care.**

1. Dismount the mower and turn it over to expose the mower blades.
2. Wedge a block of wood securely between the mower blade and mower deck.
3. Retighten the mower blade screw to the specified torque.
4. If the mower blade screw is worn or broken, replace it.

Tightening torque	Mower blade screw	98.1 to 117 N·m 10.0 to 12.0 kgf·m 72.4 to 86.7 lbf·ft

(1) Mower Blade Screw

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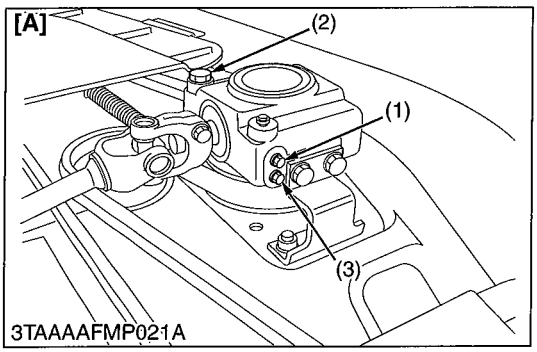
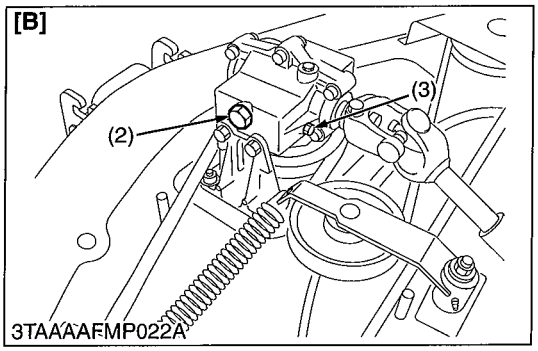




Checking Gear Box Oil Level

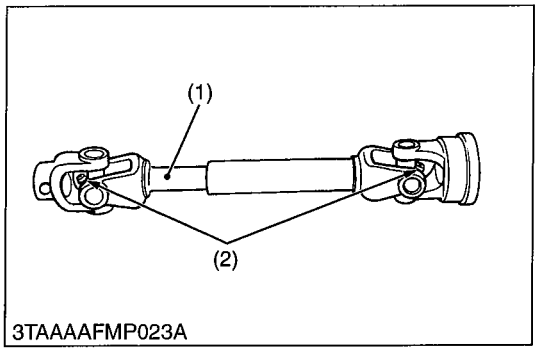
1. Place the mower on level ground.
2. Loosen the check plug (1), and check to see if oil seems from the opening.
3. If the oil level is low, remove the oil filler plug (2) and add new gear oil.

■ IMPORTANT

- **Use the specified gear oil.**
  Refer to "[2] MOWER" on page G-12.

(1) Check Plug
(2) Oil Filler Plug
(3) Drain Plug
[A] RCK60B-23BX, RCK54-23BX and RCK48-18BX
[B] RCK48P-18BX and RCK54P-23BX

9Y1210855GEG0055US0

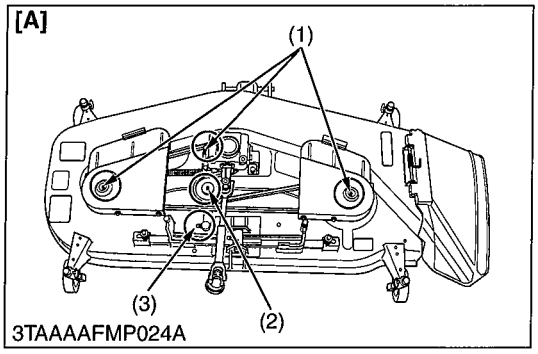


Greasing Universal Joint

1. Grease the internal splines (1) and grease fittings (2) of the universal joint if the amount of grease is insufficient.

(1) Spline
(2) Grease Fitting

9Y1210855GEG0056US0



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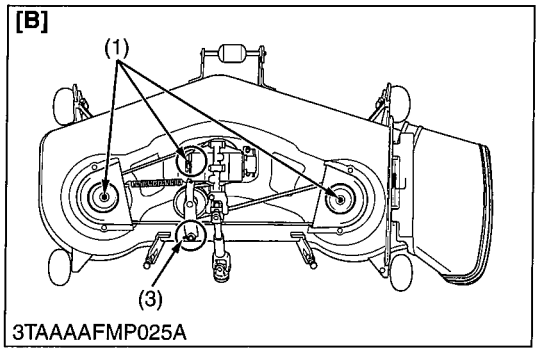

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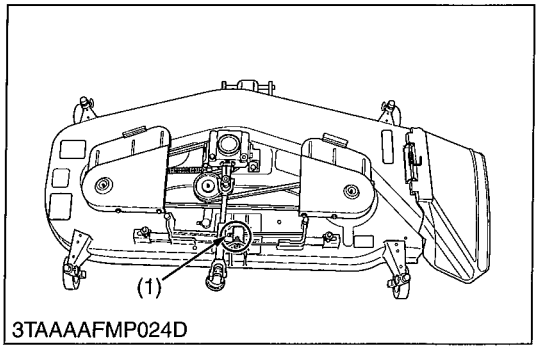
Greasing Spindle Shafts, Belt Tension Pivot and Tension Pulley

1. Grease the grease fittings (1), (2) of the spindle shafts if the amount of grease is insufficient.

(1) Grease Fitting (Spindle Shaft)
(2) Grease Fitting (Belt Tension Pulley)
(3) Grease Fitting (Belt Tension Pivot)
[A] RCK60B-23BX, RCK54-23BX and RCK48-18BX
[B] RCK54P-23BX and RCK48P-18BX

9Y1210855GEG0058US0



3TAAAAFMP024D

Greasing Balance Shaft [RCK60B-23BX]

1. Grease the grease fitting (1) of the balance shaft if the amount of grease is insufficient.

(1) Grease Fitting

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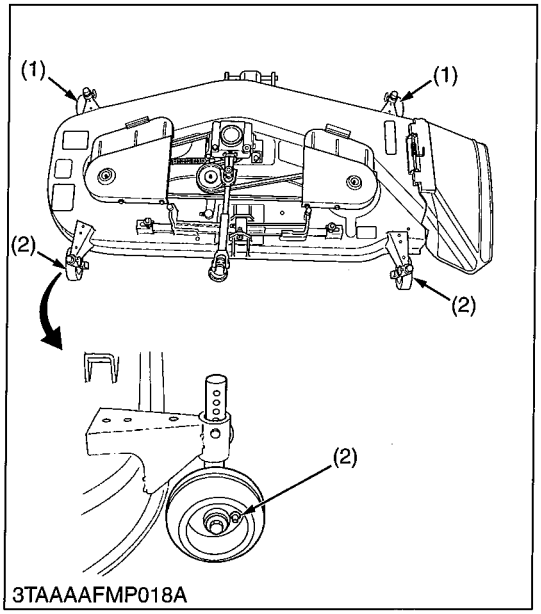


3TAAAAFMP018A

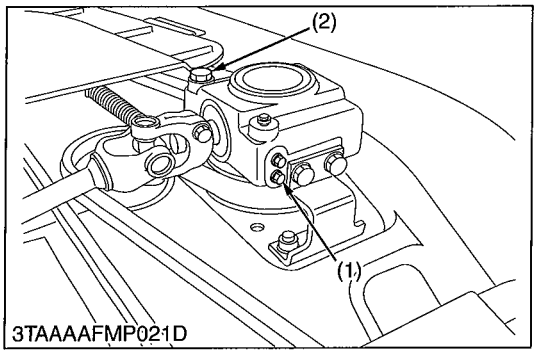
Greasing Front and Rear Anti-scalp Rollers [RCK60B-23BX, RCK54P-23BX and RCK54-23BX]

1. Grease the grease fitting (1), (2) of the front and rear anti-scalp rollers if the amount of grease is insufficient.

(1) Grease Fitting (Front Anti-scalp Roller)
(2) Grease Fitting (Rear Anti-scalp Roller)

9Y1210855GEG0060US0

(2) Check Point of Initial 50 Hours



Changing Gear Box Oil

CAUTION

- **Be sure to stop the engine and remove the key before changing the oil.**

1. Dismount the mower from the tractor, and place the mower on level ground.
2. Remove the oil filler plug (2).
3. Remove the drain plug (1), and drain the used oil completely.
4. After draining the used oil, reinstall the drain plug.
5. Fill with new oil up to the specified level.

IMPORTANT

- **Use the specified gear oil.**
  Refer to "[2] MOWER" on page G-12.

(1) Drain Plug (2) Oil Filler Plug

9Y1210855GEG0061US0

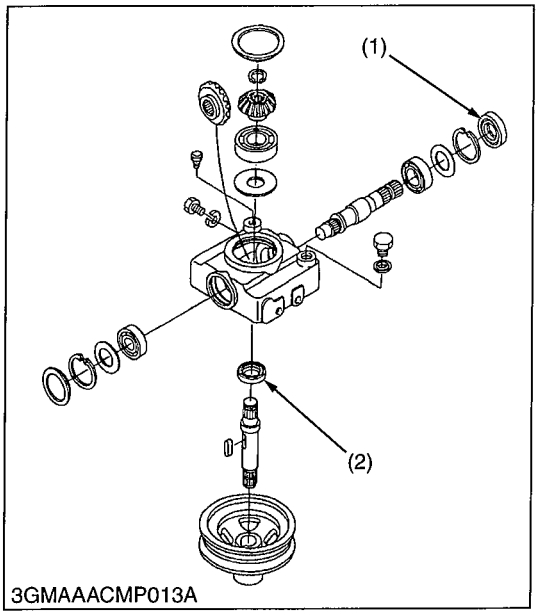
(3) Check Point of Every 150 Hours

Changing Gear Box Oil

1. See above.

9Y1210855GEG0062US0

(4) Check Point of Every 2 Years



Replacing Gear Box Oil Seal

1. Replace the gear box oil seals (1), (2) with new ones.

(1) Oil Seal (2) Oil Seal

9Y1210855GEG0063US0

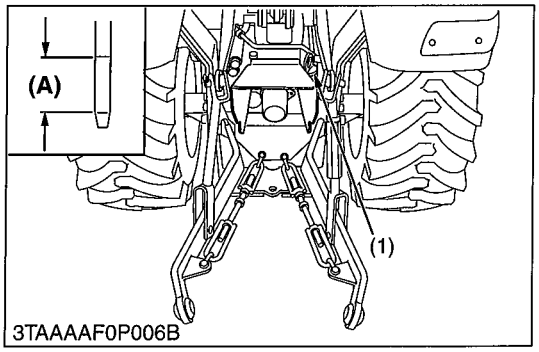
[3] FRONT LOADER

CAUTION

- **When checking and repairing, park the tractor on flat ground and apply the parking brake.**
- **When checking and repairing, lower the bucket and stop the engine.**

9Y1210855GEG0064US0

(1) Check Points of Each Use or Daily



Checking Transmission Fluid Level

1. Check the oil level at the dipstick (1).
2. If the level is too low, add new oil to the prescribed level at the oil inlet.

■ **IMPORTANT**

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

(1) Dipstick
(A) Oil level is acceptable within this range.

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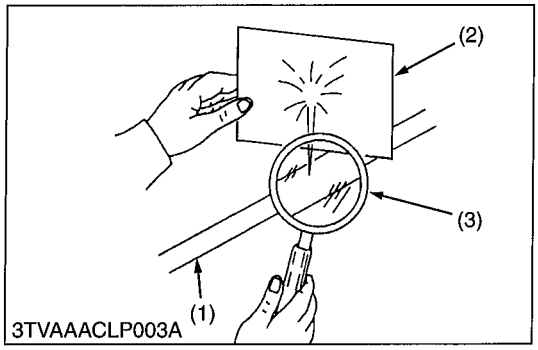


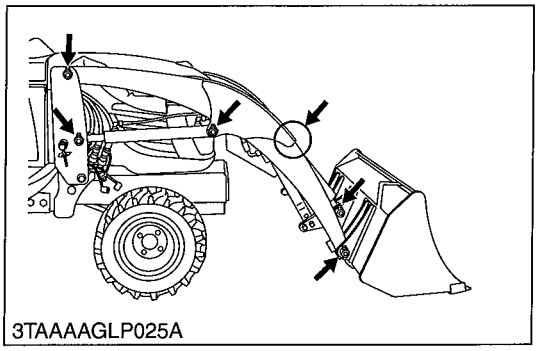
Checking Hydraulic Hoses

1. Checking all hydraulic hoses for cuts or wear.
2. If damages are found, replace them.

(1) Hydraulic Hose
(2) Cardboard
(3) Magnifying Glass

9Y1210855GEG0066US0

(2) Check Points of Every 10 Hours



Greasing

1. Inject grease in all grease fitting with a hand grease gun.

9Y1210855GEG0067US0

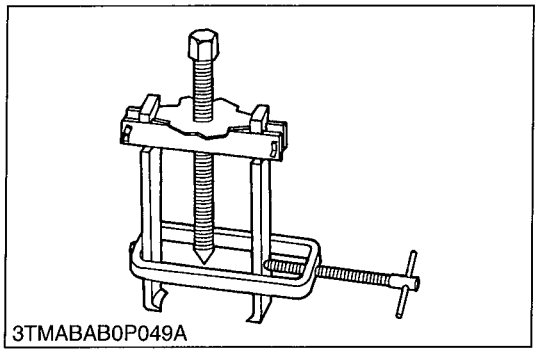
Lubricating

1. Lubricate joints of control lever linkage.

9Y1210855GEG0068US0

8. SPECIAL TOOLS

[1] SPECIAL TOOLS FOR ENGINE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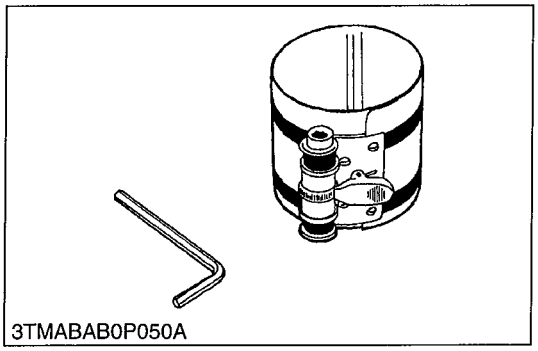
Special Use Puller Set

Code No.
- 07916-09032

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

WSM000001GEG0011US0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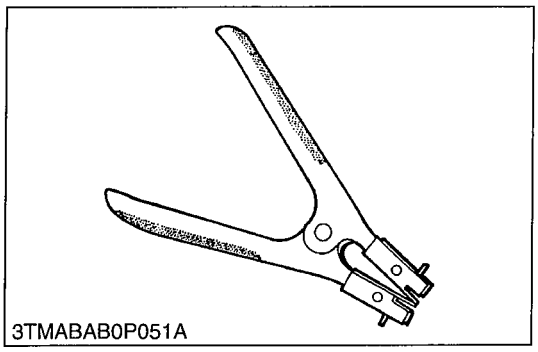
Piston Ring Compressor

Code No.
- 07909-32111

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

WSM000001GEG0012US0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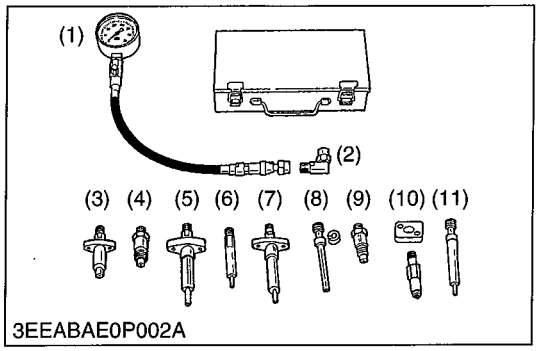
Piston Ring Tool

Code No.
- 07909-32121

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

WSM000001GEG0013US0



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Diesel Engine Compression Tester (for Injection Nozzle)

Code No.
- 07909-30208 (Assembly)
- 07909-30934 (**A** to **F**)
- 07909-31211 (**E** and **F**)
- 07909-31231 (**H**)
- 07909-31251 (**G**)
- 07909-31271 (**I**)
- 07909-31281 (**J**)

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

(1) Gauge
(2) **L** Joint
(3) Adaptor **A**
(4) Adaptor **B**
(5) Adaptor **C**
(6) Adaptor **E**
(7) Adaptor **F**
(8) Adaptor **G**
(9) Adaptor **H**
(10) Adaptor **I**
(11) Adaptor **J**

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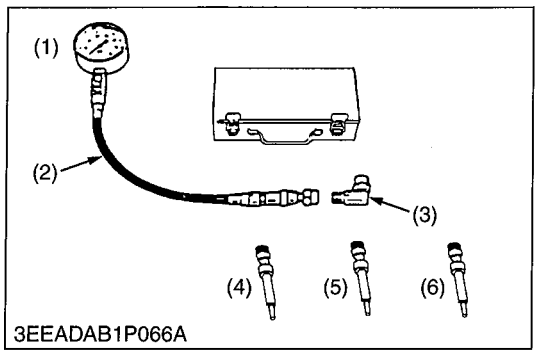


Diesel Engine Compression Tester (for Glow Plug)

Code No.

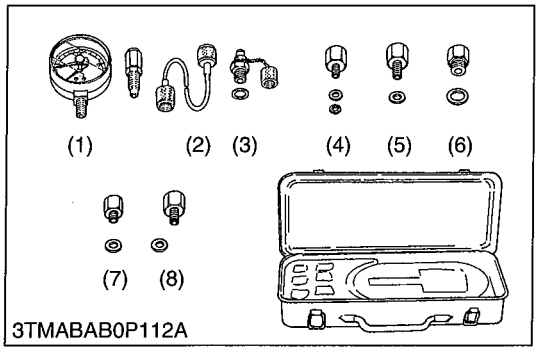
- 07909-39081 (Assembly)
- 07909-31291 (**K**)
- 07909-31301 (**L**)
- 07909-31311 (**M**)

Application

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

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

WSM000001GEG0096US0



Oil Pressure Tester

Code No.

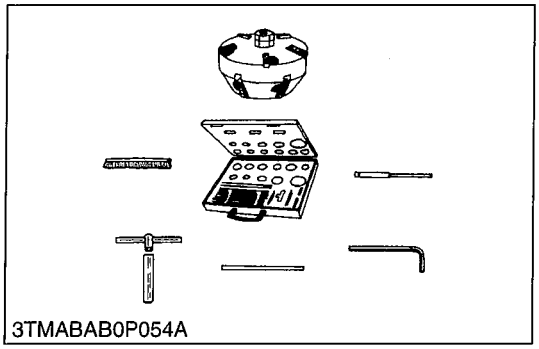
- 07916-32032

Application

- Use to measure lubricating oil pressure.

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

WSM000001GEG0015US0



Valve Seat Cutter

Code No.

- 07909-33102

Application

- Use to reseat valves.

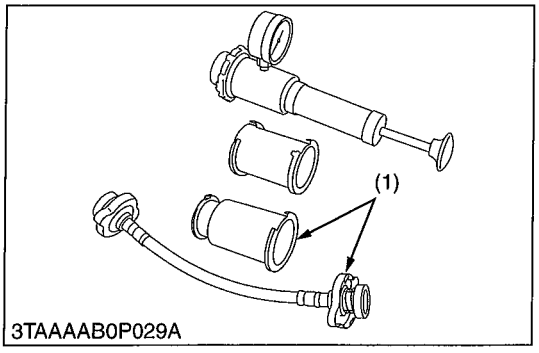
Angle

- 0.79 rad (45 °)
- 0.26 rad (15 °)

Diameter

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

WSM000001GEG0016US0



Radiator Tester

Code No.

- 07909-31551

Application

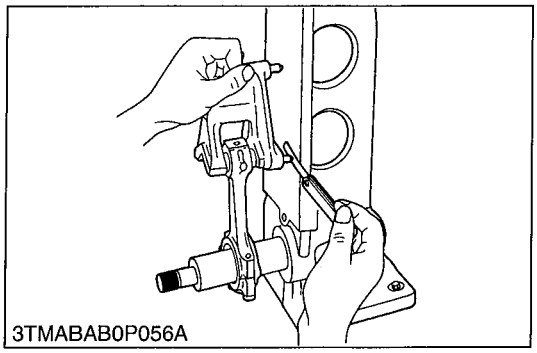
- Use to check of radiator cap pressure, and leaks from cooling system.

Remarks

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

(1) Adaptor

WSM000001GEG0017US0


3TMABAB0P056A

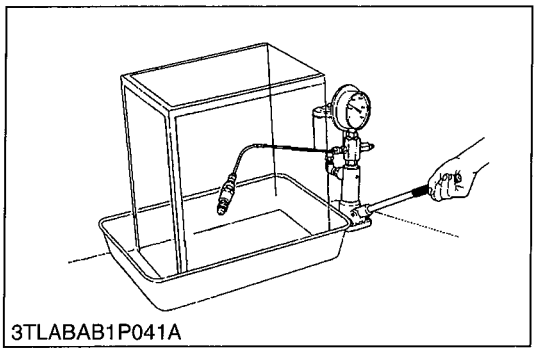
Connecting Rod Alignment Tool

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


3TLABAB1P041A

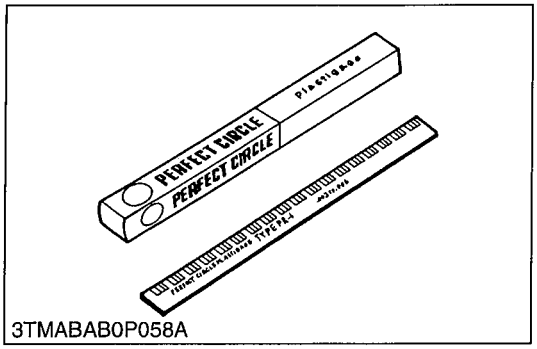
Nozzle Tester

Code No.
- 07909-31361

Application
- Use to check the fuel injection pressure and spray pattern of nozzle.

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

WSM000001GEG0021US0



3TMABAB0P058A

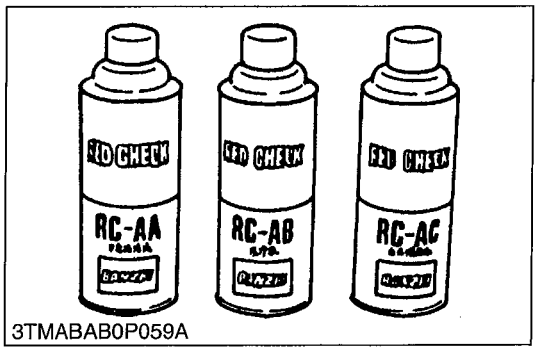
Plastigauge

Code No.
- 07909-30241

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

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

WSM000001GEG0022US0



3TMABAB0P059A

Red Check

Code No.
- 07909-31371

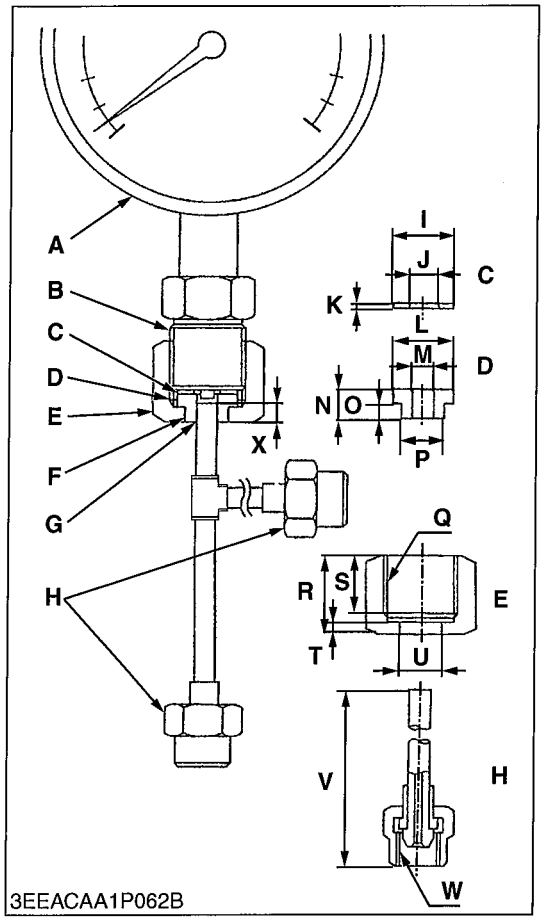
Application
- Use to check cracks on cylinder head, cylinder block, etc..

WSM000001GEG0023US0

■ **NOTE**

- **The following special tools are not provide, so make them referring to the figure.**

9Y1210855GEG0069US0



3EEACAA1P062B

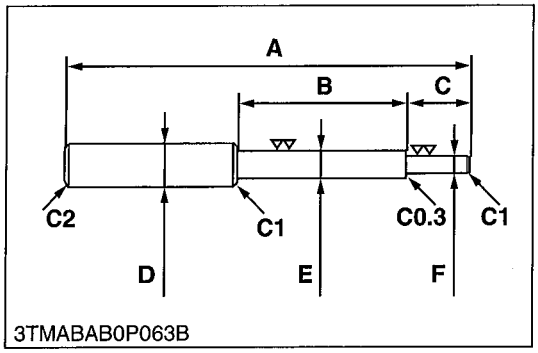
Injection Pump Pressure Tester

Application

- Use to check fuel tightness of injection pumps.

A	Pressure gauge fuel scale: More than 29.4 MPa (300 kgf/cm^2, 4267 psi)
B	PF 1/2
C	Copper gasket
D	Flange (Material: Steel)
E	Hex. nut 27 mm (1.1 in.) across the plat
F	Adhesive application
G	Fillet welding on the enter circumference
H	Retaining nut
I	17 mm dia. (0.67 in. dia.)
J	8.0 mm dia. (0.31 in. dia.)
K	1.0 mm dia. (0.039 in. dia.)
L	17 mm dia. (0.67 in. dia.)
M	6.10 to 6.20 mm dia. (0.241 to 0.244 in. dia.)
N	8.0 mm (0.31 in.)
O	4.0 mm (0.16 in.)
P	11.97 to 11.99 mm dia. (0.4713 to 0.4720 in. dia.)
Q	PD 1/2
R	23 mm (0.91 in.)
S	17 mm (0.67 in.)
T	4.0 mm (0.16 in.)
U	12.00 to 12.02 mm dia. (0.472 to 0.4732 in. dia.)
V	100 mm (3.94 in.)
W	M12 × P1.5
X	5.0 mm (0.20 in.)

9Y1210855GEG0070US0



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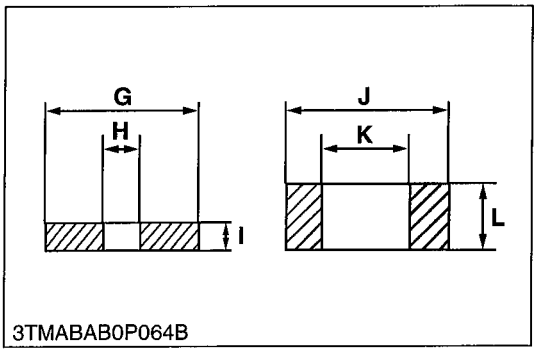


3TMABAB0P064B

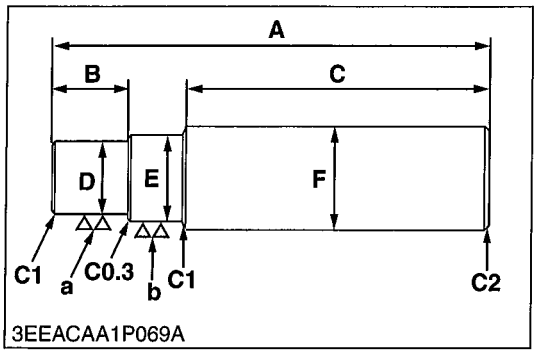
Valve Guide Replacing Tool

Application

- Use to press out and press fit the valve guide.

	BX1870D (D722-E4)	BX2370D (D902-E4)	BX2670D (D1005-E4)
A	220 mm (8.66 in.)		225 mm (8.86 in.)
B	80 mm (3.1 in.)		70 mm (2.8 in.)
C	40 mm (1.6 in.)		45 mm (1.8 in.)
D	20 mm dia. (0.79 in. dia.)		
E	9.960 to 9.980 mm dia. (0.3922 to 0.3929 in. dia.)		11.7 to 11.9 mm dia. (0.461 to 0.468 in. dia.)
F	5.50 to 5.70 mm dia. (0.217 to 0.224 in. dia.)		6.50 to 6.60 mm dia. (0.256 to 0.259 in. dia.)
G	25 mm dia. (0.98 in. dia.)		
H	6.00 to 6.10 mm dia. (0.237 to 0.240 in. dia.)		6.70 to 7.00 mm dia. (0.264 to 0.275 in. dia.)
I	5.0 mm (0.20 in.)		
J	18 mm dia. (0.71 in. dia.)		20 mm dia. (0.79 in. dia.)
K	10.6 to 10.7 mm dia. (0.418 to 0.421 in. dia.)		12.5 to 12.8 mm dia. (0.493 to 0.503 in. dia.)
L	6.90 to 7.10 mm (0.272 to 0.279 in.)		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 (0.012 in.)		

9Y1210855GEG0071US0



3EEACAA1P069A

Bushing Replacing Tool [For BX1870D (D722-E4) and BX2370D (D902-E4)]

Application

- Use to press out and press fit the bushing.

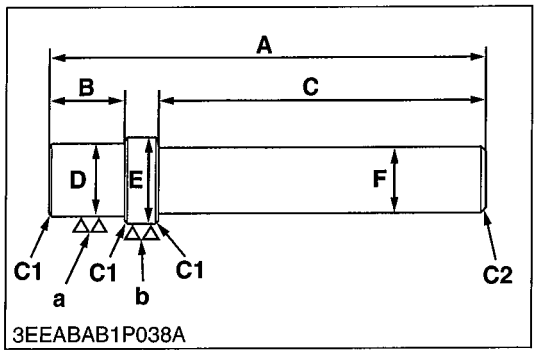
[For small end bushing]

A	145 mm (5.71 in.)
B	20 mm (0.79 in.)
C	100 mm (3.94 in.)
D	19.90 to 19.95 mm dia. (0.7835 to 0.7854 in. dia.)
E	21.90 to 21.95 mm dia. (0.8622 to 0.8642 in. dia.)
F	25 mm dia. (0.98 in. dia.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.012 in.)
a	6.3 µm (250 µin.)
b	6.3 µm (250 µin.)

[For idle gear bushing]

A	150 mm (5.91 in.)
B	23 mm (0.91 in.)
C	100 mm (3.94 in.)
D	19.90 to 19.95 mm dia. (0.7835 to 0.7854 in. dia.)
E	21.90 to 21.95 mm dia. (0.8622 to 0.8642 in. dia.)
F	25 mm dia. (0.98 in. dia.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.012 in.)
a	6.3 µm (250 µin.)
b	6.3 µm (250 µin.)

9Y1210855GEG0072US0



3EEABAB1P038A

Busing Replacing Tool [For BX2670D (D1005-E4)]

Application

- Use to press out and press fit the valve guide.

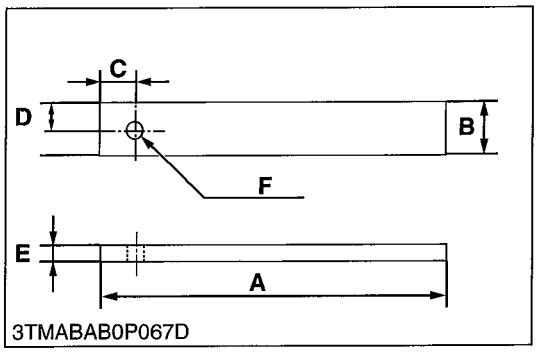
[For small end bushing]

A	157 mm (6.18 in.)
B	24 mm (0.94 in.)
C	120 mm (4.72 in.)
D	21.8 to 21.9 mm dia. (0.859 to 0.862 in. dia.)
E	24.8 to 24.9 mm dia. (0.977 to 0.980 in. dia.)
F	20 mm dia. (0.79 in. dia.)
a	6.3 µm (250 µin.)
b	6.3 µm (250 µin.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.0079 in.)

[For idle gear bushing]

A	196 mm (7.72 in.)
B	26 mm (1.0 in.)
C	150 mm (5.91 in.)
D	25.80 to 25.90 mm dia. (1.016 to 1.019 in. dia.)
E	28.80 to 28.90 mm dia. (1.134 to 1.137 in. dia.)
F	20 mm dia. (0.79 in. dia.)
a	6.3 µm (250 µin.)
b	6.3 µm (250 µin.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.0079 in.)

9Y1210855GEG0073US0



3TMABAB0P067D

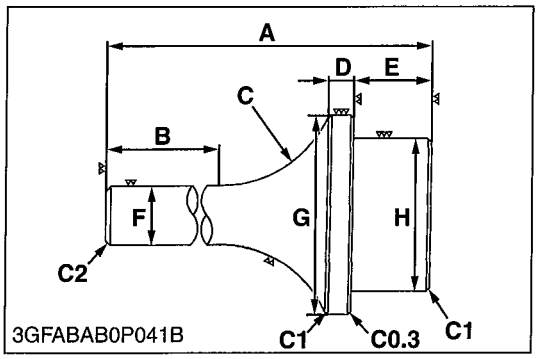
Flywheel Stopper

Application

- Use to loosen and tighten the flywheel screw.

A	200 mm (7.87 in.)
B	30 mm (1.18 in.)
C	20 mm (0.79 in.)
D	15 mm (0.59 in.)
E	8 mm (0.31 in.)
F	10 mm dia. (0.39 in. dia.)

9Y1210855GEG0074US0



Crankshaft Bearing 1 Replacing Tool

Application

- Use to press out and press fit the crankshaft bearing 1.

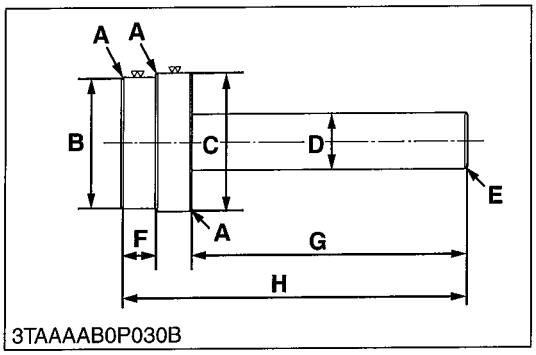
[Press Out]

	BX1870D (D722-E4)	BX2370D (D902-E4)	BX2670D (D1005-E4)
A	135 mm (5.31 in.)		
B	72 mm (2.8 in.)		
C	40 mm (1.6 in.)		
D	10 mm dia. (0.39 in. dia.)		
E	22 mm (0.87 in.)		24 mm (0.94 in.)
F	20 mm dia. (0.79 in. dia.)		
G	47.90 to 47.95 mm dia. (1.886 to 1.887 in. dia.)		51.20 to 51.40 mm dia. (2.016 to 2.023 in. dia.)
H	43.90 to 43.95 mm dia. (1.729 to 1.730 in. dia.)		47.30 to 47.50 mm dia. (1.863 to 1.870 in. dia.)
C1	Chamfer 1.0 mm (0.039 in.)		
C2	Chamfer 2.0 mm (0.079 in.)		
C0.3	Chamfer 0.30 mm (0.012 in.)		

[Press Fit]

	BX1870D (D722-E4)	BX2370D (D902-E4)	BX2670D (D1005-E4)
A	130 mm (5.12 in.)		
B	72 mm (2.83 in.)		
C	40 mm radius (1.6 in. radius)		
D	9.0 mm (0.35 in.)		
E	24 mm (0.94 in.)		
F	20 mm dia. (0.79 in. dia.)		
G	68 mm dia. (2.7 in. dia.)		
H	39.90 to 39.95 mm dia. (1.571 to 1.572 in. dia.)	43.90 to 43.95 mm dia. (1.729 to 1.730 in. dia.)	47.30 to 47.50 mm dia. (1.863 to 1.870 in. dia.)
C1	Chamfer 1.0 mm (0.039 in.)		
C2	Chamfer 2.0 mm (0.079 in.)		
C0.3	Chamfer 0.30 mm (0.012 in.)		

9Y1210855GEG0075US0



3TAAAAB0P030B

Governor Gear Holder Busing Replacing Tool [For BX2670D (D1005-E4)]

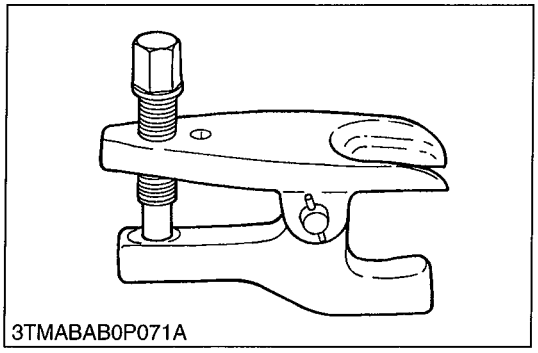
Application

- Use to press out and press fit the governor gear holder bushing.

A	C1: Chamfer 1.0 mm (0.039 in.)
B	73.90 to 74.00 mm dia. (2.910 to 2.913 in. dia.)
C	69.80 to 69.90 mm dia. (2.748 to 2.751 in. dia.)
D	30 mm dia. (1.2 in. dia.)
E	C2: Chamfer 2.0 mm (0.079 in.)
E	18 mm (0.71 in.)
F	150 mm (5.91 in.)
G	188 mm (7.40 in.)

9Y1210855GEG0076US0

[2] SPECIAL TOOLS FOR TRACTOR

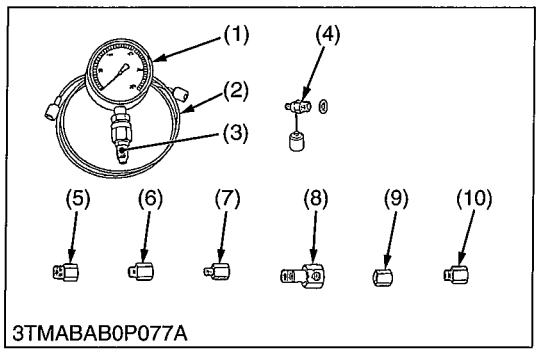

3TMABAB0P071A

Tie-rod End Lifter

Code No.
- 07909-39051

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

WSM000001GEG0029US0



3TMABAB0P077A

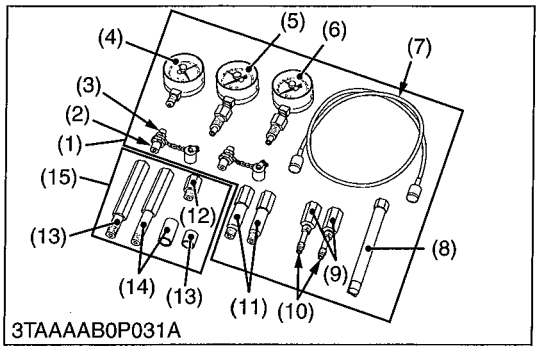
Relief Valve Pressure Tester

Code No.
- 07916-50045

Application
- This allows easy measurement of relief set pressure.

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

WSM000001GEG0027US0



3TAAAAB0P031A

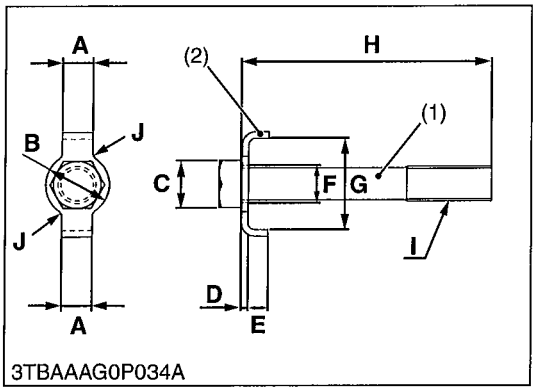
Hydrostatic Transmission Tester and HST Adaptor Set

Code No.
- 07916-52040 (Hydrostatic Transmission Tester)
- 07916-53072 (HST Adaptor Set)

Application
- This allows easy measurement of hydrostatic transmission pressure.

(1) Hydrostatic Transmission Tester (07916-52040)
(2) Gasket (04714-00200)
(3) Connector **3** (07916-51331)
(4) Vacuum Gauge (07916-51331)
(5) Pressure Gauge (Low Pressure) (07916-51301)
(6) Pressure Gauge (High Pressure) (in Relief Valve Set Pressure Tester) (07916-50321)
(7) HN Tube (in Relief Valve Set Pressure Tester) (07916-50331)
(8) Valve Seat Driver (07916-60841)
(9) Connector **1** (07916-60811)
(10) Connector **2** (07916-60821)
(11) Long Connector (07916-60831)
(12) Adaptor **1** (07916-52621)
(13) Adaptor **2** with Collar (07916-52632)
(14) Adaptor **3** with Collar (07916-52642)
(15) HST Adaptor Set (07916-53072)

WSM000001GEG0104US0



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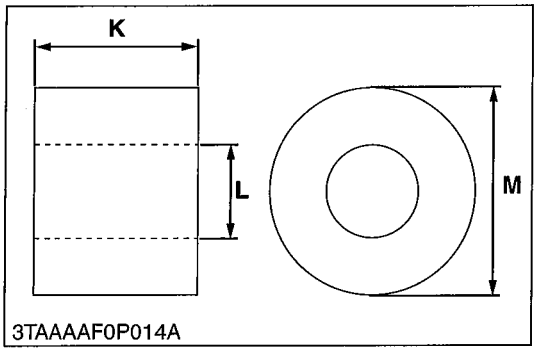


3TAAAAF0P014A

Independent PTO Clutch Spring Compression Tool

Application

- Use for compressing the spring into the spline boss. This tool can be used for B30 series, BX50 series, BX60 series, BX24 and BX25 tractor.

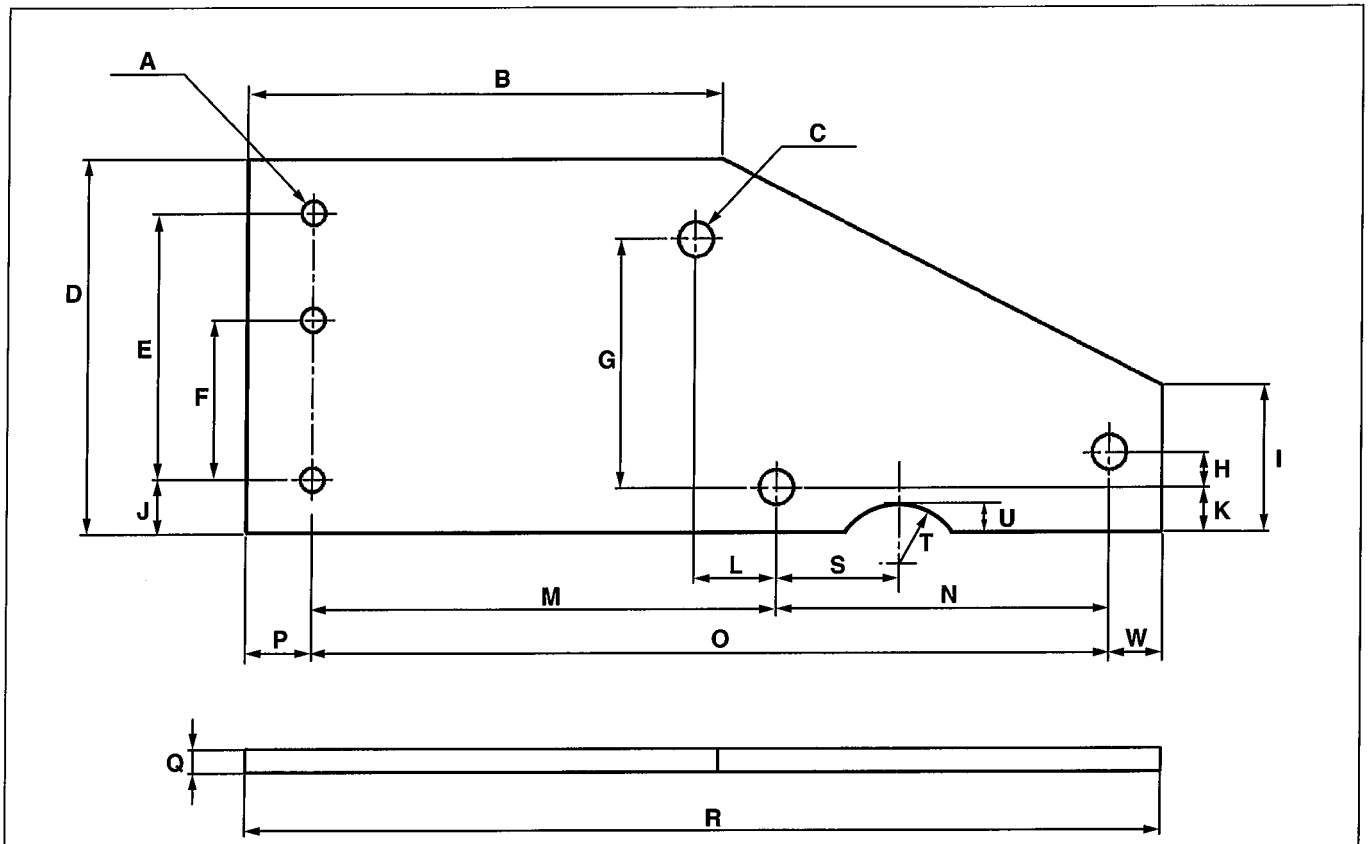
A	12 mm (0.47 in.)
B	25.4 mm (1.00 in.)
C	19 mm radius (0.75 in.) Hex.
D	2.7 mm (0.11 in.)
E	8 mm (0.31 in.)
F	15 mm dia. (0.59 in. dia.)
G	37 mm (1.46 in.)
H	70 mm (2.76 in.)
I	M14 ×1.5
J	R 3 mm (0.12 in.)
K	30 mm (1.18 in.)
L	17 mm (0.67 in.)
M	38 mm (1.50 in.)

9Y1210855GEG0077US0

Disassembling and Assembling Stand (1/2)

Application

- Use to disassembling transaxle assembly and to assembling transaxle assembly.



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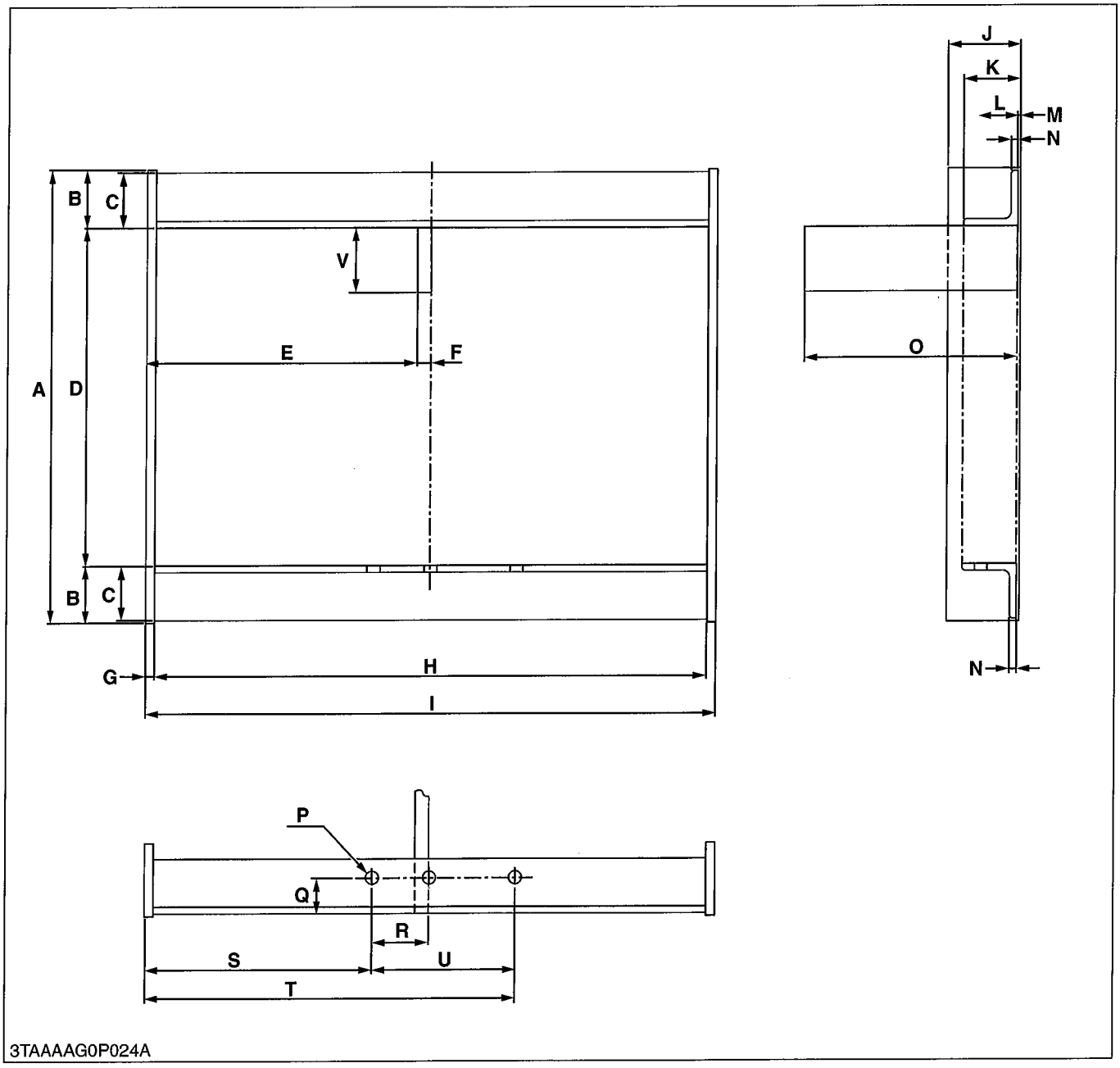
A	ϕ9 mm (ϕ0.35 in.) 3 Holes	L	30.5 to 31.5 mm (1.21 to 1.24 in.)
B	225 mm (8.86 in.)	M	226 mm (8.90 in.)
C	ϕ13 mm (ϕ0.51 in.) 3 Holes	N	125.5 to 126.5 mm (4.95 to 4.98 in.)
D	140 mm (5.51 in.)	O	352 mm (13.86 in.)
E	99.5 to 100.5 mm (3.92 to 3.95 in.)	P	25 mm (0.98 in.)
F	59.5 to 60.5 mm (2.35 to 2.38 in.)	Q	9.5 mm (0.37 in.)
G	92.5 to 93.5 mm (3.65 to 3.68 in.)	R	397 mm (15.63 in.)
H	12.5 to 13.5 mm (0.50 to 0.53 in.)	S	46 mm (1.81 in.)
I	55 mm (2.17 in.)	T	R25 mm (0.98 in.)
J	20 mm (0.79 in.)	U	11 mm (0.43 in.)
K	17 mm (0.67 in.)	W	20 mm (0.79 in.)

9Y1210855GEG0078US0

Disassembling and Assembling Stand (2/2)

Application

- Use to disassembling transaxle assembly and to assembling transaxle assembly.



3TAAAAG0P024A

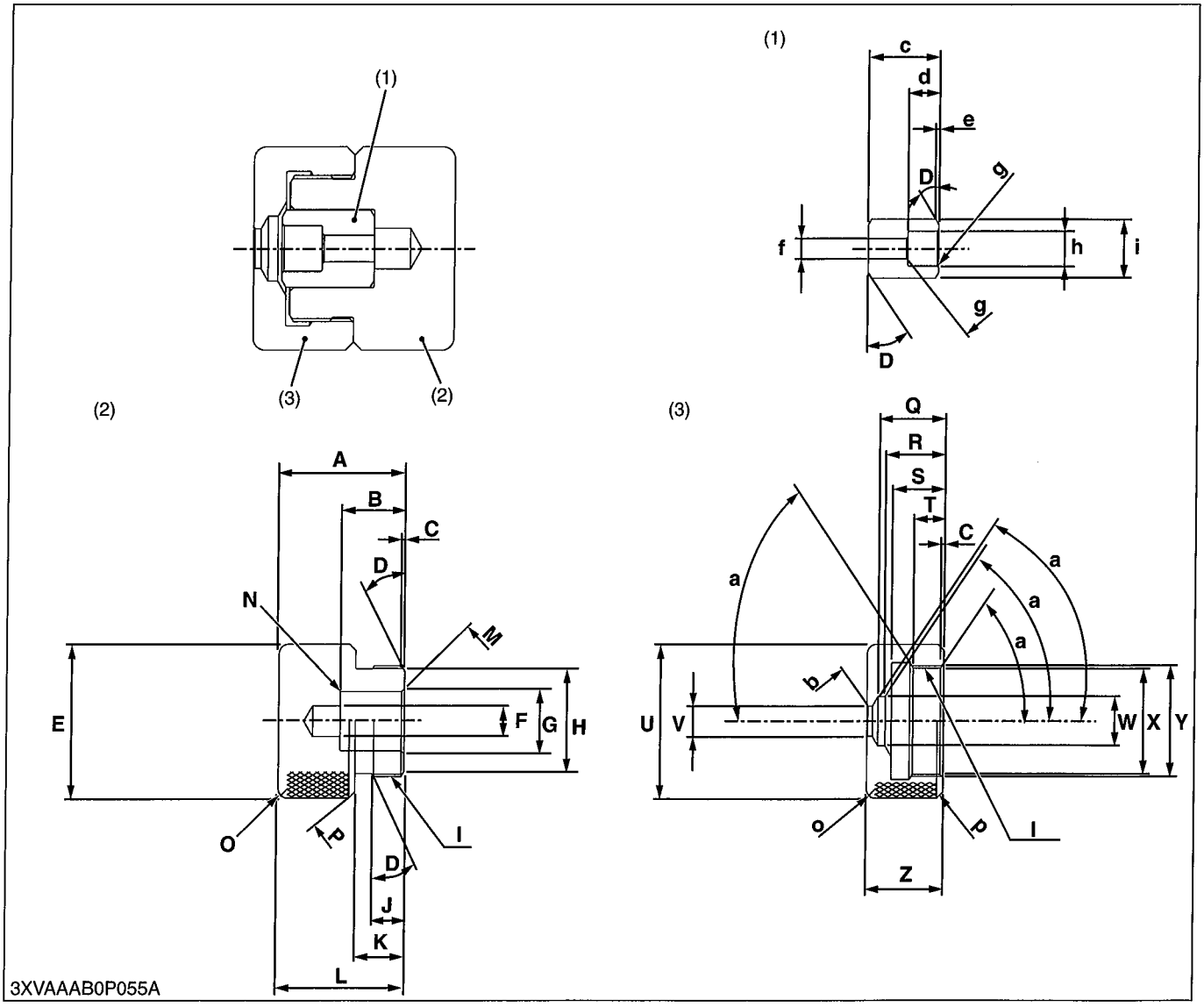
A	311 mm (12.24 in.)	L	38.1 mm (1.50 in.)
B	40 mm (1.57 in.)	M	1.9 mm (0.07 in.)
C	38.1 mm (1.50 in.)	N	4.8 mm (0.19 in.)
D	235 mm (9.25 in.)	O	200 mm (7.87 in.)
E	170 mm (6.69 in.)	P	ϕ9 mm (ϕ0.35 in.), 3 Holes
F	9.5 mm (0.37 in.)	Q	25 mm (0.98 in.)
G	6.4 mm (0.25 in.)	R	39.5 to 40.5 mm (1.56 to 1.59 in.)
H	365 mm (14.37 in.)	S	140 mm (5.51 in.)
I	377.8 mm (14.87 in.)	T	260 mm (10.24 in.)
J	50.8 mm (2.00 in.)	U	99.5 to 100.5 mm (3.92 to 3.95 in.)
K	40 mm (1.57 in.)	V	45 mm (1.77 in.)

9Y1210855GEG0079US0

Check and High Pressure Relief Valve Assembly Tool

Application

- Use for readjusting relief valve pressure.



A	30 mm (1.181 in.)	N	Chamfer 0.4 mm (0.157 in.)	a	1.05 rad (10 °)
B	21 mm (0.827 in.)	O	Chamfer 3 mm (0.118 in.)	b	Chamfer 0.3 mm (0.012 in.)
C	1 mm (0.039 in.)	P	Chamfer 2 mm (0.079 in.)	c	23 mm (0.906 in.)
D	0.52 rad (30 °)	Q	21.4 mm (0.843 in.)	d	10 mm (0.394 in.)
E	50 mm dia. (1.969 in. dia.)	R	19 mm (0.748 in.)	e	1 mm (0.039 in.)
F	10 mm dia. (0.394 in. dia.)	S	17 mm (0.669 in.)	f	6.5 mm (0.256 in.)
G	9.1 to 9.3 mm dia. (0.359 to 0.366 in. dia.)	T	10 mm (0.393 in.)	g	Chamfer 0.5 mm (0.020 in.)
H	34 mm dia. (1.336 in. dia.)	U	50 mm dia. (1.969 in. dia.)	h	11.1 to 11.3 mm (0.437 to 0.445 in.)
I	M36 x 1.5 mm Pitch	V	9.8 mm dia. (0.386 in. dia.)	i	18.8 to 19.0 mm (0.740 to 0.748 in.)
J	10 mm (0.394 in.)	W	16 mm dia. (0.629 in. dia.)		
K	16 mm (0.630 in.)	X	34.5 mm dia. (1.358 in. dia.)	(1)	Spacer
L	41 mm (1.614 in.)	Y	38 mm dia. (1.496 in. dia.)	(2)	Block
M	Chamfer 1 mm (0.039 in.)	Z	25 mm (0.984 in.)	(3)	Cap

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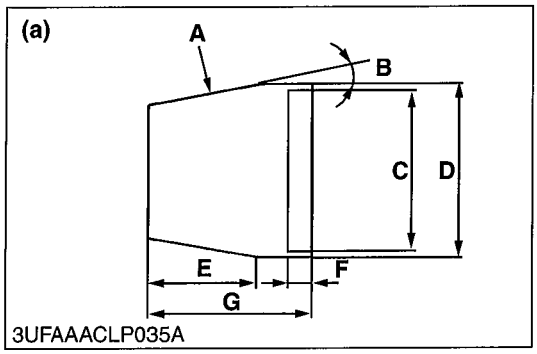
[3] SPECIAL TOOLS FOR LOADER



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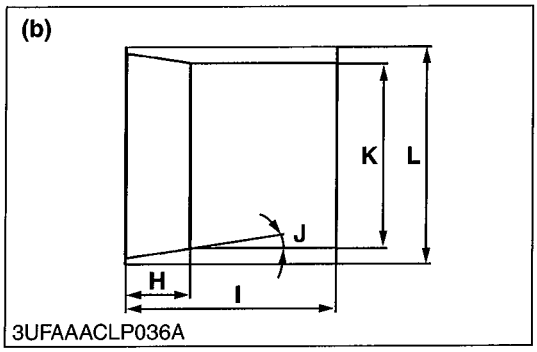

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Sliding Jig and Correcting Jig

Application

- Use to install the O-ring and the piston seal.

	Boom cylinder (40 mm (1.57 in.))	Bucket cylinder (65 mm (2.56 in.))
A	80 √	
B	0.157 rad (9.0 °)	
C	40.18 mm dia. (1.582 in. dia.)	65.18 mm dia. (2.566 in. dia.)
D	41.18 mm dia. (1.621 in. dia.)	66.18 mm dia. (2.606 in. dia.)
E	42.0 mm (1.65 in.)	
F	10.0 mm (0.4 in.)	
G	58.5 mm (2.30 in.)	
H	14 mm (0.55 in.)	
I	35.0 mm (1.38 in.)	
J	0.122 rad (7 °)	
K	40.2 mm dia. (1.583 in. dia.)	65.2 mm dia. (2.567 in. dia.)
L	48.9 mm dia. (1.925 in. dia.)	73.9 mm dia. (2.909 in. dia.)

(a) Sliding Jig (b) Correcting Jig

9Y1210855GEG0081US0

9. TIRES

[1] TIRE PRESSURE

WARNING

- **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 larger than specified.**
- **When you intend to mount different size of tires from equipped ones, consult your distributor about front drive gear ratio for detail.**
  Excessive wear of tires may occur due to improper gear ratio.

[BX1870D]

	Tire sizes	Inflation pressure
Rear	24 × 12.00 – 12 Turf 24 × 12.00 – 12 Bar	100 kPa (1.0 kgf/cm^2, 14 psi) 120 kPa (1.2 kgf/cm^2, 17 psi)
Front	16 × 7.50 – 8 Turf 16 × 7.50 – 8 Bar	120 kPa (1.2 kgf/cm^2, 17 psi) 150 kPa (1.5 kgf/cm^2, 22 psi)

[BX2370D and BX2670D]

	Tire sizes	Inflation pressure
Rear	26 × 12.00 – 12 Turf 26 × 12.00 – 12 Bar 26 × 12.00 – 12 Ind.	100 kPa (1.0 kgf/cm^2, 14 psi) 120 kPa (1.2 kgf/cm^2, 17 psi) 120 kPa (1.2 kgf/cm^2, 17 psi)
Front	18 × 8.50 – 10 Turf 18 × 8.50 – 10 Bar 18 × 8.50 – 10 Ind.	120 kPa (1.2 kgf/cm^2, 17 psi) 150 kPa (1.5 kgf/cm^2, 22 psi) 150 kPa (1.5 kgf/cm^2, 22 psi)

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.**

9Y1210855GEG0082US0

[2] WHEEL TREAD

CAUTION

To avoid personal injury:

- **Support tractor securely on stands before removing a wheel.**
- **Never operate tractor with a loose rim, wheel or axle.**

9Y1210855GEG0083US0

(1) Front Wheels

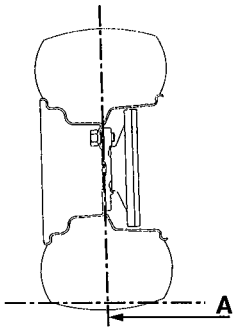
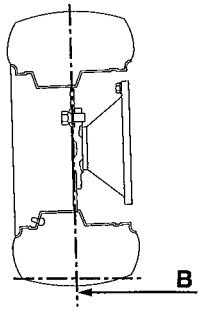
Front tread can not be adjusted.

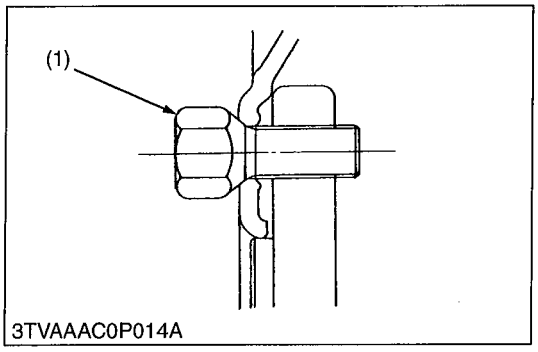
■ **IMPORTANT**

- **Do not turn discs to obtain wider tread.**

■ **NOTE**

- **Use the tapered bolts for wheels with beveled or tapered holes.**

Models	BX1870D	BX2370D and BX2670D
Tire	16 × 7.50 – 8 Turf, 16 × 7.50 – 8 Bar	18 × 8.50 – 10 Turf, 18 × 8.50 – 10 Bar, 18 × 8.50 – 10 Ind.
Tread	 3TAAAAF0P015A	 3TAAAAG0P025B



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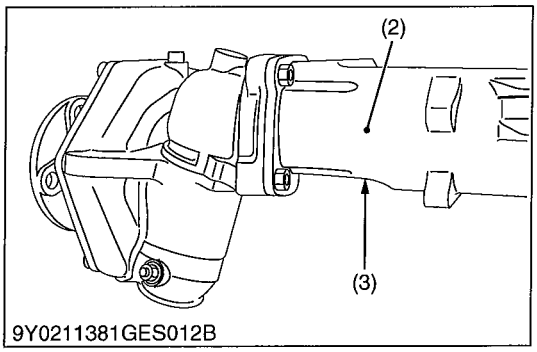

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CAUTION

- **Before jacking up the tractor, park it on a firm and level ground and chock the rear wheels.**
- **Fix the front axle to keep it from swinging.**
- **Select jacks that with stand the machine weight and set them up at jack point (3).**

Tightening torque	Front wheel	149.2 to 179.0 N·m 15.2 to 18.3 kgf·m 110 to 132 lbf·ft

(1) Wheel Mounting Screw
(2) Front Axle Case
(3) Jack Point

A: 880 mm (34.6 in.)
B: 910 mm (35.8 in.)

9Y1210855GEG0084US0

(2) Rear Wheels

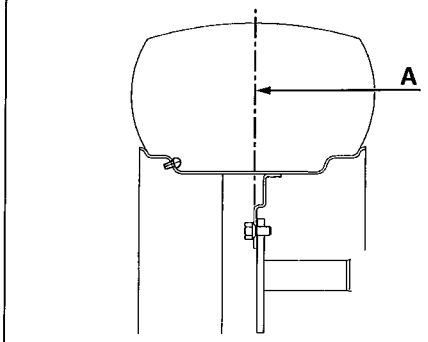
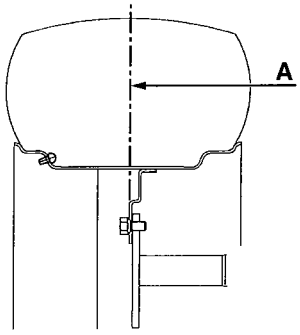
Rear tread can not be adjusted.

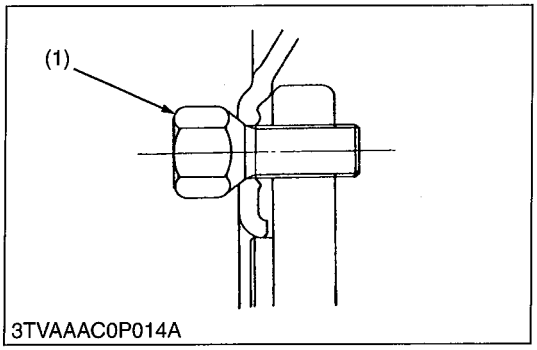
■ **IMPORTANT**

- **Do not turn discs to obtain wider tread.**
- **Always attach tires as shown in the drawing.**
- **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 daily check service.**

■ **NOTE**

- **Use the tapered bolts for wheels with beveled or tapered holes.**

Models	BX1870D	BX2370D and BX2670D
Tire	16 × 7.50 – 8 Turf, 16 × 7.50 – 8 Bar	26 × 12.00 – 12 Turf, 26 × 12.00 – 12 Bar, 26 × 12.00 – 12 Ind.
Tread	 3TAAAAG0P006B	 3TAAAAG0P006B



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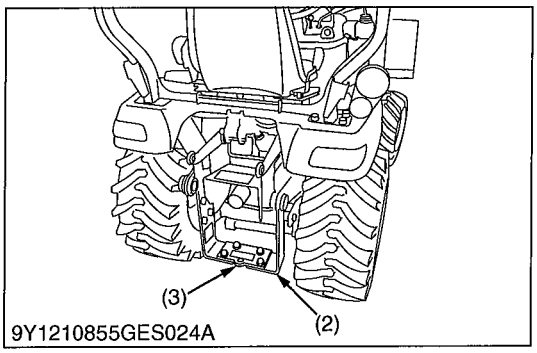

9Y1210855GES024A

CAUTION

- **Before jacking up the tractor, park it on a firm and level ground and chock the rear wheels.**
- **Fix the front axle to keep it from swinging.**
- **Select jacks that with stand the machine weight and set them up at jack point (3).**

Tightening torque	Rear wheel	108.5 to 130.2 N·m 11.1 to 13.3 kgf·m 80 to 96 lbf·ft

(1) Wheel Mounting Screw
(2) Frame
(3) Jack Point

A: 820 mm (32.2 in.)

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[3] BALLAST

CAUTION

- **Additional ballast will be needed for transporting heavy implements. When the implements is raised, drive slowly over rough ground, regardless of how much ballast is used.**
- **Do not fill the front wheels with liquid to maintain steering control.**

9Y1210855GEG0086US0

(1) Front Ballast

Add weights if needed for stability and improve traction.

Heavy pulling and heavy rear mounted implements tend to lift front wheels. Add enough ballast to maintain steering control and prevent tip over.

Remove weight when no longer needed.

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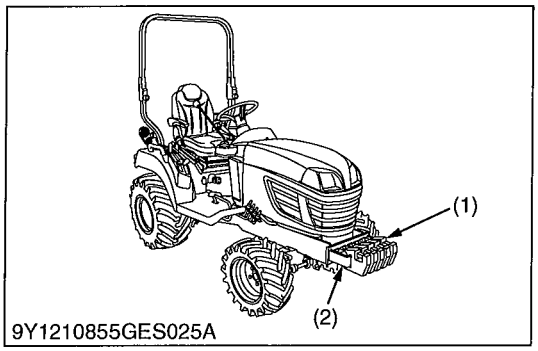

Front End Weights (Option)

1. The front end weights can be attached to the bumper. See your implement operator's manual for required number of weights.

■ **NOTE**

- **Besides the weight, a front weight bracket and mounting bolt kit(s) are required for mounting the weight.**

■ **IMPORTANT**

- **Do not overload tires.**
- **Add no more weight than indicated in chart.**

Maximum weight	Factory specification	125 kg 275 lbs

(1) Front End Weights (2) Front Weight Bracket (Option)

9Y1210855GEG0088US0

(2) Rear Ballast

Add weights to rear wheels if needed to improve traction or for stability. The amount of rear ballast should be matched to job and the ballast should be remove when it is not needed.

The weight should be added to the tractor in the form of liquid ballast.

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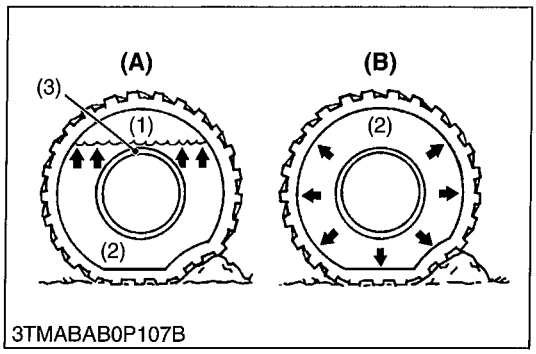

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Liquid Ballast in Rear Tires

1. Water and calcium chloride solution provides safe economical ballast. Used properly, it will not damage tires, tubes or rims.
2. The addition of calcium chloride is recommended to prevent the water from freezing.
3. Use of this method of weighting the wheels has the full approval of the tire companies.

■ **IMPORTANT**

- **Do not fill tires with water or solution more than 75 % of full capacity (to the level of valve stem at 12 o'clock position).**
- **To avoid damage of transmission, do not use rear wheel weights and liquid ballast at the same time.**

Tire sizes	24 × 12.00 – 12 (BX1870D)	26 × 12.00 – 12 (BX2370D and BX2670D)
Slush free at −10 °C (14 °F) Solid at −30 °C (−22 °F) [Approx. 1 kg (2 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	35 kg (77 lbs)	45 kg (99 lbs)
Slush free at −24 °C (−11 °F) Solid at −47 °C (−52 °F) [Approx. 1.5 kg (3.5 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	38 kg (84 lbs)	50 kg (110 lbs)
Slush free at −47 °C (−53 °F) Solid at −52 °C (−62 °F) [Approx. 2.25 kg (5 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	44 kg (97 lbs)	56 kg (123 lbs)

(1) Air
(2) Water
(3) Valve Stem

(A) Correct: 75 % Full Air Compresses Like A Cushion
(B) Incorrect: 100 % Full Water Can Not Be Compressed

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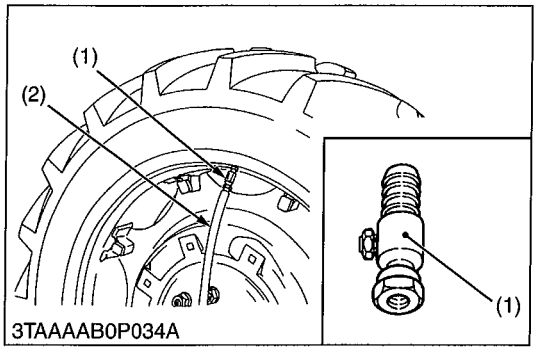

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Attaching Injector

1. Lift the rear tires off the ground.
2. Turn the tire so that the air valve is at the top.
3. Remove the air valve, and attach the injector. (Code No. 07916-52511)

(1) Injector (2) Hose

9Y1210855GEG0091US0

10. IMPLEMENT LIMITATIONS

The KUBOTA Tractor has been thoroughly tested for proper performance with implements sold or approved by KUBOTA. Use with implements which are not sold or approved by KUBOTA and 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.]

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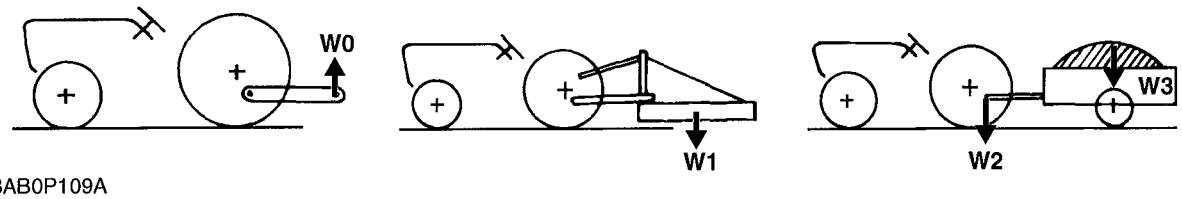
	Tread (max. width) with farm tires		Lower link end max. loading weight **W0**
	Front	Rear	
BX1870D	880 mm (34.6 in.)	820 mm (32.2 in.)	550 kg (1210 lbs)
BX2370D	910 mm (35.8 in.)		
BX2670D			

	Actual figures		
	Implement Weight **W1** and / or size	Max. Drawbar Load **W2**	Trailer loading weight **W3** Max. capacity
BX1870D	As in the following list (shown on the next page)	250 kg (550 lbs)	800 kg (1765 lbs)
BX2370D			
BX2670D			

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



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■ **NOTE**

- **Implement size may vary depending on soil operating conditions.**
- **Strictly follow the instructions outlined in the operator's manual of the mounted or trailed machinery or trailer, and do not operate the combination tractor - machine or tractor - trailer unless all instructions have been followed.**
- **Forestry Application**
  Following hazards exist;
  (a) toppling trees, primarily in case a rear-mounted tree grab-crane is mounted at the rear of the tractor;
  (b) penetrating objects in the operator's enclosure, primarily in case a winch is mounted at the rear of the tractor.
  Optional equipments such as OPS (Operator Protective Structure), FOPS (Falling Object Protective Structure), etc. to deal with these hazards and other related hazards are not available for this tractor. Without such optional equipment use is limited to tractor specific applications like transport and stationary work.

9Y1210855GEG0092US0

	Implement	Remarks	BX1870D	BX2370D	BX2670D
Mower	Mid-Mount	Max. Cutting Width	1370 mm (54 in.)	1520 mm (60 in.)	
		Max.Weight	95 kg (210 lbs)	140 kg (309 lbs)	
	Rotary-Cutter (1 Blade)	Max. Cutting Width	1070 mm (42 in.)		
		Max.Weight	140 kg (300 lbs)		
	Rear-Mount (2 or 3 Blade)	Max. Cutting Width	1220 mm (48 in.)	1520 mm (60 in.)	
		Max.Weight	115 kg (250 lbs)	140 kg (300 lbs)	
	Flail Mower	Max. Cutting Width	1070 mm (42 in.)		
	Sickle Bar	Max. Cutting Width	1220 mm (48 in.)		
Rotary Tiller		Max. Tilling Width	1070 mm (42 in.)		
		Max. Weight	170 kg (375 lbs)		
Bottom Plow		Max. Size	12 in. × 1	14 in. × 1	
Disc Plow		Max. Size	22 in. × 1		
Cultivator		Max. Width	1220 mm (48 in.) 1 Row		
Disc Harrow		Max. Harrowing Width	1220 mm (48 in.)	1370 mm (54 in.)	
		Max. Weight	120 kg (265 lbs)	140 kg (300 lbs)	
Sprayer		Max. Tank Capacity	150 L (40 U.S.gals, 33 Imp.gals)		
Front Blade		Max. Cutting Width	1370 mm (54 in.)	1520 mm (60 in.)	
		Sub Frame	Necessary		
Rear Blade		Max. Cutting Width	1370 mm (54 in.)	1520 mm (60 in.)	
		Sub Frame	140 kg (300 lbs)	160 kg (350 lbs)	
Front Loader		Max. Lifting Capacity	280 kg (617 lbs)*2	340 kg (750 lbs)*2	
		Max. Width	1220 mm (48 in.)		
Box Blade		Max. Lifting Capacity	1220 mm (48 in.)		
		Max. Width	170 kg (375 lbs)		
Snow Blower (Front)		Max. Working Width	1270 mm (50 in.)		
		Max. Weight	160 kg (350 lbs)		
		Sub Frame	Necessary		
Post Hole Digger		Digging Depth	1140 mm (45 in.)		
Rotary Broom		Cleaning Width	1190 mm (47 in.)		
Trailer		Max. Load Capacity	800 kg (1765 lbs)		
		Max. Weight	1100 kg (2425 lbs)*1		

■ **NOTE**

- **Backhoe cannot be attached.**
- **Implement size may very depending on soil operating conditions.**

***1 Reduce speed and trailer loads when operating in slippery conditions or when operating on slopes and utilize front wheel drive.**

***2 The valve contains the weight of KUBOTA standard bucket.**

9Y1210855GEG0093US0

1 ENGINE

MECHANISM

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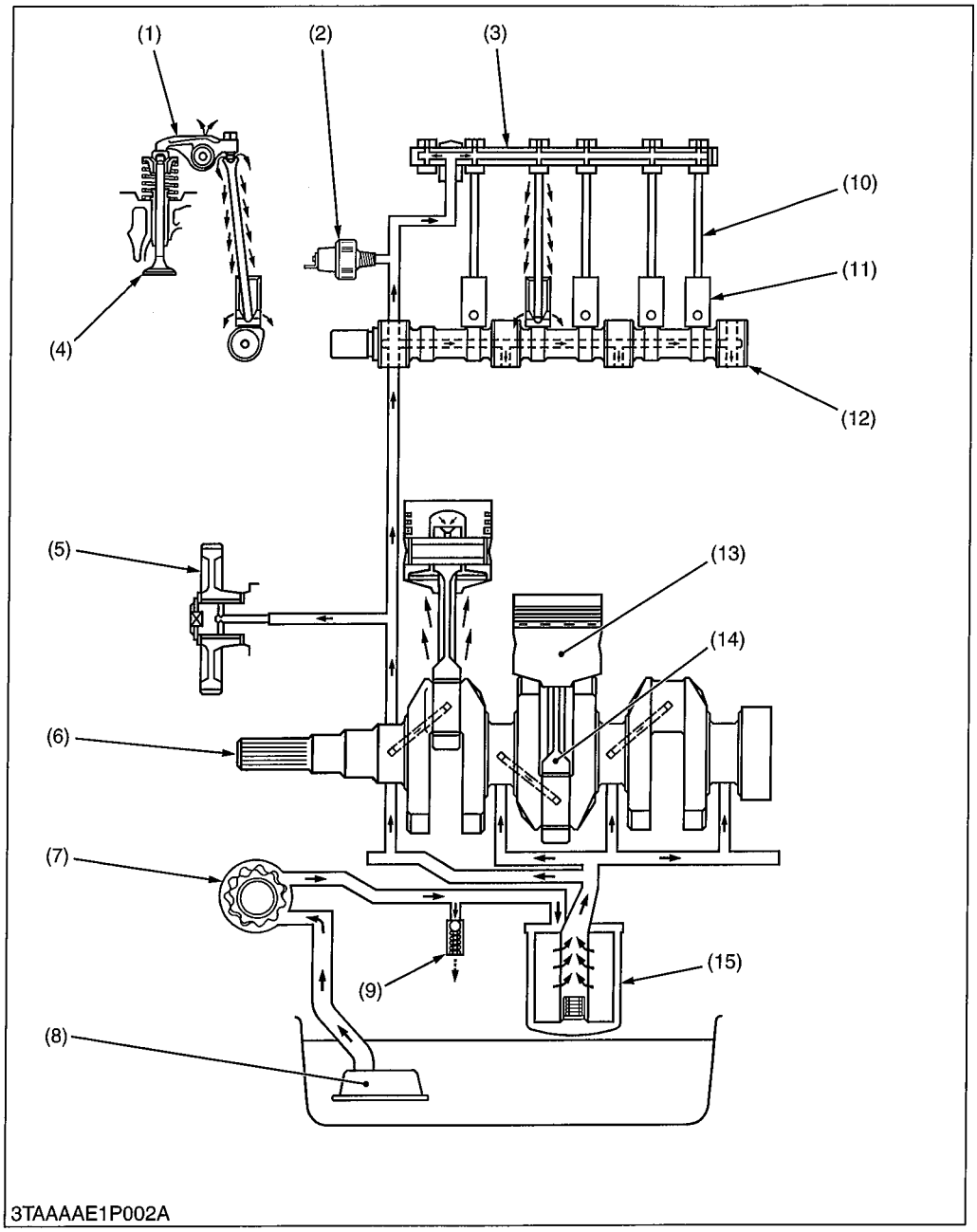
1. LUBRICATING SYSTEM 1-M1
2. COOLING SYSTEM 1-M2
3. FUEL SYSTEM 1-M3

1. LUBRICATING SYSTEM



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(1) Rocker Arm
(2) Oil Pressure Switch
(3) Rocker Arm Shaft
(4) Valve
(5) Idle Gear
(6) Crankshaft
(7) Oil Pump
(8) Oil Strainer
(9) Relief Valve
(10) Push Rod
(11) Tappet
(12) Camshaft
(13) Piston
(14) Connecting Rod
(15) Oil Filter Cartridge

This engine's lubricating system consists of oil strainer (8), oil pump (7), relief valve (9), oil filter cartridge (15) and oil pressure switch (2).

The oil pump sucks lubricating oil from the oil pan through the oil strainer and the oil flows down to the filter cartridge, where it is further filtered. Then the oil is forced to crankshaft (6), connecting rods (14), idle gear (5), camshaft (12) and rocker arm shaft (3) to lubricate each part.

Some part of oil, splashed by the crankshaft or leaking and dropping from gaps of each part, lubricates these parts: piston (13), cylinders, small ends or connecting rods, tappets (11), push rods (10), inlet and exhaust valves (4) and timing gears.

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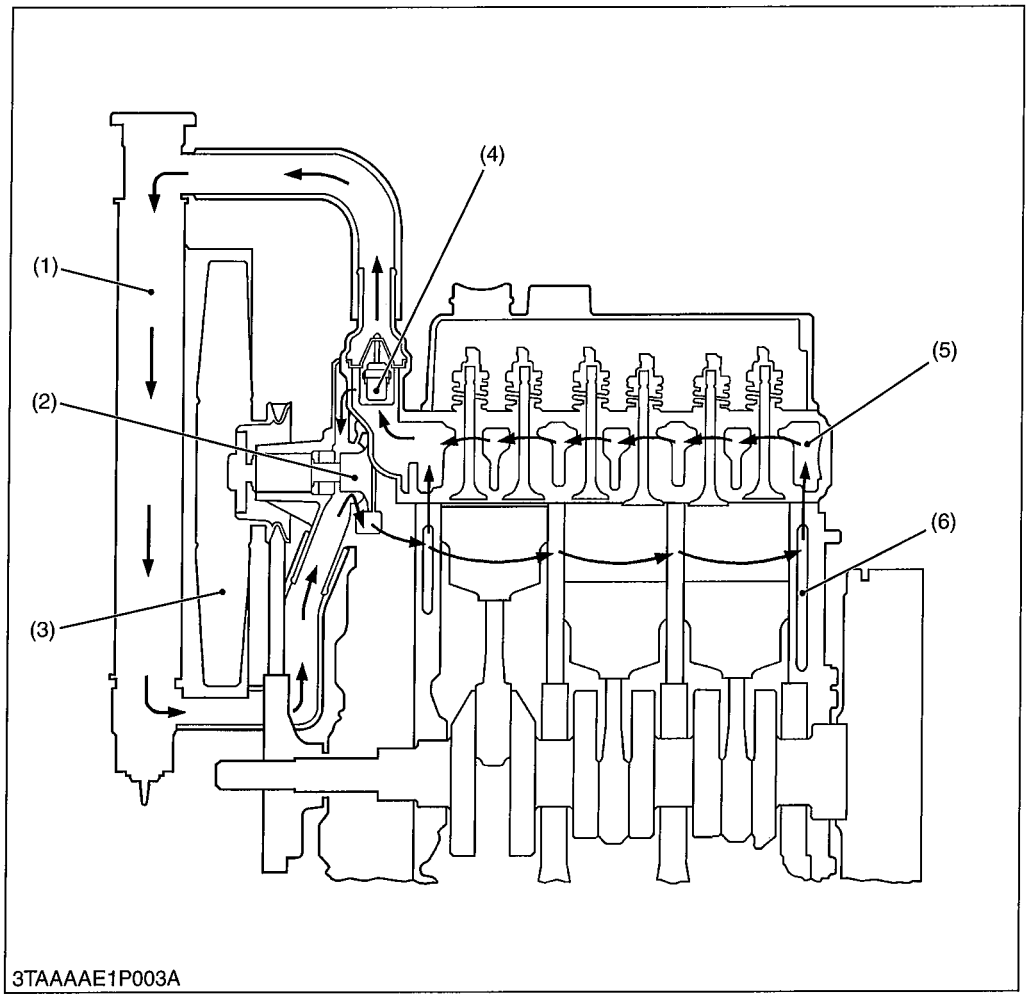
2. COOLING SYSTEM



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(1) Radiator
(2) Water Pump
(3) Cooling Fan
(4) Thermostat
(5) Cylinder Head
(6) Cylinder Head

The cooling system consists of a radiator (1), a centrifugal water pump (2), a cooling fan (3) and a thermostat (4). The coolant is cooled through the radiator core, and the cooling fan (3) set behind the radiator (1) pulls cooling air through the radiator core to improve cooling.

The water pump receives water from the radiator or from the cylinder head and force it into the cylinder block.

The thermostat opens or closes according to the water temperature. When the water temperature is high, the thermostat opens to allow the water to flow from the cylinder head to the radiator. When the water temperature is low, the thermostat close to flow the water only to the water pump.

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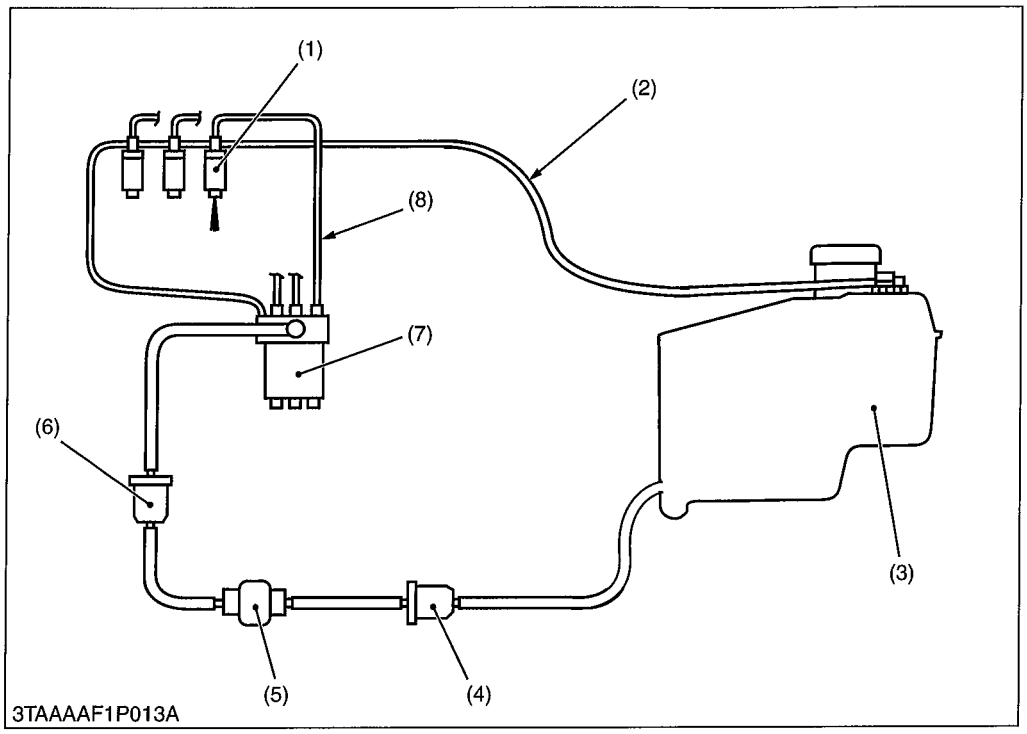
3. FUEL SYSTEM



(1) Injection Nozzle
(2) Fuel Overflow Pipe
(3) Fuel Tank
(4) Fuel Filter
(5) Fuel Feed Pump
(6) Fuel Filter
(7) Injection Pump
(8) Injection Pipe

Fuel from the fuel tank (3) passes through the fuel filter (4), and then enters the injection pump (7) after impurities such as dirt, water, etc. are removed.

The fuel pressurized by the injection pump to the opening pressure (13.7 to 14.7 MPa, 140 to 150 kgf/cm^2, 1990 to 2133 psi), of the injection nozzle (1) is injected into the combustion chamber.

Part of the fuel fed to the injection nozzle (1) lubricates the moving parts of the needle valve inside the nozzle, then returns to the fuel tank through the fuel overflow pipe (2) from the upper part of the nozzle holder.

9Y1210855ENM0003US0

SERVICING

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      (6) Oil Pump 1-S66
      (7) Relief Valve Spring 1-S68

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Fill the fuel	G-9
	Air in the fuel system	Bleed	G-39
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel line clogged	Clean	G-28
	Fuel filter clogged	Change	G-34
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-9
	Fuel with low cetane number	Use specified fuel	G-9
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S30
	Incorrect injection timing	Adjust	1-S22
	Fuel camshaft worn	Replace	1-S36
	Injection nozzle clogged	Clean or replace	1-S30
	Injection pump malfunctioning	Replace	1-S35
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	1-S37, 1-S40
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S17, 1-S31
	Improper valve timing	Correct or replace timing gear	1-S36
	Piston ring and cylinder worn	Replace	1-S38
	Excessive valve clearance	Adjust	1-S18
Starter Does Not Run	Battery discharged	Charge	G-25
	Starter malfunctioning	Repair or replace	6-S28
	Main switch malfunctioning	Repair or replace	6-S9
	Safety switches malfunctioning	Adjust or replace	6-S12
	Wiring disconnected	Connect	–
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-34
	Air cleaner clogged	Clean or replace	G-27
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S30
	Injection pump malfunctioning	Replace	1-S35
	Incorrect nozzle opening pressure	Adjust	1-S24
	Injection nozzle stuck or clogged	Repair or replace	1-S30
	Governor malfunctioning	Repair	1-S35
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to specified level	G-21
	Piston ring and cylinder worn or stuck	Repair or replace	1-S38
	Incorrect injection timing	Adjust	1-S22
	Deficient compression	Check	1-S17

Symptom	Probable Cause	Solution	Reference Page
Either Black or Dark Gray Exhaust Gas Is Observed	Overload	Reduce the load	–
	Low grade fuel used	Use specified fuel	G-9
	Fuel filter clogged	Replace	G-34
	Air cleaner clogged	Clean or replace	G-27
	Deficient nozzle injection	Repair or replace nozzle	1-S30
Deficient Output	Incorrect injection timing	Adjust	1-S22
	Engine's moving parts seem to be seizing	Repair or replace	–
	Injection pump malfunctioning	Repair or replace	1-S35
	Deficient nozzle injection	Repair or replace nozzle	1-S30
	Compression leak	Replace head gasket, tighten cylinder head screws, glow plug and nozzle holder	1-S17, 1-S31
	Air cleaner dirty or clogged	Clean or replace	G-27
Excessive Lubricant Oil Consumption	Piston ring's gap facing the same direction	Shift ring gap direction	1-S37
	Oil ring worn or stuck	Replace	1-S38
	Piston ring groove worn	Replace piston	1-S38
	Valve stem and valve guide worn	Replace	1-S43
	Oil leaking due to damaged seals or packing	Replace	–
Fuel Mixed into Lubricant Oil	Injection pump's plunger worn	Repair or replace	1-S35
	Deficient nozzle injection	Repair or replace nozzle	1-S30
	Injection pump broken	Replace	1-S35
Water Mixed into Lubricant Oil	Head gasket damaged	Replace	1-S31
	Cylinder block or cylinder head flawed	Replace	–
Low Oil Pressure	Engine oil insufficient	Fill	G-9
	Oil strainer clogged	Clean	1-S33
	Oil filter clogged	Replace	G-21
	Relief valve stuck with dirt	Clean	1-S68
	Relief valve spring weaken or broken	Replace	1-S68
	Excessive oil clearance of crankshaft bearing	Replace	1-S40, 1-S62
	Excessive oil clearance of crankpin bearing	Replace	1-S40, 1-S58
	Excessive oil clearance of rocker arm	Replace	1-S31, 1-S47
	Oil passage clogged	Clean	–
	Different type of oil	Use specified type of oil	G-9
	Oil pump damaged	Repair or replace	1-S34

Symptom	Probable Cause	Solution	Reference Page
High Oil Pressure	Different type of oil	Use specified type of oil	G-9
	Relief valve damaged	Replace	1-S19, 1-S68
Engine Overheated	Engine oil insufficient	Fill	1-S26
	Fan belt broken or elongated	Replace or adjust	G-28
	Coolant insufficient	Fill	G-9
	Radiator net and radiator fin clogged with dust	Clean	–
	Inside of radiator corroded	Clean or replace	G-27
	Coolant flow route corroded	Clean or replace	–
	Radiator cap damaged	Replace	1-S21
	Overload running	Reduce the load	–
	Head gasket damaged	Replace	1-S31
	Incorrect injection timing	Adjust	1-S22
	Unsuitable fuel used	Use specified fuel	G-9
Battery Quickly Discharged	Battery electrolyte insufficient	Fill distilled water and charge	G-25
	Fan belt slips	Adjust belt tension or replace	G-28
	Wiring disconnected	Connect	–
	Rectifier damaged	Replace	–
	Alternator damaged	Replace	–
	Battery damaged	Replace	–

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2. SERVICING SPECIFICATIONS

[1] BX1870D (D722-E4) and BX2370D (D902-E4)

ENGINE BODY

Item		Factory Specification	Allowable Limit
Valve Clearance (Cold)		0.145 to 0.185 mm 0.00571 to 0.00728 in.	–
Compression Pressure **[BX1870D (D722-E4)]**		2.85 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 413 to 469 psi	2.26 MPa 23.0 kgf/cm^2 327 psi
• Difference among Cylinders		–	10 % or less
Compression Pressure **[BX2370D (D902-E4)]**		3.53 to 4.02 MPa 36.0 to 41.0 kgf/cm^2 512 to 583 psi	2.55 MPa 26.0 kgf/cm^2 370 psi
• Difference among Cylinders		–	10 % or less
Top Clearance		0.55 to 0.70 mm 0.022 to 0.027 in.	–
Cylinder Head Surface	Flatness	–	0.05 mm 0.002 in.
Valve Recessing	Intake and Exhaust	0.10 (protrusion) to 0.10 (recessing) mm 0.0039 (protrusion) to 0.0039 (recessing) in.	0.30 (recessing) mm 0.012 (recessing) in
Valve Stem to Valve Guide	Clearance	0.030 to 0.057 mm 0.0012 to 0.0022 in.	0.10 mm 0.0039 in.
• Valve Stem	O.D.	5.968 to 5.980 mm 0.2350 to 0.2354 in.	–
• Valve Guide	I.D.	6.010 to 6.025 mm 0.2367 to 0.2372 in.	–
Valve Face	Angle (Intake)	0.79 rad 45 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
Valve Seat	Angle (Intake)	0.79 rad 45 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
	Width	2.12 mm 0.0835 in.	–
Valve Spring	Free Length	31.3 to 31.8 mm 1.24 to 1.25 in.	28.4 mm 1.12 in.
	Tilt	–	1.2 mm 0.047 in.
	Setting Load	65 N / 27.0 mm 6.6 kgf / 27.0 mm 15 lbf / 1.06 in.	55 N / 27.0 mm 5.6 kgf / 27.0 mm 12 lbf / 1.06 in.

Item		Factory Specification	Allowable Limit
Rocker Arm Shaft to Rocker Arm	Clearance	0.016 to 0.045 mm 0.00063 to 0.0017 in.	0.15 mm 0.0059 in.
• Rocker Arm Shaft	O.D.	10.473 to 10.484 mm 0.41233 to 0.41275 in.	–
• Rocker Arm	I.D.	10.500 to 10.518 mm 0.41339 to 0.41409 in.	–
Push Rod	Alignment	–	0.25 mm 0.0098 in.
Tappet to Tappet Guide	Clearance	0.016 to 0.052 mm 0.00063 to 0.0020 in.	0.10 mm 0.0039 in.
• Tappet	O.D.	17.966 to 17.984 mm 0.70733 to 0.70803 in.	–
• Tappet Guide	I.D.	18.000 to 18.018 mm 0.70867 to 0.70937 in.	–
Timing Gear • Crank Gear to Idle Gear	Backlash	0.0430 to 0.124 mm 0.00170 to 0.00488 in.	0.15 mm 0.0059 in.
• Idle Gear 1 to Cam Gear	Backlash	0.0470 to 0.123 mm 0.00185 to 0.00484 in.	0.15 mm 0.0059 in.
• Idle Gear 1 to Injection Pump Gear	Backlash	0.0460 to 0.124 mm 0.00182 to 0.00488 in.	0.15 mm 0.0059 in.
• Crank Gear to Oil Pump Drive Gear	Backlash	0.0410 to 0.123 mm 0.00162 to 0.00484 in.	0.15 mm 0.0059 in.
Idle Gear Shaft to Gear Bushing • Idle Gear 1	Clearance	0.020 to 0.084 mm 0.00079 to 0.0033 in.	0.10 mm 0.0039 in.
• Idle Gear Bushing	I.D.	20.000 to 20.051 mm 0.78741 to 0.78940 in.	–
• Idle Gear Shaft 1	O.D.	19.967 to 19.980 mm 0.78611 to 0.78661 in.	–
Idle Gear • Idle Gear 1	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.020 in.	0.80 mm 0.031 in.
Camshaft	Side Clearance	0.15 to 0.31 mm 0.0059 to 0.012 in.	0.50 mm 0.020 in.
	Alignment	–	0.01 mm 0.0004 in.
Cam Height	Intake	26.88 mm 1.058 in.	26.83 mm 1.056 in.
	Exhaust	26.88 mm 1.058 in.	26.83 mm 1.056 in.

Item		Factory Specification	Allowable Limit
Camshaft Journal to Cylinder Block Bore	Clearance	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
• Camshaft Journal	O.D.	32.934 to 32.950 mm 1.2967 to 1.2972 in.	–
• Cylinder Block Bore	I.D.	33.000 to 33.025 mm 1.2993 to 1.3001 in.	–
Piston Pin Bore	I.D.	20.000 to 20.013 mm 0.78741 to 0.78791 in.	20.05 mm 0.7894 in.
Piston Pin to Small End Bushing	Clearance	0.015 to 0.075 mm 0.0059 to 0.0029 in.	0.15 mm 0.0059 in.
• Piston Pin	O.D.	20.002 to 20.011 mm 0.78748 to 0.78783 in.	–
• Small End Bushing	I.D.	20.025 to 20.040 mm 0.78839 to 0.78897 in.	–
Piston Ring Gap **[BX1870D (D722-E4)]**	Top Ring	0.15 to 0.30 mm 0.0059 to 0.011 in.	1.2 mm 0.0472 in.
	Second Ring	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Oil Ring	0.15 to 0.30 mm 0.0059 to 0.011 in.	1.2 mm 0.0472 in.
Piston Ring Gap **[BX2370D (D902-E4)]**	Top Ring	0.20 to 0.35 mm 0.0079 to 0.013 in.	1.25 mm 0.0492 in.
	Second Ring	0.35 to 0.50 mm 0.014 to 0.019 in.	1.25 mm 0.0492 in.
	Oil Ring	0.20 to 0.35 mm 0.0079 to 0.013 in.	1.25 mm 0.0492 in.
Piston Ring to Piston Ring Groove • Second Ring	Clearance	0.0900 to 0.0120 mm 0.00355 to 0.00472 in.	0.15 mm 0.0059 in.
• Oil Ring	Clearance	0.040 to 0.080 mm 0.0016 to 0.0031 in.	0.15 mm 0.0059 in.
Connecting Rod	Alignment	–	0.05 mm 0.002 in.
Crankshaft	Alignment	–	0.02 mm 0.0008 in.
Crankshaft to Crankshaft Bearing 1 **[BX1870D (D722-E4)]**	Oil Clearance	0.0340 to 0.114 mm 0.00134 to 0.00448 in.	0.20 mm 0.0079 in.
• Crankshaft	O.D.	39.934 to 39.950 mm 1.5722 to 1.5728 in.	–
• Crankshaft Bearing 1	I.D.	39.984 to 40.040 mm 1.5742 to 1.5763 in.	–

Item		Factory Specification	Allowable Limit
Crankshaft to Crankshaft Bearing 1 **[BX2370D (D902-E4)]**	Oil Clearance	0.0340 to 0.106 mm 0.00134 to 0.00417 in.	0.20 mm 0.0079 in.
• Crankshaft	O.D.	43.934 to 43.950 mm 1.7297 to 1.7303 in.	–
• Crankshaft Bearing 1	I.D.	43.984 to 44.040 mm 1.7317 to 1.7338 in.	–
Crankshaft Bearing 1	Dimension **(A)**	0 to 0.3 mm 0 to 0.01 in.	–
Crankshaft to Crankshaft Bearing 2	Oil Clearance	0.028 to 0.059 mm 0.0011 to 0.0023 in.	0.20 mm 0.0079 in.
• Crankshaft Journal	O.D.	43.934 to 43.950 mm 1.7297 to 1.7303 in.	–
• Crankshaft Bearing 2	I.D.	43.978 to 43.993 mm 1.7315 to 1.7320 in.	–
Crankshaft to Crankshaft Bearing 3 **[BX1870D (D722-E4)]**	Oil Clearance	0.028 to 0.059 mm 0.0011 to 0.0023 in.	0.20 mm 0.0079 in.
• Crankshaft Journal	O.D.	39.934 to 39.950 mm 1.5722 to 1.5728 in.	–
• Crankshaft Bearing 3	I.D.	39.978 to 39.993 mm 1.5740 to 1.5745 in.	–
Crankshaft to Crankshaft Bearing 3 **[BX2370D (D902-E4)]**	Oil Clearance	0.028 to 0.059 mm 0.0011 to 0.0023 in.	0.20 mm 0.0079 in.
• Crankshaft Journal	O.D.	43.934 to 43.950 mm 1.7297 to 1.7303 in.	–
• Crankshaft Bearing 3	I.D.	43.978 to 43.993 mm 1.7315 to 1.7320.	–
Crankpin to Crankpin Bearing	Oil Clearance	0.020 to 0.051 mm 0.00079 to 0.0020 in.	0.15 mm 0.0059 in.
• Crankpin	O.D.	33.959 to 33.975 mm 1.3370 to 1.3375 in.	–
• Crankshaft Bearing	I.D.	33.995 to 34.010 mm 1.3384 to 1.3389 in.	–
Crankshaft	Side Clearance	0.15 to 0.31 mm 0.0059 to 0.012 in.	0.50 mm 0.020 in.
Cylinder Liner I.D. **[BX1870D (D722-E4)]**	I.D.	67.000 to 67.019 mm 2.6378 to 2.6385 in.	67.150 mm 2.6437 in.
[BX2370D (D902-E4)]	I.D.	72.000 to 72.019 mm 2.8347 to 2.8353 in.	72.150 mm 2.8406 in.

Item	Factory Specification	Allowable Limit
Cylinder (Oversized) **[BX1870D (D722-E4)]**	67.250 to 67.269 mm 2.6477 to 2.6483 in.	67.400 mm 2.6535 in.
[BX2370D (D902-E4)]	72.250 to 72.269 mm 2.8445 to 2.8452 in.	72.400 mm 2.8504 in.

LUBRICATING SYSTEM

Item		Factory Specification	Allowable Limit
Engine Oil Pressure	At Idle Speed	More than 49 kPa 0.50 kgf/cm^2 7.1 psi	–
	At Rated Speed	197 to 441 kPa 2.00 to 4.50 kgf/cm^2 28.5 to 64.0 psi	147 kPa 1.50 kgf/cm^2 21.3 psi
Inner Rotor to Outer Rotor	Clearance	0.030 to 0.14 mm 0.0012 to 0.0055 in.	–
Outer Rotor to Pump Body	Clearance	0.070 to 0.15 mm 0.0028 to 0.0059 in.	–
Inner Rotor to Cover	Clearance	0.0750 to 0.135 mm 0.00296 to 0.00531 in.	–
Relief Valve Spring	Length	32 mm 1.26 in.	28 mm 1.10 in.

COOLING SYSTEM

Item		Factory Specification	Allowable Limit
Fan Belt	Tension	7.0 to 9.0 mm / 98 N 0.28 to 0.35 in. / 98 N (10 kgf, 22 lbf)	–
Thermostat	Valve Opening Temperature (At Beginning)	69.5 to 72.5 °C 157.1 to 162.5 °F	–
	Valve Opening Temperature (Opened Completely)	85 °C 185 °F	–
Radiator Cap	Pressure Falling Time	10 seconds or more 88 → 59 kPa 0.90 → 0.60 kgf/cm^2 13 → 8.5 psi	–
Radiator	Water Leakage Test Pressure	No leak at specified pressure	–

FUEL SYSTEM

Item		Factory Specification	Allowable Limit
Injection Pump **[BX1870D (D722-E4)]**	Injection Timing	0.3186 to 0.3447 rad (18.25 to 19.75 °) before T.D.C	–
[BX2370D (D902-E4)]	Injection Timing	0.3360 to 0.3621 rad (19.25 to 20.75 °) before T.D.C.	–
Pump Element	Fuel Tightness	–	13.73 MPa 140.0 kgf/cm^2 1991 psi
Delivery Valve	Fuel Tightness	10 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1991 → 1849 psi	5 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1991 → 1849 psi
Injection Nozzle	Injection Pressure	13.73 to 14.70 MPa 140.0 to 150.0 kgf/cm^2 1992 to 2133 psi	–
Injection Nozzle Valve Seat	Valve Seat Tightness	When the pressure is 12.75 MPa (130.0 kgf/cm^2, 1849 psi), the valve seat must be fuel tightness.	–

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[2] BX2670D (D1005-E4)

ENGINE BODY

Item		Factory Specification	Allowable Limit
Valve Clearance (Cold)		0.145 to 0.185 mm 0.00571 to 0.00728 in.	–
Compression Pressure		3.73 to 4.11 MPa 38.0 to 42.0 kgf/cm^2 541 to 597 psi	2.26 MPa 23.0 kgf/cm^2 327 psi
• Difference among Cylinders		–	10 % or less
Top Clearance		0.55 to 0.75 mm 0.022 to 0.029 in.	–
Cylinder Head Surface	Flatness	–	0.05 mm 0.002 in.
Valve Recessing	Intake and Exhaust	0.050 (protrusion) to 0.25 (recessing) mm 0.0020 (protrusion) to 0.0098 (recessing) in.	0.40 (recessing) mm 0.016 (recessing) in.
Valve Stem to Valve Guide	Clearance	0.035 to 0.065 mm 0.0014 to 0.0025 in.	0.10 mm 0.0039 in.
• Valve Stem	O.D.	6.960 to 6.975 mm 0.2741 to 0.2746 in.	–
• Valve Guide	I.D.	7.010 to 7.025 mm 0.2760 to 0.2765 in.	–

Item		Factory Specification	Allowable Limit
Valve Face	Angle (Intake)	1.0 rad 60 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
Valve Seat	Angle (Intake)	1.0 rad 60 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
	Width	2.12 mm 0.0835 in.	–
Valve Spring	Free Length	37.0 to 37.5 mm 1.46 to 1.47 in.	36.5 mm 1.44 in.
	Tilt	–	1.0 mm 0.039 in.
	Setting Load	117.4 N / 31.0 mm 11.97 kgf / 31.0 mm 26.39 lbf / 1.22 in.	100.0 N / 31.0 mm 10.20 kgf / 31.0 mm 22.48 lbf / 1.22 in.
Rocker Arm Shaft to Rocker Arm	Clearance	0.016 to 0.045 mm 0.00063 to 0.0017 in.	0.10 mm 0.0039 in.
• Rocker Arm Shaft	O.D.	11.973 to 11.984 mm 0.47138 to 0.47181 in.	–
• Rocker Arm	I.D.	12.000 to 12.018 mm 0.47244 to 0.47314 in.	–
Push Rod	Alignment	–	0.25 mm 0.0098 in.
Tappet to Tappet Guide	Clearance	0.020 to 0.062 mm 0.00079 to 0.0024 in.	0.07 mm 0.003 in.
• Tappet	O.D.	19.959 to 19.980 mm 0.78579 to 0.78661 in.	–
• Tappet Guide	I.D.	20.000 to 20.021 mm 0.78740 to 0.78822 in.	–
Timing Gear • Crank Gear to Idle Gear 1	Backlash	0.0320 to 0.115 mm 0.00126 to 0.00452 in.	0.15 mm 0.0059 in.
• Idle Gear 1 to Cam Gear	Backlash	0.0360 to 0.114 mm 0.00142 to 0.00448 in.	0.15 mm 0.0059 in.
• Idle Gear 1 to Injection Pump Gear	Backlash	0.0340 to 0.116 mm 0.00134 to 0.00456 in.	0.15 mm 0.0059 in.
Governor Gear • Governor Gear to Injection Pump Gear (Fuel Cam Gear)	Backlash	0.0300 to 0.117 mm 0.00119 to 0.00460 in.	0.15 mm 0.0059 in.

Item		Factory Specification	Allowable Limit
Idle Gear Shaft to Gear Bushing • Idle Gear 1	Clearance	0.020 to 0.054 mm 0.00079 to 0.0021 in.	0.10 mm 0.0039 in.
• Idle Gear Bushing	I.D.	26.000 to 26.021 mm 1.0237 to 1.0244 in.	–
• Idle Gear Shaft 1	O.D.	25.967 to 25.980 mm 1.0224 to 1.0228 in.	–
Idle Gear • Idle Gear 1	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.020 in.	0.80 mm 0.031 in.
Camshaft	Side Clearance	0.070 to 0.22 mm 0.0028 to 0.0086 in.	0.30 mm 0.012 in.
	Alignment	–	0.01 mm 0.0004 in.
Cam Height	Intake	28.80 mm 1.134 in.	28.75 mm 1.132 in.
	Exhaust	29.00 mm 1.142 in.	28.95 mm 1.140 in.
Camshaft Journal to Cylinder Block Bore	Clearance	0.050 to 0.091 mm 0.0020 to 0.0035 in.	0.15 mm 0.0059 in.
• Camshaft Journal	O.D.	35.934 to 35.950 mm 1.4148 to 1.4153 in.	–
• Cylinder Block Bore	I.D.	36.000 to 36.025 mm 1.4174 to 1.4183 in.	–
Piston Pin Bore	I.D.	22.000 to 22.013 mm 0.86615 to 0.86665 in.	22.03 mm 0.8673 in.
Piston Pin to Small End Bushing	Clearance	0.014 to 0.038 mm 0.00056 to 0.0014 in.	0.15 mm 0.0059 in.
• Piston Pin	O.D.	22.002 to 22.011 mm 0.86622 to 0.86657 in.	–
• Small End Bushing	I.D.	22.025 to 22.040 mm 0.86713 to 0.86771 in.	–
Piston Ring Gap	Top Ring	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Second Ring	0.30 to 0.45 mm 0.012 to 0.017 in.	1.25 mm 0.0492 in.
	Oil Ring	0.25 to 0.40 mm 0.0098 to 0.015 in.	1.25 mm 0.0492 in.
Piston Ring to Piston Ring Groove • Second Ring	Clearance	0.0850 to 0.112 mm 0.00335 to 0.00440 in.	0.2 mm 0.008 in.
• Oil Ring	Clearance	0.020 to 0.060 mm 0.00079 to 0.0023 in.	0.15 mm 0.0059 in.
Connecting Rod	Alignment	–	0.05 mm 0.002 in.

Item		Factory Specification	Allowable Limit
Crankshaft	Alignment	–	0.02 mm 0.0008 in.
Crankshaft to Crankshaft Bearing 1	Oil Clearance	0.0340 to 0.114 mm 0.00134 to 0.00448 in.	0.20 mm 0.0079 in.
• Crankshaft	O.D.	47.934 to 47.950 mm 1.8872 to 1.8877 in.	–
• Crankshaft Bearing 1	I.D.	47.984 to 48.048 mm 1.8892 to 1.8916 in.	–
Crankshaft Bearing 1	Dimension **(A)**	0 to 0.3 mm 0 to 0.01 in.	–
Crankshaft to Crankshaft Bearing 2	Oil Clearance	0.034 to 0.095 mm 0.0014 to 0.0037 in.	0.20 mm 0.0079 in.
• Crankshaft Journal	O.D.	47.934 to 47.950 mm 1.8872 to 1.8877 in.	–
• Crankshaft Bearing 2	I.D.	47.984 to 48.029 mm 1.8892 to 1.8909 in.	–
Crankshaft to Crankshaft Bearing 3	Oil Clearance	0.034 to 0.098 mm 0.0014 to 0.0038 in.	0.20 mm 0.0079 in.
• Crankshaft Journal	O.D.	51.921 to 51.940 mm 2.0442 to 2.0448 in.	–
• Crankshaft Bearing 3	I.D.	51.974 to 52.019 mm 2.0463 to 2.0479 in.	–
Crankpin to Crankpin Bearing	Oil Clearance	0.029 to 0.091 mm 0.0012 to 0.0035 in.	0.20 mm 0.0079 in.
• Crankpin	O.D.	39.959 to 39.975 mm 1.5732 to 1.5738 in.	–
• Crankshaft Bearing	I.D.	40.040 to 40.050 mm 1.5764 to 1.5767 in.	–
Crankshaft	Side Clearance	0.15 to 0.31 mm 0.0059 to 0.012 in.	0.50 mm 0.020 in.
Cylinder Liner I.D.		76.000 to 76.019 mm 2.9922 to 2.9928 in.	76.15 mm 2.998 in.
Cylinder (Oversized)		76.500 to 76.519 mm 3.0119 to 3.0125 in.	76.65 mm 3.018 in.

LUBRICATING SYSTEM

Item		Factory Specification	Allowable Limit
Engine Oil Pressure	At Idle Speed	More than 49 kPa 0.50 kgf/cm^2 7.1 psi	–
	At Rated Speed	197 to 441 kPa 2.00 to 4.50 kgf/cm^2 28.5 to 64.0 psi	147 kPa 1.50 kgf/cm^2 21.3 psi
Inner Rotor to Outer Rotor	Clearance	0.060 to 0.18 mm 0.0024 to 0.0071 in.	–
Outer Rotor to Pump Body	Clearance	0.100 to 0.180 mm 0.00394 to 0.00708 in.	–
Inner Rotor to Cover	Clearance	0.025 to 0.075 mm 0.00099 to 0.0029 in.	–
Relief Valve Spring	Length	32 mm 1.26 in.	28 mm 1.10 in.

COOLING SYSTEM

Item		Factory Specification	Allowable Limit
Fan Belt	Tension	7.0 to 9.0 mm / 98 N 0.28 to 0.35 in. / 98 N (10 kgf, 22 lbf)	–
Thermostat	Valve Opening Temperature (At Beginning)	69.5 to 72.5 °C 157.1 to 162.5 °F	–
	Valve Opening Temperature (Opened Completely)	85 °C 185 °F	–
Radiator Cap	Pressure Falling Time	10 seconds or more 88 → 59 kPa 0.90 → 0.60 kgf/cm^2 13 → 8.5 psi	–
Radiator	Water Leakage Test Pressure	No leak at specified pressure	–

FUEL SYSTEM

Item		Factory Specification	Allowable Limit
Injection Pump	Injection Timing	0.3360 to 0.3621 rad (19.25 to 20.75 °) before T.D.C.	–
Pump Element	Fuel Tightness	–	13.73 MPa 140.0 kgf/cm^2 1991 psi
Delivery Valve	Fuel Tightness	10 seconds 13.73 → 12.75 MPa 140.0 →130.0 kgf/cm^2 1991 → 1849 psi	5 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1991 → 1849 psi
Injection Nozzle	Injection Pressure	13.73 to 14.70 MPa 140.0 to 150.0 kgf/cm^2 1991 to 2133 psi	–
Injection Nozzle Valve Seat	Valve Seat Tightness	When the pressure is 12.75 MPa (130.0 kgf/cm^2, 1849 psi), the valve seat must be fuel tightness.	–

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(Tractor section for general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-13.)

Tractor Section

Item	N·m	kgf·m	lbf·ft
Front coupling mounting bolt	24 to 27	2.4 to 2.8	18 to 20
Engine mounting nut	24 to 27	2.4 to 2.8	18 to 20
Cushion mounting nut	24 to 27	2.4 to 2.8	18 to 20
Engine support mounting screw	48 to 55	4.9 to 5.7	36 to 41

Engine Section

Item	Dimension × Pitch	N·m	kgf·m	lbf·ft
Cylinder head cover screw [BX1870D (D722-E4) and BX2370D (D902-E4)]	M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Cylinder head cover screw [BX2670D (D1005-E4)]	M6 × 1.0	7 to 8	0.7 to 0.9	5 to 6
Cylinder head screw [BX1870D (D722-E4) and BX2370D (D902-E4)]	M8 × 1.25	38 to 42	3.8 to 4.3	28 to 31
Cylinder head screw [BX2670D (D1005-E4)]	M8 × 1.25	64 to 68	6.5 to 7.0	47 to 50
*Main bearing case screw 1 [BX1870D (D722-E4) and BX2370D (D902-E4)]	M6 × 1.0	13 to 15	1.3 to 1.6	9.4 to 11
*Main bearing case screw 1 [BX2670D (D1005-E4)]	M7 × 1.0	30 to 34	3.0 to 3.5	22 to 25
*Main bearing case screw 2 [BX1870D (D722-E4) and BX2370D (D902-E4)]	M7 × 1.0	27 to 30	2.7 to 3.1	20 to 22
*Main bearing case screw 2 [BX2670D (D1005-E4)]	M8 × 1.25	49 to 53	5.0 to 5.5	37 to 39
*Flywheel screw	M10 × 1.25	54 to 58	5.5 to 6.0	40 to 43
*Connecting rod screw [BX1870D (D722-E4) and BX2370D (D902-E4)]	M7 × 0.75	27 to 30	2.7 to 3.1	20 to 22
*Connecting rod screw [BX2670D (D1005-E4)]	M7 × 0.75	42 to 46	4.2 to 4.7	31 to 33
*Rocker arm bracket screw [BX1870D (D722-E4) and BX2370D (D902-E4)]	M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
*Rocker arm bracket nut [BX2670D (D1005-E4)]	M7 × 1.0	22 to 26	2.2 to 2.7	16 to 19
*Fan drive pulley screw [BX1870D (D722-E4) and BX2370D (D902-E4)]	M12 × 1.5	118 to 127	12.0 to 13.0	86.8 to 94.0
*Fan drive pulley screw [BX2670D (D1005-E4)]	M14 × 1.5	236 to 245	24.0 to 25.0	174 to 180
Bearing case cover mounting screw	M6 × 1.0	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31
Glow plug	M8 × 1.0	7.9 to 14	0.80 to 1.5	5.8 to 10

Item	Dimension × Pitch	N·m	kgf·m	lbf·ft
Nozzle holder assembly	M20 × 1.5	49 to 68	5.0 to 7.0	37 to 50
Nozzle holder	–	35 to 39	3.5 to 4.0	26 to 28
Oil pressure switch	PT 1/8	15 to 19	1.5 to 2.0	11 to 14
Injection pipe retaining nut	M12 × 1.5	25 to 34	2.5 to 3.5	18 to 25
Overflow pipe retaining nut	M12 × 1.5	20 to 24	2.0 to 2.5	15 to 18
Drain plug with copper gasket	M12 × 1.25	33 to 37	3.3 to 3.8	24 to 27
Oil filter joint	–	40 to 49	4.0 to 5.0	29 to 36

■ **NOTE**

- **In removing and applying the bolts and nuts marked with "*", a pneumatic wrench or similar pneumatic tool, if employed, must be used with enough care not to get them seized.**
- **For * marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in Size × Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

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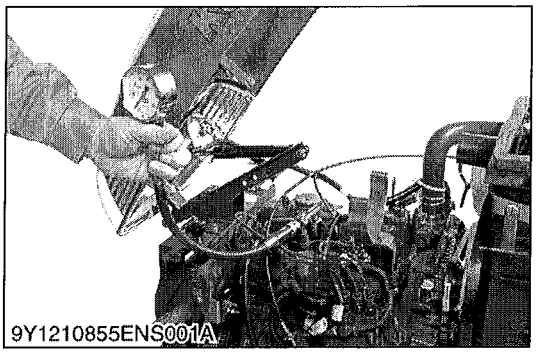
4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Engine Body



Compression Pressure

1. Run the engine until it is warmed up.
2. Stop the engine.
3. Remove the air cleaner, the muffler and all glow plugs (or nozzles).
4. Set a compression tester with the adaptor to the glow plug hole (or nozzle hole).
   Nozzle hole: Adaptor **H** (07909-31231)
   Glow plug hole: Adaptor **L** (07909-31301)
5. Disconnect the connector of engine stop solenoid and keep the engine stop position (non-injection). Then, run the engine with the starter and measure the compression pressure.
6. Repeat steps 4 and 5 for each cylinder.
7. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the glow plug hole (or nozzle hole) and measure the compression pressure again.
8. If the compression pressure is still less than the allowable limit, check the top clearance, valve clearance and cylinder head.
9. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

■ **NOTE**

- **Check the compression pressure with the specified valve clearance.**
- **Always use a fully charged battery for performing this test.**
- **Variances in cylinder compression values should be under 10 %.**

[BX1870D (D722-E4)]

Compression pressure	Factory specification	2.85 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 413 to 469 psi
	Allowable limit	2.26 MPa 23.0 kgf/cm^2 327 psi

[BX2370D (D902-E4)]

Compression pressure	Factory specification	3.53 to 4.02 MPa 36.0 to 41.0 kgf/cm^2 512 to 583 psi
	Allowable limit	2.55 MPa 26.0 kgf/cm^2 370 psi

[BX2670D (D1005-E4)]

Compression pressure	Factory specification	3.73 to 4.11 MPa 38.0 to 42.0 kgf/cm^2 541 to 597 psi
	Allowable limit	2.26 MPa 23.0 kgf/cm^2 327 psi

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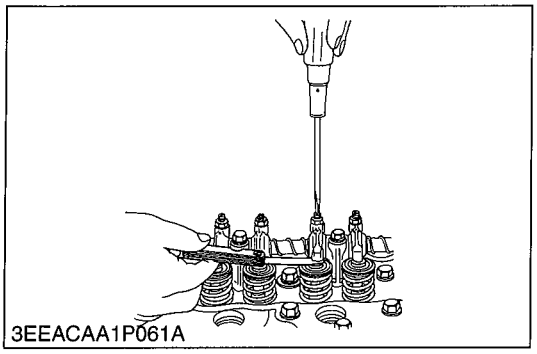
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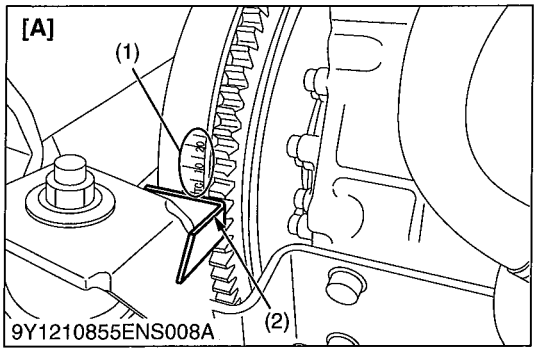

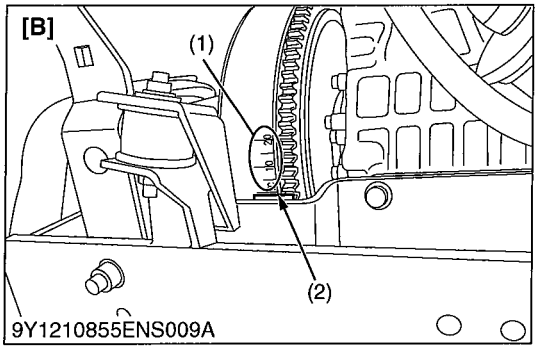

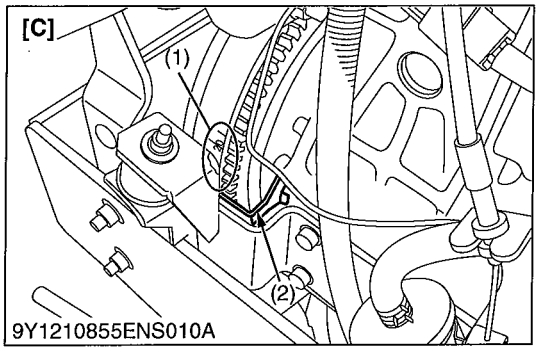

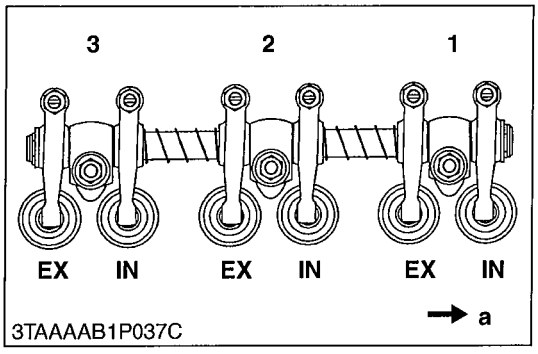

Checking Valve Clearance

■ **IMPORTANT**

- **Valve clearance must be checked and adjusted when engine is cold.**

1. Remove the cylinder head cover and the glow plugs.
2. Align the **"1TC"** mark at **"1TC"** and **"Timing Line"** (1) on the flywheel and alignment mark (2) on the rear end plate so that the No. 1 piston comes to the compression top dead center.
3. Check the following valve clearance marked with "★" using a feeler gauge.
4. If the clearance is not within the factory specifications, adjust with the adjusting screw.
5. Then turn the flywheel 6.28 rad (360 °), and align the **"1TC"** mark at **"1TC"** and **"Timing Line"** (1) on the flywheel and alignment mark (2) on the rear end plate so that the No. 1 piston comes to the overlap position.
6. Check the following valve clearance marked with "☆" using a feeler gauge.
7. If the clearance is not within the factory specifications, adjust with the adjusting screw.

Adjustable cylinder location of piston	Number of cylinders Valve arrangement	
	Intake valve	Exhaust valve
No. 1	★	★
No. 2	☆	★
No. 3	★	☆

Valve clearance marked with "★" can be adjusted.

Intake and exhaust valve clearance (cold)	Factory specification	0.145 to 0.185 mm 0.00571 to 0.00728 in.

■ **NOTE**

- **The sequence of cylinder numbers is given as No. 1, No. 2 and No. 3 starting from the gear case side.**
- **After adjusting the valve clearance, secure the adjusting screw with the lock nut.**

(1) **"1TC" and "Timing Line"**
(2) Alignment Mark

a: Gear Case Side
[A] BX1870D (D722-E4)
[B] BX2370D (D902-E4)
[C] BX2670D (D1005-E4)

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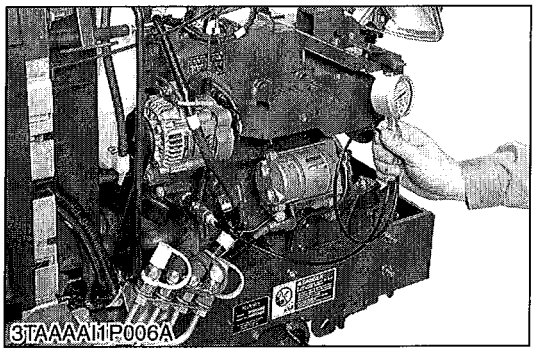
(2) Lubricating System



Engine Oil Pressure

1. Remove the engine oil pressure switch, and set an oil pressure tester.
2. Start the engine. After warming up, measure the oil pressure of both idling and rated speeds.
3. If the oil pressure is less than the allowable limit, check the following.

- Engine oil insufficient
- Oil pump damaged
- Oil strainer clogged
- Oil filter cartridge clogged
- Oil gallery clogged
- Excessive oil clearance
- Foreign matter in the relief valve
- Relief valve spring length (Refer to 1-S68.)

Engine oil pressure	At idle speed	Factory specification	More than 49 kPa 0.50 kgf/cm^2 7.1 psi
	At rated speed	Factory specification	197 to 441 kPa 2.00 to 4.50 kgf/cm^2 28.5 to 64.0 psi
		Allowable limit	147 kPa 1.50 kgf/cm^2 21.3 psi

(When reassembling

- After checking the engine oil pressure, tighten the engine oil pressure switch to the specified torque.

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

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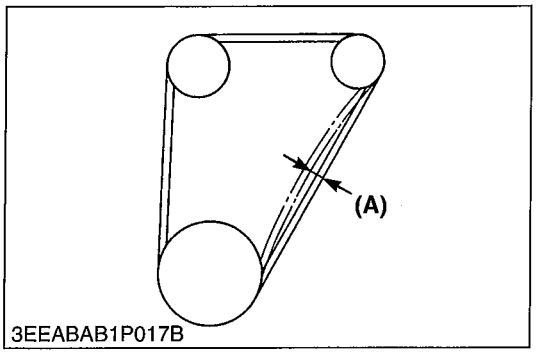
(3) Cooling System



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Fan Belt Tension

1. Measure the deflection **(A)**, depressing the belt halfway between the fan drive pulley and alternator pulley at specified force 98 N (10 kgf, 22 lbf).
2. If the measurement is not within the factory specifications, loosen the alternator mounting screws and relocate the alternator to adjust.

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

(A) Deflection

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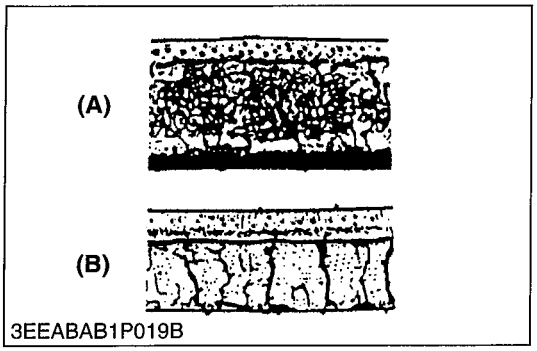

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Fan Belt Damage and Wear

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

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

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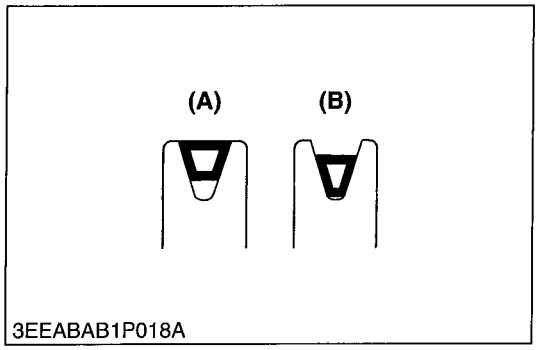

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⚠ CAUTION

- **When removing the radiator cap, wait at least ten minutes after the engine has stopped and cooled down. Otherwise, hot water may gush out, scalding nearby people.**

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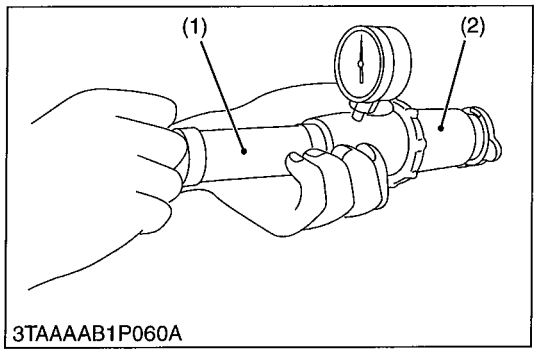

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Radiator Cap Air Leakage

1. Set a radiator tester (1) and an adaptor (2) on the radiator cap.
2. Apply the specified pressure 88 kPa (0.90 kgf/cm^2, 13 psi), and measure the time for the pressure to fall to 59 kPa (0.60 kgf/cm^2, 8.5 psi).
3. If the measurement is less than the factory specification, replace the radiator cap.

Pressure falling time	Factory specification	More than 10 seconds for pressure fall 88 → 59 kPa (0.90 → 0.60 kgf/cm^2, 13 → 8.5 psi)

(1) Radiator Tester (2) Adaptor

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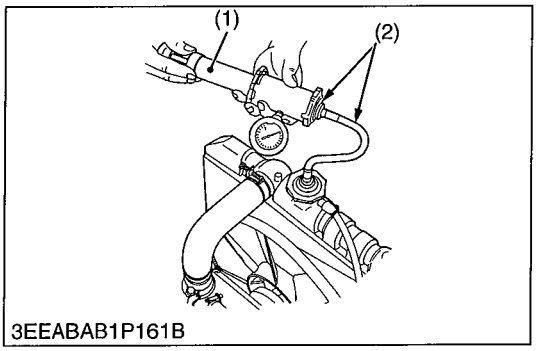

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Radiator Water Leakage

1. Pour a specified amount of water into the radiator.
2. Set a radiator tester (1) and an adaptor (2) and raise the water pressure to the specified pressure.
3. Check the radiator for water leaks.
4. For water leak from the pinhole, repair with the radiator cement. When water leak is excessive, replace the radiator.

Radiator water leakage test pressure	Factory specification	No leak at specified pressure

■ **NOTE**

- **The pressure of the leak test is different from each radiator specification.**
  Thus, do the leak test, refer to the test pressure of each radiator specification.

(1) Radiator Tester (2) Adaptor

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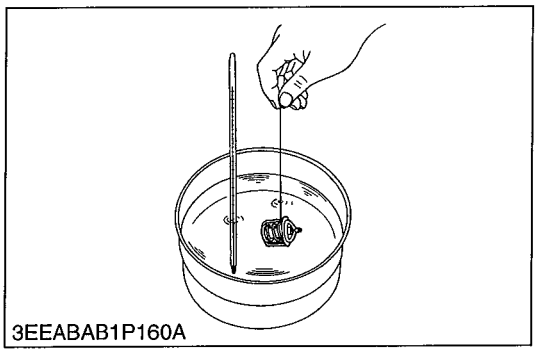
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Thermostat Valve Opening Temperature

1. Suspend the thermostat in the water by a string with its end inserted between the valve and seat.
2. Heating the water gradually, read the temperature when the valve opens and leaves the string.
3. Continue heating and read the temperature when the valve opens approx. 8 mm (0.3 in.).
4. If the measurement is not within the factory specifications, replace the thermostat.

Thermostat's valve opening temperature	Factory specification	69.5 to 72.5 °C 157.1 to 162.5 °F
Temperature at which thermostat completely opens	Factory specification	85 °C 185 °F

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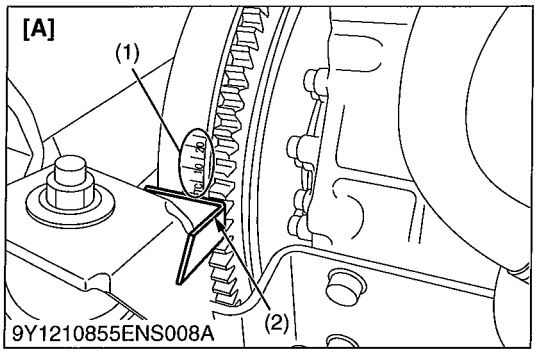
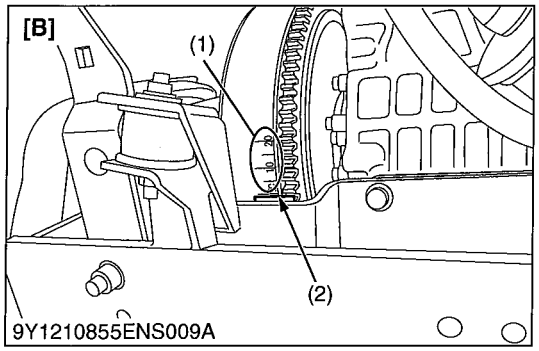
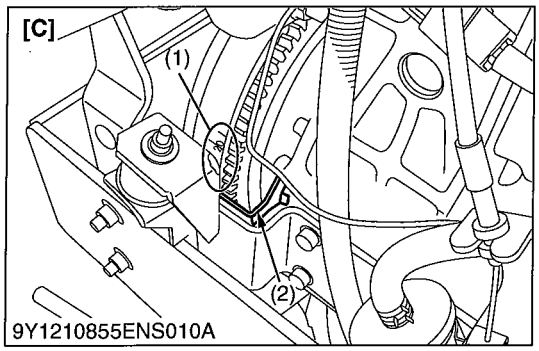
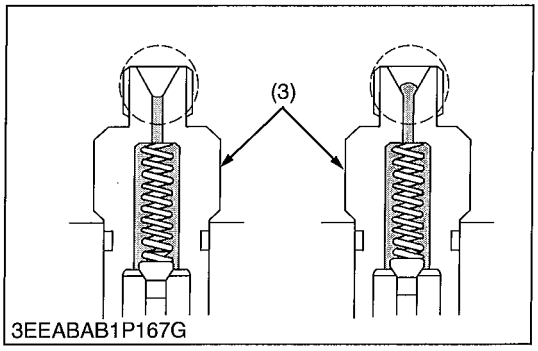
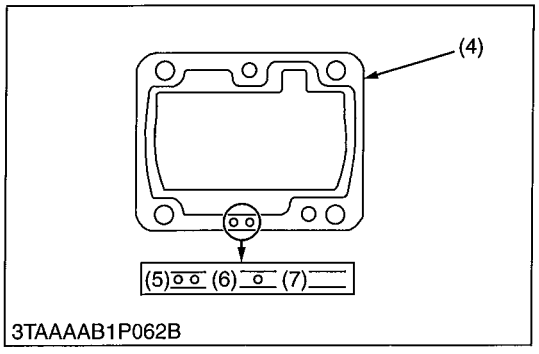
(4) Fuel System











Injection Timing

1. Remove the injection pipes.
2. Remove the engine stop solenoid.
3. Turn the flywheel counterclockwise (viewed from flywheel side) until the fuel fills up to the hole of the delivery valve holder (3) for No. 1 cylinder.
4. After the fuel fills up to the hole of the delivery valve holder for No. 1 cylinder, turn back (clockwise) the flywheel around 1.6 rad (90 °).
5. Turn the flywheel counterclockwise to set at around 0.44 rad (25 °) before T.D.C..
6. Slowly turn the flywheel counterclockwise and stop turning when the fuel begins to come up, to get the present injection timing.
7. Check to see the degree on flywheel.
   The flywheel has mark **"1TC"**, **"10"** and **"20"** for the crank angle before the top dead center of No. 1 cylinder.
8. If injection timing is out of adjustment, readjust the timing with shims.

[BX1870D (D722-E4)]

Injection timing	Factory specification	0.3186 to 0.3447 rad (18.25 to 19.75 °) before T.D.C.

[BX2370D (D902-E4) and BX2670D (D1005-E4)]

Injection timing	Factory specification	0.3360 to 0.3621 rad (19.25 to 20.75 °) before T.D.C.

■ **NOTE**

- **The liquid gasket is not required for assembling.**
- **Shims are available in thickness of 0.20 mm (0.0079 in.), 0.25 mm (0.0098 in.), 0.30 mm (0.012 in.) and 0.175 mm (0.00689 in.). Combine these shims for adjustments.**
- **Addition or reduction of shim (0.05 mm, 0.002 in.) delays or advances the injection timing by approx. 0.009 rad (0.5 °).**
- **In disassembling and replacing the injection pump, be sure to use the same number of new shims with the same thickness.**
- **The 0.175 mm thick shim is coated only on the lower face. Therefore, do not use the 0.175 mm thick shim as the top shim of the combination (injection pump side), because this can cause oil leakage.**

(1) **"1TC" and "Timing Line"**
(2) Alignment Mark
(3) Delivery Valve Holder
(4) Shim (Soft Metal Gasket Shim)
(5) Two-holes: 0.20 mm (0.0079 in.)
Two-holes: 0.175 mm (0.00689 in.)
(6) One-hole: 0.25 mm (0.0098 in.)
(7) Without Hole: 0.30 mm (0.012 in.)

[A] BX1870D (D722-E4)
[B] BX2370D (D902-E4)
[C] BX2670D (D1005-E4)

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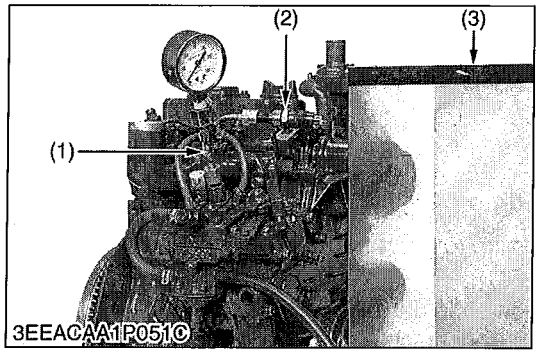

Fuel Tightness of Pump Element

1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Install the injection pump pressure tester to the injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1). (Refer to the photo.)
5. Set the speed control lever to the maximum speed position.
6. Run the starter to increase the pressure.
7. If the pressure can not reach the allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

Fuel tightness of pump element	Allowable limit	13.73 MPa 140.0 kgf/cm^2 1991 psi

■ **NOTE**

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Pump Pressure Tester (3) Protection Cover for Jetted Fuel
(2) Injection Nozzle

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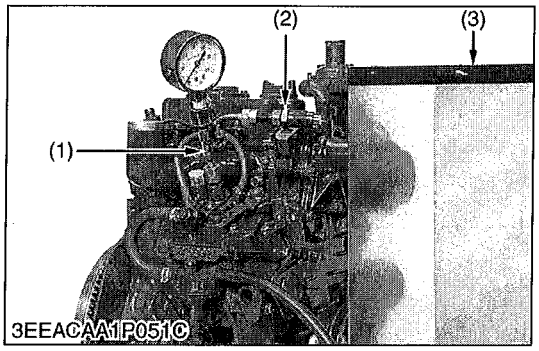

Fuel Tightness of Delivery Valve

1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Set a pressure tester to the fuel injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1).
5. Run the starter to increase the pressure.
6. Stop the starter when the fuel jets from the injection nozzle. After that, turn the flywheel by the hand and raise the pressure to approx. 13.73 MPa (140.0 kgf/cm^2, 1991 psi).
7. Now turn the flywheel back about half a turn (to keep the plunger free). Keep the flywheel at this position and clock the time taken for the pressure to drop from 13.73 to 12.75 MPa (from 140.0 to 130.0 kgf/cm^2, from 1991 to 1849 psi).
8. Measure the time needed to decrease the pressure from 13.73 to 12.75 MPa (140.0 to 130.0 kgf/cm^2, 1991 to 1849 psi).
9. If the measurement is less than allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

Fuel tightness of delivery valve	Factory specification	10 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1991 → 1849 psi
	Allowable limit	5 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1991 → 1849 psi

■ **NOTE**

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Pump Pressure Tester (3) Protection Cover for Jetted Fuel
(2) Injection Nozzle

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CAUTION

- **Check the nozzle injection pressure and condition after you make sure that there is nobody standing in the direction the fume goes. If the fume from the nozzle directly contacts the human body, cells may be destroyed and blood poisoning may be caused.**

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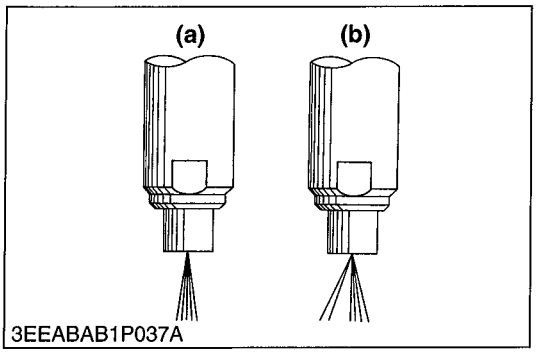

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Nozzle Spraying Condition

1. Set the injection nozzle to a nozzle tester, and check the nozzle spraying condition.
2. If the spraying condition is damaged, replace the nozzle piece.

(a) Good **(b) Bad**

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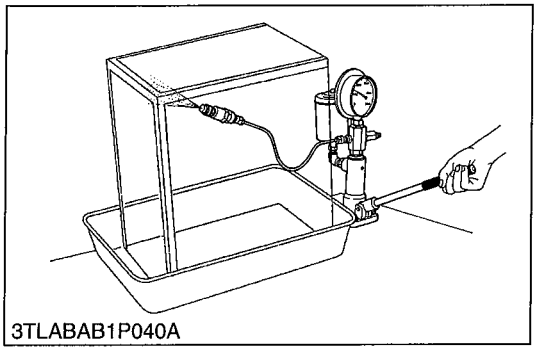
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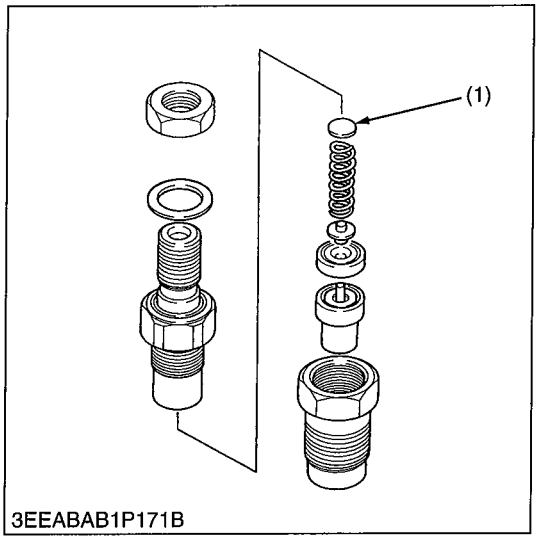
Fuel Injection Pressure

1. Set the injection nozzle to a nozzle tester.
2. Slowly move the tester handle to measure the pressure at which fuel begins jetting out from the nozzle.
3. If the measurement is not within the factory specifications, replace the adjusting washer (1) in the nozzle holder to adjust it.

(Reference)

- Pressure variation with 0.01 mm (0.0004 in.) difference of adjusting washer thickness.
  Approx. 235 kPa (2.4 kgf/cm^2, 34 psi)

Fuel injection pressure	Factory specification	13.73 to 14.70 MPa 140.0 to 150.0 kgf/cm^2 1992 to 2133 psi



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(1) Adjusting Washer

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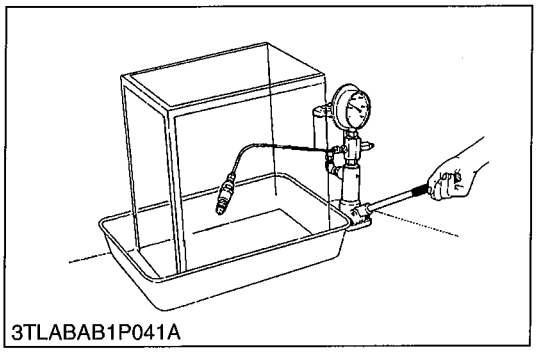
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Valve Seat Tightness

1. Set the injection nozzle to a nozzle tester.
2. Raise the fuel pressure, and keep at 12.75 MPa (130.0 kgf/cm^2, 1849 psi) for 10 seconds.
3. If any fuel leak is found, replace the nozzle piece.

Valve seat tightness	Factory specification	No fuel leak at 12.75 MPa 130.0 kgf/cm^2 1849 psi

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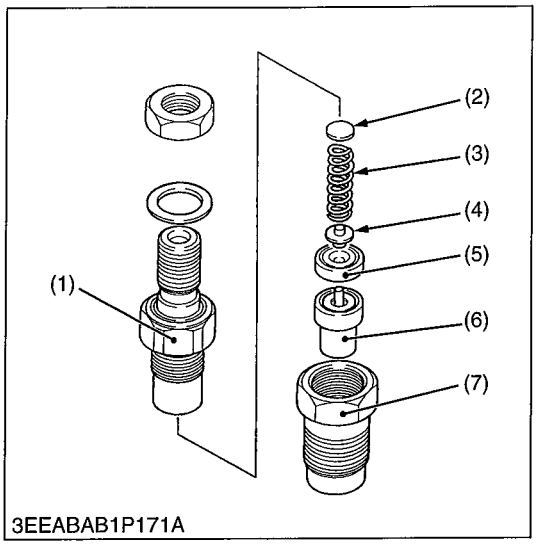

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Nozzle Holder

1. Secure the nozzle retaining nut (7) with a vise.
2. Remove the nozzle holder (1), and remove parts inside.

(When reassembling)

- Assemble the nozzle in clean fuel oil.
- Install the push rod (4), noting its direction.
- After assembling the nozzle, be sure to adjust the fuel injection pressure.

Tightening torque	Nozzle holder	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Overflow pipe retaining nut	20 to 24 N·m 2.0 to 2.5 kgf·m 15 to 18 lbf·ft
	Nozzle holder assembly	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

(1) Nozzle Holder
(2) Adjusting Washer
(3) Nozzle Spring
(4) Push Rod
(5) Distance Piece
(6) Nozzle Piece
(7) Nozzle Retaining Nut

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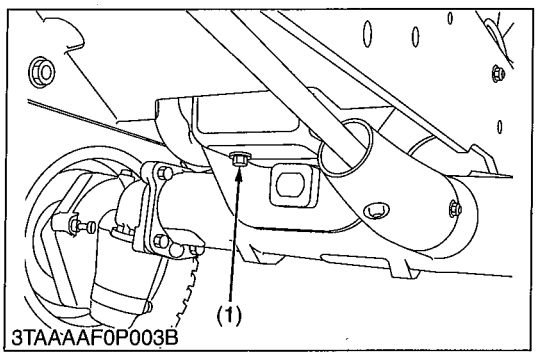
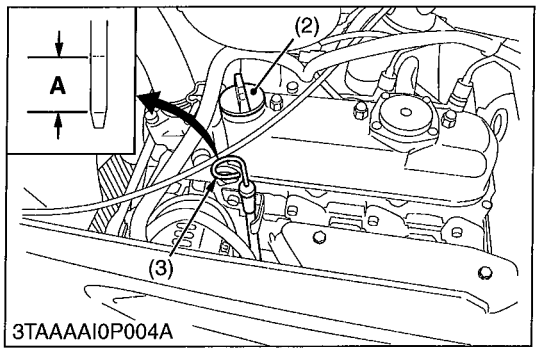
[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Engine





Draining Engine Oil

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. Remove the drain plug (1) to drain oil.
4. After draining, screw in the drain plug (1).

(When refilling)

- Fill the engine oil up to the upper line on the dipstick (3).

■ **IMPORTANT**

- **Never mix two different type of oil.**
- **Use the proper SAE Engine Oil according to ambient temperature.**
  Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-9.

Engine oil	Capacity	BX1870D (D722-E4)	2.9 L 3.1 U.S.qts 2.6 Imp.qts
		BX2370D (D902-E4)	3.1 L 3.3 U.S.qts 2.7 Imp.qts
		BX2670D (D1005-E4)	3.5 L 3.7 U.S.qts 3.1 Imp.qts

Tightening torque	Drainer plug with copper gasket (M12, 1.25)	33 to 37 N·m 3.3 to 3.8 kgf·m 24 to 27 lbf·ft

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

A: Oil level is acceptable within this range.

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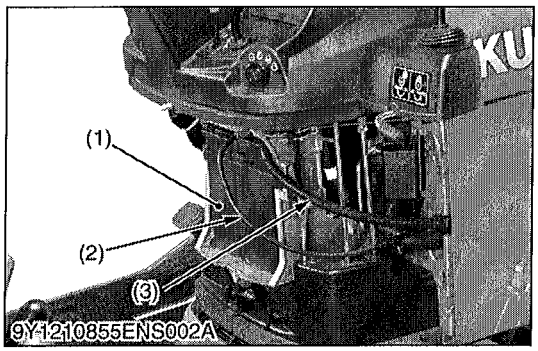

Battery Cables and Battery

⚠ CAUTION

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

1. Remove the under panel.
2. Disconnect the negative cable (2) from the battery (1).
3. Disconnect the positive cable (3) from the battery (1) and remove the battery (1).

(1) Battery
(2) Negative Cable
(3) Positive Cable

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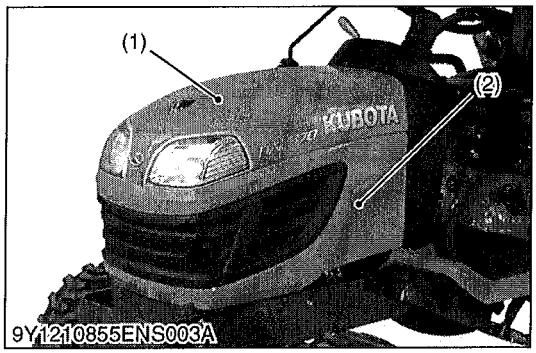

Bonnet and Under Cover

1. Open the bonnet (1), and then loosen the knob bolts (5) and pull forward to remove the under cover (2).
2. Disconnect the connectors (3) for head light and remove the bonnet bracket (4) with bonnet.

(1) Bonnet
(2) Under Cover
(3) Connector
(4) Bonnet Bracket
(5) Knob Bolt

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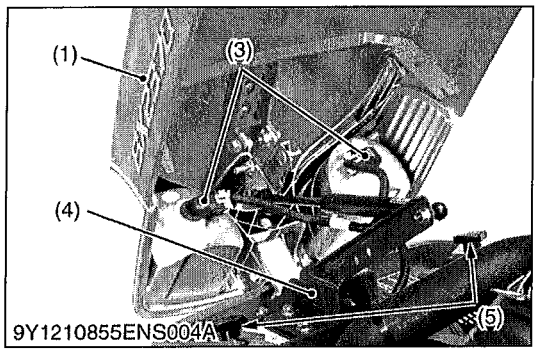

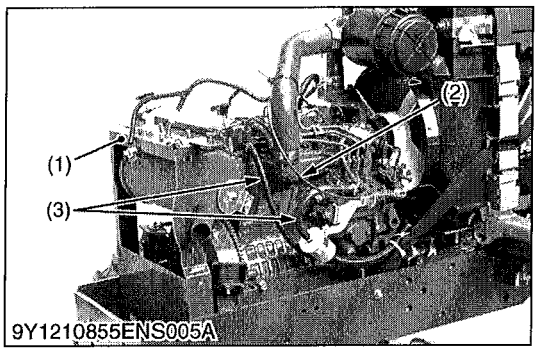

Accelerator Wire, Bonnet Post, Fuel Hoses, Wiring Harness and Others

1. Disconnect the wiring harness (4) from coolant temperature switch, stop solenoid, glow plug, starter motor, engine oil switch, alternator and ground cable.
2. Disconnect the accelerator wire (2) and fuel hoses (3).
3. Remove the bonnet post (1).

(1) Bonnet Post
(2) Accelerator Wire
(3) Fuel Hose
(4) Wiring Harness

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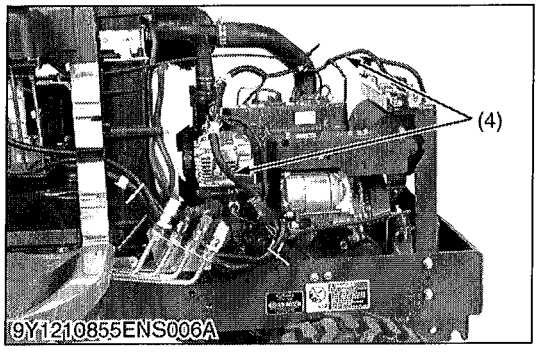

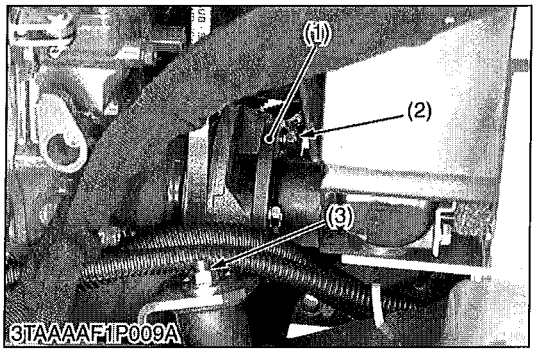

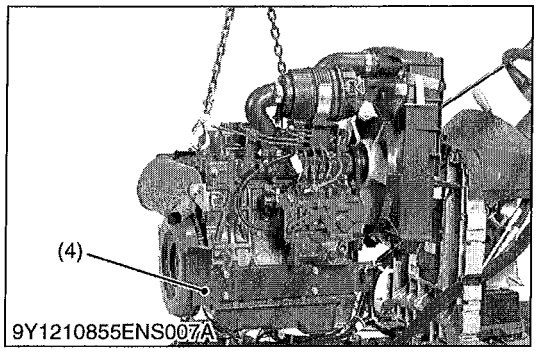

Separating Engine from Front Axle

1. Disconnect the ground cable.
2. Disconnect the front coupling (1).
3. Remove the engine mounting nuts (3).
4. Remove the engine support (4).
5. Hook the engine and separate the engine assembly with the radiator from the frame.

(When reassembling)

Tightening torque	Front coupling mounting bolt	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Engine mounting nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Cushion mounting nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Engine support mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Front Coupling
(2) Front Coupling Mounting Bolt
(3) Engine Mounting Nut
(4) Engine Support

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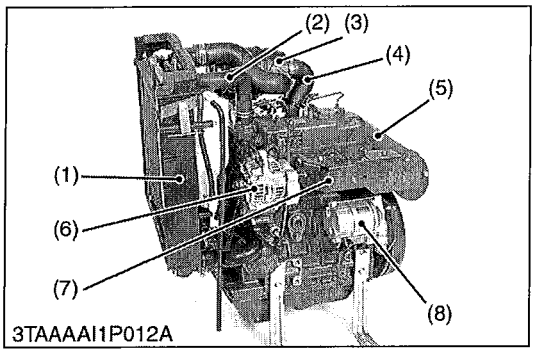
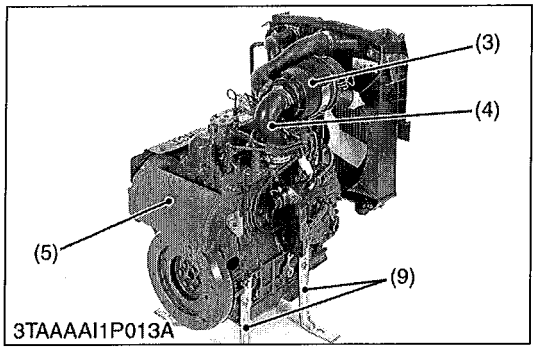
(2) Removing Outer Parts





Draining Coolant, Radiator, Air Cleaner and Muffler etc.

⚠ CAUTION

- **Never open the radiator cap while operating or immediately after stopping. Otherwise, hot water will spout out from the radiator. Wait for more than ten minutes to cool the radiator, before opening the cap.**

1. Set the engine stands (9) to the crankcase.
2. Open the radiator drain plug, and remove radiator cap to completely drain the coolant.
3. After all coolant is drained, close the drain plug.
4. Loosen the inlet hose band and the radiator hose bands, and remove the radiator (1) with the radiator hoses (2) and the air cleaner (3).
5. Loosen the fan belt. Remove the alternator (6), the starter motor (8), the fan and the fan belt.
6. Remove the heat proof cover (7), the muffler (5) and the exhaust manifold.

Coolant with recovery tank	Capacity	BX1870D (D722-E4)	2.5 L 2.6 U.S.qts 2.2 Imp.qts
		BX2370D (D902-E4)	2.7 L 2.8 U.S.qts 2.4 Imp.qts
		BX2670D (D1005-E4)	3.3 L 3.5 U.S.qts 2.9 Imp.qts

(1) Radiator
(2) Radiator Hose
(3) Air Cleaner
(4) Inlet Hose
(5) Muffler
(6) Alternator
(7) Heat Proof Cover
(8) Starter Motor
(9) Engine Stand

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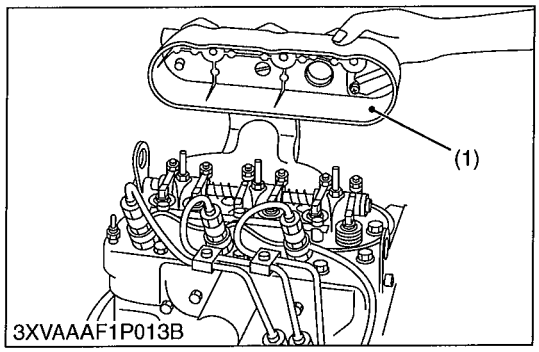
(3) Cylinder Head and Valves



Cylinder Head Cover

1. Disconnect the breather hose.
2. Remove the cylinder head cover nuts.
3. Remove the cylinder head cover (1).

(When reassembling)

- Check to see if the cylinder head cover gasket is not damaged.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tightening torque	Cylinder head cover screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft

[BX2670D (D1005-E4)]

Tightening torque	Cylinder head cover screw	7 to 8 N·m 0.7 to 0.9 kgf·m 5 to 6 lbf·ft

(1) Cylinder Head Cover

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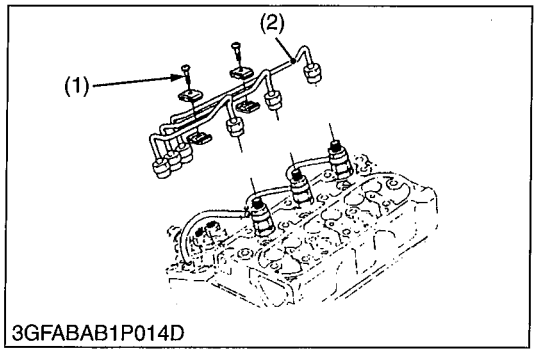

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Injection Pipes

1. Loosen the screws to the pipe clamp (1).
2. Remove the injection pipes (2).

(When reassembling)

- Send compressed air into the pipes to blow out dust. Then, reassemble the pipes in the reverse order.

Tightening torque	Injection pipe retaining nut	25 to 34 N·m 2.5 to 3.5 kgf·m 18 to 25 lbf·ft

(1) Pipe Clamp
(2) Injection Pipe

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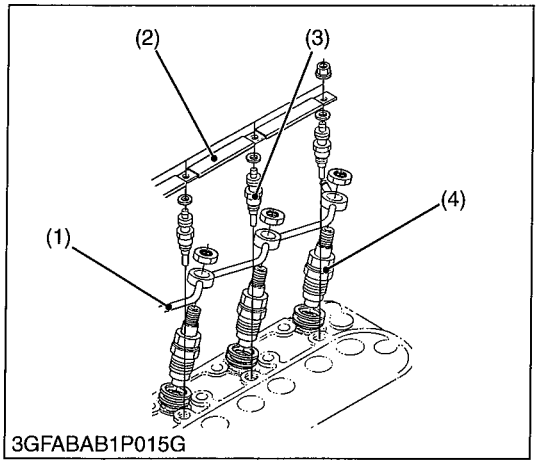

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Nozzle Holder Assembly and Glow Plug

1. Remove the overflow pipe (1).
2. Remove the nozzle holder assemblies (4).
3. Remove the copper gasket (5) and heat seal (6).
4. Remove the lead (2) from the glow plugs (3).
5. Remove the glow plugs (3).

(When reassembling)

- Replace the copper gasket and heat seal with new one.

Tightening torque	Overflow pipe retaining nut	20 to 24 N·m 2.0 to 2.5 kgf·m 15 to 18 lbf·ft
	Nozzle holder assembly	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Glow plug	7.9 to 14 N·m 0.80 to 1.5 kgf·m 5.8 to 10 lbf·ft

(1) Overflow Pipe
(2) Lead
(3) Glow Plug
(4) Nozzle Holder Assembly
(5) Copper Gasket
(6) Heat Seal

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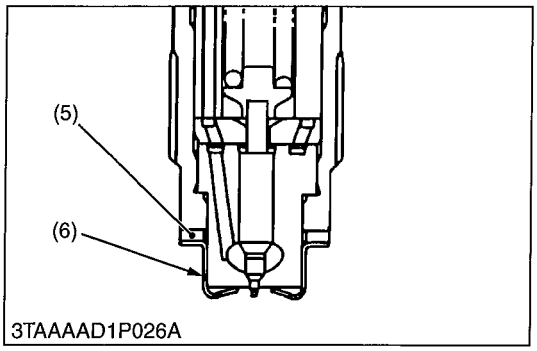

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Nozzle Heat Seal Removal Procedure

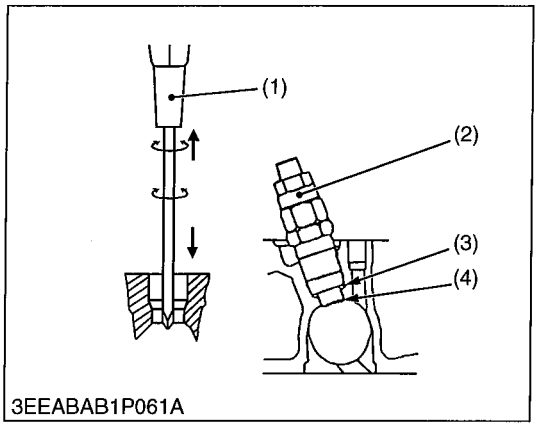
■ **IMPORTANT**

- **Use a plus (phillips head) screw driver (1) that has a diameter which is bigger than the heat seal hole (Approx. 6 mm (1/4 in.)).**

1. Drive screw driver (1) lightly into the heat seal hole.
2. Turn screw driver three or four times each way.
3. While turning the screw driver, slowly pull the heat seal (4) out together with the injection nozzle gasket (3).
4. If the heat seal drops, repeat the above procedure.

(When reassembling)

- Heat seal and injection nozzle gasket must be changed when the injection nozzle is removed for cleaning or for service.



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(1) Plus Screw Driver
(2) Injection Nozzle
(3) Injection Nozzle Gasket
(4) Heat Seal

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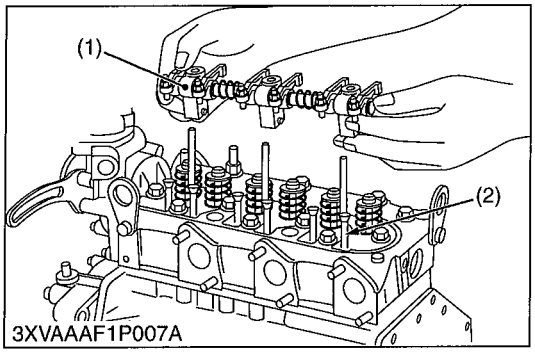

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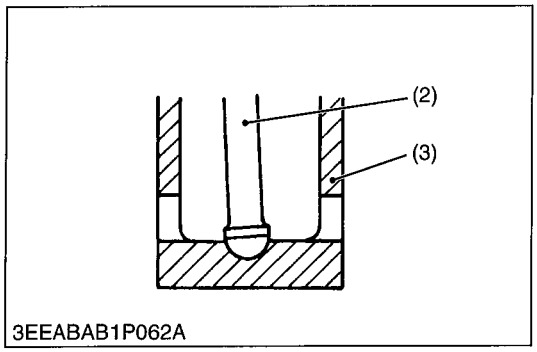

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Rocker Arm and Push Rod

1. Remove the rocker arm bracket screw. [BX1870D (D722-E4) and BX2370D (D902-E4)]
   Remove the rocker arm bracket nut. [BX2670D (D1005-E4)]
2. Remove the rocker arm assembly (1).
3. Remove the push rods (2).

(When reassembling)

- When refitting the push rods (2) into the tappets (3), make sure the push rod locates correctly into the tappet seat.

■ **IMPORTANT**

- **After installing the rocker arm, be sure to adjust the valve clearance.**

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tightening torque	Rocker arm bracket screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft

[BX2670D (D1005-E4)]

Tightening torque	Rocker arm bracket screw	22 to 26 N·m 2.2 to 2.7 kgf·m 16 to 19 lbf·ft

(1) Rocker Arm Assembly
(2) Push Rod
(3) Tappet

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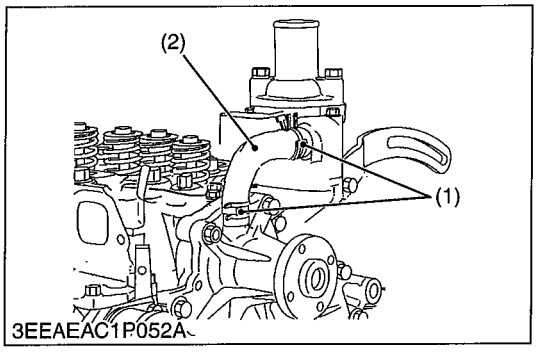

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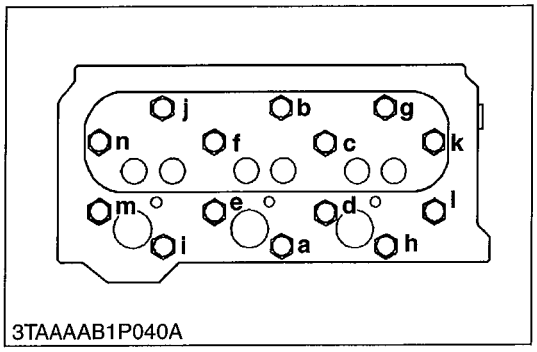

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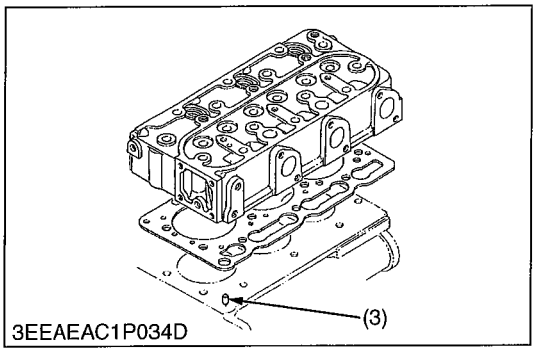

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Cylinder Head and Cylinder Head Gasket

1. Loosen the pipe clamps (1), and remove the water return pipe (2).
2. Remove the cylinder head screw in the order of **"n"** to **"a"** and remove the cylinder head.
3. Remove the cylinder head gasket.

(When reassembling)

- Replace the cylinder head gasket with new one.
- When mounting the gasket, set it to the pin pipe holes. Be careful not to mount it reversely.
- The cylinder head should be free of scratches and dust.
- Install the cylinder head, using care not to damage the gasket.
- After applying engine oil to the thread of screws, tighten them in several steps and specified sequence **"a"** to **"n"**.

■ **NOTE**

- **Do not use O-ring on the pin pipe.**
- **It is not necessary to retighten the cylinder head screw and to readjust valve clearance after engine warmed up.**

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tightening torque	Cylinder head screw	38 to 42 N·m 3.8 to 4.3 kgf·m 28 to 31 lbf·ft

[BX2670D (D1005-E4)]

Tightening torque	Cylinder head screw	64 to 68 N·m 6.5 to 7.0 kgf·m 47 to 50 lbf·ft

(1) Clamp
(2) Return Pipe
(3) Pin Pipe

n to a: To Loosen
a to n: To Tighten

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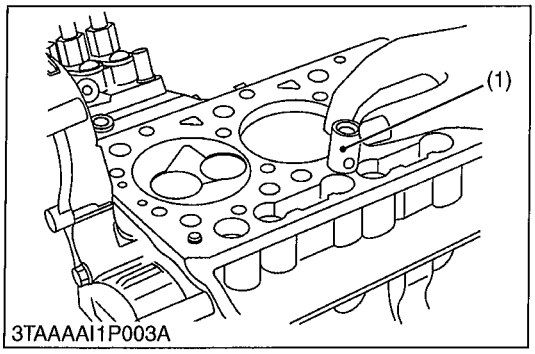

Tappets

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

(When reassembling)

- Visually check the contact between tappets and cams for proper rotation. If problem is found, replace tappets.
- Before installing the tappets, apply engine oil thinly around them.

■ IMPORTANT

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

(1) Tappet

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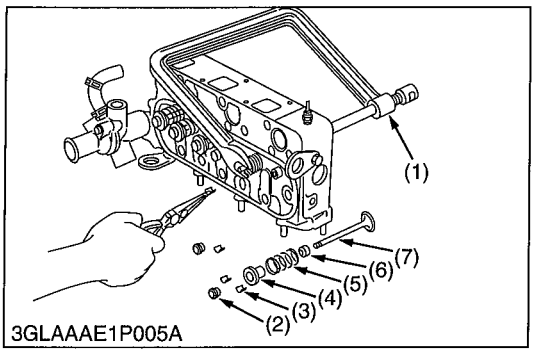

Valves

1. Remove the valve caps (2).
2. Remove the valve spring collet (3), pushing the valve spring retainer (4) by valve spring replacer (1).
3. Remove the valve spring retainer (4), valve spring (5) and valve stem seal (6).
4. Remove the valve (7).

(When reassembling)

- Wash the valve stem and valve guide hole, and apply engine oil sufficiently.
- After installing the valve spring collets, lightly tap the stem to assure proper fit with a plastic hammer.

■ IMPORTANT

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

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

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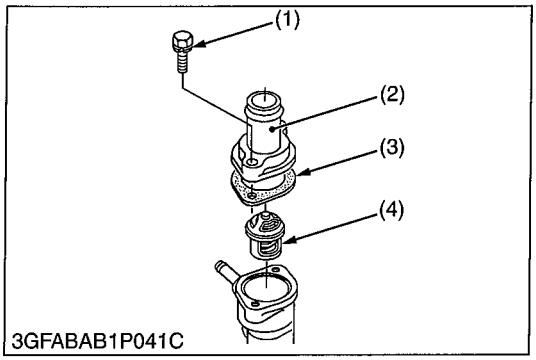

Thermostat Assembly

1. Remove the thermostat cover mounting screws (1), and remove the thermostat cover (2).
2. Remove the thermostat assembly (4).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) only at the thermostat cover side of the gasket (3).

(1) Thermostat Cover Mounting Screw
(2) Thermostat Cover
(3) Thermostat Cover Gasket
(4) Thermostat Assembly

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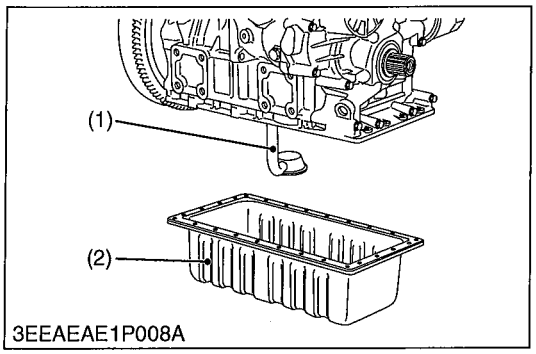
(4) Gear Case and Timing Gears



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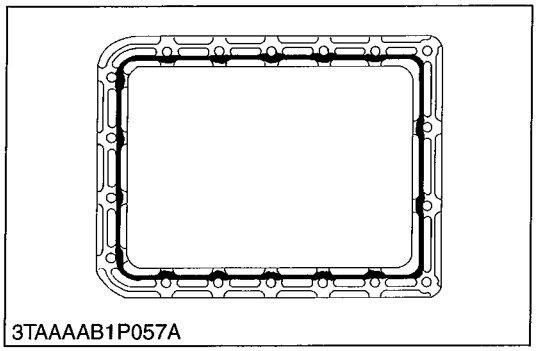
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Oil Pan and Oil Strainer

1. Remove the oil pan mounting screws.
2. Remove the oil pan (2).
3. Remove the oil strainer (1).

(When reassembling)

- After cleaning the oil strainer, check to see that the filter mesh in clean, and install it.
- Visually check the O-ring, apply engine oil, and install it.
- Securely fit the O-ring to the oil strainer.
- To avoid uneven tightening, tighten oil pan mounting screws in diagonal order form the center.

■ **IMPORTANT**

- **Scrape off the old adhesive completely. Wipe the sealing surface clean using waste cloth soaked with gasoline. Now apply new adhesive 3.0 to 5.0 mm (0.12 to 0.19 in.) thick all over the contact surface. Apply the adhesive also on the center of the flange as well as on the inner wall of each screw hole.**
- **Cut the nozzle of the "liquid gasket" container at its second notch. Apply "liquid gasket" about 5.0 mm (0.19 in.) thick. Within 20 minutes after the application of fluid sealant, reassemble the components. Wait then for about 30 minutes, and pour oil in the crankcase.**

(1) Oil Strainer (2) Oil Pan

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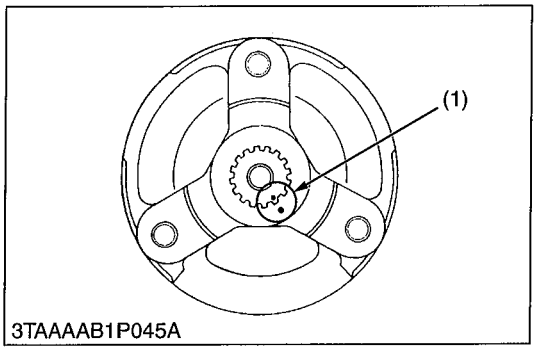

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Fan Drive Pulley

1. Secure the flywheel to keep it from turning.
2. Remove the fan drive pulley screw.
3. Draw out the fan drive pulley with a puller.

(When reassembling)

- Install the pulley to crankshaft, aligning the mark (1) on them (3-cylinder engine).
- Apply engine oil to the fan drive pulley retaining screw. And tighten it.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tightening torque	Fan drive pulley screw	118 to 127 N·m 12.0 to 13.0 kgf·m 86.8 to 94.0 lbf·ft

[BX2670D (D1005-E4)]

Tightening torque	Fan drive pulley screw	236 to 245 N·m 24.0 to 25.0 kgf·m 174 to 180 lbf·ft

(1) Aligning Mark

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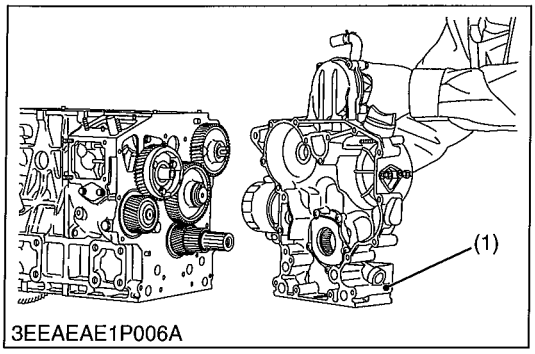

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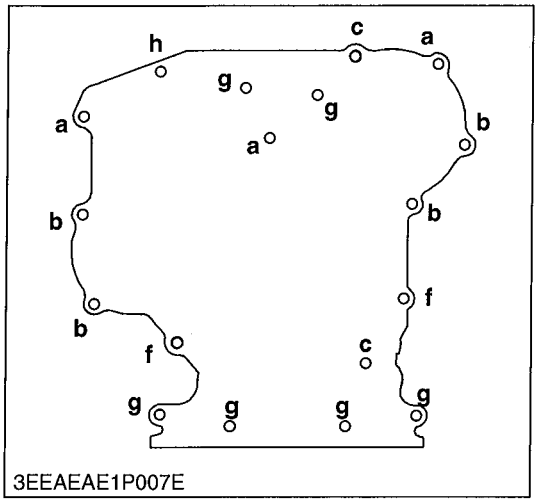

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Gear Case

1. Remove the fuel feed pump.
2. Remove the gear case.

(When reassembling)

- Grease thinly to the oil seal, and install it, ensuring the lip does not come off.

(1) Gear Case

a: Bolt Length = 45 mm (1.8 in.)
b: Bolt Length = 50 mm (2.0 in.)
c: Bolt Length = 55 mm (2.2 in.)
d: Bolt Length = 65 mm (2.6 in.)
e: Bolt Length = 68 mm (2.7 in.)
f: Bolt Length = 70 mm (2.8 in.)
g: Bolt Length = 85 mm (3.3 in.)
h: Nut

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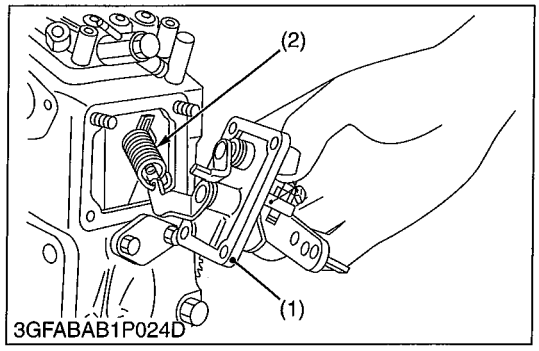

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Speed Control Plate

1. Remove the engine stop solenoid.
2. Remove the speed control plate (1).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to both sides of the solenoid cover gasket and control plate gasket.
- Be careful not to drop the governor spring (2) into the crankcase.

(1) Speed Control Plate (2) Governor Spring

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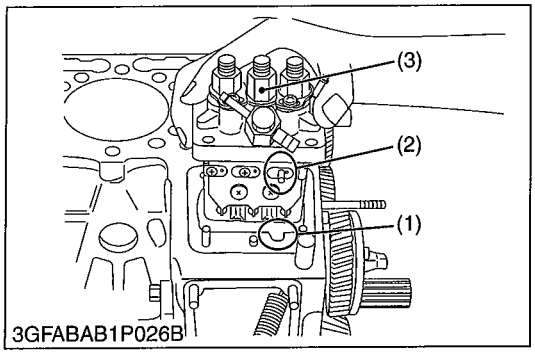

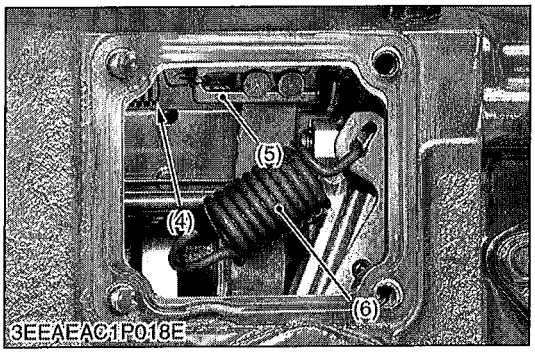

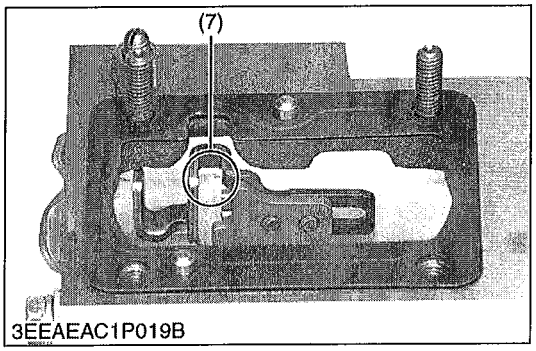

Injection Pump

1. Disconnect the start spring (4) on the thrust lever side (5).
2. Align the control rack pin (2) with the notch (1) on the crankcase, and remove the injection pump (3).
3. Remove the injection pump shims.
4. In principle, the injection pump should not be disassembled.

(When reassembling)

- When installing the injection pump, insert the control rack pin (2) firmly into the groove (7) of the thrust lever of fork lever.

■ **NOTE**

- **Addition or reduction of shim (0.05 mm, 0.002 in.) delays or advances the injection timing by approx. 0.0087 rad (0.50 °).**
- **In disassembling and replacing, be sure to use the same number or new gasket shims with the same thickness.**

(1) Notch
(2) Control Rack Pin
(3) Injection Pump
(4) Start Spring
(5) Thrust Lever
(6) Governor Spring
(7) Groove

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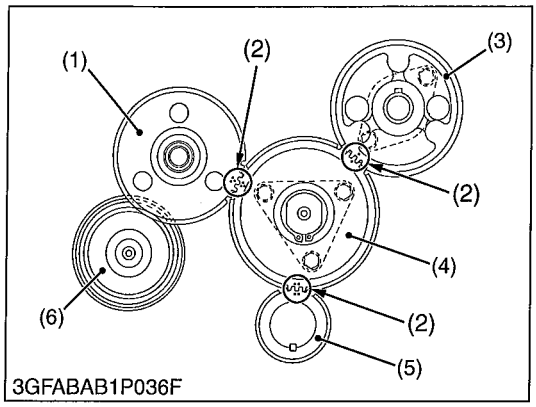

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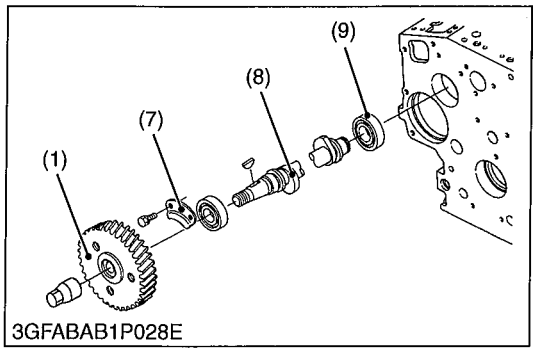

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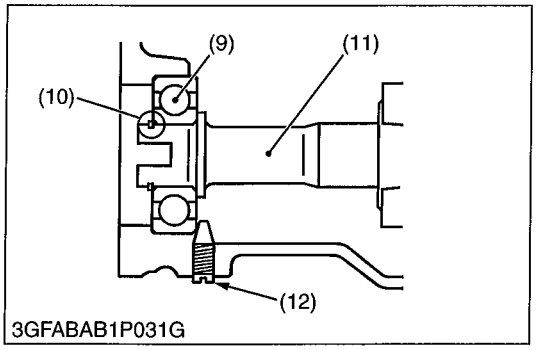

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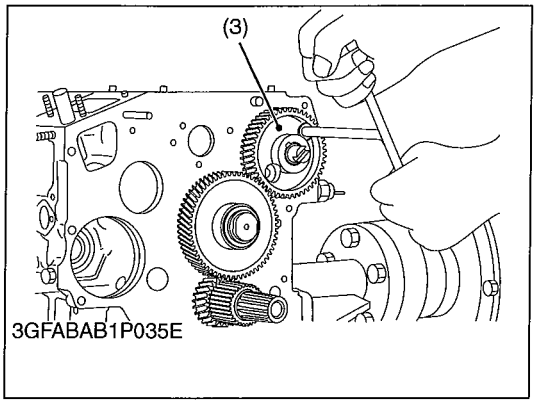

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Cam Gear, Idle Gear 1, 2 and Governor Gear

1. Remove the idle gear 1 (4).
2. Remove the fuel camshaft stopper (7).
3. Draw out the fuel cam gear (1) with fuel camshaft (8).
4. Remove the camshaft stopper bolt.
5. Remove the cam gear (3) with camshaft.
6. Remove the external snap ring (10) from the governor shaft (11).
7. Remove the governor gear (6) with governor shaft (11).

■ **NOTE**

- **Three-lever type fork lever**
  To remove the governor shaft, follow the procedures in 5, 6 above and never remove fork lever and the max torque limiter.

(When reassembling)

- Apply engine oil thinly to the fuel camshaft before installation.
- Make sure to assemble the external snap ring of the governor shaft.
- Check the governor shaft for smooth rotation.

■ **IMPORTANT**

- **When replacing the ball bearing of governor shaft, securely fit the ball bearing (9) to the crankcase, apply an adhesive (Three Bond 1324B or equivalent) to the set screw (12), and fasten the screw until its tapered part contacts the circumferential end of the ball bearing.**
- **When installing the idle gear, be sure to align the alignment marks (2) on each gears.**

(1) Fuel Cam Gear
(2) Alignment Mark
(3) Cam Gear
(4) Idle Gear 1
(5) Crank Gear
(6) Governor Gear
(7) Fuel Camshaft Stopper
(8) Fuel Camshaft
(9) Ball Bearing
(10) External Snap Ring
(11) Governor Shaft
(12) Set Screw

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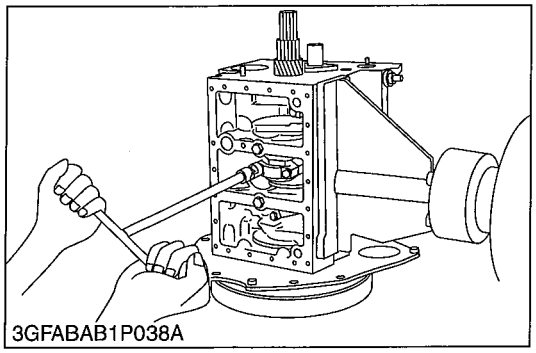
(5) Piston and Connecting Rod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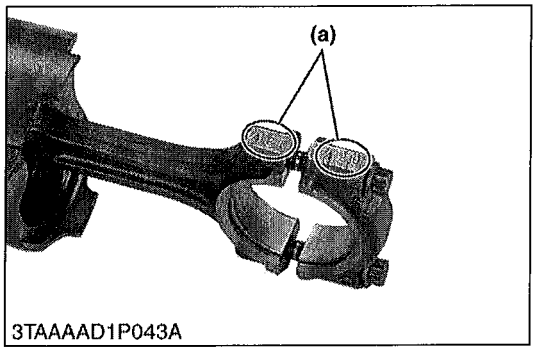

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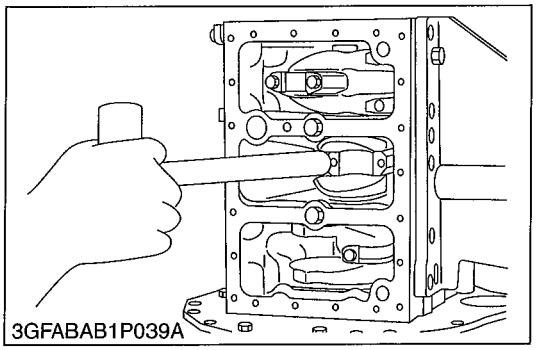
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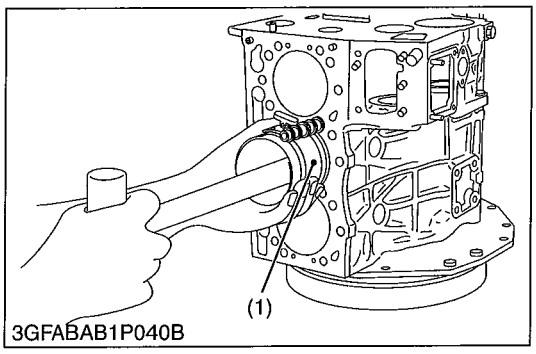

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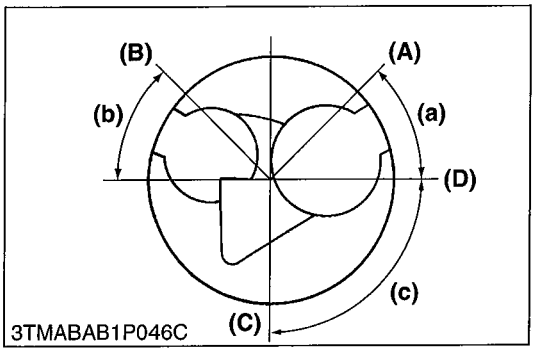

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Connecting Rod

1. Remove the connecting rod cap.

(When reassembling)

- Align the marks **(a)** with each other. (Face the marks toward the injection pump.)
- Apply engine oil to the connecting rod screws and lightly screw it in by hand, then tighten it to the specified torque.
  If the connecting rod screw won't be screwed in smoothly, clean the threads.
  If the connecting rod screw is still hard to screw in, replace it.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tightening torque	Connecting rod screw	27 to 30 N·m 2.7 to 3.1 kgf·m 20 to 22 lbf·ft

[BX2670D (D1005-E4)]

Tightening torque	Connecting rod screw	42 to 46 N·m 4.2 to 4.7 kgf·m 31 to 33 lbf·ft

(a) Mark

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Pistons

1. Turn the flywheel and bring the piston to top dead center.
2. Draw out the piston upward by lightly tapping it from the bottom of the crankcase with the grip of a hammer.
3. Draw out the other piston in the same method as above.

(When reassembling)

- Before inserting the piston into the cylinder, apply enough engine oil to the piston.
- When inserting the piston into the cylinder, face the mark on the connecting rod to the injection pump.

■ **IMPORTANT**

- **Do not change the combination of cylinder and piston. Make sure of the position of each piston by marking. For example, mark "1" on the No.1 piston.**
- **When installing the piston into the cylinder, place the gaps of all the piston rings as shown in the figure.**
- **Carefully insert the pistons using a piston ring compressor (1). Otherwise, their chrome-plated section may be scratched, causing trouble inside the cylinder.**

(1) Piston Ring Compressor

(A) Top Ring Gap
(B) Second Ring Gap
(C) Oil Ring Gap
(D) Piston Pin Hole
(a) 0.79 rad (45 °)
(b) 0.79 rad (45 °)
(c) 1.6 rad (90 °)

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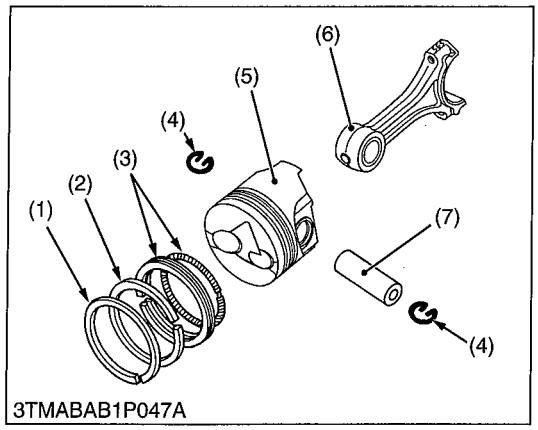

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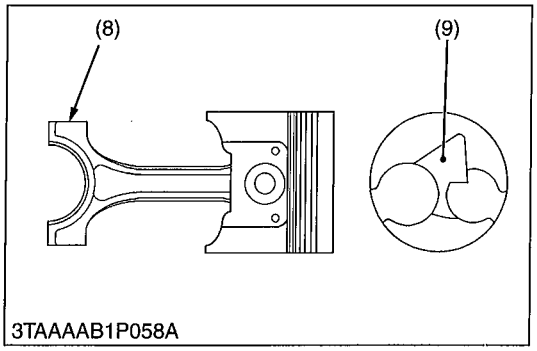

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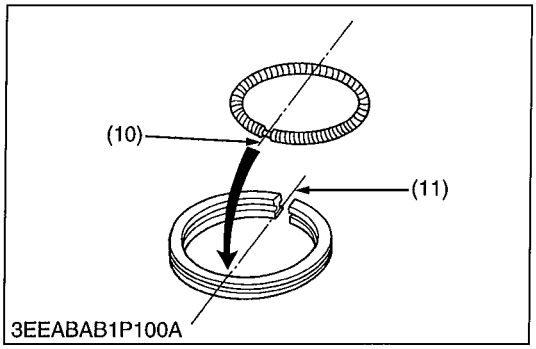

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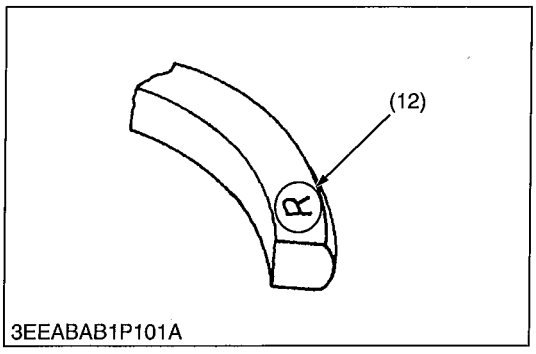

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Piston Ring and Connecting Rod

1. Remove the piston rings using a piston ring tool.
2. Remove the piston pin (7), and separate the connecting rod (6) from the piston (5).

(When reassembling)

- Install the rings so that the manufacturer's mark (12) near the gap faces the top of the piston.
- When installing the oil ring onto the piston, place the expander joint (10) on the opposite side of the oil ring gap (11).
- Apply engine oil to the piston pin.
- When installing the connecting rod to the piston, immerse the piston in 80 °C (176 °F) oil for 10 to 15 minutes and insert the piston pin to the piston.
- When installing the connecting rod to the piston, align the mark (8) on the connecting rod to the fan-shaped concave (9).

■ **NOTE**

- **Mark the same number on the connecting rod and the piston so as not to change the combination.**

(1) Top Ring
(2) Second Ring
(3) Oil Ring
(4) Piston Pin Snap Ring
(5) Piston
(6) Connecting Rod
(7) Piston Pin
(8) Mark
(9) Fan-shaped Concave
(10) Expander Joint
(11) Oil Ring Gap
(12) Manufacturer's Mark

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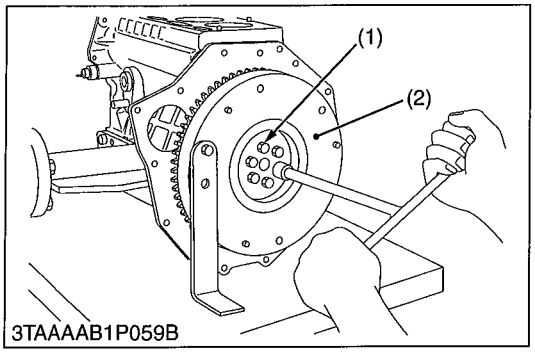
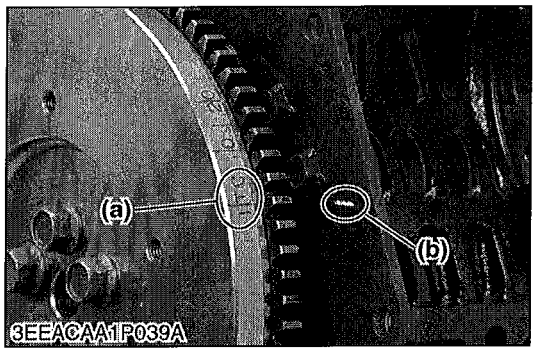
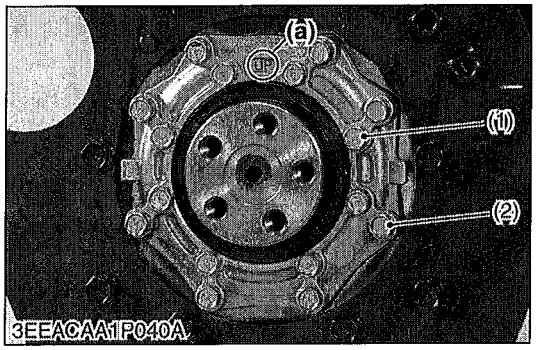
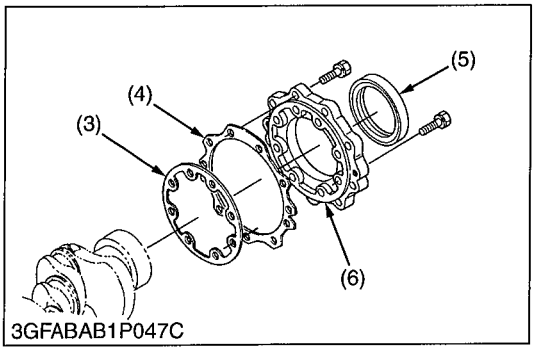
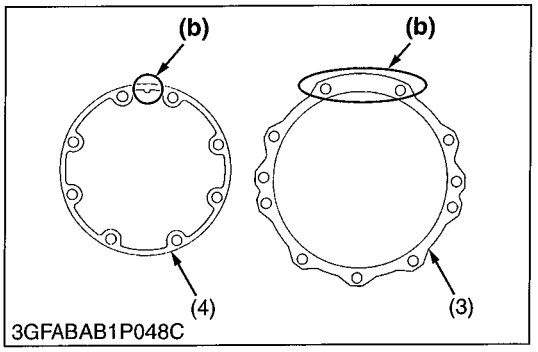
(6) Flywheel and Crankshaft











Flywheel

1. Secure the flywheel to keep it from turning, using a flywheel stopper.
2. Remove all flywheel screws (1) and then remove the flywheel (2).

(When reassembling)

- Align the **"1TC"** mark **(a)** on the outer surface of the flywheel horizontally with the alignment mark **(b)** on the rear end plate. Now fit the flywheel in position.
- Apply engine oil to the threads and the undercut surface of the flywheel screw and fit the screw.

Tightening torque	Flywheel screw	54 to 58 N·m 5.5 to 6.0 kgf·m 40 to 43 lbf·ft

(1) Flywheel Screw
(2) Flywheel
(a) 1TC Mark
(b) Alignment Mark

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Bearing Case Cover

1. Remove the bearing case cover mounting screws.
2. Remove the bearing case cover (6).

(When reassembling)

- Fit the bearing case gasket (3) and the bearing case cover gasket (4) with correct directions.
- Install the bearing case cover (6) to position the casting mark **"UP"** on it upward.
- Apply engine oil to the oil seal (5) lip and be careful that it is not rolled when installing.
- Tighten the bearing case cover mounting screws with even force on the diagonal line.

Tightening torque	Bearing case cover mounting screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft

(1) Bearing Case Cover Mounting Screw (Inside)
(2) Bearing Case Cover Mounting Screw (Outside)
(3) Bearing Case Gasket
(4) Bearing Case Cover Gasket
(5) Oil Seal
(6) Bearing Case Cover
(a) Top Mark "UP"
(b) Upside

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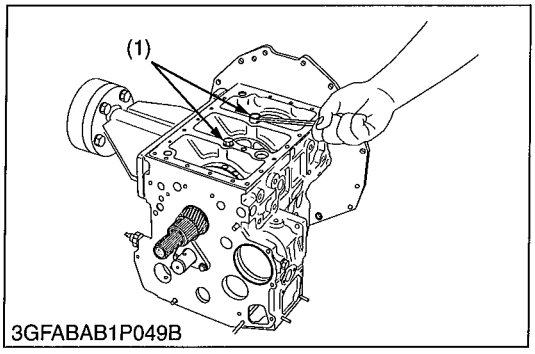

Crankshaft Assembly

1. Remove the main bearing case screw 2 (1).
2. Pull out the crankshaft assembly.

■ **IMPORTANT**

- **Be careful to protect crankshaft bearing 1 from scratches, caused by the crank gear, etc.. (Wrap the gear in vinyl tape, etc..)**

(When reassembling)

- Clean the oil passage of the crankshaft with compressed air.
- Apply oil to the main bearing case screw 2 (1).
- Install the crankshaft assembly, aligning the screw hole of main bearing case with the screw hole of crankcase.
- Clean the oil passage of the crankshaft with compressed air.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tightening torque	Main bearing case screw 2	27 to 30 N·m 2.7 to 3.1 kgf·m 20 to 22 lbf·ft

[BX2670D (D1005-E4)]

Tightening torque	Main bearing case screw 2	49 to 53 N·m 5.0 to 5.5 kgf·m 37 to 39 lbf·ft

(1) Main Bearing Case Screw 2

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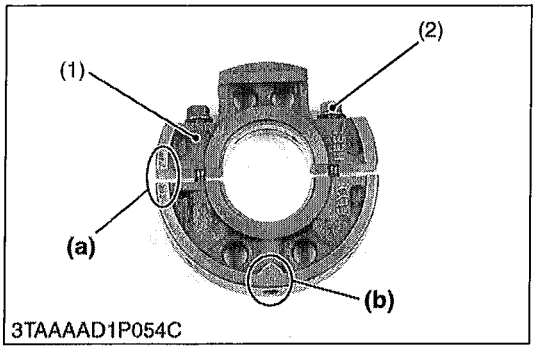

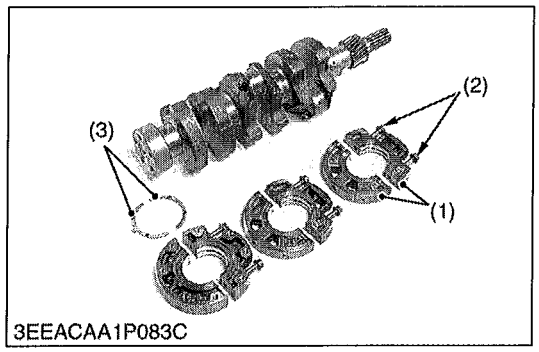

Main Bearing Case Assembly

1. Remove the two main bearing case screws 1 (2) of each main bearing cases.
2. Remove the main bearing case from crankshaft.

(When reassembling)

- Clean the oil passage in the main bearing cases.
- Apply clean engine oil on the bearings.
- Install the main bearing case assemblies in the original positions.
  Since diameters of main bearing cases vary, install them in order of makings **(b)** (**A**, **B**, **C**) from the gear case side.
- Match the alignment numbers **(a)** on the main bearing case assembly 1.
- When installing the main bearing case 1 and 2, face the mark **"FLYWHEEL"** to the flywheel.
- Install the thrust bearing (3) with its oil groove facing outward.
- Make sure that the main bearing case moves smoothly after tightening the main bearing case screw 1 to the specified torque.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tightening torque	Main bearing case screw 1	13 to 15 N·m 1.3 to 1.6 kgf·m 9.4 to 11 lbf·ft

[BX2670D (D1005-E4)]

Tightening torque	Main bearing case screw 1	30 to 34 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft

(1) Main Bearing Case Assembly 1
(2) Main Bearing Case Screw 1
(3) Thrust Bearing
(a) Alignment Number
(b) Marking (A, B, C)

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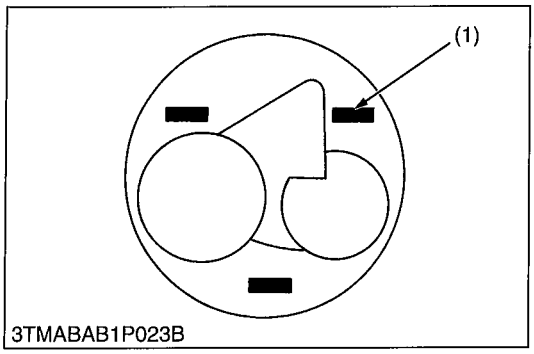
[3] SERVICING

(1) Cylinder Head and Valves



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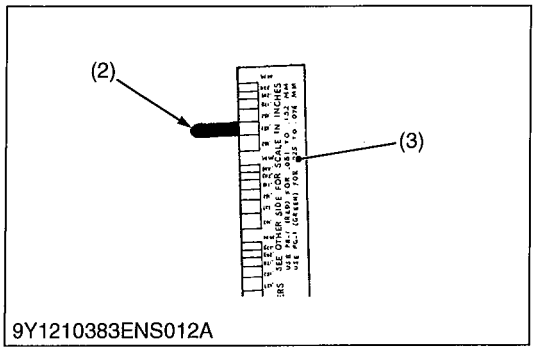

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Top Clearance

1. Remove the cylinder head.
2. With the piston at TDC, use grease to affix three or four plastigauges (1) of a diameter 1.5 mm (0.059 in.) × 5.0 to 7.0 mm (0.20 to 0.27 in.) long to the crown of the piston; keep the gauges away from the intake valve and combustion chamber fittings.
3. Take the piston to an intermediate position, install the cylinder head and tighten the head bolts 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.
6. If they are out of spec, check the oil clearance of the crank pin, journals and piston pins.

■ **NOTE**

- **Top clearance = Width of the crushed plastigauge (2).**

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Top clearance	Factory specification	0.55 to 0.70 mm 0.022 to 0.027 in.

Tightening torque	Cylinder head screw	38 to 42 N·m 3.8 to 4.3 kgf·m 28 to 31 lbf·ft

[BX2670D (D1005-E4)]

Top clearance	Factory specification	0.55 to 0.75 mm 0.022 to 0.029 in.

Tightening torque	Cylinder head screw	64 to 68 N·m 6.5 to 7.0 kgf·m 47 to 50 lbf·ft

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

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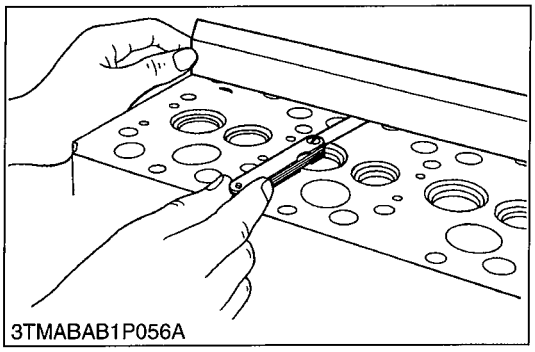
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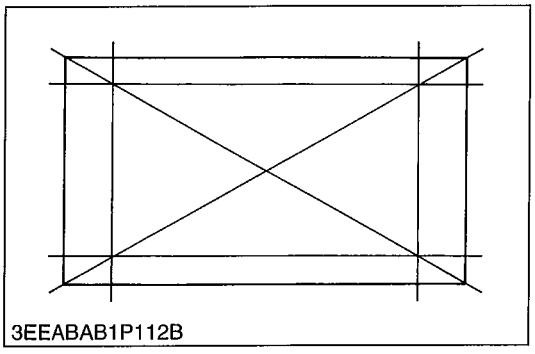
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Cylinder Head Surface Flatness

1. Clean the cylinder head surface.
2. Place a straightedge on the cylinder head's four sides and two diagonal as shown in the figure.
3. Measure the clearance with a thickness gauge.
4. If the measurement exceeds the allowable limit, correct it with a surface grinder.

■ **IMPORTANT**

- **Do not place the straightedge on the combustion chamber.**
- **Be sure to check the valve recessing after correcting.**

Cylinder head surface flatness	Allowable limit	0.05 mm 0.002 in.

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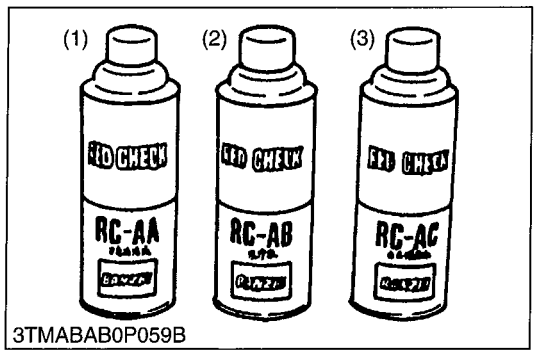

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Cylinder Head Flaw

1. Prepare an air spray red check.
2. Clean the surface of the cylinder head with detergent (2).
3. Spray the cylinder head surface with the red permeative liquid (1). Leave it five to ten minutes after spraying.
4. Wash away the read permeative liquid on the cylinder head surface with the detergent (2).
5. Spray the cylinder head surface with white developer (3).
6. If flawed, it can be identified as red marks.

(1) Red Permeative Liquid
(2) Detergent
(3) White Developer

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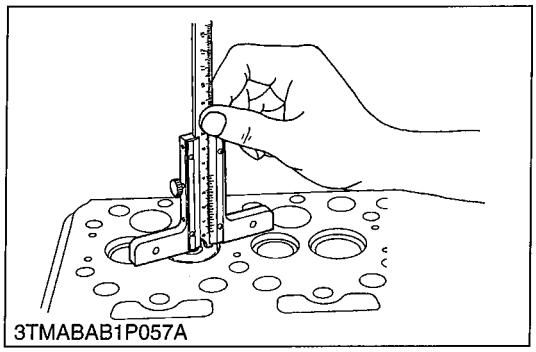
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Valve Recessing

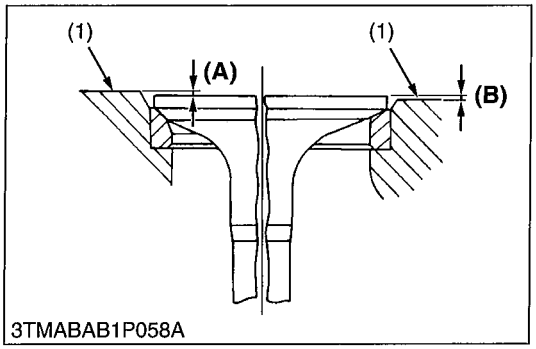
1. Clean the cylinder head surface, valve face and valve seat.
2. Insert the valve into the valve guide.
3. Measure the valve recessing with a depth gauge.
4. If the measurement exceeds the allowable limit, replace the valve.
5. If it still exceeds the allowable limit after replacing the valve, replace the cylinder head.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Valve recessing	Factory specification	0.10 (protrusion) to 0.10 (recessing) mm 0.0039 (protrusion) to 0.0039 (recessing) in.
	Allowable limit	0.30 (recessing) mm 0.012 (recessing) in.

[BX2670D (D1005-E4)]

Valve recessing	Factory specification	0.050 (protrusion) to 0.25 (recessing) mm 0.0020 (protrusion) to 0.0098 (recessing) in.
	Allowable limit	0.40 (recessing) mm 0.016 (recessing) in.



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(1) Cylinder Head Surface
(A) Recessing
(B) Protrusion

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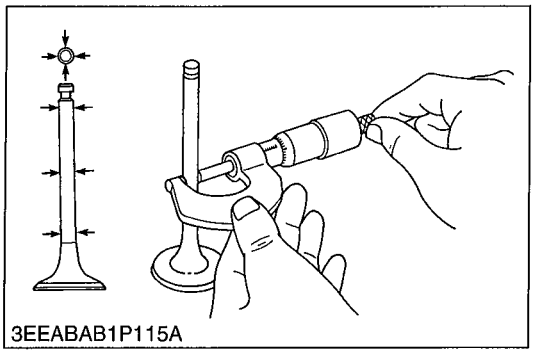
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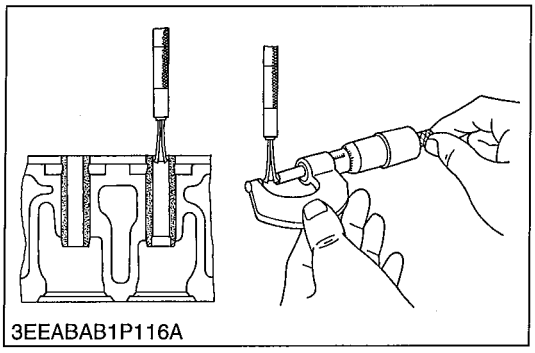
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Clearance between Valve Stem and Valve Guide

1. Remove carbon from the valve guide section.
2. Measure the valve stem O.D. with an outside micrometer.
3. Measure the valve guide I.D. with a small hole gauge, and calculate the clearance.
4. If the clearance exceeds the allowable limit, replace the valves. If it still exceeds the allowable limit, replace the valve guide.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Clearance between valve stem and valve guide	Factory specification	0.030 to 0.057 mm 0.0012 to 0.0022 in.
	Allowable limit	0.10 mm 0.0039 in.

Valve stem O.D.	Factory specification	5.968 to 5.980 mm 0.2350 to 0.2354 in.
Valve guide I.D.	Factory specification	6.010 to 6.025 mm 0.2367 to 0.2372 in.

[BX2670D (D1005-E4)]

Clearance between valve stem and valve guide	Factory specification	0.035 to 0.065 mm 0.0014 to 0.0025 in.
	Allowable limit	0.10 mm 0.0039 in.

Valve stem O.D.	Factory specification	6.960 to 6.975 mm 0.2741 to 0.2746 in.
Valve guide I.D.	Factory specification	7.010 to 7.025 mm 0.2760 to 0.2765 in.

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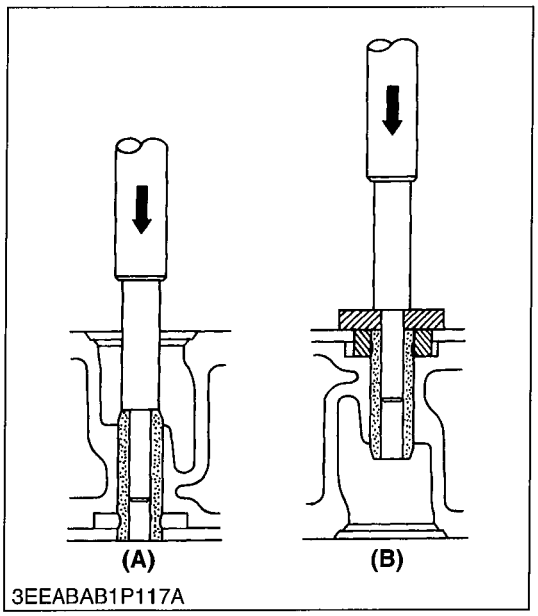

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Replacing Valve Guide

(When removing)

1. Press out the used valve guide using a valve guide replacing tool. (See page **"SPECIAL TOOLS"**.)

(When installing)

1. Clean a new valve guide and valve guide bore, and apply engine oil to them.
2. Press in a new valve guide using a valve guide replacing tool.
3. Ream precisely the I.D. of the valve guide to the specified dimension.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Valve guide I.D. (Intake and exhaust)	Factory specification	6.010 to 6.025 mm 0.2367 to 0.2372 in.

[BX2670D (D1005-E4)]

Valve guide I.D. (Intake and exhaust)	Factory specification	7.010 to 7.025 mm 0.2760 to 0.2765 in.

■ **IMPORTANT**

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

(A) When Removing **(B) When Installing**

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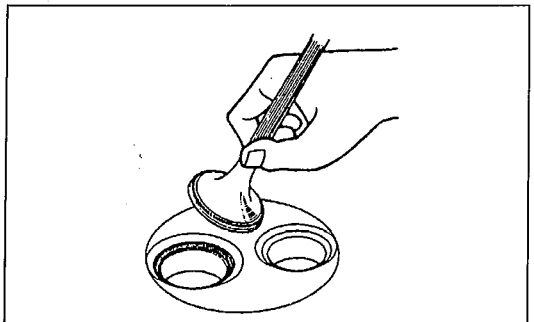

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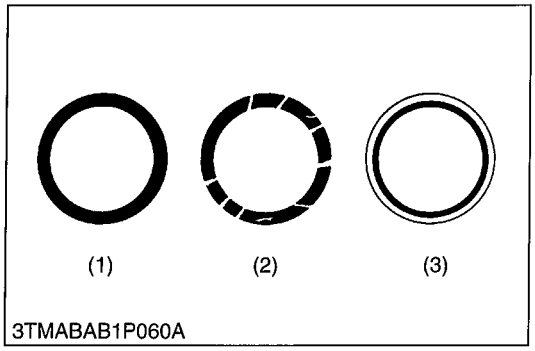

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Valve Seating

1. Coat the valve face lightly with prussian blue and put the valve on its seat to check the contact.
2. If the valve does not seat all the way around the valve seat or the valve contact is less than 70 %, correct the valve seating as follows.
3. If the valve contact does not comply with the reference value, replace the valve or correct the contact of valve seating.

Valve seat width	Factory specification	2.12 mm 0.835 in.

(1) Correct
(2) Incorrect
(3) Incorrect

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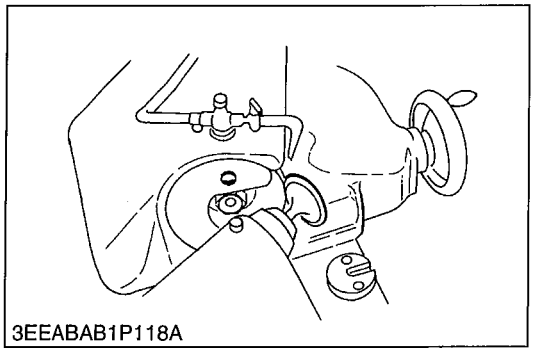
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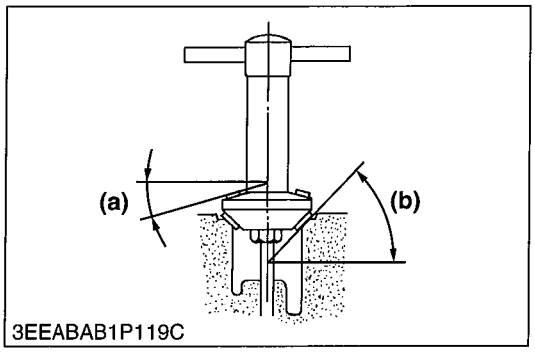

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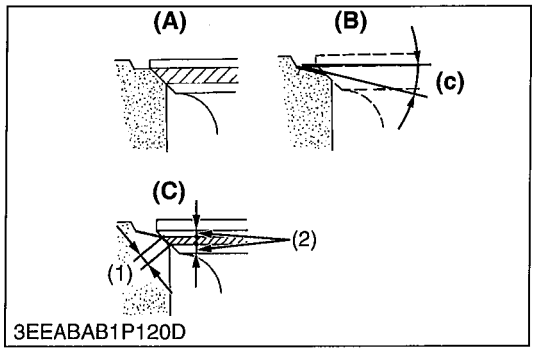

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Correcting Valve and Valve Seat

■ **NOTE**

- **Before correcting the valve and seat, check the valve stem and the I.D. of valve guide section, and repair them if necessary.**
- **After correcting the valve seat, be sure to check the valve recessing.**

1) Correcting Valve

1. Correct the valve with a valve refacer.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Valve face angle	Factory specification	0.79 rad 45 °

[BX2670D (D1005-E4)]

Valve face angle	Factory specifica-tion	IN.	1.0 rad 60 °
		EX.	0.79 rad 45 °

2) Correcting Valve Seat

1. Slightly correct the seat surface with a 1.0 rad (60 °) (intake valve) or 0.79 rad (45 °) (exhaust valve) valve seat cutter.
2. Resurface the seat surface with a 0.52 rad (30 °) valve seat cutter to intake valve seat and with a 0.26 rad (15 °) valve seat cutter to exhaust valve seat so that the width is close to specified valve seat width (2.12 mm, 0.0835 in.).
3. After resurfacing the seat, inspect for even valve seating, apply a thin film of compound between the valve face and valve seat, and fit them with valve lapping tool.
4. Check the valve seating with prussian blue. The valve seating surface should show good contact all the way around.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Valve seat angle	Factory specification	0.79 rad 45 °

[BX2670D (D1005-E4)]

Valve seat angle	Factory specifica-tion	IN.	1.0 rad 60 °
		EX.	0.79 rad 45 °

(1) Valve Seat Width
(2) Identical Dimension

(A) Check Contact
(B) Correct Seat Width
(C) Check Contact
(a) 0.26 rad (15 °) or 0.52 rad (30 °)
(b) 0.79 rad (45 °) or 1.0 rad (60 °)
(c) 0.52 rad (30 °) or 0.26 rad (15 °)

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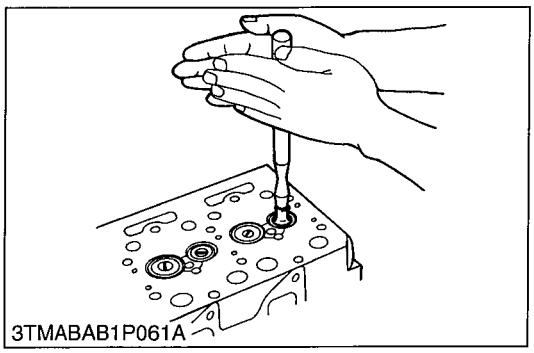
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Valve Lapping

1. Apply compound evenly to the valve lapping surface.
2. Insert the valve into the valve guide. Lap the valve onto its seat with a valve flapper or screwdriver.
3. After lapping the valve, wash the compound away and apply oil, then repeat valve lapping with oil.
4. Apply prussian blue to the contact surface to check the seated rate. If it is less than 70 %, repeat valve lapping again.

■ **IMPORTANT**

- **When valve lapping is performed, be sure to check the valve recessing and adjust the valve clearance after assembling the valve.**

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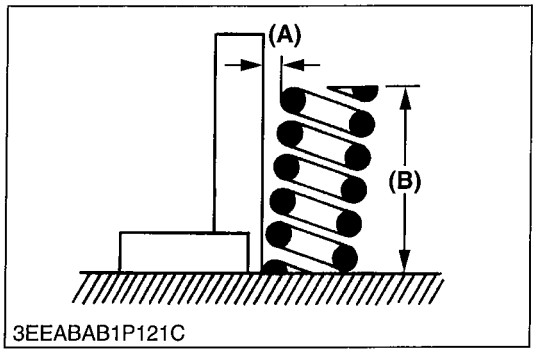

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Free Length and Tilt of Valve Spring

1. Measure the free length **(B)** of valve spring with vernier calipers. If the measurement is less than the allowable limit, replace it.
2. Put the valve spring on a surface plate, place a square on the side of the valve spring.
3. Check to see if the entire side is in contact with the square. Rotate the valve spring and measure the maximum tilt **(A)**. If the measurement exceeds the allowable limit, replace it.
4. Check the entire surface of the valve spring for scratches. If there is any problem, replace it.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Tilt **(A)**	Allowable limit	1.2 mm 0.047 in.
Free length **(B)**	Factory specification	31.3 to 31.8 mm 1.24 to 1.25 in.
	Allowable limit	28.4 mm 1.12 in.

[BX2670D (D1005-E4)]

Tilt **(A)**	Allowable limit	1.0 mm 0.039 in.
Free length **(B)**	Factory specification	37.0 to 37.5 mm 1.46 to 1.47 in.
	Allowable limit	36.5 mm 1.44 in.

(A) Tilt **(B) Free Length**

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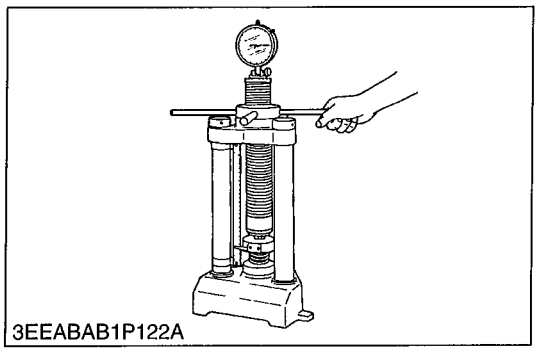
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Valve Spring Setting Load

1. Place the valve spring on a tester and compress it to the same length it is actually compressed in the engine.
2. Read the compression load on the gauge.
3. If the measurement is less than the allowable limit, replace it.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Setting load / Setting length	Factory specification	65 N / 27.0 mm 6.6 kgf / 27.0 mm 15 lbf / 1.06 in.
	Allowable limit	55 N / 27.0 mm 5.6 kgf / 27.0 mm 12 lbf / 1.06 in.

[BX2670D (D1005-E4)]

Setting load / Setting length	Factory specification	117.4 N / 31.0 mm 11.97 kgf / 31.0 mm 26.39 lbf / 1.22 in.
	Allowable limit	100.0 N / 31.0 mm 10.20 kgf / 31.0 mm 22.48 lbf / 1.22 in.

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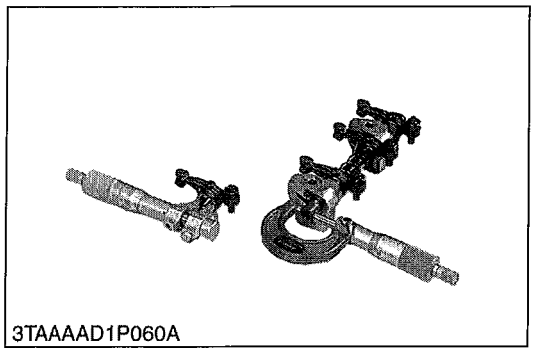
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Oil Clearance between Rocker Arm and Rocker Arm Shaft

1. Measure the rocker arm shaft O.D. with an outside micrometer.
2. Measure the rocker arm I.D. with an inside micrometer, and then calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the rocker arm and measure the oil clearance again. If it still exceeds the allowable limit, replace also the rocker arm shaft.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

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	0.15 mm 0.0059 in.
Rocker arm shaft O.D.	Factory specification	10.473 to 10.484 mm 0.41233 to 0.41275 in.
Rocker arm I.D.	Factory specification	10.500 to 10.518 mm 0.41339 to 0.41409 in.

[BX2670D (D1005-E4)]

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	11.973 to 11.984 mm 0.47138 to 0.47181 in.
Rocker arm I.D.	Factory specification	12.000 to 12.018 mm 0.47244 to 0.47314 in.

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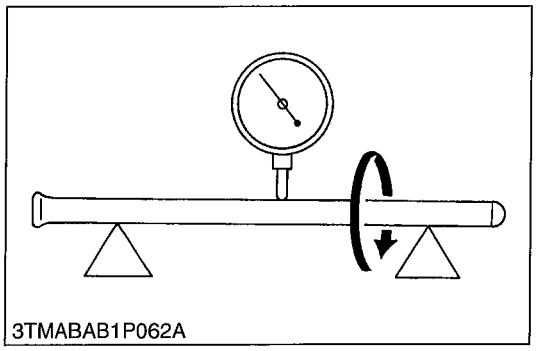
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Push Rod Alignment

1. Place the push rod on V blocks.
2. Measure the push rod alignment.
3. If the measurement exceeds the allowable limit, replace the push rod.

Push rod alignment	Allowable limit	0.25 mm 0.0098 in.

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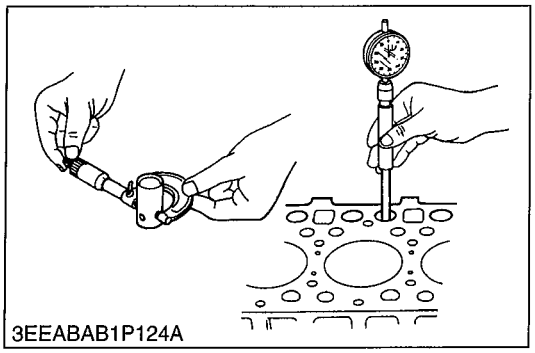
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Oil Clearance between Tappet and Tappet Guide Bore

1. Measure the tappet O.D. with an outside micrometer.
2. Measure the I.D. of the tappet guide bore with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit or the tappet is damaged, replace the tappet.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Oil Clearance between tappet and tappet guide bore	Factory specification	0.016 to 0.052 mm 0.00063 to 0.0020 in.
	Allowable limit	0.10 mm 0.0039 in.
Tappet O.D.	Factory specification	17.966 to 17.984 mm 0.70733 to 0.70803 in.
Tappet guide bore I.D.	Factory specification	18.000 to 18.018 mm 0.70867 to 0.70937 in.

[BX2670D (D1005-E4)]

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	19.959 to 19.980 mm 0.78579 to 0.78661 in.
Tappet guide bore I.D.	Factory specification	20.000 to 20.021 mm 0.78740 to 0.78822 in.

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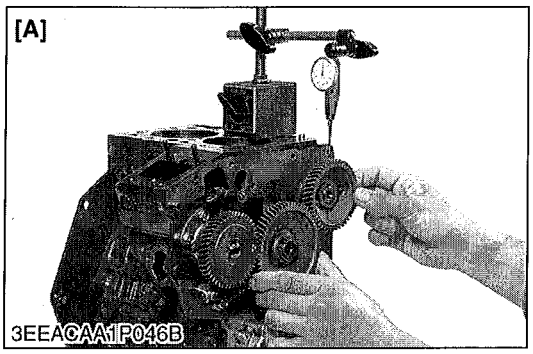
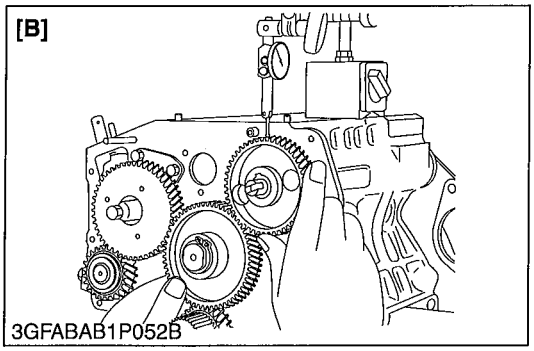
(2) Timing Gears, Camshaft and Governor Gear





Timing Gear Backlash

1. Set a dial indicator (lever type) with its tip on the gear tooth.
2. Move the gear to measure the backlash, holding its mating gear.
3. If the backlash exceeds the allowable limit, check the oil clearance of the shafts and the gear.
4. If the oil clearance is proper, replace the gear.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Backlash between idle gear and crank gear	Factory specification	0.0430 to 0.124 mm 0.00170 to 0.00488 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear and cam gear	Factory specification	0.0470 to 0.123 mm 0.00185 to 0.00484 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear and injection pump gear	Factory specification	0.0460 to 0.124 mm 0.00182 to 0.00488 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between oil pump drive gear and crank gear	Factory specification	0.0410 to 0.123 mm 0.00162 to 0.00484 in.
	Allowable limit	0.15 mm 0.0059 in.

[BX2670D (D1005-E4)]

Backlash between idle gear 1 and crank gear	Factory specification	0.0320 to 0.115 mm 0.00126 to 0.00452 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear 1 and cam gear	Factory specification	0.0360 to 0.114 mm 0.00142 to 0.00448 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear 1 and injection pump gear	Factory specification	0.0340 to 0.116 mm 0.00134 to 0.00456 in.
	Allowable limit	0.15 mm 0.0059 in.

[A] BX1870D (D722-E4) and BX2370D (D902-E4) **[B] BX2670D (D1005-E4)**

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Governor Gear Backlash [BX2670D (D1005-E4) Only]

Backlash between injection pump gear and governor gear	Factory specification	0.0300 to 0.117 mm 0.00119 to 0.00460 in.
	Allowable limit	0.15 mm 0.0059 in.

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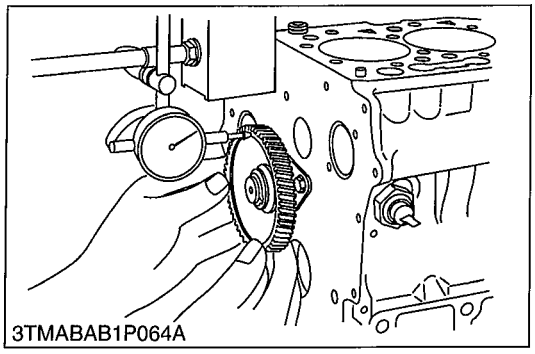
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Idle Gear 1 Side Clearance

1. Set a dial indicator with its tip on the idle gear.
2. Measure the side clearance by moving the idle gear to the front and rear.
3. If the measurement exceeds the allowable limit, replace the idle gear collar.

Idle gear 1 side clearance	Factory specification	0.20 to 0.51 mm 0.0079 to 0.020 in.
	Allowable limit	0.80 mm 0.031 in.

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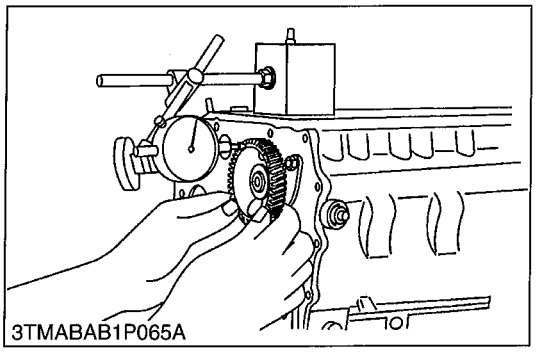
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Camshaft Side Clearance

1. Set a dial indicator with its tip on the camshaft.
2. Measure the side clearance by moving the cam gear to the front to rear.
3. If the measurement exceeds the allowable limit, replace the camshaft stopper.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Camshaft side clearance	Factory specification	0.15 to 0.31 mm 0.0059 to 0.012 in.
	Allowable limit	0.50 mm 0.020 in.

[BX2670D (D1005-E4)]

Camshaft side clearance	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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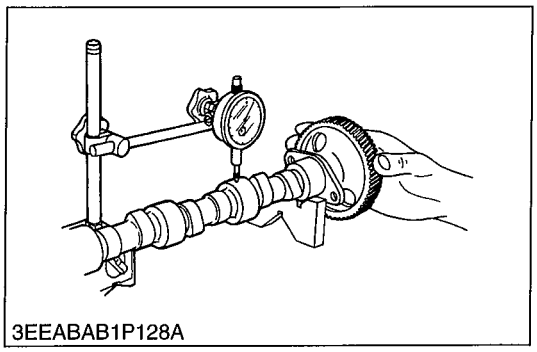
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Camshaft Alignment

1. Support the camshaft with V blocks on the surface plate at both end journals.
2. Set a dial indicator with its tip on the intermediate journal.
3. Measure the camshaft alignment.
4. If the measurement exceeds the allowable limit, replace the camshaft.

Camshaft alignment	Allowable limit	0.01 mm 0.0004 in.

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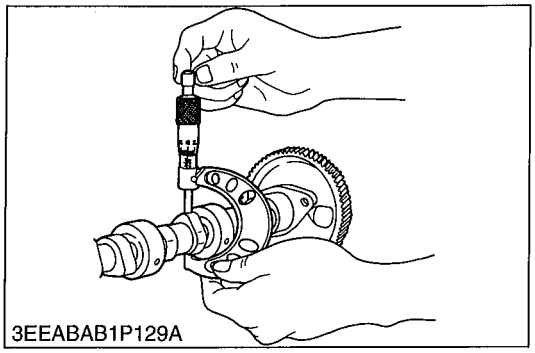
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Cam Height

1. Measure the height of the cam at its highest point with an outside micrometer.
2. If the measurement is less than the allowable limit, replace the camshaft.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Cam height of intake and exhaust	Factory specification	26.88 mm 1.058 in.
	Allowable limit	26.83 mm 1.056 in.

[BX2670D (D1005-E4)]

Cam height of intake	Factory specification	28.80 mm 1.134 in.
	Allowable limit	28.75 mm 1.132 in.
Cam height of exhaust	Factory specification	29.00 mm 1.142 in.
	Allowable limit	28.95 mm 1.140 in.

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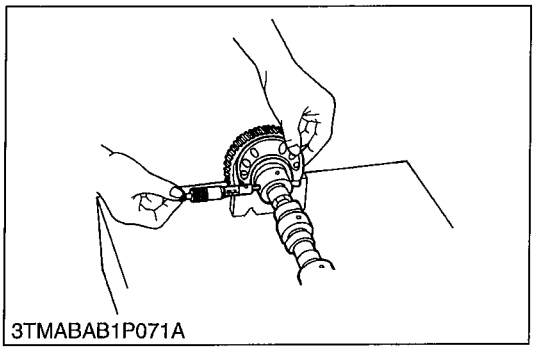
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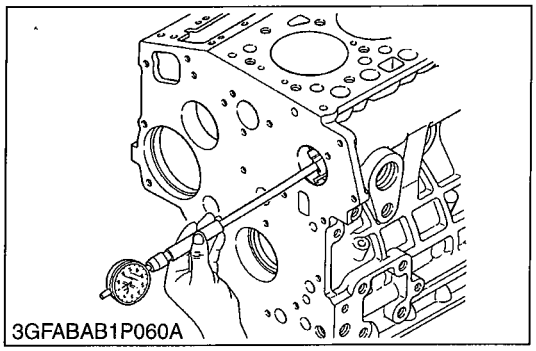
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Oil Clearance of Camshaft Journal

1. Measure the camshaft journal O.D. with an outside micrometer.
2. Measure the cylinder block bore I.D. for camshaft with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the camshaft.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

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	32.934 to 32.950 mm 1.2967 to 1.2972 in.
Camshaft bearing I.D. (Cylinder block bore I.D.)	Factory specification	33.000 to 33.025 mm 1.2993 to 1.3001 in.

[BX2670D (D1005-E4)]

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	35.934 to 35.950 mm 1.4148 to 1.4153 in.
Camshaft bearing I.D. (Cylinder block bore I.D.)	Factory specification	36.000 to 36.025 mm 1.4174 to 1.4183 in.

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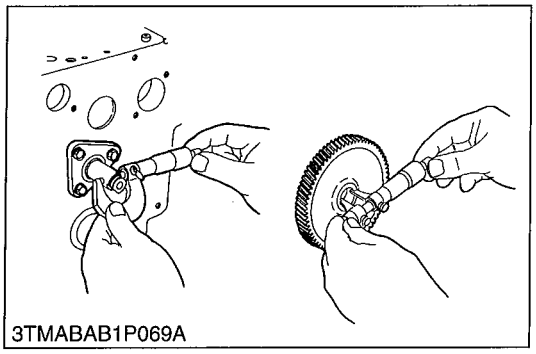
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Oil Clearance between Idle Gear 1 Shaft and Idle Gear Bushing

1. Measure the idle gear shaft O.D. with an outside micrometer.
2. Measure the idle gear bushing I.D. with an inside micrometer, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the bushing.
   If it still exceeds the allowable limit, replace the idle gear shaft.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Oil clearance between idle gear shaft 1 and idle gear bushing	Factory specification	0.020 to 0.084 mm 0.00079 to 0.0033 in.
	Allowable limit	0.10 mm 0.0039 in.
Idle gear shaft 1 O.D.	Factory specification	19.967 to 19.980 mm 0.78611 to 0.78661 in.
Idle gear bushing 1 I.D.	Factory specification	20.000 to 20.051 mm 0.78741 to 0.78940 in.

[BX2670D (D1005-E4)]

Oil clearance between idle gear shaft 1 and idle gear bushing	Factory specification	0.020 to 0.054 mm 0.00079 to 0.0021 in.
	Allowable limit	0.10 mm 0.0039 in.
Idle gear shaft 1 O.D.	Factory specification	25.967 to 25.980 mm 1.0224 to 1.0228 in.
Idle gear bushing 1 I.D.	Factory specification	26.000 to 26.021 mm 1.0237 to 1.0244 in.

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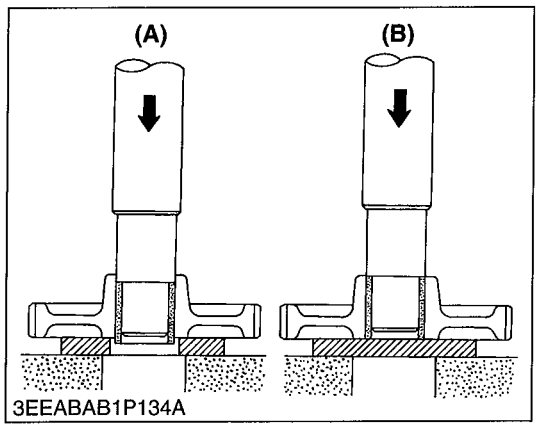

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Replacing Idle Gear Bushing

(When removing)

1. Press out the used idle gear bushing using an idle gear bushing replacing tool. (See page **"SPECIAL TOOLS"**.)

(When installing)

1. Clean a new idle gear bushing and idle gear bore, and apply engine oil to them.
2. Press in a new bushing using an idle gear bushing replacing tool, until it is flush with the end of the idle gear.

(A) When Removing **(B) When Removing**

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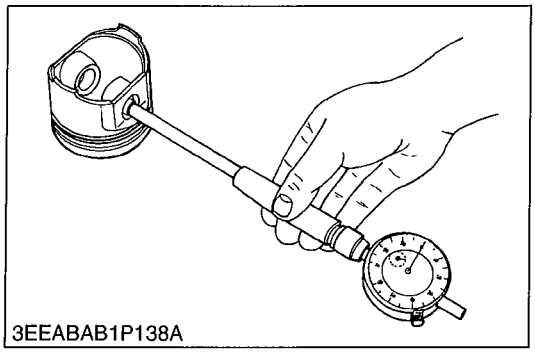
(3) Piston and Connecting Rod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Piston Pin Bore I.D.

1. Measure the piston pin bore I.D. in both the horizontal and vertical directions with a cylinder gauge.
2. If the measurement exceeds the allowable limit, replace the piston.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Piston pin bore I.D.	Factory specification	20.000 to 20.013 mm 0.78741 to 0.78791 in.
	Allowable limit	20.05 mm 0.7894 in.

[BX2670D (D1005-E4)]

Piston pin bore I.D.	Factory specification	22.000 to 22.013 mm 0.86615 to 0.86665 in.
	Allowable limit	22.03 mm 0.8673 in.

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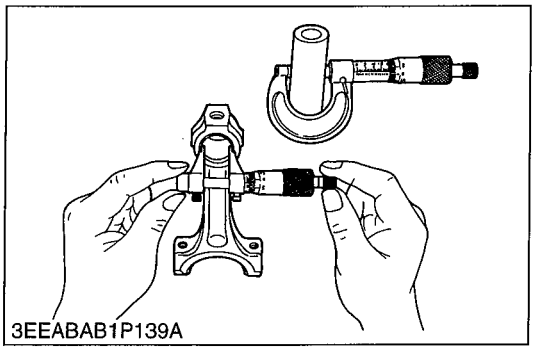
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Oil Clearance between Piston Pin and Small End Bushing

1. Measure the piston pin O.D. where it contacts the bushing with an outside micrometer.
2. Measure the small end bushing I.D. with an inside micrometer, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the bushing. If it still exceeds the allowable limit, replace the piston pin.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Oil clearance between piston pin and small end bushing	Factory specification	0.015 to 0.075 mm 0.00059 to 0.0029 in.
	Allowable limit	0.15 mm 0.0059 in.
Piston pin O.D.	Factory specification	20.002 to 20.011 mm 0.78748 to 0.78783 in.
Small end bushing I.D.	Factory specification	20.025 to 20.040 mm 0.78839 to 0.78897 in.

[BX2670D (D1005-E4)]

Oil clearance between piston pin and small end bushing	Factory specification	0.014 to 0.038 mm 0.00056 to 0.0014 in.
	Allowable limit	0.15 mm 0.0059 in.
Piston pin O.D.	Factory specification	22.002 to 22.011 mm 0.86622 to 0.86657 in.
Small end bushing I.D.	Factory specification	22.025 to 22.040 mm 0.86713 to 0.86771 in.

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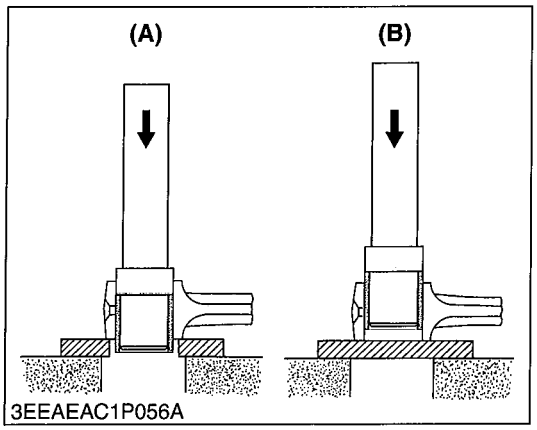

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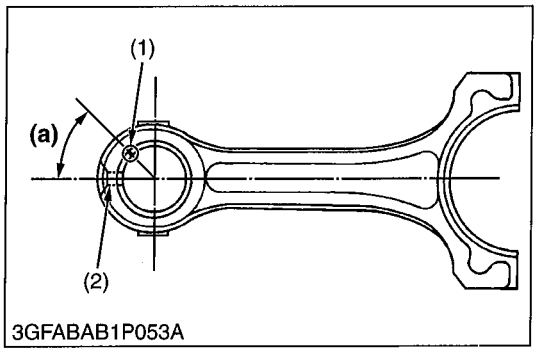

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Replacing Small End Bushing

(When removing)

1. Press out the used bushing using a small end bushing replacing tool. (See page **"SPECIAL TOOLS"**.)

(When installing)

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Using a small end bushing replacing tool, press in a new bushing (service parts) taking due care to see that the connecting rod oil hole matches the bushing hole.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Oil clearance between piston pin and small end bushing (Spare parts)	Factory specification	0.015 to 0.075 mm 0.00059 to 0.0029 in.
	Allowable limit	0.15 mm 0.0059 in.
Small end bushing I.D. (Spare parts)	Factory specification	20.026 to 20.077 mm 0.78843 to 0.79043 in.

[BX2670D (D1005-E4)]

Oil clearance between piston pin and small end bushing (Spare parts)	Factory specification	0.015 to 0.038 mm 0.00056 to 0.0014 in.
	Allowable limit	0.15 mm 0.0059 in.
Small end bushing I.D. (Spare parts)	Factory specification	22.025 to 22.040 mm 0.86713 to 0.86771 in.

(1) Seam
(2) Oil Hole

(A) When Removing
(B) When Installing
(a) 0.79 rad (45 °)

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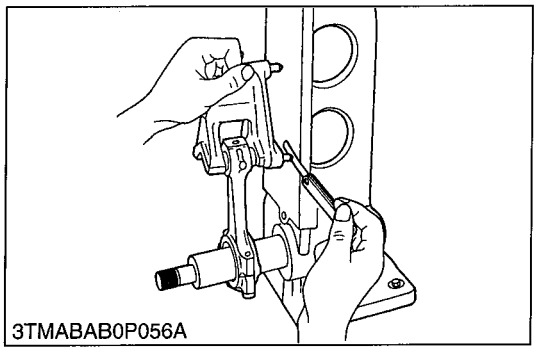
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Connecting Rod Alignment

■ **NOTE**

- **Since the I.D. of the connecting rod small end bushing is the basis of this check, check bushing for wear beforehand.**

1. Install the piston pin into the connecting rod.
2. Install the connecting rod on the connecting rod alignment tool.
3. Put a gauge over the piston pin, and move it against the face plate.
4. If the gauge does not fit squarely against the face plate, measure the space between the pin of the gauge and the face plate.
5. If the measurement exceeds the allowable limit, replace the connecting rod.

Connecting rod alignment	Allowable limit	0.05 mm 0.002 in.

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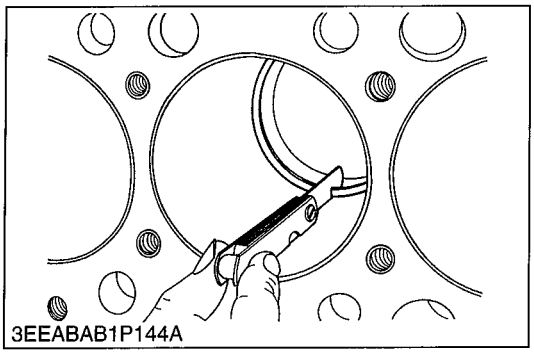
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Piston Ring Gap

1. Insert the piston ring into the lower part of the cylinder (the least worn out part) with a piston.
2. Measure the ring gap with a thickness gauge.
3. If the measurement exceeds the allowable limit, replace the piston ring.

[BX1870D (D722-E4)]

Piston ring gap	Top ring	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
		Allowable limit	1.20 mm 0.0472 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	0.15 to 0.30 mm 0.0059 to 0.011 in.
		Allowable limit	1.20 mm 0.0472 in.

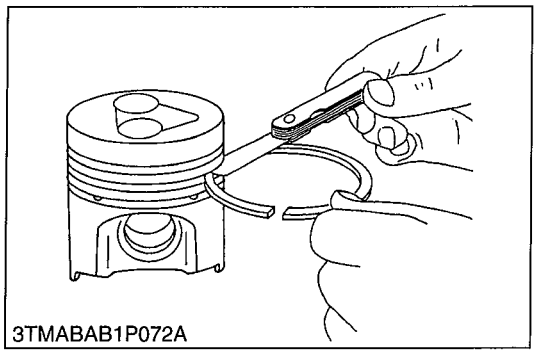
[BX2370D (D902-E4)]

Piston ring gap	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	0.35 to 0.50 mm 0.014 to 0.019 in.
		Allowable limit	1.25 mm 0.0492 in.
	Oil ring	Factory specification	0.20 to 0.35 mm 0.0079 to 0.013 in.
		Allowable limit	1.25 mm 0.0492 in.

[BX2670D (D1005-E4)]

Piston ring gap	Top ring	Factory specification	0.30 to 0.45 mm 0.012 to 0.017 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	0.25 to 0.40 mm 0.0099 to 0.015 in.
		Allowable limit	1.25 mm 0.0492 in.

9Y1210855ENS0078US0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Clearance between Piston ring and Piston Ring 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 exceeds the allowable limit, replace the piston ring.
4. If the clearance still exceeds the allowable limit with new ring, replace the piston.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Clearance between piston ring and piston ring groove	Second ring	Factory specification	0.0900 to 0.120 mm 0.00355 to 0.00472 in.
		Allowable limit	0.15 mm 0.0059 in.
	Oil ring	Factory specification	0.040 to 0.080 mm 0.0016 to 0.0031 in.
		Allowable limit	0.15 mm 0.0059 in.

[BX2670D (D1005-E4)]

Clearance between piston ring and piston ring groove	Second ring	Factory specification	0.0850 to 0.112 mm 0.00335 to 0.00440 in.
		Allowable limit	0.2 mm 0.008 in.
	Oil ring	Factory specification	0.020 to 0.060 mm 0.00079 to 0.0023 in.
		Allowable limit	0.15 mm 0.0059 in.

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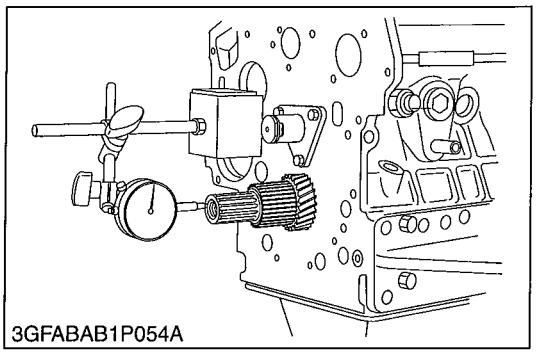
(4) Crankshaft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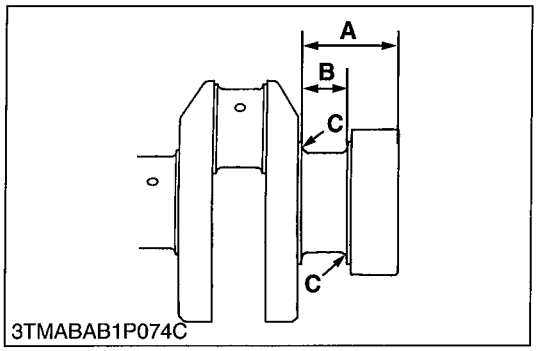

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Crankshaft Side Clearance

1. Set a dial indicator with its tip on the end of the crankshaft.
2. Measure the side clearance by moving the crankshaft to the front and rear.
3. If the measurement exceeds the allowable limit, replace the thrust bearings.
4. If the same size bearing is useless because of the crankshaft journal wear, replace it with an oversize one referring to the table and figure.

Crankshaft side clearance	Factory specification	0.15 to 0.31 mm 0.0059 to 0.012 in.
	Allowable limit	0.50 mm 0.020 in.

(Reference)
[BX1870D (D722-E4) and BX2370D (D902-E4)]

- Oversize thrust bearing

Oversize	Bearing	Code Number	Marking
0.20 mm 0.0079 in.	Thrust bearing 1 02	15261-23950	020 OS
	Thrust bearing 2 02	15261-23970	020 OS
0.40 mm 0.016 in.	Thrust bearing 1 04	15261-23960	040 OS
	Thrust bearing 2 04	15261-23980	040 OS

- Oversize dimensions of crankshaft journal

Oversize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension A	46.10 to 46.30 mm 1.815 to 1.822 in.	46.30 to 46.50 mm 1.823 to 1.830 in.
Dimension B	23.40 to 23.45 mm 0.9213 to 0.9232 in.	23.80 to 23.85 mm 0.9370 to 0.9389 in.
Dimension C	1.8 to 2.2 mm radius 0.071 to 0.086 in. radius	1.8 to 2.2 mm radius 0.071 to 0.086 in. radius
The crankshaft journal must be fine-finished to higher than Rmax=0.8S.		

[BX2670D (D1005-E4)]

Oversize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension A	51.50 to 51.70 mm 2.028 to 2.035 in.	51.60 to 51.80 mm 2.032 to 2.039 in.
Dimension B	28.20 to 28.25 mm 1.111 to 1.112 in.	28.40 to 28.45 mm 1.119 to 1.120 in.
Dimension C	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius
The crankshaft journal must be fine-finished to higher than Rmax=0.8S.		

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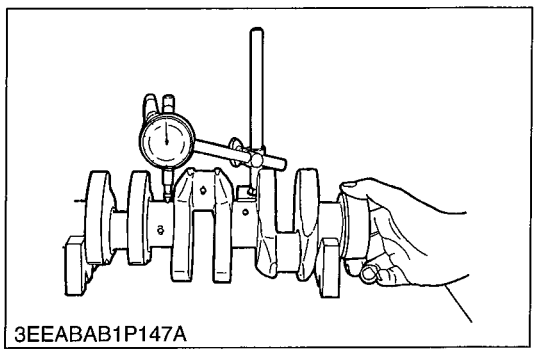
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Crankshaft Alignment

1. Support the crankshaft with V blocks on the surface plate at both end journals.
2. Set a dial indicator with its tip on the intermediate journal.
3. Measure the crankshaft alignment.
4. If the measurement exceeds the allowable limit, replace the crankshaft.

Crankshaft alignment	Allowable limit	0.02 mm 0.0008 in.

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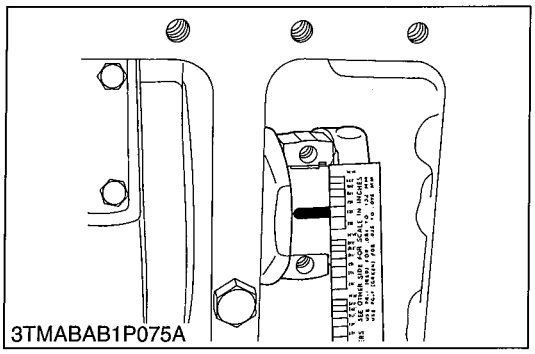
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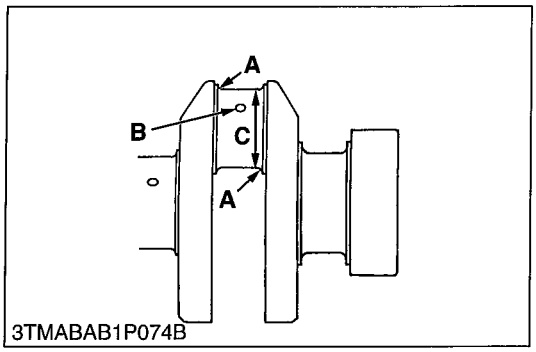

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Oil Clearance between Crankpin and Crankpin Bearing

1. Clean the crankpin and crankpin bearing.
2. Put a strip of plastigauge on the center of the crankpin.
3. Install the connecting rod cap and tighten the connecting rod screws to the specified torque, and remove the cap again.
4. Measure the amount of the flattening with the scale, and get the oil clearance.
5. If the oil clearance exceeds the allowable limit, replace the crankpin bearing.
6. If the same size bearing is useless because of the crankpin wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

- **Never insert the plastigauge into the crankpin oil hole.**
- **Be sure not to move the crankshaft while the connecting rod screws are tightened.**

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Oil clearance between crankpin and crankpin bearing	Factory specification	0.020 to 0.051 mm 0.00079 to 0.0020 in.
	Allowable limit	0.15 mm 0.0059 in.

Crankpin O.D.	Factory specification	33.959 to 33.975 mm 1.3370 to 1.3375 in.
Crankpin bearing I.D.	Factory specification	33.995 to 34.010 mm 1.3384 to 1.3389 in.

(Reference)

- Undersize crankpin bearing

Undersize	Bearing	Code Number	Marking
0.20 mm 0.0079 in.	Crankpin bearing 02	15861-22970	020 US
0.40 mm 0.016 in.	Crankpin bearing 04	15861-22980	040 US

- Undersize dimensions of crankpin

Undersize	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension **A**	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 2.7 mm radius 0.091 to 0.10 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**	33.759 to 33.775 mm dia. 1.3291 to 1.3297 in. dia.	33.559 to 33.575 mm dia. 1.3213 to 1.3218 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax=0.8S. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

(To be continued)

(Continued)

[BX2670D (D1005-E4)]

Oil clearance between crankpin and crankpin bearing	Factory specification	0.029 to 0.091 mm 0.0011 to 0.0036 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankpin O.D.	Factory specification	39.959 to 39.975 mm 1.5732 to 1.5738 in.
Crankpin bearing I.D.	Factory specification	40.040 to 40.050 mm 1.5764 to 1.5767 in.

(Reference)

- Undersize dimensions of crankpin

Undersize	**0.20 mm 0.0079 in.**	**0.40 mm 0.016 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**	39.759 to 39.775 mm dia. 1.5654 to 1.5659 in. dia.	39.559 to 39.575 mm dia. 1.5575 to 1.5580 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax=0.8S. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

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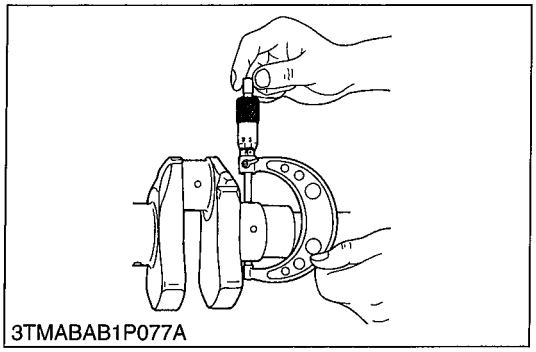
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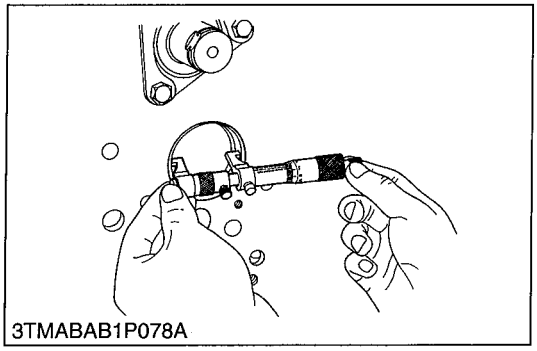
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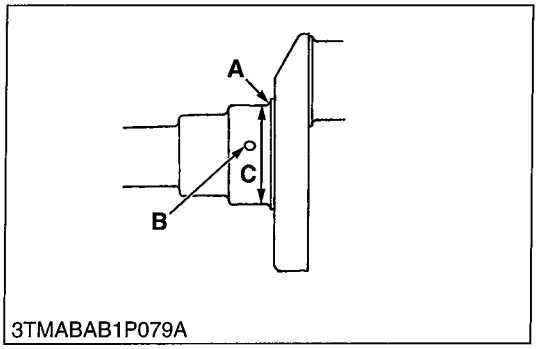

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 1

1. Measure the O.D. of the crankshaft front journal with an outside micrometer.
2. Measure the I.D. of the crankshaft bearing 1 with an inside micrometer, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the crankshaft bearing 1.
4. If the same size bearing is useless because of the crankshaft journal wear, replace it with an undersize one referring to the table and the figure.

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Oil clearance between crankshaft journal and crankshaft bearing 1	Factory specification	BX1870D (D722-E4)	0.0340 to 0.114 mm 0.00134 to 0.00448 in.
		BX2370D (D902-E4)	0.0340 to 0.106 mm 0.00134 to 0.00417 in.
	Allowable limit		0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory specification	BX1870D (D722-E4)	39.934 to 39.950 mm 1.5722 to 1.5728 in.
		BX2370D (D902-E4)	43.934 to 43.950 mm 1.7297 to 1.7303 in.
Crankshaft bearing 1 I.D.	Factory specification	BX1870D (D722-E4)	39.984 to 40.040 mm 1.5742 to 1.5763 in.
		BX2370D (D902-E4)	43.984 to 44.040 mm 1.7317 to 1.7338 in.

(Reference)

- Undersize crankshaft bearing 1

Undersize	Models	Bearing	Code Number	Marking
0.20 mm 0.0079 in.	BX1870D (D722-E4)	Crankshaft bearing 1 02	15861-23910	020 US
	BX2370D (D902-E4)		1G460-23910	
0.40 mm 0.016 in.	BX1870D (D722-E4)	Crankshaft bearing 1 04	15861-23920	040 US
	BX2370D (D902-E4)		1G4601-23920	

Undersize	Models	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension A	All models	1.8 to 2.2 mm radius 0.071 to 0.086 in. radius	1.8 to 2.2 mm radius 0.071 to 0.086 in. radius
*Dimension B	All models	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	BX1870D (D722-E4)	39.734 to 39.750 mm dia. 1.5644 to 1.5649 in. dia.	39.534 to 39.550 mm dia. 1.5565 to 1.5570 in. dia.
	BX2370D (D902-E4)	43.734 to 43.750 mm dia. 1.7219 to 1.7224 in. dia.	43.534 to 43.550 mm dia. 1.7140 to 1.7145 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax=0.8S. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.			

(To be continued)

(Continued)

[BX2670D (D1005-E4)]

Oil clearance between crankshaft journal and crankshaft bearing 1	Factory specification	0.0340 to 0.114 mm 0.00134 to 0.00448 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory specification	47.934 to 47.950 mm 1.8872 to 1.8877 in.
Crankshaft bearing 1 I.D.	Factory specification	47.984 to 48.048 mm 1.8892 to 1.8916 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	**0.20 mm 0.0079 in.**	**0.40 mm 0.016 in.**
Dimension **A**	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 2.7 mm radius 0.091 to 0.10 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**	47.734 to 47.750 mm dia. 1.8793 to 1.8799 in. dia.	47.534 to 47.550 mm dia. 1.8715 to 1.8720 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax=0.8S. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

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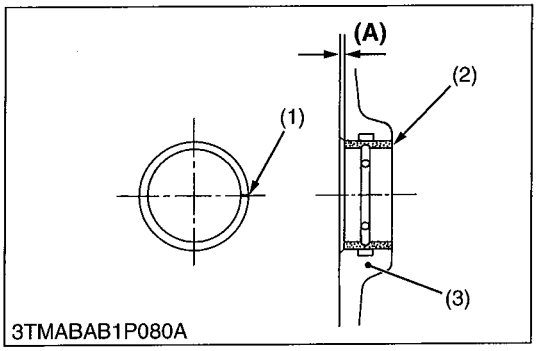

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Replacing Crankshaft Bearing 1

(When removing)

1. Press out the used crankshaft bearing 1 using a crankshaft bearing 1 replacing tool. (See page **"SPECIAL TOOLS"**.)

(When installing)

1. Clean a new crankshaft bearing 1 and crankshaft journal bore, and apply engine oil to them.
2. Using a crankshaft bearing 1 replacing tool, press in a new bearing 1 (2) so that its seam (1) directs toward the exhaust manifold side. (See figure.)

Dimension **(A)**	Factory specification	0 to 0.3 mm 0 to 0.01 in.

(1) Seam
(2) Crankshaft Bearing 1
(3) Cylinder Block

(A) Dimension

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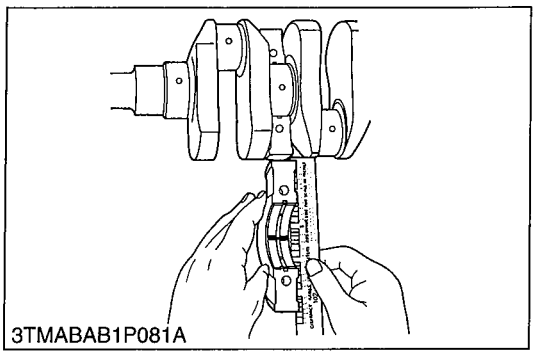
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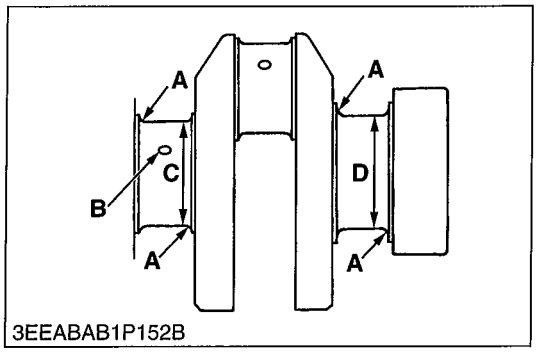

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2 and Crankshaft Bearing 3

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 amount of the flattening with the scale and get the oil clearance.
4. If the oil clearance exceeds the allowable limit, replace the crankshaft bearing 2 (crankshaft bearing 3).
5. If the same size bearing is useless because of the crankshaft journal wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

- **Be sure not to move the crankshaft while the bearing case screws are tightened.**

[BX1870D (D722-E4) and BX2370D (D902-E4)]

Oil clearance between crankshaft journal and crankshaft bearing 2 (crankshaft bearing 3)	Factory specification	0.028 to 0.059 mm 0.0011 to 0.0023 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Flywheel side)	Factory specification	43.934 to 43.950 mm 1.7297 to 1.7303 in.
Crankshaft bearing 2 I.D.	Factory specification	43.978 to 43.993 mm 1.7315 to 1.7320 in.

Crankshaft journal O.D. (Intermediate)	Factory specification	BX1870D (D722-E4)	39.934 to 39.950 mm 1.5722 to 1.5728 in.
		BX2370D (D902-E4)	43.934 to 43.950 mm 1.7297 to 1.7303 in.
Crankshaft bearing 3 I.D.	Factory specification	BX1870D (D722-E4)	39.978 to 39.993 mm 1.5740 to 1.5745 in.
		BX2370D (D902-E4)	43.978 to 43.993 mm 1.7315 to 1.7320 in.

(To be continued)

(Continued)

(Reference)

- Undersize crankshaft bearing 2 and 3 (0.20 mm (0.0079 in.))

Models	Bearing	Code Number	Marking
BX1870D (D722-E4)	Crankshaft bearing 2 02	15694-23930	020 US
	Crankshaft bearing 3 02	15861-23860	
BX2370D (D902-E4)	Crankshaft bearing 2 02	1G460-23930	
	Crankshaft bearing 3 02	1G460-23940	

- Undersize crankshaft bearing 2 and 3 (0.40 mm (0.016 in.))

Models	Bearing	Code Number	Marking
BX1870D (D722-E4)	Crankshaft bearing 2 04	15694-23940	040 US
	Crankshaft bearing 3 04	15861-23870	
BX2370D (D902-E4)	Crankshaft bearing 2 04	1G460-23950	
	Crankshaft bearing 3 04	1G460-23960	

- Undersize dimensions of crankshaft journal

Unersize	Models	0.20 mm 0.0079 in.	0.40 mm 0.016 in.
Dimension A	All models	1.8 to 2.2 mm radius 0.071 to 0.086 in. radius	1.8 to 2.2 mm radius 0.071 to 0.086 in. radius
*Dimension B	All models	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	BX1870D (D722-E4)	39.734 to 39.750 mm dia. 1.5644 to 1.5649 in. dia.	39.534 to 39.550 mm dia. 1.5565 to 1.5570 in. dia.
	BX2370D (D902-E4)	43.734 to 43.750 mm dia. 1.7219 to 1.7224 in. dia.	43.534 to 43.550 mm dia. 1.7140 to 1.7145 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax=0.8S. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.			

(To be continued)

(Continued)

[BX2670D (D1005-E4)]

Oil clearance between crankshaft journal and crankshaft bearing 2	Factory specification	0.034 to 0.095 mm 0.0014 to 0.0037 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Intermediate)	Factory specification	47.934 to 47.950 mm 1.8872 to 1.8877 in.
Crankshaft bearing 2 I.D.	Factory specification	47.984 to 48.029 mm 1.8892 to 1.8909 in.

Oil clearance between crankshaft journal and crankshaft bearing 3	Factory specification	0.034 to 0.098 mm 0.0013 to 0.0038 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Flywheel side)	Factory specification	51.921 to 51.940 mm 2.0442 to 2.0448 in.
Crankshaft bearing 3 I.D.	Factory specification	51.974 to 52.019 mm 2.0463 to 2.0479 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	**0.20 mm 0.0079 in.**	**0.40 mm 0.16 in.**
Dimension **A**	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.040 to 0.0591 in. relief
Dimension **C**	47.734 to 47.750 mm dia. 1.8793 to 1.8799 in. dia.	47.534 to 47.550 mm dia. 1.8715 to 1.8720 in. dia.
Dimension **D**	51.721 to 51.740 mm dia. 2.0362 to 2.0370 in. dia.	51.521 to 51.540 mm dia. 2.0284 to 2.0291 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax=0.8S. *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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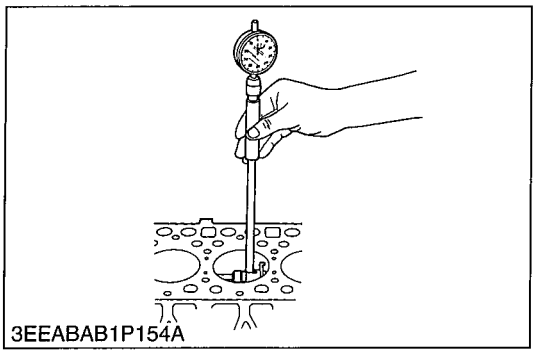
(5) Cylinder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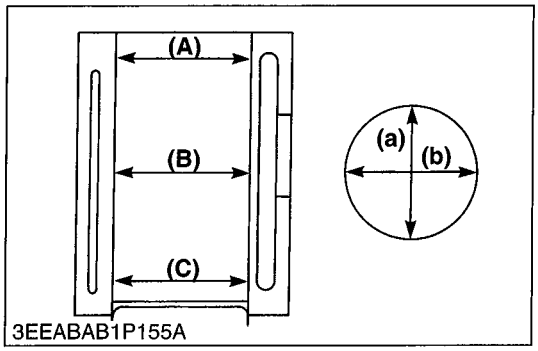

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Cylinder Wear

1. Measure the I.D. of the cylinder at the six positions (see figure) with a cylinder gauge to find the maximum and minimum I.D.'s.
2. Get the difference (Maximum wear) between the maximum and the minimum I.D.'s.
3. If the wear exceeds the allowable limit, bore and hone to the oversize dimension. (Refer to **"Correcting Cylinder".**)
4. Visually check the cylinder wall for scratches. If deep scratches are found, the cylinder should be bored. (Refer to **"Correcting Cylinder"**.)

Cylinder liner I.D.	Factory specification	BX1870D (D722-E4)	67.000 to 67.019 mm 2.6378 to 2.6385 in.
		BX2370D (D902-E4)	72.000 to 72.019 mm 2.8347 to 2.8353 in.
		BX2670D (D1005-E4)	76.000 to 76.019 mm 2.9922 to 2.9928 in.
	Allowable limit	BX1870D (D722-E4)	67.150 mm 2.6437 in.
		BX2370D (D902-E4)	72.150 mm 2.8406 in.
		BX2670D (D1005-E4)	76.15 mm 2.998 in.

(A) Top
(B) Middle
(C) Bottom (Skirt)
(a) Right-angled to Piston Pin
(b) Piston Pin Direction

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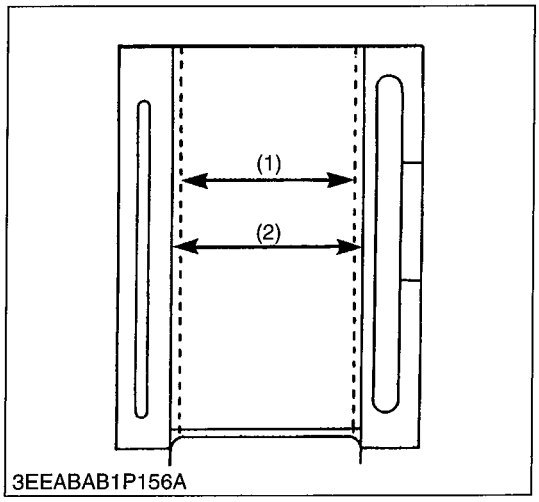

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Correcting Cylinder (Oversize)

1. When the cylinder is worn beyond the allowable limit, bore and hone it to the specified dimension.

Cylinder liner I.D.	Factory specification	BX1870D (D722-E4)	67.250 to 67.269 mm 2.6477 to 2.6483 in.
		BX2370D (D902-E4)	72.250 to 72.269 mm 2.8445 to 2.8452 in.
		BX2670D (D1005-E4)	76.500 to 76.519 mm 3.0119 to 3.0125 in.
	Allowable limit	BX1870D (D722-E4)	67.400 mm 2.6535 in.
		BX2370D (D902-E4)	72.400 mm 2.8504 in.
		BX2670D (D1005-E4)	76.65 mm 3.018 in.
Finishing		Hone to 2.2 to 3.0 µm Rz (87 to 110 µin. Rz)	

2. Replace the piston and piston rings with oversize ones.
   Oversize: 0.25 mm (0.0098 in.)
   Marking: 025

■ **NOTE**

- **When the oversize cylinder is worn beyond the allowable limit, replace the cylinder block with a new one.**

(1) Cylinder I.D. (Before Correction) (2) Cylinder I.D. (Oversize)

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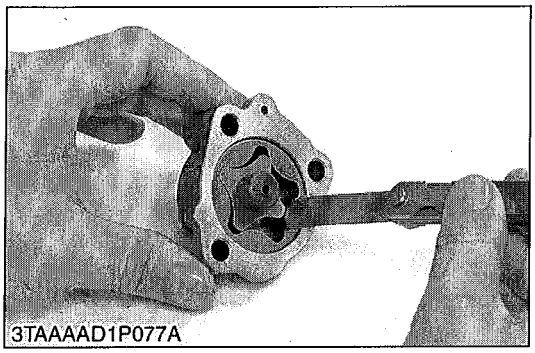
(6) Oil Pump

[A] BX1870D (D722-E4) and BX2370D (D902-E4)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Rotor Lobe Clearance

1. Measure the clearance between lobes of the inner rotor and the outer rotor with a thickness gauge.
2. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Rotor lobe clearance	Factory specification	0.030 to 0.14 mm 0.0012 to 0.0055 in.

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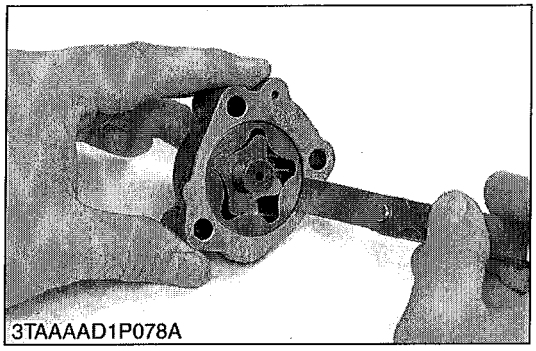
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Clearance between Outer Rotor and Pump Body

1. Measure the clearance between the outer rotor and the pump body with a thickness gauge.
2. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Clearance between outer rotor and pump body	Factory specification	0.070 to 0.15 mm 0.0028 to 0.0059 in.

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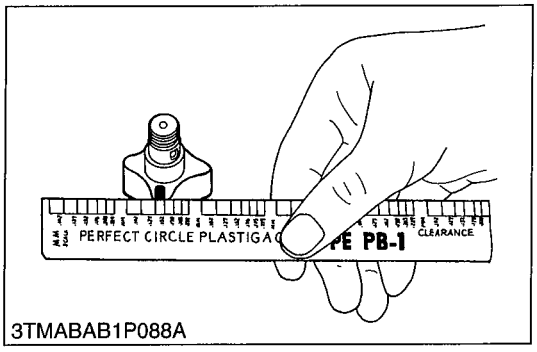

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Clearance between Rotor and Cover

1. Put a strip of plastigauge onto the rotor face with grease.
2. Install the cover and tighten the screws.
3. Remove the cover carefully, and measure the amount of the flattening with the scale and get the clearance.
4. If the clearance exceeds the factory specifications, replace oil pump rotor assembly.

Clearance between rotor and cover	Factory specification	0.0750 to 0.135 mm 0.00296 to 0.00531 in.

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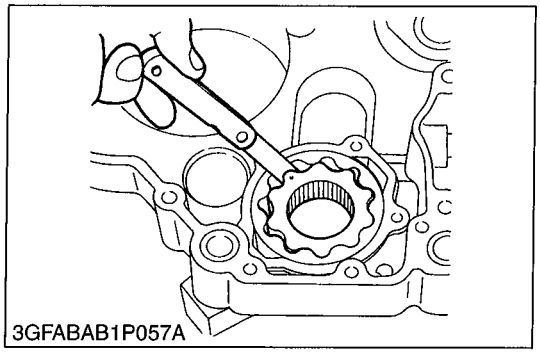
[B] BX2670D (D1005-E4)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Rotor Lobe Clearance

1. Measure the clearance between lobes of the inner rotor and the outer rotor with a feeler gauge.
2. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Rotor lobe clearance	Factory specification	0.060 to 0.18 mm 0.0024 to 0.0071 in.

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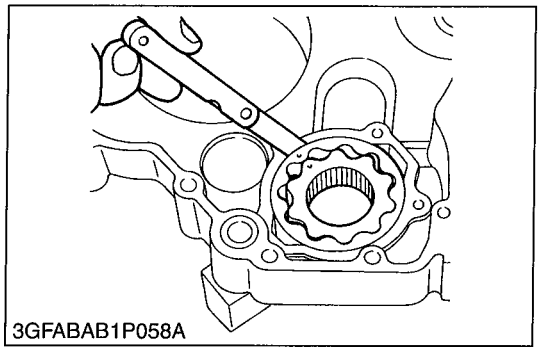
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Clearance between Outer Rotor and Pump Body

1. Measure the clearance between the outer rotor and the pump body with a feeler gauge.
2. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Clearance between outer rotor and pump body	Factory specification	0.100 to 0.180 mm 0.00394 to 0.00708 in.

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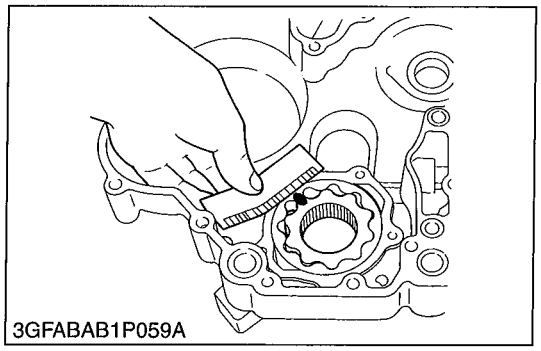
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Clearance between Rotor and Cover

1. Put a strip of plastigauge onto the rotor face with grease.
2. Install the cover and tighten the screws.
3. Remove the cover carefully, and measure the amount of the flattening with the scale and get the clearance.
4. If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

Clearance between rotor and cover	Factory specification	0.025 to 0.075 mm 0.00099 to 0.0029 in.

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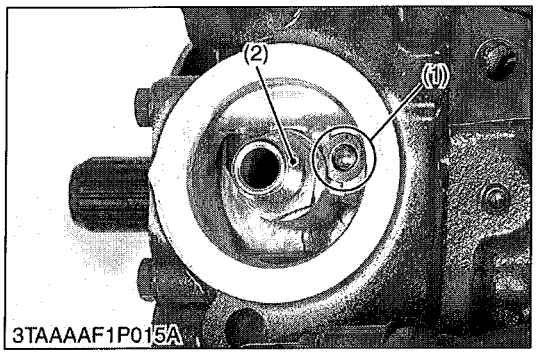
(7) Relief Valve Spring



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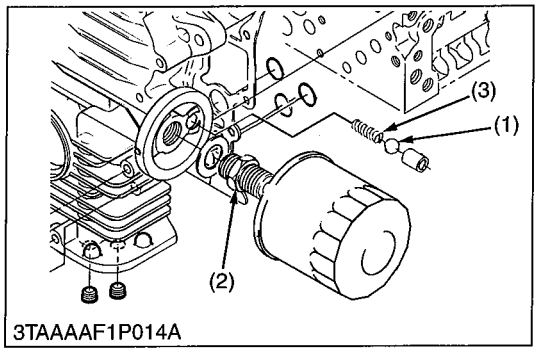

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Relief Valve

1. Remove the oil filter base.
2. Check the relief valve for dirt, and the seat and ball for damage.
3. If damaged, replace.
4. Check the free length of spring.
5. If less than the allowable limit, replace.

Relief valve spring	Factory specification	32 mm 1.26 in.
	Allowable limit	28 mm 1.10 in.

Tightening torque	Joint	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft

(1) Relief Valve
(2) Joint
(3) Spring

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