

WSM

WORKSHOP MANUAL
TRACTOR

ME5700

Kubota

TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of KUBOTA tractor ME5700. It is divided into two parts, "Mechanism" and "Servicing" for each section.

■ Mechanism

Information on the construction and function are included. This part should be understood before proceeding with troubleshooting, disassembling and servicing.

Refer to Diesel engine / Tractor Mechanism Workshop Manual (Code No. 97897-01872 / 97897-18200) for the one which has not been described to this workshop manual.

■ Servicing

The heading "General" section comes general precautions, check and maintenance and special tools. Other section, there are troubleshooting, servicing specification lists, checking and adjusting, disassembling and assembling, and servicing which cover procedures, precautions, factory specifications and allowable limits.

All information illustrations and specifications contained in this manual are based on the latest product information available at the time of publication.

The right is reserved to make changes in all information at any time without notice.

June 2003

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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 attempt 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.

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BEFORE SERVICING AND REPAIRING

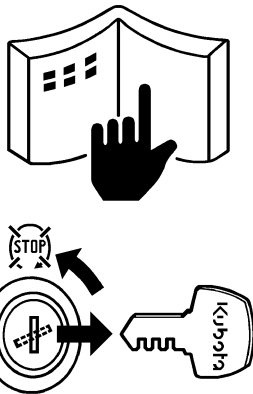
- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key
- Disconnect the battery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

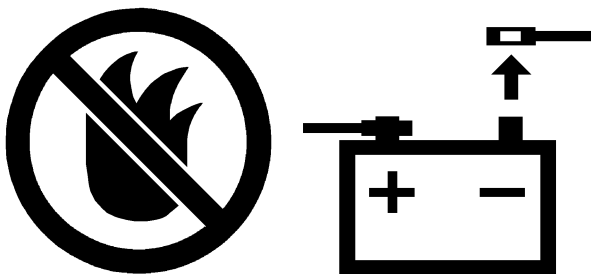
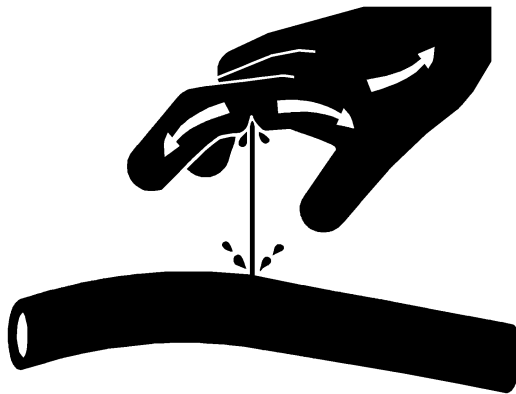
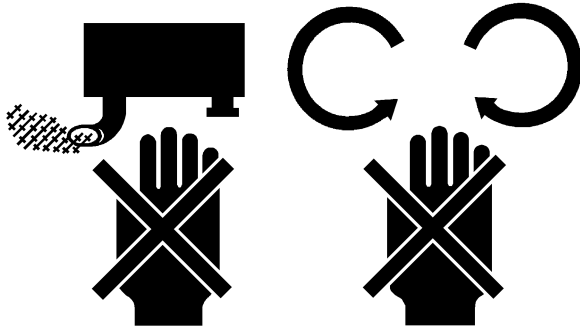
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SAFETY STARTING

- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine while standing on ground. Start the engine only from operator's seat.

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SAFETY WORKING

- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Do not work under the machine that is supported solely by a jack. Always support the machine by safety stands.
- Do not touch the rotating or hot parts while the engine is running.
- Never remove the radiator cap while the engine is running, or immediately after stopping. Otherwise, hot water will spout out from radiator. Only remove radiator cap when cool enough to touch with bare hands. Slowly loosen the cap to first stop to relieve pressure before removing completely.
- Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or fuel lines. Tighten all connections before applying pressure.

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AVOID FIRES

- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open flame away from the top of battery, especially when charging the battery.
- Make sure that no fuel has been spilled on the engine.

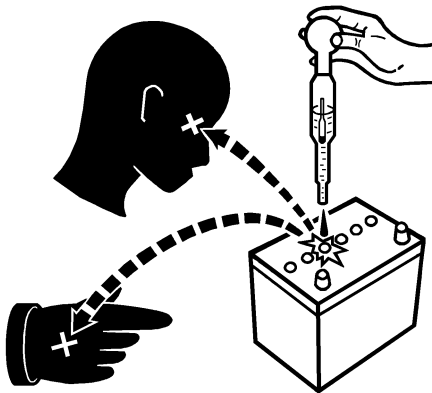
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VENTILATE WORK AREA

- If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.

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PREVENT ACID BURNS

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, clothing and cause blindness if splashed into eyes. Keep electrolyte away from eyes, hands and clothing. If you spill electrolyte on yourself, flush with water, and get medical attention immediately.

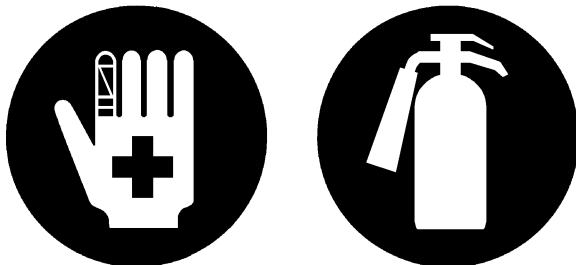
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DISPOSE OF FLUIDS PROPERLY

- Do not pour fluids into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, electrolyte and other harmful waste.

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PREPARE FOR EMERGENCIES

- Keep a first aid kit and fire extinguisher handy at all times.
- Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

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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.

[ROPS TYPE]

(1) Part No. TA040-4965-2



⚠ DANGER
TO AVOID POSSIBLE INJURY OR DEATH FROM A MACHINE RUNAWAY.
 1. Do not start engine by shorting across starter terminals or bypassing the safety start switch. Machine may start in gear and move if normal starting circuitry is bypassed.
 2. Start engine only from operator's seat with transmission and PTO OFF.
 Never start engine while standing on the ground.

(2) Part No. 6C140-4746-1




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

(3) Part No. TA040-4935-1



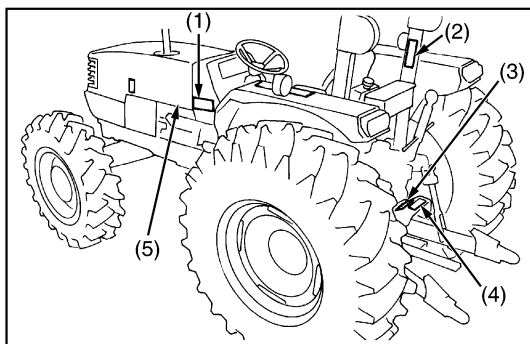
⚠ WARNING
TO AVOID PERSONAL INJURY:
 1. Attach pulled or towed loads to the drawbar only.
 2. Use the 3-point hitch only with equipment designed for 3-point hitch usage.

(4) Part No. TA040-4959-3



⚠ WARNING
TO AVOID PERSONAL INJURY.
 1. Keep PTO shield in place at all times.
 2. Do not operate the PTO at speeds faster than the speed recommended by the implement manufacturer.
 3. For trailing PTO-driven implements, set drawbar at towing position. (see operator's manual)

(5) Part No. 32310-4958-1
Do not touch hot surface like muffler, etc.



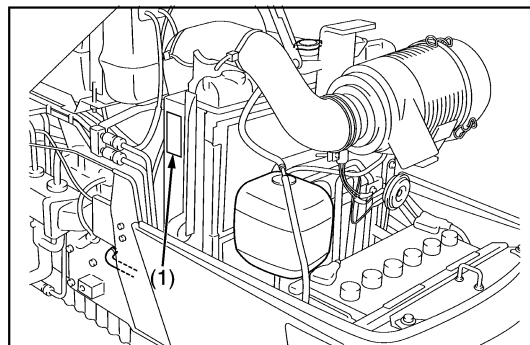
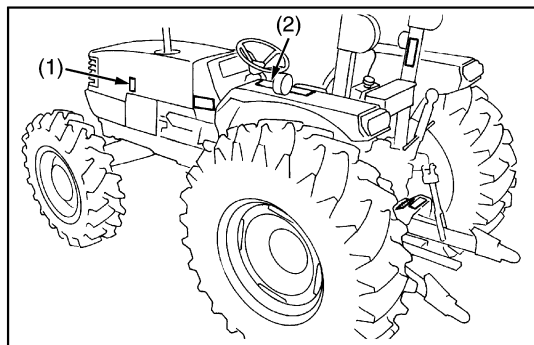
(1) Part No. 35260-3491-4

(2) Part No. 32751-4958-1
Stay clear of engine fan and fanbelt.

⚠ CAUTION

TO AVOID PERSONAL INJURY:

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



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(1) Part No. 3F240-9857-1

⚠ WARNING

To avoid free wheeling when shifting the shuttle lever while on a slope : Stop completely by using the brake and by depressing the clutch pedal. Start off after selecting shuttle direction by releasing the clutch pedal.

(2) Part No. 35080-6528-2

⚠ CAUTION

Pull the engine stop knob back and hold it until the engine stops in case of emergency.

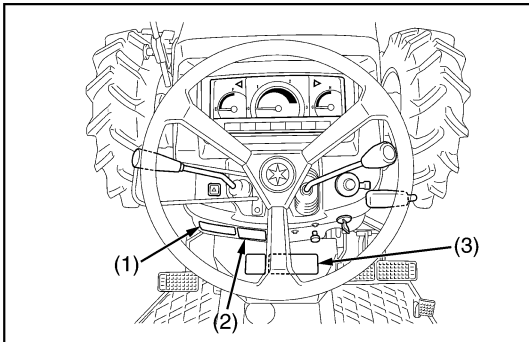
(3) Part No. 6C150-4743-1

⚠ WARNING



BEFORE DISMOUNTING TRACTOR:

1. ALWAYS SET PARKING BRAKE.
2. PARK ON LEVEL GROUND WHENEVER POSSIBLE. If parking on a slope, position tractor across the slope.
3. LOWER ALL IMPLEMENTS TO THE GROUND.
4. STOP THE ENGINE.



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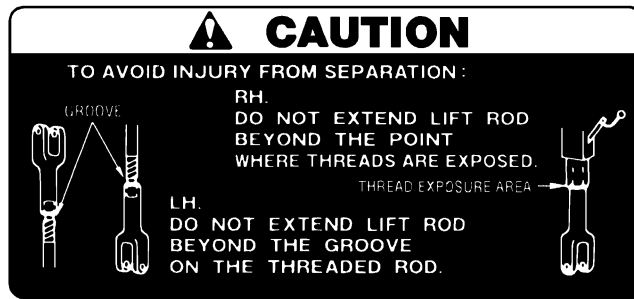
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(1) Part No. 6C040-4741-2

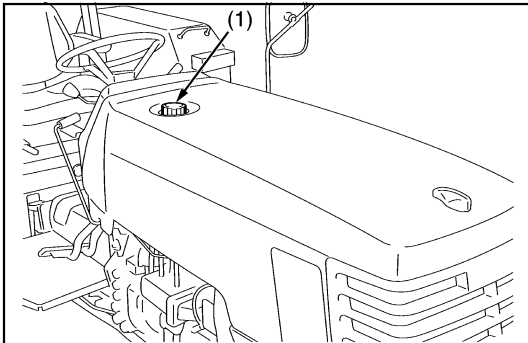
No fire



(2) Part No. 3A111-9856-3



(3) Part No. 6C040-5559-1



DANGER EXPLOSIVE GASES

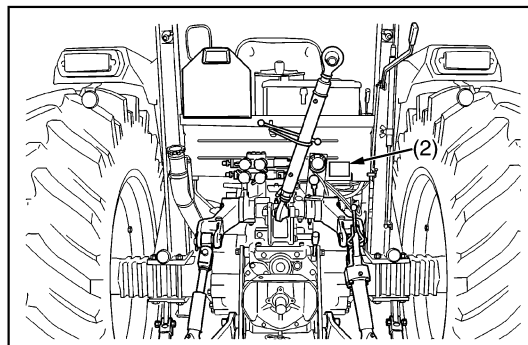
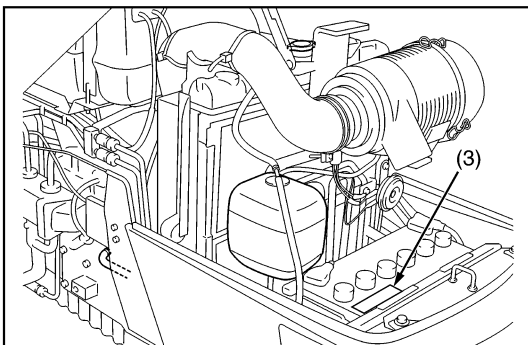
Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery. Do not charge or use booster cables or adjust post connections without proper instruction and training.

KEEP VENT CAPS TIGHT AND LEVEL

POISON CAUSES SEVERE BURNS

Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately.

KEEP OUT OF REACH OF CHILDREN



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 or 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.

[CABIN TYPE]

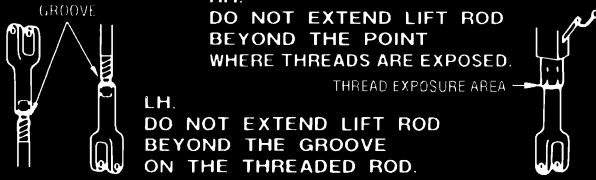
(1) Part No. TA040-4965-2



⚠ DANGER
TO AVOID POSSIBLE INJURY OR DEATH FROM A MACHINE RUNAWAY.
 1. Do not start engine by shorting across starter terminals or bypassing the safety start switch. Machine may start in gear and move if normal starting circuitry is bypassed.
 2. Start engine only from operator's seat with transmission and PTO OFF. Never start engine while standing on the ground.

(2) Part No. 3A111-9856-3

⚠ CAUTION
TO AVOID INJURY FROM SEPARATION:




RH. DO NOT EXTEND LIFT ROD BEYOND THE POINT WHERE THREADS ARE EXPOSED.
LH. DO NOT EXTEND LIFT ROD BEYOND THE GROOVE ON THE THREADED ROD.

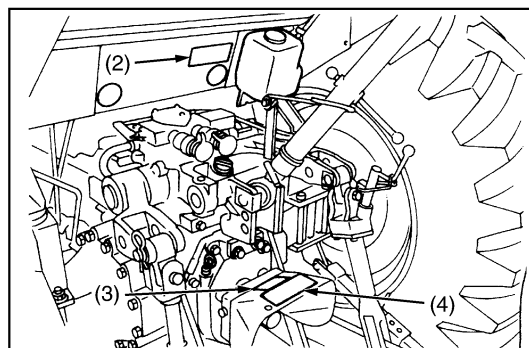
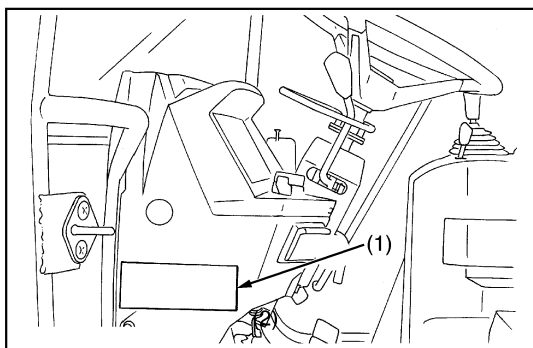
(3) Part No. TA040-4935-1

⚠ WARNING
TO AVOID PERSONAL INJURY:
 1. Attach pulled or towed loads to the drawbar only.
 2. Use the 3-point hitch only with equipment designed for 3-point hitch usage.

(4) Part No. TA040-4959-3



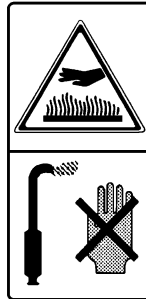
⚠ WARNING
TO AVOID PERSONAL INJURY.
 1. Keep PTO shield in place at all times.
 2. Do not operate the PTO at speeds faster than the speed recommended by the implement manufacturer.
 3. For trailing PTO-driven implements, set drawbar at towing position. (see operator's manual)



(1) Part No. TA040-4956-2
Diesel fuel
only



(2) Part No. 32310-4958-1
Do not touch hot
surface like muffler, etc.



(3) Part No. 32751-4958-1
Stay clear of engine fan
and fanbelt.



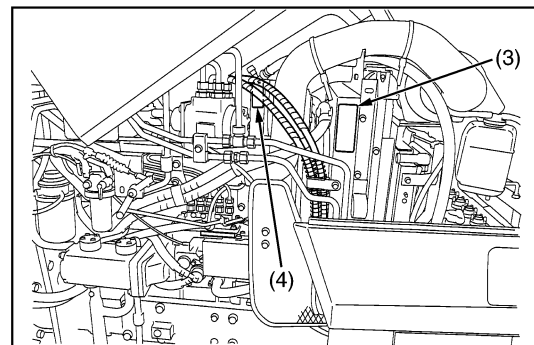
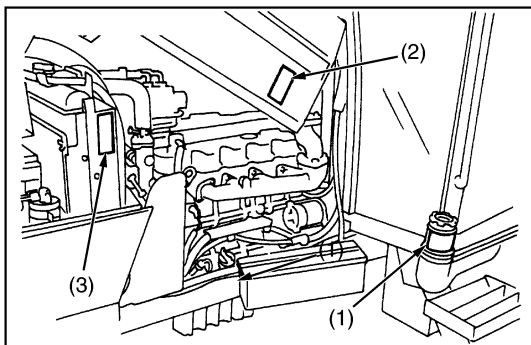
(4) Part No. TA040-7295-1

CAUTION REFRIGERANT UNDER HIGH PRESSURE

Important service methods may cause personal injury. This air conditioning system should be service by your dealer or any other qualified service shop. See Repair Manual for details.

Refrigerant		Oil	
R134a	Max. 1.05 kg (2.31 lbs.)	ND-OIL8	SAE
USE ONLY	Min. 0.95 kg (2.09 lbs.)	USE ONLY	J-639

MFD. BY NIPPONDENSO CO., LTD JAPAN



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(1) Part No. 3F240-9836-1

CAUTION**TO AVOID PERSONAL INJURY:**

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

(2) Part No. 35080-6528-2

CAUTION

Pull the engine stop knob back and hold it until the engine stops in case of emergency.

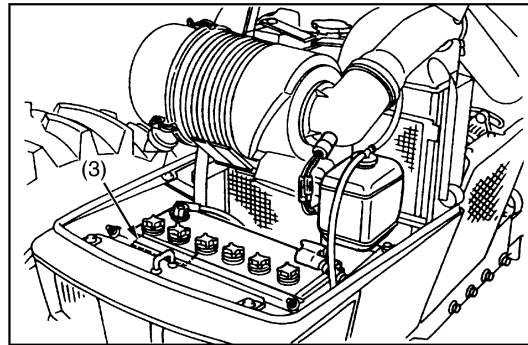
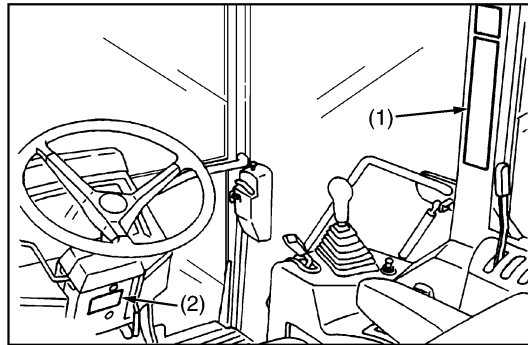
(3) Part No. 6C040-5559-1

DANGER EXPLOSIVE GASES

Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery. Do not charge or use booster cables or adjust post connections without proper instruction and training.

KEEP VENT CAPS TIGHT AND LEVEL**POISON CAUSES SEVERE BURNS**

Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately.

KEEP OUT OF REACH OF CHILDREN**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 or 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.

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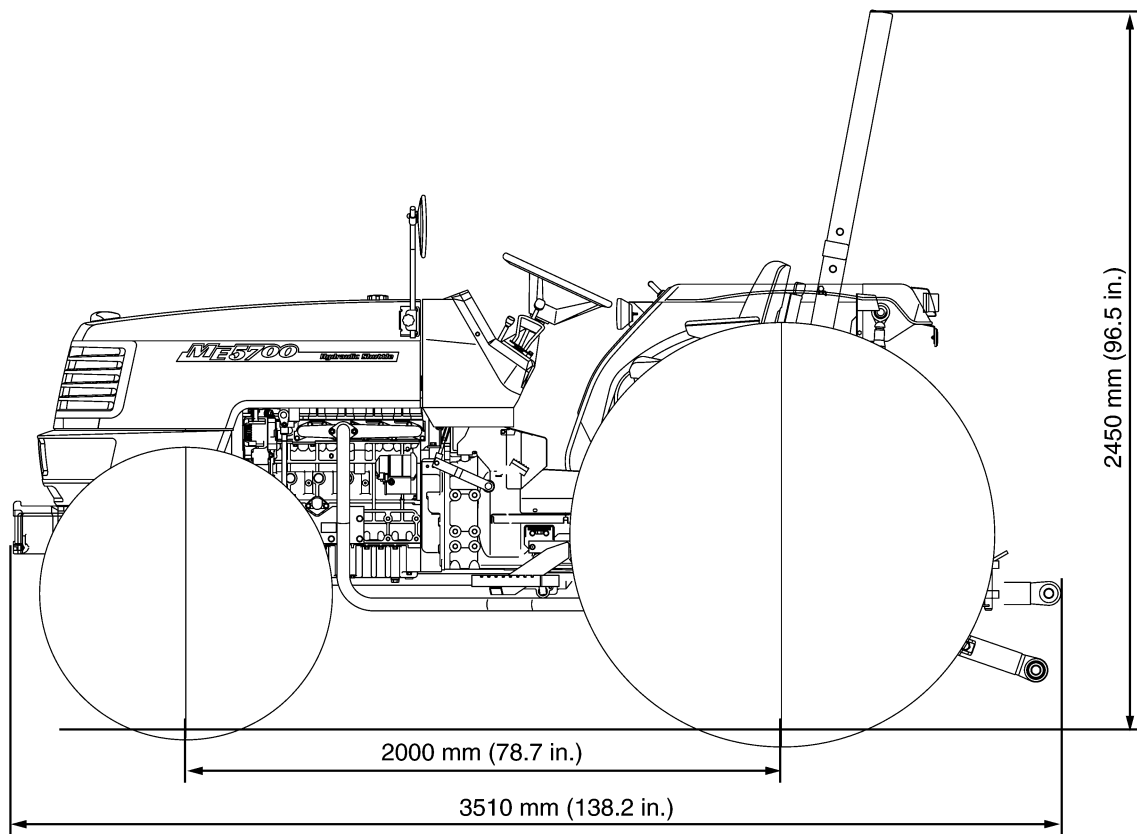
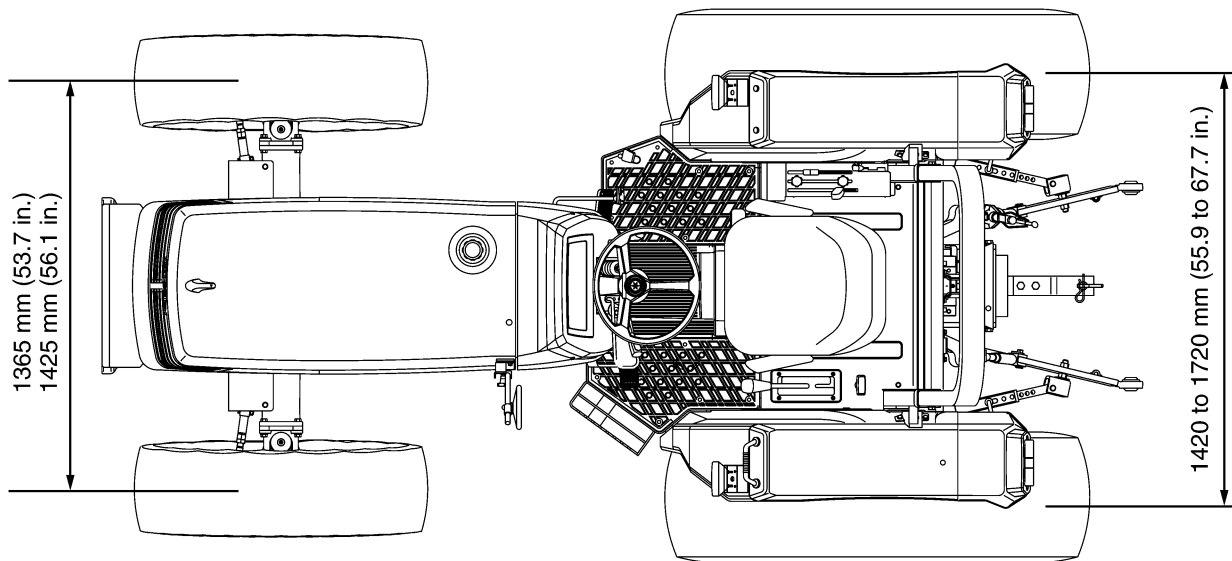
SPECIFICATIONS

Model		ME5700		
		ROPS TYPE	CABIN TYPE	
Engine	Model	F2803-EA		
	Type	Vertical, water-cooled, 4-cycle diesel engine		
	No. of cylinders	5		
	Total displacement	2746 cm ³ (167.6 cu.in.)		
	Bore and stroke	87 x 92.4 mm (3.4 x 3.6 in.)		
	Net power	42.5 kW (57 HP, 57.8 PS)* / 2800 min ⁻¹ (rpm)		
	PTO power (factory observed)	38.8 kW (52 HP, 52.8 PS)* / 2800 min ⁻¹ (rpm)		
	Maximum torque	183 N·m (18.7 kgf·m, 135 ft-lbs) / 1400 to 1600 min ⁻¹ (rpm)		
	Battery capacity	12 V, CCA : 577 A		
	Fuel	Diesel fuel No.1[below -10 °C (14 °F)], Diesel fuel No.2-D [above -10 °C (14 °F)]		
	Fuel tank capacity	65 L (17.2 U.S.gals, 14.3 Imp.gals)	95 L (25.1 U.S.gals, 20.9 Imp.gals)	
	Engine oil capacity	8.0 L (8.5 U.S.qts, 7.0 Imp.qts)		
	Coolant capacity	7.3 L (7.7 U.S.qts, 6.4 Imp.qts)		
Dimensions	Overall length	3510 mm (138.2 in.)	3565 mm (140.4 in.)	
	Overall width (Minimum tread)	1850 mm (72.8 in.)		
	Overall height	2450 mm (96.5 in.)	2480 mm (97.6)	
	Wheel base	2000 mm (78.7 in.)	2075 mm (81.7 in.)	
	Tread	Front	1365 mm, 1425 mm (53.7 in., 56.1 in.)	
		Rear	1420 to 1720 mm (55.9 to 67.7 in.)	
Minimum ground clearance	425 mm (16.7 in.) (BRACKET DRAWBAR)	420 mm (16.5 in.) (PARKING BRAKE LINKAGE)		
Weight		2095 kg (4619 lbs)	2475 kg (5457 lbs)	
Traveling system	Standard tire size	Front	11.2R20	
		Rear	16.9R28	
	Clutch	Multiple wet disc hydraulic		
	Steering	Full hydraulic power steering		
	Transmission	Shuttle synchromesh, 12F / 12R		
	Brake	Travelling	Wet type multiple (mechanical)	
		Parking	Connected with the travelling brake	
	Differential	Front	Bevel gears	
Rear		Bevel gears with differential lock		
Hydraulic system	Hydraulic control system	Position, draft and mix control		
	Pump capacity	41.6 L/min. (44.0 U.S.gals/min., 36.6 Imp.gals/min.)		
	Three point hitch	Category 1 and 2		
	Max. lifting force	At lifting point**	1900 kg (4200 lbs)	
		24 in. behind lifting point	1500 kg (3307 lbs)	
System pressure	19.1 MPa (195 kgf/cm ² , 2775.4 psi)			
PTO system	Independent clutch	Wet type, multiple discs		
	Live PTO	Direction of turning	Clockwise, viewed from tractor rear	
		PTO speed	540 min ⁻¹ (rpm) at 2307 min ⁻¹ (rpm), 540E min ⁻¹ (rpm) at 1828 min ⁻¹ (rpm)	
Traction system		Drawbar with clevis		

NOTE: *Manufacture's estimate. **At lower link and with links horizontal.
The company reserves the right to change the specifications without notice.

DIMENSIONS

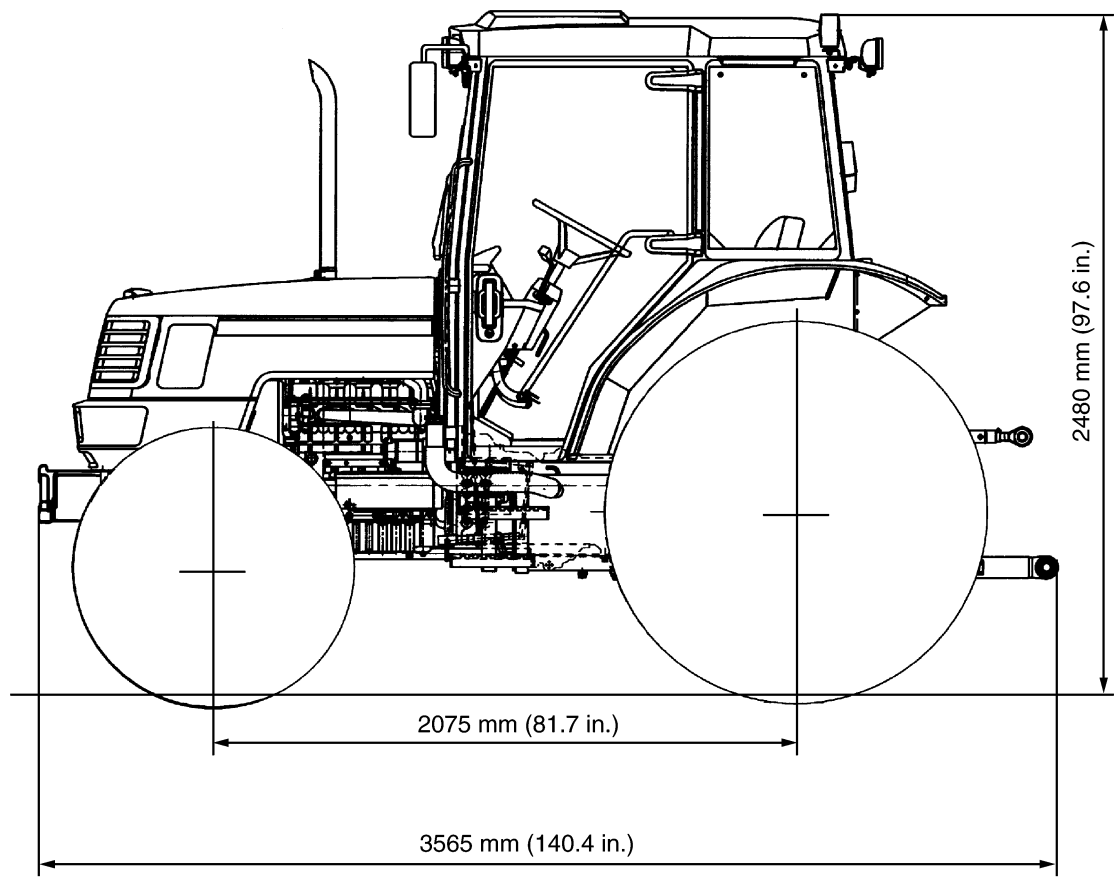
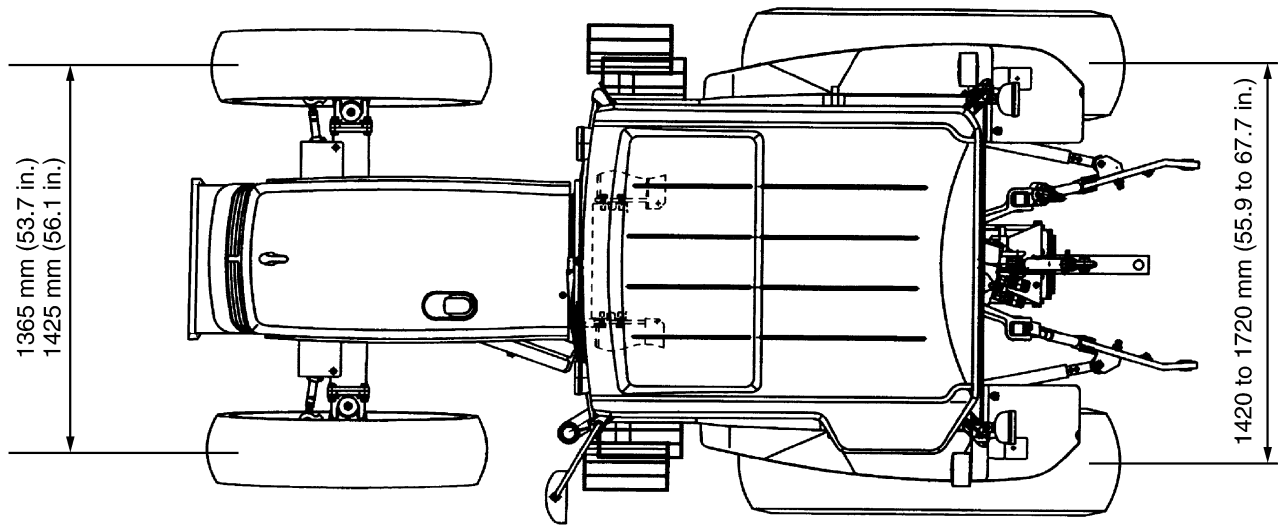
[ROPS TYPE]



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[CABIN TYPE]



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G GENERAL

CONTENTS

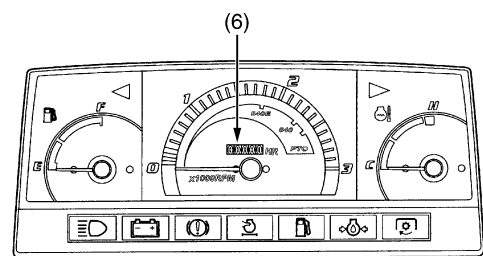
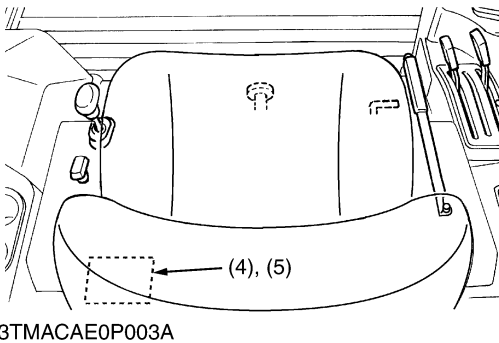
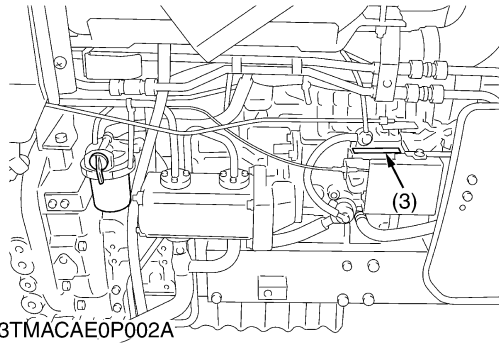
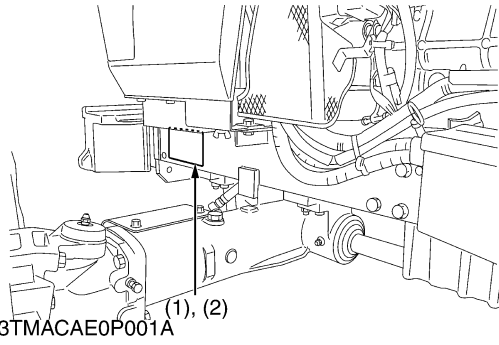
1. TRACTOR IDENTIFICATION.....	G-1
2. GENERAL PRECAUTIONS.....	G-2
3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING.....	G-3
[1] WIRING.....	G-3
[2] BATTERY	G-5
[3] FUSE	G-5
[4] CONNECTOR.....	G-6
[5] HANDLING OF CIRCUIT TESTER.....	G-7
4. LUBRICANTS, FUEL AND COOLANT.....	G-8
5. TIGHTENING TORQUES.....	G-10
[1] GENERAL USE SCREWS, BOLT AND NUTS.....	G-10
[2] STUD BOLTS	G-10
6. MAINTENANCE.....	G-11
7. CHECK AND MAINTENANCE	G-14
[1] DAILY CHECK.....	G-14
[2] CHECK POINTS OF INITIAL 50 HOURS.....	G-15
[3] CHECK POINTS OF EVERY 50 HOURS.....	G-18
[4] CHECK POINTS OF EVERY 100 HOURS.....	G-19
[5] CHECK POINTS OF EVERY 200 HOURS.....	G-25
[6] CHECK POINTS OF EVERY 300 HOURS.....	G-28
[7] CHECK POINTS OF EVERY 400 HOURS.....	G-28
[8] CHECK POINTS OF EVERY 600 HOURS.....	G-29
[9] CHECK POINTS OF EVERY 800 HOURS.....	G-29
[10] CHECK POINTS OF EVERY 1 YEAR.....	G-30
[11] CHECK POINTS OF EVERY 2 YEARS.....	G-31
[12] OTHERS.....	G-34
8. SPECIAL TOOLS	G-39
[1] SPECIAL TOOLS FOR ENGINE	G-39
[2] SPECIAL TOOLS FOR TRACTOR.....	G-47
9. TIRES	G-61
[1] TYPE OF TIRES	G-61
[2] TREAD ADJUSTMENT.....	G-62
(1) Front Wheels	G-62
(2) Rear Wheels.....	G-63
[3] WHEEL HUB.....	G-64
[4] TIRE PRESSURE	G-64
[5] TIRE LIQUID INJECTION.....	G-65
10. IMPLEMENT LIMITATIONS	G-69

1. TRACTOR IDENTIFICATION

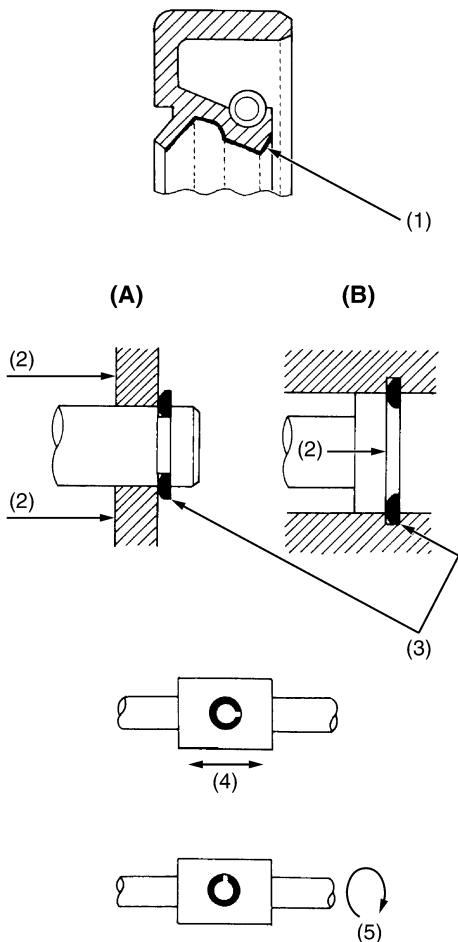
When contacting your local KUBOTA distributor, always specify engine serial number, tractor serial number, CABIN serial number and hour meter reading.

- | | |
|----------------------------------|--------------------------------|
| (1) Tractor Identification Plate | (4) CABIN Identification Plate |
| (2) Tractor Serial Number | (5) CABIN Serial Number |
| (3) Engine Serial Number | (6) Hour Meter |

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2. GENERAL PRECAUTIONS



- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be installed in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently used should be made according to the drawings provided.
- Before disassembling or servicing electrical wires, always disconnect the ground cable from the battery first.
- Remove oil and dirt from parts before measuring.
- Use only KUBOTA genuine parts for parts replacement to maintain machine performance and to assure safety.
- Gaskets and O-rings must be replaced during reassembly. Apply grease to new O-rings or oil seals before assembling. See the figure left side.
- When reassembling external snap rings or internal snap rings, they must be positioned so that sharp edge faces against the direction from which a force is applied. See the figure left side.
- 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.

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

- (A) External Snap Ring
- (B) Internal Snap Ring

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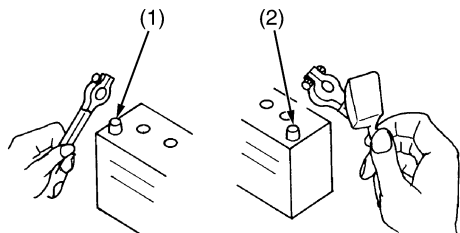
3TMABAB0P005A

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING

To ensure safety and prevent damage to the machine and surrounding equipment, heed 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 attempt 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.

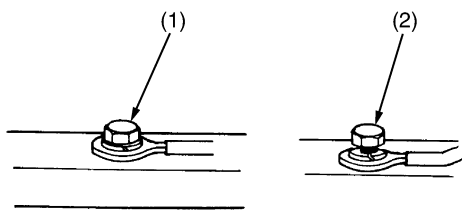


3TMABAB0P006A

- (1) Negative Terminal
- (2) Positive Terminal

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[1] WIRING

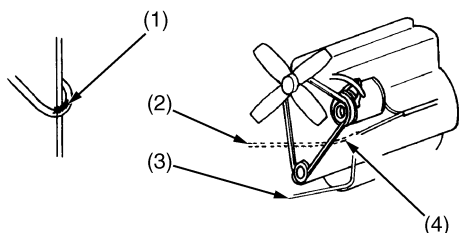


- Securely tighten wiring terminals.

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

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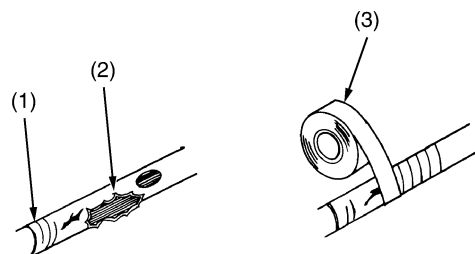


- Do not let wiring contact dangerous part.

- (1) Dangerous Part
- (2) Wiring (Incorrect)
- (3) Wiring (Correct)
- (4) Dangerous Part

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3TMABAB0P008A

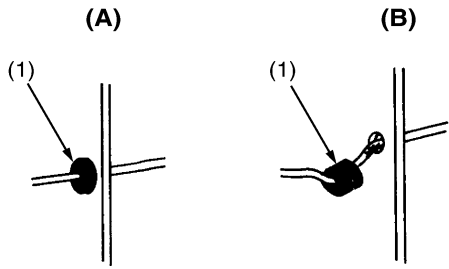


- Repair or change torn or aged wiring immediately.

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

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3GFABAB0P003A



3TMABAB0P009A

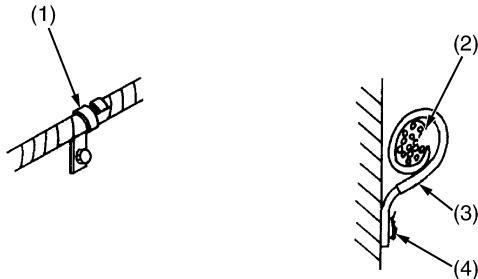
● Securely insert grommet.

(1) Grommet

(A) Correct

(B) Incorrect

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3TMABAB0P010A

● Securely clamp, being careful not to damage wiring.

(1) Clamp

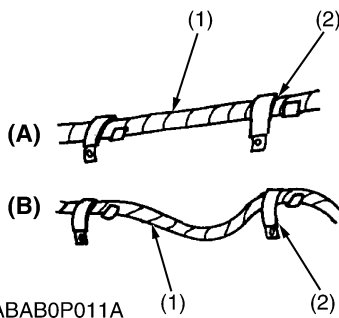
(3) Clamp

*Wind Clamp Spirally

(4) Welding Dent

(2) Wire Harness

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3TMABAB0P011A

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

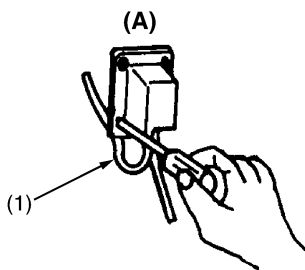
(1) Wiring

(A) Correct

(2) Clamp

(B) Incorrect

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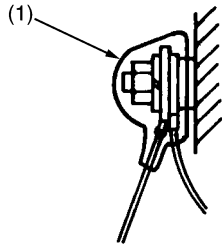
3TMABAB0P012A

● In installing a part, take care not to get wiring caught by it.

(1) Wiring

(A) Incorrect

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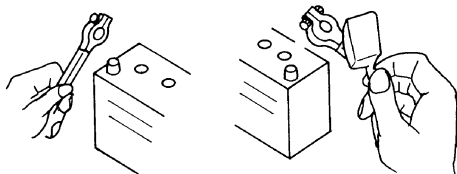
- After installing wiring, check protection of terminals and clamped condition of wiring, only connect battery.

(1) Cover
*Securely Install Cover

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3TMABAB0P013A

[2] BATTERY



3TMABAB0P006B

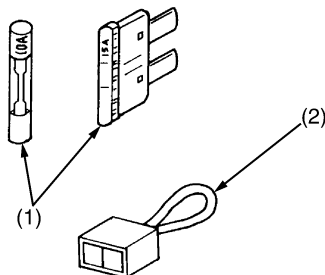
- Take care not to confuse positive and negative terminal posts.
- When removing battery cables, disconnect negative cable first. When installing battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After connecting 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

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

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[3] FUSE



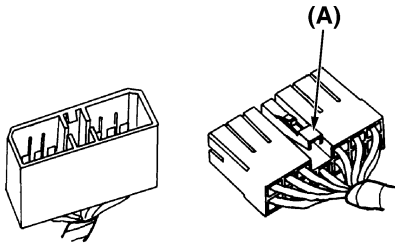
- Use fuses with specified capacity. Neither too large or small capacity fuse is acceptable.
- Never use steel or copper wire in place of fuse.
- Do not install working light, radio set, etc. on machine which is not provided with reserve power supply.
- Do not install accessories if fuse capacity of reserve power supply is exceeded.

(1) Fuse (2) Slow Blow Fuse

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3TMABAB0P014A

[4] CONNECTOR

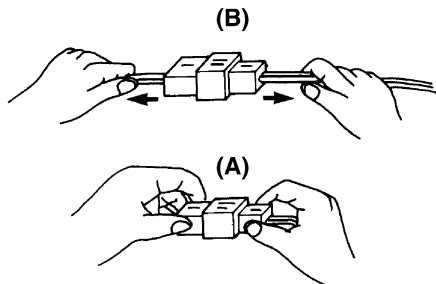


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- For connector with lock, push lock to separate.

(A) Push

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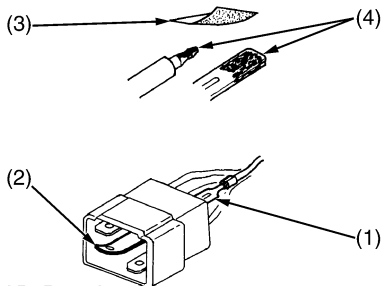
3TMABAB0P016A

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

(A) Correct

(B) Incorrect

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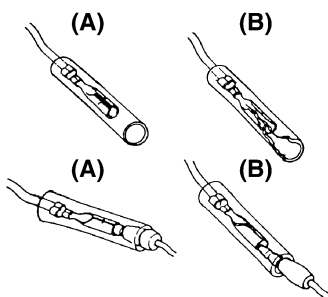
3TMABAB0P017A

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

- (1) Exposed Terminal
- (2) Deformed Terminal

- (3) Sandpaper
- (4) Rust

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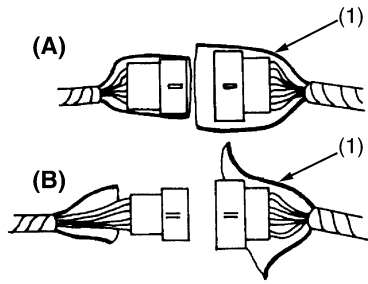
3TMABAB0P018A

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

(A) Correct

(B) Incorrect

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- Make certain plastic cover is large enough to cover whole connector.

(1) Cover

(A) Correct

(B) Incorrect

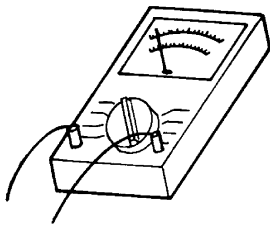
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[5] HANDLING OF CIRCUIT TESTER

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

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4. LUBRICANTS, FUEL AND COOLANT

	Place	Capacity		Lubricants, fuel and coolant
		ROPS	CABIN	
1	Fuel tank	65 L 17.2 U.S.gals 14.3 Imp.gals	95 L 25.1 U.S.gals 20.9 Imp.gals	No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below -10 °C (14 °F)
2	Coolant (Radiator)	7.3 L 7.7 U.S.qts 6.4 Imp.qts		Fresh clean water with anti-freeze
	Coolant (Recovery tank)	1.0 L 1.1 U.S.qts 0.9 Imp.qts		
3	Washer liquid	—	1.3 L 1.4 U.S.qts 1.1 Imp.qts	Automobile washer liquid
4	Engine crankcase	8.0 L 8.5 U.S.qts 7.0 Imp.qts		Engine oil: API service classification CD, CE or CF Below 0 °C (32 °F) : SAE10W, 10W-30 or 10W-40 0 to 25 °C (32 to 77 °F) : SAE20, 10W-30 or 10W-40 Above 25 °C (77 °F) : SAE30, 10W-30 or 10W-40
5	Transmission case	40.0 L 42.3 U.S.gals 35.2 Imp.gals	43.0 L 45.4 U.S.gals 37.8 Imp.gals	KUBOTA UDT or SUPER UDT fluid*
6	Front axle case	8.0 L 8.5 U.S.qts 7.0 Imp.qts		KUBOTA SUPER UDT fluid or SAE80, 90 gear oil

*KUBOTA original transmission hydraulic fluid.

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Greasing					
	Place	No. of greasing point		Capacity	Type of grease
		ROPS	CABIN		
7	Front wheel case support	2		Until grease overflow	Multipurpose type grease
	Front axle support	1			
	Top link	2			
	Top link bracket	2			
	Lift rod	1			
	Steering joint	—	1		
	Battery terminal	2		Moderate amount	

■ 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 temperature 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, CD or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.
- Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.
O : Recommendable X : Not Recommendable

Lubricating oil class	Fuel		Remark
	Low-sulfur	High-sulfur	
CF	O	O	TBN greater or equal 10
CF-4	O	X	
CG-4	O	X	

■ NOTE

- Transmission Oil : The oil used to lubricate the transmission is also used as hydraulic fluid. To insure proper operation of the hydraulic system and complete lubrication of the transmission, it is important that a multi-grade transmission fluid be used in this system. We recommend the use of KUBOTA SUPER UDT fluid for optimum protection and performance.
Do not mix different brands together.
- Indicated capacity of water and oil are manufacture's estimate.

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5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLT AND NUTS

Screws, bolt and nuts whose tightening torque are not specified in this Workshop Manual should be tightened according to the table below.

Indication on top of bolt	⬡ 4 No-grade or 4T						⬡ 7 7T						⬡ 9 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit Diameter	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M6 (6 mm, 0.24 in.)	7.85 to 9.31	0.80 to 0.95	5.79 to 6.87	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	16.7 to 19.6	1.7 to 2.0	12.3 to 14.4	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	29.5 to 34.3	3.0 to 3.5	21.7 to 25.3
M10 (10 mm, 0.39 in.)	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2	31.4 to 34.3	3.2 to 3.5	23.2 to 25.3	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5	60.9 to 70.6	6.2 to 7.2	44.9 to 52.0
M12 (12 mm, 0.47 in.)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	-	-	-	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	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

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[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit Diameter	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M8 (8 mm, 0.31 in.)	11.8 to 15.6	1.2 to 1.6	8.68 to 11.5	8.82 to 11.8	0.90 to 1.2	6.51 to 8.67
M10 (10 mm, 0.39 in.)	24.6 to 31.3	2.5 to 3.2	18.1 to 23.1	19.7 to 25.4	2.0 to 2.6	14.5 to 18.8
M12 (12 mm, 0.47 in.)	29.5 to 49.0	3.0 to 5.0	21.7 to 36.1	31.4	3.2	23.1

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6. MAINTENANCE

No.	Item		Period	Indication on hour meter								Important	Reference page			
				50	100	150	200	250	300	350	400			450	500	
1	Engine oil		Change	★	☆		☆		☆		☆		☆		G-15	
2	Engine oil filter		Replace	★			☆				☆				G-15	
3	Hydraulic oil filter		Replace	★						☆				*3	G-16	
4	Transmission fluid		Change	★											G-17	
5	Front axle case oil		Change	★											G-17	
6	Water separation (CABIN)		Clean	★							☆				G-18	
7	Engine start system		Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆		G-18	
8	Wheel bolt torque		Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆		G-19	
9	Greasing		-		☆		☆		☆		☆		☆		G-20	
10	Battery condition		Check		☆		☆		☆		☆		☆	*4	G-21	
11	Air cleaner element (Double type)	Primary element	Clean		☆		☆		☆		☆		☆	*1	G-22	
		Secondary element	Replace												*2	G-30
			Replace													*2
12	Fuel filter element (ROPS)		Clean		☆		☆		☆		☆		☆		G-23	
			Replace								☆					G-23
13	Fan belt		Adjust		☆		☆		☆		☆		☆		G-23	
14	Brake		Adjust		☆		☆		☆		☆		☆		G-24	
15	Fuel line		Check		☆		☆		☆		☆		☆		G-24	
			Replace													G-33
16	Radiator hose and clamp		Check				☆				☆				G-25	
			Replace													G-33
17	Power steering oil line		Check				☆				☆				G-25	
			Replace													G-33
18	Toe-in		Adjust				☆				☆				G-26	
19	Fuel Tank Water		Drain				☆				☆				G-26	
20	Inner air filter (CABIN)		Clean				☆				☆				G-27	
21	Fresh air filter (CABIN)		Clean				☆				☆				G-27	
22	Air conditioner condenser (CABIN)		Clean				☆				☆				G-27	
23	Air conditioner drive belt (CABIN)		Adjust				☆				☆				G-28	
24	Fuel filter (CABIN)		Replace								☆				G-28	
25	Front axle pivot		Adjust												G-29	
26	Engine valve clearance		Adjust												1-S27	
27	Air conditioner pipes and hoses (CABIN)		Check												G-30	
28	CABIN isolation cushion (CABIN)		Check												G-30	
29	Cooling system		Flush												G-31	
30	Coolant		Change												G-31	
31	Fuel system		Bleed												G-34	
32	Clutch housing water		Drain												G-35	
33	Fuse		Replace												G-35,36	
34	Light bulb		Replace												G-37	
35	Washer liquid		Add												G-37	
36	Refrigerant (gas)		Check												10-S23	
37	Lubricating door and rear window hinge		Add												G-38	

No.	Item		Period	Indication on hour meter						After purchase		Important	Reference page	
				550	600	650	700	750	800	1500	3000			1 year
1	Engine oil		Change		☆		☆		☆					G-15
2	Engine oil filter		Replace		☆				☆					G-15
3	Hydraulic oil filter		Replace		☆								*3	G-16
4	Transmission fluid		Change		☆									G-17
5	Front axle case oil		Change		☆									G-17
6	Water separation (CABIN)		Clean						☆					G-18
7	Engine start system		Check	☆	☆	☆	☆	☆	☆					G-18
8	Wheel bolt torque		Check	☆	☆	☆	☆	☆	☆					G-19
9	Greasing		-		☆		☆		☆					G-20
10	Battery condition		Check		☆		☆		☆				*4	G-21
11	Air cleaner element (Double type)	Primary element	Clean		☆		☆		☆				*1	G-22
		Secondary element	Replace								☆		*2	G-30
			Replace									☆		*2
12	Fuel filter element (ROPS)		Clean		☆		☆		☆					G-23
			Replace						☆					
13	Fan belt		Adjust		☆		☆		☆					G-23
14	Brake		Adjust		☆		☆		☆					G-24
15	Fuel line		Check		☆		☆		☆					G-24
			Replace										☆	
16	Radiator hose and clamp		Check		☆				☆					G-25
			Replace										☆	
17	Power steering oil line		Check		☆				☆					G-25
			Replace										☆	
18	Toe-in		Adjust		☆				☆					G-26
19	Fuel Tank Water		Drain		☆				☆					G-26
20	Inner air filter (CABIN)		Clean		☆				☆					G-27
21	Fresh air filter (CABIN)		Clean		☆				☆					G-27
22	Air conditioner condenser (CABIN)		Clean		☆				☆					G-27
23	Air conditioner drive belt (CABIN)		Adjust		☆				☆					G-28
24	Fuel filter (CABIN)		Replace						☆					G-28
25	Front axle pivot		Adjust		☆									G-29
26	Engine valve clearance		Adjust						☆					1-S27
27	Air conditioner pipes and hoses (CABIN)		Check								☆			G-30
28	CABIN isolation cushion (CABIN)		Check								☆			G-30
29	Cooling system		Flush									☆		G-31
30	Coolant		Change									☆		G-31
31	Fuel system		Bleed											G-34
32	Clutch housing water		Drain											G-35
33	Fuse		Replace											G-35,36
34	Light bulb		Replace											G-37
35	Washer liquid		Add											G-37
36	Refrigerant (gas)		Check											10-S23
37	Lubricating door and rear window hinge		Add											G-38

■ 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 : Hydraulic oil filter should be changed more often in severe conditions.
- *4 : When the battery is used for less than 100 hours per year, check the fluid level annually.

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7. CHECK AND MAINTENANCE



CAUTION

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

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[1] DAILY CHECK

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

Checking

- Check areas where previous trouble was experienced.
- Walk around the tractor.
 1. Check the tire pressure, and check for wear and damage.
 2. Check for oil and water leak.
 3. Check the engine oil level.
 4. Check the transmission fluid level.
 5. Check the coolant level.
 6. Check the brake oil level.
 7. Check the condition of seat belt and ROPS attaching hardware.
 8. Check and clean the radiator screen and grill.
 9. Check and clean the air conditioner condenser screen, and intercooler screen.
 10. Check the nuts of tires are tight.
 11. Check the number plate or SMV emblem for damage and replace as necessary if equipped.
 12. Care of danger, warning and caution labels.
 13. Clean around the exhaust manifold and the muffler of the engine.
- While sitting in the operator's seat.
 1. Check the brake pedal.
 2. Check the throttle lever and shuttle lever.
 3. Check the parking brake.
 4. Check the steering wheel.
- Turning the key switch.
 1. Check the performance of the easy checker lights.
 2. Check the head lights, turn signal lights, hazard lights and other light equipment. Clean if necessary.
 3. Check the performance of the meters and gauges.
- Starting the engine.
 1. Check to see that the lights on the easy checker go off.
 2. Check the color of the exhaust gas.
 3. Check the brakes for proper operation.

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[2] CHECK POINTS OF INITIAL 50 HOURS

Changing Engine Oil

CAUTION

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

1. To drain the used oil, remove the drain plugs (1) 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 plugs (1).
3. Fill with the new oil up to the upper notch on the dipstick. Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-8.)

Engine Oil	Capacity	8.0 L 8.5 U.S.qts 7.0 Imp.qts

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

(A) Oil level is acceptable within this range.

000003060E

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.

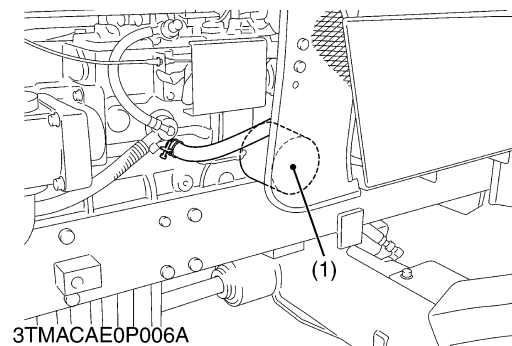
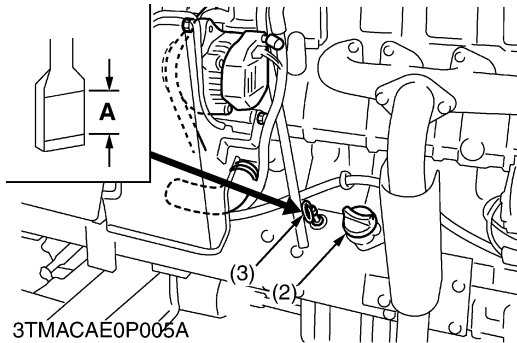
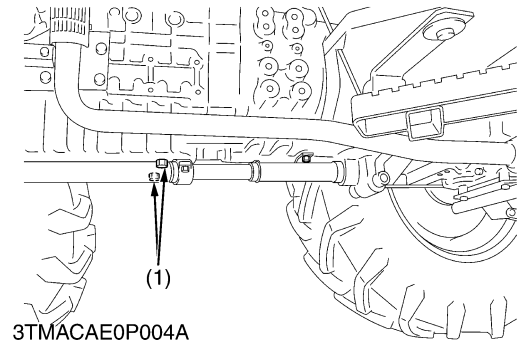
1. Remove the oil filter (1).
2. Put a film of clean engine oil on rubber seal of new filter.
3. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
4. After the new filter has been replaced, the engine oil normally decreases a little.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

■ IMPORTANT

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

- (1) Engine Oil Filter

000002264E



Replacing Hydraulic Oil Filter

CAUTION

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

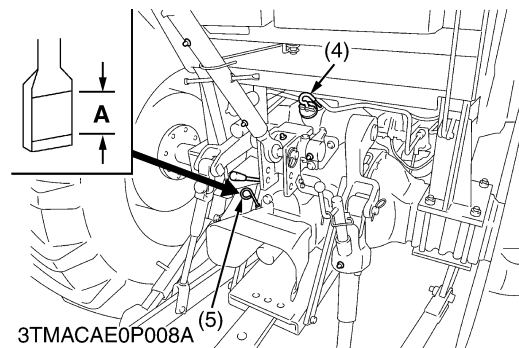
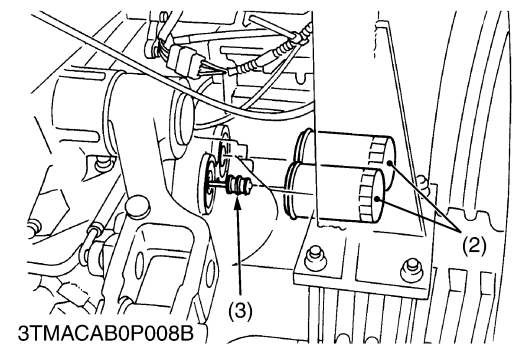
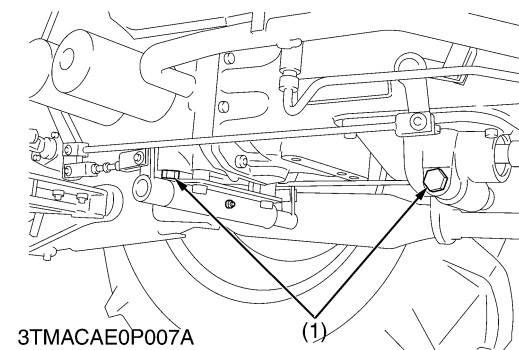
1. Remove the drain plug at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plug.
3. Remove the two oil filters (1).
4. Clean off metal fillings with clean rags at the magnetic filters (2).
5. Put a film of clean transmission fluid on rubber seal of new filters.
6. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand and additional 1/2 turn only.
7. After the new filter has been replaced, fill with the oil up to the upper notch on the dipstick (3).
8. After running the engine for a few minutes, stop it and check the oil level again, add oil to the prescribed level.
9. Make sure that the transmission fluid doesn't leak through the seal.

IMPORTANT

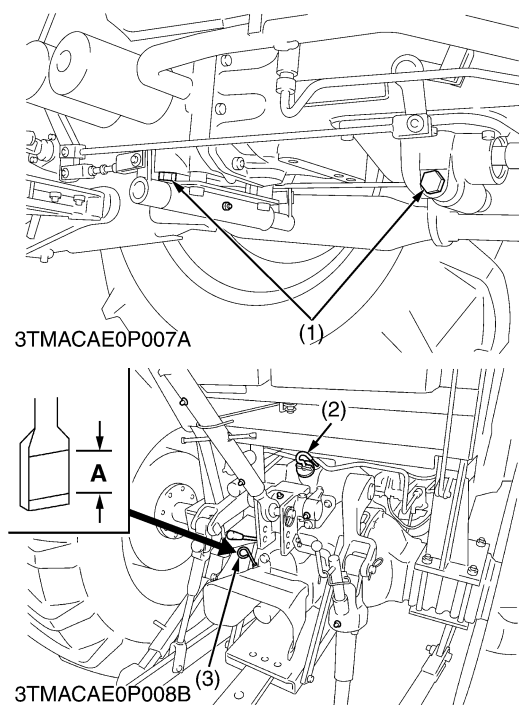
- To prevent serious damage to the hydraulic system, use only a KUBOTA genuine filter.

- (1) Drain Plug
- (2) Hydraulic Oil Filter
- (3) Magnetic Filter (Clean off Metal Fillings)
- (4) Oil Filling Plug
- (5) Dipstick

A : Oil level is acceptable within this range.



000003061E



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 (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
2. After draining reinstall the drain plug.
3. Fill with the new KUBOTA SUPER UDT fluid up to the upper notch on the dipstick (3).

Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-8.)

4. After running the engine for a few minutes, stop it and check the oil level again; add oil to prescribed level.

Transmission fluid	Capacity	ROPS	40.0 L 42.3 U.S.qts 35.2 Imp.qts
		CABIN	43.0 L 45.4 U.S.qts 37.8 Imp.qts

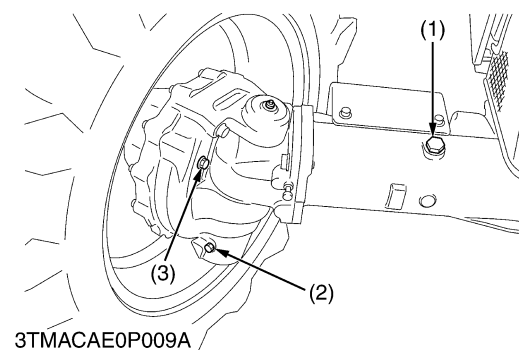
- (1) Drain Plug
- (2) Oil Inlet
- (3) Dipstick

A : Oil level is acceptable within the range.

000003062E

Changing Front Axle Case Oil

1. To drain the used oil, remove the right and left drain plugs (2) and filling plug (1) at the front axle case and drain the oil completely into the oil pan.
2. After draining, reinstall the drain plugs (2).
3. Remove the right and left breather plugs (3).
4. Fill with the new oil.
5. After filling, reinstall the filling plug (1) and breather plugs (3).



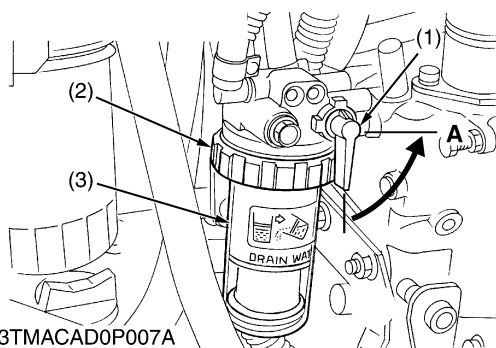
Front axle case oil	Capacity	8.0 L 8.5 U.S.qts 7.0 Imp.qts
---------------------	----------	-------------------------------------

■ IMPORTANT

● **Use KUBOTA SUPER UDT fluid or SAE80, 90 gear oil. Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)**

- (1) Filling Plug
- (2) Drain Plug
- (3) Breather Plug

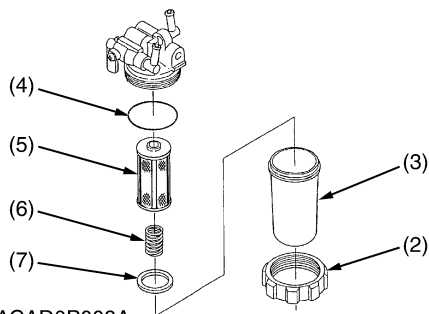
000003063E



Cleaning Water Separator (CABIN Type)

1. Close the fuel cock (1).
2. Unscrew the retainer ring (2) and remove the cup (3), and rinse the inside with kerosene.
3. Take out the element and dip it in the kerosene to rinse.
4. After cleaning, reassemble the water separator, keeping out dust and dirt.
5. Bleed the fuel system. (See page G-34.)

- | | |
|-------------------|------------------|
| (1) Fuel Cock | (6) Spring |
| (2) Retainer Ring | (7) Red Float |
| (3) Cup | |
| (4) O-ring | A : CLOSE |
| (5) Element | |



000003166E

[3] CHECK POINTS OF EVERY 50 HOURS

Checking Engine Start System



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

■ Preparation before testing.

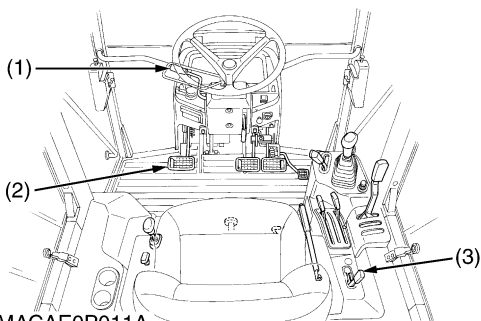
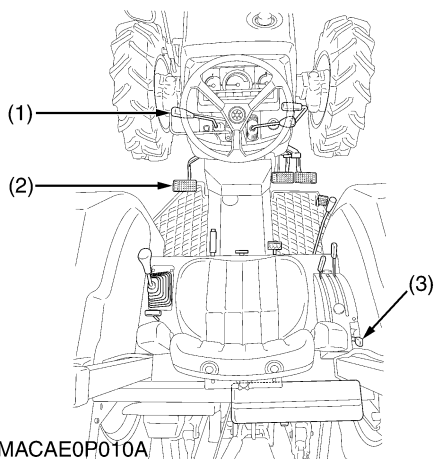
1. Place all shift lever and hydraulic levers in the "NEUTRAL".
2. Set the parking brake and stop the engine.

■ Test 1 : Switch for the shuttle shift lever.

1. Sit on operator's seat.
2. Shift the shuttle shift lever to the forward or reverse position.
3. Depress the clutch pedal fully.
4. Disengage the PTO clutch control lever.
5. Pull out the engine emergency stop knob and turn the key to "START" position.
6. The engine must not crank.
7. If it cranks, inspect the safety switch.

■ Test 2 : Switch for the PTO clutch control lever.

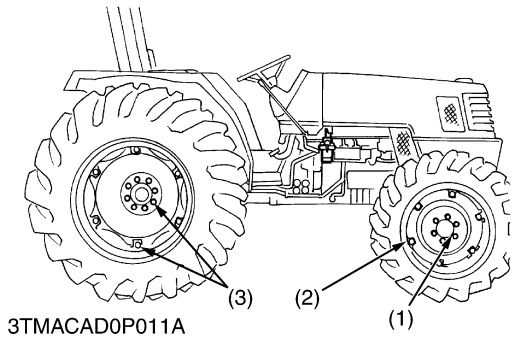
1. Sit on operator's seat.
2. Engage the PTO clutch control lever.
3. Depress the clutch pedal fully.
4. Shift the shuttle shift lever to the neutral position.
5. Pull out the engine emergency stop knob and turn the key to "START" position.
6. The engine must not crank.
7. If it cranks, inspect the safety switch.



- | | |
|-----------------------------------|----------------------|
| (1) Hydraulic Shuttle Shift Lever | (3) PTO Clutch Lever |
| (2) Clutch Pedal | |

000002270E

KiSC issued 04, 2006 A



Checking Wheel Mounting Nuts Tightening Torque

⚠ CAUTION

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

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

Tightening torque	Front wheel mounting nut and front disc mounting nut	168 to 196 N·m 17.0 to 20.0 kgf·m 123.0 to 144.7 ft-lbs
	Rear wheel mounting nut and rear disc mounting nut	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft-lbs

- (1) Front Wheel Mounting Nut
- (2) Front Disc Mounting Nut

- (3) Rear Wheel Mounting Nut and Rear Disc Mounting Nut

000003064E

[4] CHECK POINTS OF EVERY 100 HOURS

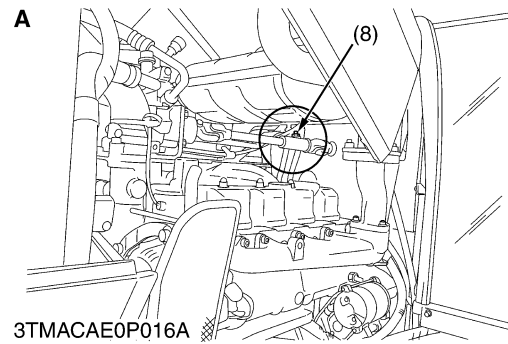
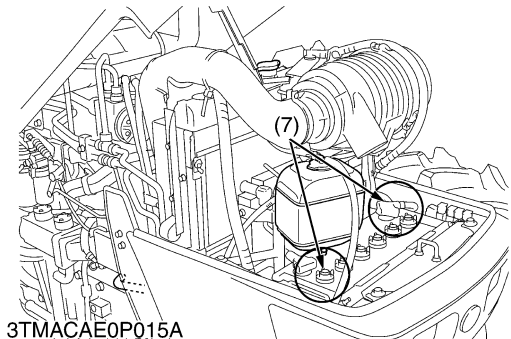
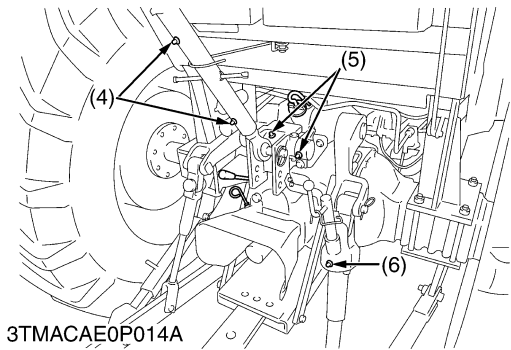
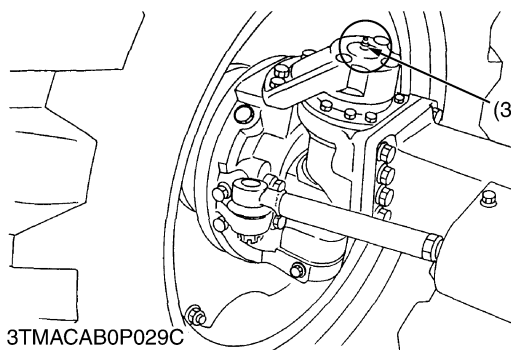
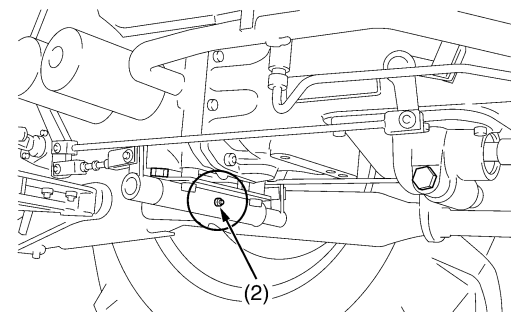
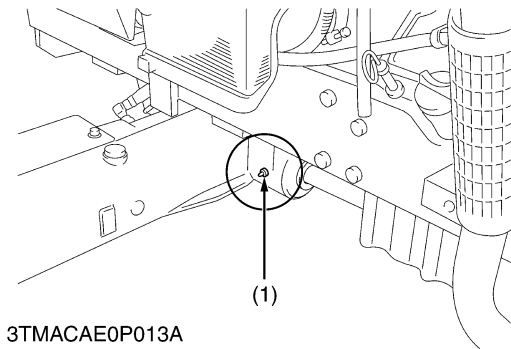
Changing Engine Oil

1. See page G-15.

000003150E

Lubricating Grease Fittings

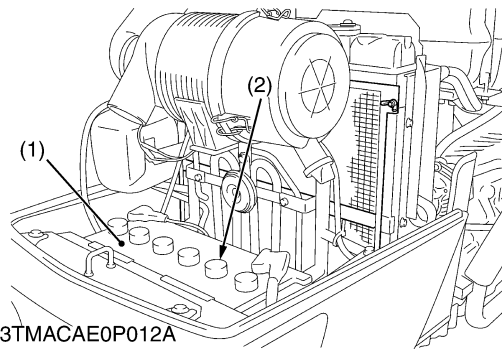
1. Apply a small amount of multipurpose grease to following points every 100 hours.
2. If you operated the machine in extremely wet and muddy condition, lubricate grease fittings more often.



- | | |
|---|--|
| (1) Grease Fitting
(Front Axle Support) | (5) Grease Fitting
(Top Link Bracket) |
| (2) Grease Fitting
(Parking Brake Lever Shaft) | (6) Grease Fitting (Lifting Rod) |
| (3) Grease Fitting (Front Wheel
Case Support) (RH, LH) | (7) Battery Terminal |
| (4) Grease Fitting (Top Link) | (8) Grease Fitting
(Steering Joint Shaft) |

A : CABIN Type

000003065E



Checking Battery Condition

⚠ DANGER

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

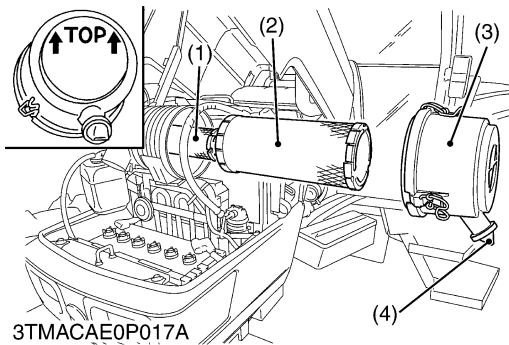
⚠ CAUTION

- Never remove the vent plugs while the engine is running.
 - Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately and get medical attention.
 - Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.
 - Wear eye protection and rubber gloves when working around battery.
1. The original battery is maintenance free type battery. When the performance becomes low, inspect the battery.
 2. Clean the battery surface with a clean cloth. Keep the terminals clean and coated with petroleum jelly.

(1) Battery

(2) Vent Cap

000003066E



Cleaning Air Cleaner Primary Element

1. Remove the air cleaner cover (3) and primary element (2).
2. Clean the primary element if:
 - 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/cm², 30 psi).
 - When carbon or oil adheres to the element, soak the element in detergent for 15 minutes then wash it several times in water, rinse with clean water and dry it naturally. After element is fully dried, inspect inside of the element with a light and check if it is damaged or not.
3. Replace air cleaner primary element :
 - **Once a year or after every six times of cleaning, whichever comes first.**

■ NOTE

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

■ IMPORTANT

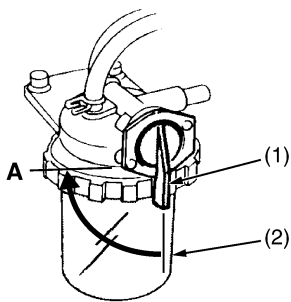
- The air cleaner uses a dry element, never apply oil.
- Do not run the engine with filter element removed.
- Be sure to refit the dust cup with the arrow ↑ (on the rear of cover) upright. If the cover is improperly fitted, evacuator valve will not function and dust will adhere to the element.
- Do not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

■ Evacuator Valve

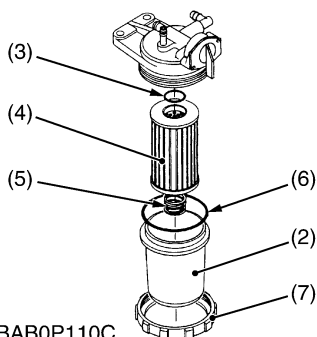
Open evacuator valve once a week under ordinary conditions or daily when used in a dusty place to get rid of large particles of dust and dirt.

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

000003067E



3TMACAA0P018A



3TMABAB0P110C

Cleaning Fuel Filter (ROPS Type)

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

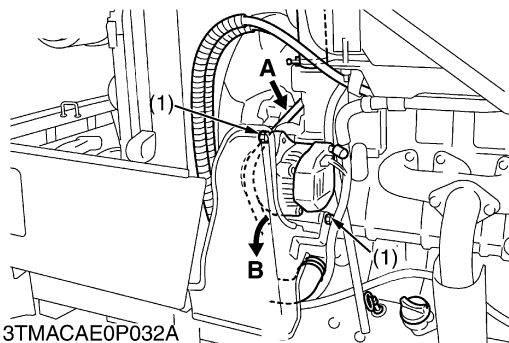
1. Close the fuel cock (1).
2. Unscrew the screw ring and remove the filter bowl (2), and rinse the inside with kerosene.
3. Take out the element (4) and dip it in the kerosene to rinse.
4. After cleaning, reassemble the fuel filter, keeping out dust and dirt.
5. Bleed the fuel system. (See page G-34.)

IMPORTANT

● **If dust and dirt enters the fuel system the fuel pump and injection nozzles are subject to premature wear. To prevent this, be sure to clean the fuel filter bowl and element periodically.**

- | | |
|----------------------|------------------|
| (1) Fuel Cock | (6) O-ring |
| (2) Fuel Filter Bowl | (7) Screw Ring |
| (3) O-ring | |
| (4) Filter Element | A : Close |
| (5) Spring | |

000003068E



3TMACAE0P032A

Adjusting Fan Belt Tension

CAUTION

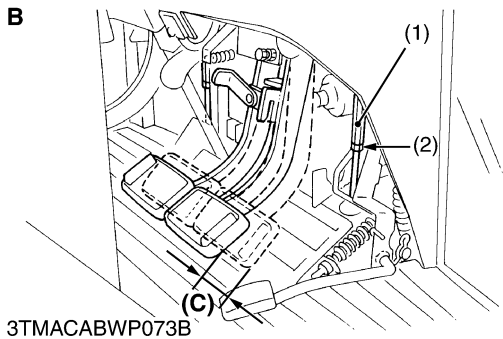
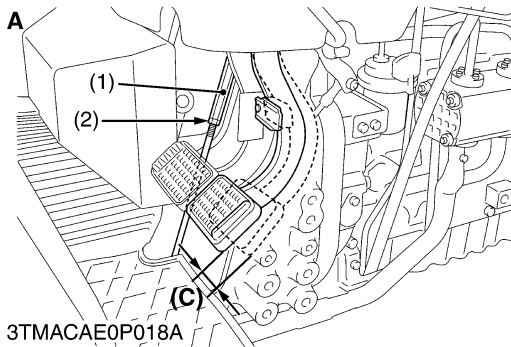
● **Be sure to stop the engine before checking belt tension.**

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

Deflection (A)	Factory spec.	7 to 9 mm 0.28 to 0.35 in.
----------------	---------------	-------------------------------

- | | |
|----------|-----------------------------------|
| (1) Bolt | A : Check the Belt Tension |
| | B : To Tighten |

000003069E



Adjusting Brake Pedal Free Travel

⚠ CAUTION

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

1. Release the parking brake.
2. Slightly depress the brake pedals and measure free travel (C) at top of pedal stroke.
3. If the measurement is not within the factory specifications, loosen the lock nut (2) and turn the turnbuckle (1) to adjust the rod length within acceptable limit.
4. Retighten the lock nut (2).

Brake pedal free travel (C)	Factory spec.	40 to 45 mm 1.6 to 1.8 in.
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■ IMPORTANT

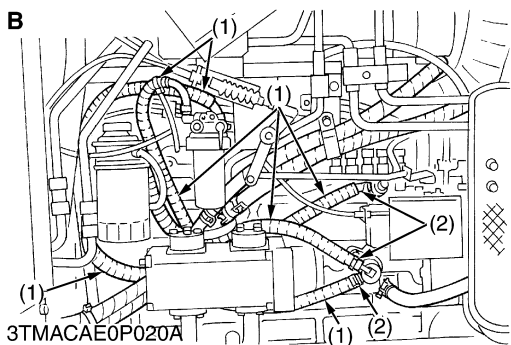
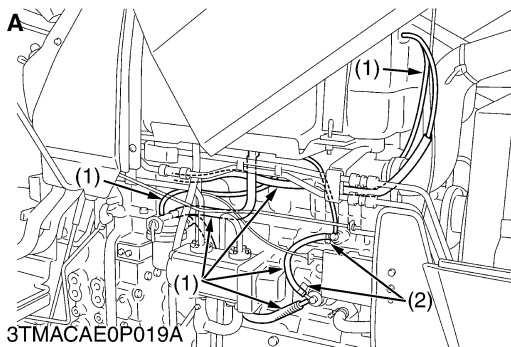
● **Keep the free travel in the right and left brake pedals equal.**

- (1) Turnbuckle
- (2) Lock Nut

A : ROPS Type

B : CABIN Type

000003070E



Checking Fuel Line

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

■ NOTE

● **If the fuel line is removed, be sure to properly bleed the fuel system.**

Refer to "Bleeding Fuel System". (See page G-34.)

- (1) Fuel Line
- (2) Clamp Band

A : ROPS Type

B : CABIN Type

000003071E

[5] CHECK POINTS OF EVERY 200 HOURS

Replacing Engine Oil Filter

1. See page G-15.

000003072E

Checking Radiator Hose and Hose Clamp

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

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

■ **Precaution at Overheating**

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

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

(1) Radiator Hose

(2) Clamp

000003073E

Checking Power Steering Oil Line

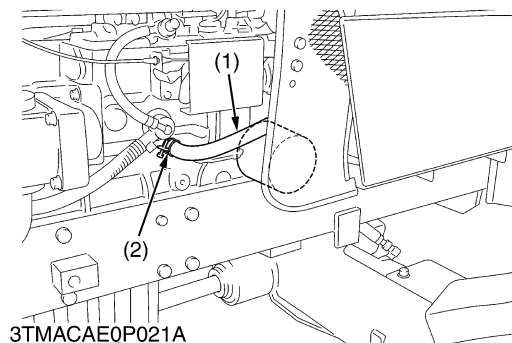
1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace or repair them at once.

(1) Power Steering Hose

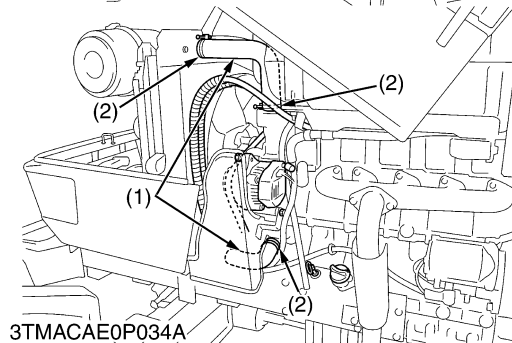
A : ROPS Type

B : CABIN Type

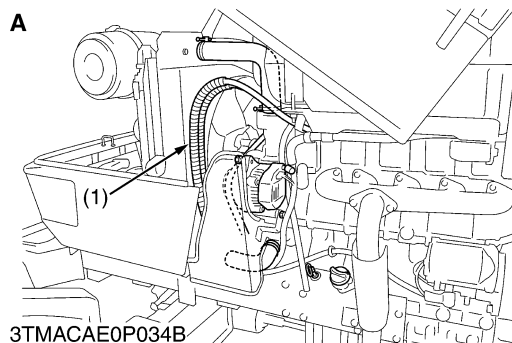
000003074E



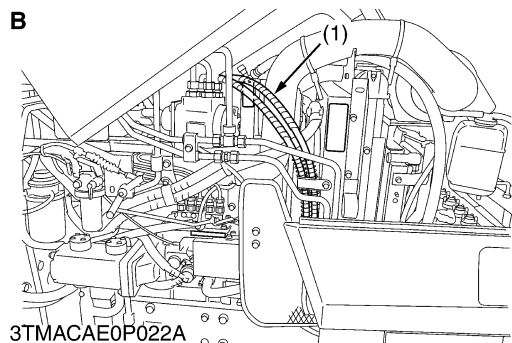
3TMACAE0P021A



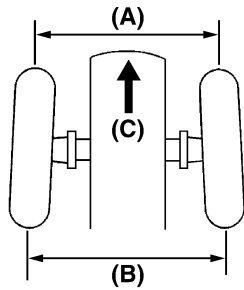
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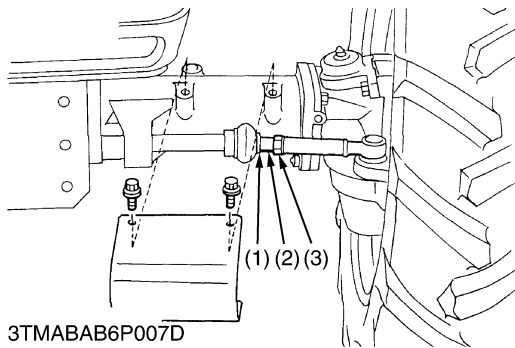
3TMACAE0P034B



3TMACAE0P022A



3TMABAB0P042A



3TMABAB6P007D

Adjusting Toe-in

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

Toe-in (B-A)	Factory spec.	2 to 8 mm 0.08 to 0.31 in.
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■ **Adjusting Procedures**

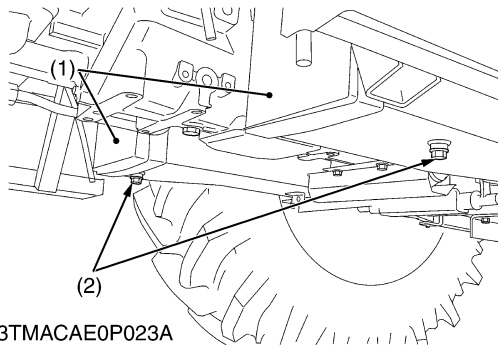
1. Detach the snap ring (1).
2. Loosen the tie-rod nut (3).
3. Turn the tie-rod joint (2) to adjust the rod length until the proper toe-in measurement is obtained.
4. Retighten the tie-rod nut (3).
5. Attach the snap ring (1) of the tie-rod joint (2).

Tightening torque	Tie-rod joint lock nut	166.7 to 196.1 N-m 17.0 to 20.0 kgf-m 123.0 to 144.7 ft-lbs
-------------------	------------------------	---

- (1) Snap Ring
- (2) Tie-rod Joint
- (3) Tie-rod Nut

- A : Wheel-to-wheel distance at front**
- B : Wheel-to-wheel distance at rear**
- C : FRONT**

000003075E



3TMACAE0P023A

Draining Fuel Tank Water (CABIN Type)

1. Loosen the drain plugs (2) at the bottom of the fuel tanks (1) to let sediments, impurities and water out of the tanks (1).
2. Finally tighten up the plugs (2).

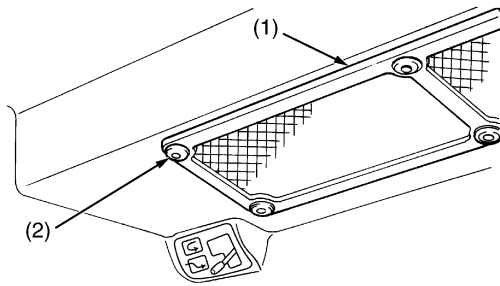
■ **IMPORTANT**

- **If the fuel contains poor qualities with much water in it, drain the fuel tank at shorter intervals.**
- **Drain the fuel before operating the tractor after a long period of storage.**

- (1) Fuel Tank

- (2) Drain Plug

000003076E



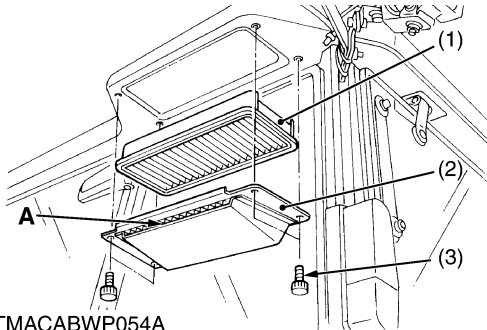
3TMACABWP140A

Cleaning Inner Air Filter (CABIN Type)

1. Remove the inner air filter (1), and blow air from the direction opposite to the filter's normal flow.

- (1) Inner Air Filter
- (2) Push-rivet

000002284E



3TMACABWP054A

Cleaning Fresh Air Filter (CABIN Type)

1. Remove the knob bolts (3) and pull out filter (1).

■ NOTE

- Attach the filter and cover as the illustration above.

■ Cleaning the air filter

- Normal use

Blow air from the opposite direction to the filter's normal air flow.

■ IMPORTANT

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

■ NOTE

- If the filter is very dirty:

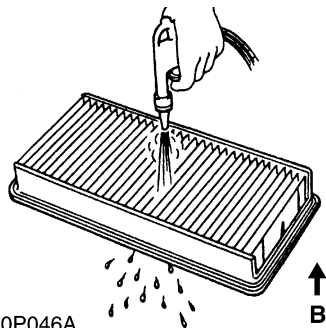
Dip the filter in lukewarm water with mild dish washing detergent.

Move it up and down as well as left and right to loosen dirt. Rinse the filter with clean water and let it air-dry.

■ IMPORTANT

- Do not use gasoline, thinner or similar chemicals to clean the filter as damage to the filter may occur.

- If may also cause an unpleasant odor in the CAB when the system is used next.



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

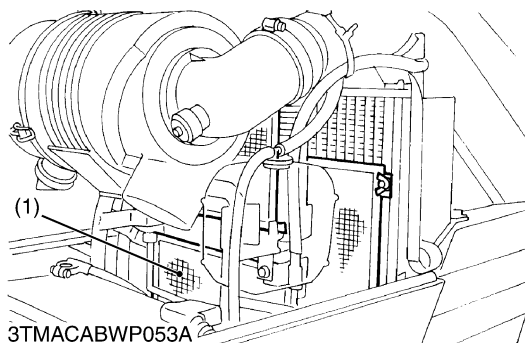
000003077E

Cleaning Air Conditioner Condenser (CABIN Type)

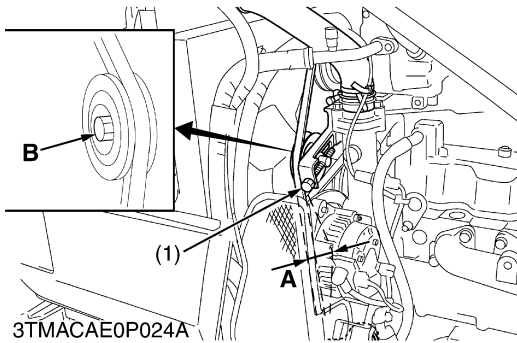
1. Check the air conditioner condenser (1) to be sure it is clean of debris.

- (1) Air Conditioner Condenser

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3TMACABWP053A



Adjusting Air Conditioner Belt Tension (CABIN Type)

1. Push on the belt between the pulleys with a finger.
2. A deflection of 10 to 12 mm (0.39 to 0.47 in.) under a 98 N (10 kgf, 22 lbs) load is appropriate.

Air conditioner belt tension	Factory spec.	A deflection of between 10 to 12 mm (0.39 to 0.47 in.) when the belt is pressed in the middle of the span
------------------------------	---------------	---

(1) Adjusting Bolt

A : Deflection

B : Loosen the Nut

000003079E

[6] CHECK POINTS OF EVERY 300 HOURS

Replacing Hydraulic Oil Filter

1. See page G-16.

000003080E

[7] CHECK POINTS OF EVERY 400 HOURS

Replacing Fuel Filter Element (ROPS Type)

1. See page G-23.

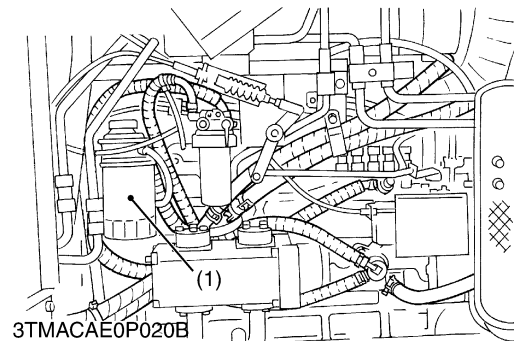
000003081E

Replacing Fuel Filter (CABIN Type)

1. Remove the fuel filter (1).
2. Put a film of clean fuel on rubber seal of new filter.
3. Tighten the filter until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
4. Bleed the fuel system.
Refer to "**Bleeding Fuel System**". (See page G-34.)

(1) Fuel Filter

000003082E



[8] CHECK POINTS OF EVERY 600 HOURS

Changing Transmission Fluid

1. See page G-17.

000003084E

Changing Front Axle Case Oil

1. See page G-17.

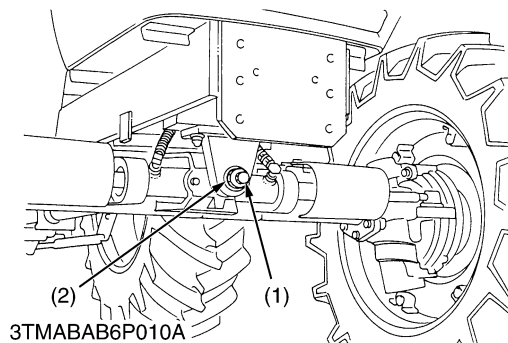
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Adjusting Front Axle Pivot

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

■ Adjusting Procedure

1. Loosen the lock nut (2), tighten the adjusting screw (1) all the way, and then loosen the screw by 1/6 turn.
2. Retighten the lock nut (2).



Tightening torque	Front axle adjusting screw	19.6 to 29.4 N·m 2.0 to 3.0 kgf·m 14.5 to 21.7 ft-lbs
	Lock nut	98.1 to 147.1 N·m 10.0 to 15.0 kgf·m 72.3 to 108.5 ft-lbs

(1) Adjusting Screw

(2) Lock Nut

000003086E

[9] CHECK POINTS OF EVERY 800 HOURS

Adjusting Engine Valve Clearance

1. See page 1-S27.

000003087E

[10]CHECK POINTS OF EVERY 1 YEAR

Replacing Air Cleaner Primary Element and Secondary Element

1. Refer to "**Cleaning Air Cleaner Primary Element**".
(See page G-22.)

000003088E

Checking Air Conditioner Pipes and Hoses (CABIN Type)

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

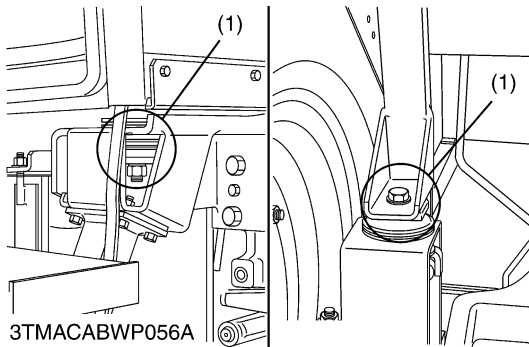
000002299E

Checking Cabin Isolation Cushion (CABIN Type)

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

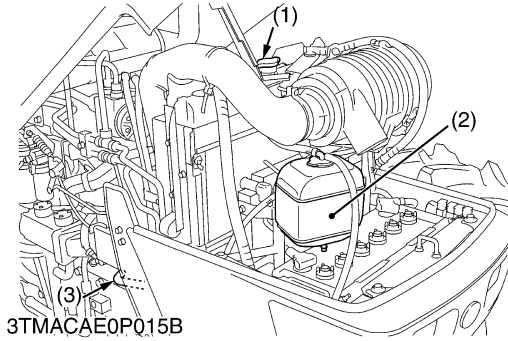
(1) Cushion

000002300E



[11]CHECK POINTS OF EVERY 2 YEARS

Flush Cooling System and Changing Coolant



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⚠ CAUTION

● **Do not remove the radiator cap (1) while coolant is hot. When cool, slowly rotate cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely.**

1. Stop the engine and let cool down.
2. To drain the coolant, remove the radiator hose (3) and radiator cap. The radiator cap (1) must be removed to completely drain the coolant.
3. After all coolant is drained, install the hose (3) securely.
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.
7. Fill with clean water and anti-freeze up to the upper line of recovery tank (2).
8. Install the radiator cap (1) securely.
9. Start and operate the engine for a few minutes.
10. Stop the engine. Check coolant level and add coolant if necessary.

Coolant capacity	Radiator	7.3 L 7.7 U.S.qts 6.4 Imp.qts
	Recovery tank	1.0 L 1.1 U.S.qts 0.9 Imp.qts

■ 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 must be less than 50 %.**
- **Securely tighten radiator cap (1). If the cap is loose or improperly fitted, water may leak out and the engine could overheat.**

■ NOTE

- **On cabin type machines, fresh water circulates through the heater. This means that one more liter or so of fresh water is required.**

In changing fresh water, pour fresh water up to the filter port of the recovery tank. Turn ON the heater (shift the temperature control lever toward WARM), and run the engine for a while in order to warm fresh water. Then stop the engine.

When fresh water has cooled down, some of the fresh water in the recovery tank is sucked. Now the recovery tank is appropriately filled with fresh water.

- (1) Radiator Cap
- (2) Recovery Tank
- (3) Radiator Hose

Flush Cooling System and Changing Coolant (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 or before a long-term storage, let out cooling water 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 cooling water, fill the radiator with fresh water and empty it again.
Repeat this procedure 2 or 3 times to clean up the inside.
3. Mixing the LLC
Put the LLC in cooling water 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, the antifreeze mixing ratio must be less than 50 %.**

Vol % Anti-freeze	Freeze Point	Boiling Point*
	°C	°C
40	-24	106
50	-37	108

*At 1.013 x 1000000 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.

5. Adding the LLC
 - (1) Add only water if the mixture reduces in amount by evaporation.
 - (2) 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 represents industry standards that necessitate a minimum glycol content in the concentrated anti-freeze.**
- **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 Radiator Hose (Water Pipes)

1. Replace the hoses and clamps.
Refer to "**Checking Radiator Hose and Hose Clamp**".
(See page G-25.)

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Replacing Power Steering Hose

1. Replace the hoses and clamps, if necessary.
Refer to "**Checking Power Steering Oil Line**".
(See page G-25.)

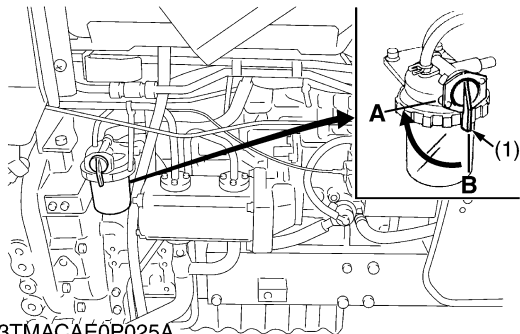
0000003138E

Replacing Fuel Hose

1. Replace the fuel hose and clamps, if necessary.
Refer to "**Checking Fuel Line**".
(See page G-24.)

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[12] OTHERS



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Bleeding Fuel System (ROPS Type)

Air must be removed :

1. When the fuel filter 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 :**

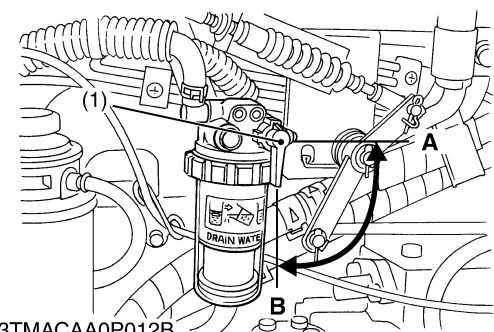
1. Fill the fuel tank with fuel, and open the fuel cock (1).
2. Start the engine and run for about 30 seconds, and then stop the engine.

(1) Fuel Cock

A : Close

B : Open

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3TMACAA0P012B

Bleeding Fuel System (CABIN Type)

Air must be removed :

1. When the fuel filter 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, and open the fuel cock.
2. Start the engine and run for about 30 seconds, and then stop the engine.
3. Pump the fuel pump knob (2) located on the top of the fuel filter. The fuel pump knob will pump easily at first and with added resistance as air is purged from the system. To make sure air is completely purged, pitch the fuel overflow hose with fingers, if a pulsation is felt when the knob is pumped, then, no air remains.
4. Set the hand throttle lever at the maximum speed position, turn the key switch to start the engine, and then reset the throttle lever at the mid speed (around 1500 rpm) position. If engine doesn't start, try it several times at 30 second intervals.

■ **IMPORTANT**

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

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

■ **IMPORTANT**

- **Always close the air vent cock except for bleeding fuel lines. Otherwise, engine runs irregularly or stalls frequently.**

(1) Fuel Cock

A : Close

(2) Fuel Pump Knob

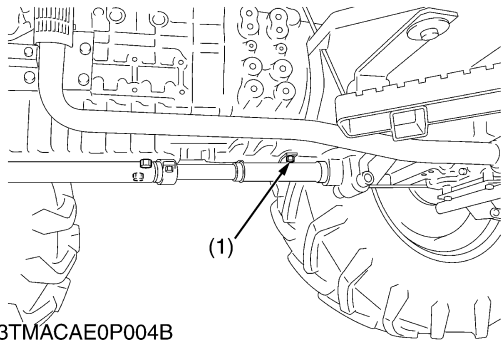
B : Open

(3) Fuel Overflow Hose

C : Up

D : Down

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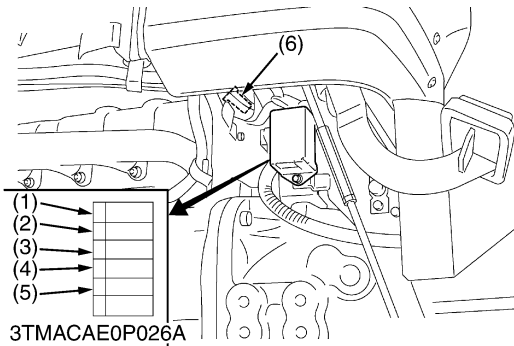


Draining Clutch Housing Water

1. The tractor is equipped with drain plug (1) under the clutch housing.
2. After operating in rain, snow or tractor has been washed, water may get into the clutch housing.
3. Remove the drain plug (1) and drain the water, then install the plug (1) again.

(1) Water Drain Plug

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Replacing Fuse (ROPS Type)

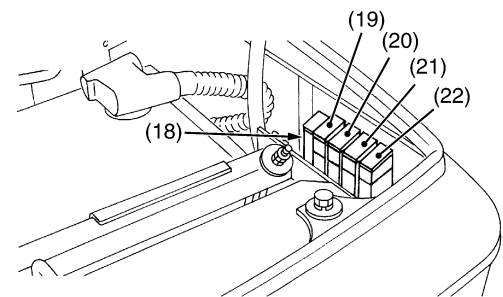
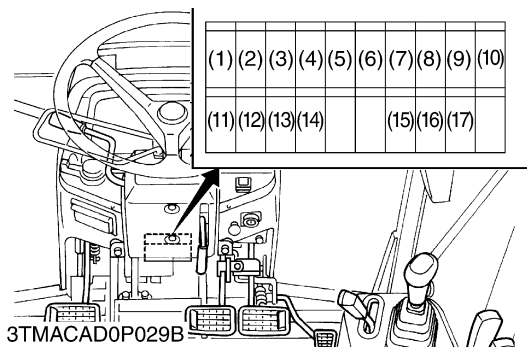
1. The tractor electrical system is protected from potential damage by fuses.
A blown fuse indicates that there is an overload or short somewhere in the electrical system.
2. If any of the fuses should blow, replace with a new one of the same capacity.

■ **IMPORTANT**

- **Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system. Refer to troubleshooting section of this manual for specific information dealing with electrical problems.**

Fuse No.	Capacity (A)	Protected circuit
1	15	Main key
2	15	Head light - Flasher
3	15	Parking - Hazard
4	10	Work light
5	15	Key stop
6	50 Slow blow fuse	Check circuit against wrong battery connection.

000003095E



Replacing Fuse (CABIN Type)

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

IMPORTANT

- Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system. Refer to troubleshooting section of this manual for specific information dealing with electrical problems.

Fuse No.	Capacity (A)	Protected circuit
1	15	Flasher (Hazard)
2	10	Dome light
3	10	Air conditioner (Compressor)
4	25	Air conditioner (Fan motor)
5	5	Air conditioner (Control)
6	15	Wiper
7	5	Radio
8	15	Key stop
9	15	Spare
10	25	Spare
11	10	Engine panel
12	15	Turn signal - Stop lamp
13	15	Auxiliary power
14	15	Head light - Tail lamp - Horn
15	15	Work light (Front)
16	15	Work light (Rear)
17	15	Cigarette lighter
18	65 Slow blow fuse	Check circuit against wrong battery connection.
19	30	Battery
20	30	Accessory
21	30	Main key
22	30	Air conditioner (Fan motor)

000003096E

Replacing Light Bulb (ROPS Type)

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 lights	45 W
Tail light	10 W
Turn signal / hazard light (front)	21 W
Turn signal / hazard light (rear)	21 W
Sidemarkers light	5 W
Brake stop light	21 W
Number plate light	5 W
Instrument panel light	3.4 W
Work light	35 W

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Replacing Light Bulb (CABIN Type)

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 lights	45 / 45 W
Tail light	10 W
Turn signal / hazard light (front)	21 W
Turn signal / hazard light (rear)	21 W
Brake stop light	21 W
Instrument panel light	3.4 W
Easy checker	1.4 W, 3 W
Work light	55 W
Dome light (room light)	10 W
Sidemarkers light	5 W
Number plate light	5 W

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Adding Washer Liquid (CABIN Type)

1. Add a proper amount of automobile washer liquid.

Washer liquid tank	Capacity	1.3 L 1.4 U.S.qts 1.1 Imp.qts

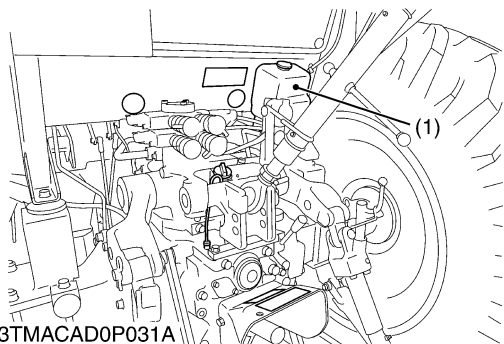
(1) Washer Liquid Tank

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Checking the Amount of Refrigerant (CABIN Type)

1. See page 10-S23.

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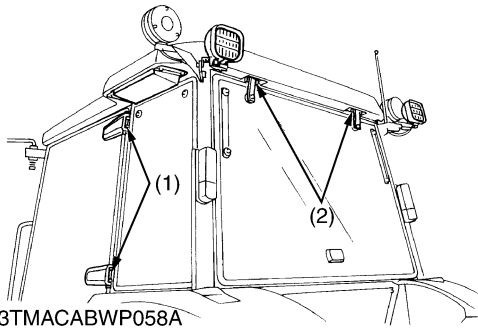
Lubricating Door and Rear Window Hinge

1. Apply a small amount of lubricating liquid to the following points when it is necessary.

(1) Door Hinge

(2) Rear Window Hinge

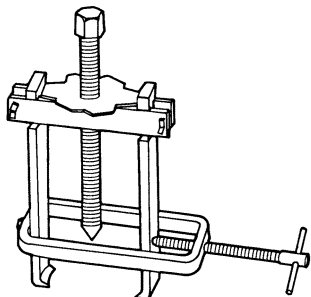
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8. SPECIAL TOOLS

[1] SPECIAL TOOLS FOR ENGINE



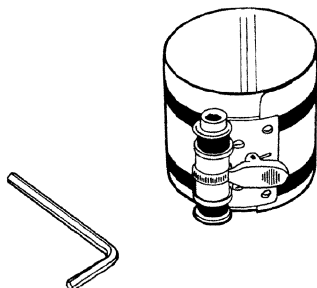
3TMABAB0P049A

Special Use Puller Set

Code No : 07916-09032

Application : Use exclusively for pulling out bearing, gears and other parts with ease.

000000677E



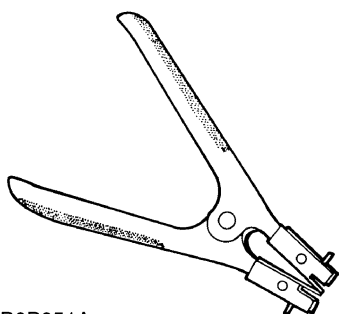
3TMABAB0P050A

Piston Ring Compressor

Code No : 07909-32111

Application : Use exclusively for pushing in the piston with piston rings into the cylinder.

000000678E



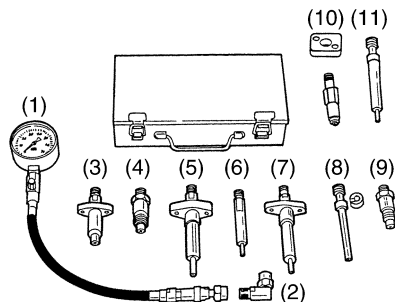
3TMABAB0P051A

Piston Ring Tool

Code No : 07909-32121

Application : Use exclusively for removing or installing the piston ring with ease.

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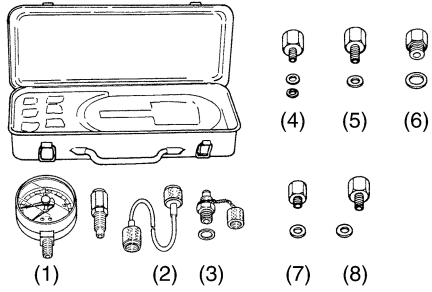
Diesel Engine Compression Tester

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

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

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

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3TMABAB0P053A

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

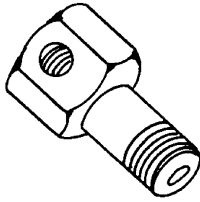
000000681E

Adaptor 7

Code No : 07916-32591

Application : Use to measure lubricating oil pressure.

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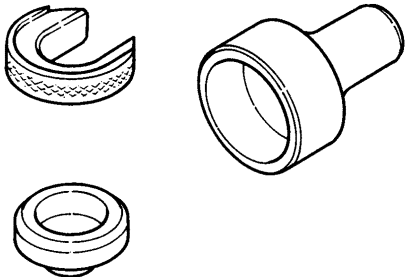
3TMACAB0P036A

Auxiliary Socket For Fixing Crankshaft Sleeve

Code No : 07916-32091

Application : Use to fix the crankshaft sleeve of the diesel engine.

0000003099E



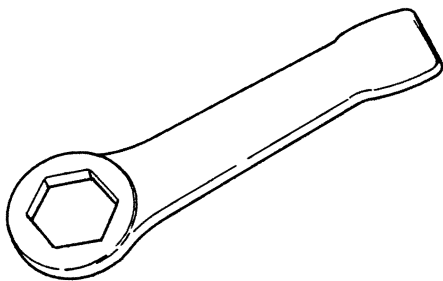
3TMABAB0P062A

Socket Wrench 46

Code No : 07916-30901

Application : Use exclusively for removing or installing the crankshaft nut.

0000003100E

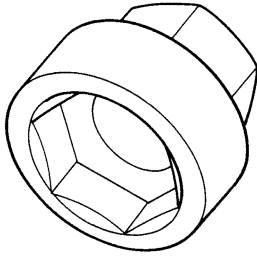


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Crankshaft Nut Socket 46

Code No : 07916-30821

Application : Use exclusively for removing or installing the crankshaft nut.



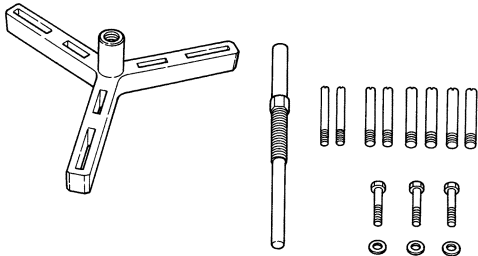
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Flywheel Puller

Code No : 07916-32011

Application : Use exclusively for removing the flywheel with ease.



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3GFABAB0P039A

Valve Seat Cutter

Code No : 07909-33102

Application : Use to reseal valves.

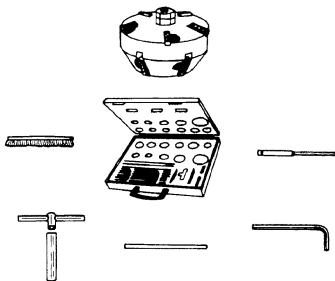
Angle : 0.785 rad (45°)

0.262 rad (15°)

Diameter : 28.6 mm (1.126 in.) 38.0 mm (1.496 in.)

31.6 mm (1.244 in.) 41.3 mm (1.626 in.)

35.0 mm (1.378 in.) 50.8 mm (2.000 in.)



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Connecting Rod Alignment Tool

Code No : 07909-31661

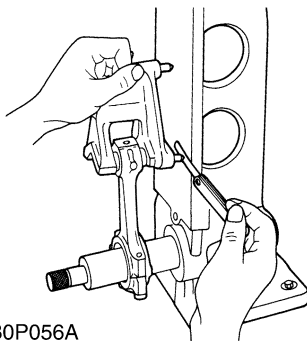
Application : Use to check the connecting rod alignment.

Applicable : Connecting rod big end I.D.

range 30 to 75 mm (1.18 to 2.95 in.) dia.

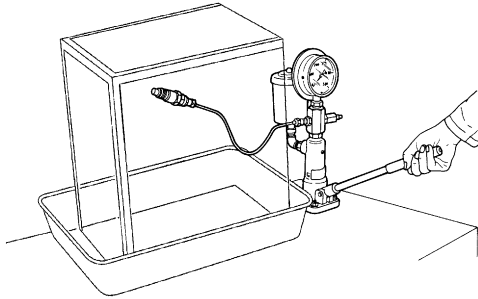
Connecting rod length

65 to 300 mm (2.56 to 11.81 in.)



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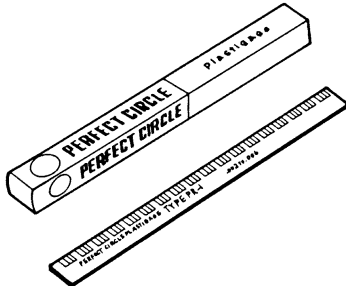
Nozzle Tester

Code No : 07909-31361

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

Measuring : 0 to 50 MPa
range (0 to 500 kgf/cm², 0 to 7000 psi)

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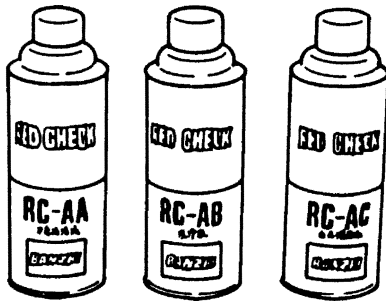
Plastigage

Code No : 07909-30241

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

Measuring : Green.....0.025 to 0.076 mm (0.001 to 0.003 in.)
range Red.....0.051 to 0.152 mm (0.002 to 0.006 in.)
Blue.....0.102 to 0.229 mm (0.004 to 0.009 in.)

000000686E



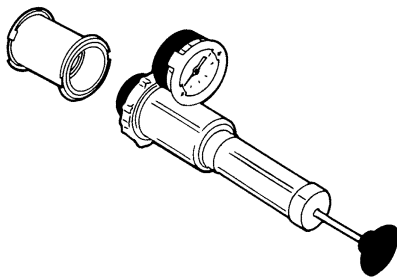
3TMABAB0P059A

Red Check

Code No : 07909-31371

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

000000687E



3TMABAB0P055A

Radiator Tester

Code No : 07909-31551

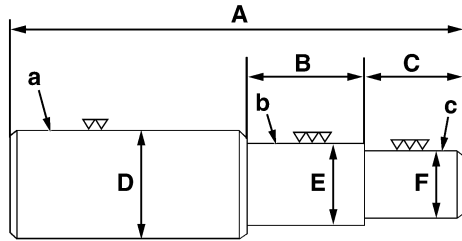
Application : Use to check of radiator cap pressure, and leaks from cooling system.

000003103E

■ **NOTE**

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

000002319E



3TMABAB0P066B

Bushing Replacing Tools

Application : Use to press out and to press fit the bushing.

[For small end bushing]

A	162 mm (6.38 in.)
B	35 mm (1.38 in.)
C	27 mm (1.06 in.)
D	35 mm dia. (1.38 in. dia.)
E	27.90 to 27.95 mm dia. (1.098 to 1.100 in. dia.)
F	25.00 to 25.01 mm dia. (0.984 to 0.985 in. dia.)
a	6.3 μm (250 μin.)
b	1.25 μm (50 μin.)
c	1.25 μm (50 μin.)

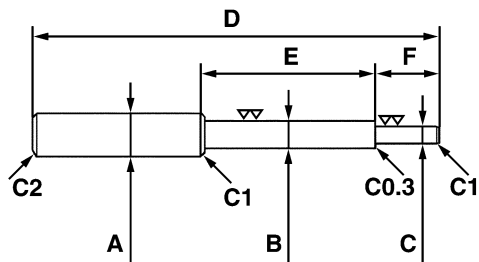
[For idle gear bushing]

A	175 mm (6.89 in.)
B	40 mm (1.57 in.)
C	38 mm (1.49 in.)
D	45 mm dia. (1.77 in. dia.)
E	41.90 to 41.95 mm dia. (1.650 to 1.652 in. dia.)
F	37.95 to 37.97 mm dia. (1.494 to 1.495 in. dia.)
a	6.3 μm (250 μin.)
b	1.25 μm (50 μin.)
c	1.25 μm (50 μin.)

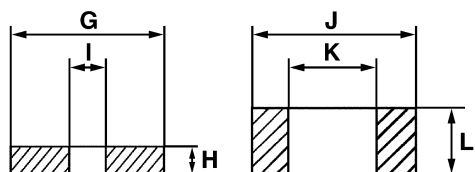
000003104E

Valve Guide Replacing Tool

Application : Use to press out and press fit the valve guide.



3TMABAB0P063A



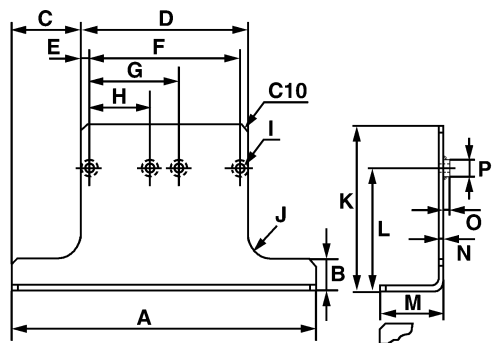
3TMABAB0P064A

A	20 mm dia. (0.79 in. dia.)
B	11.7 to 11.9 mm dia. (0.460 to 0.468 in.dia.)
C	6.5 to 6.6 mm dia. (0.256 to 0.259 in.dia.)
D	225 mm (8.86 in.)
E	70 mm (2.76 in.)
F	45 mm (1.77 in.)
G	25 mm (0.98 in.)
H	5 mm (0.197 in.)
I	6.7 to 7.0 mm dia. (0.263 to 0.275 in.dia.)
J	20 mm dia. (0.787 in.dia.)
K	12.5 to 12.8 mm dia. (0.492 to 0.504 in.dia.)
L	8.9 to 9.1 mm (0.350 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.)

000003105E

Engine Stand

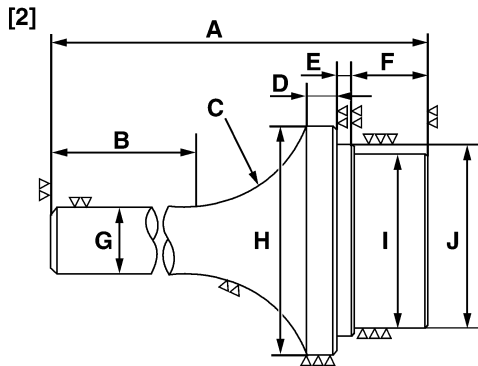
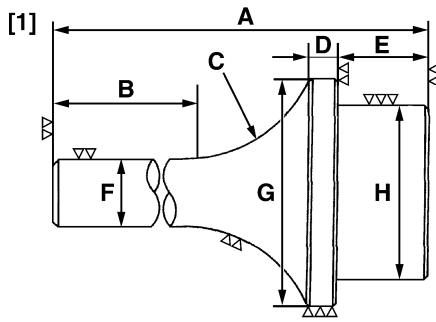
Application :Use to support engine.



3TMACAB0P039A

A	480 mm (18.90 in.)
B	50 mm (1.97 in.)
C	108.5 mm (4.272 in.)
D	263 mm (10.35 in.)
E	12.5 mm (0.492 in.)
F	237.5 mm (9.350 in.)
G	142.5 mm (5.610 in.)
H	95 mm (3.74 in.)
I	4.14 mm dia. (0.55 in. dia.)
J	40 mm (1.57 in.)
K	210 mm (8.27 in.)
L	190 mm (7.48 in.)
M	100 mm (3.94 in.)
N	6 mm (0.24 in.)
O	6 mm (0.24 in.)
P	25 mm dia. (0.98 in. dia.)
C10	Chamfer 10 mm (0.394 in.)

000002337E



3TMABAB0P068A

Crankshaft Bearing 1 Replacing Tool

Application : Use to press out and press fit the crankshaft bearing 1.

[1] Extracting tool

A	135 mm (5.31 in.)
B	72 mm (2.83 in.)
C	R40 mm (R1.57 in.)
D	10 mm (0.39 in.)
E	20 mm (0.79 in.)
F	20 mm dia. (0.79 in. dia.)
G	56.8 to 56.9 mm dia. (2.236 to 2.240 in. dia.)
H	51.8 to 51.9 mm dia. (2.039 to 2.043 in. dia.)

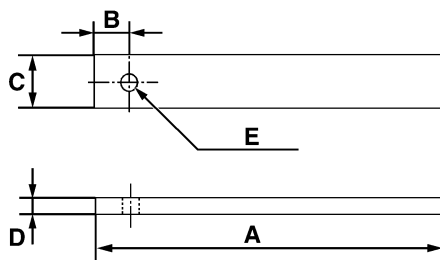
[2] Inserting tool

A	130 mm (5.12 in.)
B	72 mm (2.83 in.)
C	R40 mm (R1.57 in.)
D	9 mm (0.35 in.)
E	4 mm (0.16 in.)
F	20 mm (0.79 in.)
G	20 mm dia. (0.79 in. dia.)
H	68 mm dia. (2.68 in. dia.)
I	51.8 to 51.9 mm dia. (2.039 to 2.043 in. dia.)
J	56.8 to 56.9 mm dia. (2.236 to 2.240 in. dia.)

000003106E

Flywheel Stopper

Application : Use to loosen and tighten the flywheel screw.



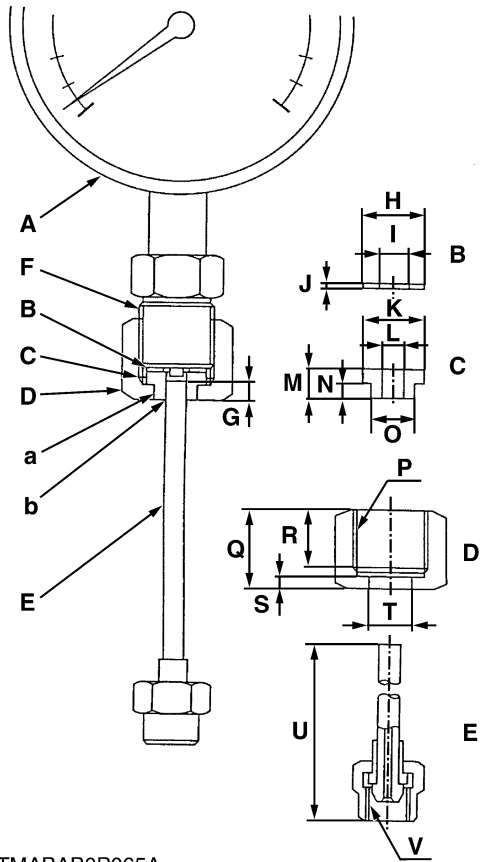
3TMABAB0P067B

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

000003107E

Injection Pump Pressure Tester

Application : Use to check fuel tightness of injection pumps.



3TMABAB0P065A

A	Pressure gauge full scale : More than 29.4 MPa (300kgf/cm ² , 4267 psi)
B	Copper gasket
C	Flange (Material : Steel)
D	Hex. nut 27 mm (1.06 in.) across the plat
E	Injection Pipe
F	PF 1/2
G	5 mm (0.20 in.)
H	17 mm dia. (0.67 in.dia.)
I	8 mm dia. (0.31 in.dia.)
J	1.0 mm (0.039 in.)
K	17 mm dia. (0.67 in.dia.)
L	6.10 to 6.20 mm dia. (0.2402 to 0.2441 in.dia.)
M	8 mm (0.31 in.)
N	4 mm (0.16 in.)
O	11.97 to11.99 mm dia. (0.4713 to 0.4721 in.dia.)
P	PF 1/2
Q	23 mm (0.91 in.)
R	17 mm (0.67 in.)
S	4 mm (0.16 in.)
T	12.00 to 12.02 mm dia. (0.4724 to 0.4732 in.dia.)
U	100 mm (3.94 in.)
V	M12 x P1.5
a	Adhesive application
b	Fillet welding on the enter circumference

000000693E

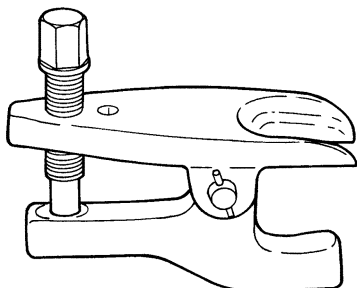
[2] SPECIAL TOOLS FOR TRACTOR

Tie-rod End Lifter

Code No : 07909-39051

Application : Use for removing the tie-rod end with ease.

000000699E



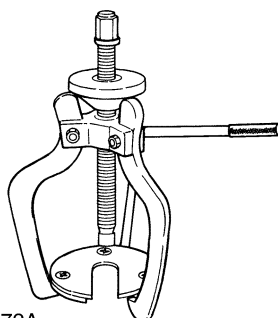
3TMABAB0P071A

Steering Wheel Puller

Code No : 07916-51090

Application : Use for removing the steering wheel without damaging the steering shaft.

000002338E

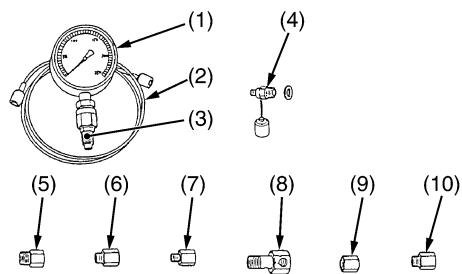


3TMABAB0P072A

Relief Valve Pressure Tester

Code No : 07916-50045

Application : This allows easy measurement of relief set pressure.



3TMABAB0P077A

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

000000705E

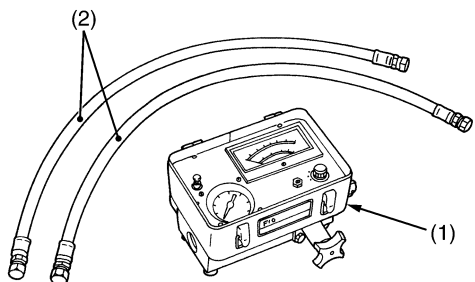
Flow Meter

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

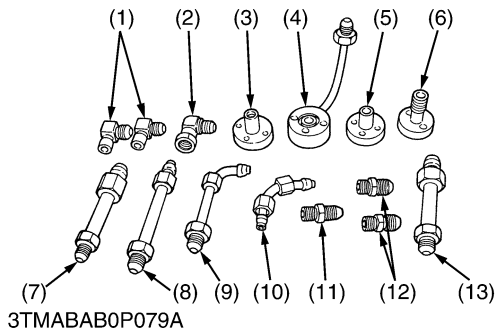
Application : This allows easy testing of hydraulic system.

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

000002339E



3TMABAB0P078A



Adaptor Set for Flow Meter

Code No : 07916-54031

Application : Use for testing the hydraulic system.

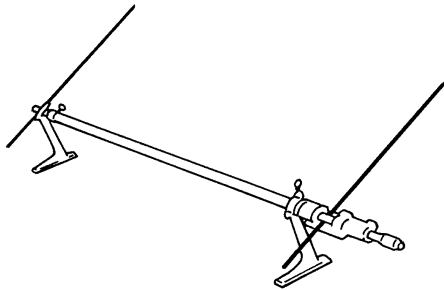
- | | |
|-----------------------|---------------------------------|
| (1) Adaptor 52 | (8) Adaptor 65 |
| (2) Adaptor 53 | (9) Adaptor 66 |
| (3) Adaptor 54 | (10) Adaptor 67 |
| (4) Adaptor 61 | (11) Adaptor 68 |
| (5) Adaptor 62 | (12) Adaptor 69 |
| (6) Adaptor 63 | (13) Hydraulic Adaptor 1 |
| (7)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

000002340E

Toe-in Gauge

Code No : 07909-31681

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



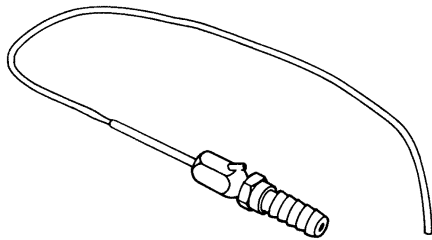
000002341E

3TMABAB0P075A

Injector CH3

Code No : 07916-52501

Application : Use for injecting calcium chloride solution into, and removing it from, rear tires.



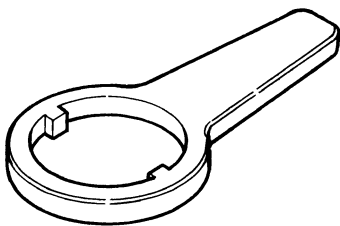
000002342E

3TMABAB0P073A

Rear Axle Nut Wrench 85

Code No : 07916-52541

Application : Use for removing and installing a rear axle nut.



000003108E

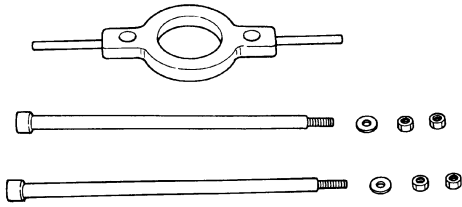
3TMACAB0P038A

Rear Axle Cover Puller

Code No : 07916-51041

Application : Use for removing a rear axle cover from rear axle.

0000003139E



3TMABAB0P076A

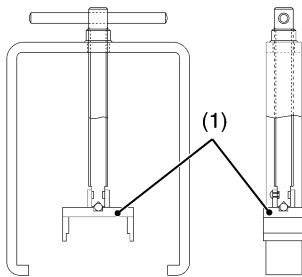
Shuttle Clutch Compression Tool

Code No. : 07916-55031

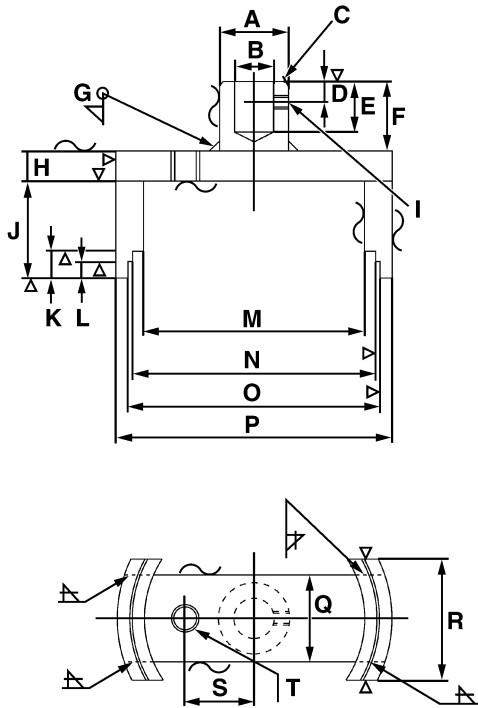
Application : Use exclusively for pushing the thrust collar, remove the external snap ring.

■ **NOTE**

- Replace the center guide (1) for shown in figure.



3TMACAD0P033A



3TMACAD0P034A

A	20 mm dia. (0.79 in. dia.)
B	11.5 mm dia. (0.45 in. dia.)
C	Chamfer 1 mm (0.04 in.)
D	6 mm (0.24 in.)
E	15 mm (0.59 in.)
F	20 mm (0.79 in.)
G	Weld all around
H	6 mm (0.24 in.)
I	M4 x 0.7
J	28 mm (1.1 in.)
K	8 mm (0.31 in.)
L	5 mm (0.2 in.)
M	67 mm dia. (2.64 in. dia.)
N	73.5 mm dia. (2.89 in. dia.)
O	76 mm dia. (3.27 in. dia.)
P	83 mm dia. (3.27 in. dia.)
Q	25 mm (0.98 in.)
R	35 mm (1.38 in.)
S	20 mm (0.79 in.)
T	M8 x 1.25

(1) Center Guide

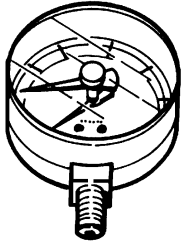
0000002344E

Pressure Gauge 50

Code No : 07916-52961

Application : This pressure gauge is used to measure the low oil pressure.

000002345E



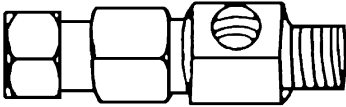
3TMACAD0P035A

Power Steering Adaptor

Code No : 07916-54021

Application : Use for measuring the relief valve setting pressure for power steering.

000002346E



3TMABAB0P080A

■ NOTE

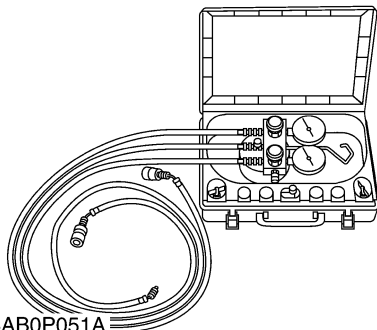
- Special tools for R134a refrigerant air conditioning system introduced below are available from DENSO CO.LTD..

000002347E

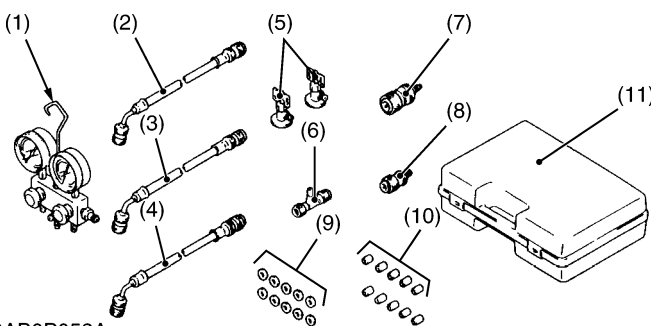
Air Conditioner Service Tool

Code No. : DENSO.CO. 95048-00061

Application : Use for charging, testing or discharging the air conditioning system.



3TLABAB0P051A



3TLABAB0P052A

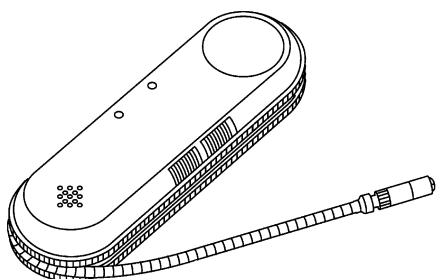
- | | |
|-------------------------------|-------------|
| (1) Manifold Gauge Assembly | 95048-10090 |
| (2) Charging Hose (Red : HI) | 95948-10270 |
| (3) Charging Hose (Blue : LO) | 95048-10280 |
| (4) Charging Hose (Green) | 95948-10260 |
| (5) Can Tap Valve | 95048-10150 |
| (6) T Joint | 95048-10160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

000002349E

Electric Gas Leak Tester

Code No : DENSO.CO. 95146-00060

Application : Use for gas leak testing the air conditioning system.



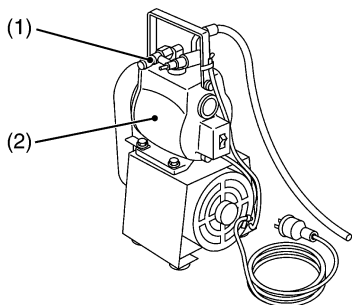
3TLABAB0P053A

000002348E

Vacuum Pump

Code No : DENSO.CO. 95046-00040 (AC220V)
95046-00050 (AC240V)

Application : Use for evacuating the air conditioning system.



3TLABABWP012A

- | | |
|-------------------------|-----------------|
| (1) Adaptor (for R134a) | (2) Vacuum Pump |
|-------------------------|-----------------|

000002350E

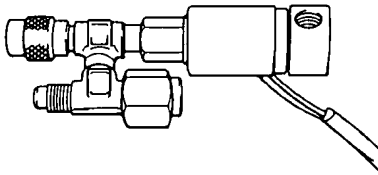
Adaptor (for R134a)

Code No : DENSO.CO. 95048-10190 (AC220V)

95048-10200 (AC240V)

Application : Use for evacuating the air conditioning system.

000002351E



3TLABAB0P054A

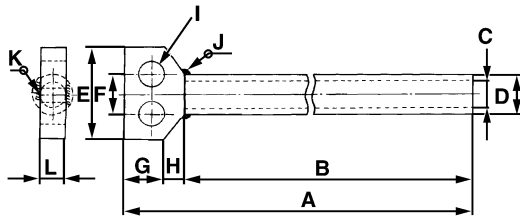
NOTE

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

000002319E

Draft Control Test Bar

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



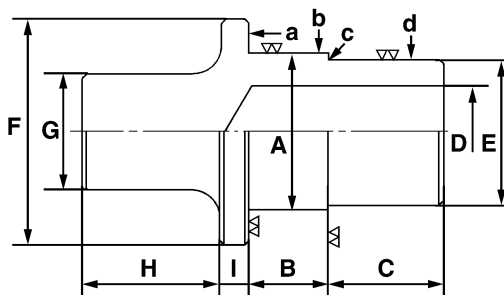
3TMABABOP086A

A	1045 mm (41.14 in.)
B	1000 mm (29.37 in.)
C	20 mm dia. (0.79 in. dia.)
D	30 mm dia. (1.18 in. dia.)
E	90 mm (3.54 in.)
F	30.5 mm (1.20 in.)
G	30 mm (1.18 in.)
H	15 mm (0.59 in.)
I	21 mm dia. (0.83 in. dia.)
J	Weld all around
K	Weld all around
L	20 mm (0.79 in.)

000002352E

Hydraulic Arm Shaft Bushing Press-Fitting Tool

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



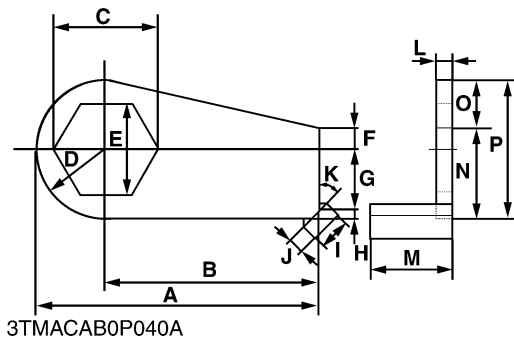
3TMABABOP085A

NOTE

- Unless otherwise specified : All surface 12.5 μm (500 μin.)

	Right	Left
A	54.7 to 54.9 mm (2.1535 to 2.1614 in.)	49.7 to 49.9 mm (1.9567 to 1.9646 in.)
B	22.5 to 23.5 mm (0.729 to 0.767 in.)	18.5 to 19.0 mm (0.886 to 0.925 in.)
C	55 mm (2.10 in.)	60 mm (2.36 in.)
D	32 mm (1.26 in.)	30 mm (1.18 in.)
E	49.7 to 49.9 mm (1.9567 to 1.9646 in.)	44.7 to 44.9 mm (1.7598 to 1.7677 in.)
F	70 mm dia. (2.76 in. dia.)	
G	40 mm dia. (1.57 in. dia.)	
H	50 mm (1.97 in.)	
I	10 mm (0.39 in.)	
a	6.3 μm (250 μin.)	
b	6.3 μm (250 μin.)	
c	6.3 μm (250 μin.)	
d	6.3 μm (250 μin.)	

000003109E

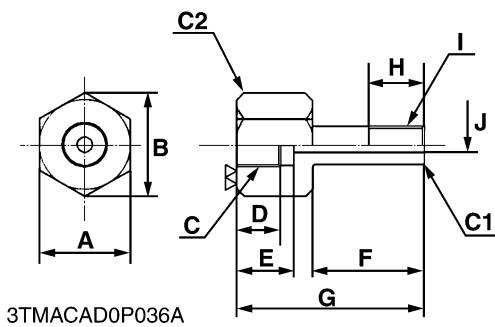


Locking Wrench

Application :Use for locking a pinion nut.

A	170 mm (6.69 in.)
B	130 mm (5.12 in.)
C	63.5 mm (2.5 in.)
D	40 mm radius (1.57 in. radius)
E	55 mm (2.17 in.)
F	15 mm (0.59 in.)
G	35 mm (1.38 in.)
H	5 mm (0.2 in.)
I	20 mm (0.55 in.)
J	10 mm (0.39 in.)
K	0.78 rad (45 °)
L	10 mm (0.39 in.)
M	50 mm (1.97 in.)
N	55 mm (2.17 in.)
O	25 mm (0.97 in.)
P	80 mm (3.15 in.)

000002354E



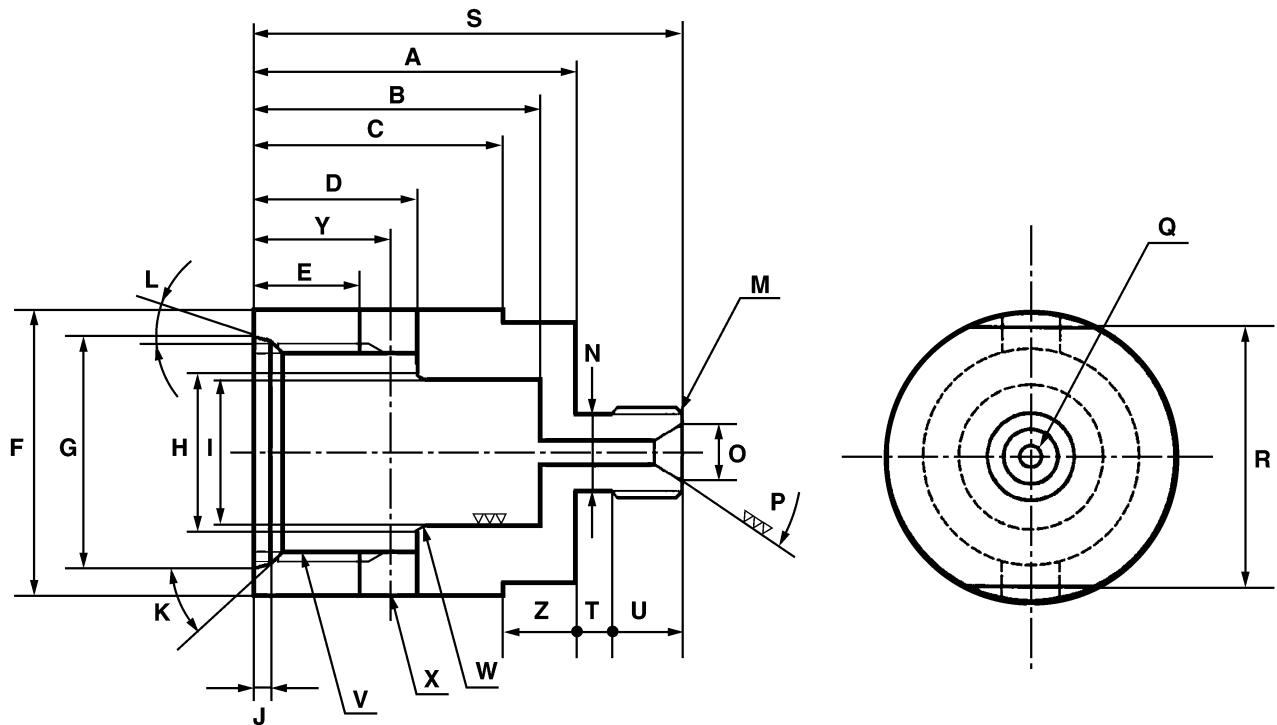
Valve Adaptor

Application :Use for measuring the system pressure of shuttle valve.

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

000002355E

Cylinder Safety Valve Setting Pressure Adaptor



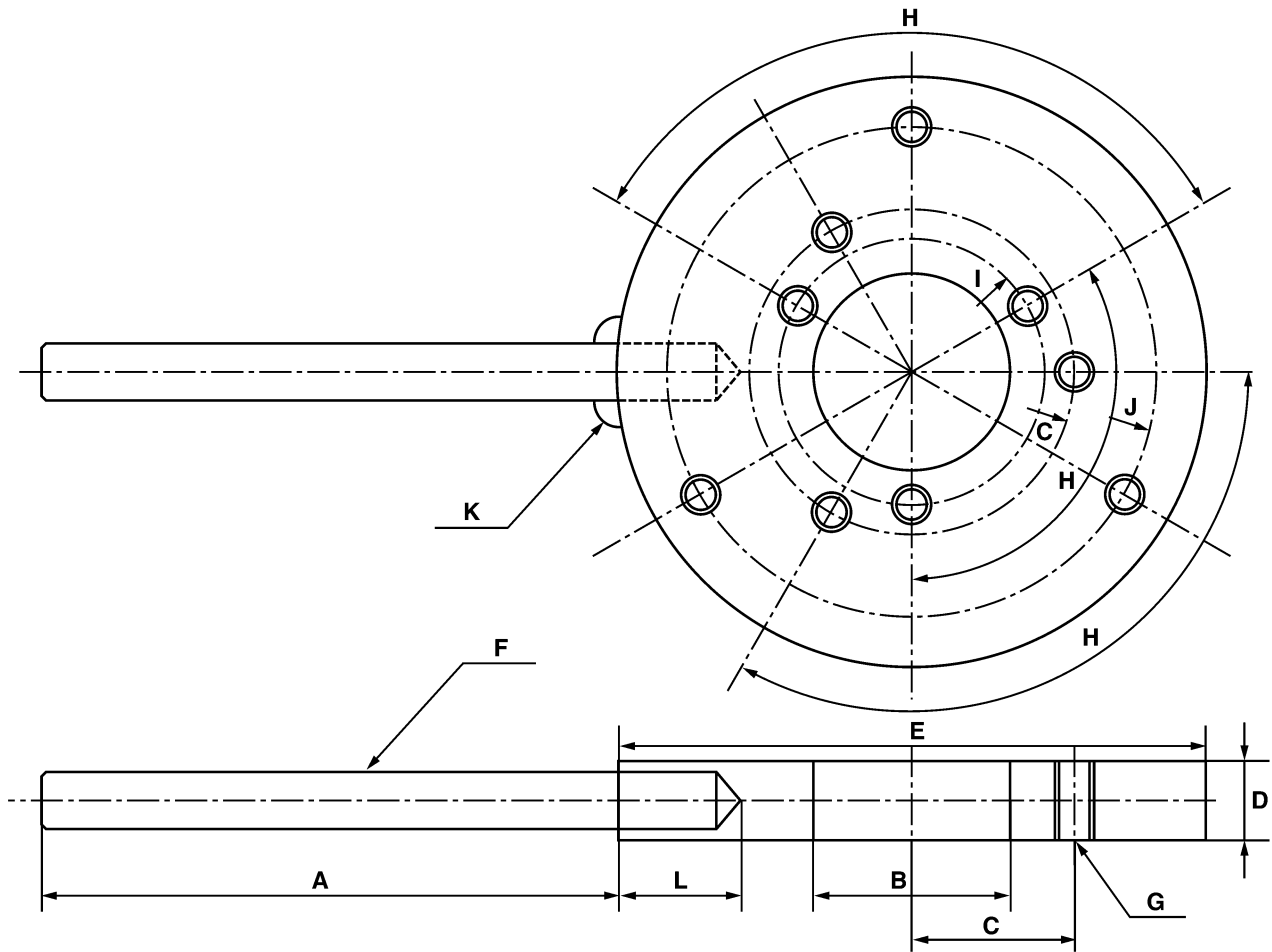
3TMACAB0P042A

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

A	45 mm (1.77 in.)	N	10 mm dia. (0.39 in. dia.)
B	40 mm (1.58 in.)	O	7.5 mm dia. (0.3 in. dia.)
C	35 mm (1.38 in.)	P	1.05 rad (60 °)
D	23 to 23.3 mm (0.9055 to 0.9713 in.)	Q	3 mm dia. (1.18 in. dia.)
E	16 mm (0.63 in.)	R	36 mm (1.18 in.)
F	40 mm (1.58 in.)	S	60 mm (2.36 in.)
G	32.4 to 32.7 mm (1.2756 to 1.2874 in.)	T	5 mm (0.20 in.)
H	21 mm dia. (0.83 in. dia.)	U	10 mm (0.39 in.)
I	20 to 20.05 mm (0.7874 to 0.7894 in.)	V	M30 x 1.5
J	2.5 to 2.59 mm (0.0984 to 0.1097 in.)	W	0.52 rad (30 °)
K	0.79 rad (45 °)	X	8 mm dia. (0.32 in. dia.)
L	0.26 rad (15 °)	Y	19 mm (0.75 in.)
M	M12 x P1.5	Z	10 mm (0.39 in.)

000002356E

Stopper Magnet Clutch (For A/C Compressor)

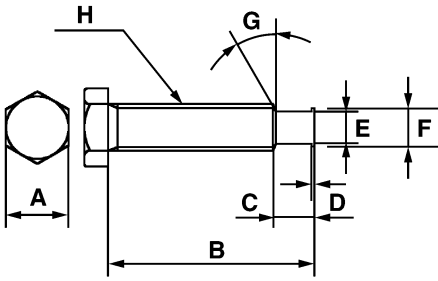


3TLABAB0P038A

Application : Use for loosen and tighten the magnet clutch mounting nut.

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

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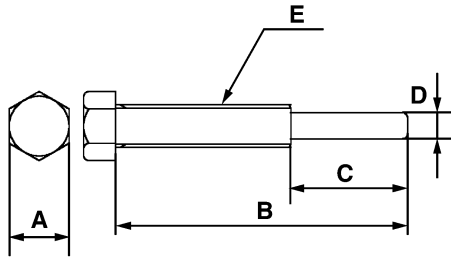
3TLABAB0P039A

Stopper Bolt (for A/C Compressor)

Application : Use with the stopper magnet clutch.

A	12 mm (0.47 in.)	E	5.5 mm dia. (0.22 in. dia.)
B	35 mm (1.38 in.)	F	6.5 mm dia. (0.26 in. dia.)
C	7 mm (0.28 in.)	G	0.52 rad (30 °)
D	0.4 mm (0.016 in.)	H	M8 x 1.25

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3TLABAB0P040A

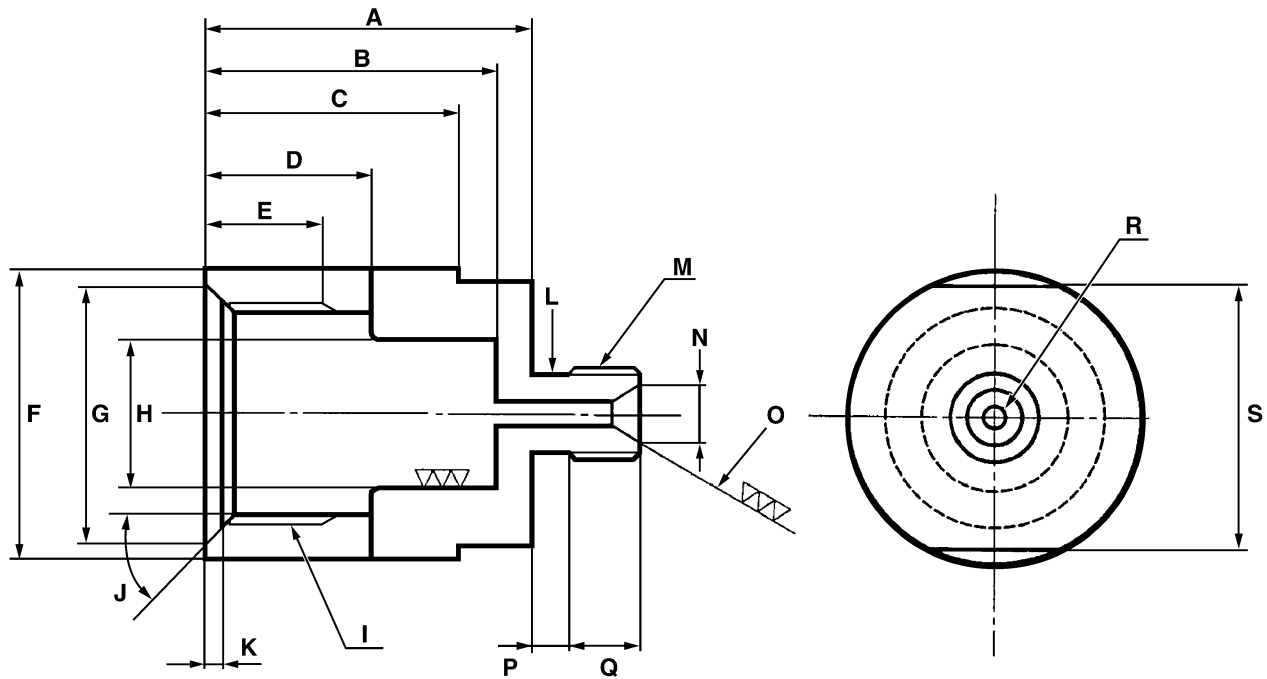
Remove Magnet Clutch (for A/C Compressor)

Application :Use to remove the hub plate or center piece.

A	12 mm (0.14 in.)
B	55 mm (2.17 in.)
C	20 mm (0.55 in.)
D	5 mm dia. (0.2 in. dia.)
E	M8 x 1.25

0000002358E

Oil Cooler Relief Valve Setting Pressure Adaptor



3TMACAA0P034A

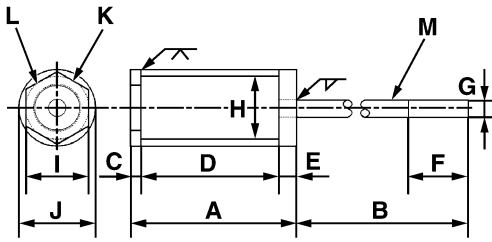
Application : Use for setting the oil cooler relief valve to the nozzle tester to measure cracking pressure and check oil tightness of the oil cooler relief valve.

A	45 mm (1.77 in.)	K	2 mm (0.079 in.)
B	40 mm (1.58 in.)	L	10 mm dia. (0.39 in. dia.)
C	28 mm (1.1 in.)	M	M12 x 1.5
D	18 mm (0.71 in.)	N	7.5 mm dia. (0.3 in. dia.)
E	15 mm (0.59 in.)	O	1.05 rad. (60 °)
F	24 mm (0.94 in.)	P	5 mm (0.20 in.)
G	20 mm (0.79 in.)	Q	10 mm (0.39 in.)
H	15 mm (0.59 in.)	R	3 mm dia. (0.118 in. dia.)
I	M18 x 1.5	S	21 mm (0.83 in.)
J	0.79 rad. (45 °)		

000003111E

Pinion Shaft Remover

Application :Use for removing a pinion shaft.

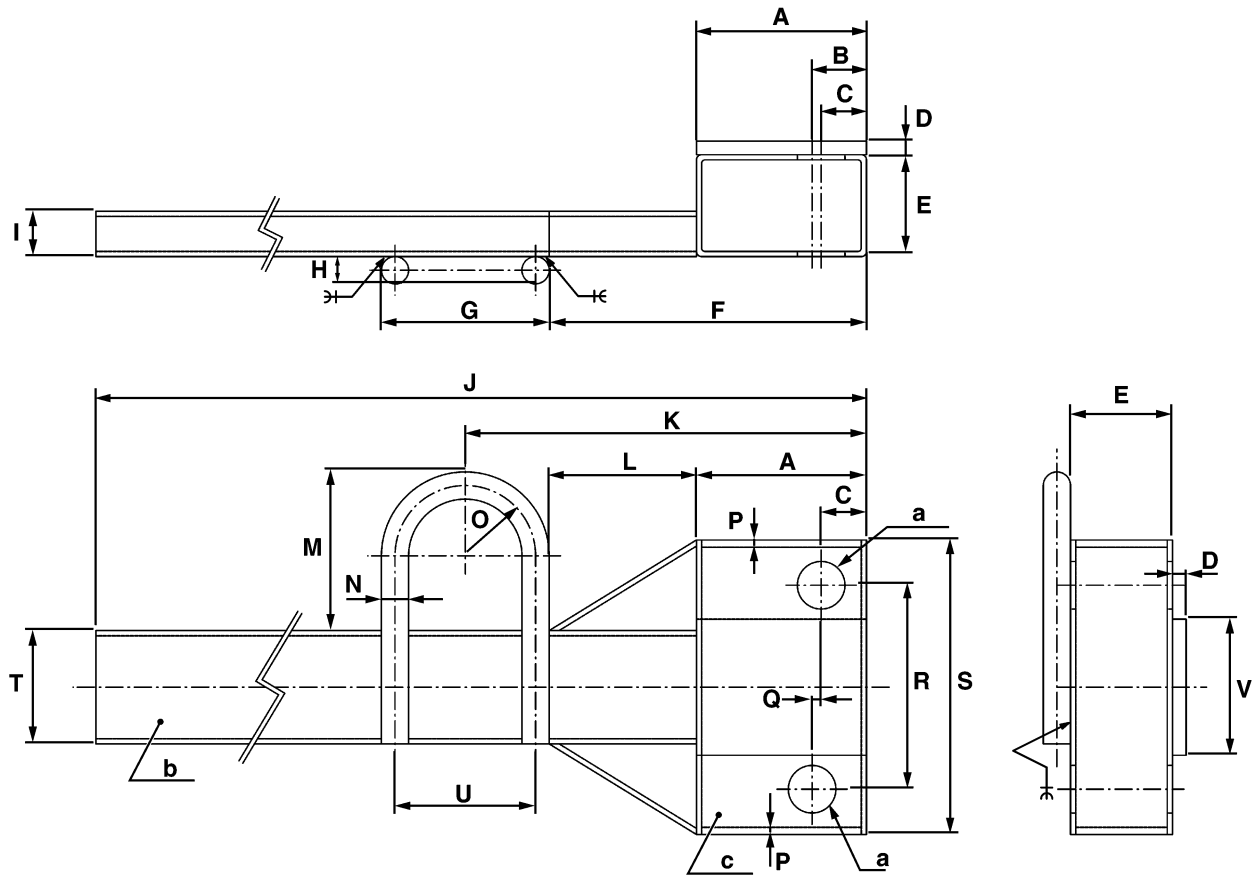


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A	106 mm (4.17 in.)
B	350 mm (13.078 in.)
C	6 mm (0.24 in.)
D	90 mm (3.54 in.)
E	10 mm (0.39 in.)
F	40 mm (1.57 in.)
G	10 mm (0.39 in.)
H	35.6 mm (1.40 in.)
I	36 mm (1.42 in.)
J	41.6 mm (1.64 in.)
K	Part code No. 3A201-4130 nut
L	M27 x 1.5
M	M10 x 1.25

000003112E

Hydraulic Cylinder Block Tool



3TMACAE0P035A

Application : Use for separating a hydraulic cylinder block.

■ NOTE

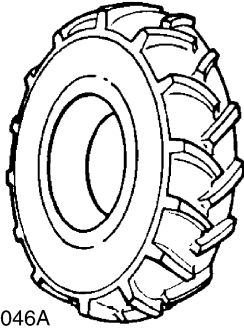
- The sealing surface of the connecting parts must be welded.

A	75 mm (2.95 in.)	N	12 mm dia. (0.47 in. dia.)
B	24 mm (0.94 in.)	O	31 mm radius (1.22 in. radius)
C	20 mm (0.79 in.)	P	t3.2 mm (t0.126 in.)
D	6 mm (0.24 in.)	Q	4 mm (0.16 in.)
E	45 mm (1.77 in.)	R	90 mm (3.54 in.)
F	140 mm (5.51 in.)	S	130 mm (5.12 in.)
G	74 mm (2.91 in.)	T	50 mm (1.97 in.)
H	12 mm (0.47 in.)	U	62 mm (2.44 in.)
I	20 mm (0.79 in.)	V	60 mm (2.36 in.)
J	1580 mm (62.2 in.)	a	21 mm dia. (0.83 in. dia.)
K	177 mm (6.97 in.)	b	Square steel tube 50 mm x 20 mm x t2.3 mm (Square steel tube 1.97 in. x 0.79 in. x t0.09 in.)
L	65 mm (2.56 in.)	c	Square steel tube 75 mm x 45 mm x t2.3 mm (Square steel tube 2.95 in. x 1.77 in. x t0.09 in.)
M	70 mm (2.76 in.)		

000003149E

9. TIRES

[1] TYPE OF TIRES



3TMACAB0P046A

The following tires can be mounted on models ME5700.

■ **IMPORTANT**

- **Do not use tires larger than specified.**

Model	Type of Tire	Front	Rear
ME5700	Farm Tire	9.5 / 9 - 20	14.9 R28
		11.2 R20	420 / 85R28
		11.2 R20	16.9 R28

000003113E

[2] TREAD ADJUSTMENT

(1) Front Wheels



CAUTION

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

IMPORTANT

- Always attach wheels 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 according to service interval. (See "MAINTENANCE" section.)

<p>3TMACAD0P039B</p>		<p>3TMACAE0P027A</p>		<p>3TMACAE0P028A</p>	
ME5700	9.5 / 9-20	—	—	1340 mm (52.8 in.)	
	11.2R20	1365 mm (53.7 in.)	1425 mm (56.1 in.)	—	

(1) Front Wheel Disc

(2) Front Wheel Rim

(A) Tread

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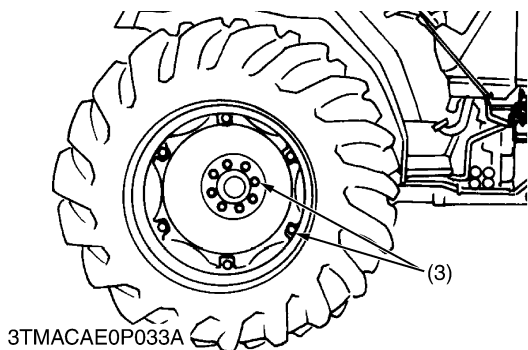
(2) Rear Wheels

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

To change the tread width

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

000002363E



⚠ CAUTION

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

■ IMPORTANT

- Always attach tires as shown in the drawings.
- If not attached as illustrated, transmission parts may be damaged.
- When re-fitting or adjusting a wheel, tighten the nuts to the following torques then recheck after driving the tractor 200 m (200 yards) and thereafter daily check service.

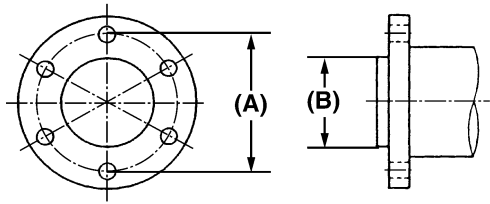
Tightening torque	Rear wheel mounting nut and rear disc mounting nut	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft·lbs
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ME5700	14.9R28	1320 mm (52.00 in.)	1420 mm (55.9 in.)	1520 mm (59.8 in.)	1620 mm (63.8 in.)	1720 mm (67.7 in.)			
	420/ 85R28	—	1410 mm (55.5 in.)	1520 mm (59.8 in.)	1620 mm (63.8 in.)	—			
	16.9R28	—	1420 mm (55.9 in.)	1520 mm (59.8 in.)	1620 mm (63.8 in.)	1720 mm (67.7 in.)			

- (1) Rear Wheel Disc (2) Rear Wheel Rim (3) Rear Wheel Mounting Nut and Rear Disc Mounting Nut (A) Tread

000003115E

[3] WHEEL HUB



	Front wheel hub	Rear wheel hub
Screw circle diameter (A)	203.2 mm (8 in.)	203.2 mm (8 in.)
Number of screws	6	8
Screws	M16 x 1.5	M16 x 1.5
Hub pilot diameter (B)	152.4 mm (6 in.)	152.4 mm (6 in.)

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3TMABAB0P102A

[4] TIRE PRESSURE



CAUTION

- Do not attempt mount a tire. This should be done by a qualified person with the proper equipment.

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.

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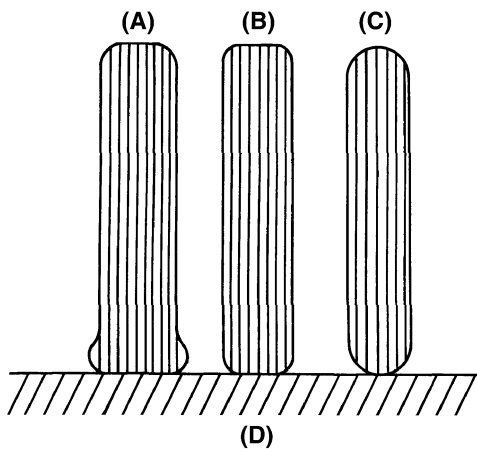
Through the tire pressure is factory-set to the prescribed level, it naturally drops slowly in the course of time. Thus, check it every day and inflate as necessary.

To inflate the wheel tires, use an air compressor or hand pump.

Recommended Inflation Pressure

- Maintain the pressure shown below for normal use.

	Tire sizes	Inflation pressure
Front	9.5 / 9-20	210 kPa (2.1 kgf/cm ² , 30 psi)
	11.2R20	160 kPa (1.6 kgf/cm ² , 23 psi)
Rear	14.9R28	140 kPa (1.4 kgf/cm ² , 20 psi)
	420 / 85R28	120 kPa (1.2 kgf/cm ² , 18 psi)
	16.9R28	120 kPa (1.2 kgf/cm ² , 18 psi)



3TMACAB0P052A

NOTE

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

(A) Insufficient

(B) Standard

(C) Excessive

(D) Ground

000003116E

[5] TIRE LIQUID INJECTION

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

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

■ IMPORTANT

- Do not fill the front tires with liquid.

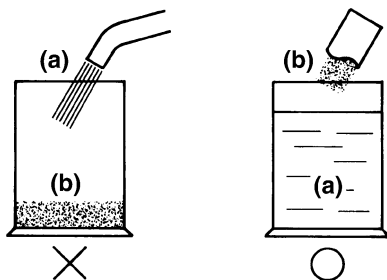
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Preparation of Calcium Chloride Solution



CAUTION

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



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Freezing temp.	Weight of CaCl ₂ to be dissolved in 100 L (26.5 U.S.gals, 22.0 Imp.gals) of water
-5 °C (23 °F)	12 kg (26.4 lbs)
-10 °C (14 °F)	21 kg (46.3 lbs)
-15 °C (5 °F)	28 kg (61.7 lbs)
-20 °C (-4 °F)	34 kg (75.0 lbs)
-25 °C (-13 °F)	40 kg (88.2 lbs)
-30 °C (-22 °F)	44 kg (97.0 lbs)
-35 °C (-31 °F)	49 kg (108 lbs)
-40 °C (-40 °F)	52 kg (114.6 lbs)
-45 °C (-49 °F)	56 kg (123.5 lbs)
-50 °C (-58 °F)	61 kg (134.5 lbs)

(a) Water

(b) CaCl₂ (Calcium Chloride)

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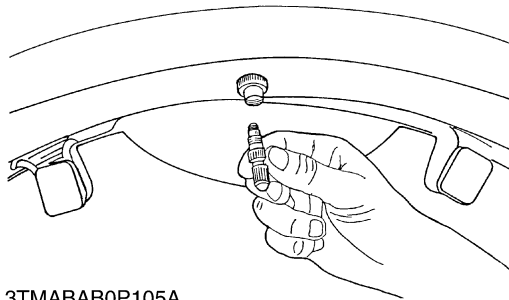
Attaching Injector

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

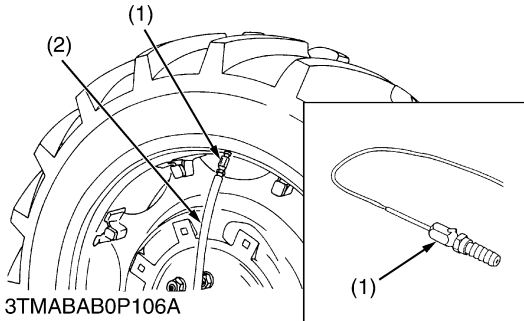
(1) Injector

(2) Hose

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3TMABAB0P106A

Fig. 1

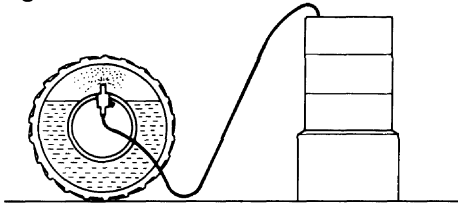


Fig. 2

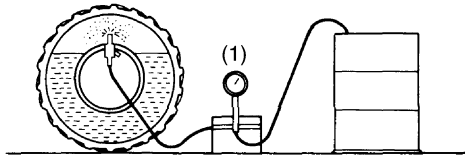
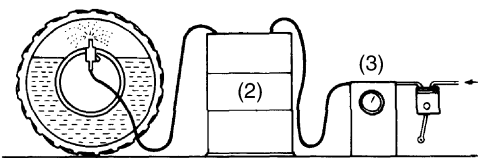
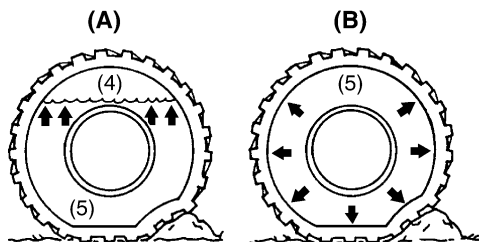


Fig. 3



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3TMABAB0P107A

Injection

CAUTION

- When a calcium chloride solution is used, cool it before pouring it into the tire.
- Do not fill tires with water or solution more than 75 % of full capacity (to the valve stem level).
- To avoid damage of transmission, do not use rear wheel weights and liquid ballast at the same time.

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

1. Gravity injection (Fig. 1)
2. Pump injection (Fig. 2)
3. Pressure tank injection (Fig. 3)
4. Injection directly from tap (only when water is being used).

NOTE

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

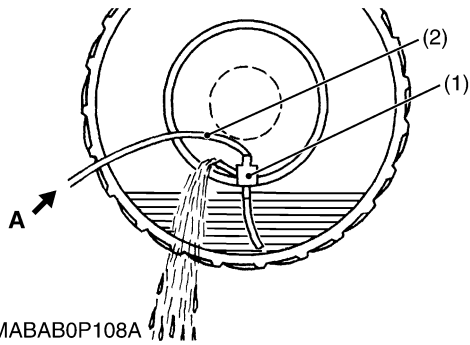
Weight of calcium chloride solution filling 75 % of full capacity of a tire.

Tire sizes	14.9-28	16.9-28
Slush free at -10 °C(14 °F) Solid at -30 °C (-22 °F) [Approx. 1 kg (2 lbs) CaCl ₂ per 4 L (1 gal) of water]	230 kg (507 lbs)	295 kg (650 lbs)
Slush free at -24 °C(-11 °F) Solid at -47 °C (-53 °F) [Approx. 1.5 kg (3.5 lbs) CaCl ₂ per 4 L (1 gal) of water]	247 kg (545 lbs)	317 kg (699 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]	260 kg (573 lbs)	339 kg (747 lbs)

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

- (A) **Correct : 75 %**
Air compresses like a cushion
- (B) **Incorrect : 100 % full**
water can not be compressed

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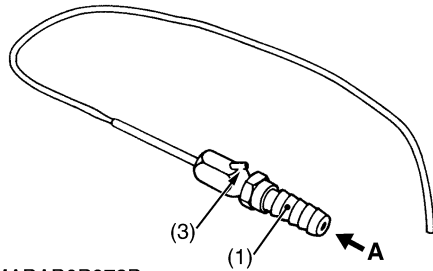


Draining Water or Solution

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

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

A : Compressed Air



000002370E

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.]

	Tread (max. width)		Lower link end max. loading weight W0
	Front	Rear	
ME5700	1430 mm (56.3 in.)	1720 mm (67.7 in.)	1900 kg (4190 lbs)

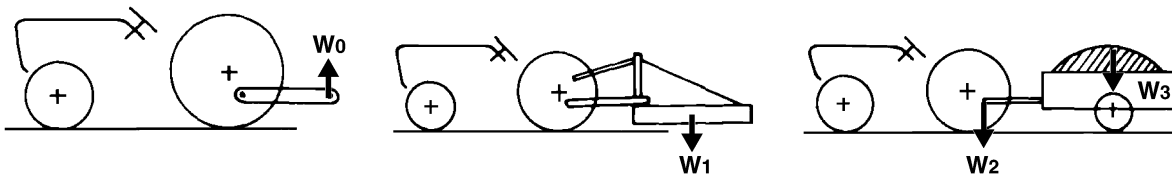
	Actual figures			
	Implement weight W1 and/or size	Max. Hitch Load W2	Trailer loading weight W3 Max. capacity	
ME5700	As in the following list (Shown on the next page)	800 kg (1760 lbs)	2500 kg (5500 lbs) without trailer brake	5000 kg (11000 lbs) with trailer brake

Lower link end max. loading weight.....W0

Implement weight.....The implement's weight which can be put on the lower link : W1

Max. drawbar load.....W2

Trailer loading weight.....The max. loading weight for trailer (without trailer's weight) : W3



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NOTE

- Implement size may vary depending on soil operating conditions.

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No.	Implement		Remarks		ME5700
1	Slurry Tank		Max. Tank Capacity		3000 L (792 U.S.gals., 660 Imp.gals.)
			Max. Load Capacity		4000 kg (8800 lbs)
2	Trailer		Max. Load Capacity		5000 kg (11000 lbs)
			Max. Drawbar Load		800 kg (1760 lbs)
3	Mower	Rotary-Cutter	Max. Cutting Width		2130 mm (84 in.)
			Max. Weight		540 kg (1200 lbs)
		Flail Mower (Heavy)	Max. Cutting Width		3050 mm (120 in.)
			Max. Weight		800 kg (1760 lbs)
Sickle Bar	Max. Cutting Width		2130 mm (84 in.)		
4	Sprayer		Max. Tank-capacity	Mid	680 L (180 U.S.gals, 150 Imp.gals)
				Rear 3P	680 L (180 U.S.gals, 150 Imp.gals)
				Drawbar	3500 L (925 U.S.gals, 770 Imp.gals)
5	Rotary Tiller		Max. Tilling Width		2130 mm (84 in.)
			Max. Weight		800 kg (1760 lbs)
6	Bottom Plow		Max. Size		14 in. x 3 16 in. x 2 18 in. x 1
			Max. Weight		450 kg (1000 lbs)
7	Disc-harrow	3P Type	Max. Size		18 in. x 24
			Max. Harrowing Width		2130 mm (84 in.)
			Max. Weight		450 kg (1000 lbs)
		Drawbar Type	Max. Harrowing Width		2750 mm (108 in.)
8	Disc Plow		Max. Size		24 in. x 3 26 in. x 2
			Max. Weight		450 kg (1000 lbs)
9	Sub Soiler		Numbers of Cultivating Tines		2
			Cultivating Depth		400 mm (16 in.)
10	Cultivator		Max. Width		3660 mm (144 in.)
			Number of Rows		4
			Max. Weight		450 kg (1000 lbs)
11	Front Blade *1, *2		Max. Cutting Width		1820 mm (72 in.)
			Max. Oil Pressure		19.1 MPa (195 kgf/cm ² , 2770 psi)
12	Rear Blade		Max. Cutting Width		1820 mm (72 in.)
			Max. Oil Pressure		19.1 MPa (195 kgf/cm ² , 2770 psi)
13	Front Loader *1, *2		Max. Lifting Capacity		1000 kg (2200 lbs)
			Max. Oil Pressure		18.6 MPa (190 kgf/cm ² , 2697 psi)

No.	Implement	Remarks	ME5700
14	Box Blade	Max. Cutting Width	1820 mm (72 in.)
		Max. Weight	450 kg (1000 lbs)
15	Back Hoe *2	Max. Digging Depth	2530 mm (100 in.)
		Max. Weight	900 kg (2000 lbs)
16	Snow Blade	Max. Width	1820 mm (72 in.)
		Max. Weight	450 kg (1000 lbs)

■ **NOTE**

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

*1 **Must remove front weight with this implement.**

*2 **Need subframe.**

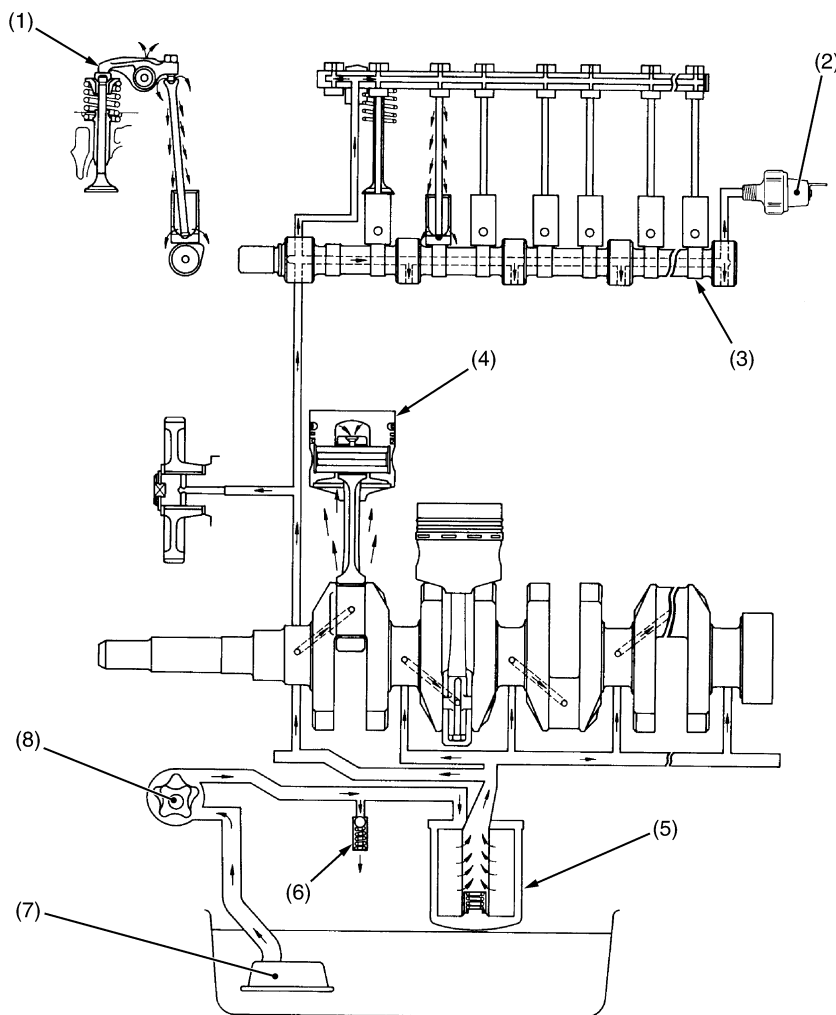
000003119E

1 ENGINE

CONTENTS

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

1. LUBRICATING SYSTEM



- (1) Rocker Arm and Rocker Arm Shaft
- (2) Oil Pressure Switch
- (3) Camshaft
- (4) Piston
- (5) Oil Filter Cartridge
- (6) Relief Valve
- (7) Oil Strainer
- (8) Oil Pump

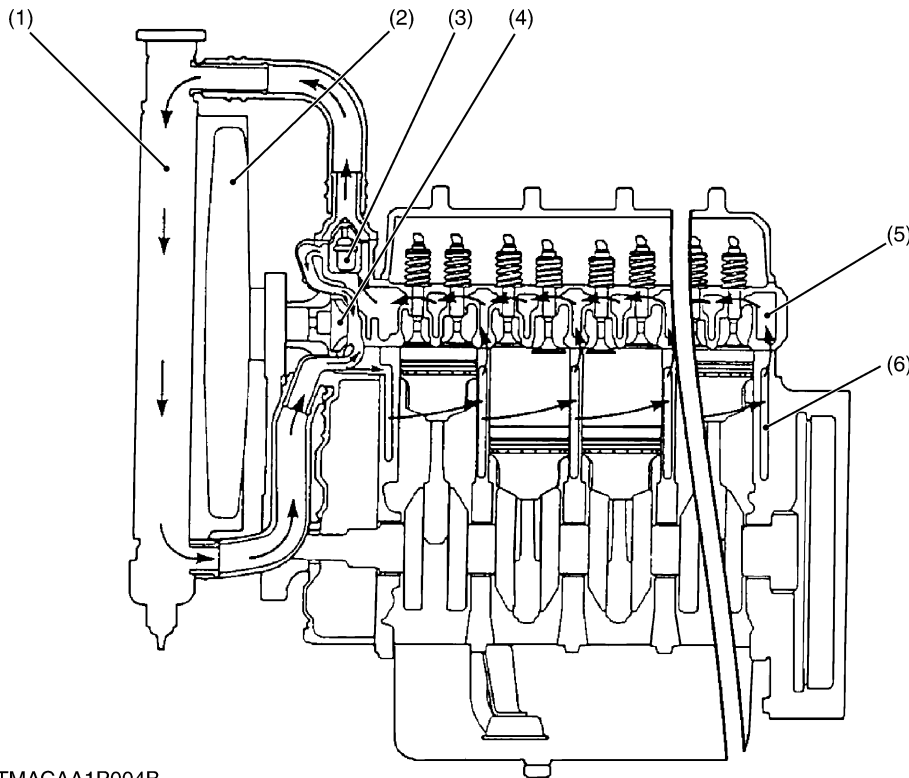
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This engine's lubricating system consists of oil strainer (7), oil pump (8), relief valve (6), oil filter cartridge (5) and oil pressure switch (2). The oil pump sucks lubricating oil from the oil pan through the oil strainer (7) and the oil flows down to the filter cartridge (5), where it is further filtered. Then the oil is forced to crankshaft, connecting rods, idle gear, camshaft and rocker arm shaft (1) to lubricate each part.

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

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2. COOLING SYSTEM



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

3TMACAA1P004B

The cooling system consists of a radiator (1), a centrifugal water pump (4), a cooling fan (2) and a thermostat (3).

The water is cooled as it flows through the radiator core, and the cooling air through the radiator core by cooling fan (2).

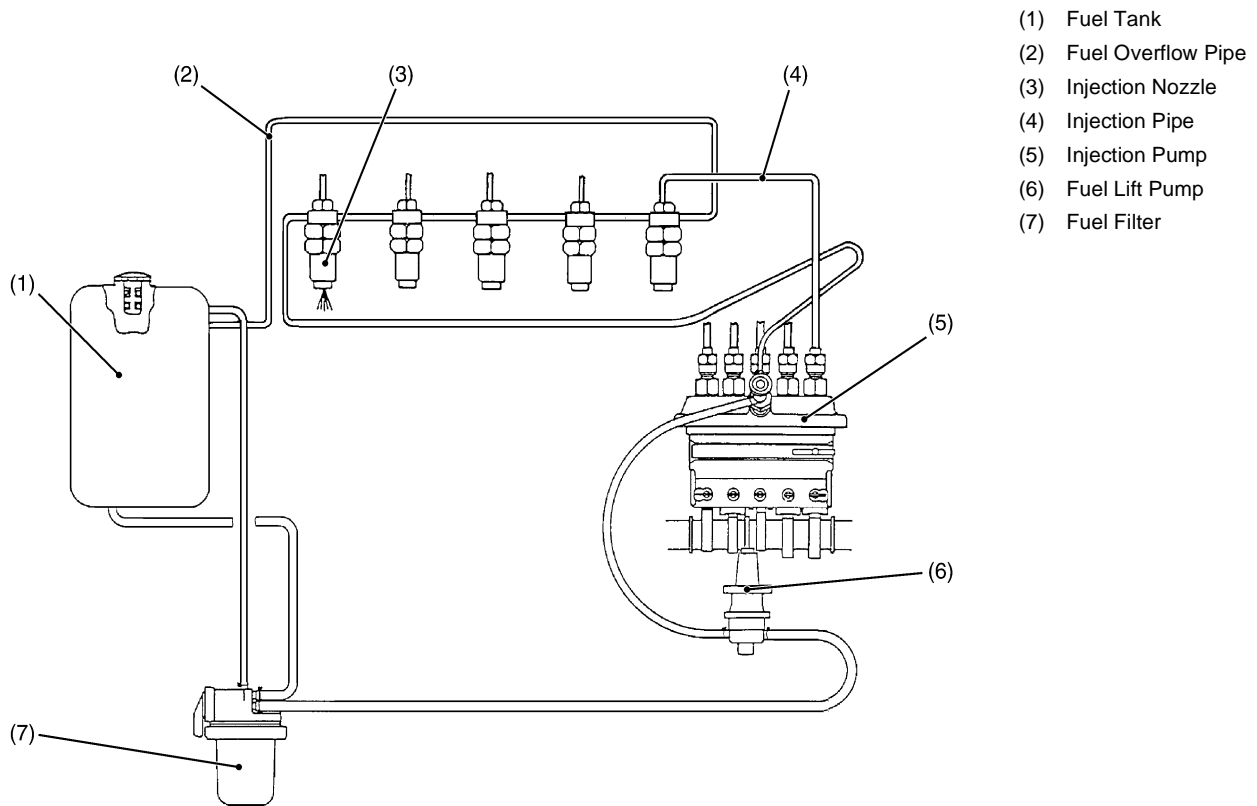
The water pump receives water from the radiator or from the cylinder head and force it into the cylinder block.

The thermostat (3) opens or closes according to the water temperature. When the water temperature is high, the thermostat (3) opens to allow the water to flow from the cylinder head to the radiator (1). When the water temperature is low, the thermostat close to flow the water only to the water pump (4).

The opening temperature of the thermostat (3) is approx. 71 °C (159.8 °F).

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3. FUEL SYSTEM



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Fuel from the fuel tank (1) passes through the fuel filter (7), and then enters the injection pump (5) after impurities such as dirt, water, etc. are removed.

The fuel pressurized by the injection pump (5) to the opening pressure (13.73 to 14.71 MPa, 140 to 150 kgf/cm², 1991 to 2062 psi), of the injection nozzle (3) is injected into the combustion chamber.

Part of the fuel fed to the injection nozzle (3) lubricates the moving parts of the plunger inside the nozzle, then returns to the fuel tank (1) through the fuel overflow pipe (2) from the upper part of the nozzle holder.

000002708E

CONTENTS

1. TROUBLESHOOTING.....	1-S1
2. SERVICING SPECIFICATIONS.....	1-S4
3. TIGHTENING TORQUES.....	1-S10
4. CHECKING, DISASSEMBLING AND SERVICING.....	1-S11
[1] SEPARATING ENGINE FROM TRACTOR.....	1-S11
(1) Disassembling and Assembling.....	1-S11
[2] ENGINE BODY.....	1-S25
(1) Checking and Adjusting.....	1-S25
(2) Disassembling and Assembling.....	1-S28
(3) Servicing.....	1-S43
[3] LUBRICATING SYSTEM.....	1-S61
(1) Checking.....	1-S61
(2) Disassembling and Assembling.....	1-S61
(3) Servicing.....	1-S62
[4] COOLING SYSTEM.....	1-S63
(1) Checking and Adjusting.....	1-S63
(2) Disassembling and Assembling.....	1-S64
(3) Servicing.....	1-S65
[5] FUEL SYSTEM.....	1-S66
(1) Checking and Adjusting.....	1-S66
(2) Disassembling and Assembling.....	1-S69

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	● No fuel	Replenish fuel	G-8
	● Air in the fuel system	Bleed	G-34
	● Water in the fuel system	Change fuel and repair or replace fuel system	G-24
	● Fuel pipe clogged	Clean	G-24
	● Fuel filter clogged	Replace	G-23, 28
	● Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-8
	● Fuel with low cetane number	Use specified fuel	G-8
	● Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S28
	● Incorrect injection timing	Adjust	1-S66
	● Fuel camshaft worn	Replace	—
	● Injection nozzle clogged	Clean	1-S68
	● Injection pump malfunctioning	Repair or replace	1-S33, S66
	● Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	—
	● Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S25
	● Improper valve timing	Correct or replace timing gear	1-S36
	● Piston ring and cylinder worn	Replace	1-S52, S60
● Excessive valve clearance	Adjust	1-S27	
(Starter Does Not Run)	● Battery discharged	Charge	9S-10
	● Starter malfunctioning	Repair or replace	9-S22 to S25
	● Main switch malfunctioning	Repair or replace	9-S11 to S13
	● Safety switch improperly defective	Connect	9-S19, S20
	● Starter relay defective	Replace	9-S14
	● Wiring disconnected	Connect	—

Symptom	Probable Cause	Solution	Reference Page
Engine Revolution Is Not Smooth	● Fuel filter clogged or dirty	Change	G-23, 28
	● Air cleaner clogged	Clean or replace	G-22
	● Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S28
	● Injection pump malfunctioning	Repair or replace	1-S33, S66
	● Incorrect nozzle opening pressure	Adjust	1-S68
	● Injection nozzle stuck or clogged	Repair or replace	1-S68
	● Governor malfunctioning	Repair	1-S34
Either White or Blue Exhaust Gas Is Observed	● Excessive engine oil	Reduce to specified level	G-8, 15
	● Piston ring and cylinder worn or stuck	Repair or replace	1-S52, S60
	● Incorrect injection timing	Adjust	1-S66
	● Deficient compression	Adjust top clearance	1-S25
Either Black or Dark Gray Exhaust Gas Is Observed	● Overload	Lessen load	—
	● Low grade fuel used	Use specified fuel	G-8
	● Fuel filter clogged	Replace	G-23, 28
	● Air cleaner clogged	Clean or replace	G-22, 30
	● Deficient nozzle injection	Repair or replace nozzle	1-S68
Deficient Output	● Incorrect injection timing	Adjust	1-S66
	● Engine's moving parts seem to be seizing	Repair or replace	—
	● Uneven fuel injection	Replace injection pump	1-S33, S66
	● Deficient nozzle injection	Repair or replace nozzle	1-S66
	● Compression leak	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S25
Excessive Lubricant Oil Consumption	● Piston ring's gap facing the same direction	Shift ring gap direction	1-S39
	● Oil ring worn or stuck	Replace	1-S52
	● Piston ring groove worn	Replace piston	1-S52
	● Valve stem and valve guide worn	Replace	1-S32
	● Oil leaking due to defective seals or packing	Replace	—
Fuel Mixed into Lubricant Oil	● Injection pump's plunger worn	Replace pump	1-S33
	● Deficient nozzle injection	Repair or replace nozzle	1-S66
	● Injection pump broken	Replace	1-S33

Symptom	Probable Cause	Solution	Reference Page
Water Mixed into Lubricant Oil	● Head gasket defective	Replace	1-S31
	● Cylinder block or cylinder head flawed	Replace	1-S43
Low Oil Pressure	● Engine oil insufficient	Replenish	G-15
	● Oil strainer clogged	Clean	1-S38
	● Relief valve stuck with dirt	Clean	—
	● Relief valve spring weaken or broken	Replace	—
	● Excessive oil clearance of crankshaft bearing	Replace	1-S53 to S55
	● Excessive oil clearance of crankpin bearing	Replace	1-S58
	● Excessive oil clearance of rocker arm	Replace	1-S47
	● Oil passage clogged	Clean	—
	● Different type of oil	Use specified type of oil	G-8
	● Oil pump defective	Repair or replace	1-S36, S62
High Oil Pressure	● Different type of oil	Use specified type of oil	G-8
	● Relief valve defective	Replace	—
Engine Overheated	● Engine oil insufficient	Replenish	G-8
	● Fan belt broken or elongated	Replace or adjust	G-23
	● Coolant insufficient	Replenish	G-8, 31
	● Radiator net and radiator fin clogged with dust	Clean	—
	● Inside of radiator corroded	Clean or replace	G-31
	● Coolant flow route corroded	Clean or replace	—
	● Radiator cap defective	Replace	1-S64
	● Overload running	Loosen load	—
	● Head gasket defective	Replace	1-S31
	● Incorrect injection timing	Adjust	1-S66
	● Unsuitable fuel used	Use specified fuel	G-8

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2. SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Compression Pressure (When Cracking with Starting Motor)		3.53 to 3.72 MPa 36 to 38 kgf/cm ² 512 to 540 psi	2.55 MPa 26 kgf/cm ² 370 psi
Difference among Cylinder		—	10 % or less
Top Clearance		0.55 to 0.70 mm 0.0217 to 0.0276 in.	—
Cylinder Head Gasket	Thickness (Free)	1.30 to 1.40 mm 0.0512 to 0.0551 in.	—
	Thickness (Tightened)	1.15 to 1.25 mm 0.0453 to 0.0492 in.	—
Valve Clearance (When cold)		0.18 to 0.22 mm 0.0071 to 0.0087 in.	—
Valve Seat	Width (Intake)	2.12 mm 0.0835 in.	—
	Width (Exhaust)	2.12 mm 0.0835 in.	—
Valve Seat	Angle (Intake)	1.047 rad. 60°	—
	Angle (Exhaust)	0.785 rad. 45°	—
Valve Face	Angle (Intake)	1.047 rad. 60°	—
	Angle (Exhaust)	0.785 rad. 45°	—
Cylinder Head Surface	Flatness	—	0.05 mm 0.0020 in.
Valve Stem to Valve Guide	Clearance	0.040 to 0.070 mm 0.00157 to 0.00276 in.	0.10 mm 0.0039 in.
	Valve Stem (O.D.)	7.960 to 7.975 mm 0.31339 to 0.31398 in.	—
	Valve Guide (I.D.)	8.015 to 8.030 mm 0.31555 to 0.31614 in.	—
Valve Recessing	Protrusion	0.05 mm 0.0020 in.	—
	Recessing	0.15 mm 0.0059 in.	0.40 mm 0.0157 in.

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Valve Timing (Intake Valve)	Open	0.21 rad. (12 °) before T.D.C	—
	Close	0.63 rad. (36 °) after B.D.C	—
Valve Timing (Exhaust Valve)	Open	1.05 rad. (60 °) before B.D.C	—
	Close	0.21 rad. (12 °) after T.D.C	—
Valve Spring	Free length	41.7 to 42.2 mm 1.6417 to 1.6614 in.	41.2 mm 1.6220 in.
	Setting Load	117.6 N 12.0 kgf 26.4 lbs	100.0 N 10.2 kgf 22.5 lbs
	Setting Length	35.0 mm 1.3780 in.	—
	Tilt	—	1.0 mm 0.039 in.
Rocker Arm Shaft to Rocker Arm	Clearance	0.016 to 0.045 mm 0.00063 to 0.00177 in.	0.15 mm 0.0059 in.
	Rocker Arm Shaft (O.D.)	13.973 to 13.984 mm 0.55012 to 0.55055 in.	—
	Rocker Arm (I.D.)	14.000 to 14.018 mm 0.55118 to 0.55189 in.	—
Push Rod	Alignment	—	0.25 mm 0.0098 in.
Tappet to Tappet Guide	Clearance	0.020 to 0.062 mm 0.00079 to 0.00244 in.	0.07 mm 0.0028 in.
	Tappet (O.D.)	23.959 to 23.980 mm 0.94327 to 0.94410 in.	—
	Tappet Guide (I.D.)	24.000 to 24.021 mm 0.94488 to 0.94571 in.	—
Camshaft Journal to Cylinder Block Bore	Clearance	0.050 to 0.091 mm 0.00197 to 0.00358 in.	0.15 mm 0.0059 in.
	Camshaft Journal (O.D.)	39.934 to 39.950 mm 1.57221 to 1.57284 in.	—
	Cylinder Block Bore (I.D.)	40.000 to 40.025 mm 1.57480 to 1.57579 in.	—

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Camshaft	Alignment	—	0.01 mm 0.0004 in.
Camshaft	Side Clearance	0.07 to 0.22 mm 0.0028 to 0.0087 in.	0.30 mm 0.0118 in.
Cam (Intake / Exhaust)	Height	33.463 to 33.483 mm 1.31744 to 1.31823 in.	33.42 mm 1.3157 in.
Idle Gear Shaft to Idle Gear Bushing	Clearance	0.025 to 0.066 mm 0.00098 to 0.00260 in.	0.10 mm 0.0039 in.
	Idle Gear Shaft (O.D.)	37.959 to 37.975 mm 1.49445 to 1.49508 in.	—
	Idle Gear Bushing (I.D.)	38.000 to 38.025 mm 1.49606 to 1.49704 in.	—
Idle Gear	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.0201 in.	0.90 mm 0.0345 in.
Timing Gear	Crank Gear to Idle Gear (Backlash)	0.0415 to 0.1122 mm 0.00163 to 0.00442 in.	0.15 mm 0.0059 in.
	Idle Gear to Cam Gear (Backlash)	0.0415 to 0.1154 mm 0.00163 to 0.00454 in.	0.15 mm 0.0059 in.
	Idle Gear to Injection Pump Gear (Backlash)	0.0415 to 0.1154 mm 0.00163 to 0.00454 in.	0.15 mm 0.0059 in.
	Crank Gear to Oil Pump Drive Gear (Backlash)	0.0415 to 0.1090 mm 0.00163 to 0.00429 in.	0.15 mm 0.0059 in.
Piston Pin Bore	I.D.	25.000 to 25.013 mm 0.98425 to 0.98477 in.	25.05 mm 0.9862 in.
Piston Pin to Small End Bushing	Clearance	0.014 to 0.038 mm 0.00055 to 0.00150 in.	0.10 mm 0.0039 in.
	Piston Pin (O.D.)	25.002 to 25.011 mm 0.98433 to 0.98468 in.	—
	Small End Bushing (I.D.)	25.025 to 25.040 mm 0.98523 to 0.98582 in.	—
Top Ring and Second Ring	Ring Gap	0.30 to 0.45 mm 0.0118 to 0.0177 in.	1.25 mm 0.0492 in.
Oil Ring	Ring Gap	0.25 to 0.45 mm 0.0098 to 0.0177 in.	1.25 mm 0.0492 in.
Second Ring to Ring Groove	Clearance	0.093 to 0.120 mm 0.00366 to 0.00472 in.	0.20 mm 0.0079 in.
Oil Ring to Ring Groove	Clearance	0.020 to 0.052 mm 0.0079 to 0.00205 in.	0.15 mm 0.0059 in.

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Connecting Rod	Alignment	—	0.05 mm 0.0020 in.
Crankshaft Journal to Crankshaft Bearing 1	Oil Clearance	0.040 to 0.118 mm 0.00157 to 0.00465 in.	0.20 mm 0.0079 in.
	Crankshaft Journal (O.D.)	51.921 to 51.940 mm 2.04413 to 2.04488 in.	—
	Crankshaft Bearing 1 (I.D.)	51.980 to 52.039 mm 2.04645 to 2.04878 in.	—
Crankshaft Journal to Crankshaft Bearing 2	Oil Clearance	0.040 to 0.104 mm 0.00157 to 0.00465 in.	0.20 mm 0.0079 in.
	Crankshaft Journal (O.D.)	51.921 to 51.940 mm 2.04413 to 2.04488 in.	—
	Crankshaft Bearing 2 (I.D.)	51.980 to 52.025 mm 2.04645 to 2.04822 in.	—
Cylinder Liner [Standard]	I.D.	87.000 to 87.022 mm 3.42519 to 3.42606 in.	+0.15 mm +0.0059 in.
Cylinder Liner [Oversize : 0.5 mm (0.0197 in.)]	I.D.	87.500 to 87.522 mm 3.44488 to 3.44574 in.	+0.15 mm +0.0059 in.
Crankshaft	Alignment	—	0.02 mm 0.0008 in.
Flywheel	Sway	—	0.05 mm 0.0020 in.
Crankshaft	Side Clearance	—	0.50 mm 0.0197 in.
Crankpin to Crankpin Bearing	Oil Clearance	0.025 to 0.087 mm 0.00098 to 0.00343 in.	0.20 mm 0.0079 in.
	Crankpin (O.D.)	46.959 to 46.975 mm 1.84878 to 1.84941 in.	—
	Crankpin Bearing (I.D.)	47.000 to 47.046 mm 1.85039 to 1.85220 in.	—
Crankshaft Sleeve	Wear	—	0.10 mm 0.0039 in.

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LUBRICATING SYSTEM

Item		Factory Specification	Allowable Limit
Engine Oil Pressure	At Idle Speed	98 kPa or more 1.0 kgf/cm ² or more 14 psi or more	49 kPa 0.5 kgf/cm ² 7 psi
	At Rated Speed	294 to 441 kPa 3.0 to 4.5 kgf/cm ² 43 to 64 psi	245 kPa 2.5 kgf/cm ² 36 psi
Engine Oil Pressure Switch	Working Pressure	49 kPa 0.5 kgf/cm ² 7 psi	—
Inner Rotor to Outer Roter	Clearance	0.03 to 0.14 mm 0.0012 to 0.0055 in.	0.20 mm 0.0079 in.
Outer Rotor to Pump Body	Clearance	0.11 to 0.19 mm 0.0043 to 0.0075 in.	0.25 mm 0.0098 in.
Rotor to Cover	Clearance	0.105 to 0.150 mm 0.0041 to 0.0059 in.	0.20 mm 0.0079 in.

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COOLING SYSTEM

Item		Factory Specification	Allowable Limit
Fan Belt	Tension	7 to 9 mm (0.28 to 0.35 in.) deflection at 98 N (10 kgf, 22 lbs) of force	—
Radiator	Water Leakage Test Pressure	No leaks at 137 kPa 1.4 kgf/cm ² 20 psi	—
Radiator Cap	Pressure Falling Time	10 seconds or more for pressure falling from 88 to 59 kPa from 0.9 to 0.6 kgf/cm ² from 13 to 9 psi	—
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	—

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FUEL SYSTEM

Item		Factory Specification	Allowable Limit
Injection Pump	Injection Timing	0.314 to 0.349 rad (18 to 20 °) before T.D.C.	—
Pump Element	Fuel Tightness	—	14.7 MPa 150 kgf/cm ² 2131 psi
Delivery Valve	Fuel Tightness	10 seconds or more for pressure falling from 14.7 → 13.7 MPa from 150 → 140 kgf/cm ² from 2133 → 1990 psi	5 seconds or more for pressure falling from 14.7 → 13.7 MPa from 150 → 140 kgf/cm ² from 2133 → 1990 psi
Injection Nozzle	Injection Pressure	13.73 to 14.71 MPa 140 to 150 kgf/cm ² 1991 to 2133 psi	—
Injection Nozzle Valve Seat	Valve Seat Tightness	When the pressure is 12.75 MPa (130 kgf/cm ² , 1849 psi), the valve seat must be fuel tightness	—

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3. TIGHTENING TORQUES

Tightening torques of screws and nuts on the table below are especially specified.
(For general use screws and nuts : See page G-10.)

Item	N-m	kgf-m	ft-lbs
Oil cooler pipes (Pipe diameter 12 mm (0.47 in.))	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Power steering hose retaining nut	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Front axle frame mounting screw (M10)	60.8 to 70.6	6.2 to 7.2	44.8 to 52.1
Front axle frame mounting screw (M12)	103.0 to 117.7	10.5 to 12.0	75.9 to 86.8
Compressor mounting screw	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Starter's terminal B mounting nut	8.8 to 11.8	0.9 to 1.2	6.5 to 8.7
Delivery pipe retaining nut	107.9 to 117.7	11.0 to 12.0	79.6 to 86.8
Oil cooler pipe retaining nut	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Hydraulic pipe mounting screw	17.7 to 20.6	1.8 to 2.1	13.0 to 15.2
Engine and clutch housing mounting screw and nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Engine and clutch housing mounting stud bolt	39.2 to 49.0	4.0 to 5.0	28.9 to 36.2
Dumper disc mounting screw	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2

Item	Size x Pitch	N-m	kgf-m	ft-lbs
Cylinder head cover cap nut	M8 x 1.25	6.9 to 8.8	0.7 to 0.9	5.1 to 6.5
Injection pipe retaining nut	M12 x 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Nozzle holder assembly	M20 x 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Overflow pipe assembly retaining nut	-	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Glow plug	M10 x 1.25	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
*Rocker arm bracket nut	M8 x 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
*Cylinder head screw	M11 x 1.25	93.2 to 98.1	9.5 to 10.0	68.7 to 72.3
*Crankshaft screw	M16 x 1.5	196.1 to 215.8	20.0 to 22.0	144.7 to 159.1
Oil pump drive gear 1 mounting nut	M12 x 1.25	78.5 to 88.3	8.0 to 9.0	57.9 to 65.1
Oil pan mounting screw	M10 x 1.25	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
*Connecting rod screw	M8 x 1.0	44.1 to 49.0	4.5 to 5.0	32.5 to 36.2
*Flywheel screw	M12 x 1.25	98.1 to 107.9	10.0 to 11.0	72.3 to 79.6
Bearing case cover mounting screw	M8 x 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
*Main bearing case screw 2	M10 x 1.25	68.6 to 73.6	7.0 to 7.5	50.6 to 54.2
*Main bearing case screw 1	M9 x 1.25	46.1 to 51.0	4.7 to 5.2	34.0 to 37.6
Nozzle holder	-	34.3 to 39.2	3.5 to 4.0	25.3 to 28.9

■ NOTE

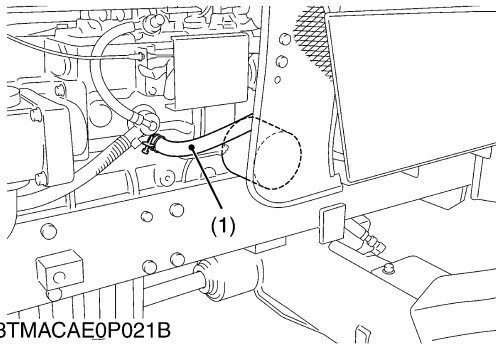
- For "*" marked screws, bolt and nuts on the table, apply engine oil to their threads and seats before tightening.
- The letter "M" in Size x Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.

4. CHECKING, DISASSEMBLING AND SERVICING

[1] SEPARATING ENGINE FROM TRACTOR

(1) Disassembling and Assembling

(A) Draining Coolant, Engine Oil, Transmission Fluid and Fuel



Draining Coolant

⚠ CAUTION

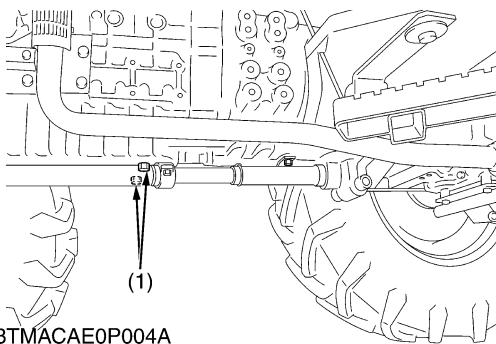
- Never remove the radiator cap until coolant temperature is well below its boiling point. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.

1. Stop the engine and let cool down.
2. Remove the radiator hose (1) from the engine side to drain the coolant.
3. Remove the radiator cap to completely drain the coolant.
4. After all coolant is drained, reinstall the radiator hose.

Draining Coolant	Capacity	7.3 L 7.7 U.S.qts 6.4 Imp.qts
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(1) Radiator Hose

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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 plugs (1) to drain oil.
4. After draining reinstall the drain plugs (1).

(When reassembling)

- Fill the engine oil up to the upper line on the dipstick (2).

Engine Oil	Capacity	8.0 L 8.5 U.S.qts 7.0 Imp.qts
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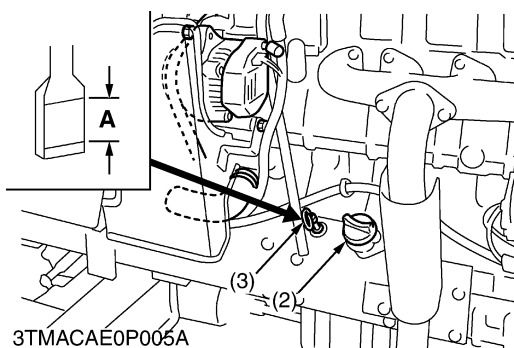
■ IMPORTANT

- Never mix two different type of oil.
- Use the proper SAE Engine Oil according to ambient temperature.

Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-8.)

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

(A) Oil level is acceptable within this range.



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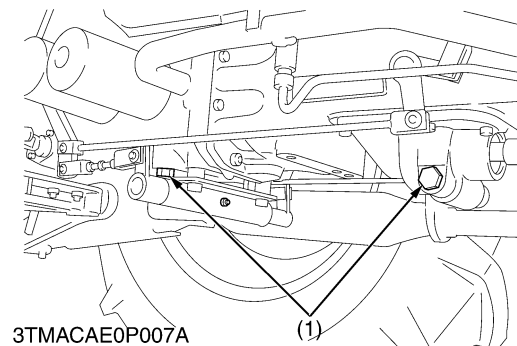
Draining Fuel (ROPS Type)

1. Disconnect the fuel hose (1).
2. Drain the fuel.

Fuel	Capacity	65.0 L 17.2 U.S.gals 14.3 Imp.gals
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(1) Fuel Hose

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Draining Transmission Fluid

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

(When reassembling)

- Fill up from filling port after removing the filling plug until reaching the gauge.
- After running the engine for a few minutes, stop it and check the fluid level again, add fluid to prescribed level if it is not correct level.

Transmission fluid	Capacity	ROPS	40.0 L 42.3 U.S.qts 35.2 Imp.qts
		CABIN	43.0 L 45.4 U.S.qts 37.8 Imp.qts

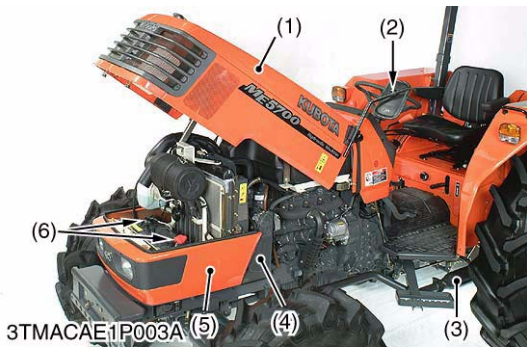
■ IMPORTANT

- Use only KUBOTA UDT or SUPER UDT fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)
- Do not mix difference brands oil together.

(1) Drain Plug

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(B) Separation Front Axle Frame As A Unit (ROPS Type)

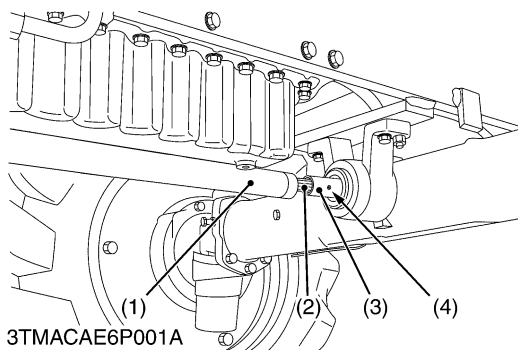


Muffler and Bonnet

1. Remove the muffler (3).
2. Remove the bonnet (1) with mirror (2).
3. Disconnect the battery's cable (6).
4. Remove the side covers (4).
5. Disconnect the head light **3P** connectors.
6. Remove the front lower cover (5).

- | | |
|-------------|-----------------------|
| (1) Bonnet | (4) Side Cover |
| (2) Mirror | (5) Front Lower Cover |
| (3) Muffler | (6) Battery Cable |

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Propeller Shaft

1. Slide the propeller shaft cover (1), (6) after removing the screws (5).
2. Tap out the spring pin (4), (7) and then slide the coupling (3), (8) to the front and rear.

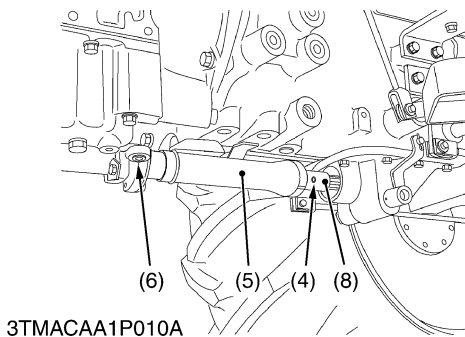
(When reassembling)

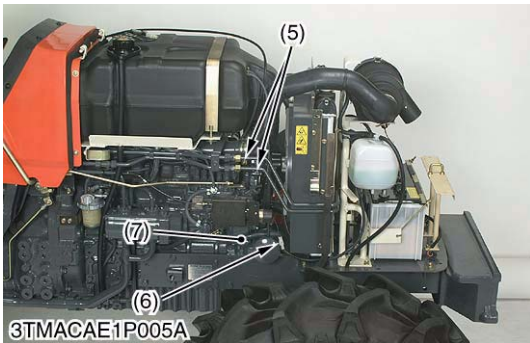
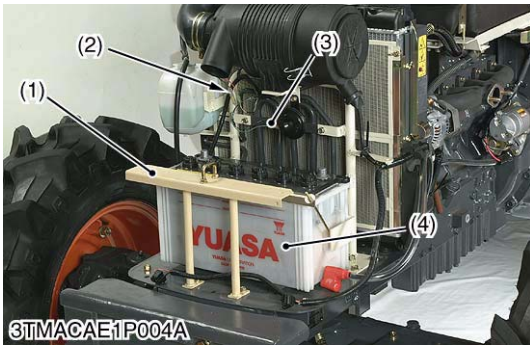
- Apply grease to the splines of the propeller shaft (2).

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

(ROPS)

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Wire Harness RH, Battery and Oil Cooler Pipe

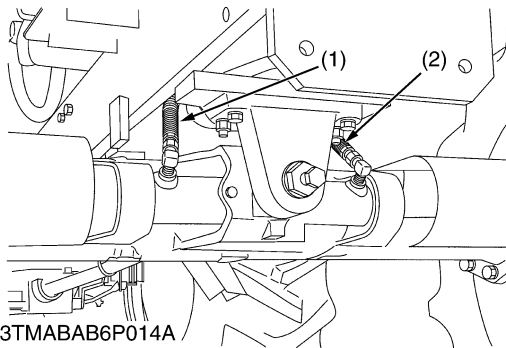
1. Remove the bonnet stay (1).
2. Remove the battery (4).
3. Disconnect the air cleaner sensor connectors (2).
4. Disconnect the horn connectors (3).
5. Disconnect the stop solenoid connector (6).
6. Disconnect the oil cooler pipes (5).
7. Remove the radiator hose (7).

(When reassembling)

Tightening torque	Oil cooler pipes	Pipe diameter	49.0 to 68.6 N-m
		Dia. 12mm (0.47 in.)	5.0 to 7.0 kgf-m 36.2 to 50.6 ft-lbs

- | | |
|----------------------------------|-----------------------------|
| (1) Bonnet Stay | (5) Oil Cooler Pipe |
| (2) Air Cleaner Sensor Connector | (6) Stop Solenoid Connector |
| (3) Horn Connector | (7) Radiator Hose |
| (4) Battery | |

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Air Cleaner Hoses, Power Steering Hoses and Radiator Hoses

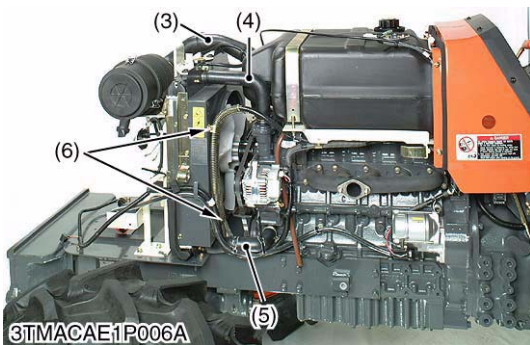
1. Disconnect the power steering hoses (1) and(2).
2. Remove the power steering hose clamps (6).
3. Remove the air cleaner hose (3).
4. Remove the radiator upper hose (4) and lower hose (5).

(When reassembling)

Tightening torque	Power steering hose retaining nut	24.5 to 29.4 N-m
		2.5 to 3.0 kgf-m 18.1 to 21.7 ft-lbs

- | | |
|-------------------------|-------------------------------|
| (1) Power Steering Hose | (4) Radiator Upper Hose |
| (2) Power Steering Hose | (5) Radiator Lower Hose |
| (3) Air Cleaner Hose | (6) Power Steering Hose Clamp |

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Front Axle Frame as a Unit

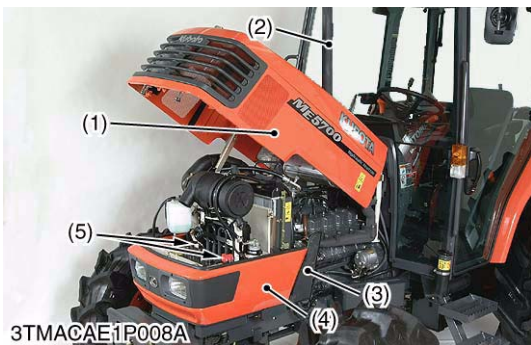
1. Check the front axle and clutch housing case are securely mounted on the disassembling stands.
2. Separate the front axle support as a unit after removing the front axle frame mounting screws.

(When reassembling)

Tightening torque	Front axle frame mounting screw (M10)	60.8 to 70.6 N-m 6.2 to 7.2 kgf-m 44.8 to 52.1 ft-lbs
	Front axle frame mounting screw (M12)	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs

(ROPS)
0000002394E

(C) Separation Front Axle Frame As A Unit (CABIN Type)

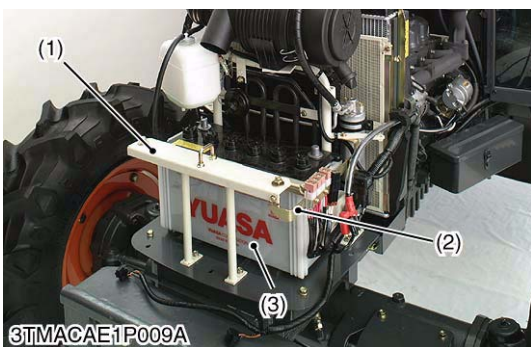


Muffler and Bonnet

1. Remove the muffler (2).
2. Remove the bonnet (1).
3. Disconnect the battery's cable (5).
4. Remove the side covers (3).
5. Disconnect the head light **3P** connectors.
6. Remove the front lower cover (4).

- | | |
|----------------|-----------------------|
| (1) Bonnet | (4) Front Lower Cover |
| (2) Muffler | (5) Battery Cable |
| (3) Side Cover | |

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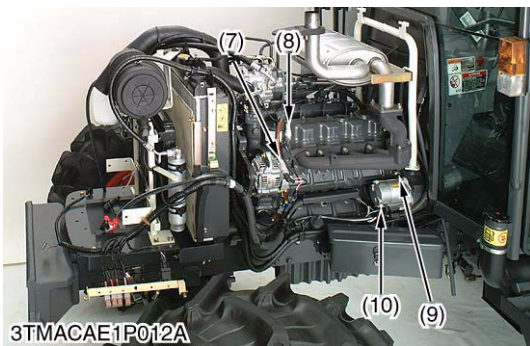
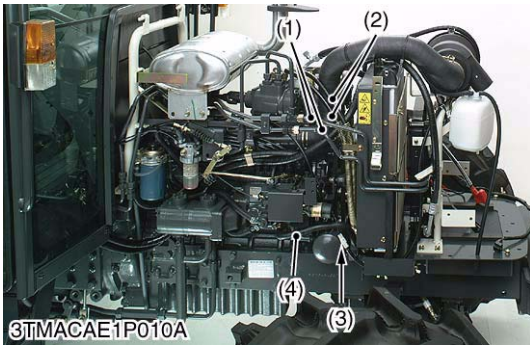


Battery

1. Remove the fuse stay (2).
2. Remove the bonnet stay (1).
3. Remove the battery (3).

- | | |
|-----------------|-------------|
| (1) Bonnet Stay | (3) Battery |
| (2) Fuse Stay | |

0000002397E



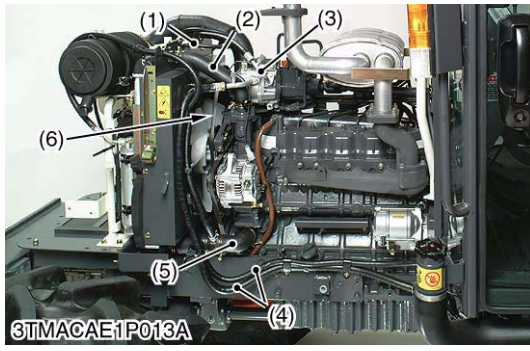
Wire Harness, Power Steering Hose and Oil Cooler Pipe

1. Disconnect the oil cooler pipes (1).
2. Disconnect the stop solenoid connector (3).
3. Remove the radiator hose (4).
4. Disconnect the air cleaner sensor connectors (5).
5. Disconnect the horn connectors (6).
6. Disconnect the air compressor connector (7).
7. Disconnect the alternator **2P** connector (6) and **B** terminal.
8. Disconnect the starter motor **C** terminal and **B** terminal (9).
9. Disconnect the engine oil pressure switch **1P** connector (8).
10. Disconnect the power steering hoses (2).

Tightening torque	Oil cooler pipes	Pipe diameter Dia. 12 mm (0.47 in.)	49.0 to 68.6 N-m 5.0 to 7.0 kgf-m 36.2 to 50.6 ft-lbs
	Power steering hose retaining nut		24.5 to 29.4 N-m 2.5 to 3.0 kgf-m 18.1 to 21.7 ft-lbs

- | | |
|----------------------------------|---|
| (1) Oil Cooler Pipe | (7) 2P Connector for Alternator |
| (2) Power Steering Hose | (8) Air Compressor Connector |
| (3) Stop Solenoid Connector | (9) 1P Connector for Oil Pressure Switch |
| (4) Radiator Hose | (10) Starter Connector |
| (5) Air Cleaner Sensor Connector | |
| (6) Horn Connector | |

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Air Conditioner Parts

1. Remove the air conditioner belt (6) and remove the compressor (3) mounting screws.
2. Disconnect the air cleaner hose (7).
3. Disconnect the recovery tank hose (1).
4. Remove the radiator upper hose (2) and lower hose (5).
5. Take out the compressor (3), condenser (9), receiver (8), hoses (4) and etc. as a unit.

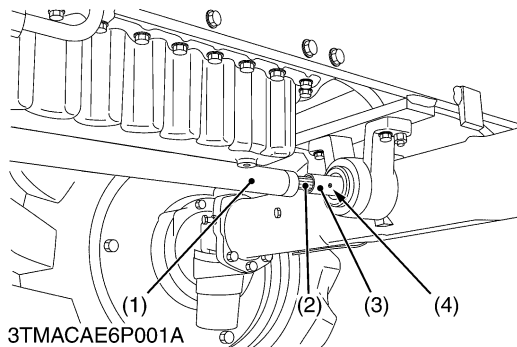
(When reassembling)

- After reassembling the compressor, be sure to adjust the air conditioner belt tension. (See page G-28.)

Tightening torque	Compressor mounting screw	24.5 to 29.4 N-m 2.5 to 3.0 kgf-m 18.1 to 21.7 ft-lbs
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- | | |
|--------------------------|--------------------------|
| (1) Recovery Tank Hose | (6) Air Conditioner Belt |
| (2) Radiator Upper Hose | (7) Air Cleaner Hose |
| (3) Compressor | (8) Receiver |
| (4) Air Conditioner Hose | (9) Condenser |
| (5) Radiator Lower Hose | |

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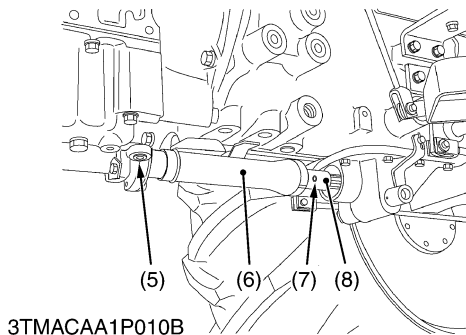
Propeller Shaft

1. Slide the propeller shaft cover (1), (6) after removing the screws (5).
2. Tap out the spring pin (4), (7) and then slide the coupling (3), (8) to the front and rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (2).

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



(CABIN)
000002408E



Front Axle Frame as a Unit

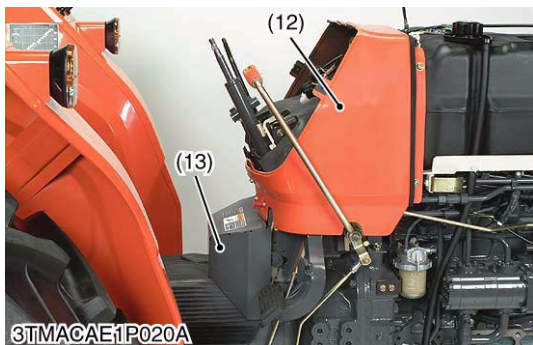
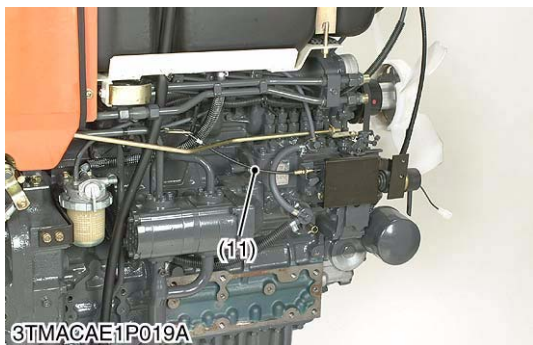
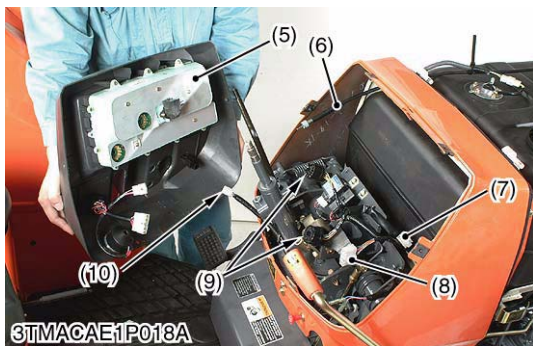
1. Check the front axle and clutch housing case are securely mounted on the disassembling stands.
2. Separate the front axle support as a unit after removing the front axle frame mounting screws.

(When reassembling)

Tightening torque	Front axle frame mounting screw (M10)	60.8 to 70.6 N-m 6.2 to 7.2 kgf-m 44.8 to 52.1 ft-lbs
	Front axle frame mounting screw (M12)	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs

(CABIN)
000002411E

(D) Separating Engine (ROPS Type)

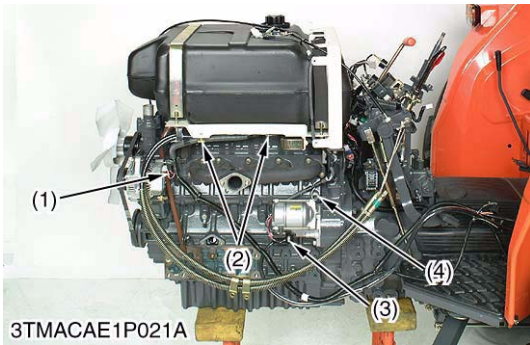


Steering Wheel, Meter Panel and Rear Bonnet

1. Remove the steering wheel (2) with a steering wheel puller (Code No. 07916-51090).
2. Remove the shuttle lever grip (1) and remove the shuttle lever guide (4).
3. Remove the main shift lever (3).
4. Remove the meter panel mounting screws and open the meter panel (5).
5. Disconnect the two connectors (9) and hour meter cable (6).
6. Disconnect the main switch connector (7), combination switch connector (8) and hazard switch connector (10).
7. Disconnect the engine stop cable (11) at the engine side.
8. Remove the rear bonnet (12) and shuttle valve cover (13).

- | | |
|---------------------------|----------------------------------|
| (1) Shuttle Lever Grip | (8) Combination Switch Connector |
| (2) Steering Wheel | (9) Connectors |
| (3) Main Shift Lever | (10) Hazard Switch Connector |
| (4) Shuttle Lever Guide | (11) Engine Stop Cable |
| (5) Meter Panel | (12) Rear Bonnet |
| (6) Hour Meter Cable | (13) Shuttle Valve Cover |
| (7) Main Switch Connector | |

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Wire Harness L.H. and Power Steering Hose Clamps

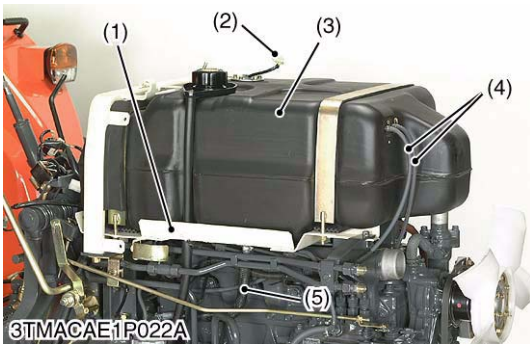
1. Remove the power steering hose clamps (2).
2. Disconnect the alternator **2P** connector (1) and **B** terminal.
3. Disconnect the starter motor **C** terminal and **B** terminal (3).
4. Disconnect the engine oil pressure switch **1P** connector (4).

(When reassembling)

Tightening torque	Starter's terminal B mounting nut	8.8 to 11.8 N-m 0.9 to 1.2 kgf·m 6.5 to 8.7 ft-lbs
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- | | |
|--|--|
| (1) 2P Connector for Alternator | (3) Starter Motor B terminal |
| (2) Hose Clamp | (4) 1P Connector for Engine Pressure Oil Switch |

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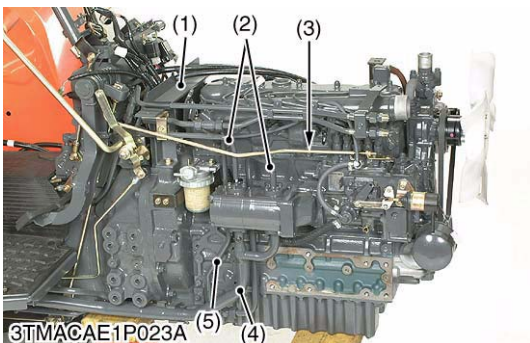


Fuel Tank

1. Disconnect the fuel level connector (2).
2. Disconnect the fuel delivery hose (5) from fuel filter.
3. Disconnect the fuel return hoses (4).
4. Remove the fuel tank (3) with fuel tank support (1).

- | | |
|--------------------------|------------------------|
| (1) Fuel Tank Support | (4) Return Hose |
| (2) Fuel Level Connector | (5) Fuel Delivery Hose |
| (3) Fuel Tank | |

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Hydraulic Pipes and Wire Harness

1. Remove the accelerator rod (3).
2. Remove the delivery pipes (2) and suction pipe (4).
3. Remove the oil cooler pipe (5).
4. Remove the stay (1).
5. Disconnect the glow plug **1P** connector (7) and coolant temperature sensor **1P** connector (6).

(When reassembling)

Tightening torque	Delivery pipe retaining nut	107.9 to 117.7 N-m 11.0 to 12.0 kgf·m 79.6 to 86.8 ft-lbs
	Oil cooler pipe retaining nut	49.0 to 68.6 N-m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs
	Hydraulic pipe mounting screw	17.7 to 20.6 N-m 1.8 to 2.1 kgf·m 13.0 to 13.2 ft-lbs

- | | |
|---------------------|--|
| (1) Stay | (5) Oil Cooler Pipe |
| (2) Delivery Pipe | (6) 1P Connector for Coolant Temperature Sensor |
| (3) Accelerator Rod | (7) 1P Connector for Glow Plug |
| (4) Suction Pipe | |

000002429E





Separating Engine from Clutch Housing

1. Hoist the engine by the hoist and chain.
2. Remove the engine mounting screws and nuts, and separate the engine from the clutch housing.

(When reassembling)

- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Apply liquid gasket (Three Bond 1141, 1211 or equivalent) to joint face of the engine and clutch housing.

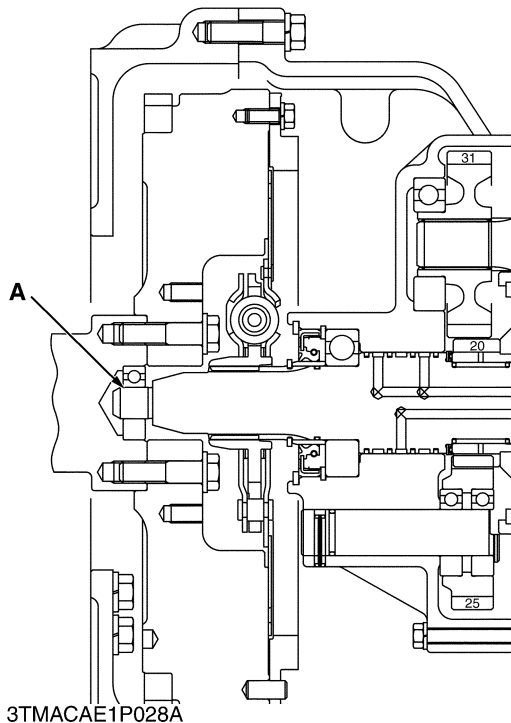
Tightening torque	Engine and clutch housing mounting screw and nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
	Engine and clutch housing mounting stud bolt	39.2 to 49.0 N-m 4.0 to 5.0 kgf-m 28.9 to 36.2 ft-lbs

(1) Engine Hook

A : Ordinary Situation

B : When the Engine Hooked Up

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3TMACAE1P028A



3TMACAE1P029A

Damper Disc

1. Remove the dumper disc.

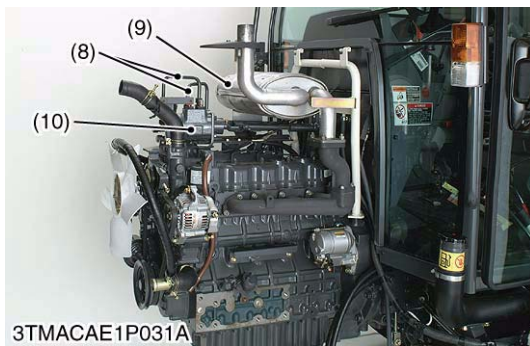
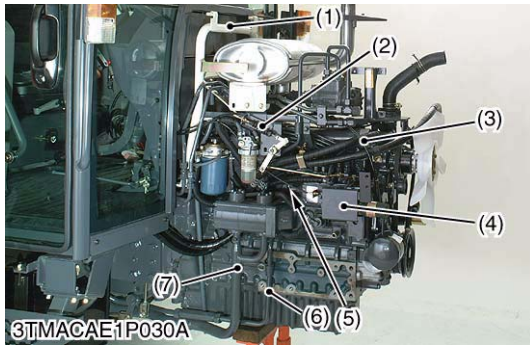
(When reassembling)

- Confirm that the bearing is surely assembled to the flywheel.
- Direct the shorter end of the dumper disc boss toward the flywheel.
- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the shaft **A**.

Tightening torque	Dumper disc mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft-lbs
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(ROPS)
000002438E

(E) Separating Engine (CABIN Type)



Separating Engine and Clutch Housing

1. Remove the muffler (9).
2. Remove the delivery pipes (6) and suction pipe (7).
3. Disconnect the hour meter cable (3).
4. Remove the stop solenoid cover (4).
5. Disconnect the engine stop cable (5).
6. Remove the power steering pipes (8).
7. Remove the power steering controller (10).
8. Disconnect the accelerator wire (2).
9. Disconnect the fuel blazer hoses.
10. Remove the bonnet support (1).
11. Hoist the engine by the hoist and chain.
12. Remove the engine mounting screws and nuts, then separate the engine from the clutch housing.

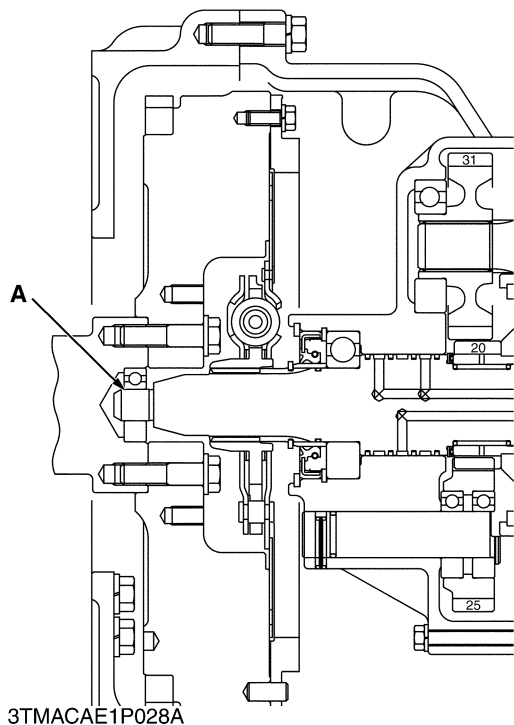
(When reassembling)

- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines.
- Apply liquid gasket (Three Bond 1141, 1211 or equivalent) to joint face of the engine and clutch housing.

Tightening torque	Delivery pipe retaining nut	107.9 to 117.7 N-m 11.0 to 12.0 kgf-m 79.6 to 86.8 ft-lbs
	Hydraulic pipe mounting screw	17.7 to 20.6 N-m 1.8 to 2.1 kgf-m 13.0 to 15.2 ft-lbs
	Power steering pipe retaining nut	47.1 to 51.0 N-m 4.8 to 5.2 kgf-m 34.7 to 37.6 ft-lbs
	Engine and clutch housing mounting screw and nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs

- | | |
|-------------------------|--------------------------------|
| (1) Bonnet Support | (6) Delivery Pipe |
| (2) Accelerator Wire | (7) Suction Pipe |
| (3) Hour Meter Cable | (8) Power Steering Pipe |
| (4) Stop Solenoid Cover | (9) Muffler |
| (5) Engine Stop Cable | (10) Power Steering Controller |

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3TMACAE1P029A

Damper Disc

1. Remove the damper disc.

(When reassembling)

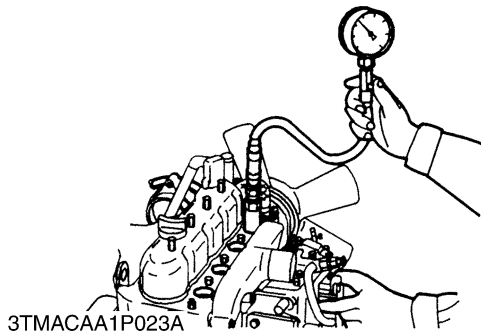
- Confirm that the bearing is surely assembled to the flywheel.
- Direct the shorter end of the damper disc boss toward the flywheel.
- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the shaft **A**.

Tightening torque	Dumper disc mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft-lbs
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(CABIN)
000002440E

[2] ENGINE BODY

(1) Checking and Adjusting



Compression Pressure

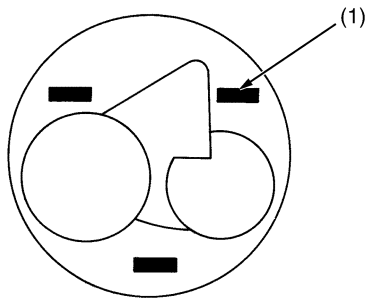
1. After warming up the engine, stop it and remove the air cleaner, the muffler and all nozzles.
2. Set a compression tester (Code No: 07909-30208) with the adaptor to the nozzle hole.
3. Keep the engine stop lever at "Stop Position".
4. While cranking the engine with the starter, measure the compression pressure.
5. Repeat steps 2 through 4 for each cylinder.
6. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the nozzle hole and measure the compression pressure again.
7. If the compression pressure is still less than the allowable limit, check the top clearance, valve and cylinder head.
8. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

■ NOTE

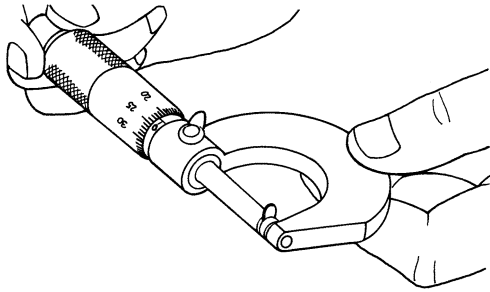
- Check the compression pressure with the specified valve clearance.
- Always use a fully charged battery for performing this test.
- Variances in cylinder compression values should be under 10 %.

Compression pressure	Factory spec.	3.53 to 3.72 MPa 36 to 38 kgf/cm ² 512 to 540 psi
	Allowable limit	2.55 MPa 26 kgf/cm ² 370 psi

000002441E



3TMABAB1P023B



3EEABAB1P057A

Top Clearance

1. Remove the cylinder head. (Do not attempt to remove the cylinder head gasket.)
2. Move the piston up, and stick a strip of fuse [1.5 mm dia. (0.059 in. dia.), 5 to 7 mm long (0.197 to 0.276 in. long)] on the piston head at three positions with grease so as to avoid the intake and exhaust valves and the combustion chamber ports.
3. Lower the piston, and install the cylinder head and tighten the cylinder head screws to the specified torque.
4. Turn the crank shaft until the piston exceeds its top dead center.
5. Remove the cylinder head, and measure the thickness of the squeezed fuses.
6. If the measurement is not within the factory specifications, check the oil clearance between the crankpin and crankpin bearing and between the piston pin and small end bushing.

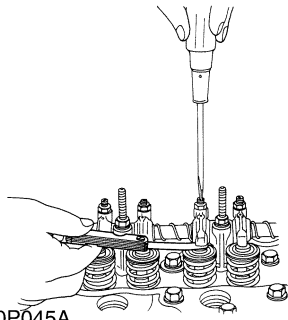
■ NOTE

- After checking the top clearance, be sure to assemble the cylinder head with a new cylinder head gasket.

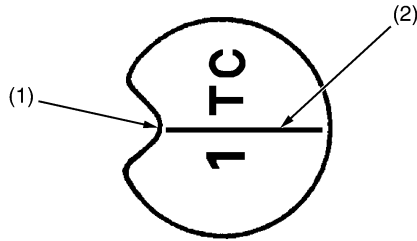
Top clearance	Factory spec.	0.55 to 0.70 mm 0.0217 to 0.0276 in.
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(1) Fuse

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3TMABAB0P045A



3TMACAA0P026A

Valve Clearance

■ **IMPORTANT**

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

1. Remove the cylinder head cover.
2. Align the "1TC" mark (2) on the flywheel and projection (1) on the housing 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.

[When No.1 piston is compression top dead center position]

Cylinder No.	1	2	3	4	5
Intake valve	★	★			
Exhaust valve	★		★		

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 (2) on the flywheel and projection (1) on the housing so that the No.1 piston comes to the overlap position.
6. Check the following valve clearance marked with "☆" using a feeler gauge.

[When No.1 piston is overlap position]

Cylinder No.	1	2	3	4	5
Intake valve			☆	☆	☆
Exhaust valve		☆		☆	☆

7. If the clearance is not within the factory specifications, adjust with the adjusting screw.

Intake and exhaust valve clearance (Cold)	Factory spec.	0.18 to 0.22 mm 0.0071 to 0.0087 in.
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■ **NOTE**

- **The sequence of cylinder numbers is given as No. 1 and No. 2, No. 3, No. 4 and No. 5 starting from the gear case side.**
- **After adjusting the valve clearance, secure the adjusting screw with the lock nut.**

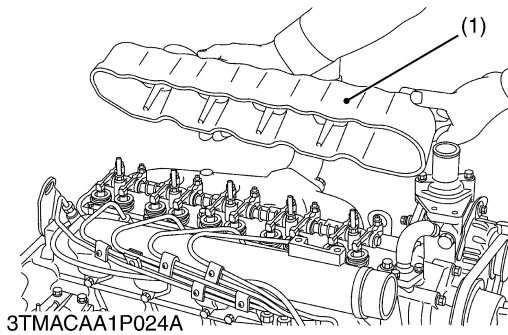
(1) Projection

(2) "1TC" Mark

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(2) Disassembling and Assembling

(A) Cylinder Head



Cylinder Head Cover

1. Remove the head cover cap nuts.
2. Remove the cylinder head cover (1).

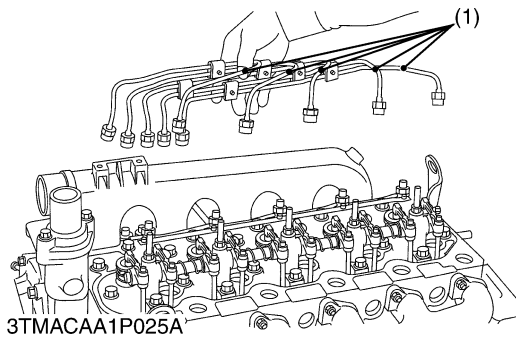
(When reassembling)

- Check to see if the head cover gasket is not defective.
- To prevent valve stem seizure, apply enough engine oil to the valve guide and valve stem

Tightening torque	Cylinder head cover cap nut	6.9 to 8.8 N·m 0.7 to 0.9 kgf·m 5.1 to 6.5 ft-lbs
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(1) Head Cover

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Injection Pipes

1. Loosen the screws on the pipe clamps.
2. Detach the injection pipes (1).

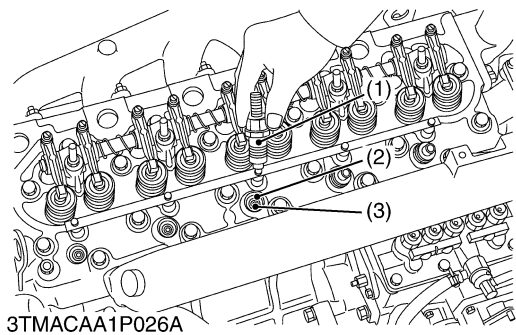
(When reassembling)

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

Tightening torque	Injection pipe retaining nut	24.5 to 34.3 N·m 2.5 to 3.5 kgf·m 18.1 to 25.3 ft-lbs
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(1) Injection Pipe

000002452E



Nozzle Holder Assembly

1. Remove the overflow pipe assembly.
2. Remove the nozzle holders using a 21 mm deep socket wrench.
3. Remove the copper gasket (2) and heat seal (3).

(When reassembling)

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

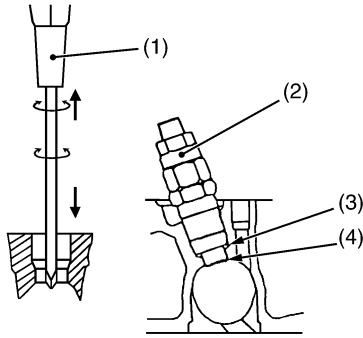
Tightening torque	Nozzle holder assembly	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs
	Overflow pipe assembly retaining nut	19.6 to 24.5 N·m 2.0 to 2.5 kgf·m 14.5 to 18.1 ft-lbs

(1) Nozzle Holder

(3) Heat Seal

(2) Copper Gasket

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3EEABAB1P061A

Nozzle Heat Seal Service Removal Procedure

■ IMPORTANT

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

1. Plus 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 copper gasket (3).
4. If the heat seal drops, repeat the above procedure

(When reassembling)

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

- (1) Plus Screw Driver
- (2) Nozzle Holder
- (3) Copper Gasket
- (4) Heat Seal

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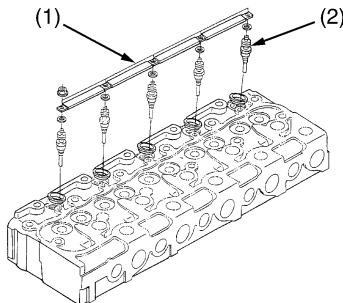
Glow Plugs

1. Remove the lead (1) from the glow plugs.
2. Remove the glow plugs (2).

Tightening torque	Glow plug	19.6 to 24.5 N·m 2.0 to 2.5 kgf·m 14.5 to 18.1 ft-lbs
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- (1) Lead
- (2) Glow Plug

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3TMACAA1P027A

Fan, Fan Belt and Alternator

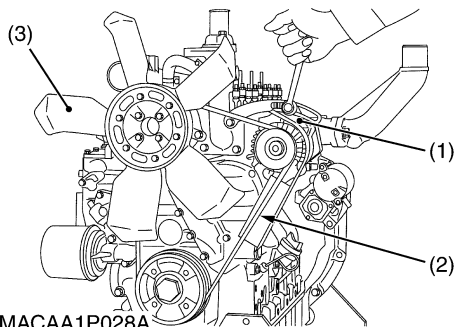
1. Loosen the nut and tension screw.
2. Remove the fan belt (2) and alternator (1).
3. Remove the fan (3).

(When reassembling)

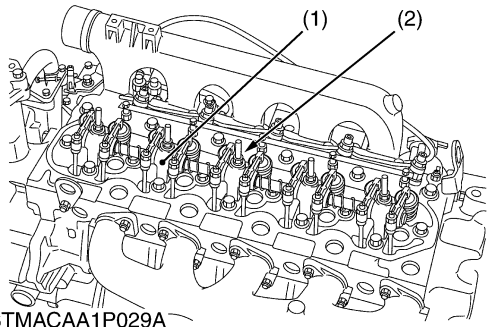
- Check to see if the fan belt is placed in a correct position (where letters on the belt can be read from you side), and there is no oil or grease on the belt.
- Adjust the fan belt tension. (See page G-23.)

- (1) Alternator
- (2) Fan Belt
- (3) Fan

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3TMACAA1P028A



Rocker Arm

1. Remove the rocker arm bracket nuts (2).
2. Detach the rocker arm assembly (1).

(When reassembling)

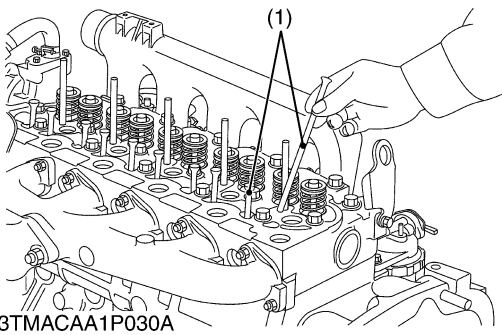
- Always adjust the valve clearance.
- Before installing the rocker arm bracket, check to see in there any metallic particles on the surface on which the assembly is mounted.

Tightening torque	Rocker arm bracket nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs
-------------------	------------------------	---

(1) Rocker Arm Assembly

(2) Rocker Arm Bracket Nut

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Push Rods

1. Remove the push rods (1).

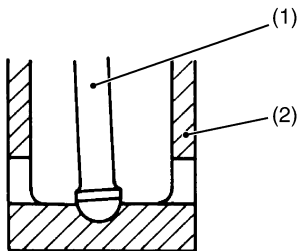
(When reassembling)

- When putting the push rods onto the tappets, check to see if their ends are properly engaged with the grooves.

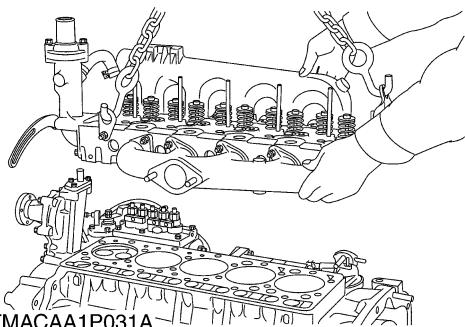
(1) Push Rod

(2) Tappet

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Cylinder Head

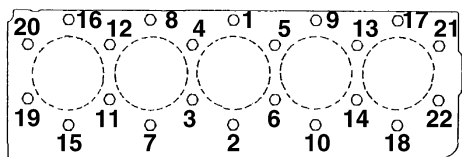
1. Loosen the pipe clam, and remove the water return pipe.
2. Remove the cylinder head screw in the order of (22) to (1).
3. Lift up the cylinder head to detach.

(When reassembling)

- Tighten the cylinder head screws after applying sufficient oil.
- Tighten the cylinder head screws gradually in order of (1) to (22) after applying engine oil.
- Tighten them uniformly, or the head may deform in the long run.

IMPORTANT

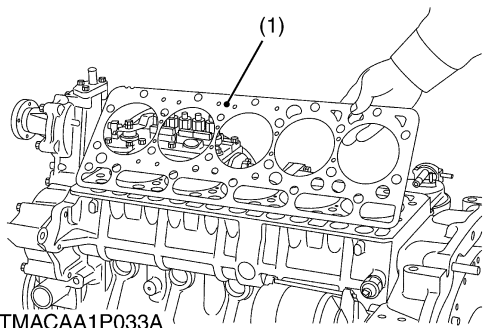
- **When overhauling the engine, replace the gasket with a new one without confusing its front and back.**
- **Retighten the cylinder head screws after running the engine for 30 minutes.**



Tightening torque	Cylinder head screw	93.2 to 98.1 N·m 9.5 to 10.0 kgf·m 68.7 to 72.3 ft-lbs
-------------------	---------------------	--

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Cylinder Head Gasket and Tappet

1. Remove the cylinder head gasket (1).
2. Remove the O-ring (2).
3. Remove the tappets (3) from the crankcase.

(When reassembling)

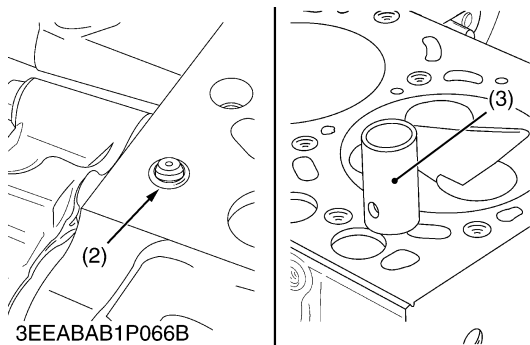
- Before installing the cylinder head gasket, check to see there is no foreign matter on the cylinder head and cylinder.
- Visually check the contact between tappets and cams for proper rotation. If defect is found, replace tappets.
- Before installing the tappets, apply engine oil thinly around them.

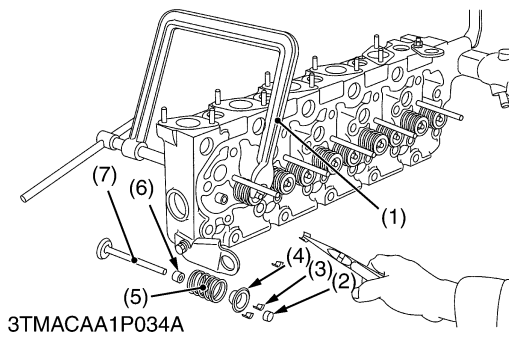
IMPORTANT

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

- (1) Cylinder Head Gasket
- (2) O-ring
- (3) 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 seal 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 | (5) Valve Spring |
| (2) Valve Cap | (6) Valve Stem Seal |
| (3) Valve Spring Collet | (7) Valve |
| (4) Valve Spring Retainer | |

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(B) Timing Gear

Cylinder Head Assembly

1. Remove the cylinder head assembly.
(See page 1-S28 to 1-S31.)

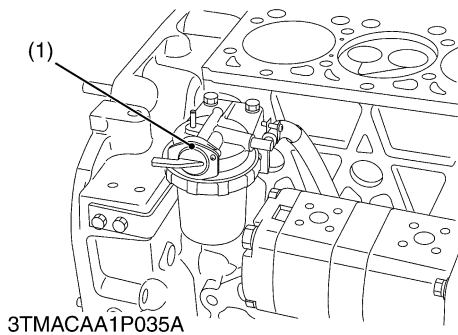
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Fuel Filter Assembly

1. Loosen the pipe clamp, and remove the fuel pipe from the fuel filter.
2. Remove the fuel filter assembly (1) with its support together.

- (1) Fuel Filter Assembly

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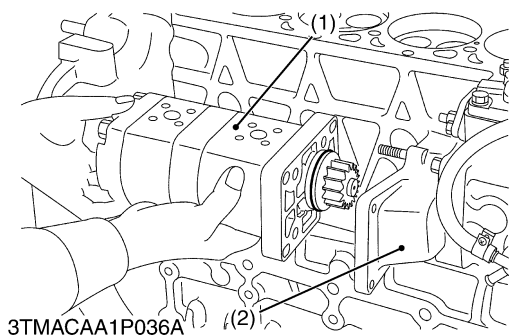


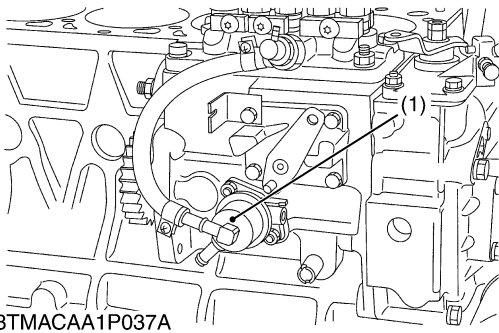
Hydraulic Pump

1. Remove the hydraulic pump (1).
2. Detach the pump base (2).

- (1) Hydraulic Pump (2) Pump Base

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Fuel Lift Pump

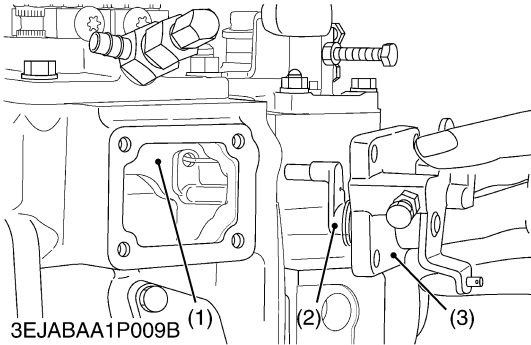
1. Loosen the pipe clamp, and remove the fuel pipe from the injection pump side.
2. Remove the fuel lift pump (1).

(When ressembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to the both sides of fuel lift pump gasket.

(1) Fuel Pump

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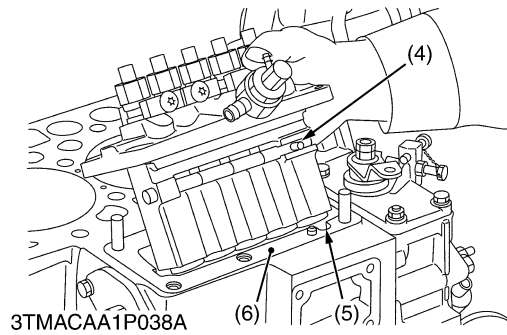


Injection Pump

1. Remove the injection pump cover (3) with the engine stop lever (2)
2. Remove the injection pump mounting screws and nuts.
3. Align the control rack pin (4) with the groove (5) on the crankcase, then remove the injection pump.
4. Remove the injection pump timing shims.
5. In principle, the injection pump should not be disassemble.

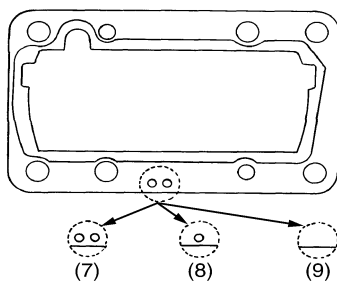
(When reassembling)

- Install the injection pump so that its control rack pin (4) engages with the groove (5) of fork lever 1 (1).
- Install the injection pump cover with the arm of engine stop lever (2) at the right of the arm of fork lever 1 (1).
- The sealant is applied to both sides of the shim (soft metal gasket shim). The liquid gasket is not required for assembling.
- Addition or reduction of shims (0.05 mm, 0.0020 in.) delays or advances the injection timing by approx. 0.0087 rad. (0.5 °).
- In disassembling and replacing, be sure to use the same number of new shims with the same thickness.
- Refer to figure left to check the thickness of the shims.

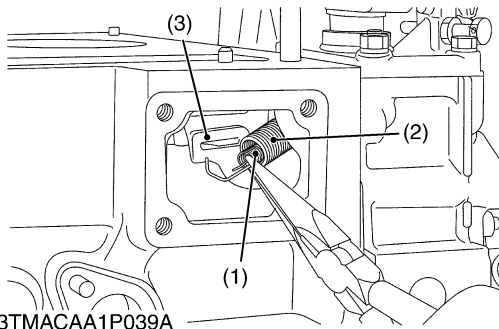


- | | |
|--------------------------|---|
| (1) Fork Lever 1 | (6) Shim |
| (2) Engine Stop Lever | (7) 2-holes : 0.20 mm (0.0079 in.) |
| (3) Injection Pump Cover | (8) 1-hole : 0.25 mm (0.0098 in.) |
| (4) Control Rack Pin | (9) Without hole : 0.30 mm (0.0118 in.) |
| (5) Groove | |

000002470E



3GFABAB1P045B



Governor Spring

1. Disconnect the governor spring 1 (1) and 2 (2) from the fork lever 2 (3).

(When reassembling)

- Fix the governor spring to the speed control lever, and pull the spring or wire through the window of the injection pump, and spring will be able to be hooked on the governor fork with ease. Bend the end of the governor spring to prevent it from falling off.

- (1) Governor Spring 1
(2) Governor Spring 2

- (3) Fork Lever 2

000002471E

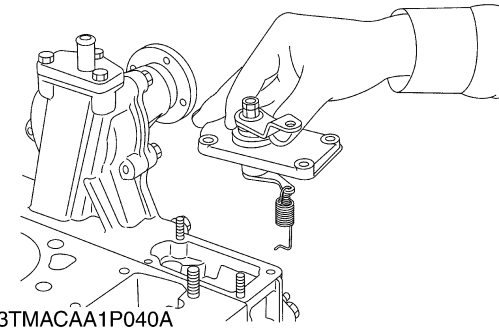
Speed Control Plate

1. Remove the speed control plate and governor spring.

(When reassembling)

- Be careful not to drop the governor spring in the gear case.
- Apply a liquid gasket (Three Bond 1102 or equivalent) to both sides of the speed control plate gasket.

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Start Spring

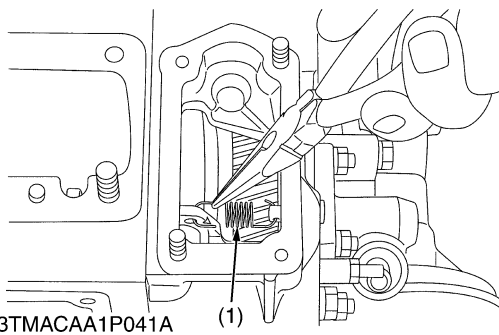
1. Remove the start spring (1) from the gear case.

(When reassembling)

- Be careful not to drop the start spring into the gear case.
- Hook the start spring so that the longer hook is on the fork lever side.

- (1) Start Spring

000002473E



Fan Drive Pulley

1. Remove the crankshaft nut.
2. Draw out the fan drive pulley (1) with a puller.

(When reassembling)

- Do not tighten the nut excessively, it may damage the oil slinger, causing oil leakage.

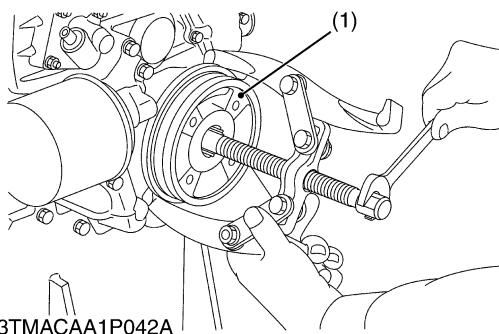
■ IMPORTANT

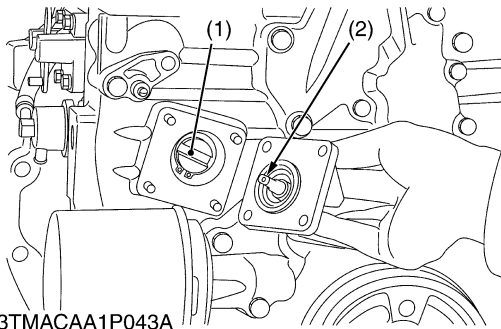
- Install the fan drive pulley to the crankshaft, aligning the marks on them.

Tightening torque	Crankshaft screw	196.1 to 215.8 N·m 20.0 to 22.0 kgf·m 144.7 to 159.1 ft·lbs
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- (1) Fan Drive Pulley

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Hourmeter Unit

1. Remove the hourmeter unit.

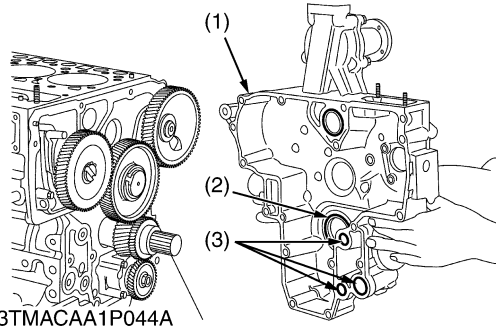
(When reassembling)

- Apply a liquid gasket (Three Bond 1104 or equivalent) to both sides of the gasket.
- Ensure that the extremity convex section (2) of the hourmeter unit is inserted into groove (1) of the fuel camshaft.

(1) Groove

(2) Convex Section

000002475E



Gear Case

1. Remove the oil filter assembly.
2. Remove the gear case (1).
3. Remove the O-rings (3).

(When reassembling)

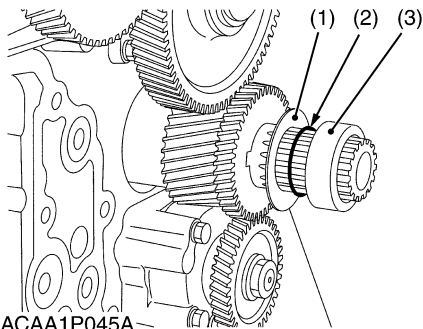
- Check to see if there are four O-rings (3) inside the gear case (1).
- Apply a thin film of engine oil to the oil seal (2), and install it, noting the lip come off.
- Apply a liquid gasket (Three Bond 1102 or equivalent) to gear case side of the gear case gasket.

(1) Gear Case

(3) O-ring

(2) Oil Seal

000002476E



Crankshaft Oil Slinger

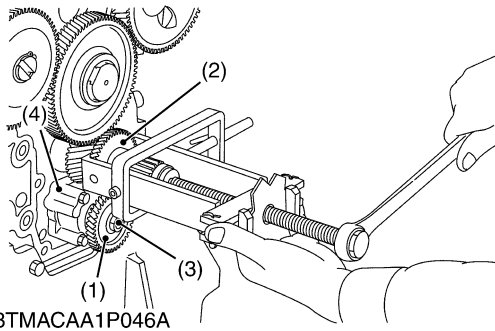
1. Remove the crankshaft collar (3).
2. Remove the O-ring (2).
3. Detach the crankshaft oil slinger (1).

(1) Crankshaft Oil Slinger

(3) Crankshaft Collar

(2) O-ring

000002477E



Oil Pump

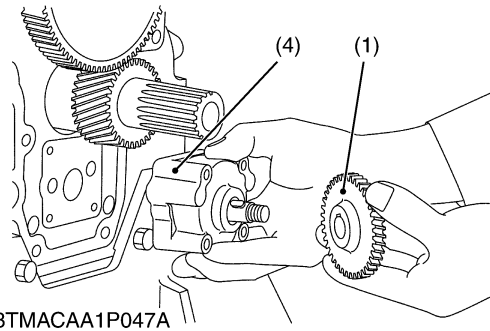
1. Loosen the oil pump drive gear 1 mounting nut (3).
2. Draw out the oil pump drive gear 2 (2) with a special use puller set (Code No. 07916-09032).
3. Remove the oil pump drive gear 1 mounting nut, and draw out the oil pump drive gear 1 (1) with a special use puller set.
4. Remove the oil pump (4).

(When reassembling)

Tightening torque	Oil pump drive gear 1 mounting nut	78.5 to 88.3 N·m 8.0 to 9.0 kgf·m 57.9 to 65.1 ft·lbs
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- | | |
|---------------------------|--|
| (1) Oil Pump Drive Gear 1 | (3) Oil Pump Drive Gear 1 Mounting Nut |
| (2) Oil Pump Drive Gear 2 | (4) Oil Pump |

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Idle Gear

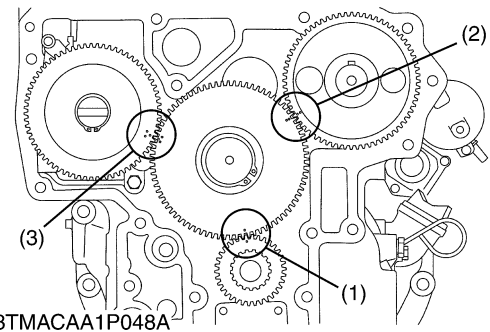
1. Remove the external snap ring.
2. Detach the idle gear collar 2.
3. Detach the idle gear.
4. Detach the idle gear collar 1.

(When reassembling)

- Check to see each gear is aligned with its aligning mark :
 One mark (1) : Idle gear and crank gear
 Two marks (2) : Idle gear and camshaft gear
 Three marks (3) : Idle gear and injection pump gear
- Apply a thin film of engine oil to the idle gear bushing before installation.

- | | |
|--------------------|--------------------|
| (1) Alignment Mark | (3) Alignment Mark |
| (2) Alignment Mark | |

000002479E



Tappets

1. Remove the tappets.
(See page 1-S31.)

000002480E

(C) Crankcase

Cylinder Head Assembly

1. Remove the cylinder head assembly.
(See page 1-S28 to 1-S31.)

000002485E

Timing Gear

1. Remove the timing gear.
(See page 1-S32 to 1-S36.)

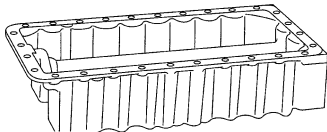
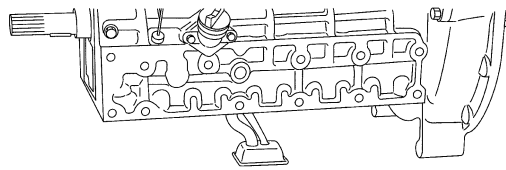
000002487E

Oil Pan and Oil Strainer

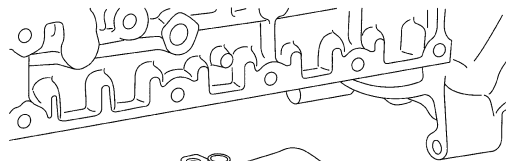
1. Remove the oil pan mounting screws.
2. Screw hooks (M11 x Pitch 1.25) to lift up the cylinder block and detach the oil pan by lightly tapping the groove of the pan with a wooden hammer.
3. Remove the mounting screw of oil strainer 1.
4. Detach oil strainer 1 (1), being careful of the O-ring.

(When reassembling)

- After cleaning the oil strainer 1 (1), check to see that the strainer mesh is clean, and install it.
- Visually check the O-ring, apply engine oil, and install it.
- After checking to see that the O-ring is securely installed, attach the oil strainer 1 (1).
- Apply a liquid gasket (Three Bond 1215 or equivalent) to both sides of the oil pan gasket.



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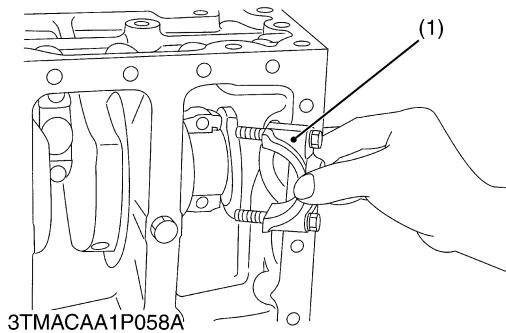


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Tightening torque	Oil pan mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft-lbs
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(1) Oil Strainer 1

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Connecting Rod Cap

1. Remove the connecting rod caps (1).

(When reassembling)

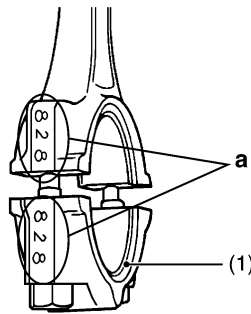
- Apply engine oil to the connecting rod screws.
- Align the marks (a) with each other. (Face the marks toward the injection pump.)

Tightening torque	Connecting rod screw	44.1 to 49.0 N·m 4.5 to 5.0 kgf·m 32.5 to 36.2 ft·lbs
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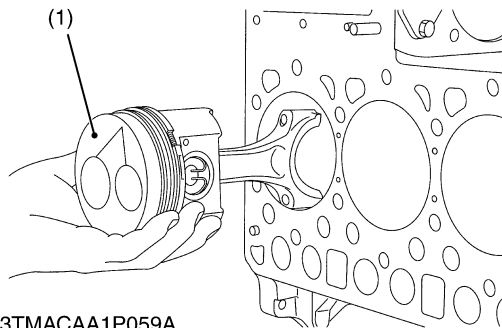
(1) Connecting Rod Cap

a : Mark

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3EEABAB1P095D



3TMACAA1P059A

Pistons

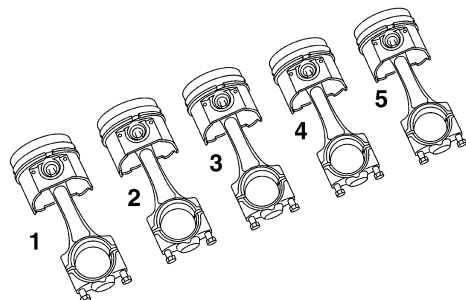
1. Turn the crankshaft by 3.14 rad (180 °) and bring the piston to top dead center.
2. Draw out the piston (1) upward by lightly tapping it from the bottom of the crankcase with the grip of a hammer.
3. Draw out the other piston in the same method as above.

(When reassembling)

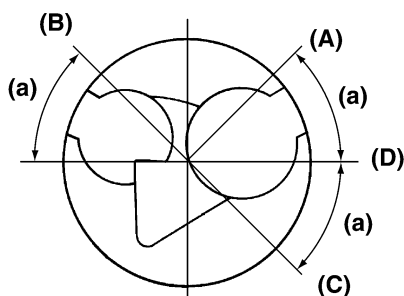
- Before inserting the pistons into the cylinders, apply enough engine oil to the pistons.
- When inserting the piston into the cylinder, face the mark on the connecting rod to the injection pump.

■ 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.
- Place the piston rings with their gaps at 0.79 rad (45 °) from the piston pin's direction as shown in the figure.
- Carefully insert the pistons using a piston ring compressor.
- Carefully insert pistons. Otherwise, their chrome-plated section at oil rings edge may be scratched, causing trouble inside the cylinder.



3TMACAA1P060A

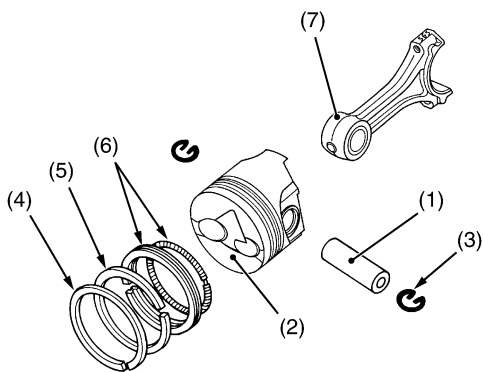


3TMABAB1P046A

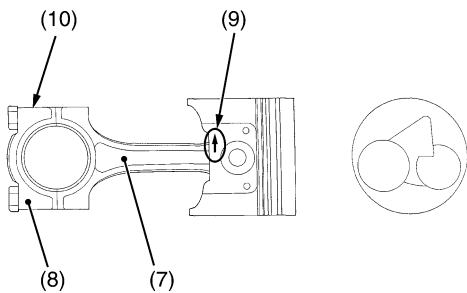
(1) Piston

- (A) Top Ring Gap
- (B) Second Ring Gap
- (C) Oil Ring Gap
- (D) Piston Pin Hole
- (a) 0.79 rad (45 °)

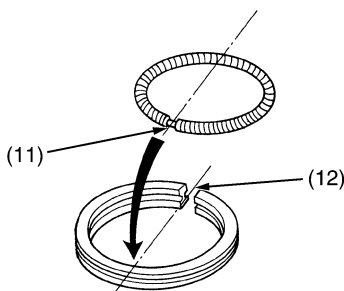
000002491E



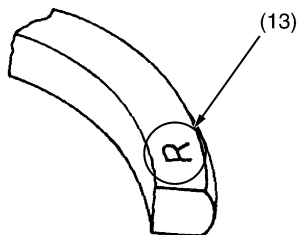
3TMABAB1P047E



3TMACAA1P061A



3EEABAB1P100D



3EEABAB1P101C

Piston Ring and Connecting Rod

1. Remove the piston rings using a piston ring tool (Code No. 07909-32121).
2. Remove the piston pin (1), and separate the connecting rod (7) from the piston (2).

(When reassembling)

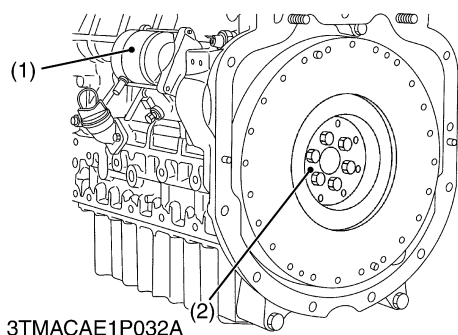
- When installing the ring, assemble the rings so that the manufacturer's mark (13) near the gap faces the top of the piston.
- When installing the oil ring onto the piston, place the expander joint (11) on the opposite side of the oil ring gap (12).
- Apply engine oil to the piston pin.
- When installing 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.

■ IMPORTANT

- **When installing the connecting rod to the piston, align the mark (10) on the connecting rod to the arrow's direction of casting mark (9) on the piston.**
- **Mark the same number on the connecting rod and the piston so as not to change the combination.**

- | | |
|--------------------------|--------------------------|
| (1) Piston Pin | (8) Connecting Rod Cap |
| (2) Piston | (9) Casting Mark |
| (3) Piston Pin Snap Ring | (10) Mark |
| (4) Compression Ring 1 | (11) Expander Joint |
| (5) Compression Ring 2 | (12) Oil Ring Gap |
| (6) Oil Ring | (13) Manufacturer's Mark |
| (7) Connecting Rod | |

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3TMACAE1P032A

Flywheel

1. Remove the starter motor (1).
2. Lock the flywheel not to turn using the flywheel stopper.
3. Remove the flywheel screws, except for two which must be loosened and left as they are.
4. Set a flywheel puller, and remove the flywheel.

(When reassembling)

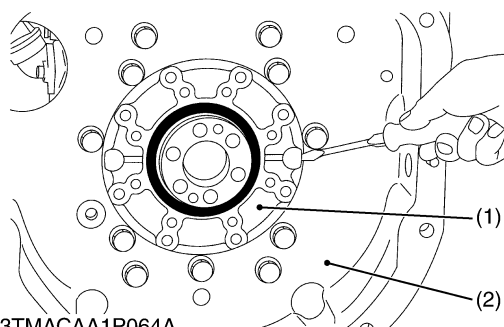
- Apply engine oil to the flywheel screws.
- Check to see that there are no metal particles left on the flywheel mounting surface.
- To ease alignment of the crankshaft and the flywheel, bring the crank of No. 1 cylinder to TC (top dead center). Make sure of the flywheel 1TC, align it in the window on flywheel housing.

Tightening torque	Flywheel screw	98.1 to 107.9 N·m 10.0 to 11.0 kgf·m 72.3 to 79.6 ft-lbs
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(1) Starter Motor

(2) PTO Propeller Shaft Spline Hub

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3TMACAA1P064A

Bearing Case Cover and Flywheel Housing Case

1. Remove the bearing case cover mounting screws first inside and next outside.
2. Remove the bearing case cover (1).
3. Remove the flywheel housing case (2).

(When reassembling)

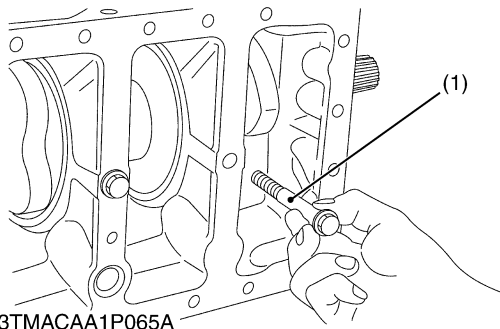
- Apply grease to the oil seal lip and take care that it is not rolled when installing.
- Tighten the bearing case cover mounting screws with even force on the diagonal line.

Tightening torque	Bearing case cover mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs
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(1) Bearing Case Cover

(2) Flywheel Housing Case

000002494E



Crankshaft

1. Remove the main bearing case screw 2 (1).
2. Pull out the crankshaft, taking care not to damage the crankshaft bearing 1.

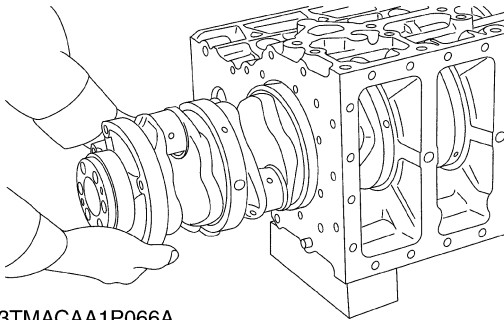
(When reassembling)

- Apply oil to the main bearing case screw 2 (1).
- Clean the oil passage of the crankshaft with compressed air.

Tightening torque	Main bearing case screw 2	68.6 to 73.6 N-m 7.0 to 7.5 kgf-m 50.6 to 54.2 ft-lbs
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(1) Main Bearing Case Screw 2

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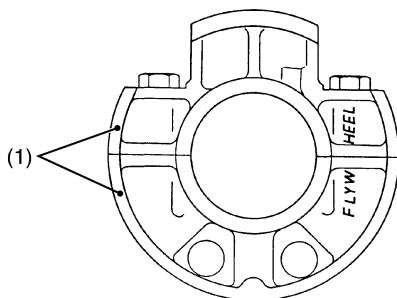
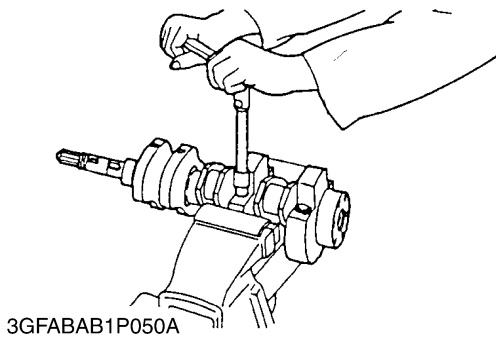


Main Bearing Case Assembly

1. Remove the two main bearing case screws 1, and remove the main bearing case assembly 1, being careful with the thrust bearing and crankshaft bearing 2.
2. Remove the main bearing case assembly 2, 3 and 4 as above.

(When reassembling)

- Clean the oil passage in the main bearing case.
- Apply clean engine oil on the bearings.
- Install the main bearing case assemblies in the original positions. Since diameters of main bearing case vary, install them in order of markings **(A, B, C, D)** from the gear case side.
- Match the alignment numbers (1) on the main bearing case.
- When installing the main bearing case 1, 2, 3 and 4, face the mark "FLYWHEEL" to the flywheel.
- Install the thrust bearing with its oil groove facing outward.
- Confirm that the main bearing case moves smoothly after tightening the main bearing case screw 1 to the specified torque.



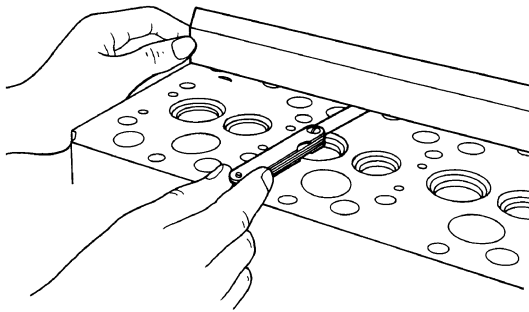
Tightening torque	Main bearing case screw 1	46.1 to 51.0 N-m 4.7 to 5.2 kgf-m 34.0 to 37.6 ft-lbs
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(1) Alignment Number

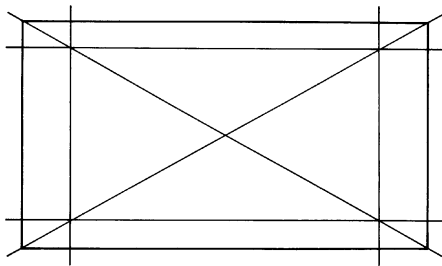
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(3) Servicing

(A) Cylinder Head



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Cylinder Head Surface Flatness

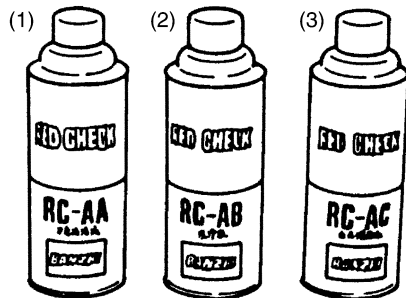
1. Clean the cylinder head surface.
2. Place a straightedge on the cylinder head's four sides and two diagonals as shown in the figure.
3. Measure the clearance with a thickness gauge.
4. If the measurement exceeds the allowable limit, correct it with a surface grinder.

■ 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 0.0020 in.
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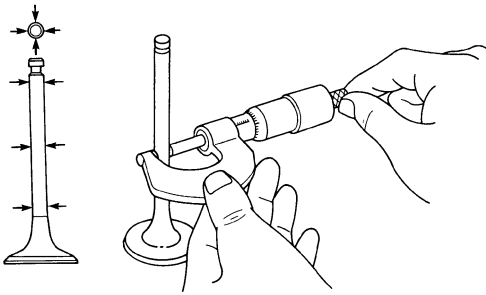
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Cylinder Head Flaw

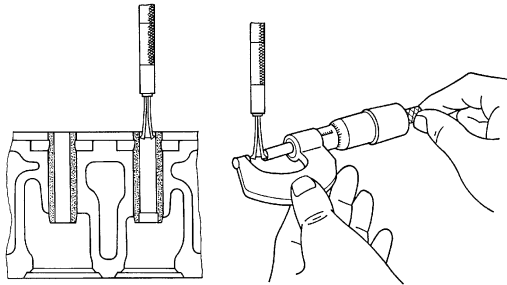
1. Prepare an air spray red check (Code No. 07909-31371).
2. Clean the surface of the cylinder head with the detergent (2).
3. Spray the cylinder head surface with the red permeative liquid (1). Leave it five to ten minutes after spraying.
4. Wash away the red permeative liquid on the cylinder head surface with the detergent (2).
5. Spray the cylinder head surface with the 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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3EEABAB1P116A

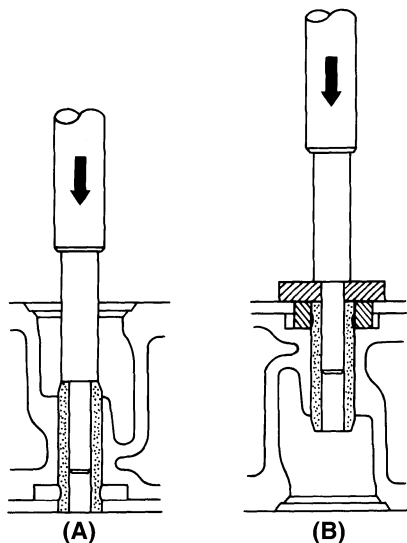
Clearance between Valve Stem and Valve Guide

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.

Clearance between valve stem and valve guide	Factory spec.	0.040 to 0.070 mm 0.00157 to 0.00276 in.
	Allowable limit	0.1 mm 0.0039 in.

Valve stem O.D.	Factory spec.	7.960 to 7.975 mm 0.31339 to 0.31398 in.
Valve guide I.D.	Factory spec.	8.015 to 8.030 mm 0.31555 to 0.31614 in.

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Replacing Valve Guide

(When removing)

1. Press out the used valve guide using a valve guide replacing tool.

(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.

Valve guide I.D. (Intake and Exhaust)	Factory spec.	8.015 to 8.030 mm 0.31555 to 0.31614 in.
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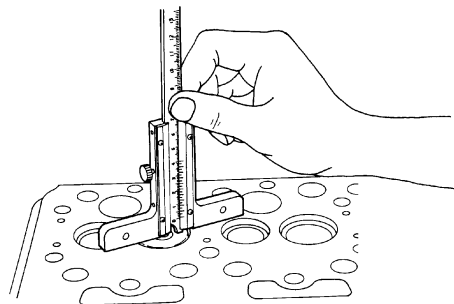
■ IMPORTANT

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

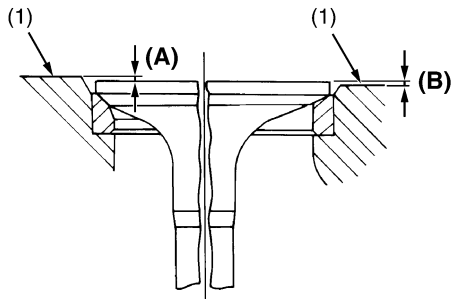
(A) When removing

(B) When installing

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Valve 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, correct the valve seat face of the cylinder head with a valve seat cutter (Code No. 07909-33102) or valve seat grinder.
6. Then, correct the cylinder head surface with a surface grinder, or replace the cylinder head.

Valve recessing	Factory spec.	0.05 (protrusion) to 0.15 (recessing) mm 0.0020 (protrusion) to 0.0059 (recessing) in.
	Allowable limit	0.40 (recessing) mm 0.0157 (recessing) in.

(1) Cylinder Head Surface

(A) Recessing

(B) Protrusion

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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.



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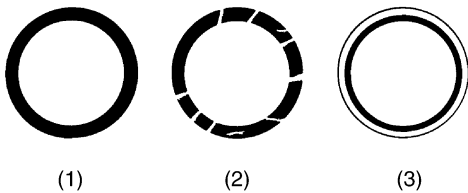
Valve seat width	Factory spec.	2.12 mm 0.0835 in.
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(1) Correct

(3) Incorrect

(2) Incorrect

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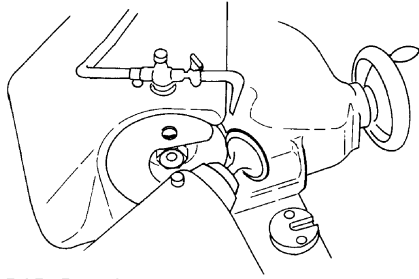


(1)

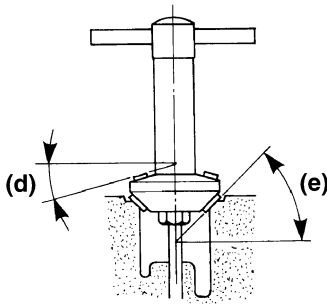
(2)

(3)

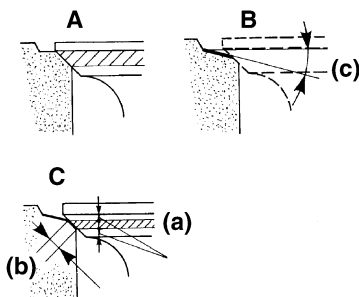
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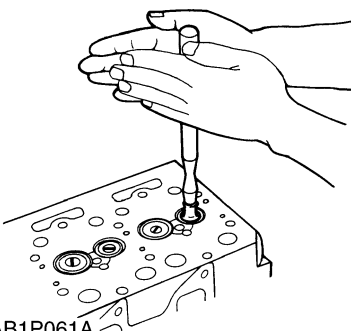
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3EEABAB1P120A



3TMABAB1P061A

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.

2) Correcting Valve Seat

1. Slightly correct the seat surface with a 1.047 rad (60 °) (intake valve) or 0.785 rad (45 °) (exhaust valve) seat cutter (Code No. 07909-33102).
2. Resurface the seat surface with a 0.523 rad (30 °) valve seat cutter to intake valve seat and with a 0.262 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.

(a) Identical Dimensions

(A) Check Contact

(b) Valve Seat Width

(B) Correct Seat Width

(c) 0.523 rad (30 °) or
0.262 rad (15 °)

(C) Check Contact

(d) 0.262 rad (15 °) or
0.523 rad (30 °)

(e) 0.785 rad (45 °) or
1.047 rad (60 °)

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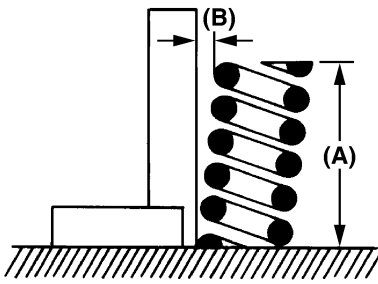
Valve Lapping

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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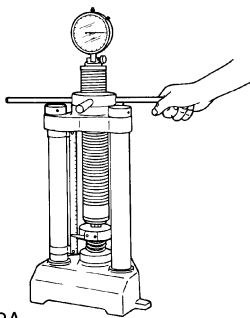
Free Length and Tilt of Valve Spring

1. Measure the free length (A) 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 (B).
If the measurement exceeds the allowable limit, replace it.
Check the entire surface of the valve spring for scratches.
If there is any defect, replace it.

Free length (A)	Factory spec.	41.7 to 42.2 mm 1.6417 to 1.6614 in.
	Allowable limit	41.2 mm 1.6220 in.

Tilt (B)	Allowable limit	1.0 mm 0.039 in.
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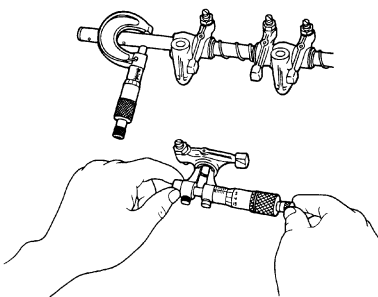
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Valve Spring Setting Load

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.

Setting load / Setting length	Factory spec.	117.6 N / 35.0 mm 12.0 kgf / 35.0 mm 26.4 lbs / 1.3780 in.
	Allowable limit	100.0 N / 35.0 mm 10.2 kgf / 35.0 mm 22.5 lbs / 1.3780 in.

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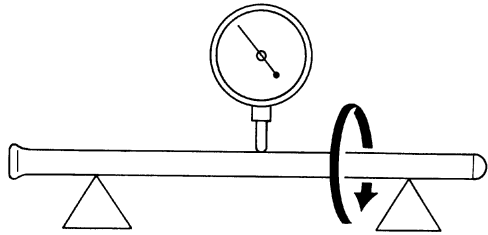
Oil Clearance between Rocker Arm and Rocker Arm Shaft

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.

Oil clearance between rocker arm and rocker arm shaft	Factory spec.	0.016 to 0.045 mm 0.00063 to 0.00177 in.
	Allowable limit	0.15 mm 0.0059 in.

Rocker arm shaft O.D.	Factory spec.	13.973 to 13.984 mm 0.55012 to 0.55055 in.
Rocker arm I.D.	Factory spec.	14.000 to 14.018 mm 0.55118 to 0.55189 in.

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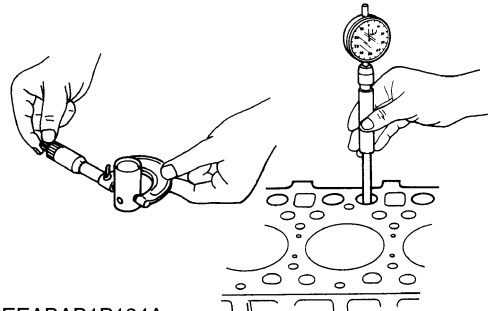
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Push Rod Alignment

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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Oil Clearance between Tappet and Tappet Guide Bore

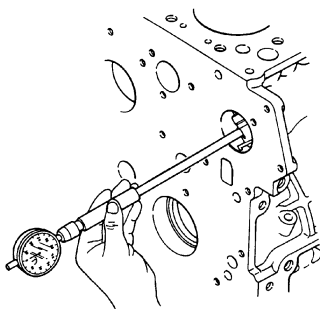
1. Measure the tappet O.D. with an outside micrometer.
2. Measure the I.D. of the tappet guide bore with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit or the tappet is damaged, replace the tappet.

Oil clearance between tappet and tappet guide bore	Factory spec.	0.020 to 0.062 mm 0.00079 to 0.00244 in.
	Allowable limit	0.07 mm 0.0028 in.

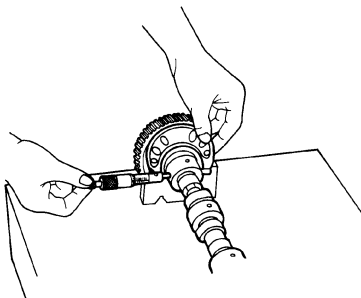
Tappet O.D.	Factory spec.	23.959 to 23.980 mm 0.94327 to 0.94410 in.
Tappet guide bore I.D.	Factory spec.	24.000 to 24.021 mm 0.94488 to 0.94571 in.

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(B) Timing Gear



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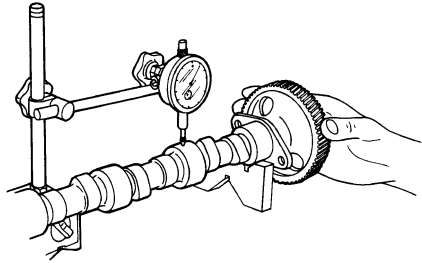
Oil Clearance of Camshaft Journal

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.

Oil clearance of camshaft journal	Factory spec.	0.050 to 0.091 mm 0.00197 to 0.00358 in.
	Allowable limit	0.15 mm 0.0059 in.

Camshaft journal O.D.	Factory spec.	39.934 to 39.950 mm 1.57221 to 1.57284 in.
Cylinder block bore I.D.	Factory spec.	40.000 to 40.025 mm 1.57480 to 1.57579 in.

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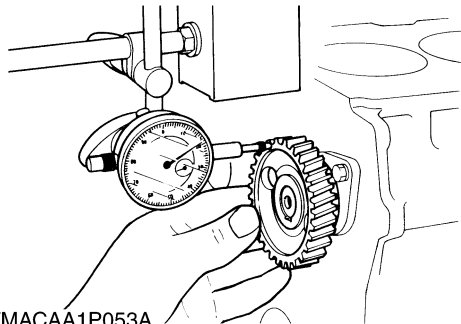
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Camshaft Alignment

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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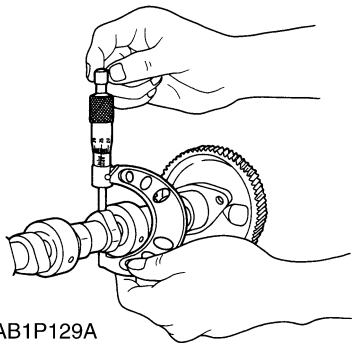
3TMACAA1P053A

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 and rear.
3. If the measurement exceeds the allowable limit, replace the camshaft stopper.

End play of camshaft	Factory spec.	0.07 to 0.22 mm 0.0028 to 0.0087 in.
	Allowable limit	0.30 mm 0.0118 in.

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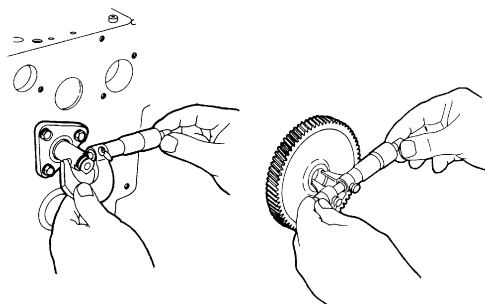
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Cam Height

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.

Cam height of intake and exhaust	Factory spec.	33.463 to 33.483 mm 1.31744 to 1.31823 in.
	Allowable limit	33.42 mm 1.3157 in.

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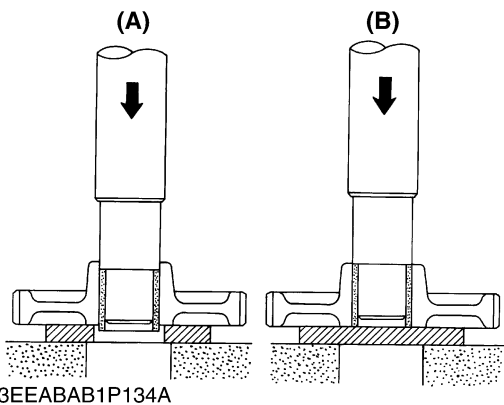
Oil Clearance between Idle Gear Shaft and Idle Gear Bushing

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.

Oil clearance between idle gear shaft and idle gear bushing	Factory spec.	0.025 to 0.066 mm 0.00098 to 0.00260 in.
	Allowable limit	0.10 mm 0.0039 in.

Idle gear shaft O.D.	Factory spec.	37.959 to 37.975 mm 1.49445 to 1.49508 in.
Idle gear bushing I.D.	Factory spec.	38.000 to 38.025 mm 1.49606 to 1.49704 in.

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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.

(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.

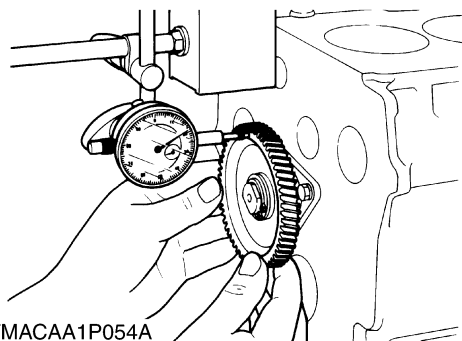
(A) When removing

(B) When installing

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Idle Gear 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.

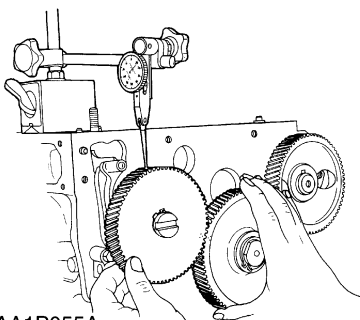


Idle gear side clearance	Factory spec.	0.20 to 0.51 mm 0.0079 to 0.0201 in.
	Allowable limit	0.9 mm 0.0354 in.

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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 not proper, replace the gear.



Backlash between idle gear and crank gear	Factory spec.	0.0415 to 0.1122 mm 0.00163 to 0.00442 in.
	Allowable limit	0.15 mm 0.0059 in.

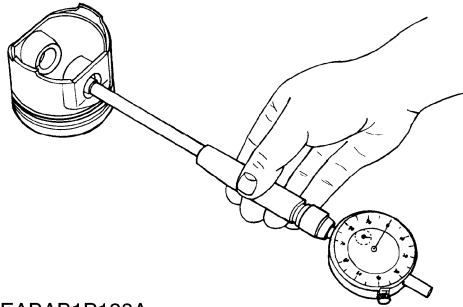
Backlash between idle gear and cam gear	Factory spec.	0.0415 to 0.1154 mm 0.00163 to 0.00454 in.
	Allowable limit	0.15 mm 0.0059 in.

Backlash between idle gear and injection pump gear	Factory spec.	0.0415 to 0.1154 mm 0.00163 to 0.00454 in.
	Allowable limit	0.15 mm 0.0059 in.

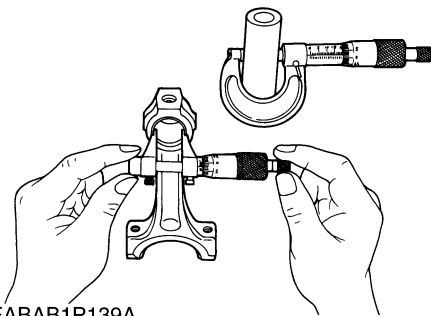
Backlash between oil pump drive gear and crank gear	Factory spec.	0.0415 to 0.1090 mm 0.00163 to 0.00429 in.
	Allowable limit	0.15 mm 0.0059 in.

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(C) Crankcase



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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.

Piston pin bore I.D.	Factory spec.	25.000 to 25.013 mm 0.98425 to 0.98477 in.
	Allowable limit	25.05 mm 0.9862 in.

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Oil Clearance between Piston Pin and Small End Bushing

1. Measure the piston pin O.D. where it 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.

Oil clearance between piston pin and small end bushing	Factory spec.	0.014 to 0.038 mm 0.00055 to 0.00150 in.
	Allowable limit	0.15 mm 0.0059 in.

Piston pin O.D.	Factory spec.	25.002 to 25.011 mm 0.98433 to 0.98468 in.
Small end bushing I.D.	Factory spec.	25.025 to 25.040 mm 0.98523 to 0.98582 in.

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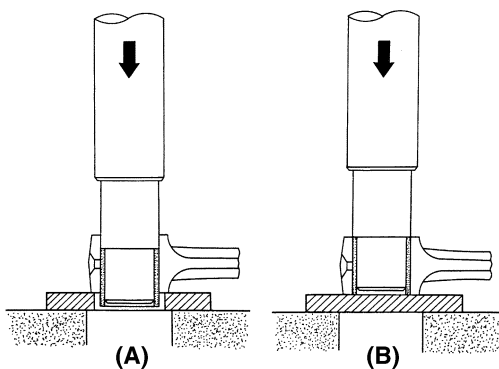
Replacing Small End Bushing

(When removing)

1. Press out the used bushing using a small end bushing replacing tool.

(When installing)

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Press in a new bushing so that it is flush with the end of the connecting rod using a small end bushing replacing tool by aligning the oil holes of the connecting rod and the bushing.

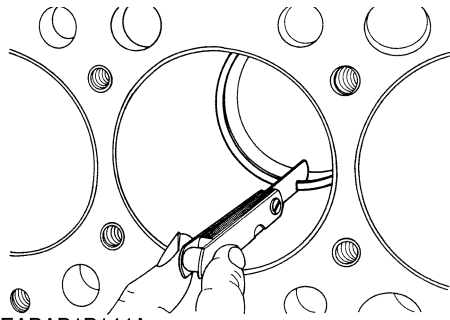


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(A) When removing

(B) When installing

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Piston Ring Gap

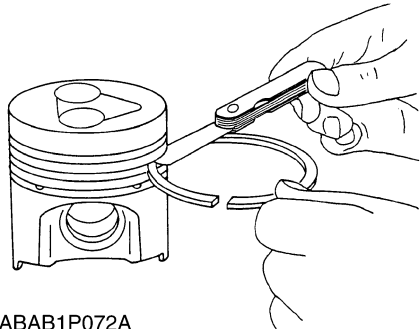
1. Insert the piston ring into the lower part of the liner (the least worn out part) with the piston ring compressor and piston.
2. Measure the ring gap with a thickness gauge.
3. If the measurement exceeds the allowable limit, replace the piston ring.

Piston ring gap	Top ring second ring	Factory spec.	0.30 to 0.45 mm 0.0118 to 0.0177 in.
		Allowable limit	1.25 mm 0.0492 in.
	Oil ring	Factory spec.	0.25 to 0.45 mm 0.0098 to 0.0177 in.
		Allowable limit	1.25 mm 0.0492 in.

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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 thickness 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.



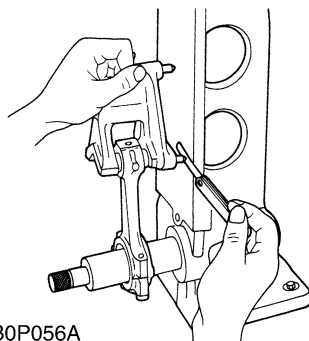
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Clearance between piston ring and piston ring groove	Second ring	Factory spec.	0.093 to 0.120 mm 0.00366 to 0.00472 in.
		Allowable limit	0.20 mm 0.0079 in.
	Oil ring	Factory spec.	0.020 to 0.052 mm 0.00079 to 0.00205 in.
		Allowable limit	0.15 mm 0.0059 in.

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Connecting Rod Alignment

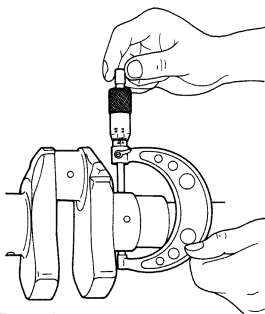
1. Remove the crankpin bearing, and install the connecting rod cap.
2. Install the piston pin in the connecting rod.
3. Install the connecting rod on the connecting rod alignment tool (Code No. 07909-31661).
4. Put a gauge over the piston pin, and move it against the face plate.
5. If the gauge does not fit squarely against the face plate, measure the space between the pin of the gauge and the face plate.
6. If the measurement exceeds the allowable limit, replace the connecting rod.



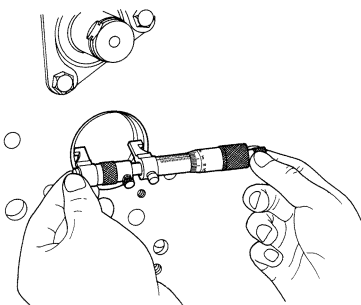
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Space between gauge pin face plate	Allowable limit	0.05 mm 0.0020 in.
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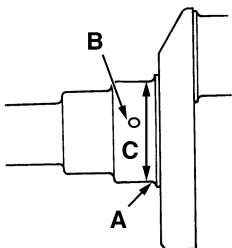
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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 1

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 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 figure.

Oil clearance between crankshaft journal and crankshaft bearing 1	Factory spec.	0.040 to 0.118 mm 0.00157 to 0.00465 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory spec.	51.921 to 51.940 mm 2.04413 to 2.04488 in.
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Crankshaft bearing 1 I.D.	Factory spec.	51.980 to 52.039 mm 2.04645 to 2.04878 in.
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(Reference)

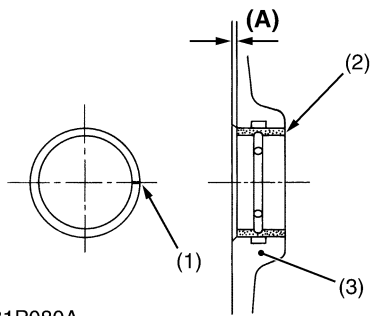
● Undersize crankshaft bearing 1

Undersize	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Crankshaft bearing 1 02	17331-23911	020 US
0.4 mm 0.016 in.	Crankshaft bearing 1 04	17331-23921	040 US

● Undersize dimensions of crankshaft journal

Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius
Dimension B	1.0 to 1.5 mm dia. 0.0394 to 0.0591 in. dia.	1.0 to 1.5 mm dia. 0.0394 to 0.0591 in. dia.
Dimension C	51.721 to 51.740 mm dia. 2.03626 to 2.03700 in. dia.	51.521 to 51.540 mm dia. 2.02838 to 2.02913 in. dia.
(0.4-S)		
The crankshaft journal must be fine-finished to higher than ▽▽▽▽		

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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.

(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.)

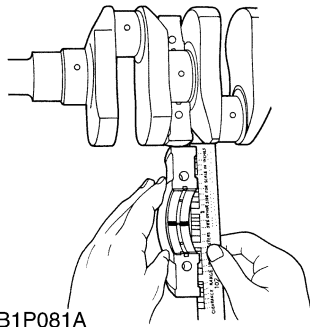
Dimension (A)	Factory spec.	4.2 to 4.5 mm 0.1654 to 0.1772 in.

(1) Seam

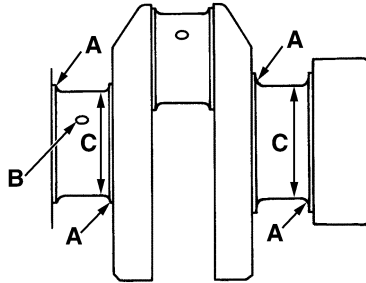
(3) Cylinder Block

(2) Crankshaft Bearing 1

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2

1. Put a strip of plastigage (Code No. 07909-30241) 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 clearance exceeds the allowable limit, replace the crankshaft bearing 2.
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.**

Oil clearance between crankshaft journal and crankshaft bearing 2	Factory spec.	0.040 to 0.104 mm 0.00157 to 0.00409 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory spec.	51.921 to 51.940 mm 2.04413 to 2.04488 in.
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Crankshaft bearing 2 I.D.	Factory spec.	51.980 to 52.039 mm 2.04645 to 2.04878 in.
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(Reference)

- **Undersize crankshaft bearing 2**

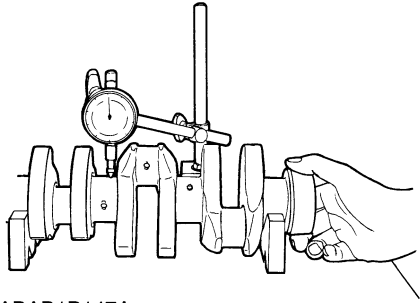
Undersize	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Crankshaft bearing 2	17331-23911	020 US
0.4 mm 0.016 in.	Crankshaft bearing 2	17331-23921	040 US

- **Undersize dimensions of crankshaft journal**

Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius
Dimension B	1.0 to 1.5 mm dia. 0.0394 to 0.0591 in. dia.	1.0 to 1.5 mm dia. 0.0394 to 0.0591 in. dia.
Dimension C	51.721 to 51.740 mm dia. 2.03626 to 2.03700 in. dia.	51.521 to 51.540 mm dia. 2.02838 to 2.02913 in. dia.

(0.4-S)
The crankshaft journal must be fine-finished to higher than ▽▽▽▽

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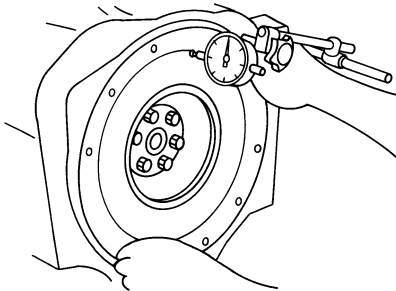
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Crankshaft Alignment

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 0.00079 in.
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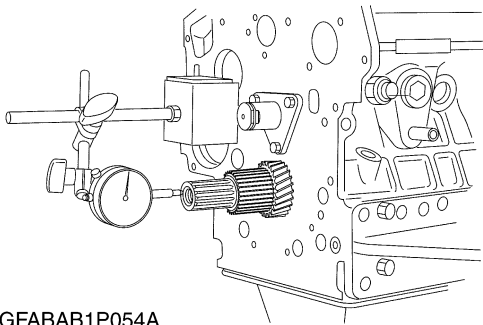
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Flywheel Sway

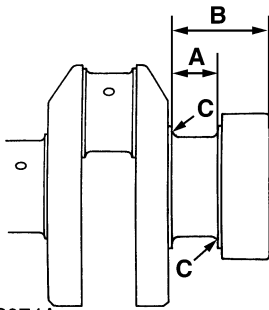
1. Set dial indicator with its tip on the rear friction face of the flywheel near the edge.
2. Turn the flywheel and measure the sway.
3. If the measurement exceeds the allowable limit, remove the flywheel and check the contact face of the crankshaft and flywheel.

Flywheel deflection	Allowable limit	0.05 mm 0.002 in.
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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 spec.	0.15 to 0.31 mm 0.0059 to 0.0122 in.
	Allowable limit	0.50 mm 0.0197 in.

(Reference)

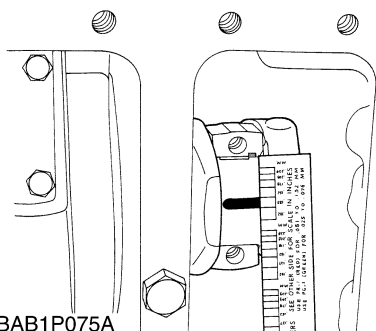
● **Oversize thrust bearing**

Oversize	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Thrust bearing 1 02	15221-23951	020 OS
	Thrust bearing 2 02	19202-23971	020 OS
0.4 mm 0.016 in.	Thrust bearing 1 04	15221-23961	040 OS
	Thrust bearing 2 04	19202-23981	040 OS

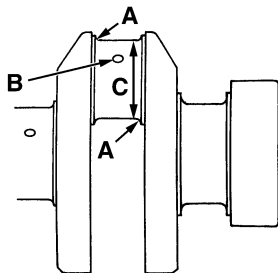
● **Oversize dimensions of crankshaft journal**

Oversize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	26.20 to 26.25 mm 1.0315 to 1.0335 in.	26.40 to 26.45 mm 1.1181 to 1.1201 in.
Dimension B	54.5 to 54.7 mm 2.146 to 2.154 in.	54.6 to 54.8 mm 2.150 to 2.157 in.
Dimension C	2.8 to 3.2 mm radius 0.110 to 0.126 in. radius	2.8 to 3.2 mm radius 0.110 to 0.126 in. radius
(0.4-S)		
The crankshaft journal must be fine-finished to higher than ▽▽▽▽		

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Oil Clearance between Crankpin and Crankpin Bearing

1. Clean the crankpin and crankpin bearing.
2. Put a strip of plastigage (Code No.: 07909-30241) 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 plastigage into the crankpin oil hole.
- Be sure not to move the crankshaft while the connecting rod screws are tightened.

Oil clearance between crankpin and crankpin bearing	Factory spec.	0.025 to 0.087 mm 0.00098 to 0.00343 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankpin O.D.	Factory spec.	46.959 to 46.975 mm 1.84878 to 1.84941 in.
Crankpin bearing I.D.	Factory spec.	47.000 to 47.046 mm 1.85039 to 1.85220 in.

(Reference)

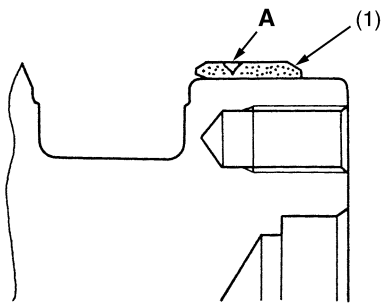
- Undersize crankpin bearing

Undersize	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Crankpin bearing 02	17331-22971	020 US
0.4 mm 0.016 in.	Crankpin bearing 04	17331-22981	040 US

- Undersize dimensions of crankpin

Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	3.3 to 3.7 mm radius 0.1299 to 0.1457 in. radius	3.3 to 3.7 mm radius 0.1299 to 0.1457 in. radius
Dimension B	1.0 to 1.5 mm dia. 0.0394 to 0.0591 in. dia.	1.0 to 1.5 mm dia. 0.0394 to 0.0591 in. dia.
Dimension C	46.759 to 46.775 mm dia. 1.84090 to 1.84153 in. dia.	46.559 to 46.575 mm dia. 1.83303 to 1.83366 in. dia.
(0.4-S)		
The crankpin must be fine-finished to higher than ▽▽▽▽		

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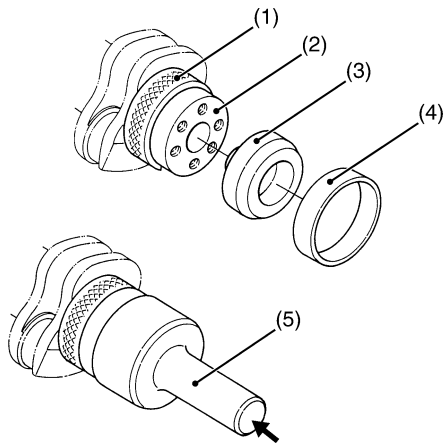
Crankshaft Sleeve Wear

1. Check the wear (A) on the crankshaft sleeve (1).
2. If the wear exceeds the allowable limit or when the engine oil leaks, replace the crankshaft sleeve.

Wear of sleeve	Allowable limit	0.10 mm 0.0039 in.
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- (1) Crankshaft Sleeve **A : Wear**

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Replacing Crankshaft Sleeve

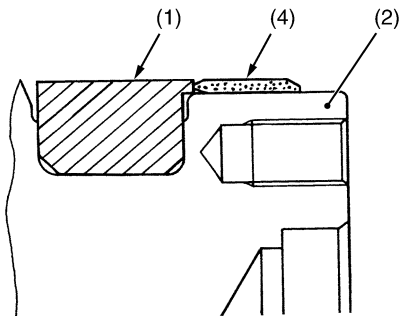
1. Remove the used crankshaft sleeve using a special-use puller set (Code No.: 07916-32091).
2. Prepare the auxiliary socket for fixing crankshaft sleeve (Code No. 07916-32091).
3. Set the sleeve guide (3) to the crankshaft (2).
4. Set the stopper (1) to the crankshaft as shown in figure.
5. Heat a new sleeve (4) to a temperature between 150 and 200 °C (302 and 392 °F), and fix the sleeve to the crankshaft as shown in figure.
6. Press fit the sleeve using the auxiliary socket for pushing (5).

NOTE

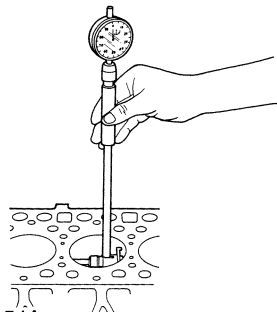
- Mount the sleeve with its largely chamfered surface facing outward.

- (1) Stopper (4) Crankshaft Sleeve
 (2) Crankshaft (5) Auxiliary Socket for Pushing
 (3) Sleeve Guide

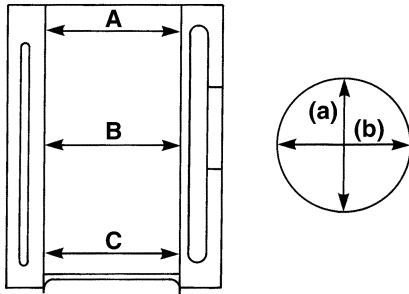
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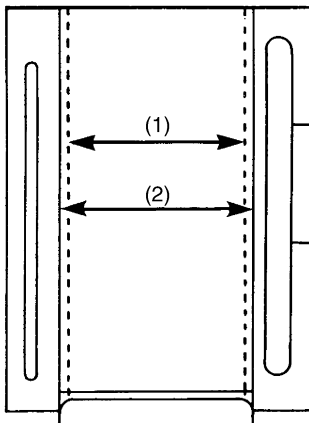
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Cylinder Wear

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 spec.	87.000 to 87.022 mm 3.42519 to 3.42606 in.
Cylinder Liner I.D.	Allowable limit	+0.15 mm +0.0059 in.

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

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Correcting Cylinder

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

Oversize Cylinder I.D.	Factory spec.	87.500 to 87.552 mm 3.44488 to 3.44574 in.
Maximum wear	Allowable limit	+0.15 mm +0.0059 in.

2. Replace the piston and piston rings with oversize ones.

Oversize	Part Name	Code Number	Marking
0.5 mm 0.0197 in.	Piston 05	19077-21911	05 OS
	Piston ring 05 assembly	17331-21091	05 OS

NOTE

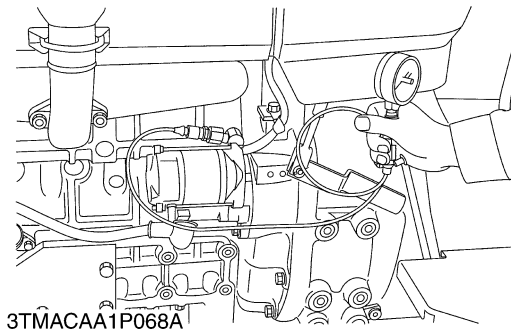
- When the oversize cylinder is worn beyond the allowable limit, replace the cylinder block with a new one.

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

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[3] LUBRICATING SYSTEM

(1) Checking



Engine Oil Pressure

1. Remove the engine oil pressure switch, and install the oil pressure tester (Code No. 07916-32032) with adaptor 7 (Code No. 07916-32591).
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 defective
 - Oil strainer clogged
 - Oil filter cartridge
 - Oil gallery clogged
 - Excessive oil clearance
 - Foreign matter in the relief valve

Engine oil pressure	At idle speed	Factory spec.	More than 98 kPa 1.0 kgf/cm ² 14 psi
		Allowable limit	49 kPa 0.5 kgf/cm ² 7 psi
	At rated speed	Factory spec.	294 to 441 kPa 3.0 to 4.5 kgf/cm ² 43 to 64 psi
		Allowable limit	245 kPa 2.5 kgf/cm ² 36 psi

(When reassembling)

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

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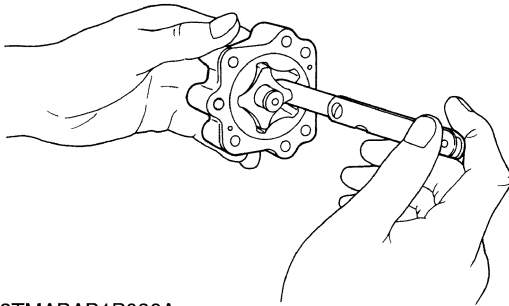
(2) Disassembling and Assembling

Oil Pump Assembly

1. Remove the oil pump assembly.
(See page 1-S32 to 1-S36.)

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(3) Servicing



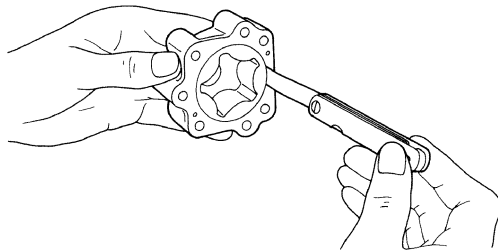
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Rotor Lobe Clearance

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

Rotor lobe clearance	Factory spec.	0.03 to 0.14 mm 0.0012 to 0.0055 in.
	Allowable limit	0.20 mm 0.0079 in.

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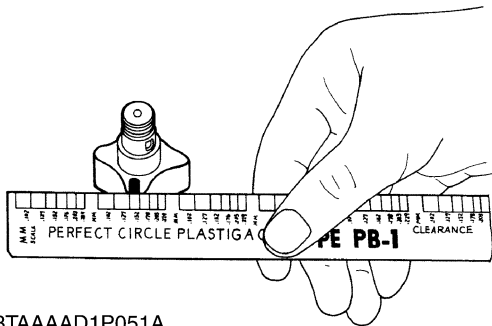
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Clearance between Outer Rotor and Pump Body

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

Clearance between outer rotor and pump body	Factory spec.	0.11 to 0.19 mm 0.0043 to 0.0075 in.
	Allowable limit	0.25 mm 0.0098 in.

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Clearance between Rotor and Cover

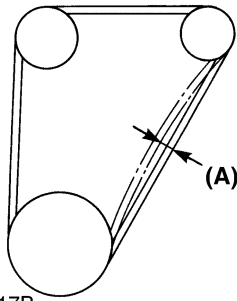
1. Put a strip of plastigage (Code No. 07909-30241) onto the rotor face with grease.
2. Install the cover and tighten the screws.
3. Remove the cover carefully, and measure the width of the press gauge with a sheet of gauge.
4. If the clearance exceeds the allowable limit, replace oil pump rotor assembly.

Clearance between rotor and cover	Factory spec.	0.105 to 0.150 mm 0.0041 to 0.0059 in.
	Allowable limit	0.20 mm 0.0079 in.

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[4] COOLING SYSTEM

(1) Checking and Adjusting



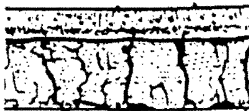
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Fan Belt Tension

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

Deflection (A)	Factory spec.	7 to 9 mm 0.28 to 0.35 in.
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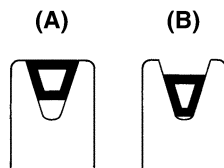


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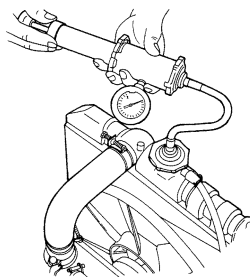
Fan Belt Damage and Wear

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.

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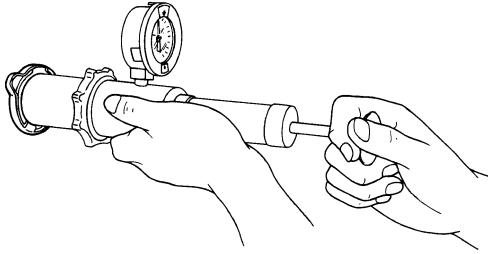
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Radiator Water Leakage

1. Pour a specified amount of water into the radiator.
2. Set a radiator tester (Code No. 07909-31551) and raise the water pressure to the specified pressure.
3. Check the radiator for water leaks.
4. For water leak from the pinhole, replace the radiator or repair with the radiator cement. When water leak is excessive, replace the radiator.

Radiator water leakage test pressure	Factory spec.	137 kPa 1.4 kgf/cm ² 20 psi
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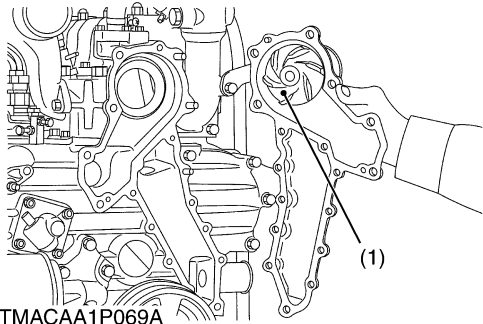
Radiator Cap Air Leakage

1. Set a radiator tester (Code No. 07909-31551) on the radiator cap.
2. Apply the specified pressure of 88 kPa (0.9 kgf/cm², 13 psi), and measure the time for the pressure to fall to 59 kPa (0.6 kgf/cm², 9 psi)
3. If the measurement is less than the factory specification, replace the radiator cap.

Pressure falling time	Factory spec.	More than 10 seconds for pressure fall from 88 → 59 kPa (from 0.9 → 0.6 kgf/cm ² from 13 → 9 psi)
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(2) Disassembling and Assembling



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Water Pump Assembly

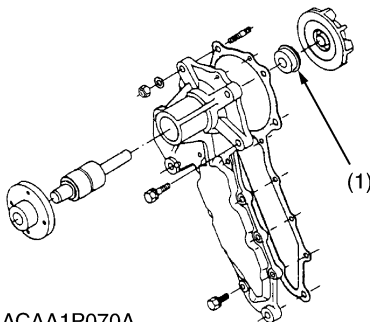
1. Loosen the alternator mounting bolts, and remove the fan belt.
2. Remove the fan pulley.
3. Remove the water pump assembly mounting screws, and remove the water pump assembly (1).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to the both sides of gasket.

(1) Water Pump Assembly

000002532E



3TMACAA1P070A

Mechanical Seal Assembly

1. Use a press, and press out the water pump shaft from the water pump impeller side.
2. Remove the mechanical seal assembly (1) from the water pump body.

(When reassembling)

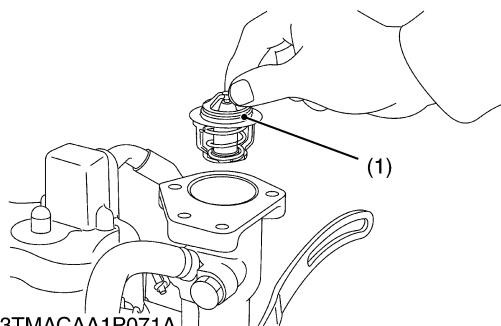
- Replace the mechanical seal with new one.

■ IMPORTANT

- **Do not disassembly the mechanical seal assembly**

(1) Mechanical Seal Assembly

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3TMACAA1P071A

Thermostat Assembly

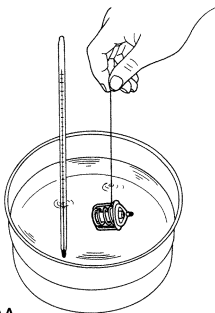
1. Remove the thermostat cover mounting screws, and remove the thermostat cover.
2. Remove the thermostat assembly (1).

(When reassembling)

- Put the rib of the thermostat assembly in place in the recess of the water flange.
- Apply a liquid gasket (Three Bond 1104 or equivalent) only at the thermostat cover side of the gasket

(1) Thermostat Assembly

000002534E

(3) Servicing

3EEABAB1P160A

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 (0.315 in.).
Read the temperature at this moment on the thermometer.
4. If the measurement is not within the factory specifications, replace the thermostat.

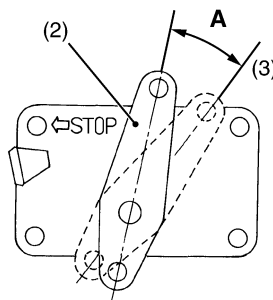
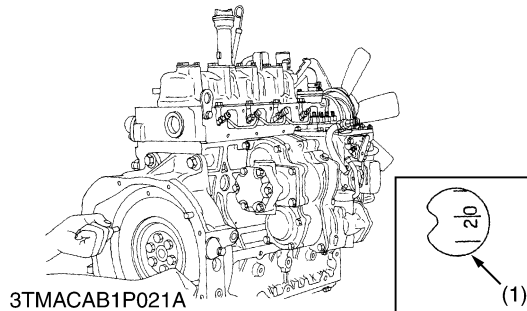
Thmostat's valve opening temperature	Factory spec.	69.5 to 72.5 °C 157.1 to 162.5 °F
Temperature at which thermostat completely opens	Factory spec.	85 °C 185 °F

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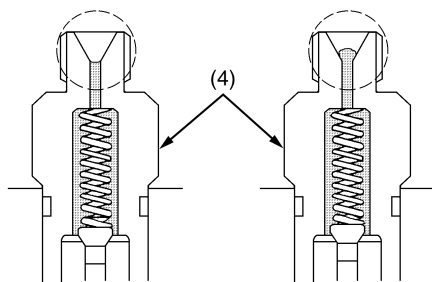
[5] FUEL SYSTEM

(1) Checking and Adjusting

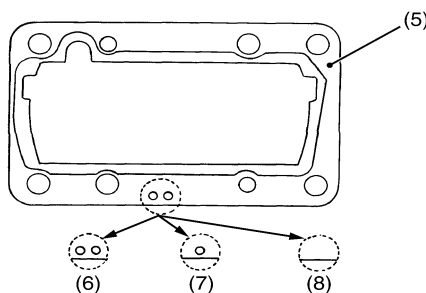
(A) Injection Pump



3TMACAA1P072A



3EEABAB1P167C



3GFABAB1P045C

Injection Timing

1. Remove the injection pipes.
2. Set the speed control lever to maximum fuel discharge position.
3. The injection pump has a displacement. In adjusting the injection timing, pull the stop lever (2) from its free position (3) by 0.401 to 0.471 rad (23 to 27 °) toward the stop position.
4. Turn the flywheel counterclockwise (facing the flywheel) until the fuel fills up to the hole of the delivery valve holder (4) for 1st cylinder.
5. Turn the flywheel further and stop turning when the fuel begins to flow over, to get the present injection timing.
6. The flywheel has mark 1TC and four lines indicating every 0.087 rad (5 °) of crank angle from 0.175 rad (10 °) to 0.436 rad (25 °) before mark 1TC.

Calculate the angle which the projection of the window points out. If the calculation differs from specified injection timing, add or remove the shim to adjust.

Injection timing	Factory spec.	0.314 to 0.349 rad (18 to 20 °) before T.D.C.
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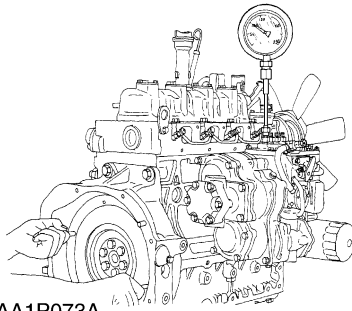
NOTE

- The sealant is applied to both sides of the shim (soft metal gasket shim). 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.) and 0.30 mm (0.0118 in.). Combine these shims for adjustments.
- Addition or reduction of shim (0.05 mm, 0.0020 in.) delays or advances the injection timing by approx. 0.0087 rad (0.5 °).
- In disassembling and replacing the injection pump, be sure to use the same number of new shims with the same thickness.
- Refer to figure below to check the thickness of the shims.

- | | |
|-----------------------------------|---|
| (1) Timing Window | (6) Two-holes:
0.20 mm (0.0079 in.) |
| (2) Stop Lever | (7) One-hole:
0.25 mm (0.0098 in.) |
| (3) Stop Lever in Free Position | (8) Without hole:
0.30 mm (0.0118 in.) |
| (4) Delivery Valve Holder | |
| (5) Shim (Soft Metal Gasket Shim) | |

A : 0.401 to 0.471 rad (23 to 27 °)

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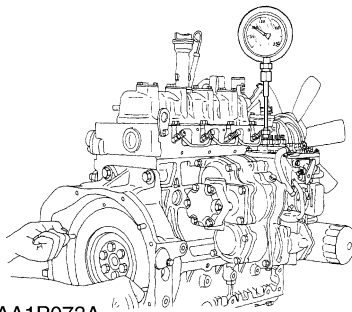
3TMACAA1P073A

Fuel Tightness of Pump Element

1. Remove the injection pipe.
2. Install the injection pump pressure tester to the injection pump.
3. Set the speed control lever to the maximum speed position.
4. Turn the flywheel ten times or more to increase the pressure.
5. If the pressure can not reach the allowable limit, replace the pump element or injection pump assembly.

Fuel tightness of pump element	Allowable limit	14.7 MPa 150 kgf/cm ² 2130 psi
--------------------------------	-----------------	---

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3TMACAA1P073A

Fuel Tightness of Delivery Valve

1. Set a pressure tester to the fuel injection pump.
2. Rotate the flywheel and raise the pressure to approx. 15.7 MPa (160 kgf/cm², 2275 psi).
3. Now turn the flywheel back about half a turn (to keep the plunger free). Maintain the flywheel at this position and clock the time taken for the pressure to drop from 14.7 to 13.7 MPa (from 150 to 140 kgf/cm², from 2133 to 1990 psi).
4. Measure the time needed to decrease the pressure from 14.7 to 13.7 MPa (from 150 to 140 kgf/cm², from 2133 to 1990 psi).
5. If the measurement is less than allowable limit, replace the delivery valve.

Fuel tightness of delivery valve	Allowable limit	5 seconds 14.7 → 13.7 MPa 150 → 140 kgf/cm ² 2130 → 1990 psi
----------------------------------	-----------------	--

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(B) Injection Nozzle



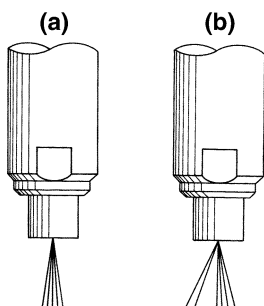
CAUTION

- Check the injection pressure and condition after confirming 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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Nozzle Spraying Condition

1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361), and check the nozzle spraying condition.
2. If the spraying condition is defective, replace the nozzle piece.

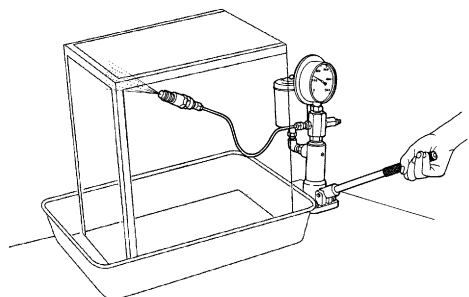


(a) Good

(b) Bad

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3EEABAB1P037A



3TLABAB1P040A

Fuel Injection Pressure

1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361).
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.

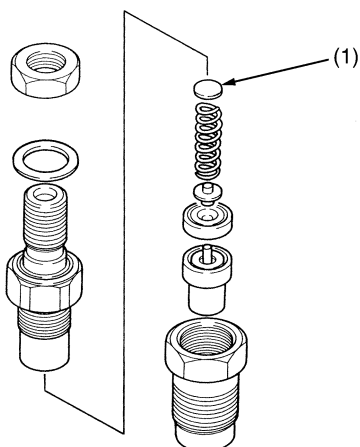
Injection pressure	Factory spec.	13.73 to 14.71 MPa 140 to 150 kgf/cm ² 1991 to 2133 psi
--------------------	---------------	--

(Reference)

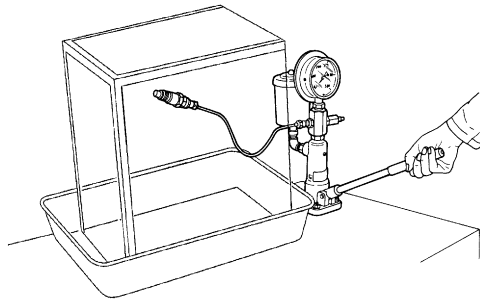
- Pressure variation with 0.1 mm (0.0039 in.) difference of adjusting washer thickness.
Approx. 981 kPa (10 kgf/cm², 142 psi)

(1) Adjusting Washer

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3EEABAB1P171B



3TLABAB1P041A

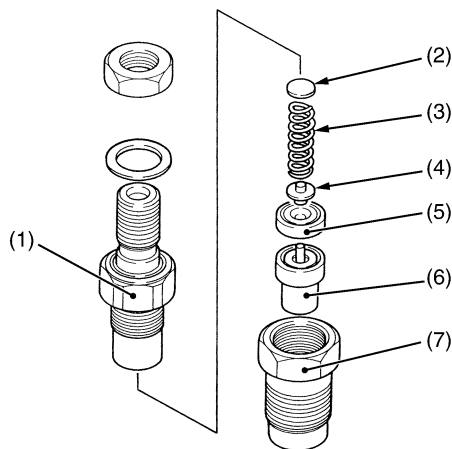
Valve Seat Tightness

1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361).
2. Raise the fuel pressure, and keep at 12.75 MPa (130 kgf/cm², 1849 psi) for 10 seconds.
3. If any fuel leak is found, replace the nozzle piece.

Valve seat tightness	Factory spec.	No fuel leak at 12.75 MPa 130 kgf/cm ² 1849 psi
----------------------	---------------	---

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(2) Disassembling and Assembling



3EEABAB1P171A

Nozzle Holder

1. Secure the nozzle retaining nut (7) with a vise.
2. Remove the nozzle holder (1), and take out 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	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 25.3 to 28.9 ft-lbs
	Overflow pipe nut	19.6 to 24.5 N·m 2.0 to 2.5 kgf·m 14.5 to 18.1 ft-lbs
	Nozzle holder assembly	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs

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

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2 CLUTCH

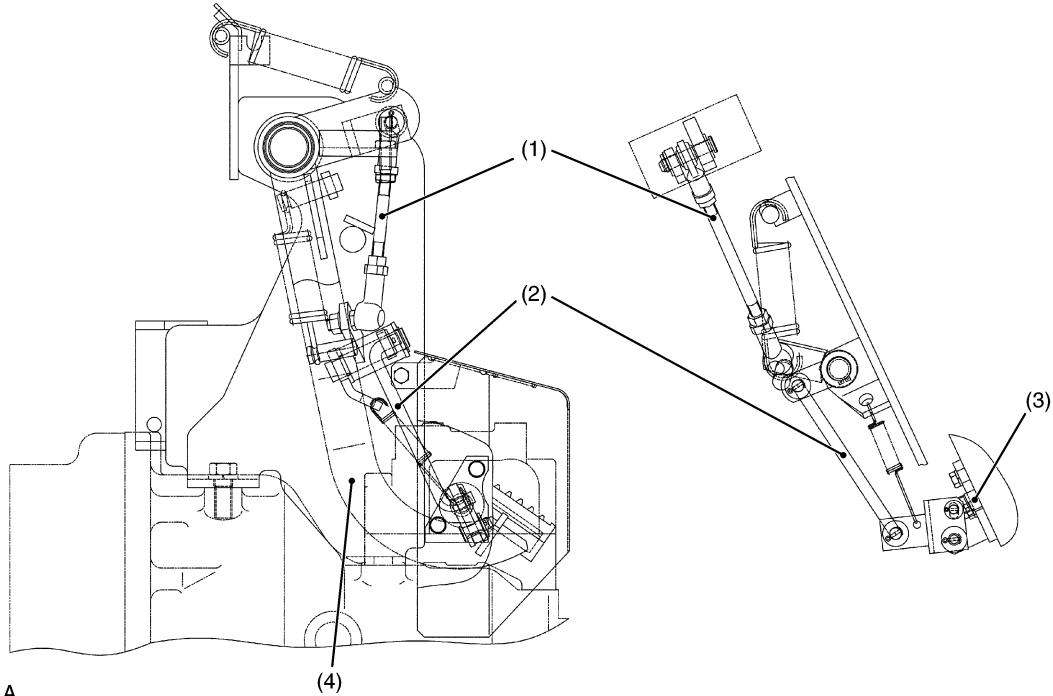
CONTENTS

1. LINKAGE	2-M1
[1] TRAVELLING.....	2-M1
(1) ROPS Type	2-M1
(2) CABIN Type.....	2-M1
2. PTO CLUTCH.....	2-M2
[1] STRUCTURE.....	2-M2
[2] PTO CLUTCH OPERATION.....	2-M3
3. PTO LINKAGE.....	2-M5

1. LINKAGE

[1] TRAVELLING

(1) ROPS Type



3TMACAE2P001A

(1) Clutch Rod 1

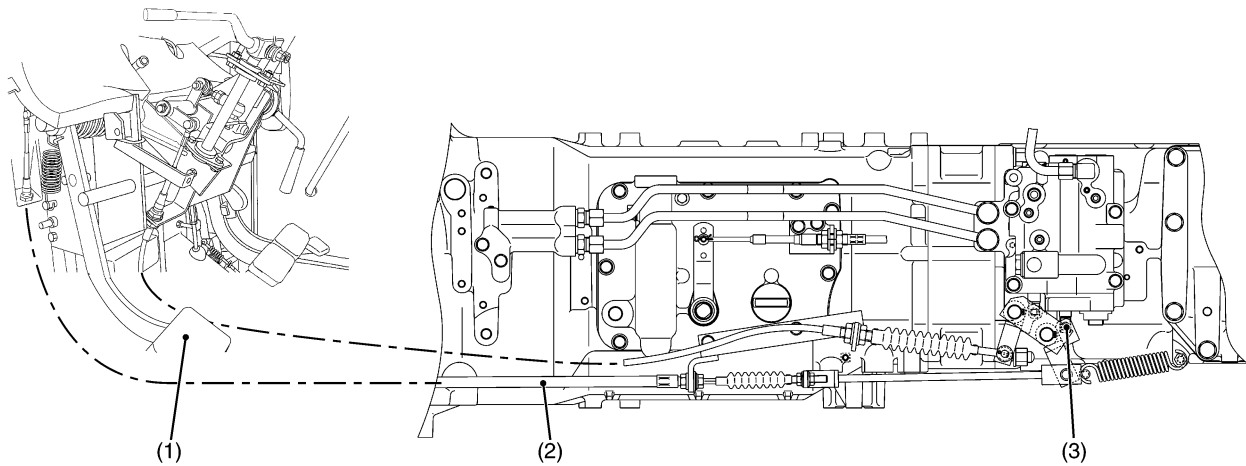
(2) Clutch Rod 2

(3) Clutch Spool

(4) Clutch Pedal

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(2) CABIN Type



3TMACAE2P002A

(1) Clutch Pedal

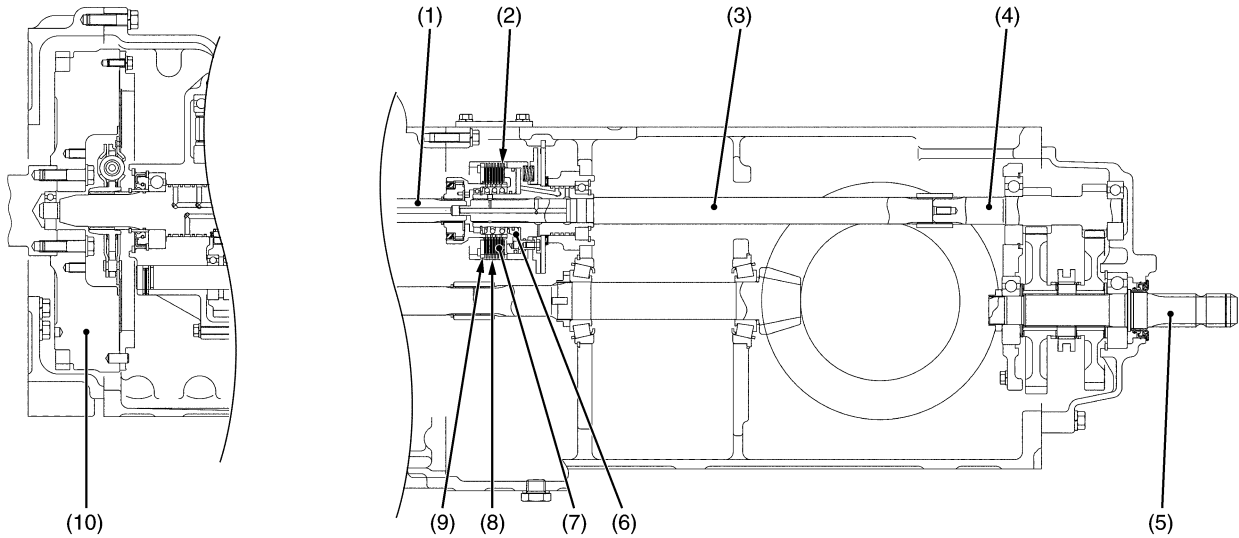
(2) Clutch Cable

(3) Clutch Spool

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2. PTO CLUTCH

[1] STRUCTURE



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- | | | | |
|---------------------------|-------------------|-----------------|--------------------|
| (1) PTO Propeller Shaft 1 | (4) Gear Shaft | (7) Clutch Disc | (9) Pressure Plate |
| (2) PTO Clutch Pack | (5) PTO Shaft | (8) Drive Plate | (10) Flywheel |
| (3) PTO Propeller Shaft 2 | (6) Clutch Piston | | |

As shown in the figure above, the PTO propeller shaft 1 (1) is always rotated while the engine runs.

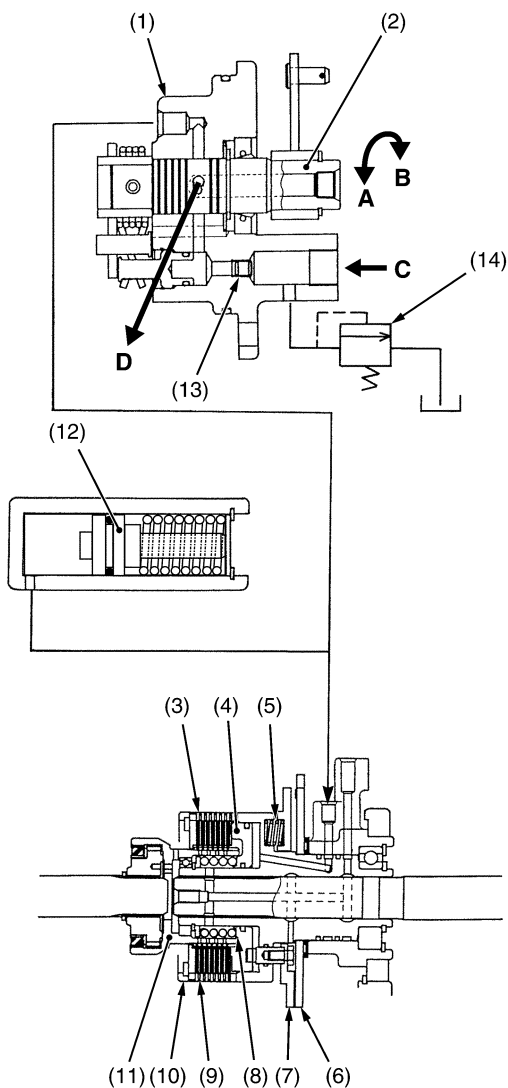
The PTO clutch pack (2) has seven clutch discs (7), seven drive plates (8) and one pressure plate (9). The clutch piston (6) actuated by hydraulic from PTO clutch valve, tightly presses the clutch discs (7) and drive plates (8) toward the pressure plate (9).

As a result, the rotation of the PTO propeller shaft is transmitted to the gear shaft (4) through the PTO clutch pack (2).

The PTO clutch valve can be in a semi-clutching state by means of the modulating valve. Thereby, the PTO clutch is engaged very smoothly.

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[2] PTO CLUTCH OPERATION



■ PTO Clutch "Engaged"

The oil from power steering controller flows into the clutch valve (1). When the PTO shift lever is set at the "Engaged" position, the spool (2) is turned to A position, then oil flows through the spool (2) into the modulating valve and the clutch pack. Oil entering the clutch pack pushes the piston (4) to engage the clutch pack. The modulating valve (12) absorbs the engaging shock of the clutch pack.

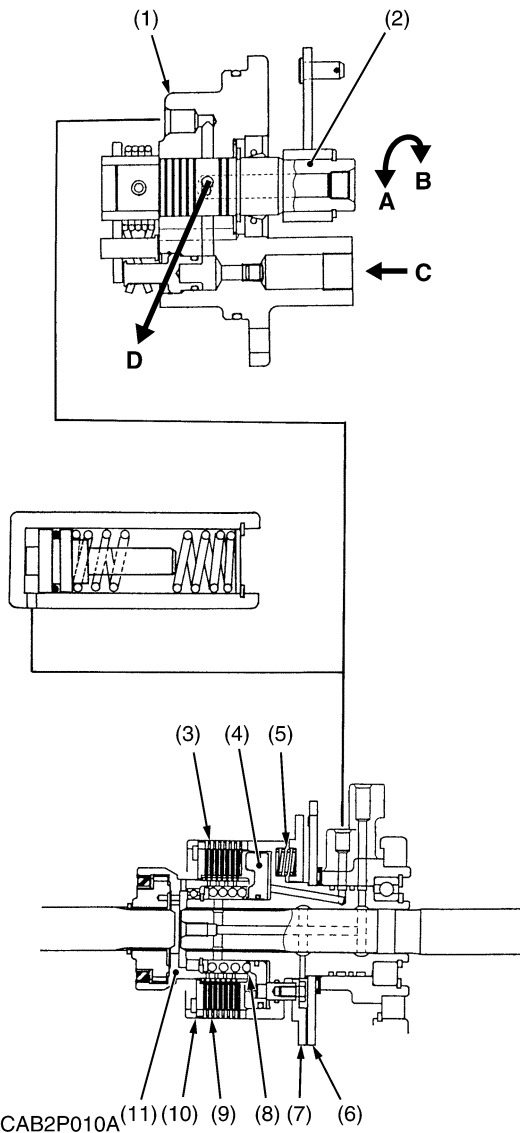
■ NOTE

- Refer to the hydraulic circuit on the section 8, Mechanism.

- | | |
|----------------------|---|
| (1) PTO Clutch Valve | (12) Modulating Valve |
| (2) Spool | (13) Orifice |
| (3) Plate | (14) Relief Valve |
| (4) Piston | |
| (5) Brake Spring | A : Engaged Position |
| (6) Brake Disc | B : Disengaged Position |
| (7) Brake Plate | C : From Power Steering Controller |
| (8) Return Spring | D : Drain (To the Transmission Case) |
| (9) Clutch Discs | |
| (10) Pressure Plate | |
| (11) Clutch Hub | |

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■ PTO Clutch "Disengaged"

When the PTO shift lever is set at the "Disengaged" position, the spool (2) is turned to B position, then the oil from the power steering controller is stopped by the spool (2) and the oil in the PTO clutch pack drained into the tank. Thus the piston (4) is pushed back by the return spring (8).

When the piston (4) is pushed back, the brake plate (7) is also moved to contact the brake disc (6) so as to stop the rotation and the drag of the PTO shaft.

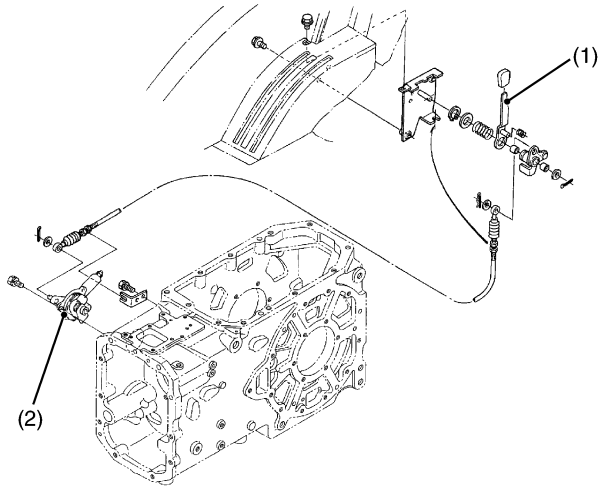
- | | |
|----------------------|---|
| (1) PTO Clutch Valve | (10) Pressure Plate |
| (2) Spool | (11) Clutch Hub |
| (3) Plate | |
| (4) Piston | A : Disengaged Position |
| (5) Brake Spring | B : Engaged Position |
| (6) Brake Disc | C : From Power Steering Controller |
| (7) Brake Plate | D : Drain (To the Transmission Case) |
| (8) Return Spring | |
| (9) Clutch Discs | |

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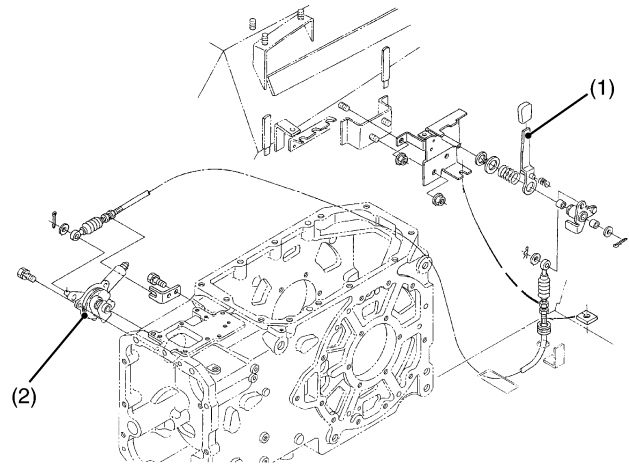
3TMACAB2P010A

3. PTO LINKAGE

A



B



3TMACAE2P005A

(1) PTO Clutch Lever

(2) PTO Clutch Valve

A : ROPS Type

B : CABIN Type

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CONTENTS

1. TROUBLESHOOTING.....	2-S1
2. SERVICING SPECIFICATIONS.....	2-S2
3. TIGHTENING TORQUES.....	2-S3
4. CHECKING, DISASSEMBLING AND SERVICING.....	2-S4
[1] TRAVELLING CLUTCH.....	2-S4
(1) Checking and Adjusting.....	2-S4
[2] PTO CLUTCH VALVE	2-S7
(1) Disassembling and Assembling.....	2-S7
[3] PTO CLUTCH.....	2-S8
(1) Disassembling and Assembling.....	2-S8
(2) Servicing.....	2-S19

1. TROUBLESHOOTING

TRAVELLING CLUTCH

Symptom	Probable Cause	Solution	Reference Page
Clutch Drags	● Clutch pedal free travel excessive	Adjust	2-S4 to S6
	● Shuttle valve spool sticking	Replace	—
Clutch Slips	● Clutch pedal free travel too small	Adjust	2-S4 to S6
	● Shuttle disc or plate worn	Replace	3-S29

PTO CLUTCH

PTO Clutch Slip	● Operating pressure is low	Adjust	8-S7
	● PTO clutch valve malfunctioning	Repair or replace	8-S24
	● Clutch disc or drive plate excessively worn	Replace	2-S17
	● Deformation of piston or return plate	Replace	2-S17
PTO Shaft Does Not Rotate	● PTO clutch malfunctioning	Repair or replace	2-S17
	● PTO propeller shaft coupling disengaged	Engage	—
PTO Clutch Operating Pressure Is Low	● Transmission oil improper or insufficient	Replenish or change	G-8
	● Relief valve malfunctioning	Adjust or replace	8-S7
PTO Clutch Drags	● Brake plate excessively worn	Replace	2-S18
	● Return spring weaken or broken	Replace	2-S18
	● Modulating valve malfunctioning	Repair or replace	2-S18
	● Deformation of plate or steel plate	Replace	2-S17

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2. SERVICING SPECIFICATIONS

TRAVELLING CLUTCH

Item		Factory Specification	Allowable Limit
Clutch Pedal	ROPS (Total Stroke)	170 to 175 mm 6.7 to 6.9 in.	—
	CABIN (Total Stroke)	165 to 170 mm 6.5 to 6.7 in.	—
Clutch Pedal	ROPS (Free Travel)	24.0 to 30.0 mm 0.9 to 1.2 in.	—
	CABIN (Free Travel)	15.0 to 25.0 mm 0.59 to 0.98 in.	—

CONTROL LINKAGE

Shift Rod	Length	Approx. 209 mm 8.23 in.	—
-----------	--------	----------------------------	---

PTO CLUTCH

PTO Clutch Disc	Thickness	1.70 to 1.90 mm 0.067 to 0.075 in.	1.55 mm 0.061 in.
PTO Steel Plate	Thickness	1.15 to 1.25 mm 0.045 to 0.049 in.	1.10 mm 0.043 in.
PTO Piston	Flatness	—	0.15 mm 0.006 in.
PTO Steel Plate	Flatness	—	0.30 mm 0.012 in.
PTO Return Spring	Free Length	40.5 mm 1.59 in.	37.5 mm 1.48 in.
PTO Brake Spring	Free Length	20.3 mm 0.80 in.	18.0 mm 0.71 in.
Seal Ring	Thickness	2.45 to 2.50 mm 0.096 to 0.098 in.	2.0 mm 0.079 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
PTO clutch control valve mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Rear wheel mounting nut	260 to 304.0	26.5 to 31.0	192 to 224
ROPS mounting screw	M16 grade 9	260 to 304.0	26.5 to 31.0
	1/4 Grade 5	8.1 to 9.5	0.83 to 0.97
	3/8 Grade 8	47.0 to 53.9	4.8 to 5.5
	9/16 Grade 8	149.0 to 179.3	15.2 to 18.3
Step mounting nut	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Step mounting screw (M16)	117.7 to 147.1	12.0 to 15.0	86.8 to 108.5
Clutch housing and transmission case mounting screw, nut	M12, grade 11 nut	103.0 to 117.7	10.5 to 12.0
	M12, grade 7 screw, nut	77.5 to 90.2	7.9 to 9.2
	M10, grade 9 screw	60.8 to 70.6	6.2 to 7.2
Delivery pipe nut	108 to 117	11.0 to 12.0	79.6 to 86.8
Return pipe nut	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Shuttle pipe nut	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
PTO clutch case bearing holder mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Brake plate mounting screw	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3

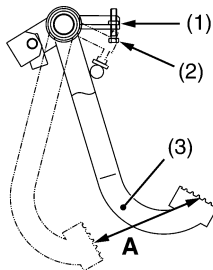
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4. CHECKING, DISASSEMBLING AND SERVICING

[1] TRAVELLING CLUTCH

(1) Checking and Adjusting

(A) Clutch Pedal (ROPS Type)



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Clutch Pedal Stroke

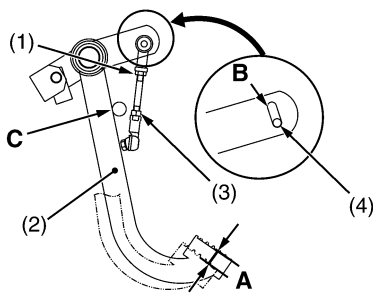
1. Stop the engine and remove the key.
2. Measure the clutch pedal stroke **A**.
3. If the measurement is not within the factory specifications, adjust with stopper bolt (2).

Total stroke A	Factory spec.	170 to 175 mm 6.7 to 6.9 in.
-----------------------	---------------	---------------------------------

- (1) Lock Nut 1
- (2) Stopper Bolt
- (3) Clutch Pedal

A : Pedal Stroke

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3TMACAD2P004A

Clutch Pedal Free Travel

NOTE

- Before checking the clutch pedal free travel, be sure to adjust the pedal stroke.

1. Make sure that clutch pedal is contact with frame **C** and upper rod end of turnbuckle (4) is located on the bottom of hole **B** when the pedal is released.
2. If the clutch pedal or turnbuckle is out of above condition, adjust with turnbuckle.
3. Measure the clutch pedal free travel **A**.
4. If adjustment is needed, change the length of turnbuckle so that the free travel becomes 24 to 30 mm (0.9 to 1.2 in.).
5. After adjustment is completed secure the lock nut of turnbuckle.

Clutch pedal free travel	Factory spec.	24.0 to 30.0 mm 0.9 to 1.2 in.
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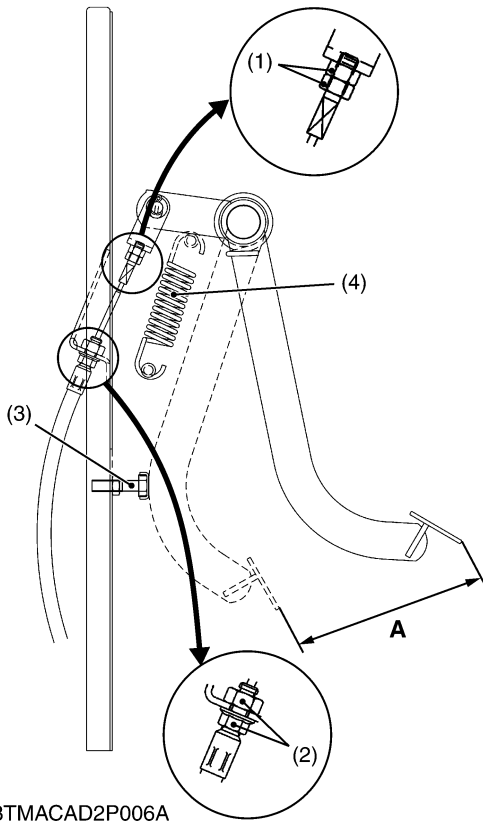
- (1) Lock Nut 1
- (2) Clutch Pedal
- (3) Lock Nut 2
- (4) Turnbuckle

A : Free Travel

B : Hole

C : Frame

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(B) Clutch Pedal (CABIN Type)Clutch Pedal Stroke

1. Stop the engine and remove the key.
2. Screw the lock nuts (1), (2) to the threaded end of cable as shown in figure.
3. Measure the clutch pedal stroke **A**.
4. If the measurement is not within the factory specifications, adjust with stopper bolt (3).

Total stroke A	Factory spec.	165 to 170 mm 6.5 to 6.7 in.
-----------------------	---------------	---------------------------------

NOTE

- Be sure to fix the coil spring (4) in original direction when hook the coil spring as shown in figure.

- (1) Lock Nut
(2) Lock Nut

- (3) Stopper Bolt
(4) Coil Spring

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Clutch Pedal Free Travel

■ **NOTE**

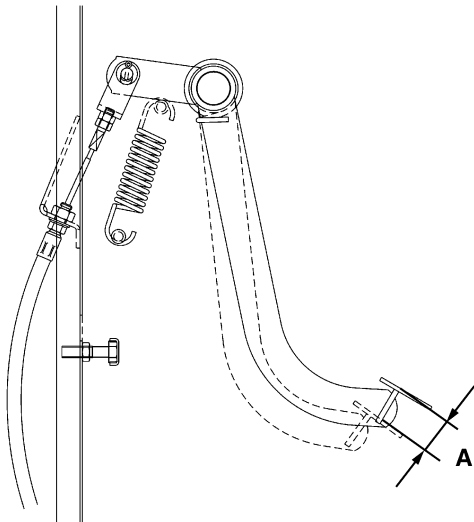
● **Before checking the clutch pedal free travel A, be sure to adjust the pedal stroke.**

1. Remove the floor mat 1 (1), floor mat 2 (2) and cover (3).
2. Measure the clutch pedal free travel.
3. If adjustment is needed, loosen the lock nuts (4) and adjust the cable length within acceptable limits.
4. Retighten the lock nut (4).

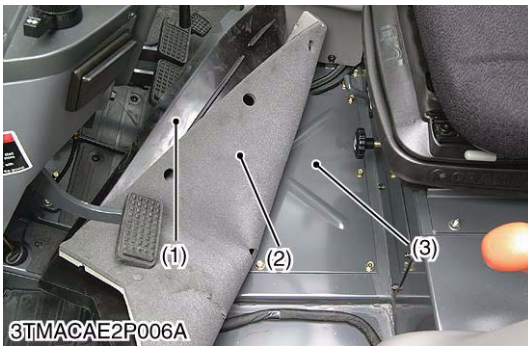
Proper clutch pedal free travel A	Factory spec.	15.0 to 25.0 mm 0.59 to 0.98 in.
--	---------------	-------------------------------------

- | | |
|-----------------|--------------|
| (1) Floor Mat 1 | (3) Cover |
| (2) Floor Mat 2 | (4) Lock Nut |

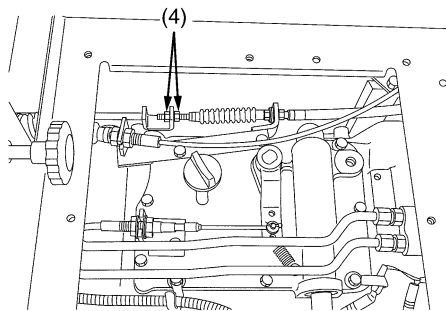
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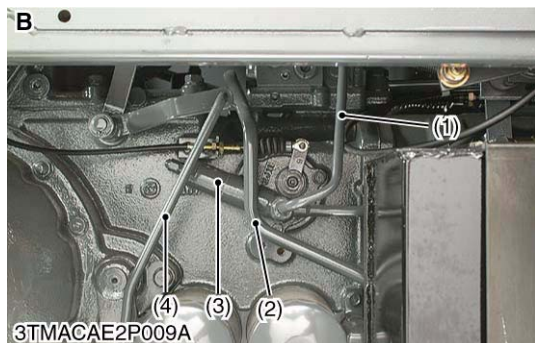
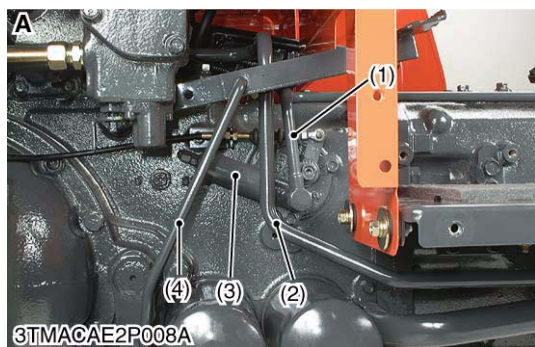
3TMACAE2P006A



3TMACAE2P007A

[2] PTO CLUTCH VALVE

(1) Disassembling and Assembling



Removing PTO Clutch Valve

1. Disconnect the suction pipe (1) and three point hydraulic system delivery pipe (2).
2. Remove the differential lock rod (4).
3. Disconnect the PTO clutch cable at PTO valve side.
4. Remove the PTO clutch valve (3).

(When reassembling)

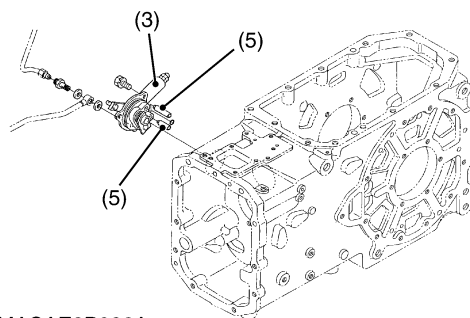
- Apply grease to the O-ring.
- Take care not to damage the O-ring.
- Replace the oil pipes (5) with new ones.
- Apply transmission oil to oil pipes (5).

Tightening torque	PTO clutch control valve mounting screw	23.5 to 27.5 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs
-------------------	---	---

- (1) Suction Pipe
- (2) Delivery Pipe
- (3) PTO Clutch Valve
- (4) Differential Lock Rod
- (5) Oil Pipe

A : ROPS Type

B : CABIN Type

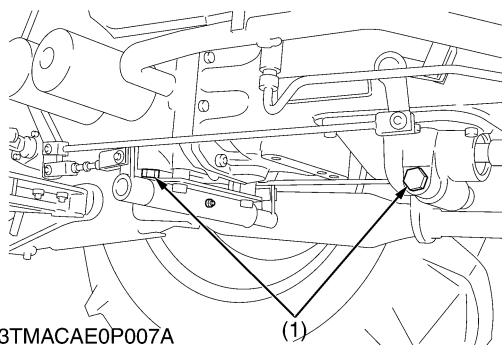


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[3] PTO CLUTCH

(1) Disassembling and Assembling

(A) Draining Transmission Fluid



3TMACAE0P007A

Draining Transmission Fluid

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

(When reassembling)

- Fill up from filling port after removing the filling plug until reaching the gauge.
- After running the engine for a few minutes, stop it and check the fluid level again, add fluid to prescribed level if it is not correct level.

Transmission fluid	Capacity	ROPS	40.0 L 42.3 U.S.qts 35.2 Imp.qts
		CABIN	43.0 L 45.4 U.S.qts 37.8 Imp.qts

■ IMPORTANT

- Use only KUBOTA UDT or SUPER UDT fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)
- Do not mix difference brands oil together.

(1) Drain Plug

000002389E

(B) Separating Transmission Case (ROPS Type)



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3TMACAE1P003B

Rear Wheels, Fenders and Bonnet

1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Remove the rear wheels (2).
3. Disconnect the jumper leads for hazard and tail light.
4. Disconnect the jumper leads for PTO safety switch.
5. Remove the fenders (1).
6. Remove the bonnet (3) with mirror.
7. Remove the muffler (4).

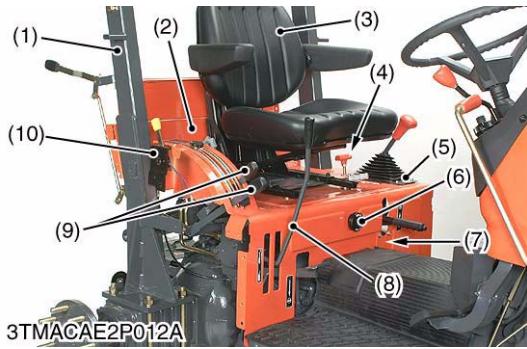
(When reassembling)

Tightening torque	Rear wheel mounting nut	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
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- (1) Fender
- (2) Rear Wheel

- (3) Bonnet
- (4) Muffler

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ROPS, Seat and Center Frame

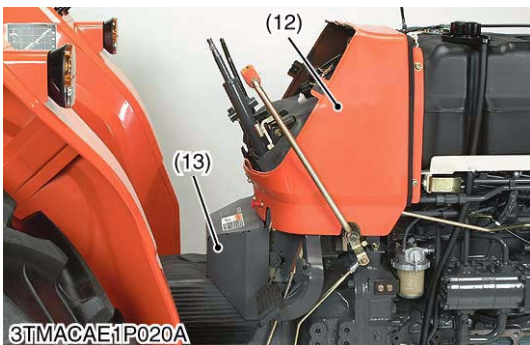
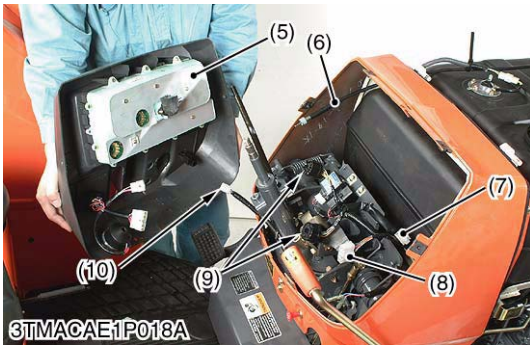
1. Remove the seat (3).
2. Remove the draft and position control lever grips (9).
3. Remove the auxiliary speed change control lever plate (5).
4. Remove the DT shift lever grip (4) and 3-point hitch lowering speed control grip (6).
5. Remove the plate (7).
6. Remove the auxiliary control valve lever assembly (8).
7. Remove the ROPS (1).
8. Remove the PTO clutch lever assembly (10).
9. Remove the center frame (2).

(When reassembling)

Tightening torque	ROPS mounting screw M16 grade 9	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
	ROPS mounting screw 1/4 grade 5	8.1 to 9.5 N-m 0.83 to 0.97 kgf-m 5.97 to 7.00 ft-lbs
	ROPS mounting screw 3/8 grade 8	47.0 to 53.9 N-m 4.8 to 5.5 kgf-m 34.7 to 39.8 ft-lbs
	ROPS mounting screw 9/16 grade 8	149.0 to 179.3 N-m 15.2 to 18.3 kgf-m 109.9 to 132.3 ft-lbs

- | | |
|--|---|
| (1) ROPS | (6) 3-Point Hitch Lowering Speed Control Grip |
| (2) Center Frame | (7) Plate |
| (3) Seat | (8) Auxiliary Control Valve Lever Assembly |
| (4) DT Shift Lever Grip | (9) Lever Grip |
| (5) Auxiliary Speed Change Control Lever Plate | (10) PTO Lever |

000002581E

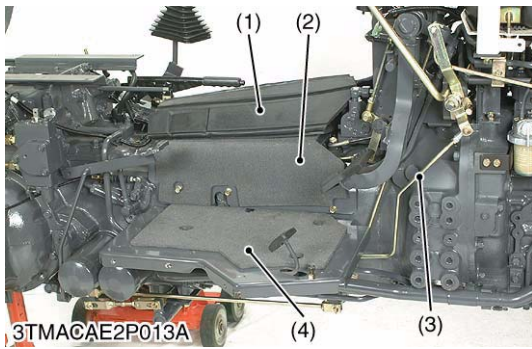


Steering Wheel, Meter Panel and Rear Bonnet

1. Remove the steering wheel (2) with a steering wheel puller (Code No. 07916-51090).
2. Remove the shuttle lever grip (1) and remove the shuttle lever guide (4).
3. Remove the main shift lever (3).
4. Remove the meter panel mounting screws and open the meter panel (5).
5. Disconnect the two connectors (9) and hour meter cable (6).
6. Disconnect the main switch connector (7), combination switch connector (8) and hazard switch connector (10).
7. Disconnect the engine stop cable (11) at the engine side.
8. Remove the rear bonnet (12) and shuttle valve cover (13).

- | | |
|---------------------------|----------------------------------|
| (1) Shuttle Lever Grip | (8) Combination Switch Connector |
| (2) Steering Wheel | (9) Connectors |
| (3) Main Shift Lever | (10) Hazard Switch Connector |
| (4) Shuttle Lever Guide | (11) Engine Stop Cable |
| (5) Meter Panel | (12) Rear Bonnet |
| (6) Hour Meter Cable | (13) Shuttle Valve Cover |
| (7) Main Switch Connector | |

000002414E



Steps and Clutch Housing Cover

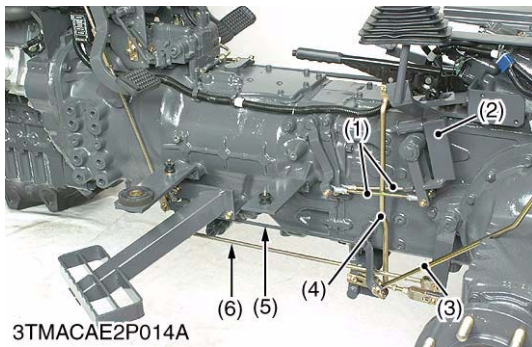
1. Disconnect the foot accelerator rod (3).
2. Remove the rubber mat (1).
3. Remove the clutch housing cover (2).
4. Remove the steps (4).
5. Disconnect the wire harness.

(When reassembling)

Tightening torque	Step mounting nut	48.1 to 55.9 N-m 4.9 to 5.7 kgf-m 35.4 to 41.2 ft-lbs
	Step mounting screw (M16)	117.7 to 147.1 N-m 12.0 to 15.0 kgf-m 86.8 to 108.5 ft-lbs

- (1) Rubber Mat
- (2) Clutch Housing Cover
- (3) Accelerator Rod
- (4) Step

000002584E



Auxiliary Shift Lever and Brake Rod

1. Disconnect the shift rods (1).
2. Remove the shift lever assembly (2).
3. Remove the brake rods (6).
4. Remove the DT rod (5).
5. Remove the parking brake rod (4).
6. Remove the DT shift rod (3).

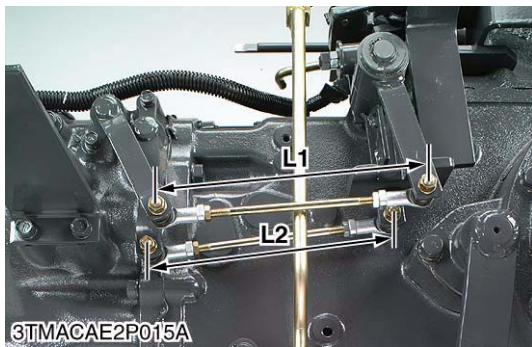
(When reassembling)

- Be sure to adjusting the shift rod.

Shift rod length L1 and L2	Factory spec.	Approx. 209 mm 8.23 in.
----------------------------	---------------	----------------------------

- (1) Shift Rod
- (2) Shift Lever Assembly
- (3) DT Shift Rod
- (4) Parking Brake Rod
- (5) DT Rod
- (6) Brake Rod

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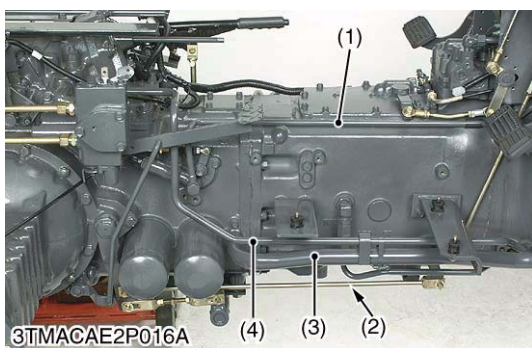


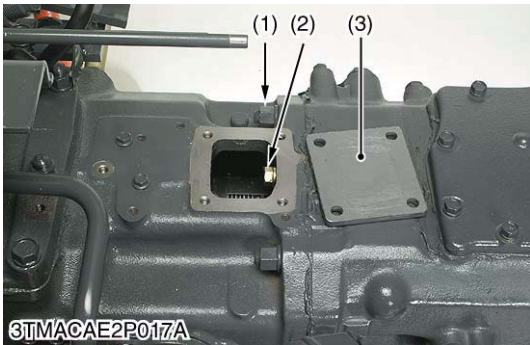
Hydraulic Pipes and Brake Rod

1. Remove the suction pipe (3).
2. Remove the delivery pipe (4) for the three point hydraulic system.
3. Remove the PTO pipe (1) from power steering controller.
4. Remove the brake rod (2).

- (1) PTO Pipe
- (2) Brake Rod
- (3) Suction Pipe
- (4) Delivery Pipe

000002586E





Separating Transmission Case

1. Remove the transmission upper cover (3).
2. Remove the transmission case mounting screws and nut, and separate the transmission case from the clutch housing.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the transmission case and clutch housing, transmission upper cover and transmission case.

Tightening torque	Transmission case and clutch housing mounting screw, nut	M12, grade 11 nut (1)	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs
		M12, grade 7 screw, nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
		M10, grade 9 screw (2)	60.8 to 70.6 N-m 6.2 to 7.2 kgf-m 44.8 to 52.1 ft-lbs

(1) Transmission Case Mounting Nut

(3) Transmission Upper Cover

(2) Transmission Case Mounting Screw

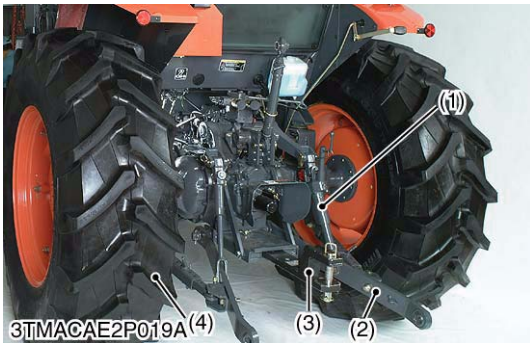
000002587E

(C) Separating Transmission Case (CABIN Type)

NOTE

- Before proceeding this section, dismantling the cabin assembly. (See page 10-S24 to S29.)

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Lift Rods and Lower Links

1. Remove the lift rods (1).
2. Remove the lower links (2) with stabilizer.
3. Remove the drawbar (3).
4. Remove the rear wheels (4).

Tightening torque	Rear wheel mounting nut	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft·lbs
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- (1) Lift Rod
- (2) Lower Link
- (3) Drawbar
- (4) Rear Wheel

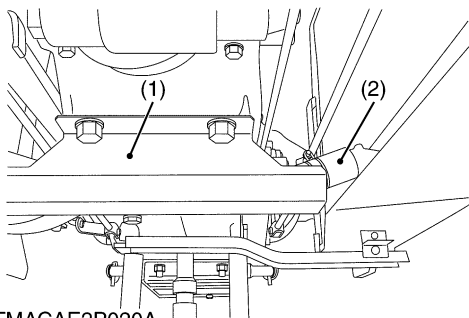
000002596E

Fuel Tank Connection Hose

1. Remove the hose cover (1).
2. Remove the connection hose (2).

- (1) Hose Cover
- (2) Connection Hose

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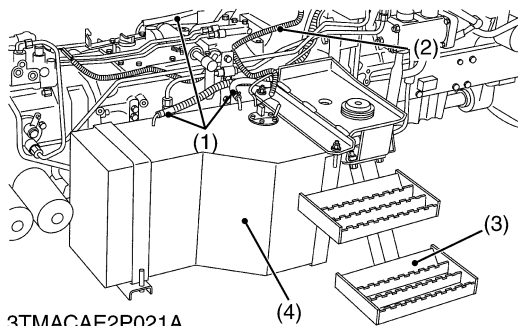
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Auxiliary Step and Fuel Tank

1. Remove the auxiliary steps (3).
2. Disconnect the wire harness (2).
3. Disconnect the fuel return hoses (1).
4. Remove the fuel tanks (4).

- (1) Fuel Return Hose
- (2) Wire Harness
- (3) Auxiliary Step
- (4) Fuel Tank

000002600E



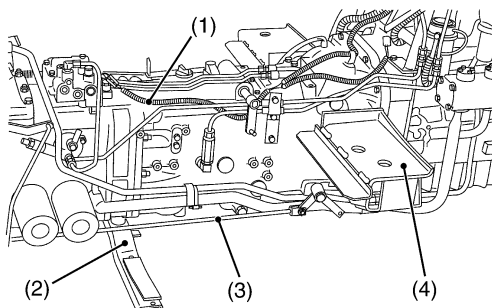
3TMACAE2P021A

Brake Rod, Cabin Support and Fuel Tank Support

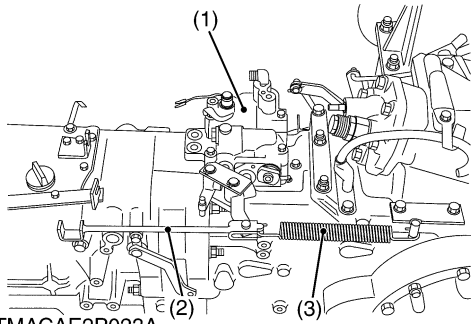
1. Remove the brake rods (3).
2. Remove the cabin supports (4).
3. Remove the fuel tank supports (2).
4. Disconnect the wire harness (1).

- (1) Wire Harness
- (2) Fuel Tank Support
- (3) Brake Rod
- (4) Cabin Support

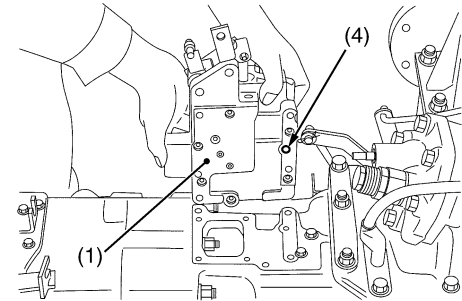
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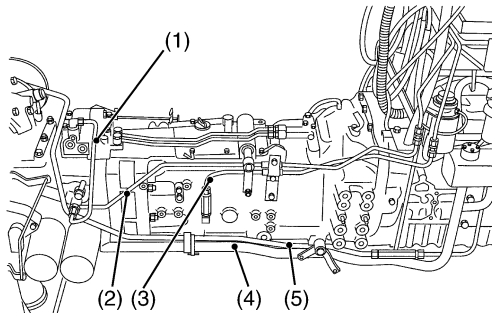
3TMACAE2P022A



3TMACAE2P023A



3TMACAE2P024A



3TMACAE2P025A

Shuttle Valve

1. Remove the return spring (3).
2. Remove the clutch rod (2).
3. Remove the shuttle valve assembly (1).

(When reassembling)

- Apply oil to the O-ring (4).
- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the shuttle valve assembly and transmission case.
- Be sure to spring direction.

- | | |
|----------------------------|-------------------|
| (1) Shuttle Valve Assembly | (3) Return Spring |
| (2) Clutch Rod | (4) O-ring |

000002603E

Hydraulic Pipes

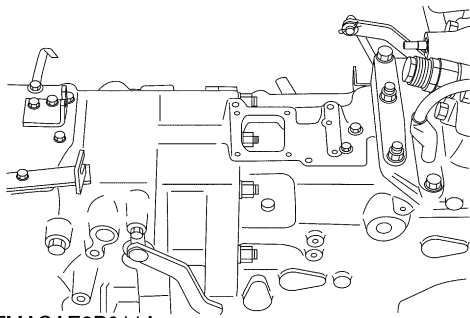
1. Remove the suction pipe (4).
2. Remove the delivery pipe (5).
3. Remove the return pipe (3) with relief valve.
4. Remove the shuttle pipe (1).
5. Remove the PTO pipe (2).

(When reassembling)

Tightening torque	Delivery pipe retaining nut	108 to 117 N·m 11.0 to 12.0 kgf·m 79.6 to 86.8 ft-lbs
	Return pipe retaining nut	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs
	Shuttle pipe retaining nut	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs

- | | |
|------------------|-------------------|
| (1) Shuttle Pipe | (4) Suction Pipe |
| (2) PTO Pipe | (5) Delivery Pipe |
| (3) Return Pipe | |

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3TMACAE2P011A

Separating Transmission Case

1. Remove the transmission case mounting screws and nut, and separate the transmission case from the clutch housing.

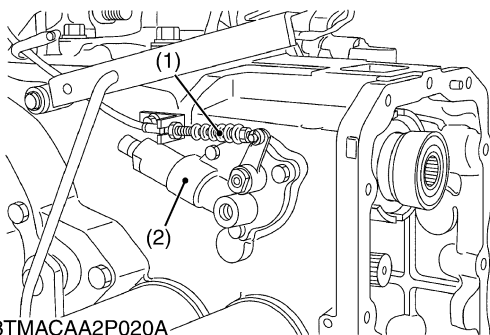
(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the transmission case and clutch housing, transmission upper cover and transmission case.

Tightening torque	Transmission case and clutch housing mounting screws, nut	M12, grade 9 nut	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs
		M12, grade 7 screws	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
		M10, grade 9 nut	60.8 to 70.6 N-m 6.2 to 7.2 kgf-m 44.8 to 52.1 ft-lbs

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(D) Remove PTO Clutch



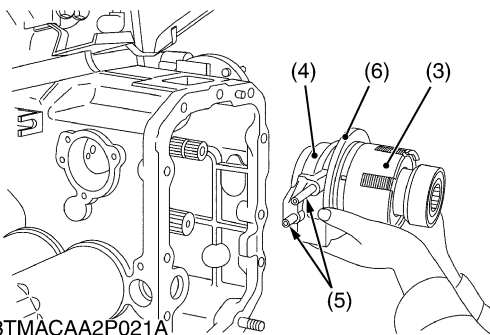
3TMACAA2P020A

Removing PTO Clutch

1. Disconnect the PTO clutch cable (1).
2. Remove the PTO clutch valve (2).
3. Remove the PTO clutch pack (3) with holder (4).

(When reassembling)

- Apply transmission fluid to the O-ring.
- Remove the two oil pipes (5) from the PTO clutch holder.
- Insert both the hydraulic pipes into the PTO clutch valve holes down to the bottom.
- Now while aligning the hydraulic pipe ends with the PTO clutch holder holes, assemble the PTO clutch valve (2) to the transmission case.



3TMACAA2P021A

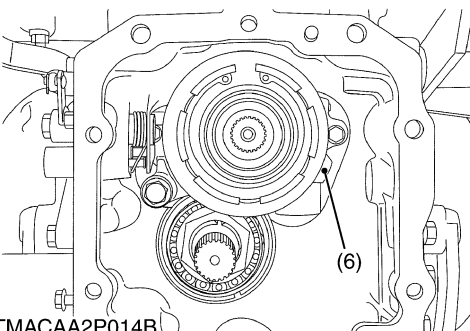
Tightening torque	PTO clutch valve mounting screw	23.5 to 27.5 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs
Tightening torque	PTO clutch case bearing holder mounting screw	23.5 to 27.4 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs

IMPORTANT

- When reassembling the PTO clutch assembly, direct the projection part of brake plate (6) as a figure.
- After assembling the PTO clutch assembly, be sure to check the piston operation by air-blowing.

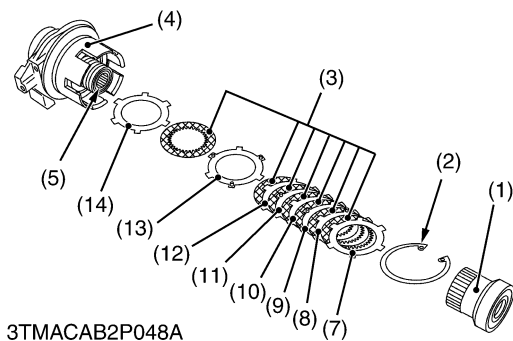
- | | |
|----------------------|-----------------|
| (1) PTO Clutch Cable | (4) Holder |
| (2) PTO Clutch Valve | (5) Oil Pipe |
| (3) PTO Clutch Pack | (6) Brake Plate |

000002610E

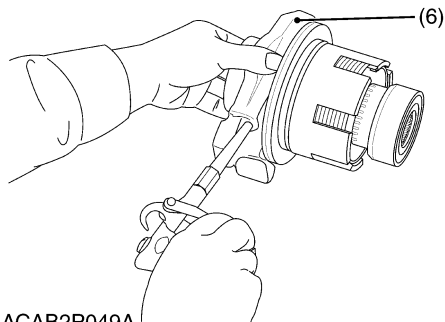


3TMACAA2P014B

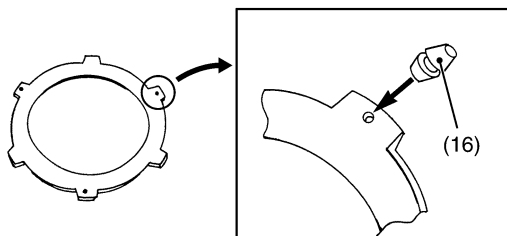
(E) Disassembling PTO Clutch Pack



3TMACAB2P048A

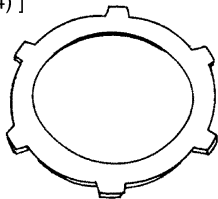


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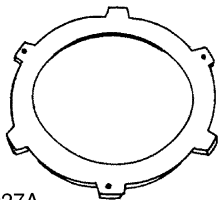


3TMABAB2P026C

[(10), (12), (14)]



[(8), (9), (11), (13)]



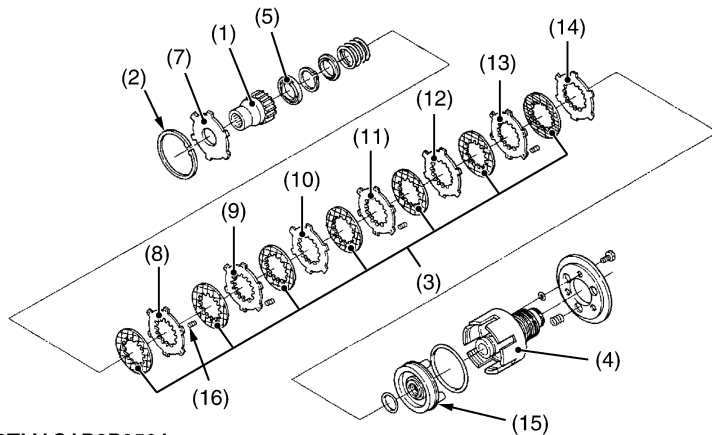
3TMACAE2P027A

Clutch Hub and Clutch Discs

1. Remove the internal snap ring (2), and then take out the clutch discs (3), the back plate (7), the steel plates (8), (9), (10), (11), (12), (13), (14), the hub (1) and the bearings (5).

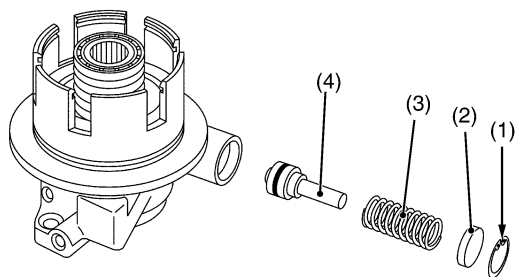
(When reassembling)

- Install the clutch discs (3) and steel plates (8), (9), (10), (11), (12), (13), (14) mutually. (Refer to figure below.)
- Do not confuse the two types steel plates. The steel plates with the plug rubbers (16) are (8), (9), (11), (13) and without plug rubber (16) are (10), (12), (14).
- Do not confuse the back plate (7) and steel plates. The back plate (7) is thicker than the steel plates.
- Assemble the plug rubbers portion of the three steel plates (9), (11), (13) are same positions while assembling them, and do not pile up the plug rubbers portions of the another steel plate (8) with the steel plate (9). (Refer to figure below.)
- Apply enough transmission fluid to the discs (3).
- Confirm the moving of the piston (15) smoothly when pressure air at 0.29 to 0.39 MPa (3 to 4 kgf/cm², 42 to 57 psi) is sent to clutch pack. (Refer to the figure left.)
- Assemble the steel plates with rubber (9), (11), (13) and steel plates without rubber (10), (12), (14) alternately, and steel plates are built in so that the part of rubber is not corresponding to the part of the hole.



3TMACAB2P050A

- | | |
|-------------------------------------|---|
| (1) Hub | (10) Steel Plate (Without Plug Rubbers) |
| (2) Internal Snap Ring | (11) Steel Plate (With Plug Rubbers) |
| (3) Clutch Discs | (12) Steel Plate (Without Plug Rubbers) |
| (4) Clutch Case | (13) Steel Plate (With Plug Rubbers) |
| (5) Bearing | (14) Steel Plate (Without Plug Rubbers) |
| (6) Mid Case Bearing Holder | (15) Piston |
| (7) Back Plate | (16) Plug Rubber |
| (8) Steel Plate (With Plug Rubbers) | |
| (9) Steel Plate (With Plug Rubbers) | |



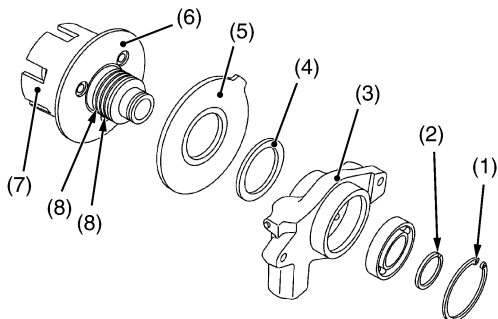
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Modulating Valve

1. Remove the internal snap ring (1).
2. Remove the spring seat (2).
3. Draw out the spring (3) and piston (4).

- (1) Internal Snap Ring
- (2) Spring Seat
- (3) Spring
- (4) Piston

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Clutch Case

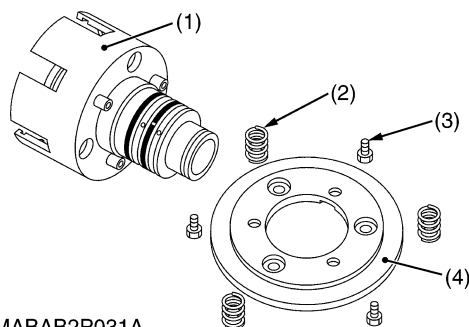
1. Remove the internal snap ring (1).
2. Remove the external snap ring (2).
3. Remove the clutch case (7) and brake disc (5).

(When reassembling)

- Direct the contact part of the brake disc (5) to the brake plate (6).
- Apply small amount of the grease to the seal rings (8).

- (1) Internal Snap Ring
- (2) External Snap Ring
- (3) Clutch Holder
- (4) Collar
- (5) Brake Disc
- (6) Brake Plate
- (7) Clutch Case
- (8) Seal Ring

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3TMABAB2P031A

Brake Plate

1. Remove the brake plate mounting screws (3) and then take out the brake plate (4) and the springs (2).

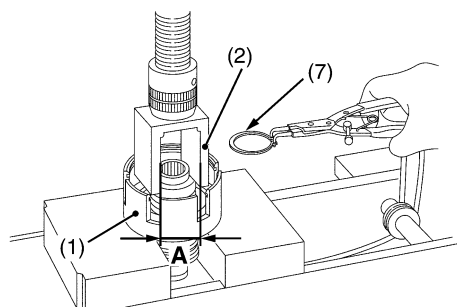
(When reassembling)

- Apply liquid lock (Three Bond 1372 or equivalent) to the brake plate mounting screws (3).

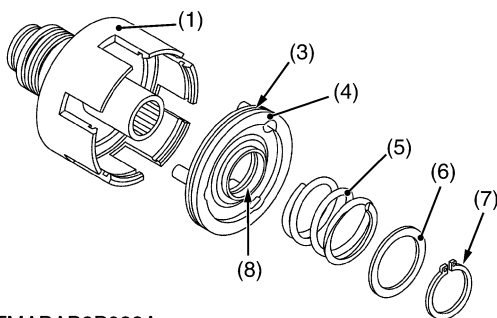
Tightening torque	Brake plate mounting screw	9.8 to 11.3 N·m 1.00 to 1.15 kgf·m 7.2 to 8.3 ft-lbs
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- (1) Clutch Case
- (2) Spring
- (3) Brake Plate Mounting Screw
- (4) Brake Plate

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3TMABAB2P032A



3TMABAB2P033A

Piston

1. Press the washer (6) lightly by the hand press, using the hand made jig. (Refer to the figure left.)
2. Draw out the piston (4).

(When reassembling)

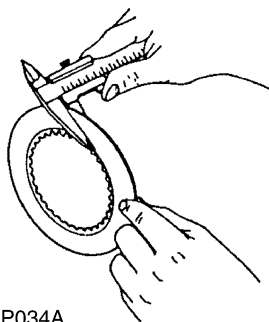
- Apply enough transmission fluid to seal rings (3) and (8).

- | | |
|-----------------|------------------------|
| (1) Clutch Case | (6) Washer |
| (2) Jig | (7) External Snap Ring |
| (3) Seal Ring | (8) Seal Ring |
| (4) Piston | |
| (5) Spring | |
- A : 41 mm (1.6 in.)**

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(2) Servicing

(A) PTO Clutch



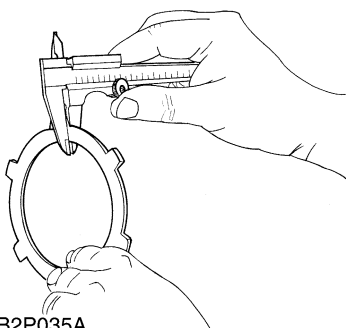
3TMABAB2P034A

PTO Clutch Disc Wear

1. Measure the thickness of PTO clutch disc with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of PTO clutch disc	Factory spec.	1.70 to 1.90 mm 0.067 to 0.075 in.
	Allowable limit	1.55 mm 0.061 in.

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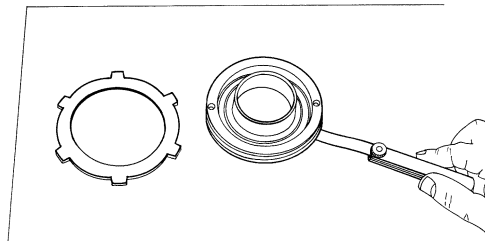
3TMABAB2P035A

PTO Steel Plate Wear

1. Measure the thickness of PTO steel plate with vernier calipers.
2. If the thickness is less than the allowable limit, replace it.

Thickness of PTO steel plate	Factory spec.	1.15 to 1.25 mm 0.045 to 0.049 in.
	Allowable limit	1.10 mm 0.043 in.

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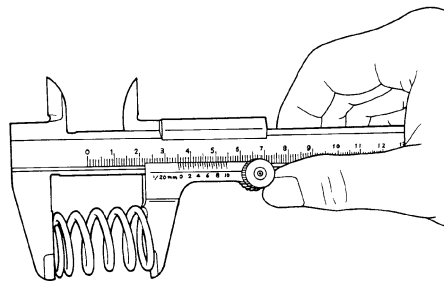
Flatness of PTO Piston and PTO Steel Plate

1. Place the part on a surface plate.
2. Check it unable to insert a thickness gauge (allowable limit size) underneath it at least four points.
3. If the gauge can be inserted, replace it.

Flatness of PTO piston	Allowable limit	0.15 mm 0.006 in.
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Flatness of PTO steel plate	Allowable limit	0.30 mm 0.012 in.
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3TMABAB2P037A

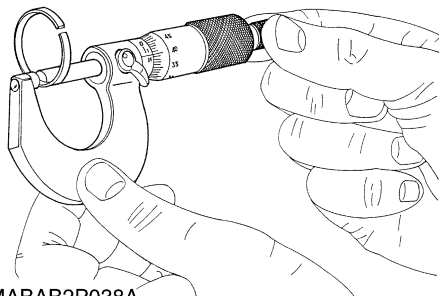
Piston Return Spring Free Length

1. Measure the free length of spring with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

PTO return spring free length	Factory spec.	40.5 mm 1.59 in.
	Allowable limit	37.5 mm 1.48 in.

PTO brake spring free length	Factory spec.	20.3 mm 0.80 in.
	Allowable limit	18.0 mm 0.71 in.

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3TMABAB2P038A

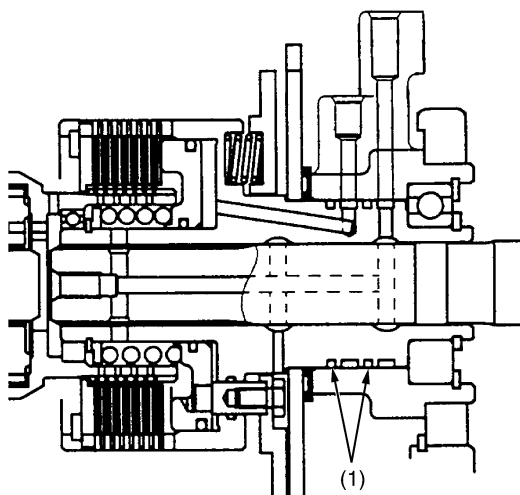
Thickness of Seal Ring

1. Measure the thickness of seal rings (1) with an outside micrometer.
2. If the measurement is less than the allowable limit, replace it.

Thickness of seal ring	Factory spec.	2.45 to 2.50 mm 0.096 to 0.098 in.
	Allowable limit	2.0 mm 0.079 in.

(1) Seal Ring

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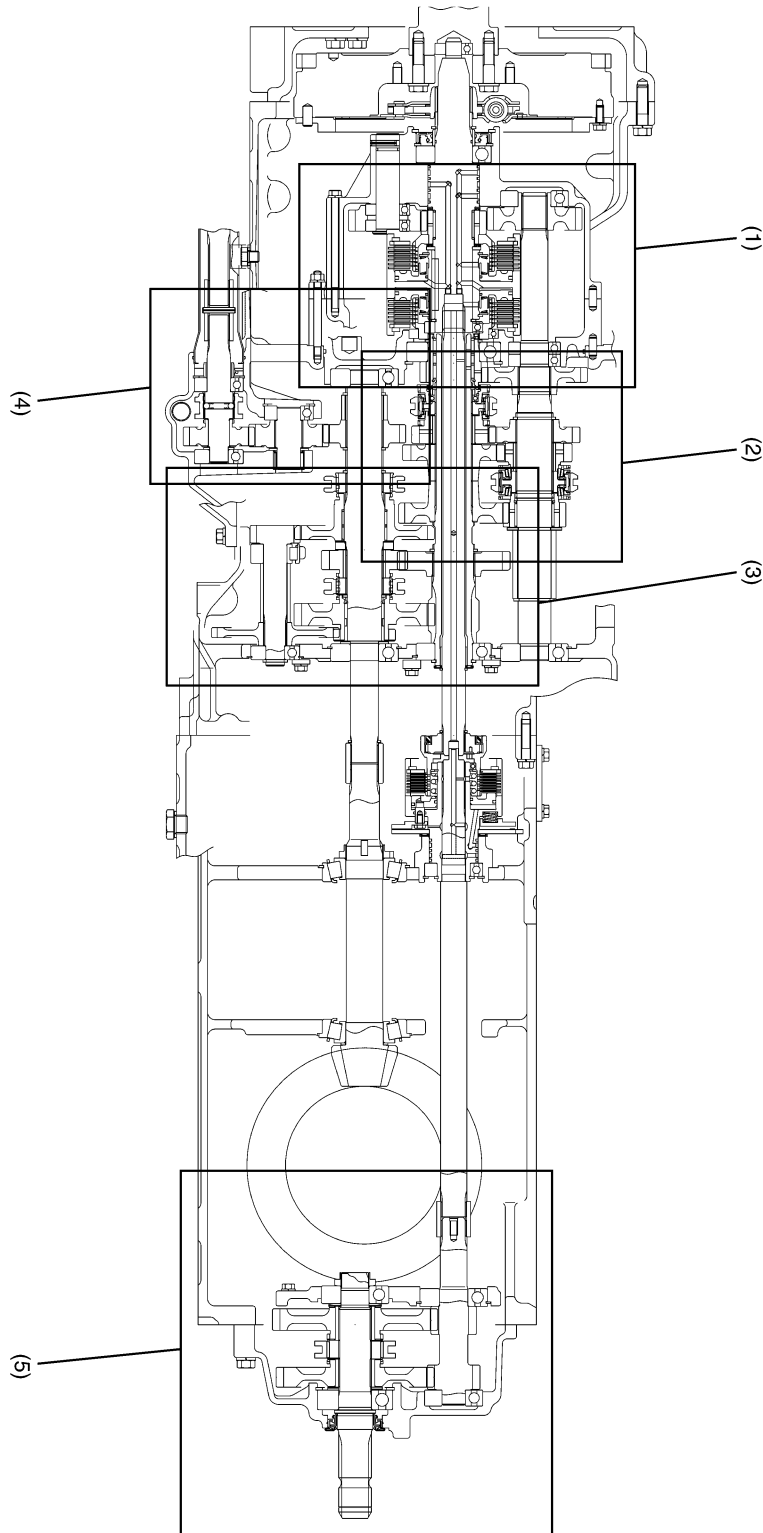
3TMACAB2P053A

3 TRANSMISSION

CONTENTS

1. STRUCTURE.....	3-M1
2. POWER TRAIN FOR TRAVELLING GEAR.....	3-M2
[1] SHUTTLE SHIFT SECTION.....	3-M2
[2] MAIN GEAR SHIFT SECTION.....	3-M2
[3] HI-LO, CREEP SHIFT SECTION.....	3-M3
[4] FOUR WHEEL DRIVE SECTION.....	3-M3
3. POWER TRAIN FOR PTO GEAR.....	3-M4
[1] PTO GEAR SECTION.....	3-M4

1. STRUCTURE



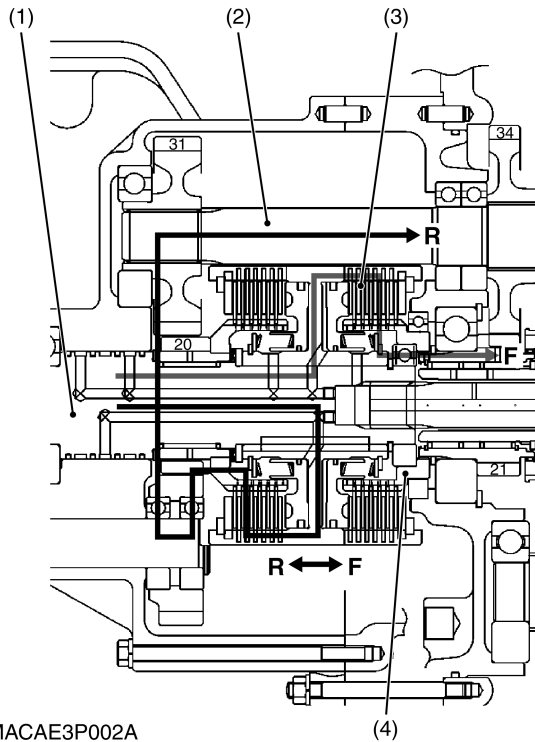
3TMACAE3P001A

- (1) Shuttle Shift Section (3) Hi-Lo, Creep Shift Section (4) Four Wheel Drive Section (5) PTO Gear Section
 (2) Main Shift Gear Section

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2. POWER TRAIN FOR TRAVELLING GEAR

[1] SHUTTLE SHIFT SECTION



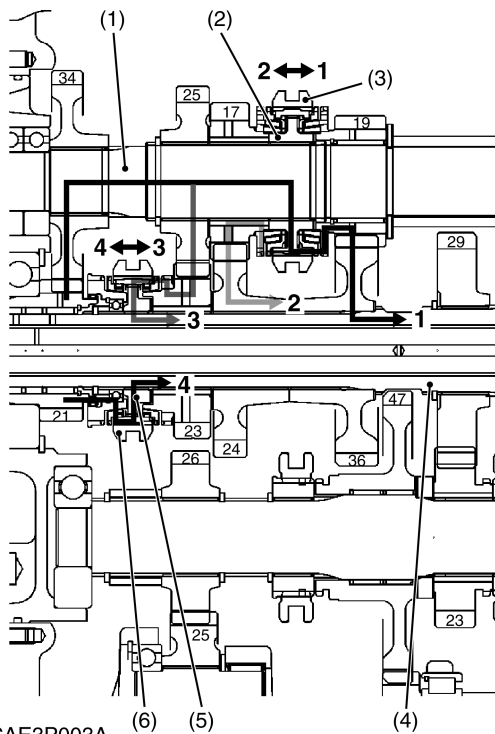
- (1) Input Shaft
- (2) 1st Shaft
- (3) Clutch Disc and Plate
- (4) Coupling

R : Reverse
F : Forward

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[2] MAIN GEAR SHIFT SECTION



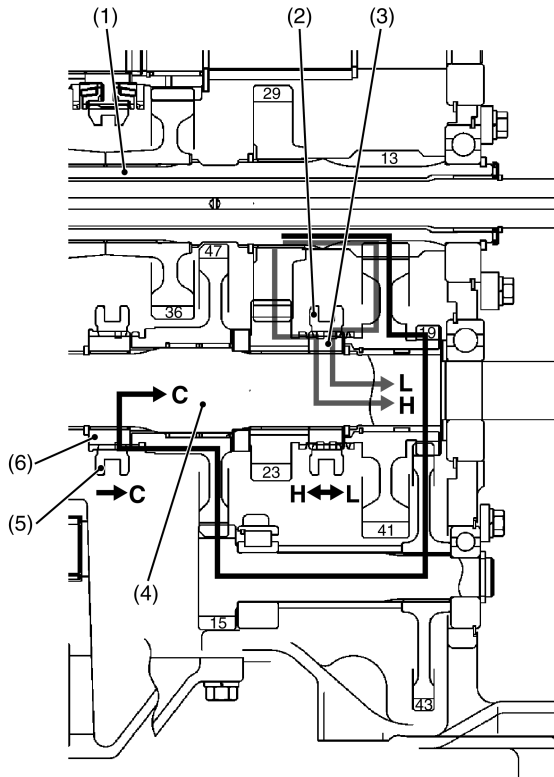
- (1) 1st Shaft
- (2) Hub
- (3) Shifter
- (4) 2nd Shaft
- (5) Hub
- (6) Shifter

1 : 1st Speed
2 : 2nd Speed
3 : 3rd Speed
4 : 4th Speed

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[3] HI-LO, CREEP SHIFT SECTION



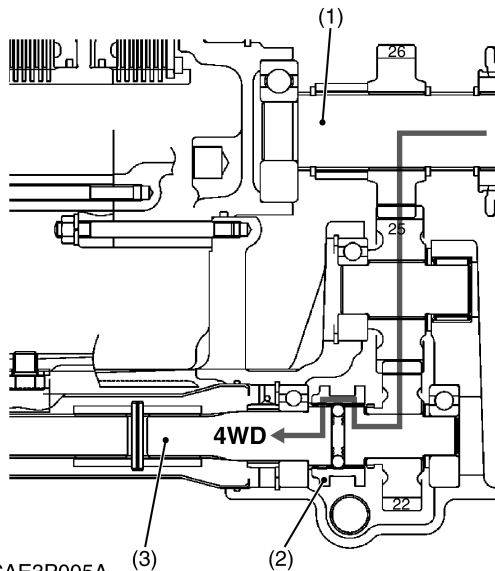
- (1) 2nd Shaft
- (2) Shifter
- (3) Hub
- (4) 3rd Shaft
- (5) Shifter
- (6) Hub

C : Creep
H : Hi Range
L : Lo Range

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3TMACAE3P004A

[4] FOUR WHEEL DRIVE SECTION



- (1) 3rd Shaft
- (2) Shifter
- (3) Propeller Shaft 1

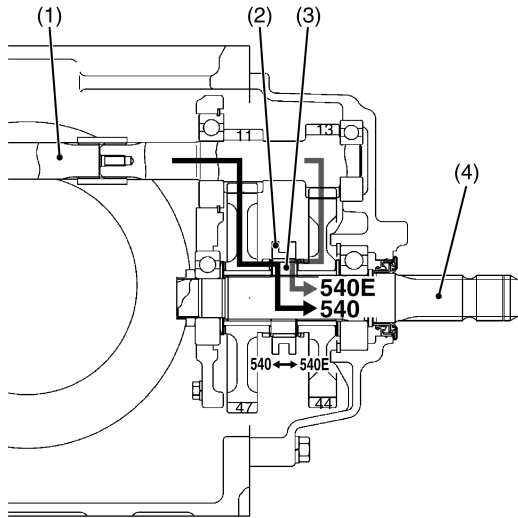
4WD : Four Wheel Drive

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3. POWER TRAIN FOR PTO GEAR

[1] PTO GEAR SECTION



- | | |
|-------------------------|---|
| (1) PTO Propeller Shaft | 540E : 540E min ⁻¹ (rpm) at |
| (2) Shifter | 1828 min ⁻¹ (rpm) |
| (3) Hub | 540 : 540 min ⁻¹ (rpm) at |
| (4) PTO Shaft | 2307 min ⁻¹ (rpm) |

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3TMACAE3P006A

CONTENTS

1. TROUBLESHOOTING.....	3-S1
2. SERVICING SPECIFICATIONS.....	3-S2
3. TIGHTENING TORQUES.....	3-S3
4. DISASSEMBLING AND SERVICING.....	3-S4
[1] CLUTCH HOUSING.....	3-S4
(1) Disassembling and Assembling.....	3-S4
(2) Servicing.....	3-S28
[2] TRANSMISSION CASE.....	3-S31
(1) Disassembling and Assembling.....	3-S31
(2) Servicing.....	3-S49

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive Transmission Noise	● Transmission fluid insufficient	Replenish	G-8, 17
	● Improper backlash between bevel pinion shaft and spiral bevel gear	Repair	3-S51
	● Improper backlash between differential pinion and side gear	Adjust	3-S53
	● Collars or shims have not been installed	Repair	—
	● Bearing worn or damaged	Replace	3-S28, S49
Gear Slip Out of Mesh	● Shifter or shift fork worn or damaged	Replace	3-S30
	● Shift fork spring weaken or damaged	Replace	—
	● Interlock ball fallen	Reassemble	—
	● Synchronizer unit damaged	Repair or replace	3-S30
Hard Shifting	● Shifter or shift fork worn or damaged	Replace	3-S30
	● Shift fork bent	Replace	—
	● Synchronizer unit damaged	Repair or replace	3-S30
Gears Clash When Shifting	● Synchronizer unit damaged	Repair or replace	3-S30
	● Clutch does not release	Adjust	2-S4 to S6
Differential Lock Can Not Be Set	● Differential lock shift fork damage	Replace	3-S43
	● Differential lock shift fork mounting spring pin damaged	Replace	3-S43
	● Movement of differential lock shifter improperly adjusted	Adjust	3-S54
Differential Lock Pedal Does Not Return	● Differential lock cam spring weaken or damaged	Replace	3-S43
	● Differential shifter pin damaged	Repair or replace	—
Rear Wheels Can Not Driven	● Gears broken	Replace	—
	● Differential gear broken	Replace	3-S44
	● Planetary gears broken	Replace	4-S8

000003141E

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Shift Rod	Length	Approx. 209 mm 8.23 in.	—
Internal Snap Ring to Pressure Plate	Clearance R side (F side)	1.9 to 2.1 mm 0.075 to 0.083 in.	3.6 mm 0.142 in.
	Clearance F side (R side)	R side (F side) -0.1 to +0.1 mm -0.004 to +0.004 in.	
Shift Fork to Shifter Groove	Clearance	0.15 to 0.40 mm 0.0059 to 0.0157 in.	0.80 mm 0.031 in.
Spiral Bevel Pinion Shaft	Turning Torque	2.94 to 3.43 N-m 0.30 to 0.35 kgf-m 2.17 to 2.53 ft-lbs	—
Spiral Bevel Pinion Shaft and Differential Assembly	Turning Torque	4.22 to 5.88 N-m 0.43 to 0.60 kgf-m 3.11 to 4.34 ft-lbs	—
Spiral Bevel Gear to Spiral Bevel Pinion Shaft	Backlash	0.20 to 0.30 mm 0.0079 to 0.0118	0.4 mm 0.016 in.
Differential Case Bore (Differential Case Cover Bore) to Differential Side Gear Boss	Clearance	0.050 to 0.151 mm 0.00197 to 0.00594 in.	0.35 mm 0.0138 in.
	Differential Case Bore (I.D.)	40.500 to 40.550 mm 1.59449 to 1.59646 in.	—
	Differential Case Cover Bore (I.D.)	40.500 to 40.550 mm 1.59449 to 1.59646 in.	—
	Differential Side Gear Boss (O.D.)	40.388 to 40.450 mm 1.59008 to 1.59252 in.	—
Differential Pinion Shaft to Differential Pinion	Clearance	0.060 to 0.102 mm 0.00236 to 0.00402 in.	0.25 mm 0.0098 in.
	Differential Pinion Shaft (O.D.)	19.959 to 19.980 mm 0.78579 to 0.78661 in.	—
	Differential Pinion (I.D.)	20.040 to 20.061 mm 0.78898 to 0.78980 in.	—
Differential Pinion to Differential Side Gear	Backlash	0.15 to 0.30 mm 0.0059 to 0.0118 in.	0.4 mm 0.016 in.
Differential Lock Shifter	Displacement	6.0 to 8.0 mm 0.236 to 0.315 in.	—

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
Rear wheel mounting nut	260 to 340	26.5 to 31.0	192 to 224
Starter's motor B terminal mounting nut	8.8 to 11.8	0.9 to 1.2	6.5 to 8.7
ROPS mounting screw	M16 grade 9	260 to 304	26.5 to 31.0
	1/4 grade 5	8.1 to 9.5	0.83 to 0.97
	3/8 grade 8	47.0 to 53.9	4.8 to 5.5
	9/16 grade 8	149.0 to 179.3	15.2 to 18.3
Step mounting nut	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Step mounting screw (M16)	117.7 to 147.1	12.0 to 15.0	86.8 to 108.5
Delivery pipe and return pipe retaining nut	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Turning delivery hose retaining nut	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Transmission case and clutch housing mounting screw, nut M12 grade 11 nut	103.0 to 117.7	10.5 to 12.0	75.9 to 86.8
	M12 grade 11 screw, nut	77.5 to 90.2	7.9 to 9.2
	M10 grade 9 screw	60.8 to 70.6	6.2 to 7.2
Transmission upper cover mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Engine and clutch housing mounting screw, nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Engine and clutch housing mounting stud bolt	38.2 to 45.1	3.9 to 4.6	28.2 to 33.3
Shuttle valve mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Delivery pipe retaining nut	108 to 117	11.0 to 12.0	79.6 to 86.8
Return pipe retaining nut	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Shuttle pipe retaining nut	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Shuttle case mounting screw M8 grade 9	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3
Shuttle case mounting nut	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Bearing retainer mounting screw	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3
PTO gear case mounting screw and reamer screw	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Hydraulic cylinder assembly mounting stud bolt	38.2 to 45.1	3.9 to 4.6	28.2 to 33.3
Hydraulic cylinder assembly mounting screw and nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Rear axle case mounting screw and nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Differential bearing support mounting screw	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Differential case cover mounting screw	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Spiral bevel gear UBS screw	70.6 to 90.2	7.2 to 9.2	52.1 to 66.5
PTO clutch valve mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
PTO shaft staking nut	225.6 to 264.8	23.0 to 27.0	166.4 to 195.3

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4. DISASSEMBLING AND SERVICING

[1] CLUTCH HOUSING

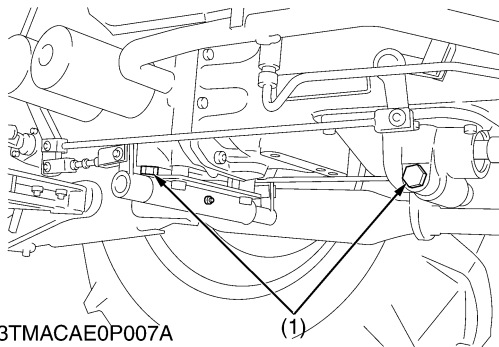
(1) Disassembling and Assembling

NOTE

- Before proceeding this section, dismantling the cabin assembly. (See page 10-S24 to S29.)

000002595E

(A) Draining the Transmission Fluid and Fuel



Draining Transmission Fluid

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

(When reassembling)

- Fill up from filling port after removing the filling plug until reaching the gauge.
- After running the engine for a few minutes, stop it and check the fluid level again, add fluid to prescribed level if it is not correct level.

Transmission fluid	Capacity	ROPS	40.0 L 42.3 U.S.qts 35.2 Imp.qts
		CABIN	43.0 L 45.4 U.S.qts 37.8 Imp.qts

IMPORTANT

- Use only KUBOTA UDT or SUPER UDT fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)
- Do not mix difference brands oil together.

(1) Drain Plug

000002389E

Draining Fuel (CABIN Type)

1. Place oil pans under the fuel tank.
2. Remove the drain plugs (1).
3. Drain the fuel.
4. Reinstall the drain plugs (1).

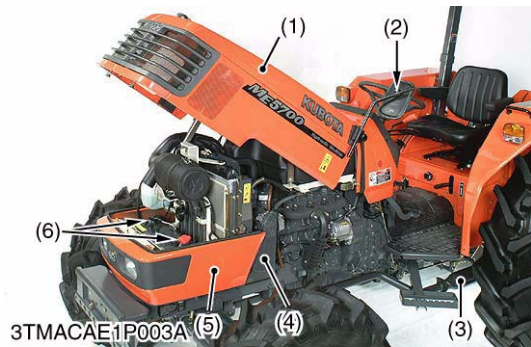


Fuel	Capacity	95 L 25.1 U.S.gals 20.9 Imp.gals
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(1) Draining Plug

000002722E

(B) Separating Engine and Clutch Housing Case (ROPS Type)



Muffler and Bonnet

1. Remove the muffler (3).
2. Remove the bonnet (1) with mirror (2).
3. Disconnect the battery's cable (6).
4. Remove the side covers (4).
5. Disconnect the head light 3P connectors.
6. Remove the front lower cover (5).

- | | |
|-------------|-----------------------|
| (1) Bonnet | (4) Side Cover |
| (2) Mirror | (5) Front Lower Cover |
| (3) Muffler | (6) Battery Cable |

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Rear Wheels, Fenders and 3-Point Linkage

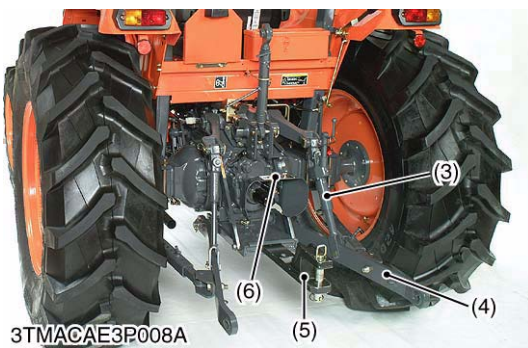
1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Remove the rear wheels (2).
3. Disconnect the jumper leads for hazard and tail light.
4. Disconnect the jumper leads for PTO safety switch.
5. Remove the fenders (1).
6. Remove the lift rods (3).
7. Remove the lower link (4) with stabilizer.
8. Remove the drawbar (5).
9. Remove the PTO shaft cover (6).

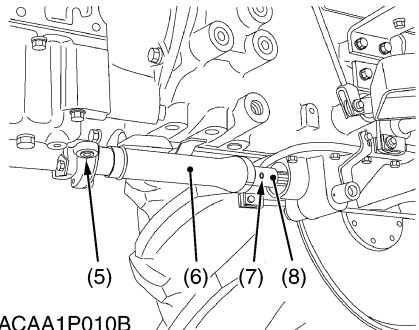
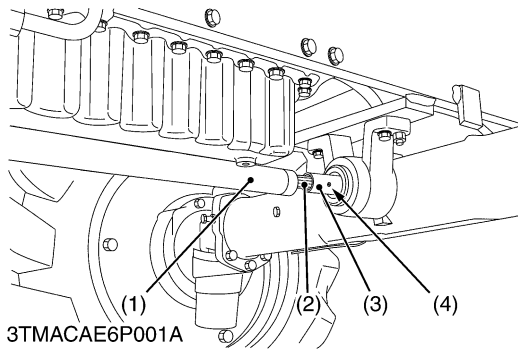
(When reassembling)

Tightening torque	Rear wheel mounting nut	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
-------------------	-------------------------	---

- | | |
|----------------|---------------------|
| (1) Fender | (4) Lower Link |
| (2) Rear Wheel | (5) Drawbar |
| (3) Lift Rod | (6) PTO Shaft Cover |

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Propeller Shaft

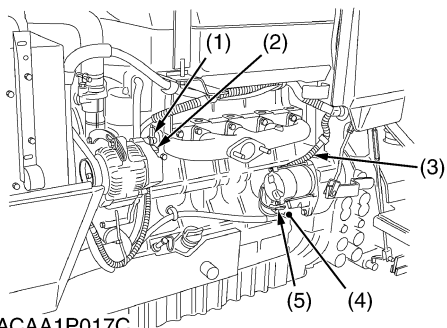
1. Slide the propeller shaft cover (1), (6) after removing the screws (5).
2. Tap out the spring pin (4), (7) and then slide the coupling (3), (8) to the front and rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (2).

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

(ROPS)
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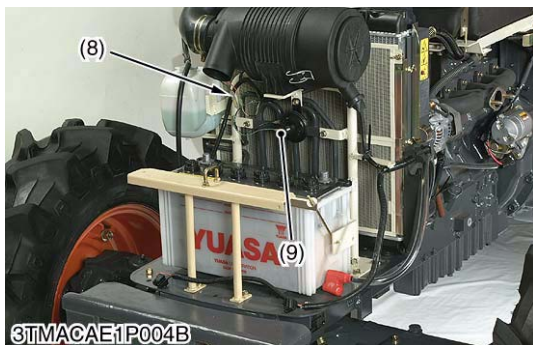
3TMACAA1P017C



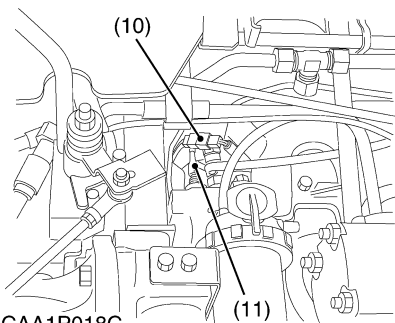
3TMACAE3P046A



3TMACAE1P005B



3TMACAE1P004B



3TMACAA1P018C

Wiring Harness

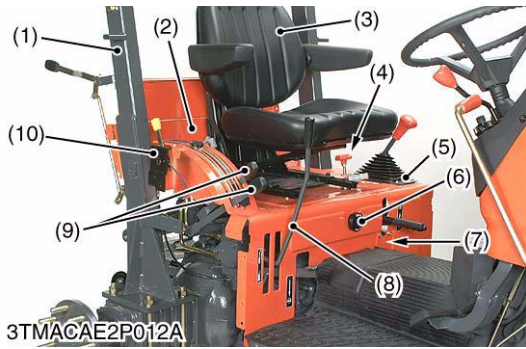
1. Disconnect the alternator **2P** connector (2) and **B** terminal (1).
2. Disconnect the starter motor **B** terminal (4) and **1P** connector (5).
3. Disconnect the engine oil pressure connector (3).
4. Disconnect the stop solenoid connector (7).
5. Disconnect the horn connector (9) and air cleaner connector (8).
6. Disconnect the fuel level connector (6).
7. Disconnect the glow plug **1P** connector (10) and coolant temperature sensor **1P** connector (11).

(When reassembling)

Tightening torque	Starter's motor B terminal mounting nut	8.8 to 11.8 N·m 0.9 to 1.2 kgf·m 6.5 to 8.7 ft·lbs
-------------------	--	--

- | | |
|---------------------------------------|---|
| (1) Alternator B Terminal | (7) Stop Solenoid Connector |
| (2) Alternator 2P Connector | (8) Air Cleaner Connector |
| (3) Oil Pressure | (9) Horn Connector |
| (4) Starter Motor B Terminal | (10) 1P Connector for Glow Plug |
| (5) Starter Motor 1P Connector | (11) 1P Connector for Coolant Temperature Sensor |
| (6) Fuel Level Connector | |

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ROPS, Seat and Center Frame

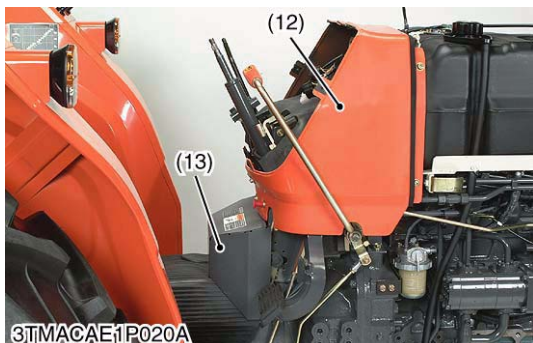
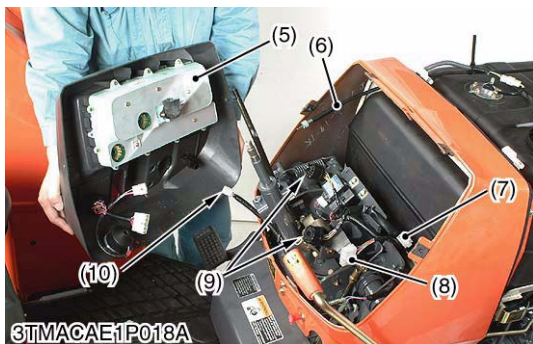
1. Remove the seat (3).
2. Remove the draft and position control lever grips (9).
3. Remove the auxiliary speed change control lever plate (5).
4. Remove the DT shift lever grip (4) and 3-point hitch lowering speed control grip (6).
5. Remove the plate (7).
6. Remove the auxiliary control valve lever assembly (8).
7. Remove the ROPS (1).
8. Remove the PTO clutch lever assembly (10).
9. Remove the center frame (2).

(When reassembling)

Tightening torque	ROPS mounting screw M16 grade 9	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
	ROPS mounting screw 1/4 grade 5	8.1 to 9.5 N-m 0.83 to 0.97 kgf-m 5.97 to 7.00 ft-lbs
	ROPS mounting screw 3/8 grade 8	47.0 to 53.9 N-m 4.8 to 5.5 kgf-m 34.7 to 39.8 ft-lbs
	ROPS mounting screw 9/16 grade 8	149.0 to 179.3 N-m 15.2 to 18.3 kgf-m 109.9 to 132.3 ft-lbs

- | | |
|--|---|
| (1) ROPS | (6) 3-Point Hitch Lowering Speed Control Grip |
| (2) Center Frame | (7) Plate |
| (3) Seat | (8) Auxiliary Control Valve Lever Assembly |
| (4) DT Shift Lever Grip | (9) Lever Grip |
| (5) Auxiliary Speed Change Control Lever Plate | (10) PTO Lever |

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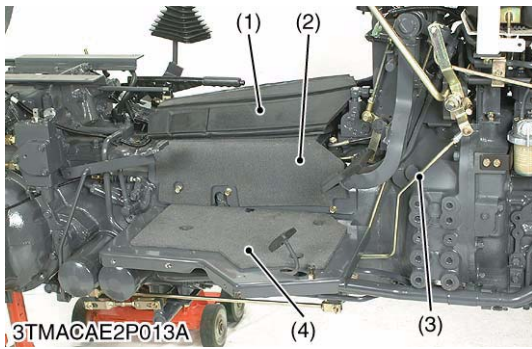


Steering Wheel, Meter Panel and Rear Bonnet

1. Remove the steering wheel (2) with a steering wheel puller (Code No. 07916-51090).
2. Remove the shuttle lever grip (1) and remove the shuttle lever guide (4).
3. Remove the main shift lever (3).
4. Remove the meter panel mounting screws and open the meter panel (5).
5. Disconnect the two connectors (9) and hour meter cable (6).
6. Disconnect the main switch connector (7), combination switch connector (8) and hazard switch connector (10).
7. Disconnect the engine stop cable (11) at the engine side.
8. Remove the rear bonnet (12) and shuttle valve cover (13).

- | | |
|---------------------------|----------------------------------|
| (1) Shuttle Lever Grip | (8) Combination Switch Connector |
| (2) Steering Wheel | (9) Connectors |
| (3) Main Shift Lever | (10) Hazard Switch Connector |
| (4) Shuttle Lever Guide | (11) Engine Stop Cable |
| (5) Meter Panel | (12) Rear Bonnet |
| (6) Hour Meter Cable | (13) Shuttle Valve Cover |
| (7) Main Switch Connector | |

000002414E



Steps and Clutch Housing Cover

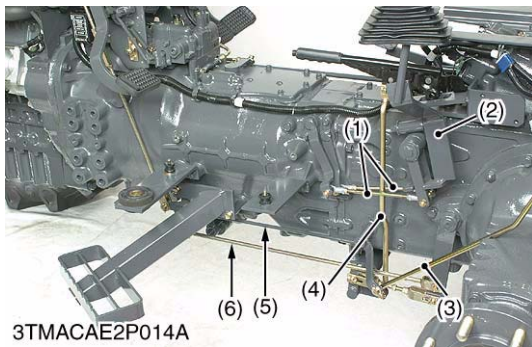
1. Disconnect the foot accelerator rod (3).
2. Remove the rubber mat (1).
3. Remove the clutch housing cover (2).
4. Remove the steps (4).
5. Disconnect the wire harness.

(When reassembling)

Tightening torque	Step mounting nut	48.1 to 55.9 N-m 4.9 to 5.7 kgf-m 35.4 to 41.2 ft-lbs
	Step mounting screw (M16)	117.7 to 147.1 N-m 12.0 to 15.0 kgf-m 86.8 to 108.5 ft-lbs

- (1) Rubber Mat
- (2) Clutch Housing Cover
- (3) Accelerator Rod
- (4) Step

000002584E



Auxiliary Shift Lever and Brake Rod

1. Disconnect the shift rods (1).
2. Remove the shift lever assembly (2).
3. Remove the brake rods (6).
4. Remove the DT rod (5).
5. Remove the parking brake rod (4).
6. Remove the DT shift rod (3).

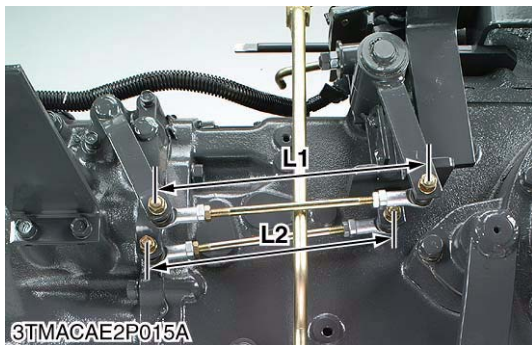
(When reassembling)

- Be sure to adjusting the shift rod.

Shift rod length L1 and L2	Factory spec.	Approx. 209 mm 8.23 in.
----------------------------	---------------	----------------------------

- (1) Shift Rod
- (2) Shift Lever Assembly
- (3) DT Shift Rod
- (4) Parking Brake Rod
- (5) DT Rod
- (6) Brake Rod

000002585E

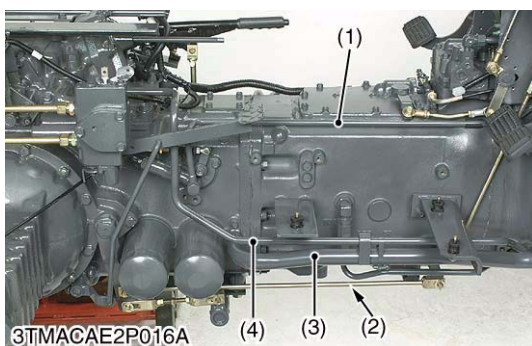


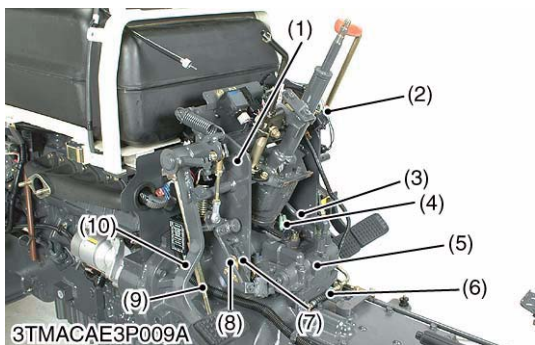
Hydraulic Pipes and Brake Rod

1. Remove the suction pipe (3).
2. Remove the delivery pipe (4) for the three point hydraulic system.
3. Remove the PTO pipe (1) from power steering controller.
4. Remove the brake rod (2).

- (1) PTO Pipe
- (2) Brake Rod
- (3) Suction Pipe
- (4) Delivery Pipe

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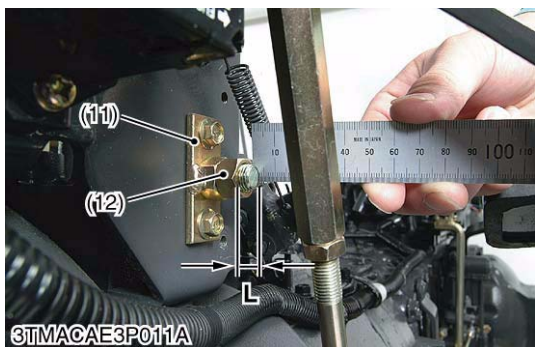
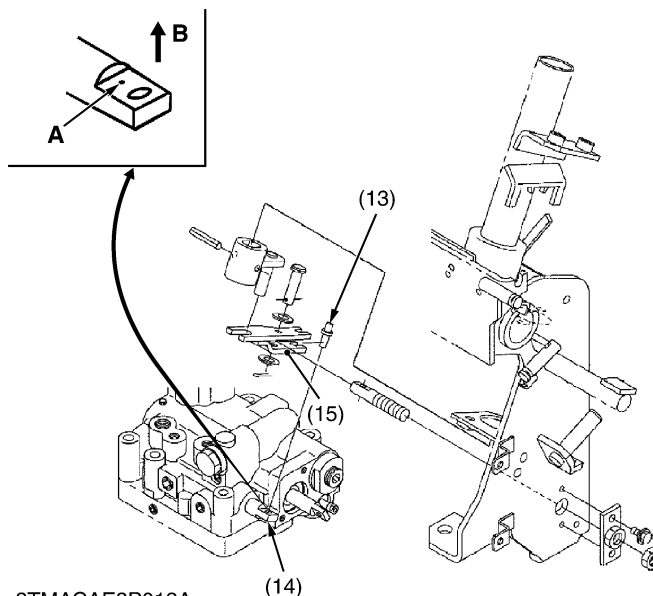
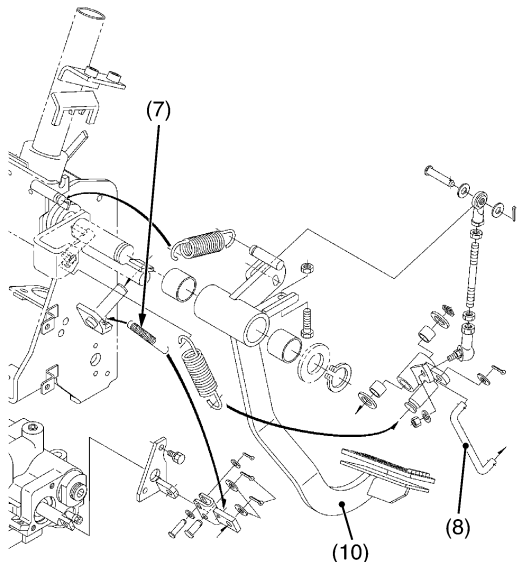


Pedal Frame Assembly

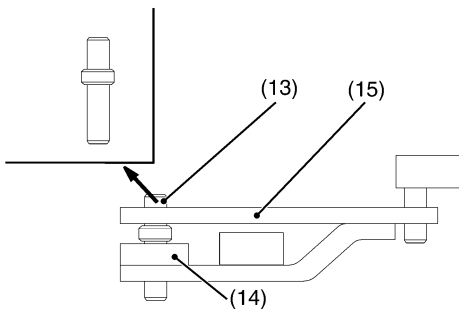
1. Disconnect the clutch rod (8) safety switch connectors (3).
2. Remove the spring (7).

■ **NOTE**

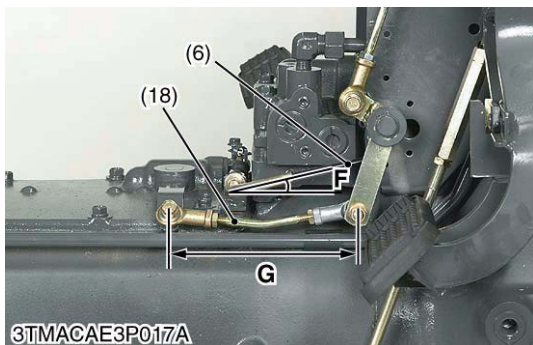
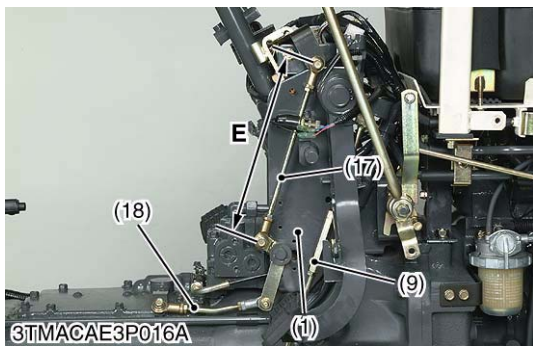
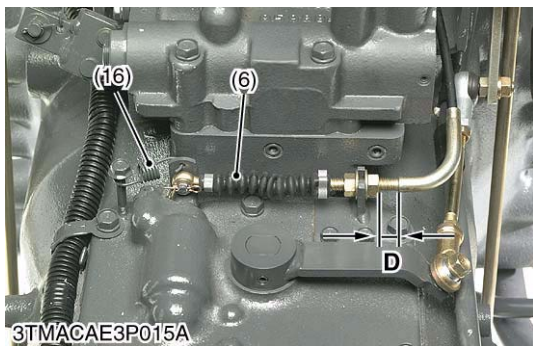
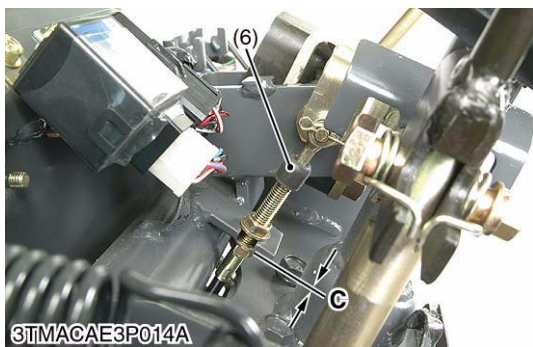
- **Measure and note the length L before removing lock nut (12) of adjusting plate (11).**
3. Remove the lock nut (12) and adjusting plate (11).
 4. Remove the neutral position adjusting assembly (15).
 5. Remove the pin (13).
 6. Remove the hydraulic pipe (3).
 7. Disconnect the brake switch connectors (2).
 8. Disconnect the wire harness.
 9. Remove the brake rods (9).



- | | |
|-----------------------------|--|
| (1) Pedal Frame Assembly | (11) Adjusting Plate |
| (2) Brake Switch Connector | (12) Lock Nut |
| (3) Safety Switch Connector | (13) Pin |
| (4) Hydraulic Pipe | (14) Shuttle Spool |
| (5) Shuttle Valve | (15) Neutral Position Adjusting Assembly |
| (6) Main Shift Cable | A : Punched Mark |
| (7) Spring | B : Up |
| (8) Clutch Rod | L : Shuttle Neutral Position Length |
| (9) Brake Rod | |
| (10) Clutch Pedal | |



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Pedal Frame Assembly (Continued)

- 10. Remove the main shift lever cable (6).
- 11. Remove the main shift rod 1 (17) and 2 (18).
- 12. Remove the pedal frame assembly (1).

(When reassembling)

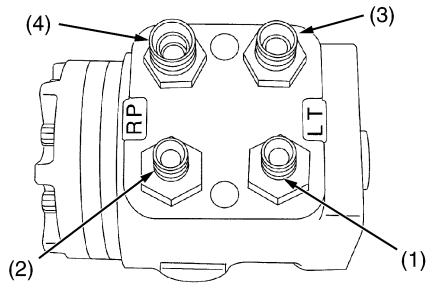
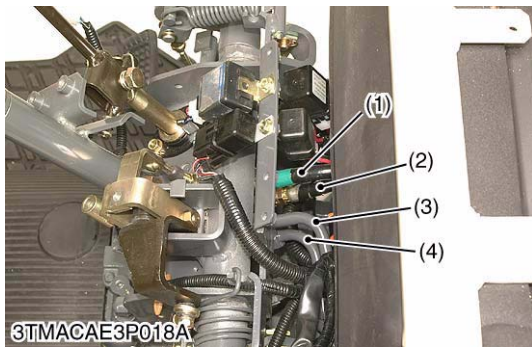
- When connecting the shuttle lever linkage, make sure that the punched mark **A** of shuttle rod is upward.
- Be sure to hook the spring (7) from bottom side shown in figure.
- Be sure to install the pin (13) as shown in figure.
- After assembled, confirm the shuttle lever can be shifted on each position securely. If not adjust the length **L**.
- Make sure length **C** of the main shift cable (6) a screw full bottom.
- Confirm the direction of attaching of spring (16).
- It is confirmed that it is not free play to the main cable (6) while drawn to 3 - 4 speed side.
If the free play of the cable, adjust the cable length **D**.
- Adjust angle **F** so that the main shift cable (6) and the rod (**G**) should not touch when changing the main shift lever.

(Reference)

Main shift cable length C	Factory spec.	0 mm 0 in.
Main shift cable length D		12.0 mm 0.47 in.
Main shift rod length E		276 mm 10.87 in.
Main shift Rod length G		154 mm 6.06 in.

- (1) Pedal Frame Assembly
- (6) Main Shift Cable
- (9) Brake Rod
- (16) Spring
- (17) Main Shift Rod 1
- (18) Main Shift Rod 2

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3TMACAB2P015G

Piping for Power Steering

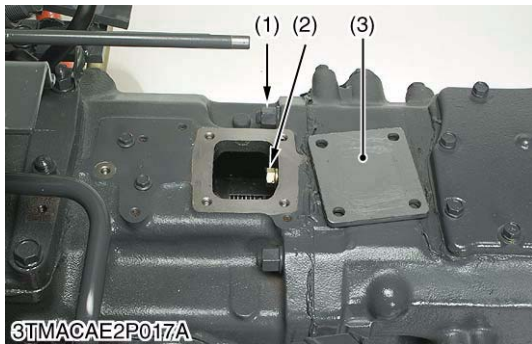
1. Disconnect the delivery pipe (4), return pipe 1 (3), right turning delivery hose (2), left turning delivery hose (1).

(When reassembling)

Tightening torque	Delivery pipe and return pipe retaining nut	49.0 to 68.6 N-m 5.0 to 7.0 kgf-m 36.2 to 50.6 ft-lbs
	Turning delivery hose retaining nut	24.5 to 29.4 N-m 2.5 to 3.0 kgf-m 18.1 to 21.7 ft-lbs

- (1) Left Turning Delivery Hose
- (2) Right Turning Delivery Hose
- (3) Return Pipe 1
- (4) Delivery Pipe

000002729E



Separating Transmission Case

1. Remove the transmission upper cover (3).
2. Remove the transmission case mounting screws and nut, and separate the transmission case from the clutch housing.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the transmission case and clutch housing, transmission upper cover and transmission case.

Tightening torque	Transmission case and clutch housing mounting screw, nut	M12, grade 11 nut (1)	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs
		M12, grade 7 screw, nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
		M10, grade 9 screw (2)	60.8 to 70.6 N-m 6.2 to 7.2 kgf-m 44.8 to 52.1 ft-lbs

- (1) Transmission Case Mounting Nut
- (2) Transmission Case Mounting Screw
- (3) Transmission Upper Cover

000002587E



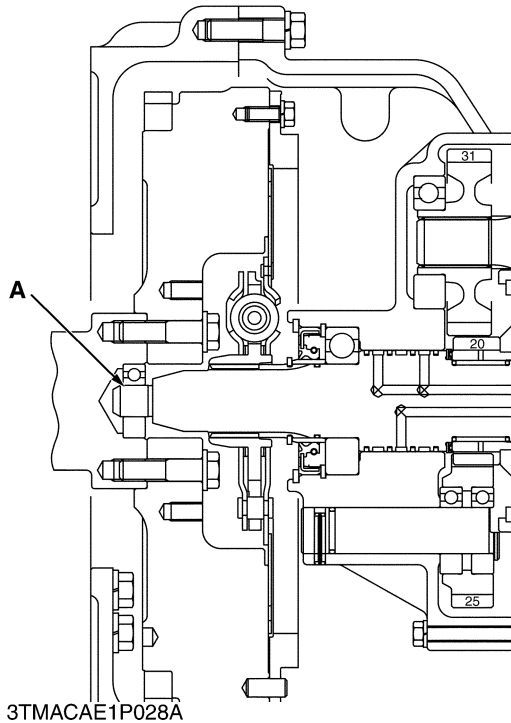
Separating Engine from Clutch Housing

1. Remove the engine mounting screws and nuts, and separate the engine from the clutch housing.

(When reassembling)

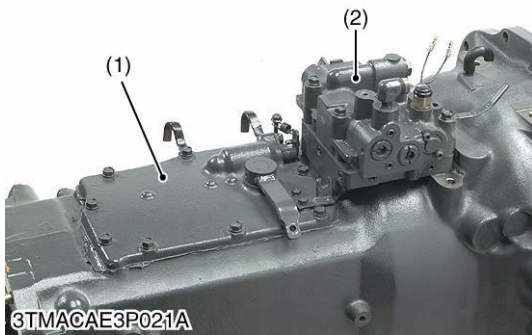
- Apply molydenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Apply liquid gasket (Three Bond 1211, 1141 or equivalent) to the seam of engine and clutch housing.
- When connecting the engine to the clutch housing, be sure to align the input shaft spline to the clutch hub center.

Tightening torque	Engine and clutch housing mounting screw, nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
	Engine and clutch housing mounting stud bolt	38.2 to 45.1 N-m 3.9 to 4.6 kgf-m 28.2 to 33.3 ft-lbs



A : Greasing Point

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Shuttle Valve and Speed Change Cover

1. Remove the shuttle valve assembly (2).
2. Remove the speed change cover (1).

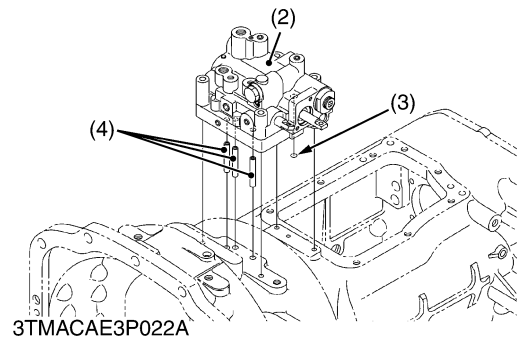
(When reassembling)

- When reassembling the speed change cover (1), set the shifter and fork in neutral position.
- Apply liquid gasket (Three Bond 1216 or equivalent) to seam of speed change cover and clutch housing.
- Replace the oil pipes (4) with a new one.
- Apply transmission fluid to the oil pipes (4).
- Be sure to install the O-ring (3).

Tightening torque	Shuttle valve mounting screw	23.5 to 27.5 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs
-------------------	------------------------------	---

- | | |
|----------------------------|--------------|
| (1) Speed Change Cover | (3) O-ring |
| (2) Shuttle Valve Assembly | (4) Oil Pipe |

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DT Gear Case

1. Remove the DT Gear Case (1).

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the clutch housing and DT gear case.

- (1) DT Gear Case

(ROPS)
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(C) Separating Engine and Clutch Housing Case (CABIN Type)

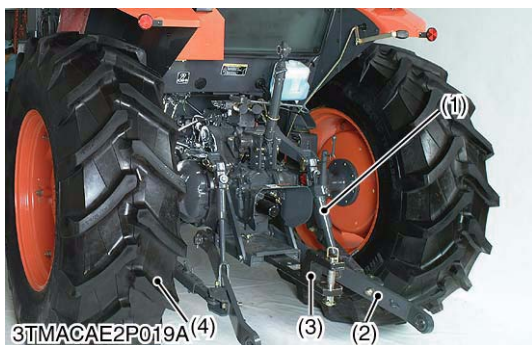
Lift Rods and Lower Links

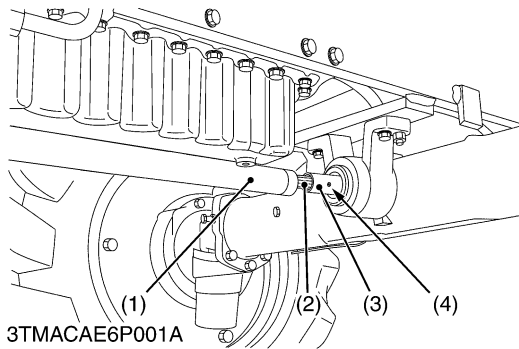
1. Remove the lift rods (1).
2. Remove the lower links (2) with stabilizer.
3. Remove the drawbar (3).
4. Remove the rear wheels (4).

Tightening torque	Rear wheel mounting nut	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
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- | | |
|----------------|----------------|
| (1) Lift Rod | (3) Drawbar |
| (2) Lower Link | (4) Rear Wheel |

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Propeller Shaft

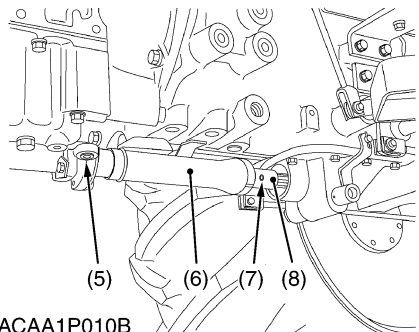
1. Slide the propeller shaft cover (1), (6) after removing the screws (5).
2. Tap out the spring pin (4), (7) and then slide the coupling (3), (8) to the front and rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (2).

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

(CABIN)
0000002408E

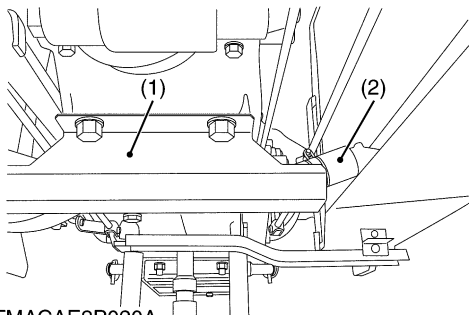


Fuel Tank Connection Hose

1. Remove the hose cover (1).
2. Remove the connection hose (2).

- | | |
|----------------|---------------------|
| (1) Hose Cover | (2) Connection Hose |
|----------------|---------------------|

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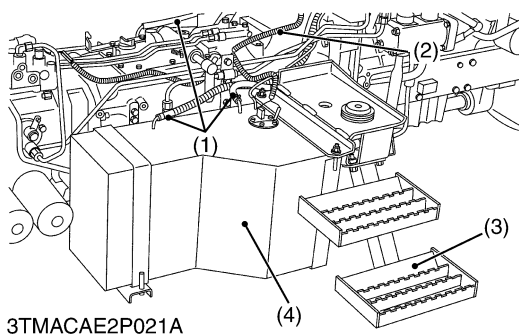


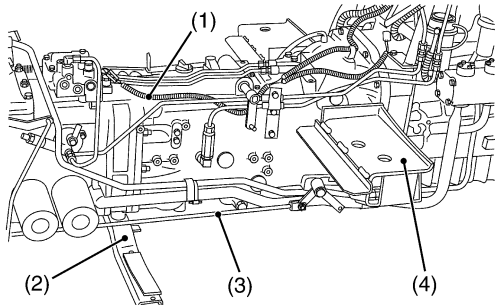
Auxiliary Step and Fuel Tank

1. Remove the auxiliary steps (3).
2. Disconnect the wire harness (2).
3. Disconnect the fuel return hoses (1).
4. Remove the fuel tanks (4).

- | | |
|----------------------|--------------------|
| (1) Fuel Return Hose | (3) Auxiliary Step |
| (2) Wire Harness | (4) Fuel Tank |

0000002600E





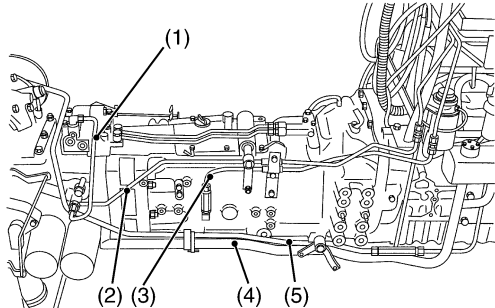
3TMACAE2P022A

Brake Rod, Cabin Support and Fuel Tank Support

1. Remove the brake rods (3).
2. Remove the cabin supports (4).
3. Remove the fuel tank supports (2).
4. Disconnect the wire harness (1).

- | | |
|-----------------------|-------------------|
| (1) Wire Harness | (3) Brake Rod |
| (2) Fuel Tank Support | (4) Cabin Support |

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3TMACAE2P025A

Hydraulic Pipes

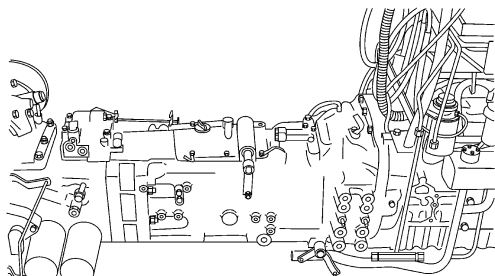
1. Remove the suction pipe (4).
2. Remove the delivery pipe (5).
3. Remove the return pipe (3) with relief valve.
4. Remove the shuttle pipe (1).
5. Remove the PTO pipe (2).

(When reassembling)

Tightening torque	Delivery pipe retaining nut	108 to 117 N-m 11.0 to 12.0 kgf-m 79.6 to 86.8 ft-lbs
	Return pipe retaining nut	49.0 to 68.6 N-m 5.0 to 7.0 kgf-m 36.2 to 50.6 ft-lbs
	Shuttle pipe retaining nut	49.0 to 68.6 N-m 5.0 to 7.0 kgf-m 36.2 to 50.6 ft-lbs

- | | |
|------------------|-------------------|
| (1) Shuttle Pipe | (4) Suction Pipe |
| (2) PTO Pipe | (5) Delivery Pipe |
| (3) Return Pipe | |

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3TMACAE3P024A

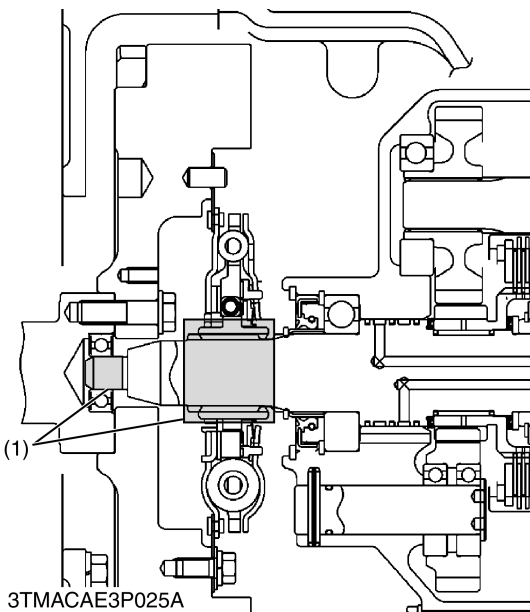
Separating Engine from Clutch Housing

1. Remove the engine mounting screws and nuts, and separate the engine from the clutch housing.

(When reassembling)

- Apply molydenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Apply liquid gasket (Three Bond 1211, 1141 or equivalent) to the seam of engine and clutch housing.
- When connecting the engine to the clutch housing, be sure to align the input shaft spline to the clutch hub center.

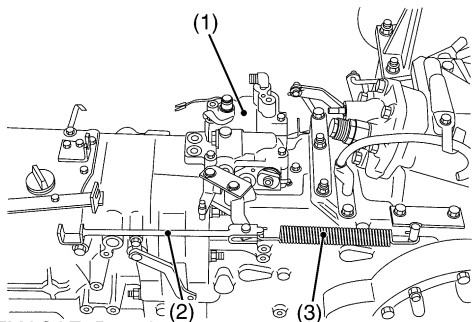
Tightening torque	Engine and clutch housing mounting screw, nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
	Engine and clutch housing mounting stud bolt	38.2 to 45.1 N-m 3.9 to 4.6 kgf-m 28.2 to 33.3 ft-lbs



3TMACAE3P025A

(1) Greasing Point

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3TMACAE2P023A

Shuttle Valve

1. Remove the return spring (3).
2. Remove the clutch rod (2).
3. Remove the shuttle valve assembly (1).

(When reassembling)

- Apply oil to the O-ring (4).
- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the shuttle valve assembly and transmission case.
- Be sure to spring direction.

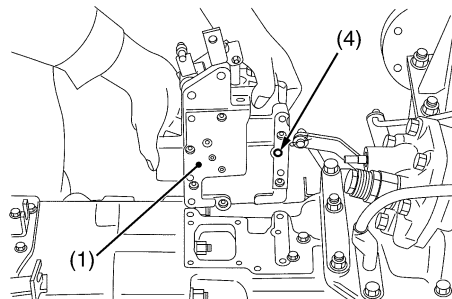
(1) Shuttle Valve Assembly

(3) Return Spring

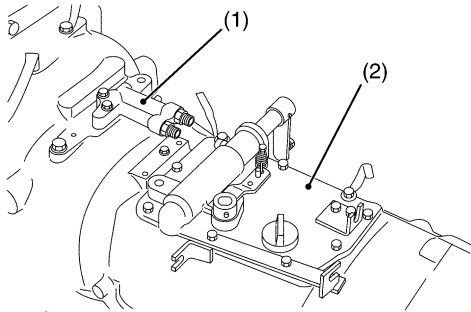
(2) Clutch Rod

(4) O-ring

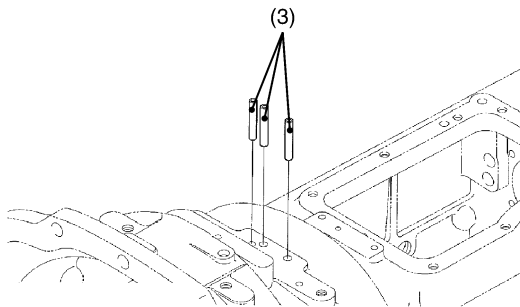
000002603E



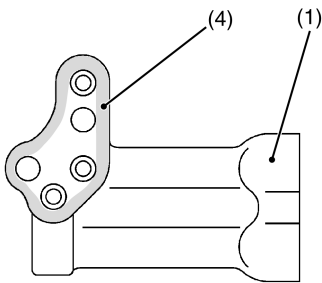
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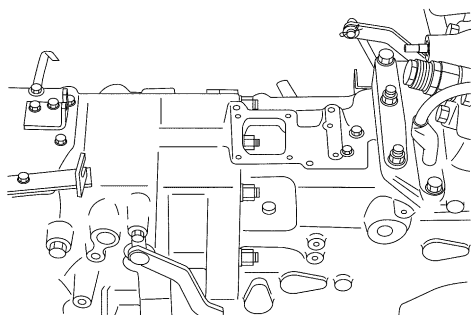
3TMACAE3P026A



3TMACAE3P027A



3TMACAE3P028A



3TMACAE2P011A

Shuttle Valve Base

1. Remove the shuttle valve base (1).
2. Remove the speed change cover (2).

(When reassembling)

- Replace the oil pipes (3) with new ones.
- When reassembling the speed change cover (2), set the shifter and fork in neutral position.
- Apply liquid gasket (Three 1216 or equivalent) to joint face of shuttle valve base and transmission case.

Tightening torque	Speed change cover mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft·lbs
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- (1) Shuttle Valve Base
- (2) Speed Change Cover
- (3) Oil Pipe
- (4) Liquid Gasket

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Separating Transmission Case

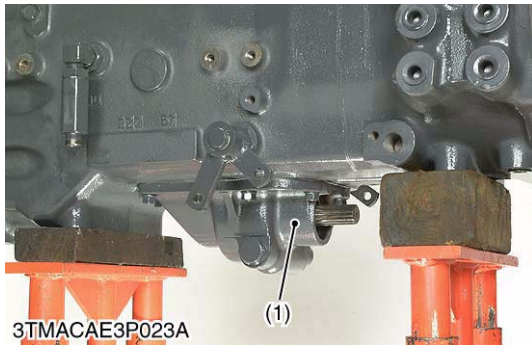
1. Remove the transmission case mounting screws and nut, and separate the transmission case from the clutch housing.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the transmission case and clutch housing, transmission upper cover and transmission case.

Tightening torque	Transmission case and clutch housing mounting screws, nut	M12, grade 9 nut	103.0 to 117.7 N·m 10.5 to 12.0 kgf·m 75.9 to 86.8 ft·lbs
		M12, grade 7 screws	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 ft·lbs
		M10, grade 9 nut	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 44.8 to 52.1 ft·lbs

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DT Gear Case

1. Remove the DT Gear Case (1).

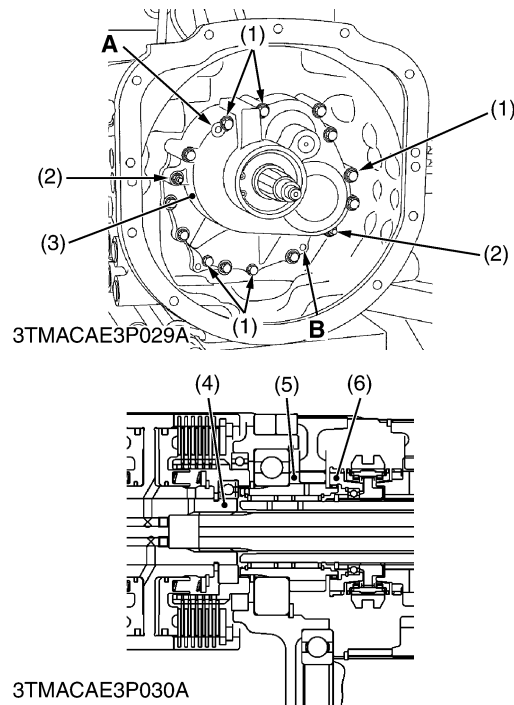
(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the clutch housing and DT gear case.

- (1) DT Gear Case

(CABIN)
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(D) Disassembling Shuttle Case



Shuttle Case Assembly

1. Remove the screws (1) and nut (2).
2. Remove the shuttle case assembly (3) by screwing M8 x Pitch 1.25 screws into holes A and B.

(When reassembling)

■ **IMPORTANT**

- Apply oil to the O-ring.
- When assemble the shuttle case to the clutch housing case, be sure to align the 21T gear (5) to coupling (6) securely by turning the input shaft (4).

Tightening torque	Shuttle case mounting screw M8 grade 9	29.4 to 34.3 N-m 3.0 to 3.5 kgf-m 21.7 to 25.3 ft-lbs
	Shuttle case mounting nut	23.5 to 27.5 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs

- | | |
|---------------------------|-----------------|
| (1) Screw | (4) Input Shaft |
| (2) Nut | (5) 21T Gear |
| (3) Shuttle Case Assembly | (6) Coupling |

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Disassembling Shuttle Case Assembly

1. Remove the screw (1).
2. Separating the shuttle case 1 (3) and shuttle case 2 (2) by screwing M8 x Pitch 1.25 screws into holes **A** and **B**.
3. Remove the external snap ring (5) and internal snap ring (6).
4. Remove the oil seal (7) and internal snap ring (8).
5. Tap out the input shaft (12) with shuttle clutch pack (13).
6. Remove the spring pin (4).
7. Tap out the idle shaft (11) with 25T gear (16).
8. Remove the 31T gear (17) with bearing (18).

(When reassembling)

- Apply grease to the sleeve (9).
- Replace the oil seal (7) with a new one.
- Take care of direction of the oil seal (7).
- Apply grease to the oil seal (7) and seal ring (15).
- Apply transmission fluid to the bearing.
- Replace the sleeve (9) with a new one and be sure to install sleeve as shown figure.
- Apply liquid gaskets (Three Bond 1216 or equivalent) to joint face of the shuttle case 1 (3) and shuttle case 2 (2).

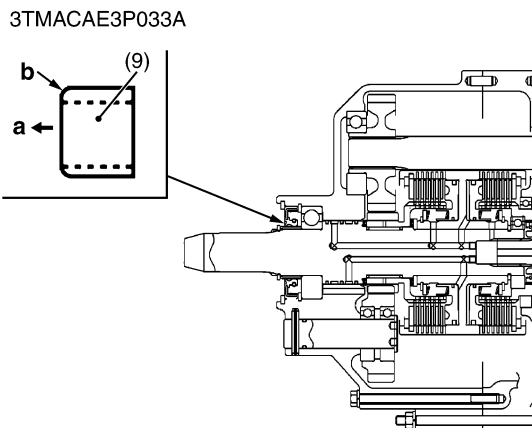
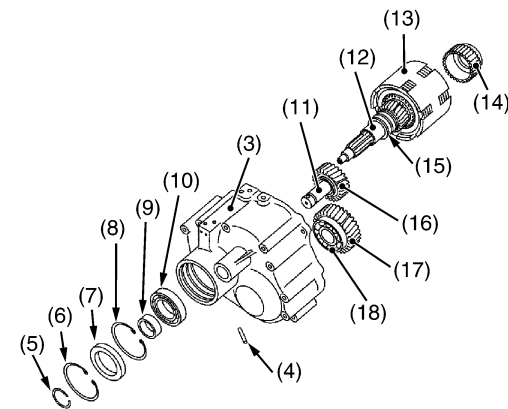
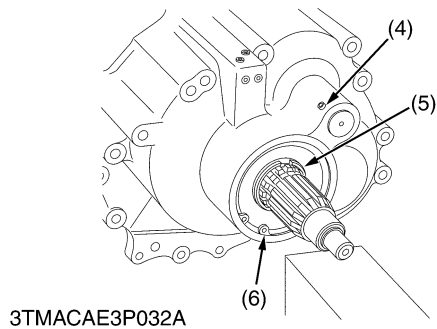
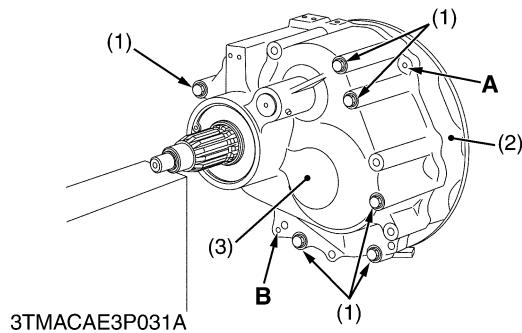
■ **NOTE**

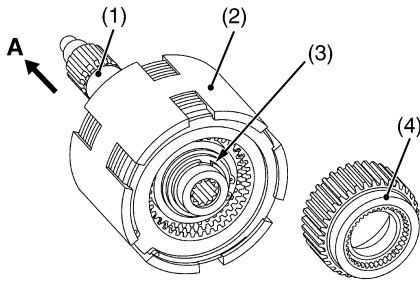
- **Do not get in the seal ring (15) between input shaft (12) and shuttle case 1 (3).**

Tightening torque	Shuttle case mounting screw M8 grade 9	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 21.7 to 25.3 ft·lbs
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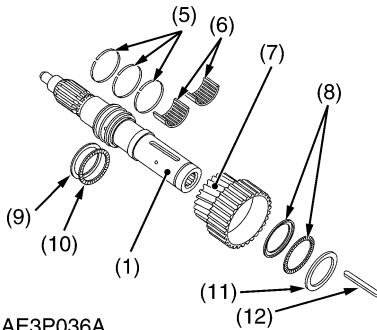
- | | |
|------------------------|--------------------------|
| (1) Screw | (11) Idle Shaft |
| (2) Shuttle Case 2 | (12) Input Shaft |
| (3) Shuttle Case 1 | (13) Shuttle Clutch Pack |
| (4) Spring Pin | (14) Coupling |
| (5) External Snap Ring | (15) Seal Ring |
| (6) Internal Snap Ring | (16) 25T Gear |
| (7) Oil Seal | (17) 31T Gear |
| (8) Internal Snap Ring | (18) Bearing |
| (9) Sleeve | a : Front Side |
| (10) Bearing | b : Rounded Edge |

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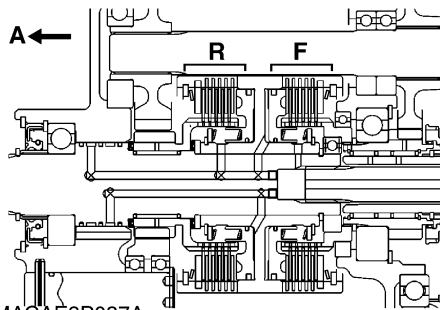




3TMACAE3P035A



3TMACAE3P036A



3TMACAE3P037A

Shuttle Clutch Assembly

1. Remove the coupling (4) with bearing.
2. Remove the external snap ring (3).
3. Tap out the input shaft (1) to the front side **A**.
4. Remove the key (12) and other part (see figure.).

(When reassembling)

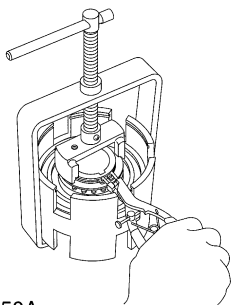
- Apply transmission fluid to the needle bearing (6) and thrust needle bearing (8), (10).
- Do not interchange the thrust collar and thrust needle bearing.
- Do not get in the thrust needle bearing (8) between thrust collar (9) and input shaft (1).
- Attach the allen plug surely when you replace the new input shaft.

■ **IMPORTANT**

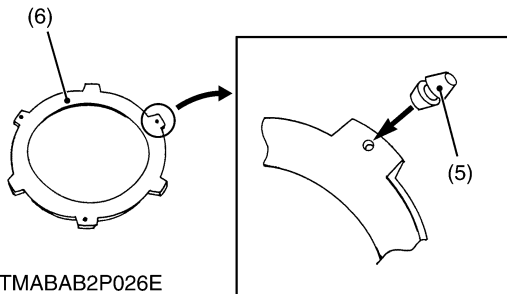
- **Do not interchange the clutch assembly between F and R side. Therefore, put a mark on the clutch disc and plate before disassembling.**

- | | |
|-------------------------|----------------------------|
| (1) Input Shaft | (8) Thrust Needle Bearing |
| (2) Shuttle Clutch Pack | (9) Thrust Collar |
| (3) External Snap Ring | (10) Thrust Needle Bearing |
| (4) Coupling | (11) Thrust Collar |
| (5) Seal Ring | (12) Key |
| (6) Needle Bearing | A : Front Side |
| (7) 20T Gear | |

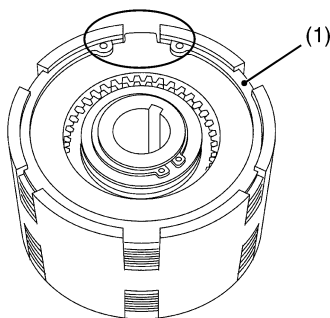
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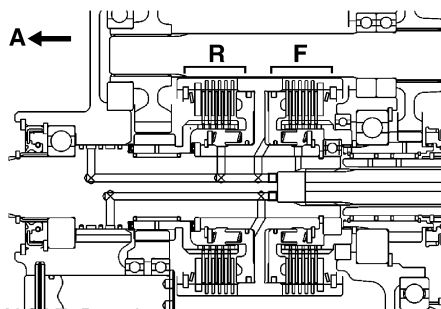
3TMACAD3P050A



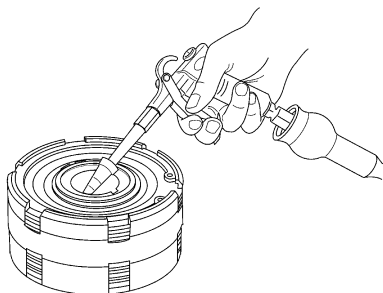
3TMABAB2P026E



3TMACAD3P051A



3TMACAE3P037A



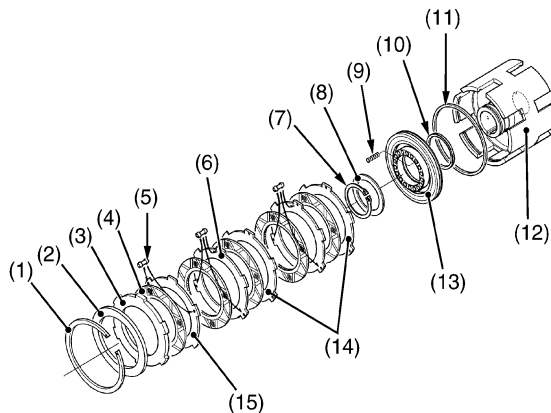
3TMACAD3P053A

Shuttle Clutch Pack

1. Remove the internal snap ring (1), and then take out the pressure plate (3), the clutch discs (4) and steel plates (6) and (14).
2. Remove the external snap ring (7) using a shuttle clutch compression tool (see page G-49), and take out the springs (9) and piston (13).

(When reassembling)

- When installing the internal snap ring (1) to the clutch body, align its split portion to the notched portion of clutch body.
- Replace the D-ring (11) with new one.
- Apply transmission fluid to the D-ring (11), and take care not to damage it.
- Install 2 pieces of thin steel plate to the piston side. If there is the 3 pieces thin steel plate, the 3rd thin steel plate is put in to the internal snap ring (1) side.
- Assemble the steel plates with rubber (5) and steel plates without rubber (14) alternately, and steel plates are built in so that the part of rubber is not corresponding to the part of the hole.
- Build in outside plate (15) with rubber of plate (6) so as not to come in succession.
- Thing to attach belleville spring (2) in the direction of figure.
- Confirm the moving of the piston (13) smoothly when pressure air at 0.5 to 0.6 MPa (5 to 6 kgf/cm², 72.5 to 87 psi) is sent to clutch pack.

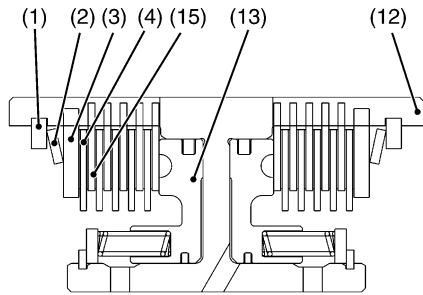


3TMACAE3P038A

- | | |
|-------------------------------|-----------------------------------|
| (1) Internal Snap Ring | (10) O-ring |
| (2) Belleville Spring | (11) D-ring |
| (3) Pressure Plate | (12) Clutch Body |
| (4) Clutch Disc | (13) Piston |
| (5) Rubber | (14) Steel Plate (without rubber) |
| (6) Steel Plate (with rubber) | (15) Steel Plate (with rubber) |
| (7) External Snap Ring | A : Front Side |
| (8) Thrust Collar | R : R Side |
| (9) Spring | F : F Side |

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Shuttle Clutch Pack (Continued)

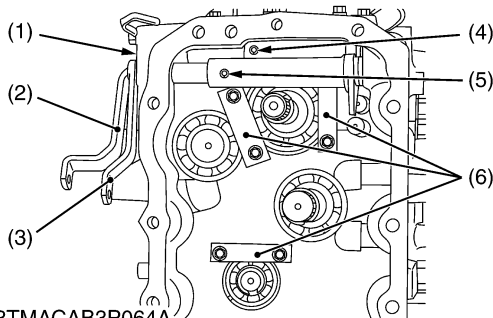


- (1) Internal Snap Ring
- (2) Belleville Spring
- (3) Pressure Plate
- (4) Clutch Disc
- (12) Clutch Body
- (13) Piston
- (15) Steel Plate (with rubber)

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3TMACAE3P039A

(E) Disassembling Clutch Housing



3TMACAB3P064A

Shift Levers and Bearing Retainer

1. Remove the shift lever stopper (1).
2. Tap out the spring pin (4) from Creep shift lever (2).
3. Draw out the Creep shift lever (2).
4. Tap out the spring pin (5) from Hi-Low shift lever (3).
5. Draw out the Hi-Low shift lever (3).
6. Remove the bearing retainers (6).

(When reassembling)

- Apply grease to the O-ring.

Tightening torque	Bearing retainer mounting screw	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 21.7 to 25.3 ft-lbs
-------------------	---------------------------------	---

- (1) Stopper
- (2) Shift Lever (Creep)
- (3) Shift Lever (Hi-Low)
- (4) Spring Pin
- (5) Spring Pin
- (6) Bearing Retainer

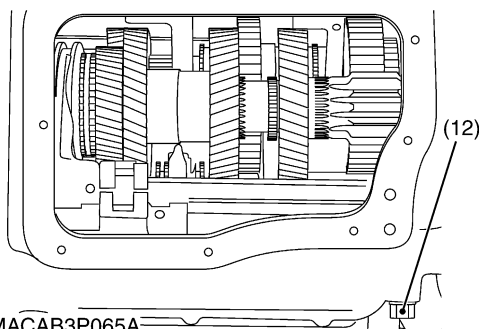
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Shift Rods and Forks (1-2), (3-4)

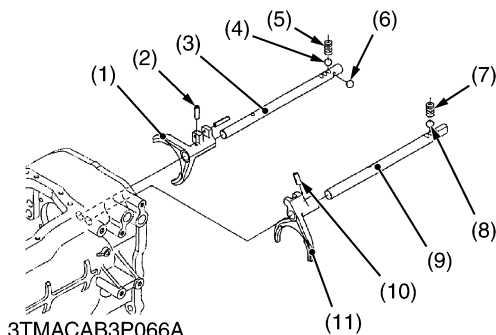
1. Remove the lock screw (12), and take out the springs (5), (7) and balls (4), (8).
2. Tap out the spring pins (2), (10) from shift forks (1) and (11).
3. Draw out the shift rod (3) and (9).
4. Take out the shift forks (1) and (11).

(When reassembling)

- Apply grease to the ball and spring.
- Take care of installing the inter-locking ball (6).
- Apply liquid lock (Three Bond 1372 or equivalent) to the lock screws (12).



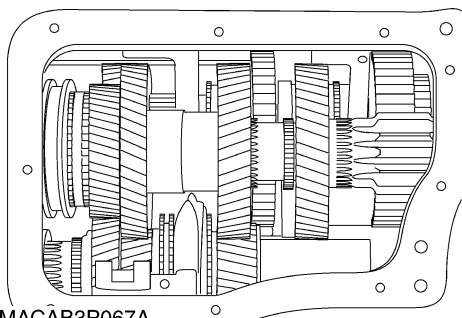
3TMACAB3P065A



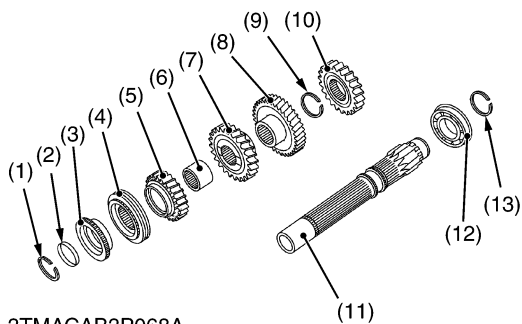
3TMACAB3P066A

- (1) Shift Fork (1-2)
- (2) Spring Pin
- (3) Shift Fork Rod (1-2)
- (4) Ball
- (5) Spring
- (6) Inter-locking Ball
- (7) Spring
- (8) Ball
- (9) Shift Fork Rod (3-4)
- (10) Spring Pin
- (11) Shift Fork (3-4)
- (12) Lock Screw

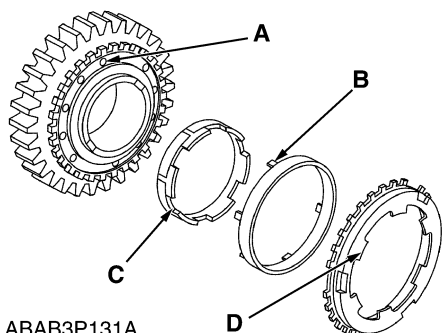
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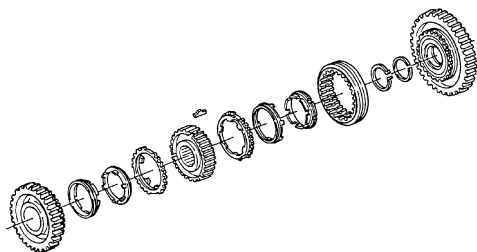
3TMACAB3P067A



3TMACAB3P068A



3TLABAB3P131A



3TMACAB3P051B

2nd Shaft

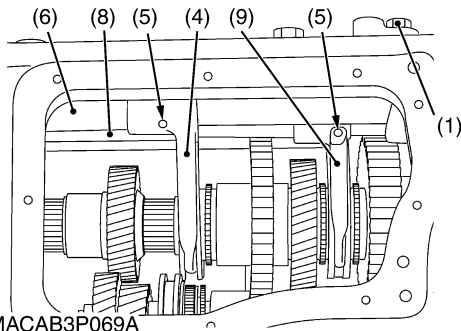
1. Remove the external snap ring (1).
2. Tap out the 2nd shaft (11) to the rear.
3. Remove the external snap ring (9) with tap out the 2nd shaft (11) to the rear.

(When reassembling)

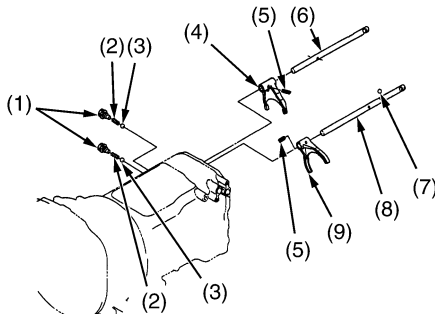
- Install the protrusion portion (B) of the center rings to the holes (A) of the gear firmly. (Refer to the figure left.)
- Install the protrusion portion (D) of the outer synchronizer rings to the grooves (C) of the inner synchronizer rings. (Refer to the figure left.)
- Install the synchronizer keys in the key groove of the outer synchronizer rings firmly.

- | | |
|------------------------|--|
| (1) External Snap Ring | (12) Bearing |
| (2) Collar | (13) External Snap Ring |
| (3) Holder | |
| (4) Synchronizer | (A) Holes of the gear |
| (5) 23T Gear | (B) Protrusion portions of the center ring |
| (6) Inner Ring | (C) Grooves of the inner synchronizer ring |
| (7) 24T Gear | (D) Protrusion portion of the outer synchronizer ring |
| (8) 36T Gear | |
| (9) External Snap Ring | |
| (10) 29T Gear | |
| (11) 2nd Shaft | |

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3TMACAB3P069A



3TMACAB3P070A

Shift Fork H-L, C and Shift Fork Rod H-L, C

1. Remove the lock screws (1) and take out the springs (2) and balls (3).
2. Tap out the spring pin (5).
3. Draw out the shift rod (6) and (8).
4. Take out the shift fork (4) and shift fork (9).

(When reassembling)

- Apply grease to the ball and spring.
- Take care of installing the inter-locking ball (7).
- Apply liquid lock (Three Bond 1372 or equivalent) to the lock screws (1).

- | | |
|------------------------|-------------------------|
| (1) Lock Screw | (6) Shift Rod (Creep) |
| (2) Spring | (7) Inter-locking Ball |
| (3) Ball | (8) Shift Rod (Hi-Low) |
| (4) Shift Fork (Creep) | (9) Shift Fork (Hi-Low) |
| (5) Spring Pin | |

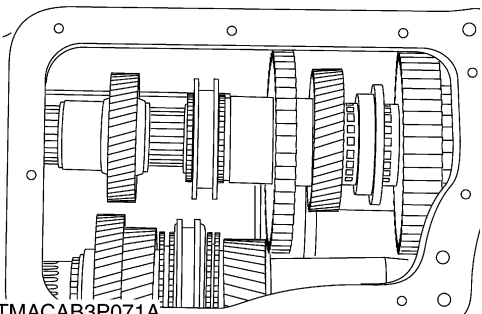
000002756E

1st Shaft

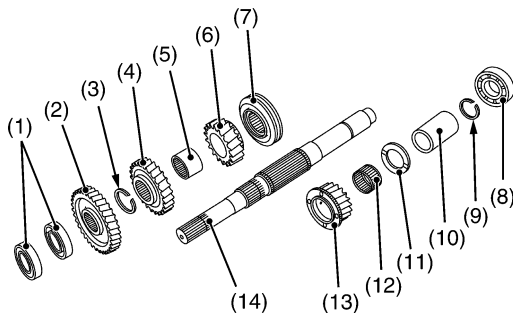
1. Tap out the 1st shaft to the front with gears.

- | | |
|------------------------|------------------------|
| (1) Ball Bearing | (8) Ball Bearing |
| (2) 34T Gear | (9) External Snap Ring |
| (3) External Snap Ring | (10) Collar |
| (4) 25T Gear | (11) Thrust Collar |
| (5) Inner Ring | (12) Needle Bearing |
| (6) 17T Gear | (13) 19T Gear |
| (7) Synchronizer | (14) 1st Shaft |

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3TMACAB3P071A



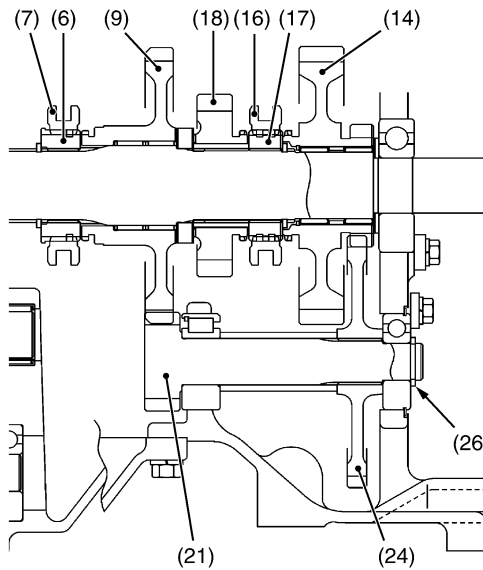
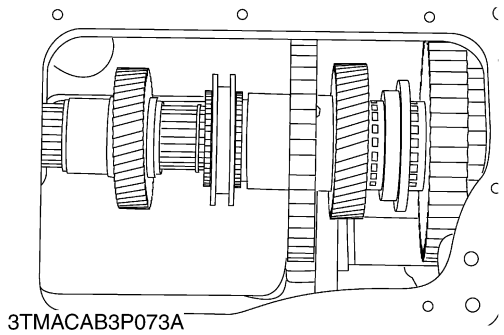
3TMACAB3P072A

Creep Gear and 3rd Shaft

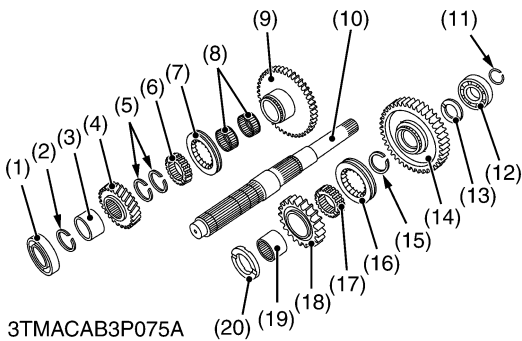
1. Tap out the 3rd shaft (10) with gears to the front.
2. Remove the external snap ring (26).
3. Tap out the 15T gear shaft (21).
4. Take out the 43T gear (24) and collar (23).

- | | |
|-------------------------|-------------------------|
| (1) Ball Bearing | (14) 41T-19T Gear |
| (2) External Snap Ring | (15) External Snap Ring |
| (3) Collar | (16) Shifter |
| (4) 26T Gear | (17) Hub |
| (5) External Snap Ring | (18) 23T Gear |
| (6) Hub | (19) Inner Ring |
| (7) Shifter | (20) Spacer |
| (8) Needle Bearing | (21) 15T Gear Shaft |
| (9) 47T Gear | (22) Ball Bearing |
| (10) 3rd Shaft | (23) Collar |
| (11) External Snap Ring | (24) 43T Gear |
| (12) Ball Bearing | (25) Ball Bearing |
| (13) Thrust Collar | (26) External Snap Ring |

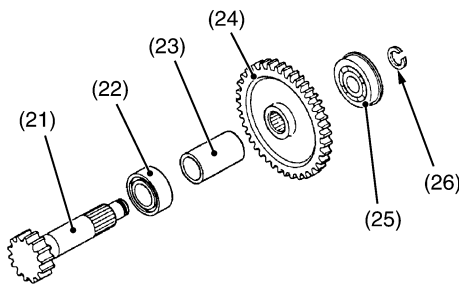
000002758E



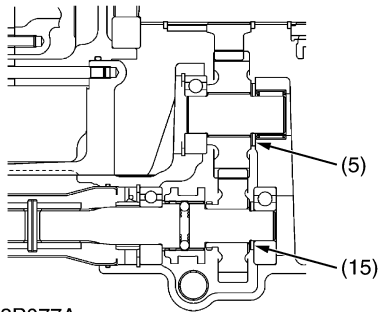
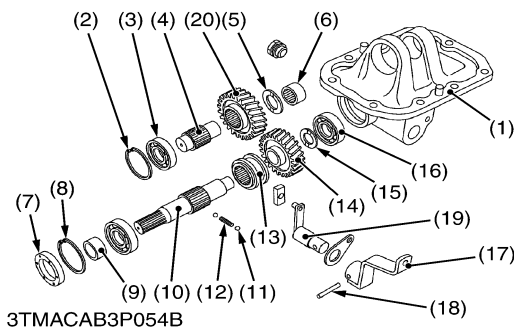
3TMACAB3P074A



3TMACAB3P075A



3TMACAB3P076A



Front Drive Shaft

1. Remove the gear case (1) from the clutch housing.
2. Remove the internal snap ring (2), and tap out the idle shaft (4).
3. Remove the oil seal (7) and internal snap ring (8).
4. Draw out the front drive shaft (10).
5. Remove the spring pin (18) and draw out the lever (17).
6. Draw out the shift lever (19).

■ **NOTE**

- **Take care not to fly out the balls (11) and spring (12) when take out the shifter (13).**

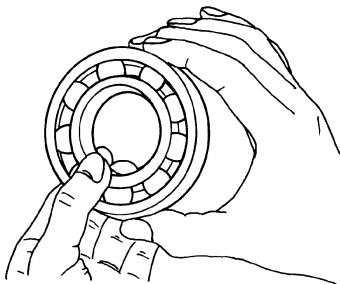
(When reassembling)

- Direct the grooved side of the thrust collars (5) and (15) to the gear side.

- | | |
|------------------------|--------------------|
| (1) Gear Case | (11) Ball |
| (2) Internal Snap Ring | (12) Spring |
| (3) Bearing | (13) Shifter |
| (4) Idle Shaft | (14) 22T Gear |
| (5) Thrust Collar | (15) Thrust Collar |
| (6) Sleeve | (16) Bearing |
| (7) Oil Seal | (17) Lever |
| (8) Internal Snap Ring | (18) Spring Pin |
| (9) Sleeve | (19) Shift Lever |
| (10) Front Drive Shaft | (20) 25T Gear |

000002759E

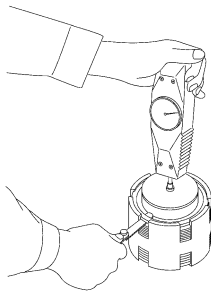
(2) Servicing



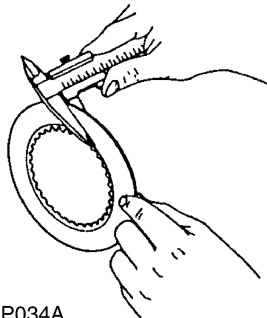
Checking Bearing

1. Hold the inner race, and push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then, turn the outer race to check rotation.
3. If there is any defect, replace it.

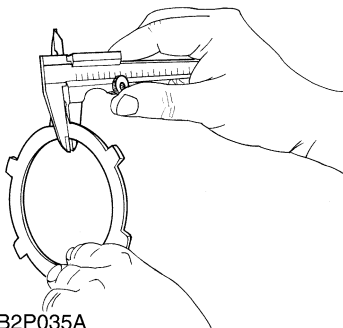
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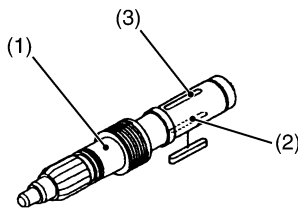
3TMACAD3P069A



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3TMABAB2P035A



3TMACAE3P040A

Clearance between Internal Snap Ring and Pressure Plate

1. Measure the clearance between internal snap ring and pressure plate with a thickness gauge while applying the specified force. Specified force : 196 to 245 N (20 to 25 kgf, 44.1 to 55.1 lbs).
2. Several places are measured, and the smallest value is assumed to be clearance.
3. If the clearance exceeds the allowable limit, measure the thickness of clutch disc and steel plate with vernir calipers.
4. If the thickness is less than the allowable limit, replace it.
5. If the clearance is not within the allowable limit, adjust the clearance by clutch disc combiration.

■ **NOTE**

- The adjustment value of the clearance is different according to the shape of input shaft which assembles the shuttle clutch.
- There is an oil groove (3) in input shaft (1) on the opposite side of the key way (2).
- Measure the R side first to decide the value of F side by R side.
- Clearance between internal snap ring and pressure plate is adjusted by two kinds of clutch disc with different thickness. Therefore, use the one of the same thickness when you change clutch disc.

Clearance between internal snap ring and pressure plate	Factory spec.	R side (F side)	1.9 to 2.1 mm 0.075 to 0.083 in.
		F side (R side)	R side (F side) -0.1 mm (0.004 in.) to R side (F side) +0.1 mm (0.004 in.)
	Allowable limit	3.6 mm (0.142 in.)	

(Reference)

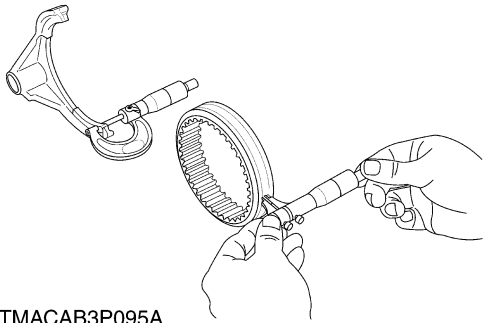
- There are two kinds of thickness of clutch disc.

Steel plate (Code No. 3A051-23110)	Factory spec.	1.75 to 1.85 mm 0.069 to 0.072 in.
Pressure plate (Code No. 3A051-23050)	Factory spec.	3.92 to 4.08 mm 0.154 to 0.161 in.
Clutch disc (Code No. 3A051-23130)	Factory spec.	2.25 to 2.35 mm 0.089 to 0.093 in.
Clutch disc (Code No. 3A051-23030)	Factory spec.	2.35 to 2.45 mm 0.093 to 0.096 in.

- (1) Input Shaft
- (2) Key Way

- (3) Oil Groove

000002761E



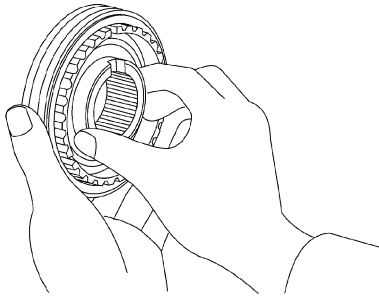
3TMACAB3P095A

Clearance between Shift Fork and Shifter Groove

1. Measure the width of shift fork.
2. Measure the shifter groove width, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

Clearance between shift fork and shifter groove	Factory spec.	0.15 to 0.40 mm 0.0059 to 0.0157 in.
	Allowable limit	0.80 mm 0.031 in.

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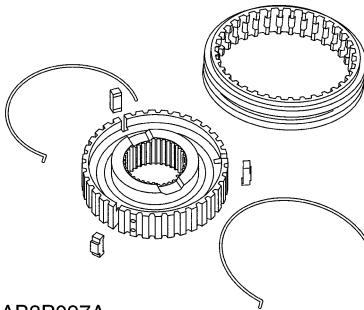


3TMACAB3P096A

Checking Contact between Coupling and Shifter

1. Check to see if there is flaw or wear on the spline of the coupling and shifter, and the key groove on the coupling.
2. Engage the shifter with the coupling, and check that they slide smoothly.
3. Similarly, check that there is any flaw or wear on the gear splines.
4. If there is any defect, replace them.

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3TMACAB3P097A

Flaw on Synchronizer Key and Spring

1. Check the projection in the center of the synchronizer key for wear.
2. Check the spring for fatigue or wear on the area where the spring contacts with the keys.
3. If there is any defect, replace them.

000002764E

[2] TRANSMISSION CASE

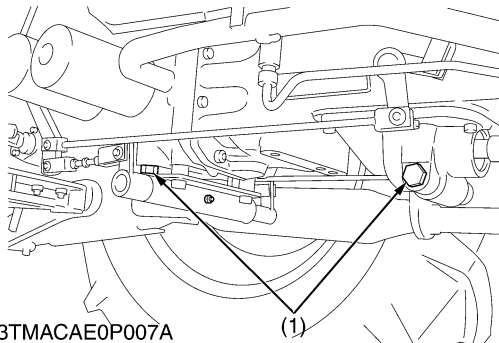
(1) Disassembling and Assembling

NOTE

- Before proceeding this section, dismantling the cabin assembly. (See page 10-S24 to S29.)

000002595E

(A) Draining the Transmission Fluid and Fuel



Draining Transmission Fluid

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

(When reassembling)

- Fill up from filling port after removing the filling plug until reaching the gauge.
- After running the engine for a few minutes, stop it and check the fluid level again, add fluid to prescribed level if it is not correct level.

Transmission fluid	Capacity	ROPS	40.0 L 42.3 U.S.qts 35.2 Imp.qts
		CABIN	43.0 L 45.4 U.S.qts 37.8 Imp.qts

IMPORTANT

- Use only KUBOTA UDT or SUPER UDT fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)
- Do not mix difference brands oil together.

(1) Drain Plug

000002389E



Draining Fuel (CABIN Type)

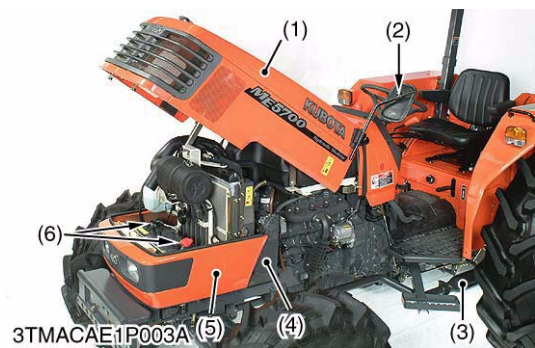
1. Place oil pans under the fuel tank.
2. Remove the drain plugs (1).
3. Drain the fuel.
4. Reinstall the drain plugs (1).

Fuel	Capacity	95 L 25.1 U.S.gals 20.9 Imp.gals
------	----------	--

(1) Draining Plug

000002722E

(B) Separating Engine and Clutch Housing Case (ROPS Type)



Muffler and Bonnet

1. Remove the muffler (3).
2. Remove the bonnet (1) with mirror (2).
3. Disconnect the battery's cable (6).
4. Remove the side covers (4).
5. Disconnect the head light 3P connectors.
6. Remove the front lower cover (5).

- | | |
|-------------|-----------------------|
| (1) Bonnet | (4) Side Cover |
| (2) Mirror | (5) Front Lower Cover |
| (3) Muffler | (6) Battery Cable |

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Rear Wheels, Fenders and 3-Point Linkage

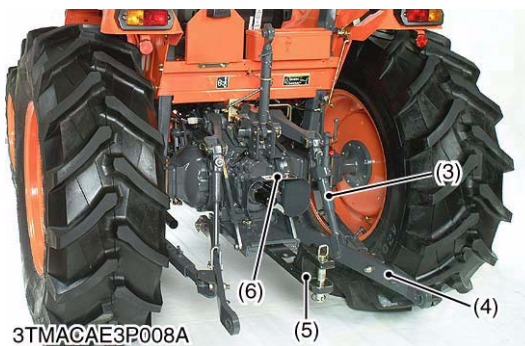
1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Remove the rear wheels (2).
3. Disconnect the jumper leads for hazard and tail light.
4. Disconnect the jumper leads for PTO safety switch.
5. Remove the fenders (1).
6. Remove the lift rods (3).
7. Remove the lower link (4) with stabilizer.
8. Remove the drawbar (5).
9. Remove the PTO shaft cover (6).

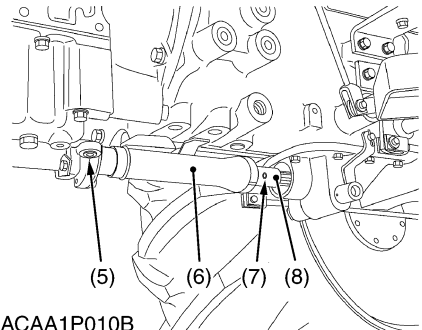
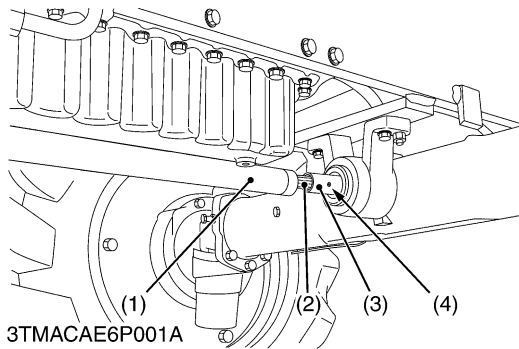
(When reassembling)

Tightening torque	Rear wheel mounting nut	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
-------------------	-------------------------	---

- | | |
|----------------|---------------------|
| (1) Fender | (4) Lower Link |
| (2) Rear Wheel | (5) Drawbar |
| (3) Lift Rod | (6) PTO Shaft Cover |

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Propeller Shaft

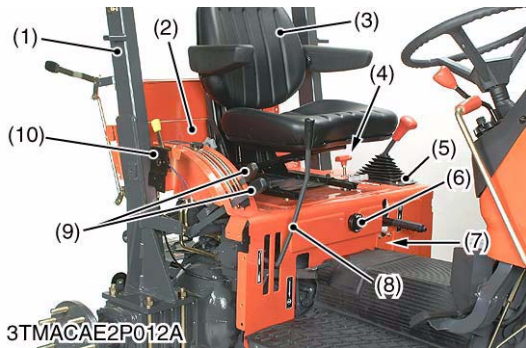
1. Slide the propeller shaft cover (1), (6) after removing the screws (5).
2. Tap out the spring pin (4), (7) and then slide the coupling (3), (8) to the front and rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (2).

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

(ROPS)
0000001895E



ROPS, Seat and Center Frame

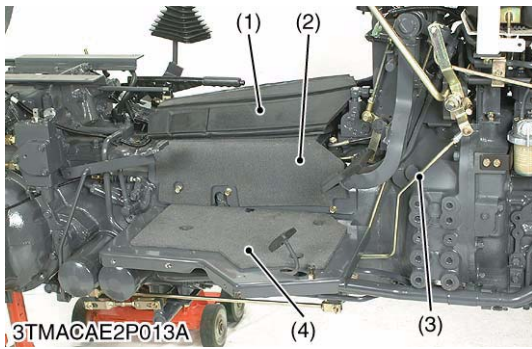
1. Remove the seat (3).
2. Remove the draft and position control lever grips (9).
3. Remove the auxiliary speed change control lever plate (5).
4. Remove the DT shift lever grip (4) and 3-point hitch lowering speed control grip (6).
5. Remove the plate (7).
6. Remove the auxiliary control valve lever assembly (8).
7. Remove the ROPS (1).
8. Remove the PTO clutch lever assembly (10).
9. Remove the center frame (2).

(When reassembling)

Tightening torque	ROPS mounting screw M16 grade 9	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft·lbs
	ROPS mounting screw 1/4 grade 5	8.1 to 9.5 N·m 0.83 to 0.97 kgf·m 5.97 to 7.00 ft·lbs
	ROPS mounting screw 3/8 grade 8	47.0 to 53.9 N·m 4.8 to 5.5 kgf·m 34.7 to 39.8 ft·lbs
	ROPS mounting screw 9/16 grade 8	149.0 to 179.3 N·m 15.2 to 18.3 kgf·m 109.9 to 132.3 ft·lbs

- | | |
|--|---|
| (1) ROPS | (6) 3-Point Hitch Lowering Speed Control Grip |
| (2) Center Frame | (7) Plate |
| (3) Seat | (8) Auxiliary Control Valve Lever Assembly |
| (4) DT Shift Lever Grip | (9) Lever Grip |
| (5) Auxiliary Speed Change Control Lever Plate | (10) PTO Lever |

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Steps and Clutch Housing Cover

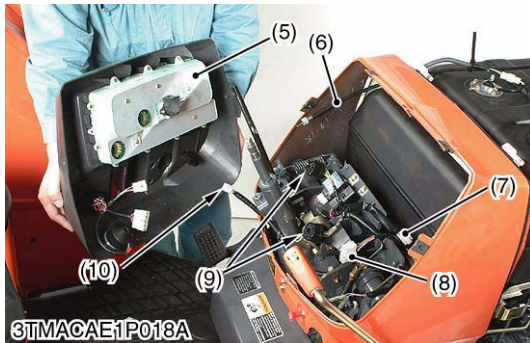
1. Disconnect the foot accelerator rod (3).
2. Remove the rubber mat (1).
3. Remove the clutch housing cover (2).
4. Remove the steps (4).
5. Disconnect the wire harness.

(When reassembling)

Tightening torque	Step mounting nut	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft-lbs
	Step mounting screw (M16)	117.7 to 147.1 N·m 12.0 to 15.0 kgf·m 86.8 to 108.5 ft-lbs

- | | |
|--------------------------|---------------------|
| (1) Rubber Mat | (3) Accelerator Rod |
| (2) Clutch Housing Cover | (4) Step |

000002584E

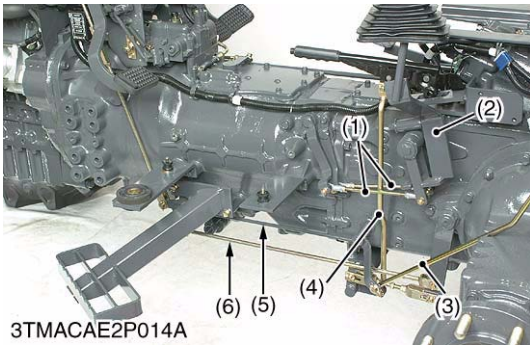


Steering Wheel, Meter Panel and Rear Bonnet

1. Remove the steering wheel (2) with a steering wheel puller (Code No. 07916-51090).
2. Remove the shuttle lever grip (1) and remove the shuttle lever guide (4).
3. Remove the main shift lever (3).
4. Remove the meter panel mounting screws and open the meter panel (5).
5. Disconnect the two connectors (9) and hour meter cable (6).
6. Disconnect the main switch connector (7), combination switch connector (8) and hazard switch connector (10).
7. Disconnect the engine stop cable (11) at the engine side.
8. Remove the rear bonnet (12) and shuttle valve cover (13).

- | | |
|---------------------------|----------------------------------|
| (1) Shuttle Lever Grip | (8) Combination Switch Connector |
| (2) Steering Wheel | (9) Connectors |
| (3) Main Shift Lever | (10) Hazard Switch Connector |
| (4) Shuttle Lever Guide | (11) Engine Stop Cable |
| (5) Meter Panel | (12) Rear Bonnet |
| (6) Hour Meter Cable | (13) Shuttle Valve Cover |
| (7) Main Switch Connector | |

000002414E



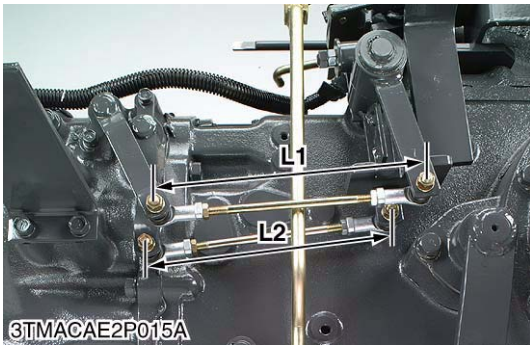
Auxiliary Shift Lever and Brake Rod

1. Disconnect the shift rods (1).
2. Remove the shift lever assembly (2).
3. Remove the brake rods (6).
4. Remove the DT rod (5).
5. Remove the parking brake rod (4).
6. Remove the DT shift rod (3).

(When reassembling)

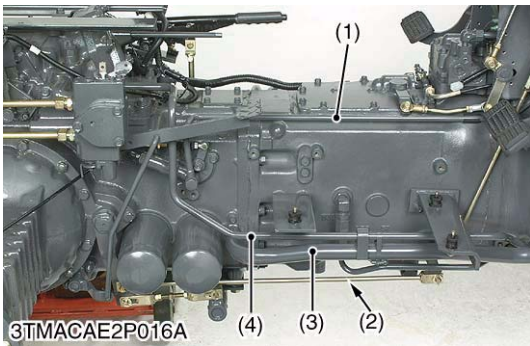
- Be sure to adjusting the shift rod.

Shift rod length L1 and L2	Factory spec.	Approx. 209 mm 8.23 in.
----------------------------	---------------	----------------------------



- | | |
|--------------------------|-----------------------|
| (1) Shift Rod | (4) Parking Brake Rod |
| (2) Shift Lever Assembly | (5) DT Rod |
| (3) DT Shift Rod | (6) Brake Rod |

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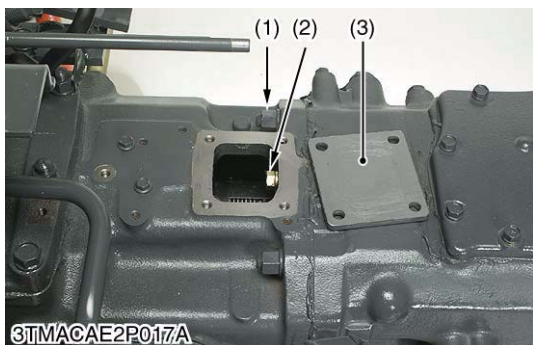


Hydraulic Pipes and Brake Rod

1. Remove the suction pipe (3).
2. Remove the delivery pipe (4) for the three point hydraulic system.
3. Remove the PTO pipe (1) from power steering controller.
4. Remove the brake rod (2).

- | | |
|---------------|-------------------|
| (1) PTO Pipe | (3) Suction Pipe |
| (2) Brake Rod | (4) Delivery Pipe |

000002586E



Separating Transmission Case

1. Remove the transmission upper cover (3).
2. Remove the transmission case mounting screws and nut, and separate the transmission case from the clutch housing.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the transmission case and clutch housing, transmission upper cover and transmission case.

Tightening torque	Transmission case and clutch housing mounting screw, nut	M12, grade 11 nut (1)	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs
		M12, grade 7 screw, nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
		M10, grade 9 screw (2)	60.8 to 70.6 N-m 6.2 to 7.2 kgf-m 44.8 to 52.1 ft-lbs

- (1) Transmission Case Mounting Nut (3) Transmission Upper Cover
- (2) Transmission Case Mounting Screw

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PTO Gear Case Assembly

1. Remove the PTO gear case (1) and PTO drive shaft as a unit.

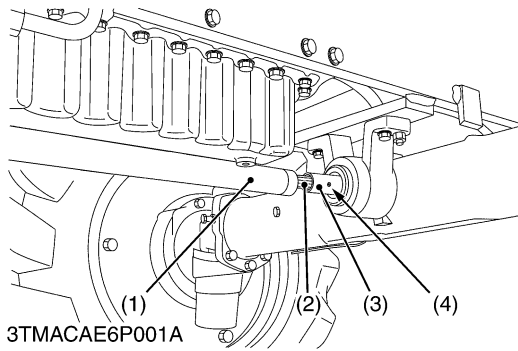
(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the PTO gear case and transmission case.

Tightening torque	PTO gear case mounting screws and reamer screws	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
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- (1) PTO Gear Case

(ROPS)
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Propeller Shaft

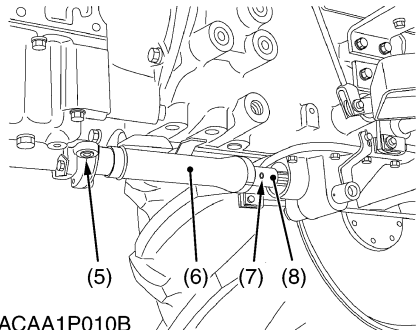
1. Slide the propeller shaft cover (1), (6) after removing the screws (5).
2. Tap out the spring pin (4), (7) and then slide the coupling (3), (8) to the front and rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (2).

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

(CABIN)
0000002408E

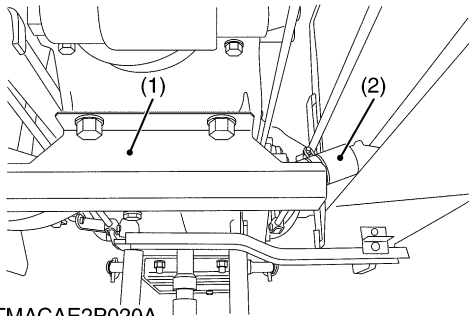


Fuel Tank Connection Hose

1. Remove the hose cover (1).
2. Remove the connection hose (2).

- | | |
|----------------|---------------------|
| (1) Hose Cover | (2) Connection Hose |
|----------------|---------------------|

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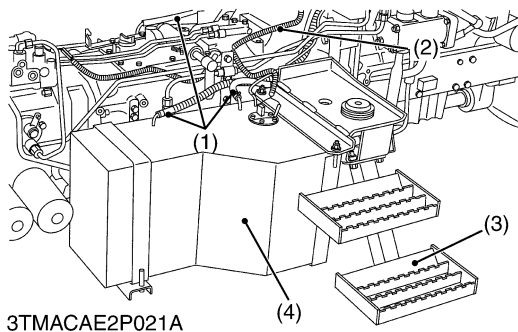


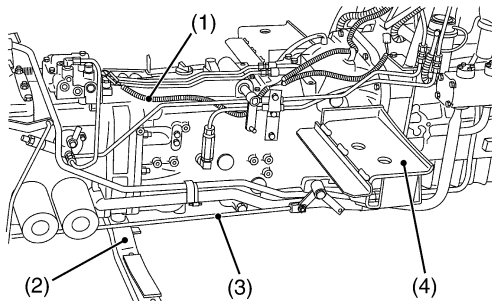
Auxiliary Step and Fuel Tank

1. Remove the auxiliary steps (3).
2. Disconnect the wire harness (2).
3. Disconnect the fuel return hoses (1).
4. Remove the fuel tanks (4).

- | | |
|----------------------|--------------------|
| (1) Fuel Return Hose | (3) Auxiliary Step |
| (2) Wire Harness | (4) Fuel Tank |

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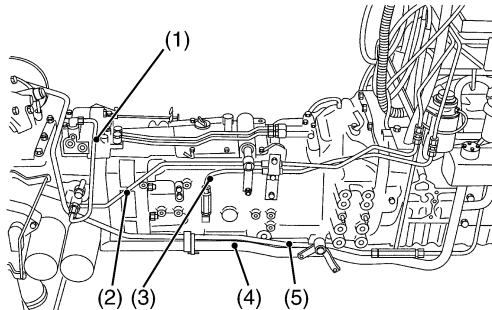
3TMACAE2P022A

Brake Rod, Cabin Support and Fuel Tank Support

1. Remove the brake rods (3).
2. Remove the cabin supports (4).
3. Remove the fuel tank supports (2).
4. Disconnect the wire harness (1).

- | | |
|-----------------------|-------------------|
| (1) Wire Harness | (3) Brake Rod |
| (2) Fuel Tank Support | (4) Cabin Support |

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Hydraulic Pipes

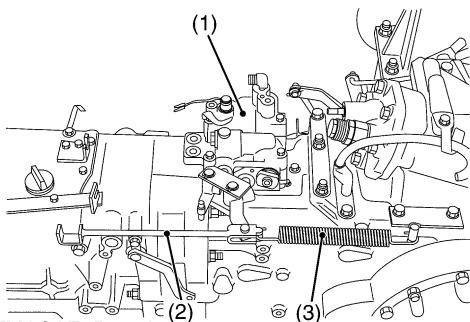
1. Remove the suction pipe (4).
2. Remove the delivery pipe (5).
3. Remove the return pipe (3) with relief valve.
4. Remove the shuttle pipe (1).
5. Remove the PTO pipe (2).

(When reassembling)

Tightening torque	Delivery pipe retaining nut	108 to 117 N-m 11.0 to 12.0 kgf-m 79.6 to 86.8 ft-lbs
	Return pipe retaining nut	49.0 to 68.6 N-m 5.0 to 7.0 kgf-m 36.2 to 50.6 ft-lbs
	Shuttle pipe retaining nut	49.0 to 68.6 N-m 5.0 to 7.0 kgf-m 36.2 to 50.6 ft-lbs

- | | |
|------------------|-------------------|
| (1) Shuttle Pipe | (4) Suction Pipe |
| (2) PTO Pipe | (5) Delivery Pipe |
| (3) Return Pipe | |

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Shuttle Valve

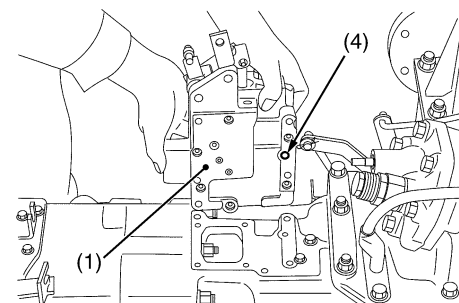
1. Remove the return spring (3).
2. Remove the clutch rod (2).
3. Remove the shuttle valve assembly (1).

(When reassembling)

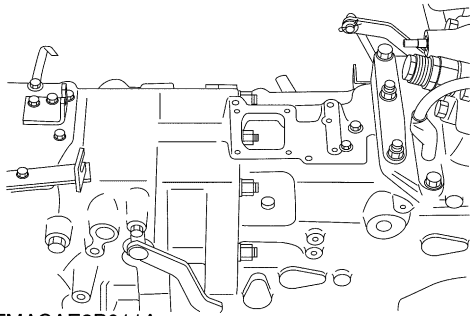
- Apply oil to the O-ring (4).
- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the shuttle valve assembly and transmission case.
- Be sure to spring direction.

- | | |
|----------------------------|-------------------|
| (1) Shuttle Valve Assembly | (3) Return Spring |
| (2) Clutch Rod | (4) O-ring |

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Separating Transmission Case

1. Remove the transmission case mounting screws and nut, and separate the transmission case from the clutch housing.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the transmission case and clutch housing, transmission upper cover and transmission case.

Tightening torque	Transmission case and clutch housing mounting screws, nut	M12, grade 9 nut	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs
		M12, grade 7 screws	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
		M10, grade 9 nut	60.8 to 70.6 N-m 6.2 to 7.2 kgf-m 44.8 to 52.1 ft-lbs

000002607E

PTO Gear Case Assembly

1. Remove the PTO gear case (1) and PTO drive shaft as a unit.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the PTO gear case and transmission case.

Tightening torque	PTO gear case mounting screws and reamer screws	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
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(1) PTO Gear Case



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(CABIN)

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Hydraulic Cylinder Assembly

1. Remove the delivery pipe.
2. Remove the hydraulic cylinder assembly mounting screws and nuts.
3. Support the hydraulic cylinder assembly with nylon lift strap and hoist, and take out it.
4. Remove the rear axle.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.
- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the rear axle case and transmission case.

Tightening torque	Hydraulic cylinder assembly mounting stud bolt	38.2 to 45.1 N-m 3.9 to 4.6 kgf-m 28.2 to 33.3 ft-lbs
	Hydraulic cylinder assembly mounting screw and nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
	Rear axle case mounting screw and nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs

■ **NOTE**

- **Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod and draft control rod.**

(CABIN)
000002769E

Brake Cam Plate

1. Remove the return spring (1).
2. Remove the brake cam plate (2).

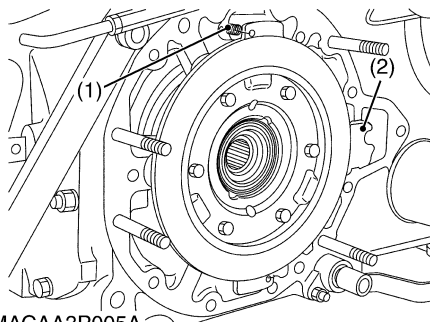
(When reassembling)

- Apply grease to the brake ball seats. (Do not grease excessively.)

(1) Return Spring

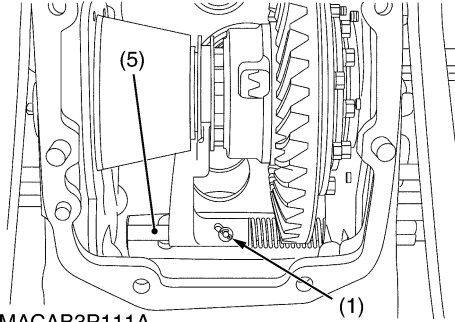
(2) Brake Cam Plate

(CABIN)
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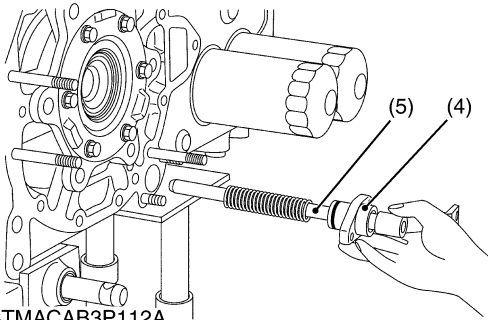


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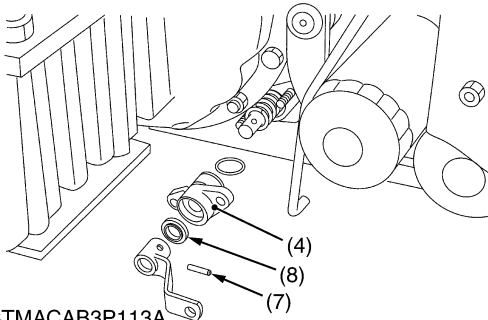
(D) Disassembling Transmission Case



3TMACAB3P111A



3TMACAB3P112A



3TMACAB3P113A

Differential Lock Fork

1. Remove the clevis pin (1).
2. Remove the plug (2) and take out the adjusting shims (3).
3. Remove the spring holder mounting nuts.
4. Tap out the differential lock shaft (5) with the spring holder (4).

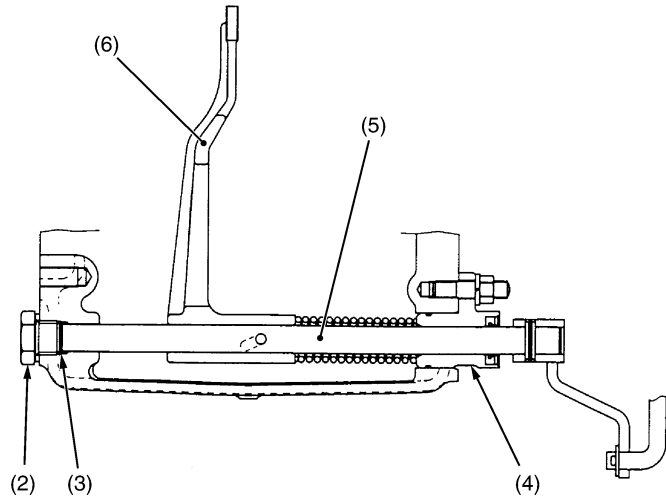
NOTE

● Taking out the differential lock fork (6), after remove the differential assembly.

● When replacing the oil seal only, tap out the differential lock lever spring pin (7), then remove the spring holder (4) and replace the oil seal (8).

(When reassembling)

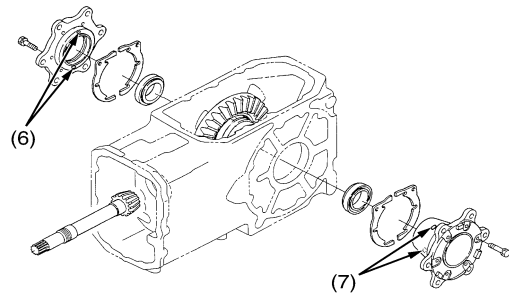
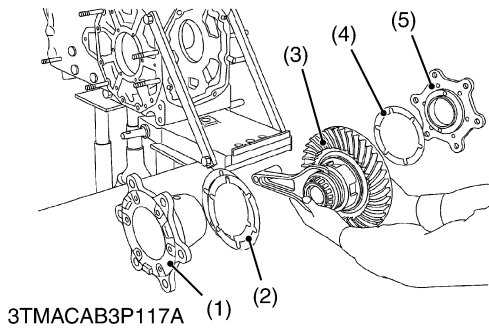
● Apply grease to the oil seal.



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- | | |
|--------------------|-----------------------------|
| (1) Clevis Pin | (5) Differential Lock Shaft |
| (2) Plug | (6) Differential Lock Fork |
| (3) Adjusting Shim | (7) Spring Pin |
| (4) Spring Holder | (8) Oil Seal |

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3TMACAB3P118A

Differential Gear Assembly

1. Remove the differential support (1), (5), noting the number of left and right shims (2), (4).
2. Take out the differential gear assembly (3) from transmission case.

(When reassembling)

- Be sure to adjust the turning torque of spiral bevel pinion shaft and differential assembly combined. (See page 3-S50.)
- Be sure to adjust the backlash and tooth contact between the spiral bevel gear and spiral bevel pinion shaft. (See page 3-S51, S52.)
- When installing the differential support to the transmission, be sure to reassemble it as shown in the figure.

Tightening torque	Differential bearing support mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft·lbs
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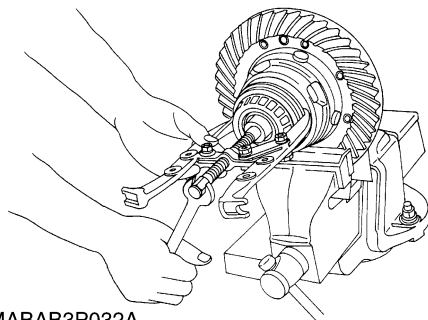
- | | |
|--------------------------------|--------------------------|
| (1) Differential Support | (5) Differential Support |
| (2) Shim | (6) Oil Hole |
| (3) Differential Gear Assembly | (7) Oil Hole |
| (4) Shim | |

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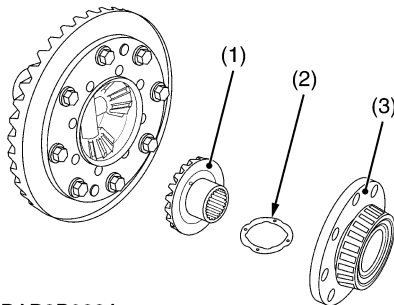
Bearing and Differential Lock Shifter

1. Secure the differential gear in a vise.
2. Remove the differential lock shifter and taper roller bearing as a unit with a puller.

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3TMABAB3P033A

Differential Case Cover and Differential Side Gear

1. Remove the differential case cover (3).
2. Remove the differential side gear (1) and differential side gear washer (2).

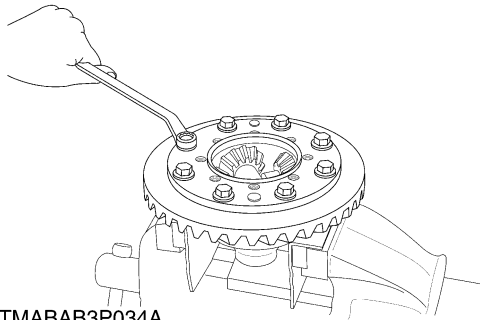
(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gear boss.

Tightening torque	Differential case cover mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft·lbs
-------------------	--	---

- | | |
|-----------------------------------|-----------------------------|
| (1) Differential Side Gear | (3) Differential Case Cover |
| (2) Differential Side Gear Washer | |

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3TMABAB3P034A

Spiral Bevel Gear

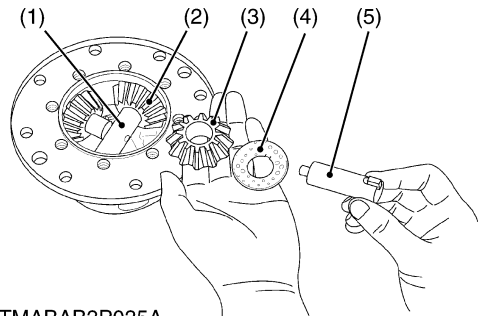
1. Remove the spiral bevel gear.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion shaft.
- Apply liquid lock (Three Bond 1372 or equivalent) to the spiral bevel gear UBS screws.

Tightening torque	Spiral bevel gear UBS screw	70.6 to 90.2 N·m 7.2 to 9.2 kgf·m 52.1 to 66.5 ft-lbs
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3TMABAB3P035A

Differential Pinion Shaft and Differential Pinion

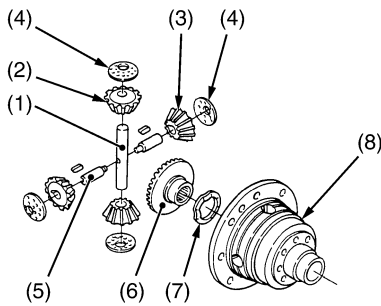
1. Draw out the differential pinion shaft 2 (5), and take out the differential pinion (3) and differential pinion washer (4).
2. Draw out the differential pinion shaft (1), and take out the differential pinion (2) and differential pinion washer.

■ **NOTE**

- **Arrange the parts to know their original position.**

(When reassembling)

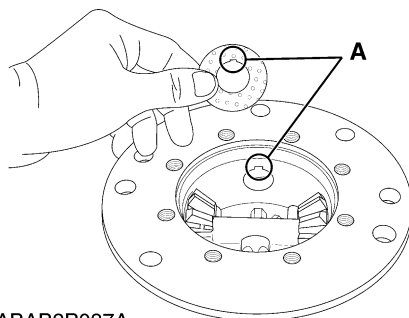
- Check the differential pinions (2) and (3), and pinion shaft (1) and (5) for excessive wear. If these parts are damaged or excessively worn, replace their parts they are in mesh with, or they sliding on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential pinions.
- Install the parts to their original position.
- Install the differential pinion washer (4), noting its groove position.



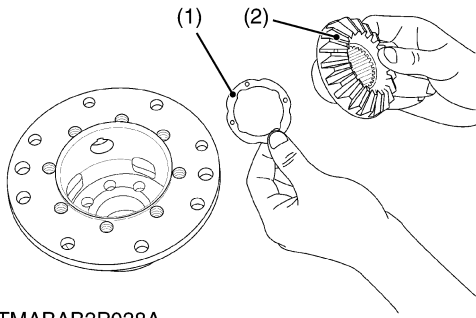
3TMABAB3P036A

- | | |
|---------------------------------|-----------------------------------|
| (1) Differential Pinion Shaft | (6) Differential Side Gear |
| (2) Differential Pinion | (7) Differential Side Gear Washer |
| (3) Differential Pinion | (8) Differential Case |
| (4) Differential Pinion Washer | |
| (5) Differential Pinion Shaft 2 | |
- A : Fit Groove**

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3TMABAB3P037A



3TMABAB3P038A

Differential Side Gear

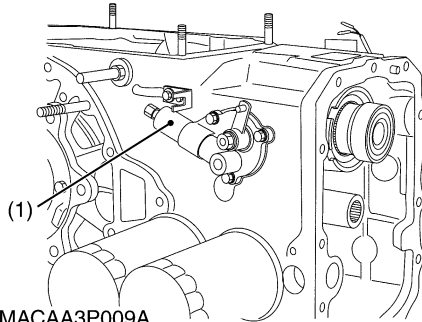
1. Take out the differential side gear (2) and differential side gear washer (1).

(When reassembling)

- Check the thrust and bearing surface of both differential side gears (2). If they are worn or damaged, bores in the differential case may also be damaged. Be sure to replace their parts.

(1) Differential Side Gear Washer (2) Differential Side Gear

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3TMACAA3P009A

PTO Clutch Valve

1. Disconnect the PTO clutch valve cable.
2. Remove the PTO clutch valve.

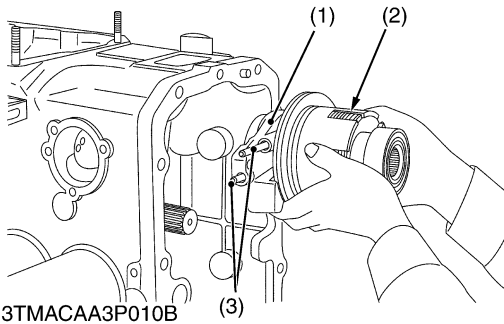
(When reassembling)

- Apply transmission fluid to O-ring.
- Install the pipes to the hole of the PTO clutch valve firmly.

Tightening torque	PTO clutch valve mounting screw	23.5 to 27.5 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs
-------------------	---------------------------------	---

(1) PTO Clutch

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PTO Clutch and Holder

1. Remove the PTO clutch holder mounting screws.
2. Remove the PTO clutch (2) with PTO clutch holder (1).

(When reassembling)

- Apply transmission fluid to O-ring.
- Take care not to damage the oil pipes (3).

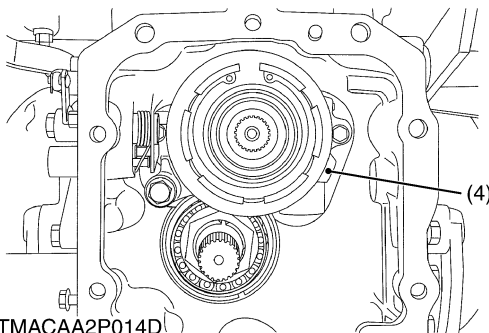
Tightening torque	PTO clutch holder mounting screw	23.5 to 27.5 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs
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■ IMPORTANT

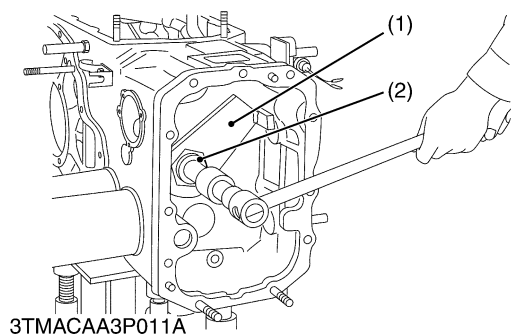
- When reassembling the PTO clutch assembly, direct the projection part of brake plate (4) as a figure.
- After assembling the PTO clutch assembly, be sure to check the piston operation by air-blowing.

(1) PTO Clutch Holder (3) Oil Pipe
(2) PTO Clutch (4) Brake Plate

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3TMACAA2P014D



Spiral Bevel Pinion Shaft

1. Remove the stake of staking nut (2).
2. Set the staking nut locking wrench (1).
3. Set the spiral bevel pinion shaft turning wrench.
4. Turn the spiral bevel pinion shaft turning wrench to the clockwise, then remove it.
5. Tap out the shaft to the rear.

(When reassembling)

- Replace the staking nut with a new one, and be sure to adjust the turning torque of spiral bevel pinion shaft only. (See page 3-S49.)
- Stake the staking nut after installing the differential assembly.

(Reference)

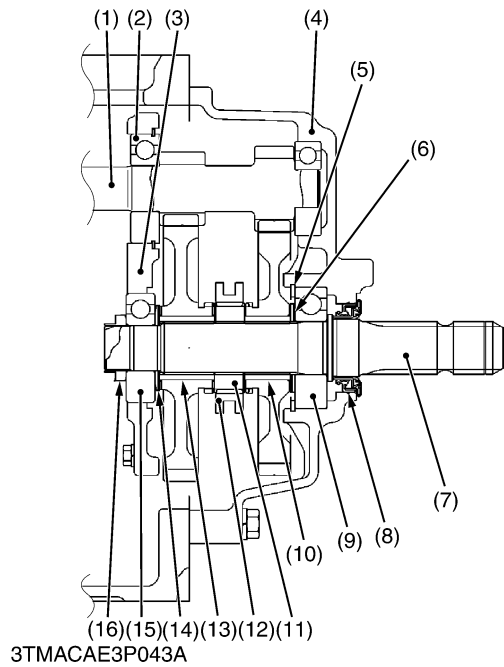
Tightening torque	Spiral bevel pinion shaft staking nut	117.7 to 127.5 N·m 12.0 to 13.0 kgf·m 86.8 to 94.0 ft-lbs
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(1) Locking Wrench

(2) Staking Nut

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(E) Disassembling PTO Gear Case



PTO Gear Case

1. Remove the PTO case cover (4) mounting screws and then remove the PTO gear case cover (3).
2. Remove the stake of the staking nut (16), and then remove it.
3. Remove the bearing (15) by using the bearing puller.
4. Tap out the PTO shaft (7) to the rear side.
5. Remove the gears, thrust collars (6), (14), inner rings (10), (13), hub (11) and shifter (12).
6. Pull out the PTO drive shaft (1) as a unit.
7. Remove the PTO shift fork parts and PTO shift lever parts.

(When reassembling)

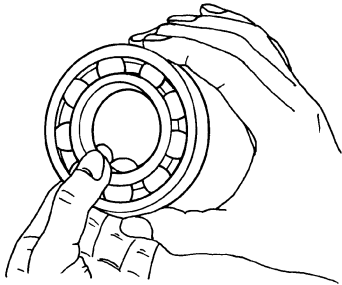
- Reinstall the reamer screw at correct position to mount the PTO cover case.
- Direct the grooves of thrust collars (6), (14) to the inner rings (10), (13) sides.
- Replace the PTO shaft staking nut (16) with new one, and stake it firmly after tightening.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner rings (10) and (13).
- Apply grease to the oil seal (8) and O-ring.

Tightening torque	PTO shaft staking nut	225.6 to 264.8 N-m 23.0 to 27.0 kgf-m 166.4 to 195.3 ft-lbs
	PTO gear case cover mounting screws and reamer screws	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs

- | | |
|-------------------------|--------------------|
| (1) PTO Drive Shaft | (9) Ball Bearing |
| (2) Ball Bearing | (10) Inner Ring |
| (3) PTO Gear Case Cover | (11) Hub |
| (4) PTO Case | (12) Shifter |
| (5) Internal Snap Ring | (13) Inner Ring |
| (6) Thrust Collar | (14) Thrust Collar |
| (7) PTO Shaft | (15) Ball Bearing |
| (8) Oil Seal | (16) Stake Nut |

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(2) Servicing



3TMABAB3P015A

Checking Bearing

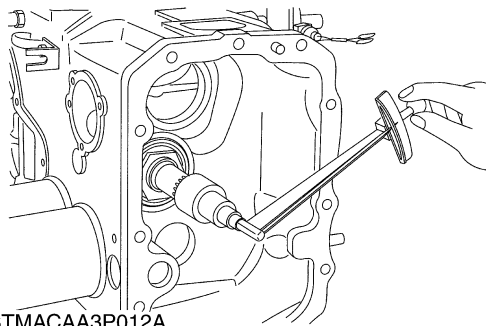
1. Hold the inner race, and push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then, turn the outer race to check rotation.
3. If there is any defect, replace it.

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■ IMPORTANT

- **When reassembling spiral bevel pinion shaft and differential assembly, be sure to adjust the following.**
 - **Turning torque of spiral bevel pinion shaft only.**
 - **Turning torque of spiral bevel pinion shaft and differential assembly combined.**
 - **Backlash and tooth contact between spiral bevel pinion shaft and spiral bevel gear.**

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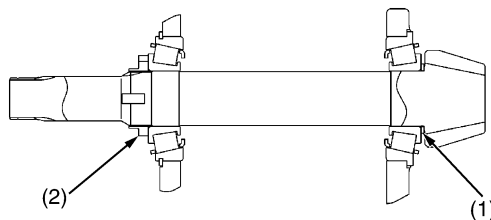
Turning Torque of Spiral Bevel Pinion Shaft Only

1. Reassemble the spiral bevel pinion shaft and tighten the staking nut with locking wrench and turning wrench.
2. After striking the bevel pinion shaft to the front and rear, retighten the staking nut to reference torque.
3. Measure the turning torque of spiral bevel pinion shaft.
4. If the measurement is not within the factory specifications, adjust the tightening torque of staking nut.

Turning torque	Factory spec.	2.94 to 3.43 N·m 0.30 to 0.35 kgf·m 2.17 to 2.53 ft-lbs
----------------	---------------	---

(Reference)

Tightening torque	Staking nut	117.7 to 127.5 N·m 12.0 to 13.0 kgf·m 86.8 to 94.0 ft-lbs
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- Thickness of adjusting collar (1) :

1.00 mm (0.039 in.)	2.00 mm (0.079 in.)
1.50 mm (0.059 in.)	2.10 mm (0.083 in.)
1.70 mm (0.067 in.)	2.20 mm (0.087 in.)
1.75 mm (0.069 in.)	2.25 mm (0.089 in.)
1.80 mm (0.071 in.)	2.30 mm (0.091 in.)
1.90 mm (0.075 in.)	

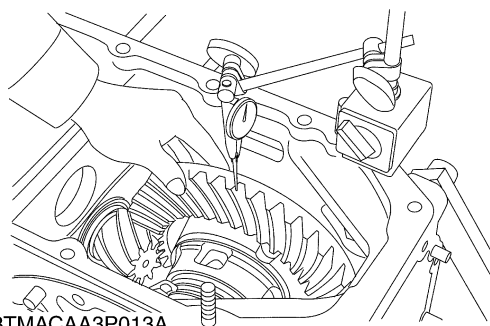
■ NOTE

- **Stake the skating nut after performing adjustments described in the following pages.**

(1) Collar 1

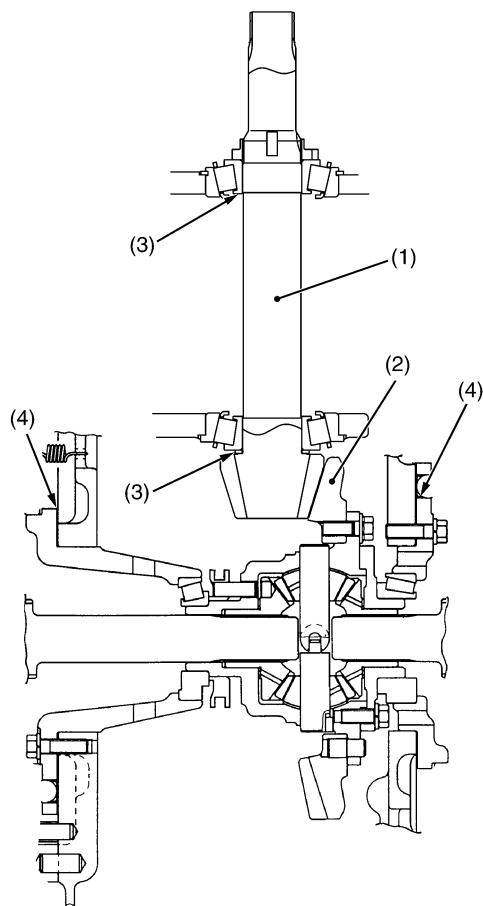
(2) Staking Nut

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Backlash and Tooth Contact between Spiral Bevel Gear and Spiral Bevel Pinion Shaft

1. Set the dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the spiral bevel pinion shaft (1) and moving the spiral bevel gear (2) by hand.
3. When the backlash is too large, decrease the number of shims in the side of the spiral bevel gear, and insert the shims in opposite side. When the backlash is too small, decrease the number of shims in the side of the differential case, and insert and removed shims in the opposite side.
4. Adjust the backlash properly by repeating the above procedure.
5. Apply red lead lightly over several teeth at three positions equally spaced on the spiral bevel gear.
6. Turn the spiral bevel pinion shaft, while pressing a wooden piece against the periphery on the spiral bevel gear.
7. Check the tooth contact. If not proper, adjust according to the instructions next page.



Backlash between spiral bevel gear and spiral bevel pinion shaft	Factory spec.	0.20 to 0.30 mm 0.0079 to 0.0118 in.
	Allowable limit	0.4 mm 0.016 in.

(Reference)

- Thickness of shims (4) :

0.1 mm (0.004 in.)	0.5 mm (0.020 in.)
0.3 mm (0.012 in.)	
- Thickness of collar (3) :

1.00 mm (0.039 in.)	2.00 mm (0.079 in.)
1.50 mm (0.059 in.)	2.10 mm (0.083 in.)
1.70 mm (0.067 in.)	2.20 mm (0.087 in.)
1.75 mm (0.069 in.)	2.25 mm (0.089 in.)
1.80 mm (0.071 in.)	2.30 mm (0.091 in.)
1.90 mm (0.075 in.)	

- | | |
|-------------------------------|------------------------|
| (1) Spiral Bevel Pinion Shaft | (3) Adjusting Collar 1 |
| (2) Spiral Bevel Gear | (4) Shim |

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More than 35 % red lead contact area on the gear tooth surface.
The center of tooth contact at 1/3 of the entire width from the small end.

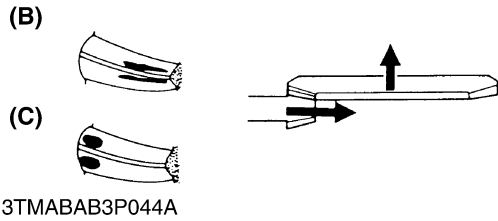
(A) Proper Contact

000002788E

Replace the adjusting collar 1 (3) with thicker one to move the spiral bevel pinion shaft backward.

And place the left side shim to the right to move the spiral bevel gear rightward.

Repeat above until the proper tooth contact and backlash are achieved.



(B) Shallow Contact

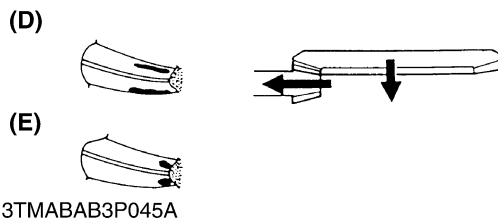
(C) Heel Contact

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Replace the adjusting collar 1 (3) with a thinner one to move the spiral bevel pinion shaft forward.

And place the right side shim to the left to move the spiral bevel gear leftward.

Repeat above until the proper tooth contact and backlash are achieved.



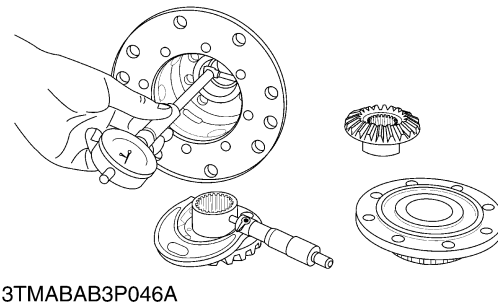
(D) Deep Contact

(E) Toe Contact

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Clearance between Differential Case Bore (Differential Case Cover Bore) and Differential Side Gear Boss

1. Measure the bore I.D. of the differential case and differential case cover.
2. Measure the differential side gear boss O.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.



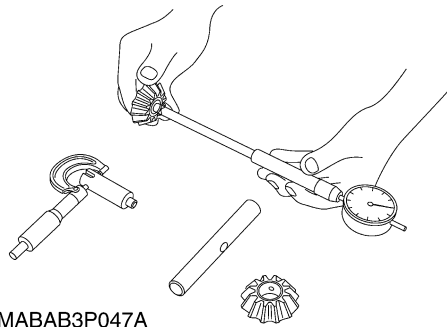
Clearance between differential case bore and differential side gear boss	Factory spec.	0.050 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.0138 in.

Differential case bore I.D.	Factory spec.	40.500 to 40.550 mm 1.59449 to 1.59646 in.
Differential side gear boss O.D.	Factory spec.	40.388 to 40.450 mm 1.59008 to 1.59252 in.

Clearance between differential case cover bore and differential side gear boss	Factory spec.	0.050 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.0138 in.

Differential case cover bore I.D.	Factory spec.	40.500 to 40.550 mm 1.59449 to 1.59646 in.
Differential side gear boss O.D.	Factory spec.	40.388 to 40.450 mm 1.59008 to 1.59252 in.

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Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceed the allowable limit, replace them.

Clearance between differential pinion shaft and differential pinion	Factory spec.	0.060 to 0.102 mm 0.00236 to 0.00402 in.
	Allowable limit	0.25 mm 0.0098 in.

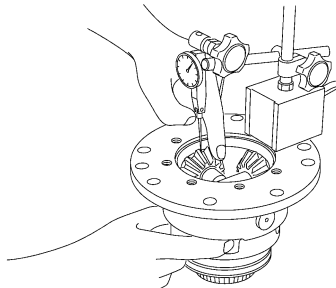
Differential pinion shaft O.D.	Factory spec.	19.959 to 19.980 mm 0.78579 to 0.78661 in.
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Differential pinion I.D.	Factory spec.	20.040 to 20.061 mm 0.78898 to 0.78980 in.
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Backlash between Differential Pinion and Differential Side Gear

1. Set a dial indicator (lever type) on the tooth of the differential pinion.
2. Hold the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement is not within the factory specifications, adjust with the differential side gear washer.



3TMABAB3P019A

Backlash between differential pinion and differential side gear	Factory spec.	0.15 to 0.30 mm 0.0059 to 0.0118 in.
	Allowable limit	0.4 mm 0.016 in.

(Reference)

- Thickness of differential side gear washer :

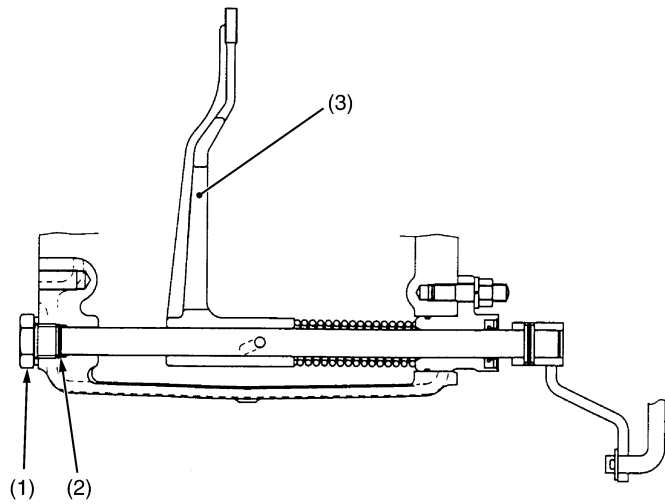
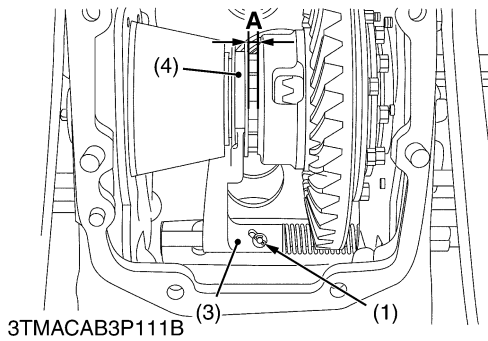
1.5 mm (0.059 in.)	1.7 mm (0.067 in.)
1.6 mm (0.063 in.)	1.8 mm (0.071 in.)
2.0 mm (0.079 in.)	

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Displacement of Differential Lock Shifter

1. Measure the displacement (**A**) of the shift fork (3) by pushing down the differential lock pedal as far as not to bend the shift fork to get the displacement of the differential lock shifter (4).
2. If the measurement is not within the factory specifications, adjust with the differential lock adjusting shim (2).

Displacement (A) of differential lock shifter	Factory spec.	6.0 to 8.0 mm 0.236 to 0.315 in.
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- | | |
|--------------------|-------------------------------|
| (1) Plug | (3) Shift Fork |
| (2) Adjusting Shim | (4) Differential Lock Shifter |

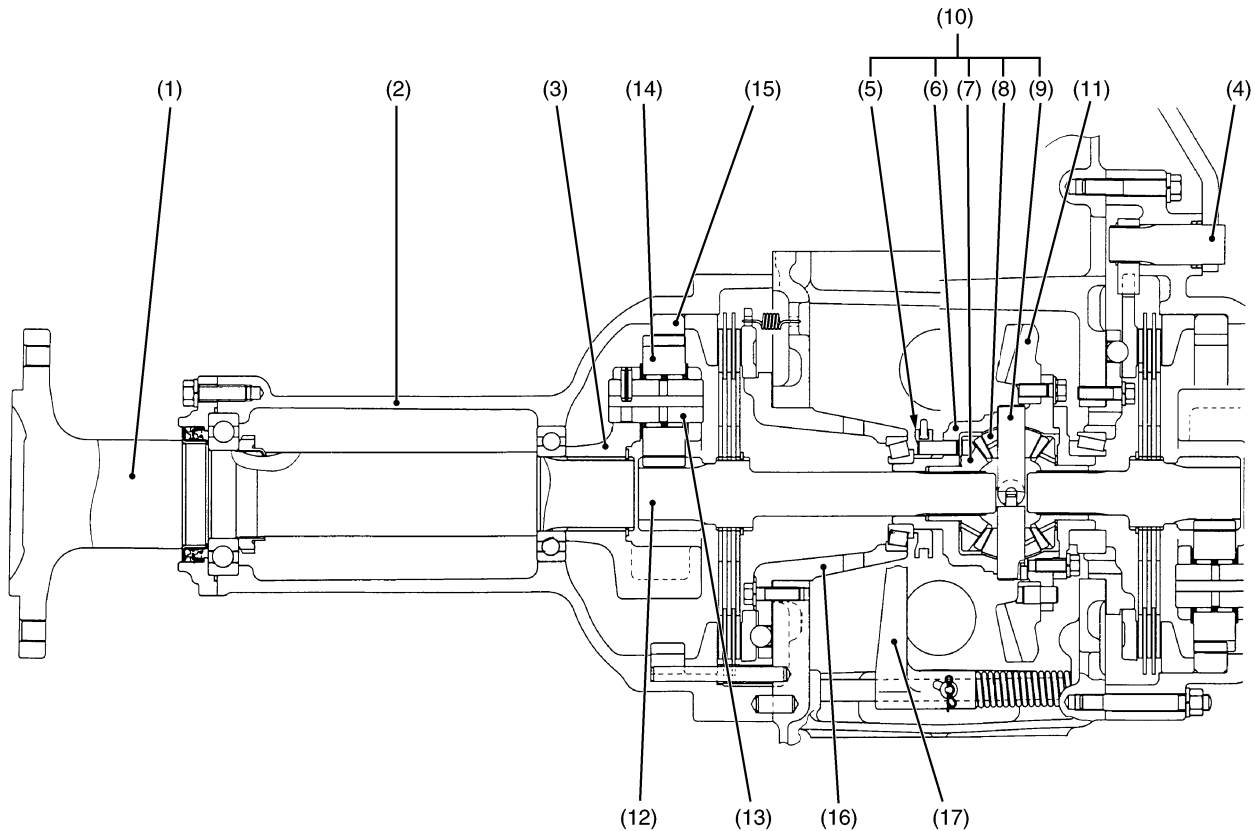
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4 REAR AXLE

CONTENTS

1. STRUCTURE.....	4-M1
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1. STRUCTURE



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- | | | | |
|-------------------------------|-------------------------------|-----------------------------|-----------------------------------|
| (1) Rear Axle | (6) Differential Case | (10) Differential Gear | (14) 25T Planetary Gear |
| (2) Rear Axle Case | (7) Differential Side Gear | (11) 39T Bevel Gear | (15) 65T Internal Gear |
| (3) Planetary Gear Support | (8) Differential Pinion Gear | (12) Brake Shaft (13T Gear) | (16) Differential Bearing Support |
| (4) Brake Cam Shaft | (9) Differential Pinion Shaft | (13) Planetary Gear Pin | (17) Differential Lock Shift Fork |
| (5) Differential Lock Shifter | | | |

The rear axles are the final mechanism which transmit power from the transmission to the rear wheels. Direction of power transmitted is changed at a right angle by the differential gear (10) and, at the same time, speed is reduced. It is further reduced by the planetary gear to drive the rear axles.

The rear axles (1) are semi-floating type with the ball bearing between the rear axle (1) and rear axle case (2), which support the rear wheel load as well as transmitting power to the rear wheel. They withstand all the forces caused by tire rotation and side skidding.

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CONTENTS

1. TROUBLESHOOTING.....	4-S1
2. SERVICING SPECIFICATIONS.....	4-S2
3. TIGHTENING TORQUES.....	4-S3
4. DISASSEMBLING AND SERVICING.....	4-S4
[1] DISASSEMBLING AND ASSEMBLING.....	4-S4
(1) Separating Rear Axle Case from Transmission Case.....	4-S4
(2) Disassembling Planetary Gear.....	4-S8
(3) Disassembling Rear Axle.....	4-S9
[2] SERVICING.....	4-S10

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual Noise at All Time	● Improper backlash between brake shaft's 13T gear and planetary gear	Replace	4-S10
	● Improper backlash between planetary gear and internal gear	Replace	4-S10
	● Bearings worn	Replace	4-S10
	● Insufficient or improper type of transmission fluid used	Replenish or change	G-8
Noise while Turning	● Brake shaft's 13T gear, planetary gears and internal gear worn or damaged	Replace	4-S10
	● Needed bearings or planetary gear shafts worn or broken	Replace	4-S10

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Internal Gear to Planetary Gear	Backlash	0.08 to 0.30 mm 0.0031 to 0.0118 in.	0.5 mm 0.020 in.
Planetary Gear Thrust Collar	Thickness	1.55 to 1.65 mm 0.0610 to 0.0650 in.	1.2 mm 0.047 in.
Planetary Gear to Planetary Gear Shaft	Clearance	0.009 to 0.048 mm 0.00035 to 0.00189 in.	0.30 mm 0.0118 in.
	Planetary Gear Shaft (O.D.)	31.989 to 32.000 mm 1.25941 to 1.25984 in.	—
	Planetary Gear (I.D.)	39.000 to 39.025 mm 1.53543 to 1.53641 in.	—
	Needle (O.D.)	3.494 to 3.500 mm 0.13756 to 0.13780 in.	—

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

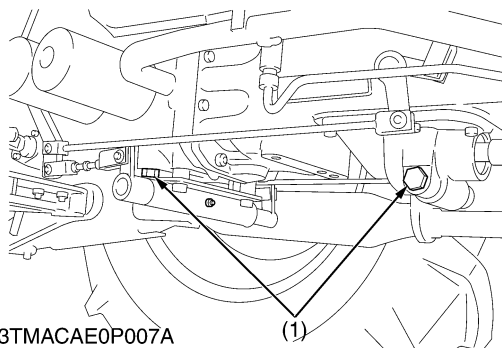
Item	N·m	kgf·m	ft-lbs
ROPS upper frame mounting screw 9/16 UNF, grade 8	149 to 179	15.2 to 18.3	110 to 132
ROPS mounting screw M16, grade 9 screw	260 to 304	26.5 to 31.0	192 to 224
Fender mounting screws 9/16 UNF, grade 8 screw	47.0 to 53.9	4.8 to 5.5	34.7 to 39.8
Rear wheel mounting nut	260 to 304	26.5 to 31.0	192 to 224
CABIN mounting bolt and nut	124 to 147	12.6 to 15.0	91.2 to 108.0
CABIN mount bracket mounting screw	197 to 225	20.0 to 23.0	145 to 166
Rear axle case mounting screw and nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Rear axle cover mounting screw	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Rear axle nut	539 to 637	55.0 to 65.0	398 to 470

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4. DISASSEMBLING AND SERVICING

[1] DISASSEMBLING AND ASSEMBLING

(1) Separating Rear Axle Case from Transmission Case



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Draining Transmission Fluid

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

(When reassembling)

- Fill up from filling port after removing the filling plug until reaching the gauge.
- After running the engine for a few minutes, stop it and check the fluid level again, add fluid to prescribed level if it is not correct level.

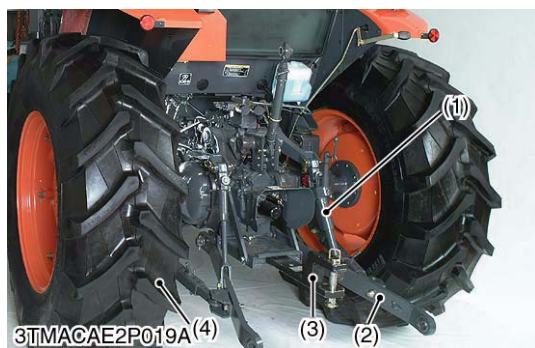
Transmission fluid	Capacity	ROPS	40.0 L 42.3 U.S.qts 35.2 Imp.qts
		CABIN	43.0 L 45.4 U.S.qts 37.8 Imp.qts

■ IMPORTANT

- Use only KUBOTA UDT or SUPER UDT fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)
- Do not mix difference brands oil together.

(1) Drain Plug

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3TMACAE2P019A(4)

Lift Rods and Lower Links

1. Remove the lift rods (1).
2. Remove the lower links (2) with stabilizer.
3. Remove the drawbar (3).
4. Remove the rear wheels (4).

Tightening torque	Rear wheel mounting nut	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
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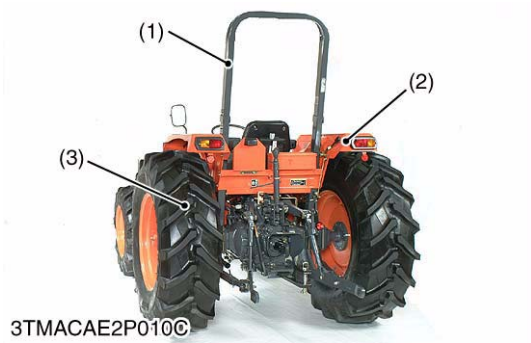
(1) Lift Rod

(3) Drawbar

(2) Lower Link

(4) Rear Wheel

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Rear Wheel, Fender and ROPS (ROPS Type)

1. Check the rear axle and transmission case securely mounted on the disassembly stands.
2. Loosen the rear wheel mounting nuts.
3. Remove the rear wheel (3).
4. Remove the brake rod (8) and parking brake rod (7).
5. Remove the differential lock rod (6).
6. Disconnect the combination lamp connector.
7. Remove the fender (2).
8. Remove the ROPS upper frame (1).
9. Remove the ROPS (5) with additional lever (4) for position control.

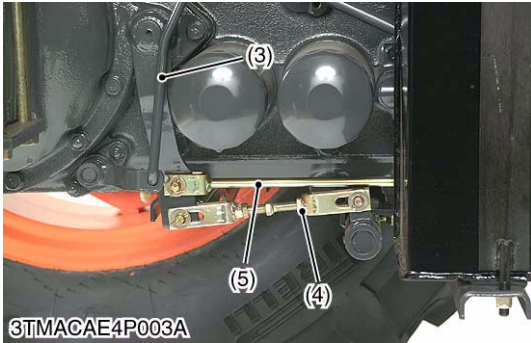
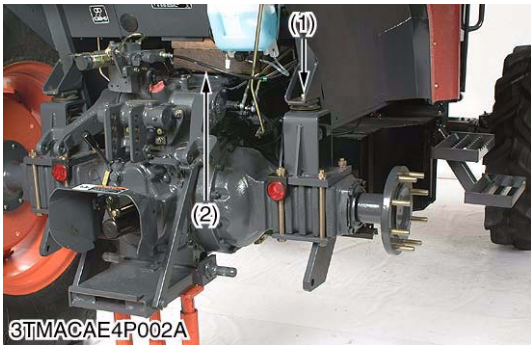
(When reassembling)

- Be sure to adjust the parking brake. (See page 5-S6.)

Tightening torque	ROPS upper frame mounting screw	9/16 UNF, grade 8 screw	149 to 179 N-m 15.2 to 18.3 kgf-m 110 to 132 ft-lbs
	ROPS mounting screw	M16, grade 9 screw	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs
	Fender mounting screw	3/8-16 UNF, grade 8 screw	47.0 to 53.9 N-m 4.8 to 5.5 kgf-m 34.7 to 39.8 ft-lbs
	Rear wheel mounting nut		260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs

- | | |
|----------------------|---------------------------|
| (1) ROPS Upper Frame | (5) ROPS |
| (2) Fender | (6) Differential Lock Rod |
| (3) Rear Wheel | (7) Parking Brake Rod |
| (4) Additional Lever | (8) Brake Rod |

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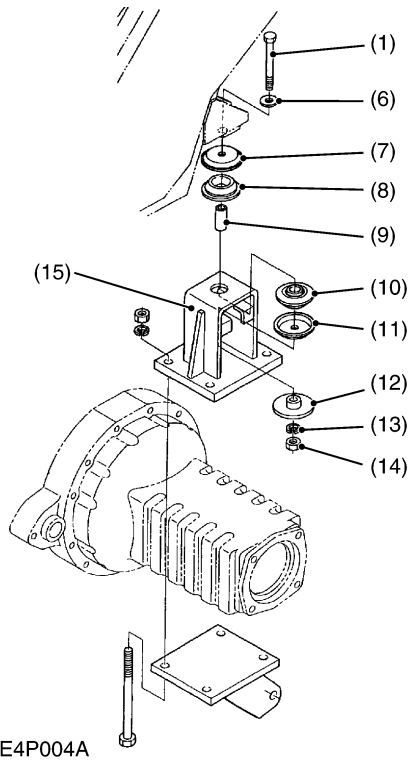
Rear Wheel and CABIN Mount Screw (CABIN Type)

1. Place the disassembling stand under the transmission case.
2. Remove the rear wheel.
3. Place the block of wood (2) between cabin and hydraulic cylinder to support the cabin.
4. Remove the cabin mount bracket mounting bolt (1) and nut.
5. Remove the differential lock rod (3).
6. Remove the brake rod (5) and parking brake rod (4).

(When reassembling)

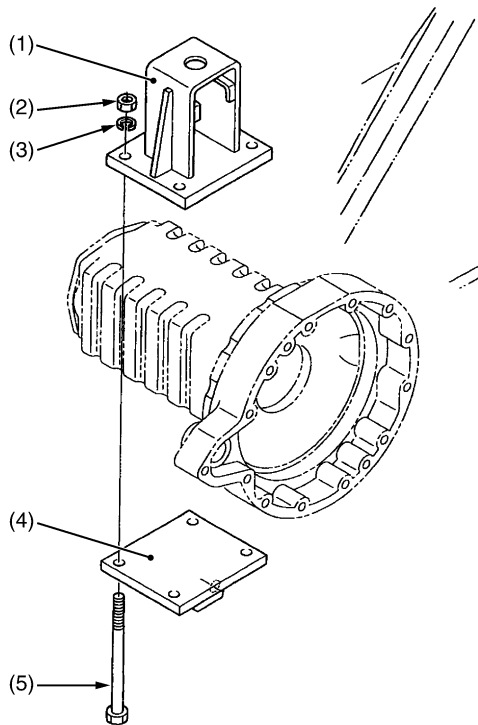
- Be sure to install the washers, plate and mount rubbers, etc. in their original positions.
- Be sure to adjust the parking brake. (See page 5-S5, S6.)

Tightening torque	Cabin mounting bolt and nut	124 to 147 N-m 12.6 to 15.0 kgf-m 91.2 to 108.0 ft-lbs
	Rear wheel mounting nut	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs



- | | |
|---------------------------|--------------------------|
| (1) Bolt | (9) Collar |
| (2) Block of Wood | (10) Mount Rubber |
| (3) Differential Lock Rod | (11) Plate |
| (4) Parking Brake Rod | (12) Plate |
| (5) Brake Rod | (13) Spring Washer |
| (6) Plain washer | (14) Nut |
| (7) Plate | (15) Cabin Mount Bracket |
| (8) Mount Rubber | |

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Cabin Mount Bracket (CABIN Type)

1. Remove the cabin mount bracket (1) and (4).

(When reassembling)

Tightening torque	Cabin mount bracket mounting screw	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 ft-lbs
-------------------	------------------------------------	---

- (1) Cabin Mount Upper Bracket
- (2) Nut
- (3) Spring Washer
- (4) Cabin Mount Lower Bracket
- (5) Bolt

000002801E



3TMACAE4P006A

Rear Axle Case

1. Remove the DT shift rod (If separating left side).
2. Remove the rear axle case mounting screw and nut.
3. Support the rear axle with nylon lift strap and hoist.
4. Separate the rear axle case from transmission case.

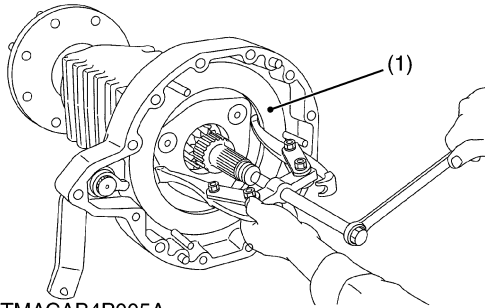
(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the rear axle case and transmission case, after eliminate the water, oil and stuck liquid gasket.

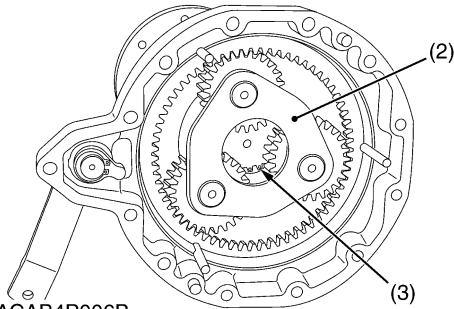
Tightening torque	Rear axle case mounting screw and nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 ft-lbs
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000002802E

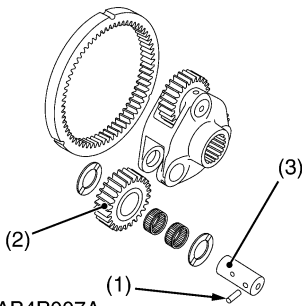
(2) Disassembling Planetary Gear



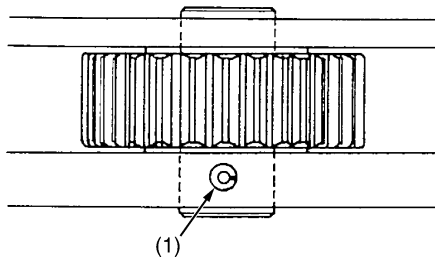
3TMACAB4P005A



3TMACAB4P006B



3TMACAB4P007A



3TMACAB4P008A

Planetary Gear Support

1. Remove the brake plate (1).
2. Remove the external snap ring (3).
3. Carefully remove the planetary gear support (2).

- | | |
|----------------------------|------------------------|
| (1) Brake Plate | (3) External Snap Ring |
| (2) Planetary Gear Support | |

000002803E

Planetary Gear

1. Tap the spring pin (1) into the planetary gear shaft (3).
2. Draw out the planetary gear shaft (3), and remove the planetary gear (2).
3. Tap out the spring pin (1) from the planetary gear shaft (3).

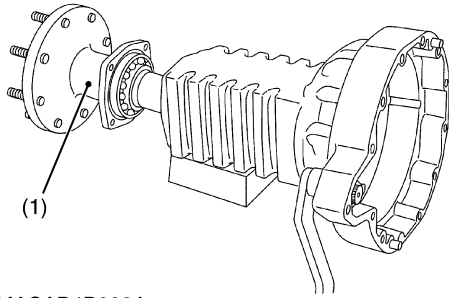
(When reassembling)

- Apply transmission fluid to the inner surface of planetary gear (2).
- Tap in the spring pin (1) as shown in the figure.

- | | |
|--------------------|--------------------------|
| (1) Spring Pin | (3) Planetary Gear Shaft |
| (2) Planetary Gear | |

000002432E

(3) Disassembling Rear Axle



3TMACAB4P009A

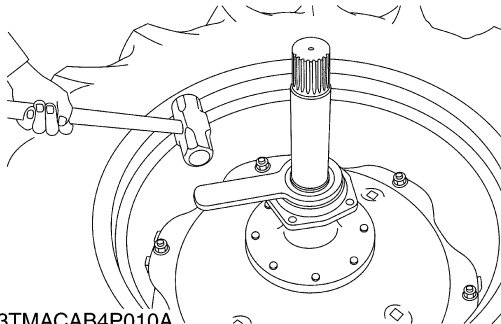
Rear Axle

1. Unscrew the rear axle cover mounting screws, and remove the rear axle (1).

Tightening torque	Rear axle cover mounting screw	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
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(1) Rear Axle

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3TMACAB4P010A

Rear Axle Nut

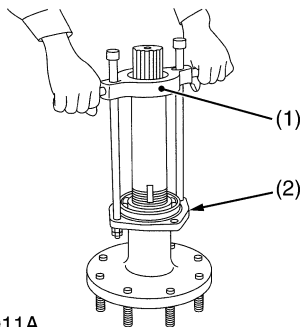
1. Fix the rear axle on the repair table or set to the rear wheel.
2. Remove the stake on the rear axle nut.
3. Remove the rear axle nut with a rear axle nut wrench 85 (Code No. 07916-52541).

(When reassembling)

- Replace the rear axle nut with a new one, and stake if firmly after tightening.

Tightening torque	Rear axle nut	539 to 637 N-m 55.0 to 65.0 kgf-m 398 to 470 ft-lbs
-------------------	---------------	---

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3TMACAB4P011A

Rear Axle Cover

1. Remove the rear axle cover (2) with a rear axle cover puller (1) (Code No. 07916-51041).

(When reassembling)

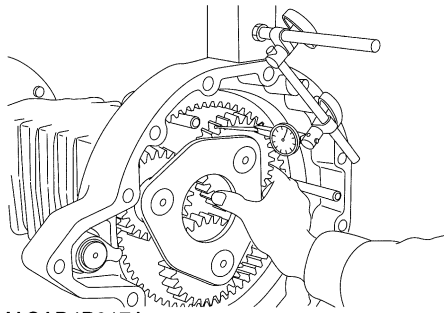
- Apply grease to the oil seal lips.

(1) Rear Axle Cover Puller

(2) Rear Axle Cover

000002806E

[2] SERVICING



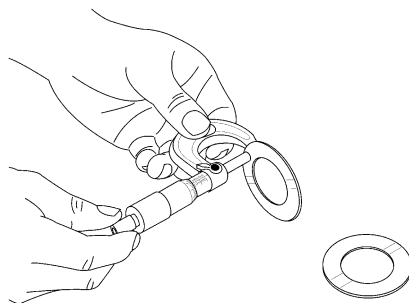
3TMACAB4P017A

Backlash between Internal Gear and Planetary Gear

1. Set a dial indicator (lever type) on the tooth of the planetary gear.
2. Hold the planetary gear support and move only the planetary gear to measure the backlash.
3. If the measurement exceeds the allowable limit, check the planetary gear and planetary shaft.

Backlash between internal gear and planetary gear	Factory spec.	0.08 to 0.30 mm 0.0031 to 0.0118 in.
	Allowable limit	0.5 mm 0.020 in.

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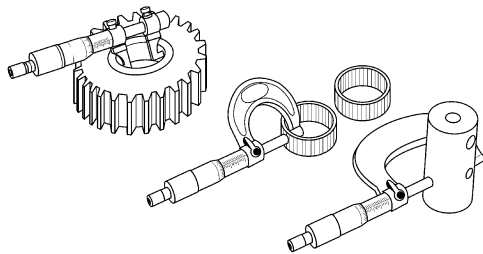
3TMACAB4P018A

Thrust Collar Thickness

1. Measure the thickness of the thrust collar.
2. If the measurement is less than the allowable limit, replace it.

Thrust collar thickness	Factory spec.	1.55 to 1.65 mm 0.0610 to 0.0650 in.
	Allowable limit	1.2 mm 0.047 in.

000002436E



3TMACAB4P019A

Clearance between Planetary Gear and Planetary Gear Shaft

1. Measure the planetary gear shaft O.D. (rubbing surface).
2. Measure planetary gear I.D. (rubbing surface).
3. Measure the O.D. of the two needles installed diagonally in the needle bearing.
4. Calculate the clearance.
5. (Clearance = Planetary gear I.D. - {(2 x Needle O.D.) + Planetary gear shaft O.D.}).
6. If the clearance exceeds the allowable limit, replace them.

Clearance between planetary gear and planetary gear shaft	Factory spec.	0.009 to 0.048 mm 0.00035 to 0.00189 in.
	Allowable limit	0.30 mm 0.0118 in.

Planetary gear shaft O.D.	Factory spec.	31.989 to 32.000 mm 1.25941 to 1.25984 in.
Planetary gear I.D.	Factory spec.	39.000 to 39.025 mm 1.53543 to 1.53641 in.
Needle O.D.	Factory spec.	3.494 to 3.500 mm 0.13756 to 0.13780 in.

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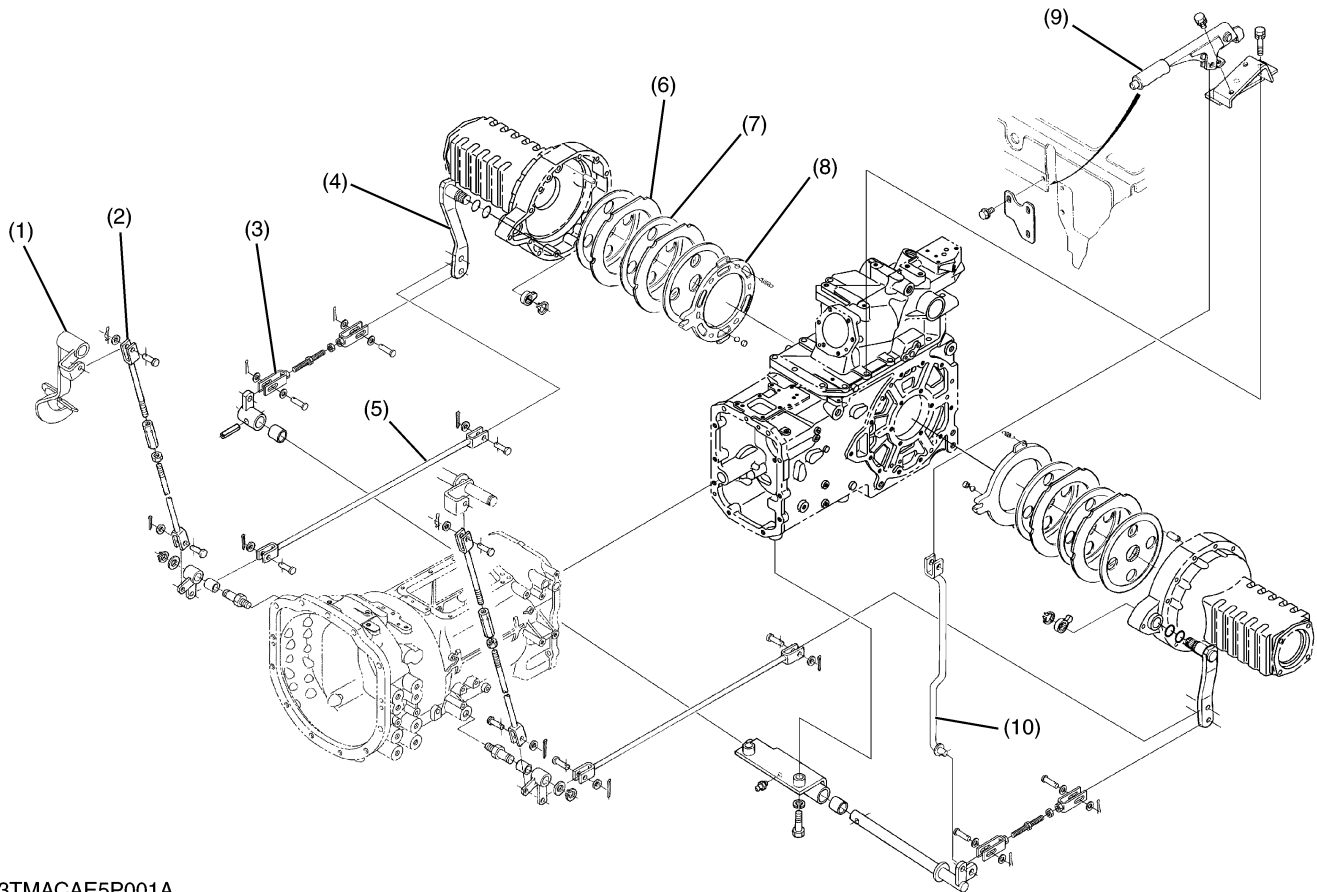
5 BRAKES

CONTENTS

1. LINKAGE	5-M1
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1. LINKAGE

■ ROPS Type

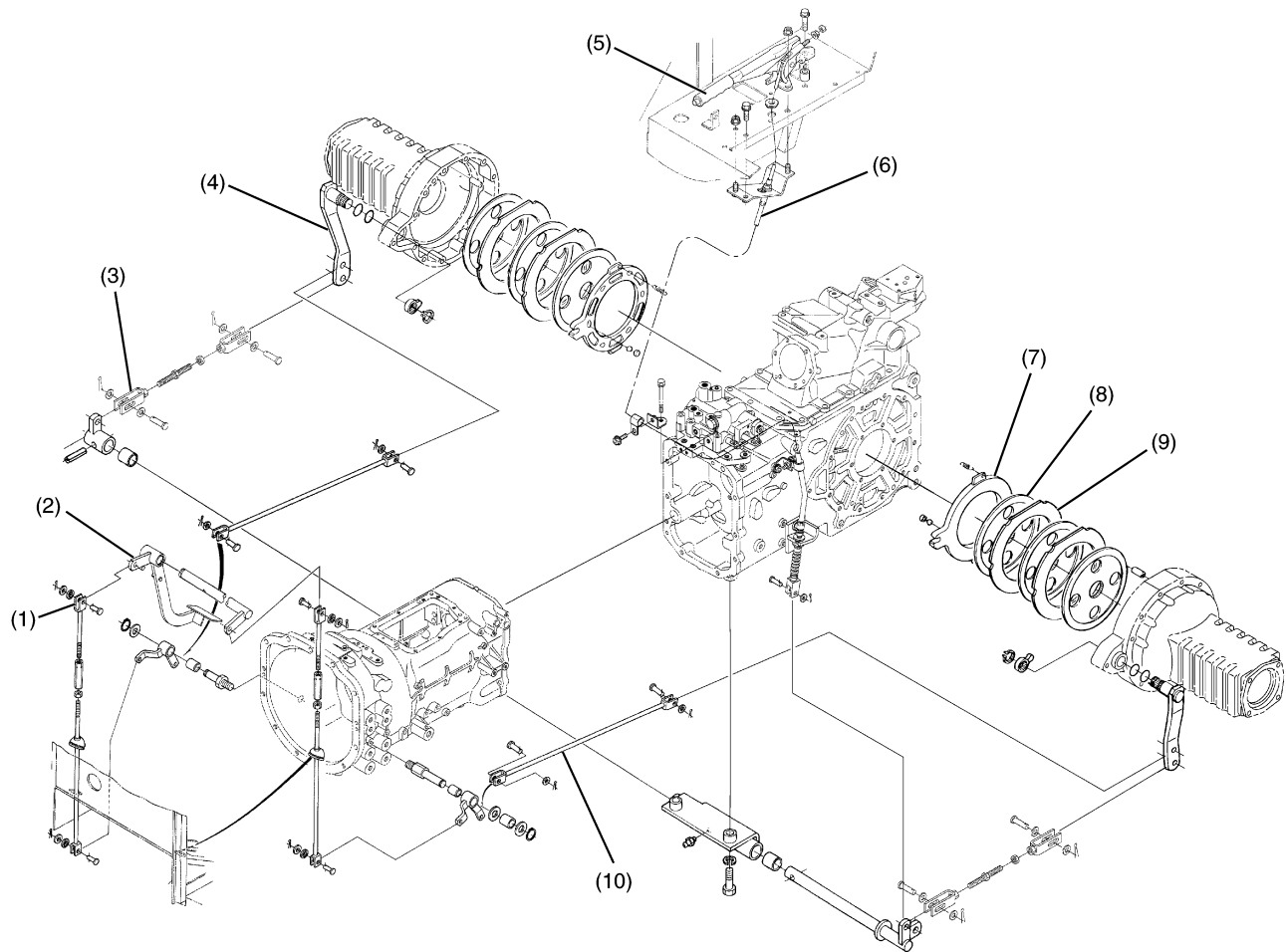


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- | | | | |
|--------------------------------|----------------------------------|-----------------|-------------------------|
| (1) Brake Pedal | (3) Parking Brake Turnbuckle Rod | (5) Brake Rod | (8) Cam Plate |
| (2) Brake Pedal Turnbuckle Rod | (4) Brake Cam Lever | (6) Brake Plate | (9) Parking Brake Lever |
| | | (7) Brake Disc | (10) Parking Brake Rod |

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■ CABIN Type



3TMACAE5P002A

- | | | | |
|--------------------------------|----------------------------------|-------------------------|-----------------|
| (1) Brake Pedal Turnbuckle Rod | (3) Parking Brake Turnbuckle Rod | (5) Parking Brake Lever | (8) Brake Disc |
| (2) Brake Pedal | (4) Brake Cam Lever | (6) Parking Brake Cable | (9) Brake Plate |
| | | (7) Cam Plate | (10) Brake Rod |

000002808E

CONTENTS

1. TROUBLESHOOTING.....	5-S1
2. SERVICING SPECIFICATIONS.....	5-S2
3. TIGHTENING TORQUES.....	5-S3
4. CHECKING, DISASSEMBLING AND SERVICING.....	5-S4
[1] BRAKE SYSTEM.....	5-S4
(1) Checking and Adjusting.....	5-S4
[2] BRAKE CASE.....	5-S7
(1) Disassembling and Assembling.....	5-S7
(2) Servicing.....	5-S12

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Uneven Braking Force	● Brake pedal free travel unevenly adjusted	Adjust	5-S4
	● Parking brake lever free play unevenly adjusted	Adjust	5-S5, S6
	● Brake disc worn	Replace	5-S12
	● Cam plate warped	Replace	5-S12
Brake Drags	● Brake pedal free travel too small	Adjust	5-S4
	● Parking brake lever free play too small	Adjust	5-S5, S6
	● Ball holes of cam plate for uneven wear	Replace	5-S12
	● Brake pedal return spring weaken or broken	Replace	—
	● Brake cam rusted	Repair	5-S12
Poor Braking Force	● Brake pedal free travel excessive	Adjust	5-S4
	● Parking brake lever free play excessive	Adjust	5-S5, S6
	● Brake disc worn	Replace	5-S12
	● Cam plate warped	Replace	5-S12
	● Brake cam or lever damaged	Replace	5-S12
	● Transmission fluid improper	Change	G-8, 17

000002809E

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Brake Pedal	Free Travel	40 to 45 mm 1.6 to 1.8 in.	—
Parking Brake Cable Position A	Length	10 mm 0.39 in.	—
Parking Brake Cable Position B	Length	0 mm 0 in.	—
Cam Plate	Flatness	—	0.3 mm 0.012 in.
Cam Plate and Ball	Height	22.45 to 22.55 mm 0.8839 to 0.8879 in.	22.00 mm 0.8661 in.
Brake Disc	Thickness	4.15 to 4.35 mm 0.1634 to 0.1713 in.	3.3 mm 0.130 in.
Plate	Thickness	2.25 to 2.35 mm 0.0886 to 0.0925 in.	1.5 mm 0.059 in.
Brake Plate	Flatness	—	0.3 mm 0.012 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
Rear wheel mounting nut	260 to 304	26.5 to 31.0	192 to 224
ROPS upper frame mounting screw 9/16 UNF, grade 8 screw	149 to 179	15.2 to 18.3	110 to 132
ROPS mounting screw M16, grade 9 screw	260 to 304	26.5 to 31.0	192 to 224
Fender mounting screw 3/8-16 UNF, grade 8 screw	47.0 to 53.9	4.8 to 5.5	34.7 to 39.8
Cabin mounting bolt and nut	124 to 147	12.6 to 15.0	91.2 to 108.0
Cabin mount bracket mounting screw	197 to 225	20.0 to 23.0	145 to 166
Rear axle case mounting screw and nut M12 screw and nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5

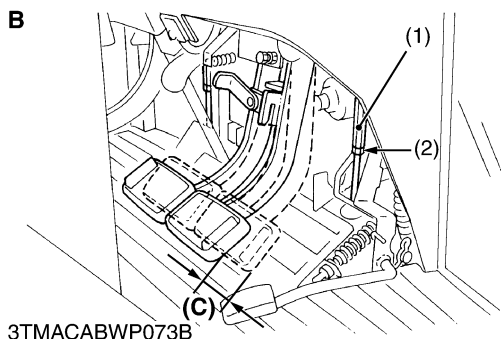
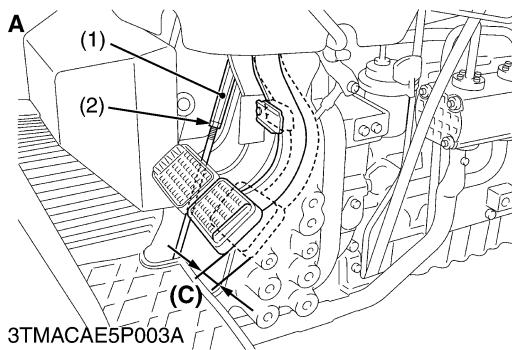
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4. CHECKING, DISASSEMBLING AND SERVICING

[1] BRAKE SYSTEM

(1) Checking and Adjusting

(A) Brake Pedal



Brake Pedal Free Travel

⚠ CAUTION

- Stop the engine and remove the key, then choke the wheel before checking brake pedal.

1. Release the parking brake.
2. Slightly depress the brake pedals and measure free travel (C) at top of pedal stroke.
3. If the measurement is not within the factory specifications, loosen the lock nut (2) and turn the turnbuckle (1) to adjust the rod length within acceptable limits.

Brake pedal free travel (C)	Factory spec.	40 to 45 mm 1.6 to 1.8 in.
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■ IMPORTANT

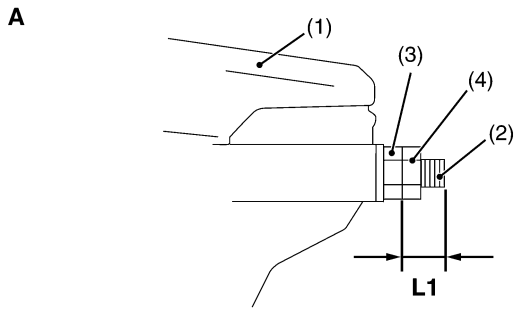
- Keep the free play in the right and left brake pedals equal.

- (1) Turnbuckle
- (2) Lock Nut

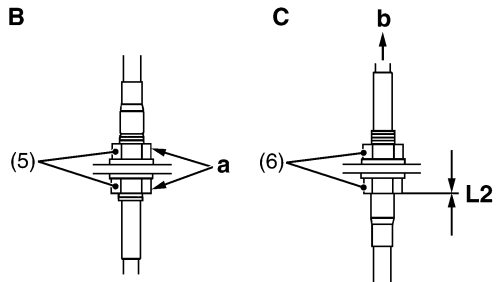
- A : ROPS Type
- B : CABIN Type

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(B) Parking Brake



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3TMACAE5P006A

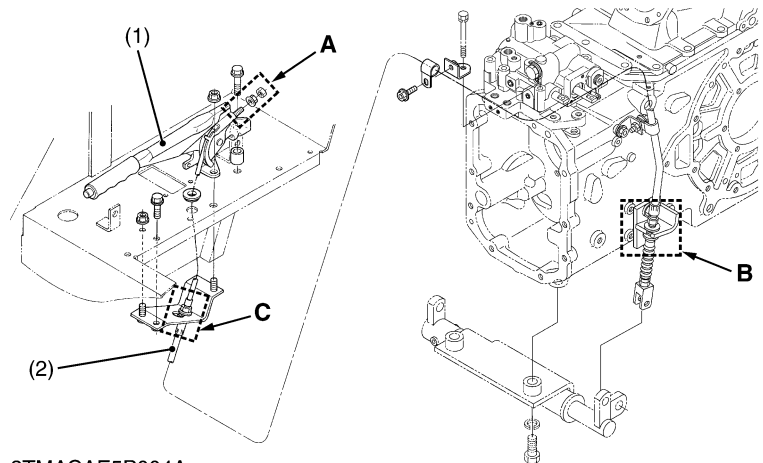
Parking Brake Cable (CABIN Type)

⚠ CAUTION

● **Stop the engine and remove the key, then choke the wheel before checking brake pedal.**

1. Measure the position **A**, **B** and **C**.
2. If the measurement is not within the factory specifications, loosen the lock nut to adjust the cable length within acceptable limits.

Parking brake cable length L1	Factory spec.	10 mm 0.39 in.
Parking brake cable length L2	Factory spec.	0 mm 0 in.

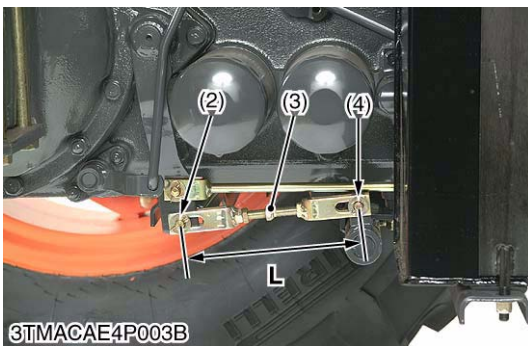
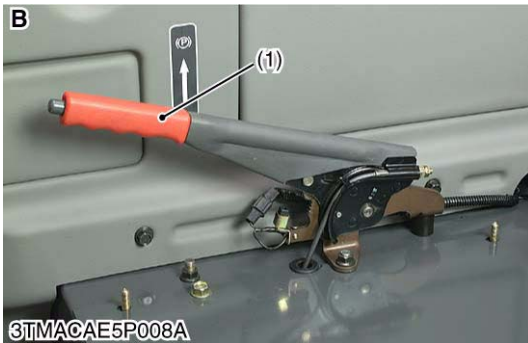
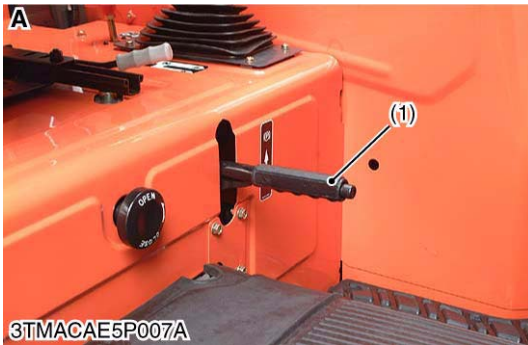


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- | | |
|-------------------------|-------------------|
| (1) Parking Brake Lever | (5) Flange Nut |
| (2) Parking Brake Cable | (6) Flange Nut |
| (3) Flange Nut | a : Center |
| (4) Nut | b : Up |

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Parking Brake Lever Free Play



⚠ CAUTION

● **Stop the engine and chock the wheel before checking parking brake lever.**

1. Pull the parking brake lever (1) just one notch.
2. Confirm that the clevis pins (2) (4) on both sides of the turnbuckle lightly contact outside of the hole at this time.
3. If not, adjust it with the turnbuckles (3).
4. Check the other side in a same way.

(Reference)

Parking brake rod length	Factory spec.	180 to 190 mm
L		7.09 to 7.48 in.

■ NOTE

- **After adjusting the parking brake lever free play.**
 - **Right and left parking brake for even braking.**
 - **With the parking brake released, make sure that the right and left tires do not drag on.**

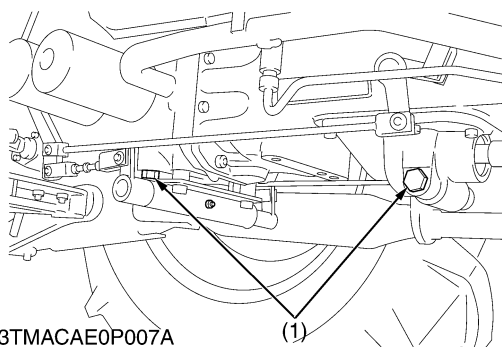
- (1) Parking Brake Lever
- (2) Clevis Pin
- (3) Turnbuckle
- (4) Clevis Pin

- A : ROPS Type**
- B : CABIN Type**

000002816E

[2] BRAKE CASE

(1) Disassembling and Assembling



Draining Transmission Fluid

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

(When reassembling)

- Fill up from filling port after removing the filling plug until reaching the gauge.
- After running the engine for a few minutes, stop it and check the fluid level again, add fluid to prescribed level if it is not correct level.

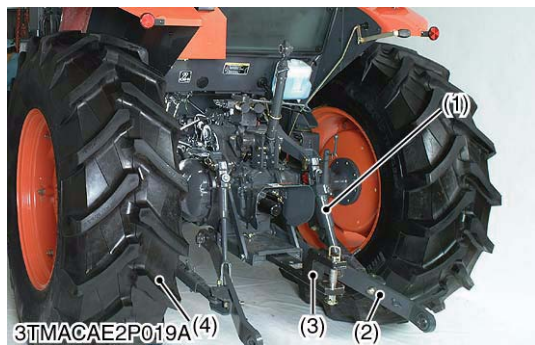
Transmission fluid	Capacity	ROPS	40.0 L 42.3 U.S.qts 35.2 Imp.qts
		CABIN	43.0 L 45.4 U.S.qts 37.8 Imp.qts

■ IMPORTANT

- Use only KUBOTA UDT or SUPER UDT fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)
- Do not mix difference brands oil together.

(1) Drain Plug

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Lift Rods and Lower Links

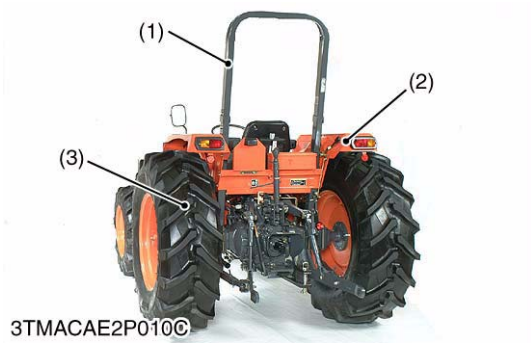
1. Remove the lift rods (1).
2. Remove the lower links (2) with stabilizer.
3. Remove the drawbar (3).
4. Remove the rear wheels (4).

Tightening torque	Rear wheel mounting nut	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft-lbs
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(1) Lift Rod
(2) Lower Link

(3) Drawbar
(4) Rear Wheel

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Rear Wheel, Fender and ROPS (ROPS Type)

1. Check the rear axle and transmission case securely mounted on the disassembly stands.
2. Loosen the rear wheel mounting nuts.
3. Remove the rear wheel (3).
4. Remove the brake rod (8) and parking brake rod (7).
5. Remove the differential lock rod (6).
6. Disconnect the combination lamp connector.
7. Remove the fender (2).
8. Remove the ROPS upper frame (1).
9. Remove the ROPS (5) with additional lever (4) for position control.

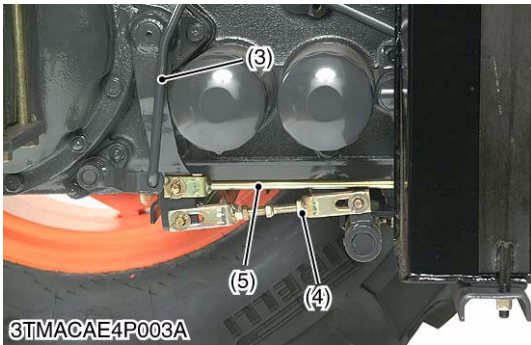
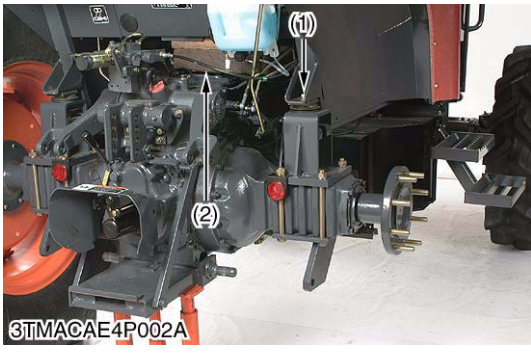
(When reassembling)

- Be sure to adjust the parking brake. (See page 5-S6.)

Tightening torque	ROPS upper frame mounting screw	9/16 UNF, grade 8 screw	149 to 179 N·m 15.2 to 18.3 kgf·m 110 to 132 ft-lbs
	ROPS mounting screw	M16, grade 9 screw	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft-lbs
	Fender mounting screw	3/8-16 UNF, grade 8 screw	47.0 to 53.9 N·m 4.8 to 5.5 kgf·m 34.7 to 39.8 ft-lbs
	Rear wheel mounting nut		260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft-lbs

- | | |
|----------------------|---------------------------|
| (1) ROPS Upper Frame | (5) ROPS |
| (2) Fender | (6) Differential Lock Rod |
| (3) Rear Wheel | (7) Parking Brake Rod |
| (4) Additional Lever | (8) Brake Rod |

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Rear Wheel and CABIN Mount Screw (CABIN Type)

1. Place the disassembling stand under the transmission case.
2. Remove the rear wheel.
3. Place the block of wood (2) between cabin and hydraulic cylinder to support the cabin.
4. Remove the cabin mount bracket mounting bolt (1) and nut.
5. Remove the differential lock rod (3).
6. Remove the brake rod (5) and parking brake rod (4).

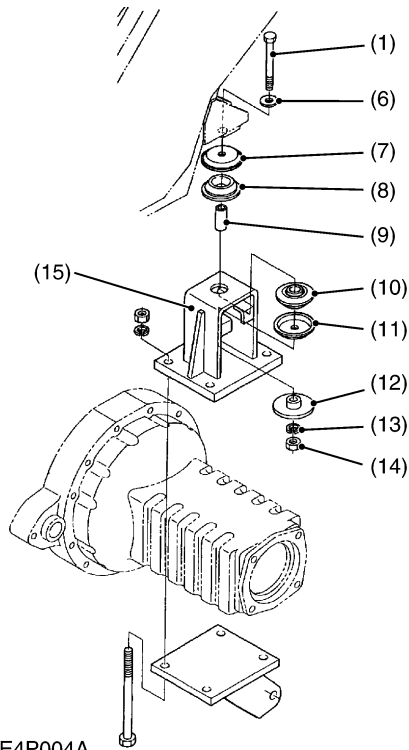
(When reassembling)

- Be sure to install the washers, plate and mount rubbers, etc. in their original positions.
- Be sure to adjust the parking brake. (See page 5-S5, S6.)

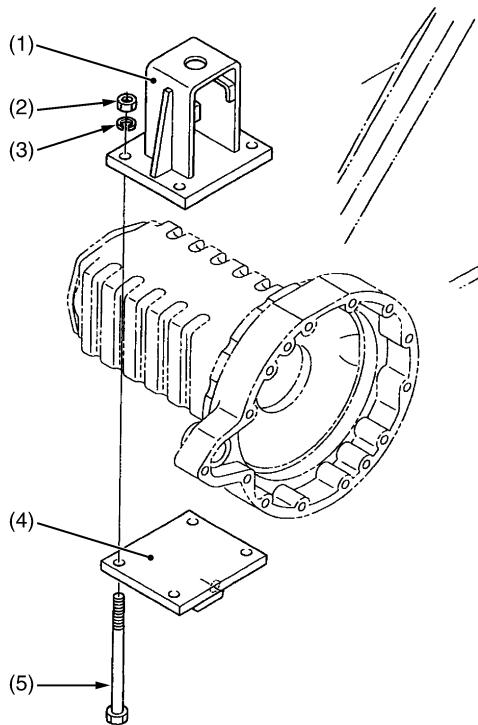
Tightening torque	Cabin mounting bolt and nut	124 to 147 N-m 12.6 to 15.0 kgf-m 91.2 to 108.0 ft-lbs
	Rear wheel mounting nut	260 to 304 N-m 26.5 to 31.0 kgf-m 192 to 224 ft-lbs

- | | |
|---------------------------|--------------------------|
| (1) Bolt | (9) Collar |
| (2) Block of Wood | (10) Mount Rubber |
| (3) Differential Lock Rod | (11) Plate |
| (4) Parking Brake Rod | (12) Plate |
| (5) Brake Rod | (13) Spring Washer |
| (6) Plain washer | (14) Nut |
| (7) Plate | (15) Cabin Mount Bracket |
| (8) Mount Rubber | |

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3TMACAE4P005A

Cabin Mount Bracket (CABIN Type)

1. Remove the cabin mount bracket (1) and (4).

(When reassembling)

Tightening torque	Cabin mount bracket mounting screw	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 ft-lbs
-------------------	------------------------------------	---

- (1) Cabin Mount Upper Bracket
- (2) Nut
- (3) Spring Washer
- (4) Cabin Mount Lower Bracket
- (5) Bolt

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Rear Axle Case

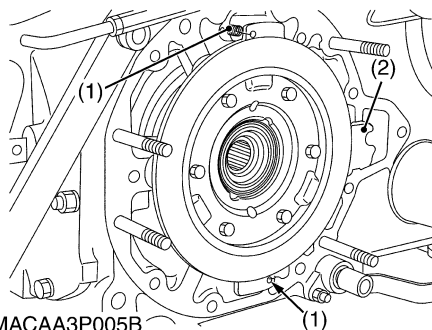
1. Remove the DT shift rod (If separating left side).
2. Remove the rear axle case mounting screw and nut.
3. Support the rear axle with nylon lift strap and hoist.
4. Separate the rear axle case from transmission case.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the rear axle case and transmission case, after eliminate the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting screw and nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 ft-lbs
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Brake Cam Plate

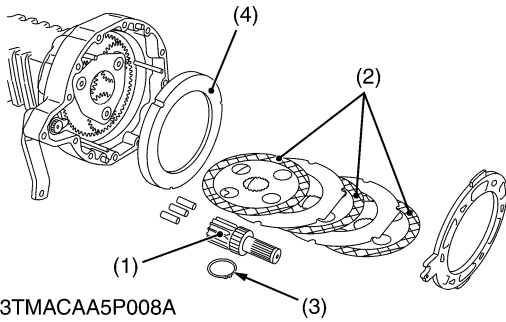
1. Remove the return springs (1).
2. Remove the brake cam plate (2).

(When reassembling)

- Apply grease to the brake ball seat. (Do not grease excessively.)

- (1) Return Spring
- (2) Brake Cam Plate

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Brake Shaft, Brake Disc and Brake Plate

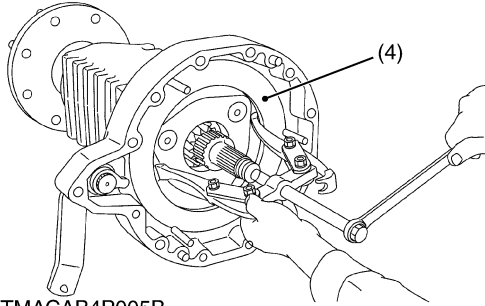
1. Draw out the brake shaft (1) with brake disc (2).
2. Remove the external snap ring (3).
3. Remove the brake plate (4).

(When reassembling)

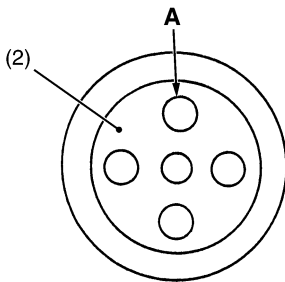
- Place the brake discs (2) so that the hole "A" of the second disc should be overlapped.

- | | |
|-----------------|------------------------|
| (1) Brake Shaft | (3) External Snap Ring |
| (2) Brake Disc | (4) Brake Plate |

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3TMACAB4P005B



3TMACAB5P013B

Brake Cam and Brake Cam Lever

1. Remove the external snap ring (1).
2. Remove the brake cam (2) and brake cam lever (3).

(When reassembling)

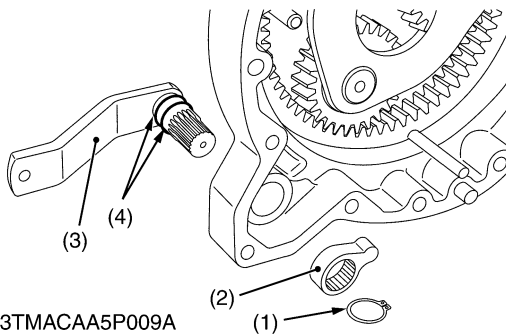
- Apply grease to the O-ring (4) and take care not to damage the O-ring.

■ **IMPORTANT**

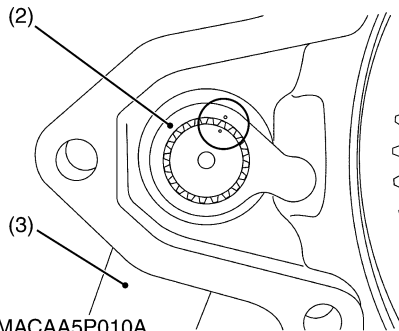
- **Install the brake cam (2) to brake cam lever, aligning the marks on them.**

- | | |
|------------------------|---------------------|
| (1) External Snap Ring | (3) Brake Cam Lever |
| (2) Brake Cam | (4) O-ring |

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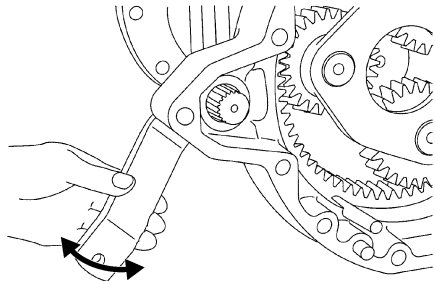


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(2) Servicing

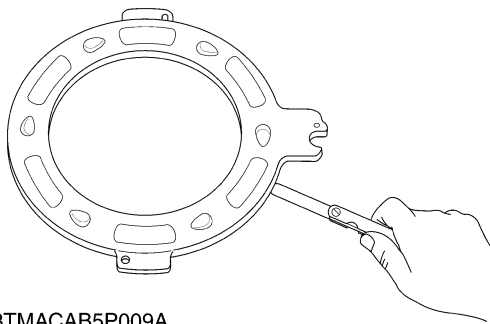


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Brake Cam Lever Movement

1. Move the brake cam lever by hand to check the movement..
2. If the movement is heavy, refine the brake cam with emery paper.

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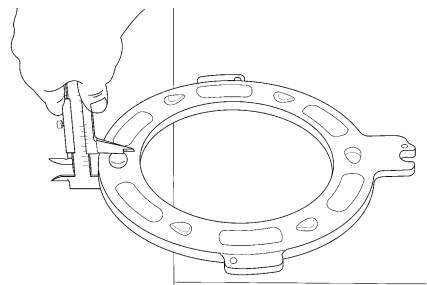
3TMACAB5P009A

Cam Plate Flatness

1. Place the cam plate on the surface plate.
2. Measure the flatness of cam plate with a feeler gauge at four points on a diagonal line.
3. If the measurement exceeds the allowable limit, replace it.

Cam plate flatness	Allowable limit	0.3 mm 0.012 in.
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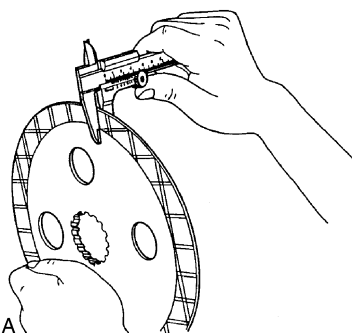
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Height of Cam Plate and Ball

1. Measure the dimensions of the cam plate with the ball installed.
2. If the measurement is less than the allowable limit, replace the cam plate and balls.
3. Inspect the ball holes of cam plate for uneven wear. If the uneven wear is found, replace it.

Height of cam plate and ball	Factory spec.	22.45 to 22.55 mm 0.8839 to 0.8879 in.
	Allowable limit	22.00 mm 0.8661 in.

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Brake Disc Wear

1. Measure the brake disc thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Brake disc wear	Factory spec.	4.15 to 4.35 mm 0.1634 to 0.1713 in.
	Allowable limit	3.3 mm 0.130 in.

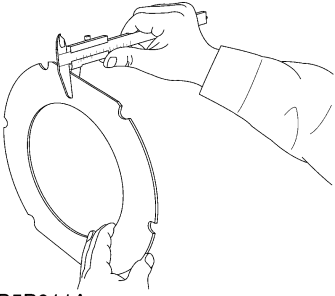
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Brake Plate Wear

1. Measure the brake plate thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Brake plate wear	Factory spec.	2.25 to 2.35 mm 0.0886 to 0.0925 in.
	Allowable limit	1.5 mm 0.059 in.

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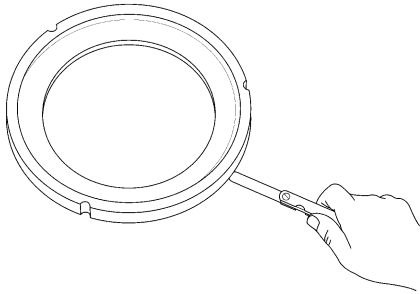
3TMACAB5P011A

Brake Plate Flatness

1. Place the brake plate on the surface plate.
2. Measure the flatness of brake plate with a feeler gauge at four points on a diagonal line.
3. If the measurement exceeds the allowable limit, replace it.

Brake plate flatness	Allowable limit	0.3 mm 0.012 in.
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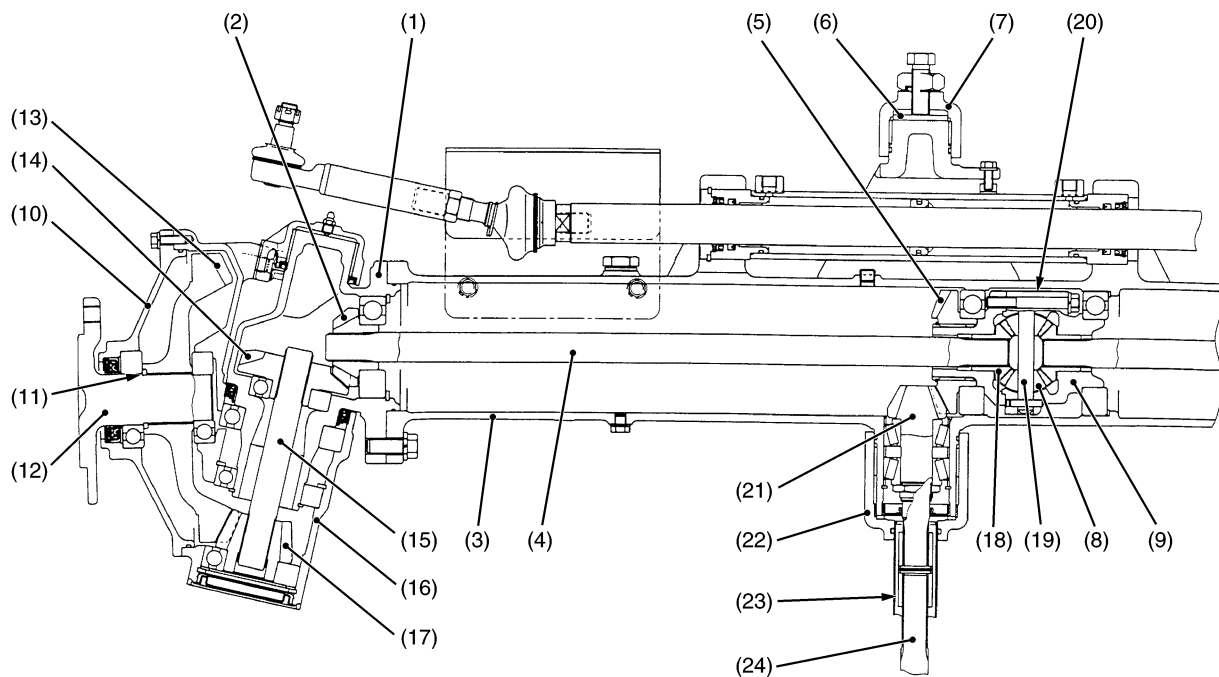
3TMACAB5P012A

6 FRONT AXLE

CONTENTS

1. STRUCTURE.....	6-M1
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1. STRUCTURE



3TMABAB6P001A

(1) Bevel Gear Case	(7) Front Axle Bracket, Front	(13) Bevel Gear	(19) Pinion Shaft
(2) Bevel Gear	(8) Differential Pinion	(14) Bevel Gear	(20) Differential Assembly
(3) Front Axle Case	(9) Differential Case	(15) Bevel Gear Shaft	(21) Spiral Bevel Pinion Shaft
(4) Differential Yoke Shaft	(10) Axle Flange	(16) Front Gear Case	(22) Front Bracket, Rear
(5) Spiral Bevel Gear	(11) Collar	(17) Bevel Gear	(23) Coupling
(6) Collar	(12) Axle	(18) Differential Side Gear	(24) Propeller Shaft

The front axle of the 4WD is constructed as shown above. Power is transmitted from the transmission through the propeller shaft (24) and to the bevel pinion shaft (21), then to the spiral bevel gear (5) after that to the differential gear.

The power through the differential is transmitted to the differential yoke shaft (4), and to the bevel gear shaft (15) in the bevel gear case (1).

The revolution is greatly reduced by the bevel gears (17), (13), then the power is transmitted to the axle (12).

The differential system allows each wheel to rotate at a different speed to make turning easier.

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CONTENTS

1. TROUBLESHOOTING.....	6-S1
2. SERVICING SPECIFICATIONS.....	6-S2
3. TIGHTENING TORQUES.....	6-S4
4. CHECKING, DISASSEMBLING AND SERVICING.....	6-S5
[1] CHECKING AND ADJUSTING.....	6-S5
[2] DISASSEMBLING AND ASSEMBLING.....	6-S7
(1) Separating Front Axle.....	6-S7
(2) Disassembling Front Axle.....	6-S10
[3] SERVICING	6-S14

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Wander to Right or Left	● Tire pressure uneven	Adjust	G-64
	● Improper toe-in adjustment (improper alignment)	Adjust	6-S5
	● Clearance between front axle case boss and front axle bracket (front, rear) bushing excessive	Replace	6-S19
	● Front axle rocking force too small	Adjust	6-S6
	● Front wheel sway excessive	Replace	6-S5
	● Tie-rod end loose	Tighten	6-S5
	● Air sucked in power steering circuit	Bleed	8-S24 to 27
Front Wheels Can Not Be Driven	● Propeller shaft broken	Replace	6-S7
	● Front wheel drive gears in transmission broken	Replace	—
	● Front differential gear broken	Replace	6-S13, S14
	● Shift fork broken	Replace	—
	● Coupling displaced	Reassemble	6-S7
Noise	● Gear backlash excessive	Adjust or replace	6-S16 to 18
	● Oil insufficient	Replenish	G-8
	● Bearings damaged or broken	Replace	—
	● Gears damaged or broken	Replace	—
	● Spiral bevel pinion shaft turning force improper	Adjust	6-S15

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Front Wheel Alignment	Toe-in	2.0 to 8.0 mm 0.078 to 0.315 in.	—
Front Wheel	Steering Angle	0.925 to 0.960 rad 53 to 55 °	—
	Axial Sway	5.0 mm 0.197 in.	—
	Radial Sway	5.0 mm 0.197 in.	—
Differential Case, Differential Case Cover to Differential Side Gear	Clearance	0.040 to 0.123 mm 0.00157 to 0.00484 in.	0.20 mm 0.0079 in.
	Differential Case (I.D.)	32.000 to 32.062 mm 1.25984 to 1.26228 in.	—
	Differential Case Cover (I.D.)	32.000 to 32.062 mm 1.25984 to 1.26228 in.	—
	Differential Side Gear (O.D.)	31.939 to 31.960 mm 1.25744 to 1.25827 in.	—
Pinion Shaft to Differential Pinion	Clearance	0.064 to 0.100 mm 0.00252 to 0.00394 in.	0.25 mm 0.0096 in.
	Pinion Shaft (O.D.)	13.950 to 13.968 mm 0.54921 to 0.54992 in.	—
	Differential Pinion (I.D.)	14.032 to 14.050 mm 0.55244 to 0.55315 in.	—
Differential Pinion to Differential Side Gear	Backlash	0.20 to 0.30 mm 0.0079 to 0.0118 in.	0.40 mm 0.016 in.
Spiral Bevel Pinion Shaft	Turning Torque	0.98 to 1.18 N-m 0.10 to 0.12 kgf-m 0.72 to 0.87 ft-lbs	—
Bevel Pinion Shaft to Bevel Gear	Backlash	0.20 to 0.30 mm 0.0079 to 0.0118 in.	—
10T Bevel Gear to 17T Bevel Gear	Backlash	0.20 to 0.30 mm 0.0079 to 0.0118 in.	—
9T Bevel Gear to 43T Bevel Gear	Backlash	0.20 to 0.30 mm 0.0079 to 0.0118 in.	—
Front Axle Case Boss (Front) to Bracket Bushing	(Clearance)	0.025 to 0.160 mm 0.00098 to 0.00630 in.	0.35 mm 0.0138 in.
	Front Axle Case Boss (Front) (O.D.)	49.950 to 49.975 mm 1.96653 to 1.96752 in.	—
	Bushing (I.D.)	50.000 to 50.110 mm 1.96850 to 1.97283 in.	—

Item		Factory Specification	Allowable Limit
Front Axle Case Boss (Rear) to Bracket Bushing	Clearance	0.025 to 0.190 mm 0.00098 to 0.00748 in.	0.35 mm 0.0138 in.
	Front Axle Case Boss (Rear) (O.D.)	70.000 to 70.035 mm 2.75590 to 2.75728 in.	—
	Bushing (I.D.)	70.060 to 70.190 mm 2.75826 to 2.76338 in.	—
Press-fitting	Depth of bushing	12.0 to 13.0 mm 0.47 to 0.51 in.	—
Bevel Gear Case Boss to Front Axle Support Bushing	Clearance	0.060 to 0.220 mm 0.00236 to 0.00866 in.	0.50 mm 0.0197 in.
	Bevel Gear Case Boss (O.D.)	54.970 to 55.000 mm 2.16417 to 2.16535 in.	—
	Front Axle Support Bushing (I.D.)	55.060 to 55.190 mm 2.16772 to 2.17283 in.	—

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3. TIGHTENING TORQUES

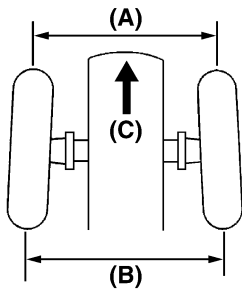
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
Tie-rod end lock nut	166.7 to 196.1	17.0 to 20.0	123.0 to 144.7
Front axle rocking force adjusting screw	19.6 to 29.4	2.0 to 3.0	14.5 to 21.7
Front axle rocking force adjusting lock nut	98.1 to 147.1	10.0 to 15.0	72.3 to 108.5
Power steering hose retaining nut	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Cylinder cover	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Front wheel mounting nut	166.7 to 196.1	17.0 to 20.0	123.0 to 144.7
Front bracket mounting screw	103.0 to 117.7	10.5 to 12.0	75.9 to 86.8
Front bracket mounting nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Tie-rod end slotted nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Bevel gear case mounting screw	166.7 to 196.1	17.0 to 20.0	123.0 to 144.7
Axle flange mounting screw	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3
Tie-rod joint and steering cylinder mounting screw	166.7 to 196.1	17.0 to 20.0	123.0 to 144.7
Differential case cover mounting screw	60.8 to 70.6	6.2 to 7.2	44.8 to 52.1

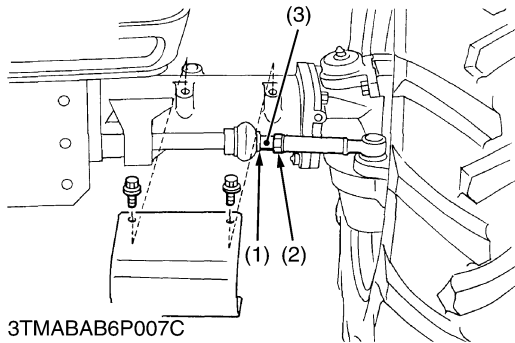
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4. CHECKING, DISASSEMBLING AND SERVICING

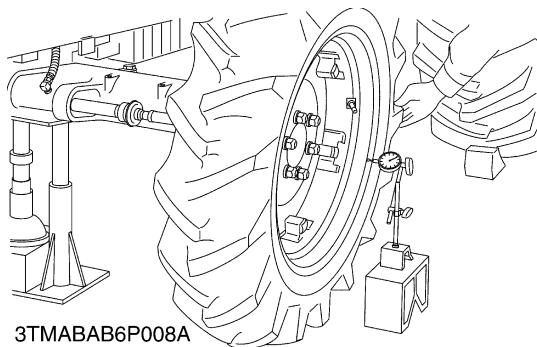
[1] CHECKING AND ADJUSTING



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Toe-in

1. Inflate the tires to the specified pressure.
2. Turn the front wheels straight ahead.
3. Measure the toe-in (B-A).
4. If the measurement is not within the factory specifications, adjust the tie-rod length.

Toe-in (B-A)	Factory spec.	2.0 to 8.0 mm 0.08 to 0.31 in.
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■ Toe-in Adjustment

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

Tightening torque	Tie-rod end lock nut	166.7 to 196.1 N-m 17.0 to 20.0 kgf-m 123.0 to 144.7 ft-lbs
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- (1) Snap Ring
- (2) Tie-rod Lock Nut
- (3) Tie-rod Joint

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

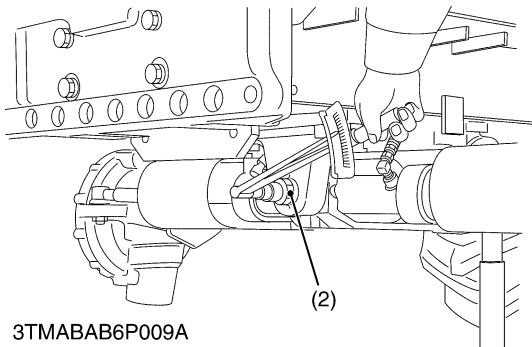
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Axial Sway of Front Wheel

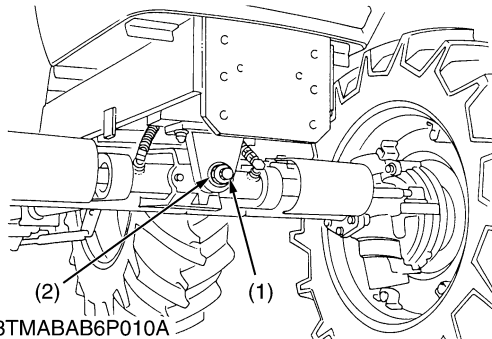
1. Jack up the front side of tractor.
2. Set a dial gauge on the outside of rim.
3. Turn the wheel slowly and rear the runout of rim.
4. If the measurement exceeds the factory specifications, check the bearing, rim and front wheel hub.

Axial sway of front wheel	Factory spec.	Less than 5.0 mm 0.197 in.
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Adjusting Front Axle Pivot

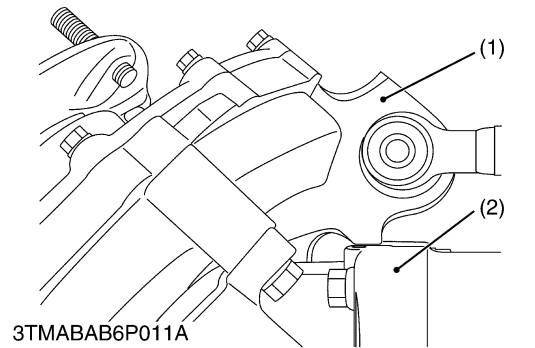
1. Jack up the tractor body, then loosen the lock nut (2).
2. Measure the adjusting screw tightening torque.
3. If tightening torque is not within the factory specifications, adjust the adjusting screw (1).
4. After adjustment, tighten the lock nut firmly.

Tightening torque	Front axle adjusting screw	19.6 to 29.4 N-m 2.0 to 3.0 kgf-m 14.5 to 21.7 ft-lbs
	Lock nut	98.1 to 147.1 N-m 10.0 to 15.0 kgf-m 72.3 to 108.5 ft-lbs

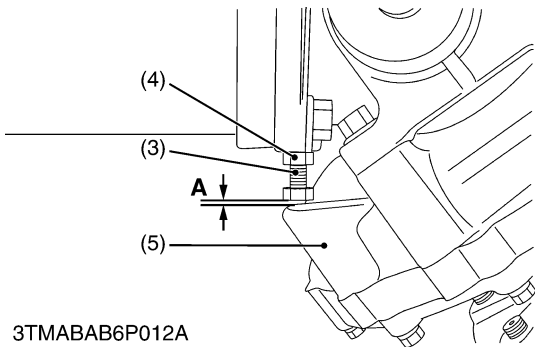
(1) Adjusting Screw

(2) Lock Nut

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Front Wheel Steering Angle

1. Inflate the tires to the specified pressure.
2. Steer the wheels to the extreme right until the front gear case (1) contacts with the bevel gear case (2) at right hand side of the front axle.
3. If the front gear case (1) can not be contacted with the bevel gear case (2), shorten the length of stopper (3).
4. Keeping the front gear case (1) contact with the bevel gear case (2), make a specified clearance (A) as shown in the lower table.
5. After adjustment, secure the stopper with the lock nut (4).
6. For adjusting the left steering angle, perform the same procedure as mentioned in right steering angle.

Clearance (A) between bevel gear case and stopper	Factory spec.	1.0 to 3.0 mm 0.04 to 0.12 in.
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(1) Front Gear Case

(5) Front Gear Case

(2) Bevel Gear Case

(3) Stopper

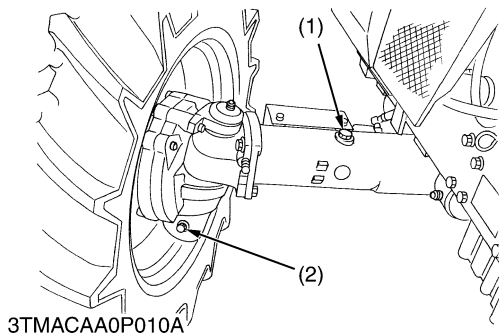
A : Clearance

(4) Lock Nut

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[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Front Axle



Draining Front Axle Case Oil

1. Place oil pans underneath the front axle case.
2. Remove the drain plug (2) both sides and filling port plug (1) to drain the oil.
3. After draining, reinstall the drain plugs (2) and filling port plug (1).

(When reassembling)

- Remove the filling port plug (1).
- Fill with the new oil.
- After filling, reinstall the filling port plug (1).

Capacity	Front axle case oil	8.0 L 8.5 U.S.qts 7.0 Imp.qts
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■ IMPORTANT

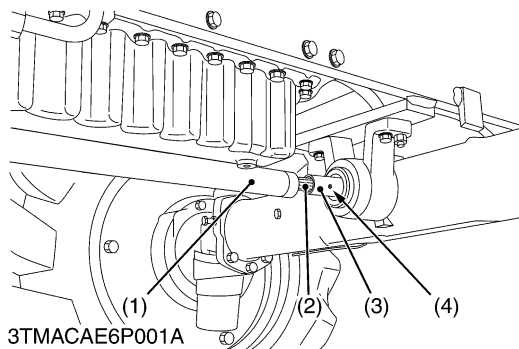
- Use KUBOTA UDT or SUPER UDT fluid or SAE80, 90 gear oil.

Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-8.)

(1) Filling Port Plug

(2) Drain Plug

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Propeller Shaft

1. Slide the propeller shaft cover (1), (6) after removing the screws (5).
2. Tap out the spring pin (4), (7) and then slide the coupling (3), (8) to the front and rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (2).

(1) Propeller Shaft Cover

(5) Screw

(2) Propeller Shaft

(6) Propeller Shaft Cover

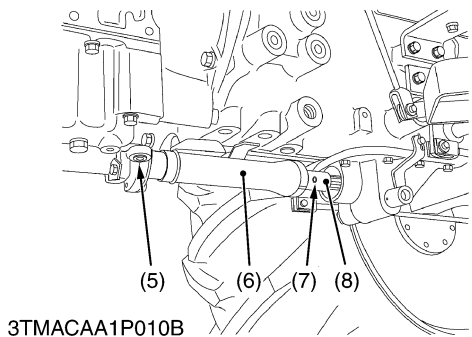
(3) Coupling

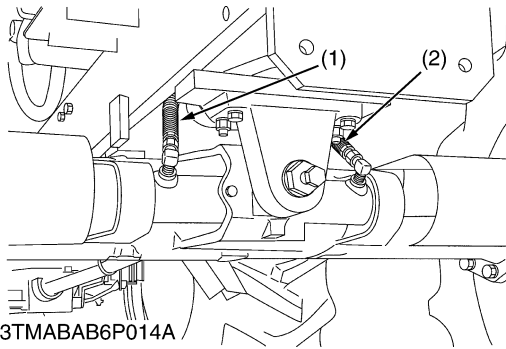
(7) Spring Pin

(4) Spring Pin

(8) Coupling

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Power Steering Hoses

1. Disconnect the power steering hoses (1), (2) from steering cylinder.

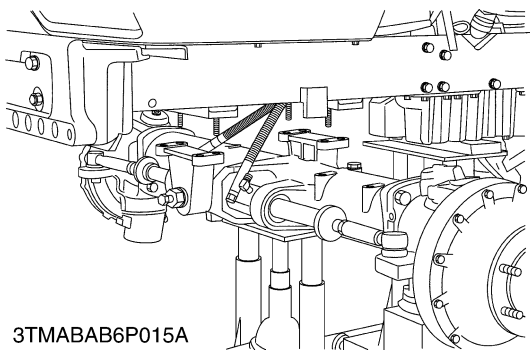
(When reassembling)

- Connect the power steering hose 1 with green tape to the RH.

Tightening torque	Power steering hose retaining nut	24.5 to 29.4 N-m 2.5 to 3.0 kgf-m 18.1 to 21.7 ft-lbs
	Cylinder cover	48.1 to 55.9 N-m 4.9 to 5.7 kgf-m 35.4 to 41.2 ft-lbs

- (1) Power Steering Hose 1 with Green Tape (2) Power Steering Hose 2

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Front Wheel and Front Axle

1. Check the front axle and engine are securely mounted on the disassembly stand.
2. Loosen the front wheel mounting nuts.
3. Lift the front axle and remove the front wheels.
4. Remove the bracket (front) mounting screws and nuts.
5. Remove the bracket (rear) mounting screws and nuts.
6. Separate the front axle from front axle bracket.

(When reassembling)

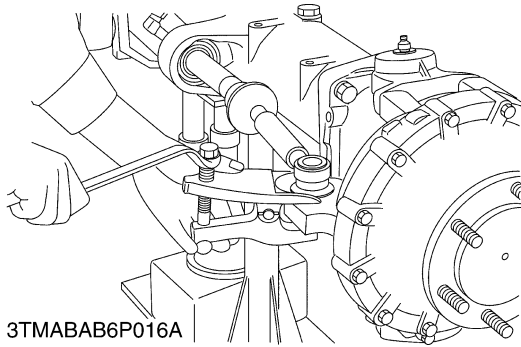
- Connect the power steering hose 1 with green tape to the RH.

Tightening torque	Front wheel mounting nut	166.7 to 196.1 N-m 17.0 to 20.0 kgf-m 123.0 to 144.7 ft-lbs
	Bracket mounting screw	103.0 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs
	Bracket mounting nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.52 ft-lbs

■ IMPORTANT

- Be sure to adjust the front axle rocking force.

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Tie-rod

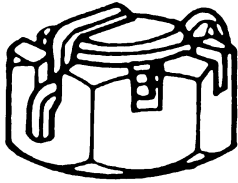
1. Pull out the cotter pin and loosen the tie-rod end slotted nut.
2. Disconnect the tie-rod with a tie-rod end lifter (Code No. 07909-39051).

(When reassembling)

- After tightening the tie-rod end nut to the specified torques, install a cotter pin as shown in the figure.

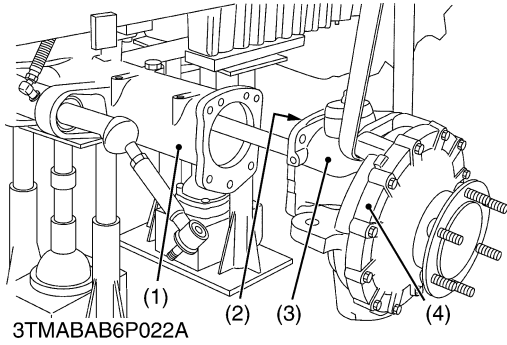
Tightening torque	Tie-rod end slotted nut	77.5 to 90.2 N·m
		7.9 to 9.2 kgf·m
		57.1 to 66.5 ft-lbs

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(2) Disassembling Front Axle



Bevel Gear Case and Front Gear Case

1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (3) and front gear case (4) as a unit from the front axle case (1).

(When reassembling)

- Apply grease to the O-ring (2) and take care not to damage it.
- Do not interchange right and left bevel gear case assemblies.

Tightening torque	Bevel gear case mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123.0 to 144.7 ft·lbs
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- | | |
|---------------------|---------------------|
| (1) Front Axle Case | (3) Bevel Gear Case |
| (2) O-ring | (4) Front Gear Case |

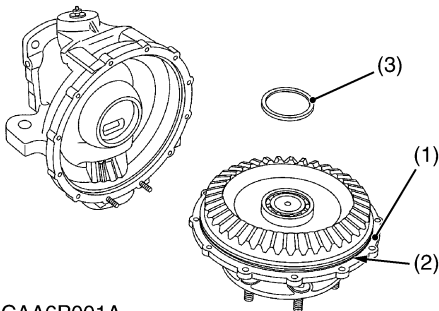
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Axle Flange and Front Gear Case

1. Remove the axle flange mounting screws.
2. Remove the axle flange (1) and shim (3).

(When reassembling)

- Apply grease to the O-ring (2) of axle flange.
- Tighten the axle flange mounting screws and nuts diagonally in several steps.
- Install the shim (3) to its original position.
- The thickness of shim (3) uses 0.4 mm (0.016 in.) by the standard.



Tightening torque	Axle flange mounting screw	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 21.7 to 25.3 ft·lbs
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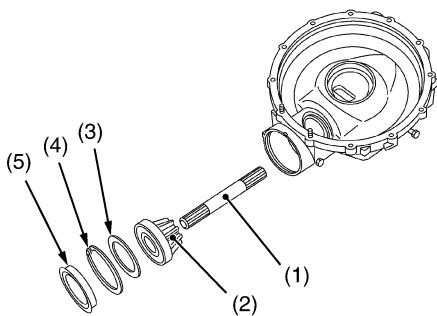
- | | |
|-----------------|----------|
| (1) Axle Flange | (3) Shim |
| (2) O-ring | |

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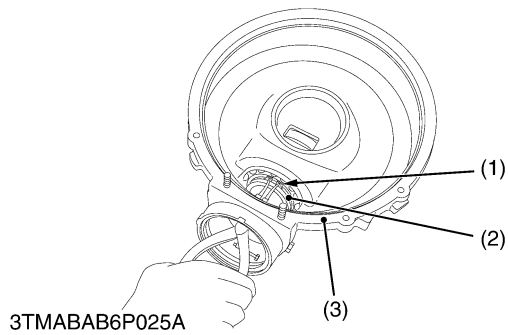
Bevel Gear and Bevel Gear Shaft

1. Remove the plug (5).
2. Remove the internal snap ring (4) and shim (3).
3. Tap out the bevel gear (2) with ball bearing.
4. Draw out the bevel gear shaft (1).

- | | |
|----------------------|------------------------|
| (1) Bevel Gear Shaft | (4) Internal Snap Ring |
| (2) Bevel Gear | (5) Plug |
| (3) Shim | |



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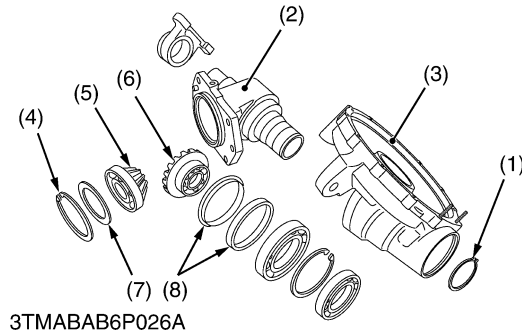


Bevel Gear Case

1. Remove the external snap ring (1).
2. Tap the bevel gear case (2) and separate it from the front gear case (3).

- | | |
|------------------------|---------------------|
| (1) External Snap Ring | (3) Front Gear Case |
| (2) Bevel Gear Case | |

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Bevel Gear Case Gears

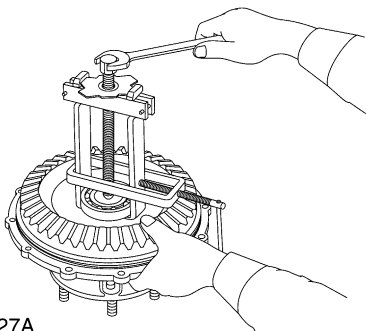
1. Remove the internal snap ring (4).
2. Take out the bevel gears (5), (6) with ball bearings, and shims (7).

(When reassembling)

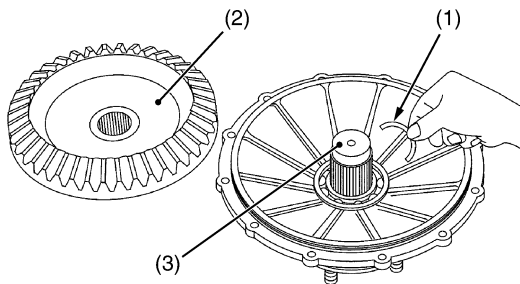
- Install the shims (7) to their original position.
- Install the oil seal (8) of bevel gear case, noting its direction.

- | | |
|------------------------|----------------|
| (1) External Snap Ring | (5) Bevel Gear |
| (2) Bevel Gear Case | (6) Bevel Gear |
| (3) Front Gear Case | (7) Shim |
| (4) Internal Snap Ring | (8) Oil Seal |

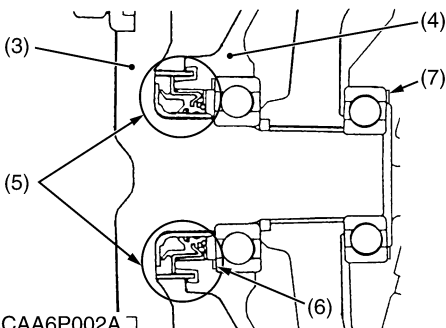
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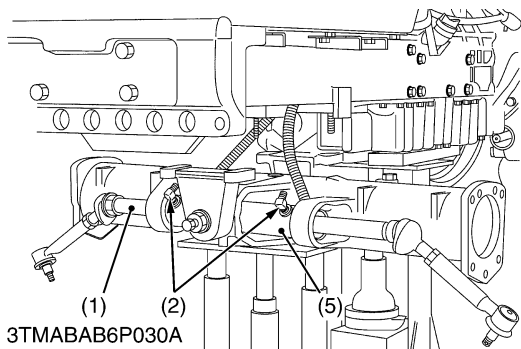
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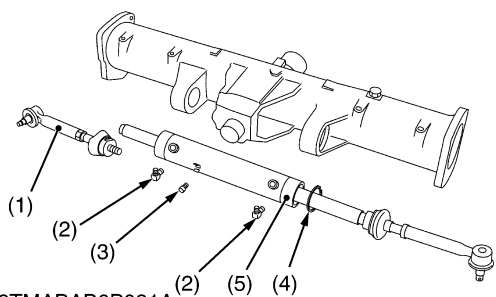
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3TMACAA6P002A 7



3TMABAB6P030A



3TMABAB6P031A

Axle

1. Remove the bearing with a special use puller set (Code No. 07916-09032).
2. Take out the bevel gear (2).
3. Take out the collar (1).
4. Tap out the axle (3).

(When reassembling)

- Install the oil seal (5) of axle flange (4), noting its direction as shown in the figure below.
- End play of axle shaft adjusts with shim (6), (7) to 0.1 mm (0.004 in.) or less while axle flange and front case were assembled.
- Install the shims (6), (7) to their original position.
- The thickness of shim (6) uses 0.5 mm (0.020 in.) and shim (7), uses 0.4 mm (0.016 in.) by the standard. There some difference in the production lot.

- | | |
|-----------------|--------------|
| (1) Collar | (5) Oil Seal |
| (2) Bevel Gear | (6) Shim |
| (3) Axle | (7) Shim |
| (4) Axle Flange | |

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Steering Cylinder

1. Remove the tie-rod joint (1) (right side).
2. Remove the cylinder set screw (3).
3. Remove the nipples (2) from steering cylinder.
4. Remove the internal snap ring (4).
5. Draw out the steering cylinder (5).

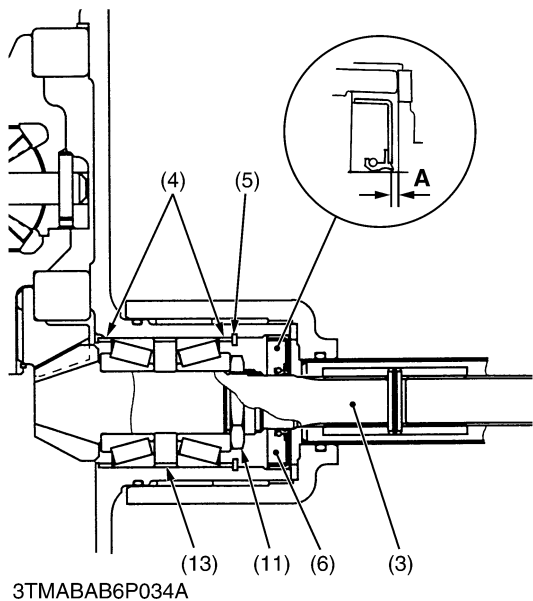
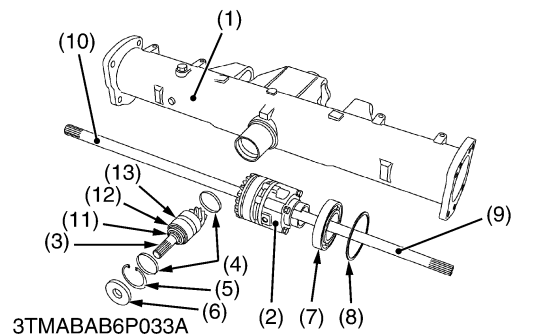
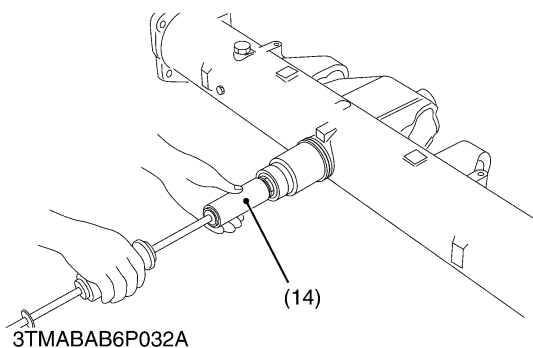
(When reassembling)

- Apply liquid lock (Three Bond 1372 or equivalent) to the tie-rod joint.

Tightening torque	Tie-rod joint and steering cylinder mounting screw	166.7 to 196.1 N-m 17.0 to 20.0 kgf-m 123.0 to 144.7 ft-lbs
-------------------	--	---

- | | |
|------------------------|------------------------|
| (1) Tie-rod Joint | (4) Internal Snap Ring |
| (2) Nipple | (5) Steering Cylinder |
| (3) Cylinder Set Screw | |

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Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Take out the differential yoke shaft (9), (10) both sides.
2. Remove the oil seal (6) and internal snap ring (5).
3. Remove the collar (4).
4. Remove the spiral bevel pinion shaft (3) by the pinion shaft remover (14). (See page G-59.)
5. Take out the differential gear assembly (2), ball bearing (7) and shim (8) from left side of front axle case (1).
6. Remove the stake of lock nut (11), and then remove the lock nut (11).
7. Remove the taper roller bearings (12).

(When reassembling)

- Replace the lock nut (11) and oil seal (6) with new ones.
- Apply grease to the oil seal (6).
- Install the shims and collars to their original position.
- Install the taper roller bearings correctly, noting their direction and apply gear oil to them.
- When press-fitting an oil seal (6), observe the dimension "A" described in the figure.
- Be sure to adjust the spiral bevel pinion shaft turning torque with lock nut (11) after assemble the spiral bevel pinion shaft assembly.

■ **IMPORTANT**

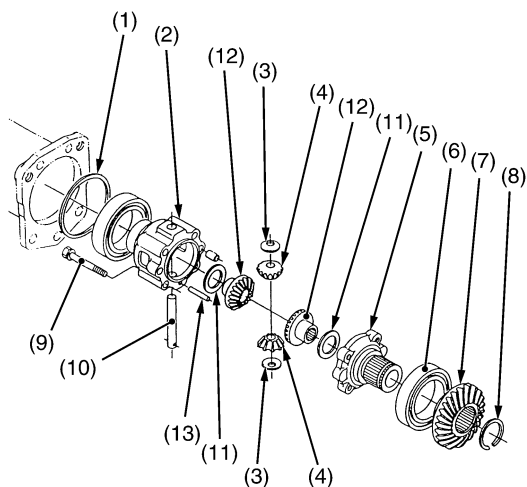
- **After adjusting the turning torque stake the lock nut (11) firmly.**

Turning torque of spiral bevel pinion shaft	Factory spec.	0.98 to 1.18 N·m 0.10 to 0.12 kgf·m 0.72 to 0.87 ft·lbs
---	---------------	---

- | | |
|----------------------------------|-----------------------------------|
| (1) Front Axle Case | (10) Differential Yoke Shaft L.H. |
| (2) Differential Gear Assembly | (11) Lock Nut |
| (3) Spiral Bevel Pinion Shaft | (12) Taper Roller Bearing |
| (4) Adjusting Collar | (13) Collar |
| (5) Internal Snap Ring | (14) Pinion Shaft Remover |
| (6) Oil Seal | |
| (7) Ball Bearing | |
| (8) Shim | |
| (9) Differential Yoke Shaft R.H. | |

**A : Dimension A : 0.5 to 1.0 mm
(0.020 to 0.039 in.)**

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Differential Gear

1. Remove the differential case cover mounting screws (9) and then take out the differential case cover (5), ball bearing (6) and spiral bevel gear (7) as a unit.
2. Remove the external snap ring (8), and then remove the ball bearing (6) and spiral bevel gear (7) as a unit with a puller.
3. Remove the straight pin (13).
4. Pull out the pinion shaft (10) and take out the differential pinions (4) and differential side gears (12).

(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gears (12) and differential pinions (4).

IMPORTANT

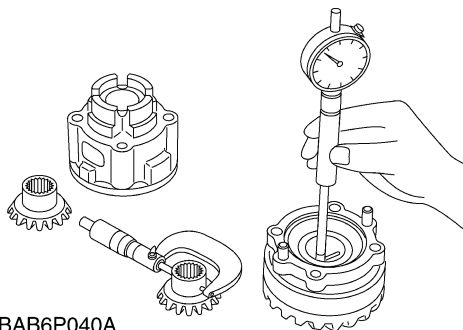
- After adjusting the turning torque stake the lock nut (11) firmly.

Tightening torque	Differential case cover mounting screw	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 44.8 to 52.1 ft·lbs
-------------------	--	---

- | | |
|-----------------------------|--|
| (1) Shim | (8) External Snap Ring |
| (2) Differential Case | (9) Differential Case Cover Mounting Screw |
| (3) Thrust Collar | (10) Pinion Shaft |
| (4) Differential Pinion | (11) Shim |
| (5) Differential Case Cover | (12) Differential Side Gear |
| (6) Ball Bearing | (13) Straight Pin |
| (7) Spiral Bevel Gear | |

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[3] SERVICING



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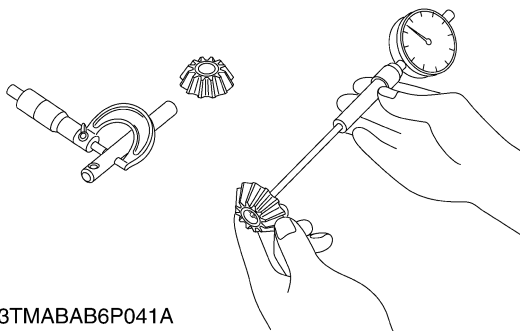
Clearance between Differential Case (Differential Case Cover) and Differential Side Gear

1. Measure the differential side gear O.D..
2. Measure the differential case bore I.D. and calculate the clearance.
3. Measure the differential case cover bore I.D. and calculate the clearance.
4. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between differential case (differential case cover) and differential side gear	Factory spec.	0.040 to 0.123 mm 0.00157 to 0.00484 in.
	Allowable limit	0.20 mm 0.0079 in.

Differential case bore I.D.	Factory spec.	32.000 to 32.062 mm 1.25984 to 1.26228 in.
Differential case cover bore I.D.	Factory spec.	32.000 to 32.062 mm 1.25984 to 1.26228 in.
Differential side gear O.D.	Factory spec.	31.939 to 31.960 mm 1.25744 to 1.25827 in.

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Clearance between Pinion Shaft and Differential Pinion

1. Measure the pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between pinion shaft and differential pinion	Factory spec.	0.064 to 0.100 mm 0.00252 to 0.00394 in.
	Allowable limit	0.25 mm 0.0096 in.

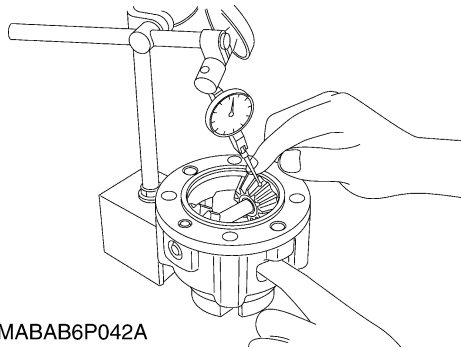
Pinion shaft O.D.	Factory spec.	13.950 to 13.968 mm 0.54921 to 0.54992 in.
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Differential pinion I.D.	Factory spec.	14.032 to 14.050 mm 0.55244 to 0.55315 in.
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Backlash between Differential Pinion and Differential Side Gear

1. Set a dial gauge (lever type) on a tooth of the differential pinion.
2. Fix the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement exceeds the factory specifications, adjust with the differential side gears shims.



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Backlash between differential pinion and differential side gear	Factory spec.	0.20 to 0.30 mm 0.0079 to 0.0118 in.
	Allowable limit	0.40 mm 0.016 in.

(Reference)

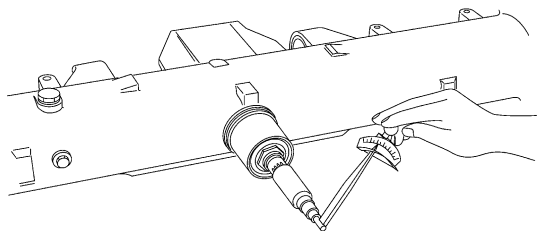
- Thickness of adjusting shims

0.4 mm (0.016 in.)	1.0 mm (0.039 in.)
0.6 mm (0.024 in.)	1.2 mm (0.047 in.)
0.8 mm (0.031 in.)	
- Tooth contact : More than 35 %

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Turning Torque of Spiral Bevel Pinion Shaft (Pinion Shaft Only)

1. Install the spiral bevel pinion shaft assembly only to the front axle case.
2. Measure the turning torque of spiral bevel pinion shaft.
3. If the turning torque is not within the factory specifications, adjust with the lock nut.



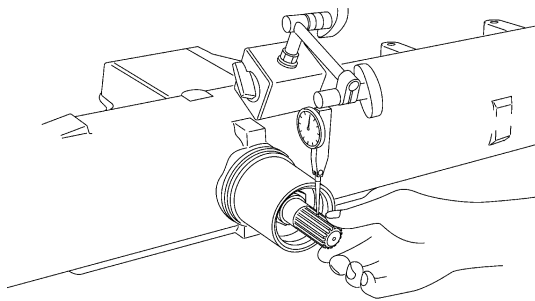
3TMABAB6P043A

Turning torque of spiral bevel pinion shaft	Factory spec.	0.98 to 1.18 N·m 0.10 to 0.12 kgf·m 0.72 to 0.87 ft-lbs
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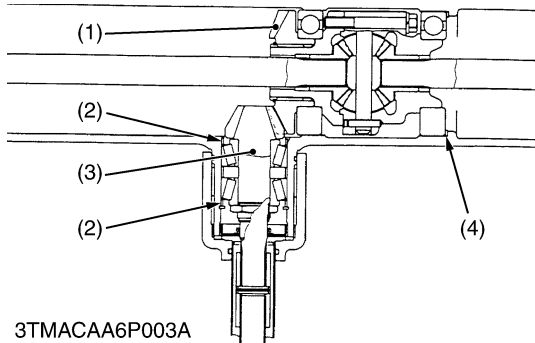
NOTE

- After turning torque adjustment, be sure to stake the lock nut.

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3TMACAA6P003A

(A)



3TMABAB3P043A

(B)



3TMACAB6P042A

(C)



3TMACAB6P043A

Backlash and Tooth Contact between Bevel Pinion Shaft and Bevel Gear

1. Set a dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the bevel pinion shaft (3) and moving the bevel gear (1) by hand.
3. If the backlash exceeds the allowable limit, adjust with the shim (4).
4. Adjust the backlash properly by repeating the above procedures.

Backlash between bevel gear and bevel pinion shaft	Factory spec.	0.20 to 0.30 mm 0.0079 to 0.0118 in.
	Allowable limit	0.40 mm 0.0157 in.

5. Apply red lead lightly over several teeth at three positions equally spaced on the bevel gear (1).
6. Turn the bevel pinion shaft (3), while pressing a wooden piece against the periphery of the bevel gear.
7. Check the tooth contact. If not proper, adjust according to the instructions shown in the figure.

(Reference)

- Thickness of adjusting collar (2) :

5.8 mm (0.228 in.)	6.2 mm (0.244 in.)
5.9 mm (0.232 in.)	6.4 mm (0.252 in.)
6.0 mm (0.236 in.)	10.0 mm (0.394 in.)
6.1 mm (0.240 in.)	

- Thickness of adjusting shims (4)

1.6 mm (0.063 in.)	2.2 mm (0.087 in.)
1.8 mm (0.071 in.)	2.4 mm (0.094 in.)
2.0 mm (0.079 in.)	

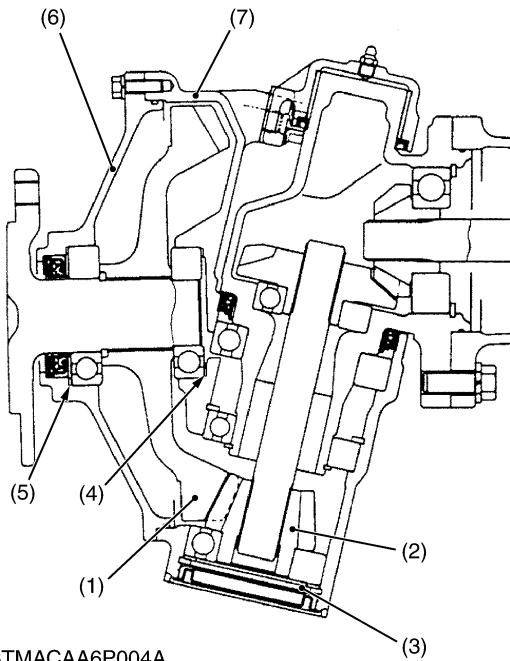
IMPORTANT

- After adjusting the tooth contact, check the backlash between spiral bevel pinion shaft and spiral bevel gear again.

- (1) Bevel Gear
- (2) Collar
- (3) Bevel Pinion Shaft
- (4) Shim

- (A) Proper Contact :
More than 35 % red lead contact area on the gear tooth surface. The center of The center of tooth contact at 1/3 of the entire width from the small end.
- (B) Deep Contact :
Decrease the shims.
- (C) Shallow Contact :
Increase the shims.

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Backlash between 9T Bevel Gear and 43T Bevel Gear

1. Stick a strip of fuse to three spots on the 43T bevel gear (1) with grease.
2. Fix the axle flange and front gear case.
3. Turn the axle.
4. Remove the axle flange (6) from front gear case (7) and measure the thickness of the fuse with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between 9T bevel gear and 43T bevel gear	Factory spec.	0.20 to 0.30 mm 0.0079 to 0.0118 in.
	Allowable limit	0.60 mm 0.024 in.

(Reference)

- Thickness of adjusting shims

Shim (3) :

- 1.0 mm (0.039 in.) 1.2 mm (0.047 in.)
- 1.6 mm (0.063 in.) 1.8 mm (0.071 in.)
- 2.0 mm (0.079 in.)

Shim (4) :

- 0.1 mm (0.004 in.) 0.2 mm (0.008 in.)
- 0.4 mm (0.016 in.)

Shim (5) :

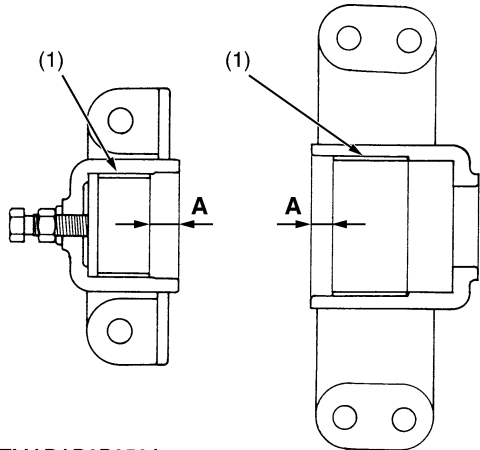
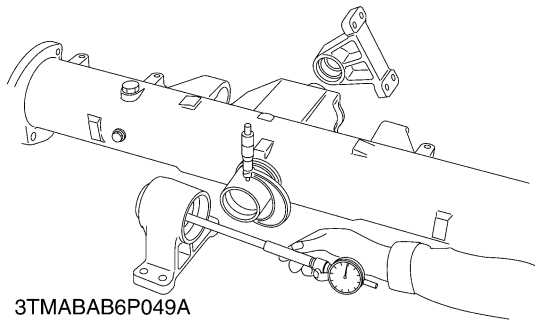
- 0.1 mm (0.004 in.) 0.2 mm (0.008 in.)
- 0.5 mm (0.020 in.)

- Tooth contact : More than 35 %
- Shim shown in the table below is used in each part in the standard. There are some difference in the production lot.

Shim (3)	2.0 mm (0.079 in.)
Shim (4)	0.4 mm (0.016 in.)
Shim (5)	0.5 mm (0.020 in.)

- (1) 43T Bevel Gear
- (2) 9T Bevel Gear
- (3) Shim
- (4) Shim
- (5) Shim
- (6) Axle Flange
- (7) Front Gear Case

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Clearance between Front Axle Case Bosses and Bracket Bushings

1. Measure the front axle case bosses O.D. with an outside micrometer.
2. Measure the bracket bushing I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bracket bushing.

Clearance between front axle case boss (front) and bracket bushing (front)	Factory spec.	0.025 to 0.160 mm 0.00098 to 0.00630 in.
	Allowable limit	0.35 mm 0.0138 in.

Front axle case boss (front) O.D.	Factory spec.	50.000 to 50.110 mm 1.96850 to 1.97283 in.
Bracket bushing (front) I.D.	Factory spec.	50.000 to 50.110 mm 1.96850 to 1.97283 in.

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory spec.	0.025 to 0.190 mm 0.00098 to 0.00748 in.
	Allowable limit	0.35 mm 0.0138 in.

Front axle case boss (rear) O.D.	Factory spec.	70.000 to 70.035 mm 2.75590 to 2.75728 in.
Bracket bushing (rear) I.D.	Factory spec.	70.060 to 70.190 mm 2.75826 to 2.76338 in.

■ **Press-fitting Bushing**

- When press-fitting a new bushing, observe the dimension described in the figure.

Press-fit depth of bushing (A)	Reference value	12.0 to 13.0 mm 0.47 to 0.51 in.
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■ **NOTE**

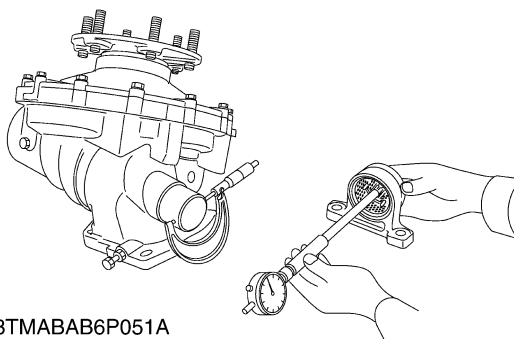
- **After replacing the bushing, be sure to adjust the front axle pivot. (See page 6-S6.)**

(1) Bushing

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Clearance between Bevel Gear Case Boss and Front Axle Support Bushing

1. Measure the bevel gear case boss O.D. with an outside micrometer.
2. Measure the support bushing I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace it.



Clearance between bevel gear case boss and front axle support bushing	Factory spec.	0.060 to 0.220 mm 0.00236 to 0.00866 in.
	Allowable limit	0.50 mm 0.0197 in.

Bevel gear case boss O.D.	Factory spec.	54.970 to 55.000 mm 2.16417 to 2.16535 in.
Front axle support bushing I.D.	Factory spec.	55.060 to 55.190 mm 2.16772 to 2.17283 in.

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KiSC issued 04, 2006 A

7 STEERING

CONTENTS

1. STRUCTURE.....	7-M1
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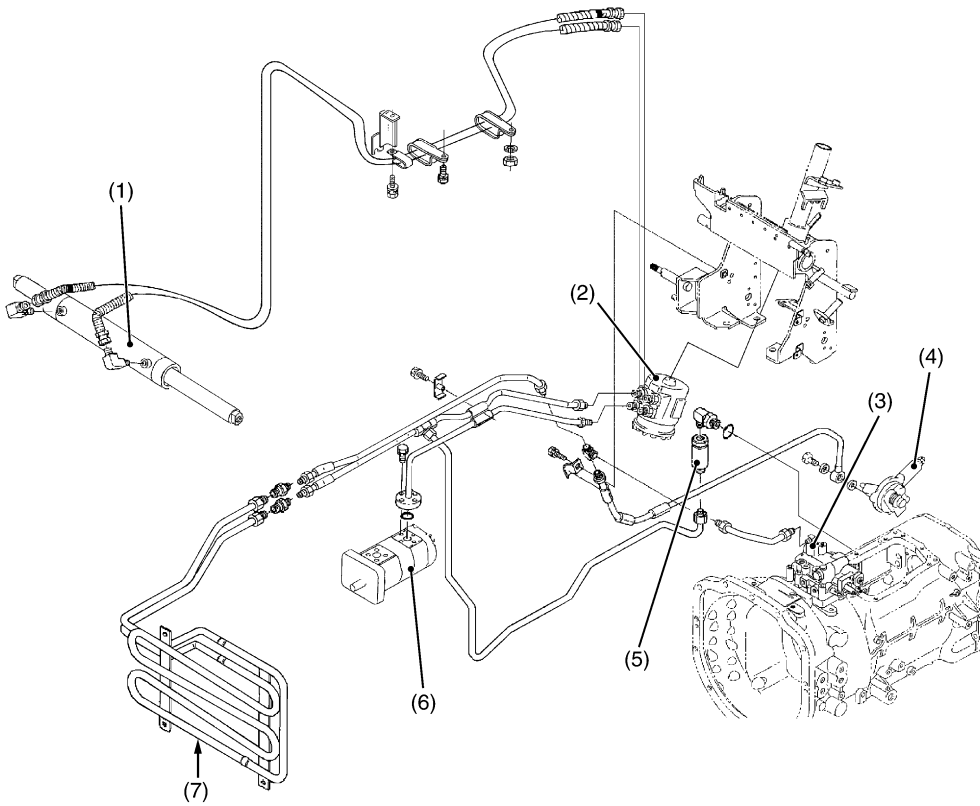
1. STRUCTURE

A

- (1) Steering Cylinder
- (2) Steering Controller
- (3) Shuttle Valve
- (4) PTO Clutch Valve
- (5) Oil Cooler Relief Valve
- (6) Hydraulic Pump
- (7) Oil Cooler

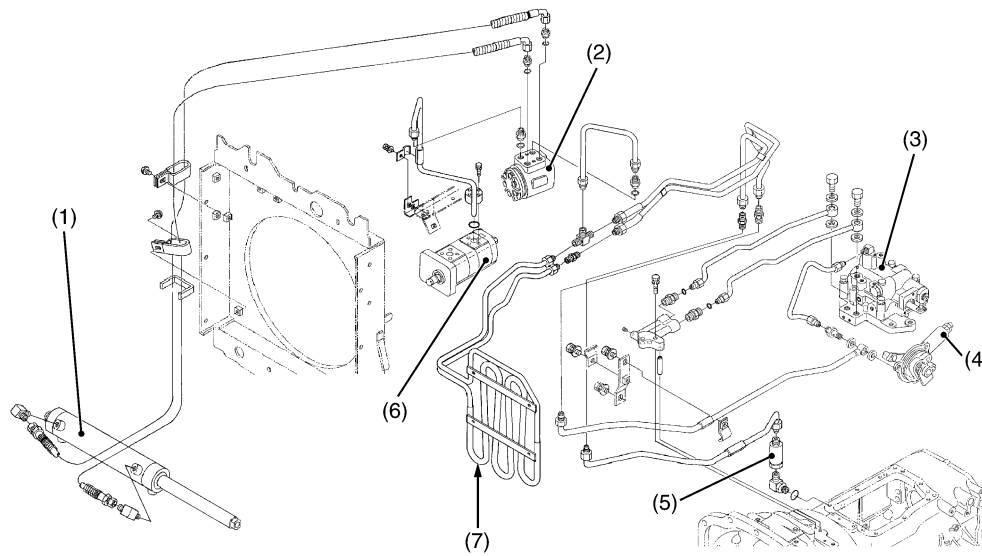
A : ROPS Type

B : CABIN Type



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B



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CONTENTS

1. TROUBLESHOOTING.....	7-S1
2. TIGHTENING TORQUES.....	7-S2
3. CHECKING, DISASSEMBLING AND SERVICING.....	7-S3
[1] STEERING CONTROLLER.....	7-S3
(1) Removing Steering Controller (ROPS Type).....	7-S3
(2) Removing Steering Controller (CABIN Type).....	7-S6
[2] STEERING CYLINDER.....	7-S7
(1) Removing Steering Cylinder.....	7-S7

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Tractor Cannot Be Steered	● Drive shaft in the power steering body improper assembled	Reassemble	8-S24 to 27
	● Pipe broken	Replace	—
Hard Steering	● Oil improper	Change with specified oil	G-8
	● Hydraulic pump malfunctioning	Replace	8-S28
	● Relief valve malfunctioning	Replace	8-S23
	● Control valve (spool and sleeve) malfunctioning	Repair or replace	8-S27
	● Oil leak due to seal damaged	Replace	—
Steering Force Fluctuates	● Control valve malfunctioning	Replace	8-S24 to S27
	● Air sucked in pump due to leaking or missing of oil	Replenish	G-8
	● Air sucked in pump from suction circuit	Repair	—
Heavy Steering Especially in the Beginning of Steering	● Control valve malfunctioning	Repair or replace	8-S24 to S27
Steering Wheel Turns Spontaneously When Released	● Control valve malfunctioning	Repair or replace	8-S24 to S27
Front Wheels Wander to Right and Left	● Control valve malfunctioning	Repair or replace	8-S24 to S27
	● Air sucked in pump due to lack of oil	Replenish	G-8
	● Air sucked in pump from suction circuit	Repair	—
	● Insufficient bleeding	Bleed	8-S14
	● Cylinder malfunctioning	Repair or replace	8-S40
Wheels Are Turned to a Direction Opposite to Steering Direction	● Cylinder piping connected in reverse	Repair	—
Steering Wheel Turns Idle in Manual Steering	● Insufficient bleeding	Bleed	8-S14
	● Air sucked in due to lack of oil	Replenish	G-8
Noise	● Air sucked in pump due to lack of oil	Replenish	G-8
	● Air sucked in pump from suction circuit	Repair	—
	● Pipe deformed	Replace	—
Oil Temperature Increases Rapidly	● Control valve malfunctioning	Replace	8-S25 to S27
Front Wheels Vibrate	● Mechanical connections or wheel bearings worn	Replace defective parts	—

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2. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
Delivery pipe and return pipe retaining nut	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Turning delivery hose retaining nut	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Tie-rod end slotted nut	77.5 to 90.2	7.9 to 9.2	18.1 to 21.7
Tie-rod joint and steering cylinder	166.7 to 196.1	17.0 to 20.0	123.0 to 144.7

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3. CHECKING, DISASSEMBLING AND SERVICING

[1] STEERING CONTROLLER

(1) Removing Steering Controller (ROPS Type)

Bonnet

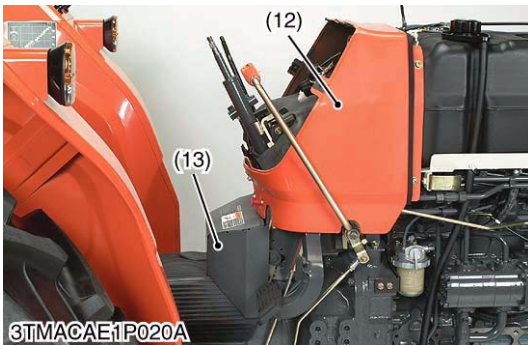
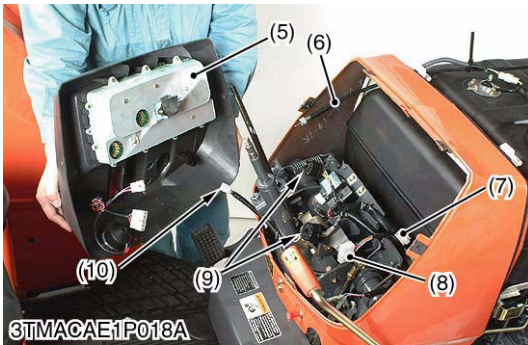
1. Remove the bonnet (1) with mirror (2).
2. Disconnect the battery's cable (3).

- (1) Bonnet
(2) Mirror

- (3) Battery Cable

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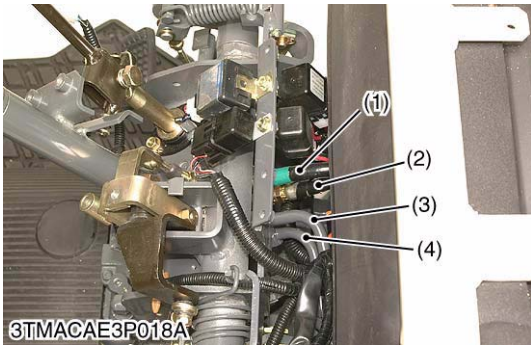


Steering Wheel, Meter Panel and Rear Bonnet

1. Remove the steering wheel (2) with a steering wheel puller (Code No. 07916-51090).
2. Remove the shuttle lever grip (1) and remove the shuttle lever guide (4).
3. Remove the main shift lever (3).
4. Remove the meter panel mounting screws and open the meter panel (5).
5. Disconnect the two connectors (9) and hour meter cable (6).
6. Disconnect the main switch connector (7), combination switch connector (8) and hazard switch connector (10).
7. Disconnect the engine stop cable (11) at the engine side.
8. Remove the rear bonnet (12) and shuttle valve cover (13).

- | | |
|---------------------------|----------------------------------|
| (1) Shuttle Lever Grip | (8) Combination Switch Connector |
| (2) Steering Wheel | (9) Connectors |
| (3) Main Shift Lever | (10) Hazard Switch Connector |
| (4) Shuttle Lever Guide | (11) Engine Stop Cable |
| (5) Meter Panel | (12) Rear Bonnet |
| (6) Hour Meter Cable | (13) Shuttle Valve Cover |
| (7) Main Switch Connector | |

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Piping for Power Steering

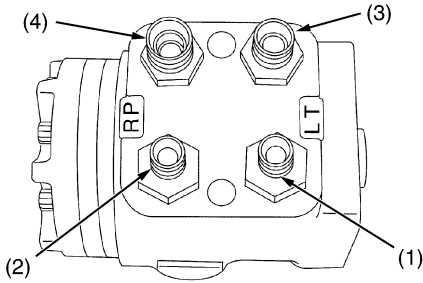
1. Disconnect the delivery pipe (4), return pipe 1 (3), right turning delivery hose (2), left turning delivery hose (1).

(When reassembling)

Tightening torque	Delivery pipe and return pipe retaining nut	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs
	Turning delivery hose retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 ft-lbs

- (1) Left Turning Delivery Hose
- (2) Right Turning Delivery Hose
- (3) Return Pipe 1
- (4) Delivery Pipe

000002729E



3TMACAB2P015G

Steering Controller

1. Remove the steering controller mounting screws.
2. Take out the steering controller.

- (1) Steering Controller

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(2) Removing Steering Controller (CABIN Type)

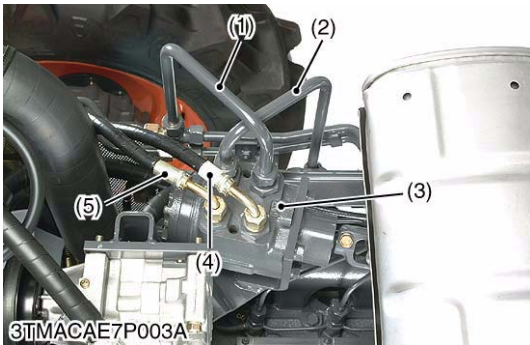


Bonnet

1. Remove the bonnet (1).
2. Disconnect the battery's cable (2).

- (1) Bonnet (2) Battery's Cable

000002836E



Steering Controller

1. Disconnect the delivery pipe (2) and return pipe (1).
2. Disconnect the delivery hoses (4) and (5).
3. Remove steering controller mounting screws.
4. Take out the steering controller (3).

(When reassembling)

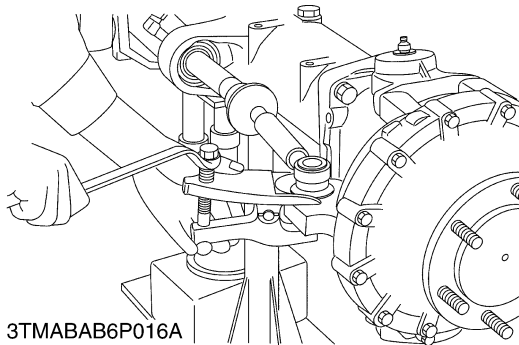
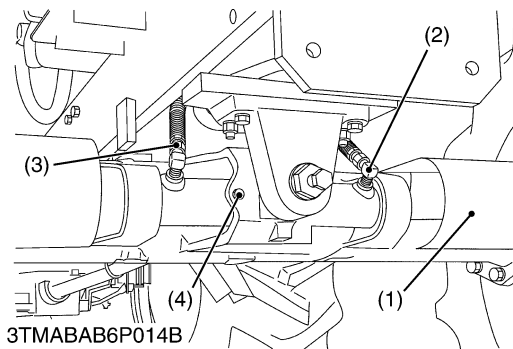
Tightening torque	Delivery pipe and return pipe retaining nut	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs
	Turning delivery hose retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 ft-lbs

- (1) Return Pipe (4) Left Turning Delivery Hose
 (2) Delivery Pipe (5) Right Turning Delivery Hose
 (3) Steering Controller

000002838E

[2] STEERING CYLINDER

(1) Removing Steering Cylinder



Tie-rod

1. Remove the cylinder cover (1).
2. Disconnect the power steering hoses (2), (3) from cylinder.
3. Remove the set screw (4).
4. Place a disassembly stand under the engine and support it with a jack.
5. Pull out the cotter pin and remove the tie-rod end slotted nuts.
6. Remove the tie-rod with a tie-rod end lifter (Code No. 07909-39051).

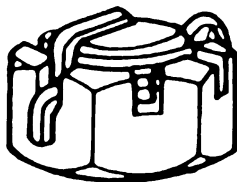
(When reassembling)

- Connect the power steering hose with green tape to the RH.
- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.

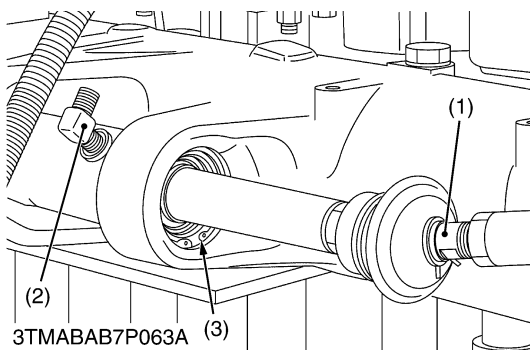
Tightening torque	Tie-rod end slotted nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 ft·lbs
-------------------	-------------------------	---

- | | |
|-------------------------|---|
| (1) Cylinder Cover | (3) Power Steering Hose (with Green Tape) |
| (2) Power Steering Hose | (4) Set Screw |

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Steering Cylinder

1. Remove the tie-rod joint (1) (right and left).
2. Remove the nipples (2) from steering cylinder.
3. Remove the internal snap ring (3).
4. Draw out the steering cylinder to the left.

(When reassembling)

- After liquid lock (Three Bond 1372 or equivalent) to the tie-rod joint.

Tightening torque	Tie-rod and steering cylinder	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123.0 to 144.7 ft·lbs
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- | | |
|-------------------|------------------------|
| (1) Tie-rod Joint | (3) Internal Snap Ring |
| (2) Nipple | |

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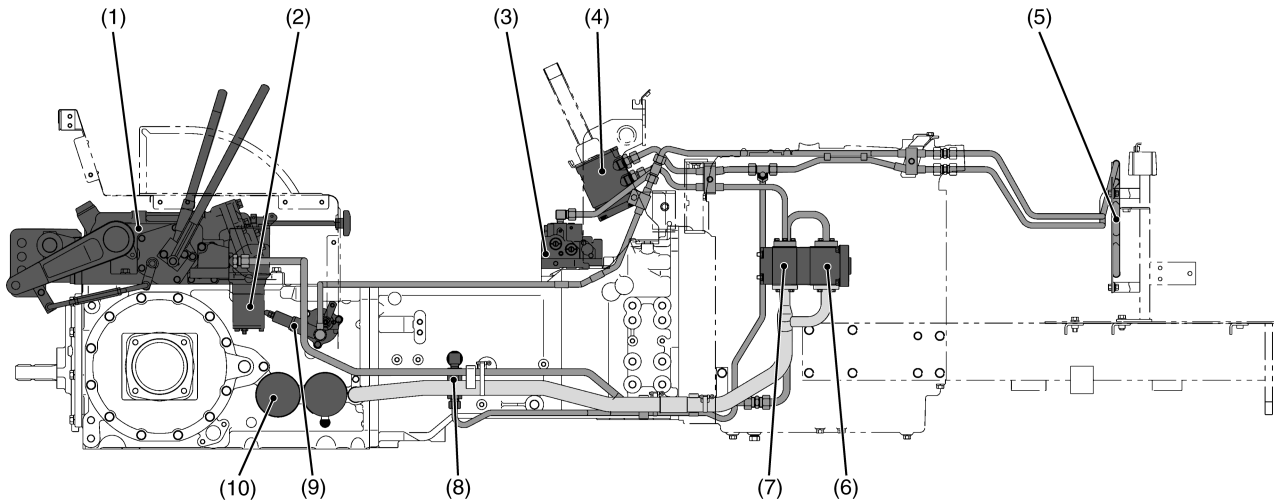
8 HYDRAULIC SYSTEM

CONTENTS

1. STRUCTURE.....	8-M1
2. HYDRAULIC CIRCUIT	8-M2
3. PTO CLUTCH VALVE	8-M3
4. HYDRAULIC SHUTTLE VALVE	8-M4
5. OIL FILTER.....	8-M16
6. POWER STEERING.....	8-M17
7. LINKAGE MECHANISM	8-M18
[1] POSITION CONTROL	8-M18
[2] DRAFT CONTROL	8-M20
[3] MIXED CONTROL.....	8-M24
8. OIL COOLER RELIEF VALVE.....	8-M25

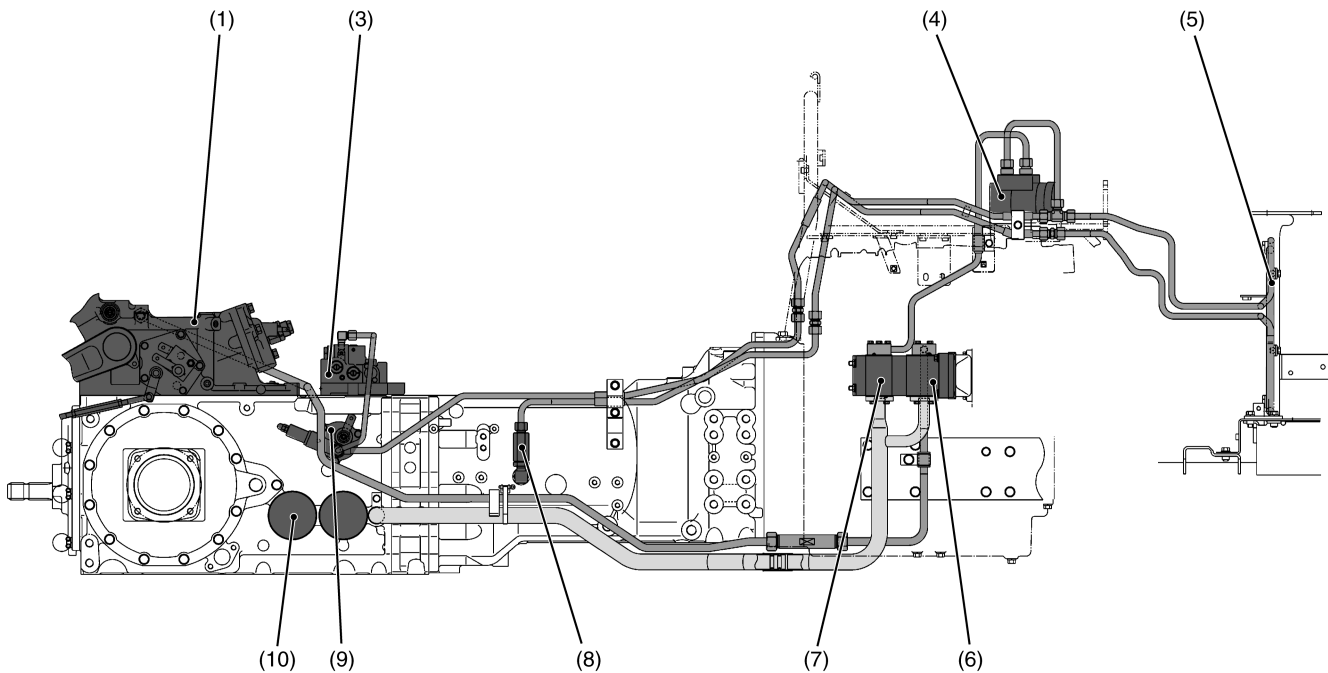
1. STRUCTURE

A



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B

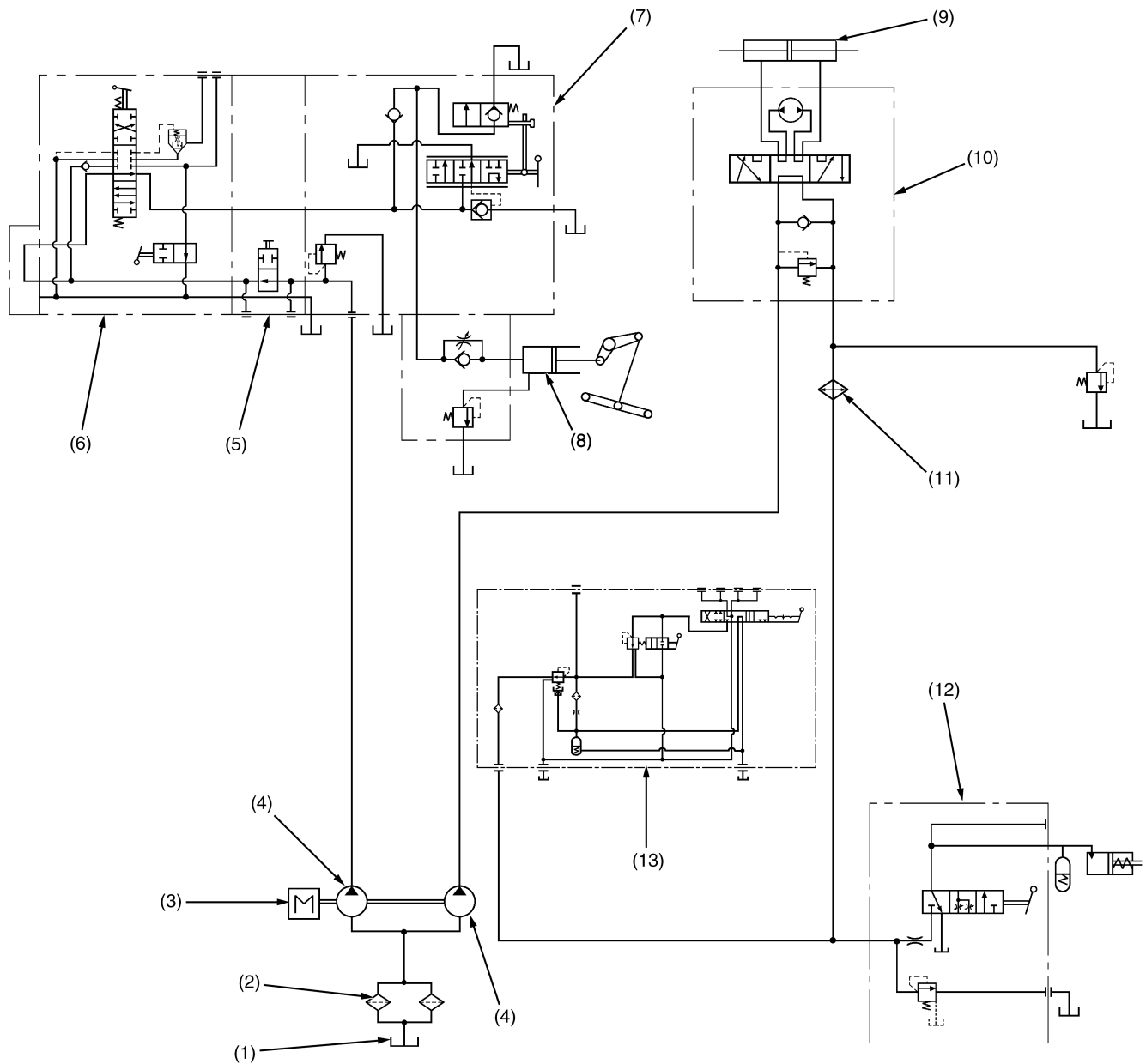


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- | | | | |
|--------------------------------------|-------------------------------|---|---------------------------|
| (1) Hydraulic Cylinder Body | (4) Power Steering Controller | (7) Hydraulic Pump for Power Steering and Shuttle Valve | (9) PTO Control Valve |
| (2) Auxiliary Control Valve | (5) Oil Cooler | (6) Hydraulic Pump for Three Point Hydraulic System | (10) Oil Filter Cartridge |
| (3) Shuttle Valve (Forward, Reverse) | (8) Oil Cooler Relief Valve | | |
- A : ROPS Type**
B : CABIN Type

000001701E

2. HYDRAULIC CIRCUIT



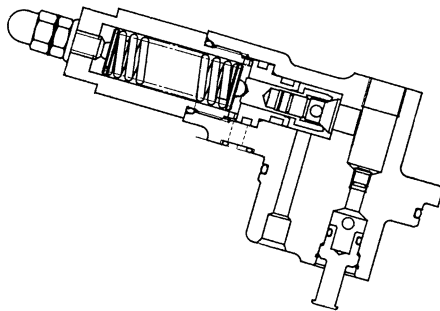
3TMACAE8P003A

- | | | | |
|------------------------------------|-------------------------------------|--|-----------------------|
| (1) Oil Tank (Transmission Case) | (4) Hydraulic Pump | (8) Hydraulic Cylinder (3 Point Linkage) | (11) Oil Cooler |
| (2) Hydraulic Oil Filter Cartridge | (5) Auxiliary Control Holder | (9) Power Steering Cylinder | (12) PTO Clutch Valve |
| (3) Engine | (6) Auxiliary Control Valve | (10) Power Steering Controller | (13) Shuttle Valve |
| | (7) Control Valve (3 Point Linkage) | | |

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3. PTO CLUTCH VALVE

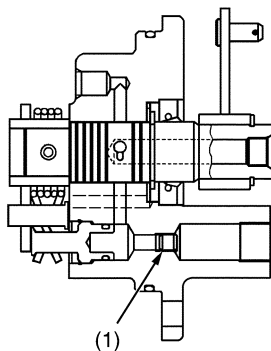
(A)



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(B)



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PTO clutch valve is composed of the following parts.

(A) Main Relief Valve

PTO clutch inner pressure is kept in approx. 2.45 to 2.55 MPa (25 to 26 kgf/cm², 355 to 370 psi) by the main relief valve.

(B) Rotary Valve

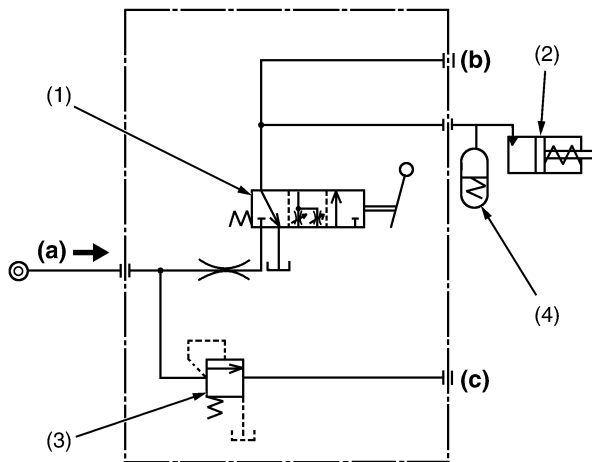
This valve change the oil flow to PTO clutch. This is rotated by the PTO operation lever via to PTO clutch cable. The oil from steering controller passes through the orifice (1) and flow to the PTO clutch.

(1) Orifice

Oil Flow

The oil from the steering controller flows into the PTO clutch valve.

When the PTO is at the disengaged position, the oil flows is stopped by the PTO clutch valve (1). When the PTO is at the engaged position, the oil flows through the PTO clutch valve (1) to the modulating valve (4) and PTO clutch pack (2) to engage it.



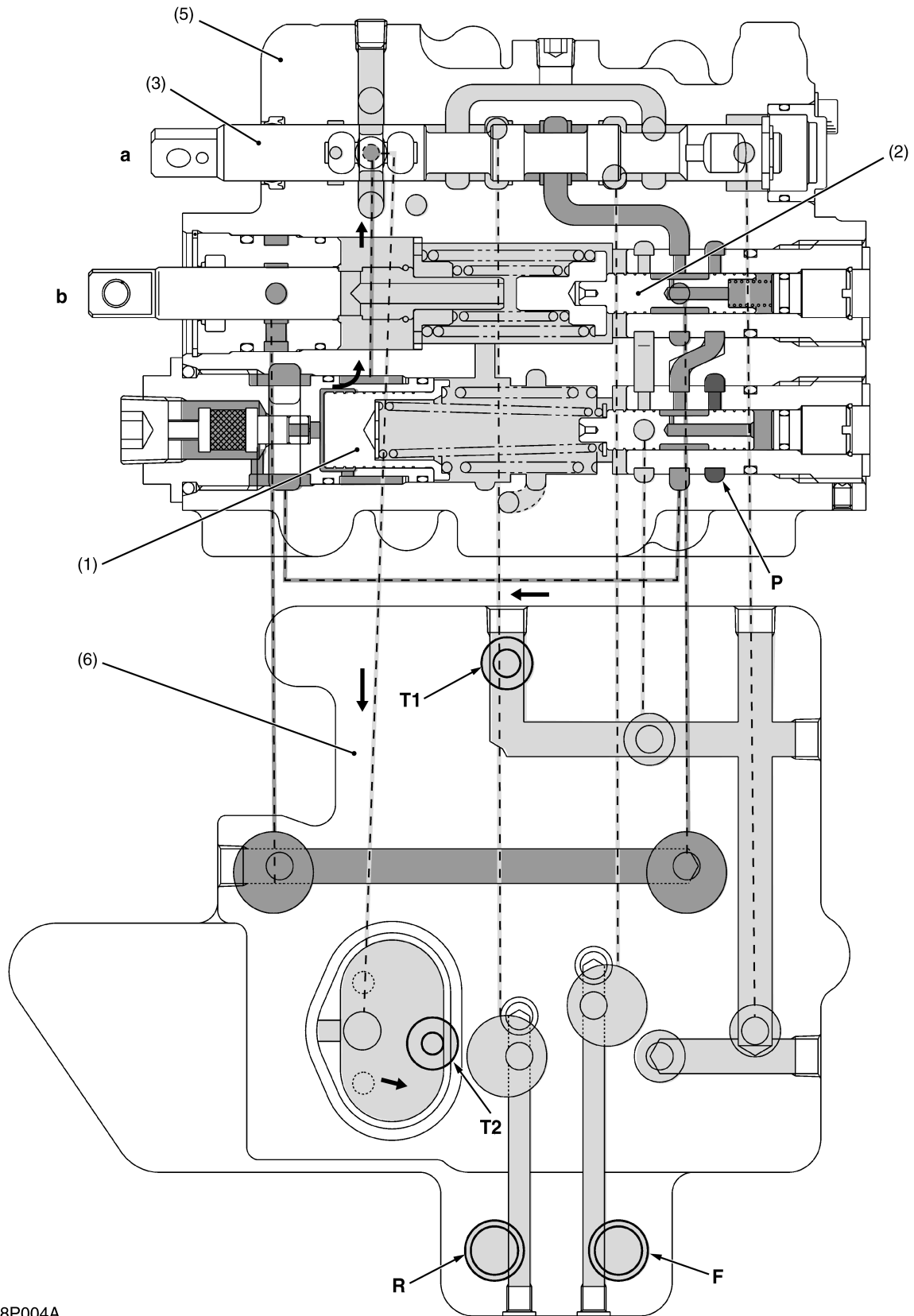
3TMACAB2P006A

- (1) PTO Clutch Valve
- (2) PTO Clutch Pack
- (3) Relief Valve
- (4) Modulating Valve
- (a) From Steering Controller
- (b) Pressure Check Port
- (c) Lubricating Port

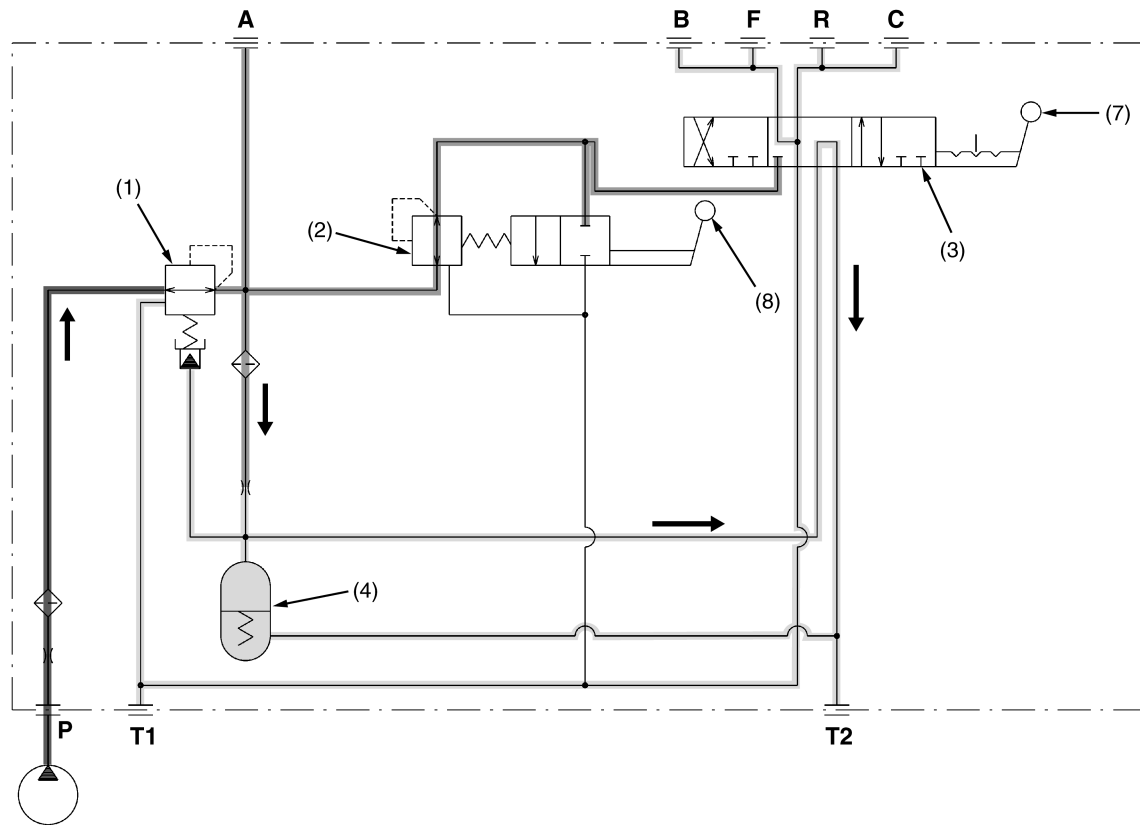
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4. HYDRAULIC SHUTTLE VALVE

■ Shuttle Lever at Neutral Position (CABIN Type)



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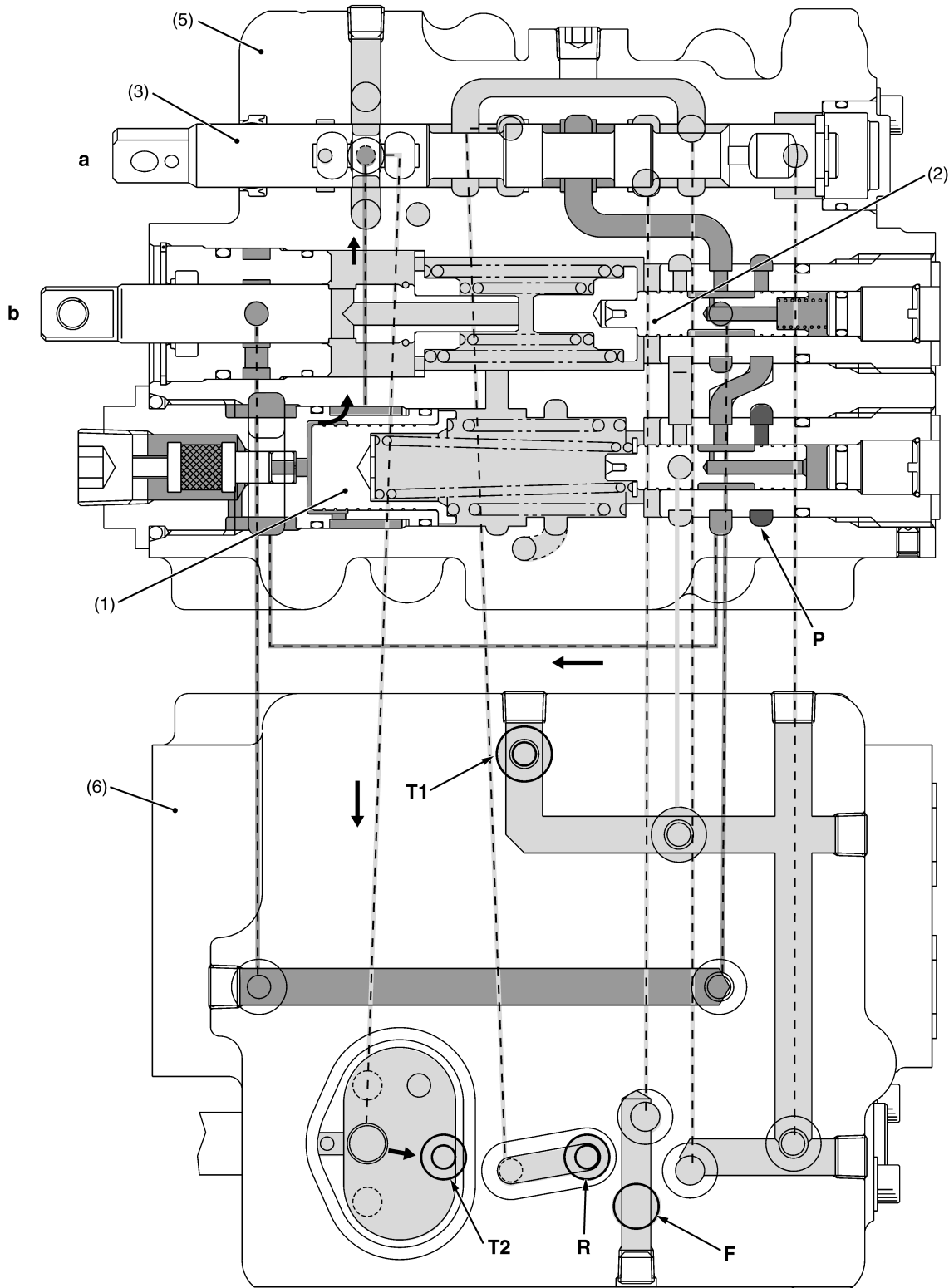
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- | | | | |
|-----------------------------------|--------------------------|-------------------------------------|-------------------------------------|
| (1) Modulating Valve | (5) Shuttle Valve Case 1 | A : Check Port (Modulation) | R : To Clutch Body (Reverse) |
| (2) Proportionally Reducing Valve | (6) Shuttle Valve Case 2 | B : Check Port (Forward) | T1 : To Transmission Case |
| (3) Spool (Forward, Reverse) | (7) Shuttle Lever | C : Check Port (Reverse) | T2 : To Transmission Case |
| (4) Accumulate Valve | (8) Clutch Pedal | P : From Pump | a : Connect to Shuttle Lever |
| | | F : To Clutch Body (Forward) | b : Connect to Clutch Pedal |

The control of shuttle valve (5) of ROPS type and CABIN type is the same. Valve case 1 (5) is different in ROPS type and CABIN type from the installation position of the shuttle valve and the piping. Valve case 1 (5) with CABIN type is designed as becoming a same oil flow as ROPS type. Therefore, only the explanation with ROPS type is described from next page.

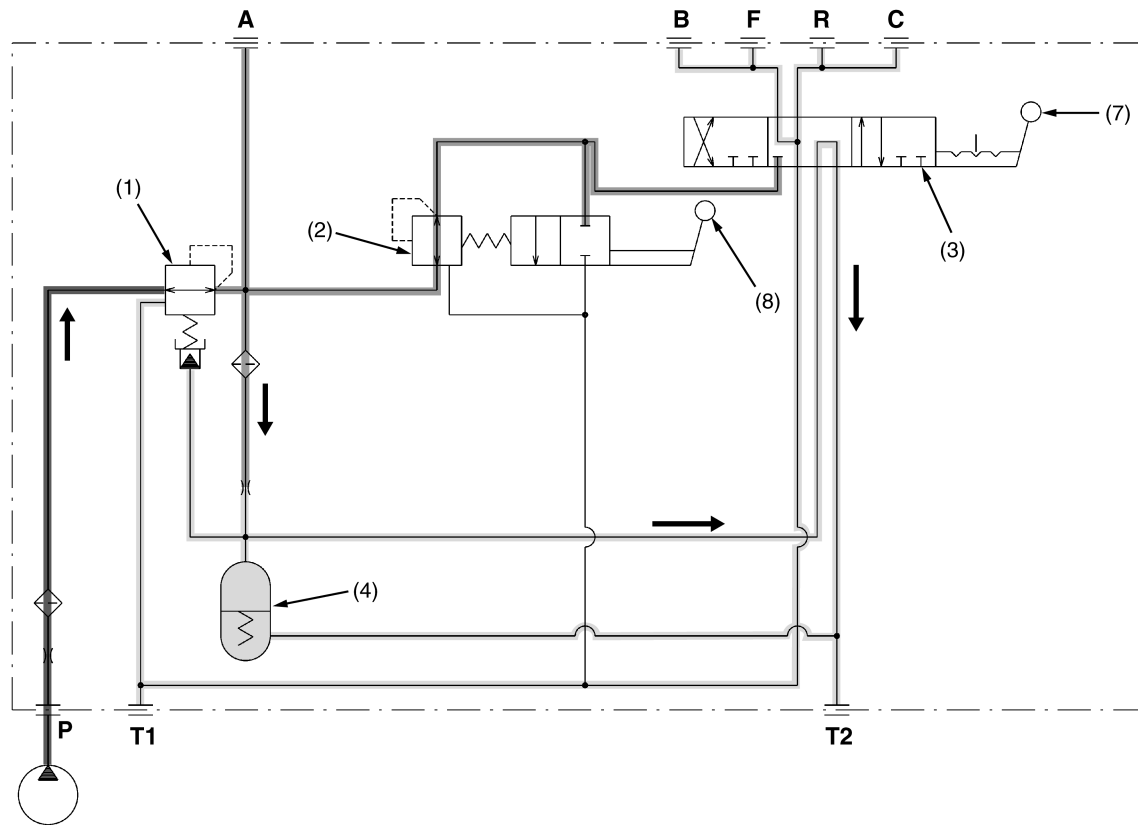
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■ Shuttle Lever at Neutral Position (ROPS Type)



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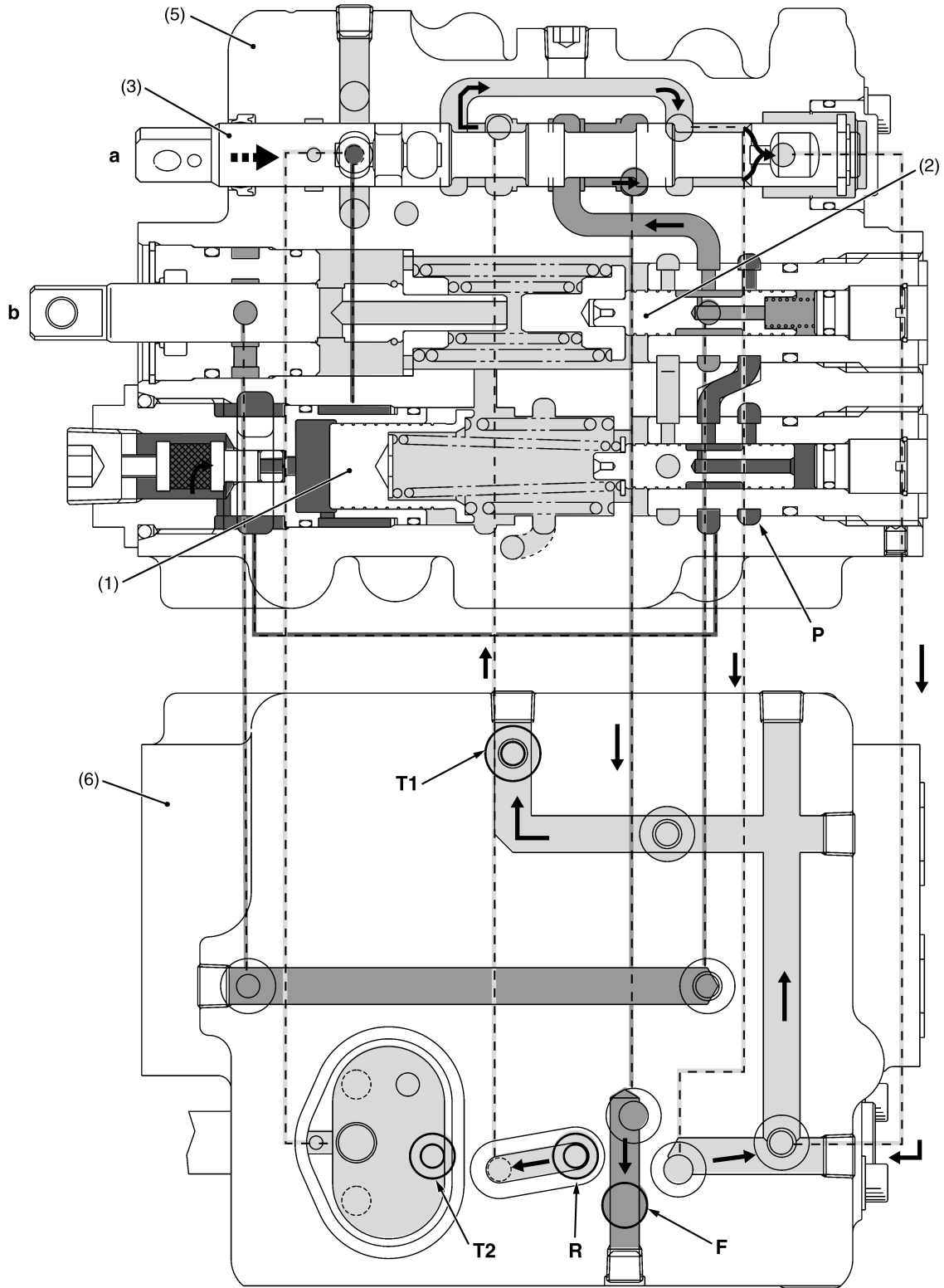
3TMACAE8P005A

- | | | | |
|-----------------------------------|--------------------------|-------------------------------------|-------------------------------------|
| (1) Modulating Valve | (5) Shuttle Valve Case 1 | A : Check Port (Modulation) | R : To Clutch Body (Reverse) |
| (2) Proportionally Reducing Valve | (6) Shuttle Valve Case 2 | B : Check Port (Forward) | T1 : To Transmission Case |
| (3) Spool (Forward, Reverse) | (7) Shuttle Lever | C : Check Port (Reverse) | T2 : To Transmission Case |
| (4) Accumulate Valve | (8) Clutch Pedal | P : From Pump | a : Connect to Shuttle Lever |
| | | F : To Clutch Body (Forward) | b : Connect to Clutch Pedal |

When the shuttle lever at **Neutral** position, as the oil passage between **P** port to **F** or **R** port is closed by spool (3), pressure-fed oil from **P** port flows to the **T2** port. Thus the shuttle clutch is not engage.

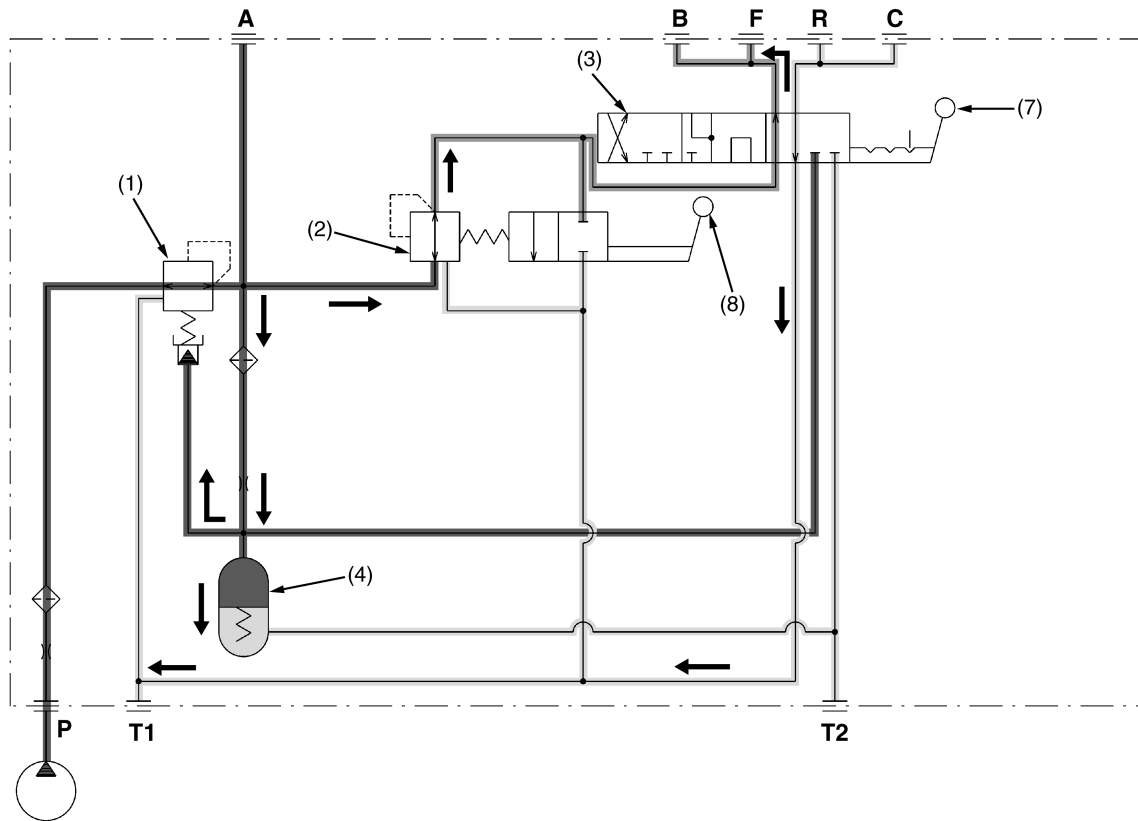
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■ When Shuttle Lever is Shifting Neutral to Forward or Reverse Position (Clutch Pedal is Released)



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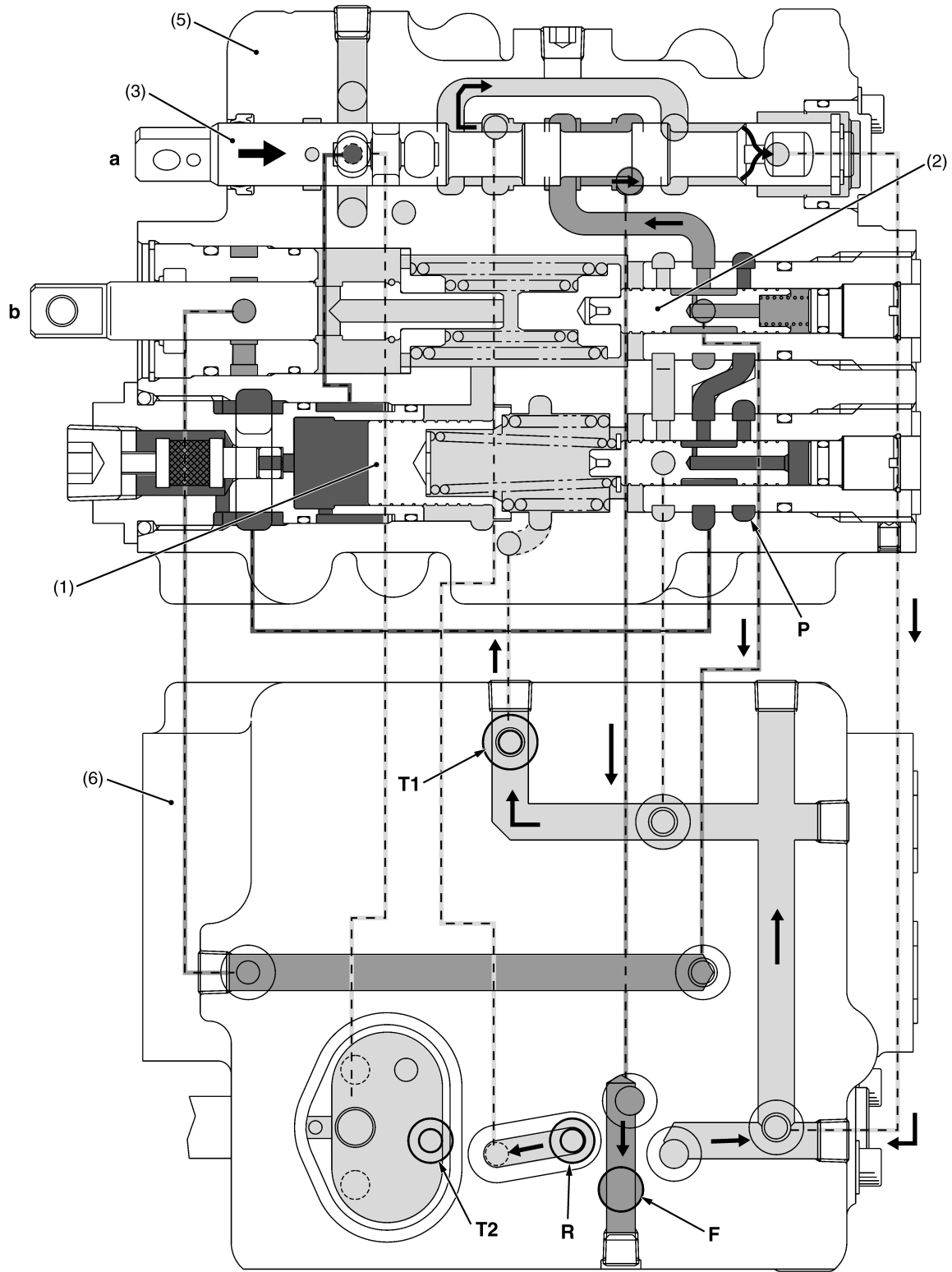
- | | | | |
|-----------------------------------|--------------------------|-------------------------------------|-------------------------------------|
| (1) Modulating Valve | (5) Shuttle Valve Case 1 | A : Check Port (Modulation) | R : To Clutch Body (Reverse) |
| (2) Proportionally Reducing Valve | (6) Shuttle Valve Case 2 | B : Check Port (Forward) | T1 : To Transmission Case |
| (3) Spool (Forward, Reverse) | (7) Shuttle Lever | C : Check Port (Reverse) | T2 : To Transmission Case |
| (4) Accumulate Valve | (8) Clutch Pedal | P : From Pump | a : Connect to Shuttle Lever |
| | | F : To Clutch Body (Forward) | b : Connect to Clutch Pedal |

When the shuttle lever is moved to "**FORWARD**" or "**REVERSE**", pressure-fed oil from **P** port flows into shuttle clutch via **F** or **R** port. At this time, the pressure of **F** or **R** port is increased gradually by modulating valve (1).

When the shuttle clutch is engaging, the accumulate valve (4) assists the operation of modulating valve (1) to reduce a shock.

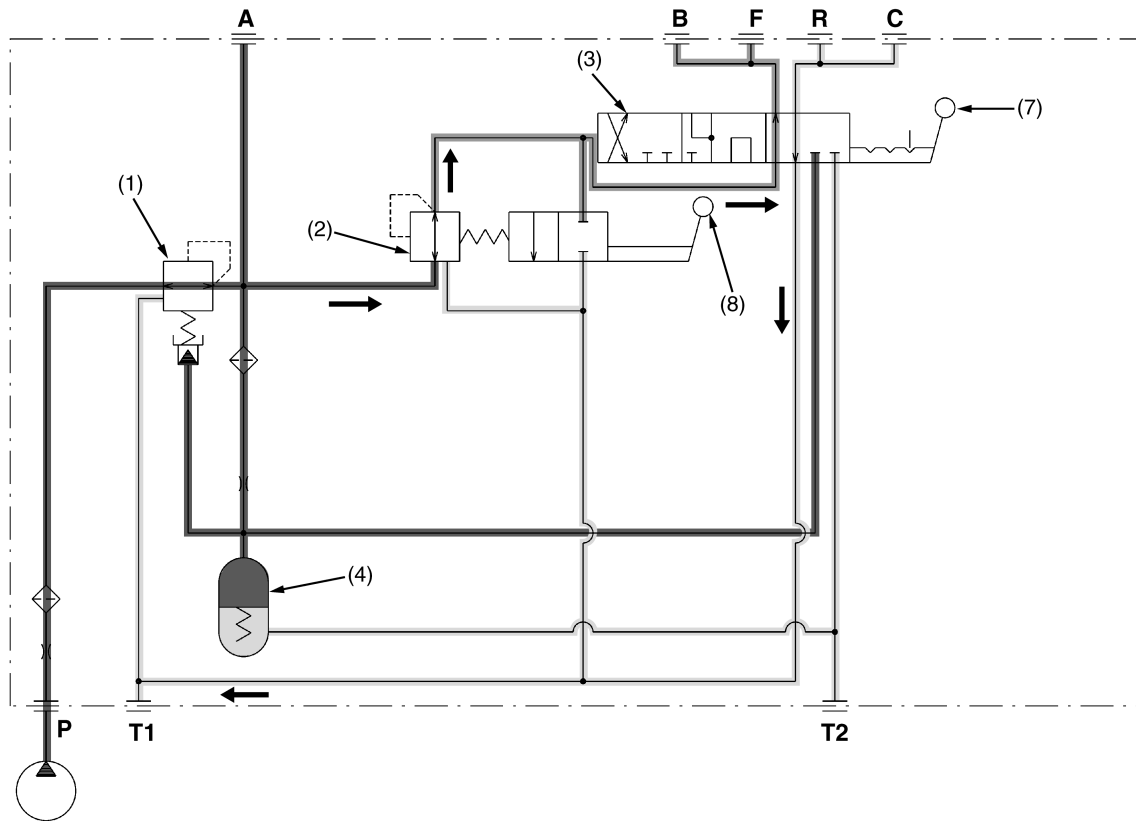
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■ Shuttle Lever at Forward Position (Clutch Pedal is Released)



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3TMACAE8P008B

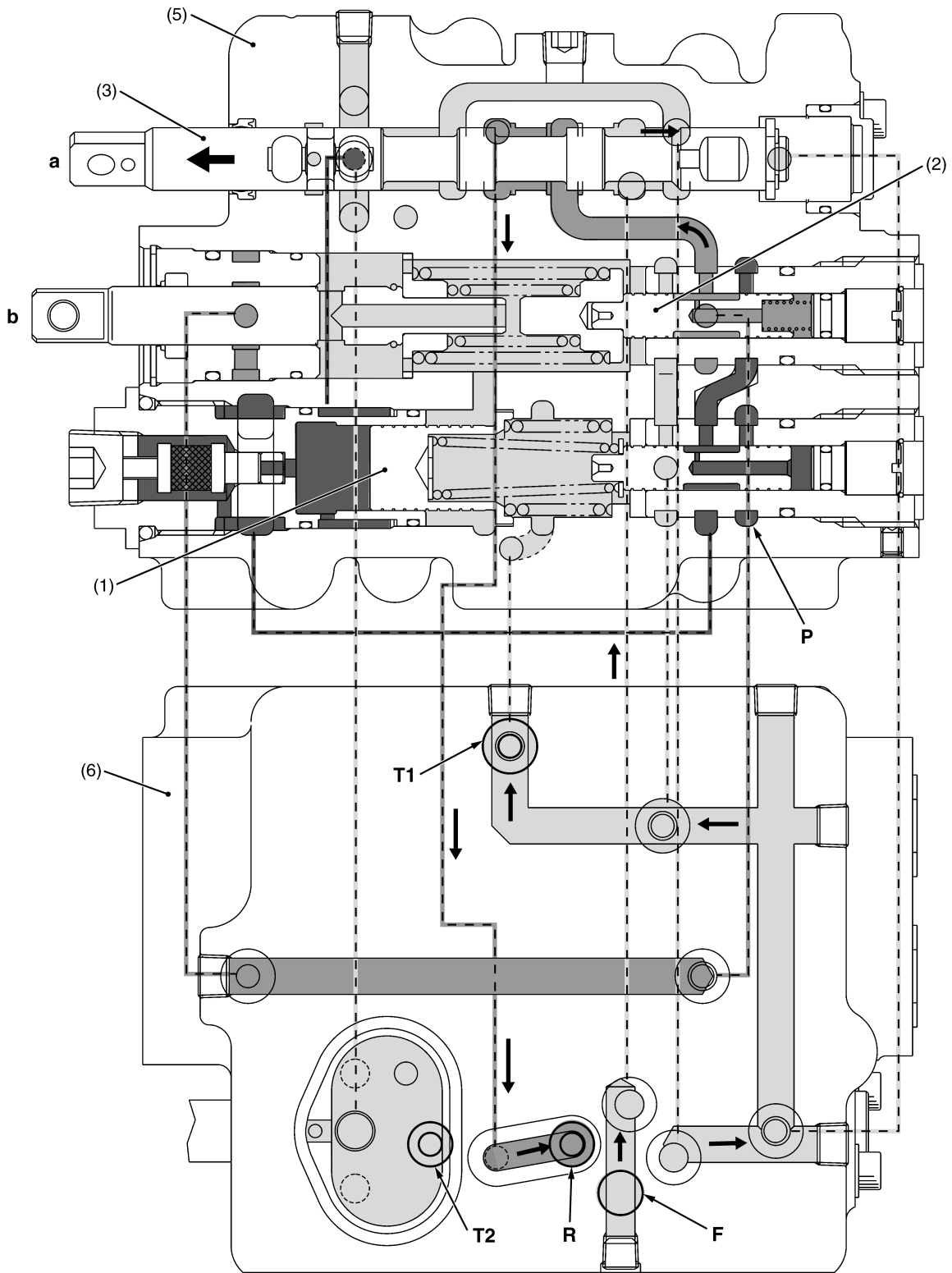
- | | | | |
|-----------------------------------|--------------------------|-------------------------------------|-------------------------------------|
| (1) Modulating Valve | (5) Shuttle Valve Case 1 | A : Check Port (Modulation) | R : To Clutch Body (Reverse) |
| (2) Proportionally Reducing Valve | (6) Shuttle Valve Case 2 | B : Check Port (Forward) | T1 : To Transmission Case |
| (3) Spool (Forward, Reverse) | (7) Shuttle Lever | C : Check Port (Reverse) | T2 : To Transmission Case |
| (4) Accumulate Valve | (8) Clutch Pedal | P : From Pump | a : Connect to Shuttle Lever |
| | | F : To Clutch Body (Forward) | b : Connect to Clutch Pedal |

When the shuttle lever have been setting on the **F** side, the oil pressure on **F** port is constantly controlled by proportionally reducing valve (2).

On the other hand, the oil in the **R** side of shuttle clutch returns to **T1** port through **R** port and spool (3).

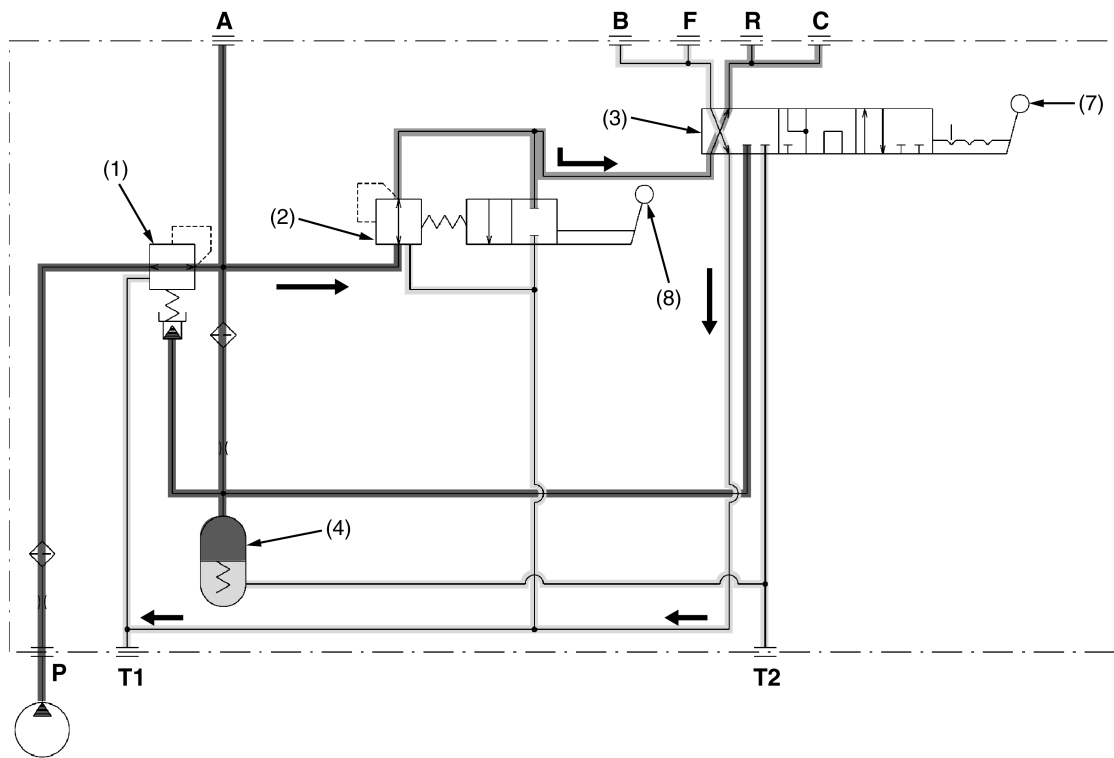
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■ Shuttle Lever at Reverse Position (Clutch Pedal is Released)



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3TMACAE8P011A

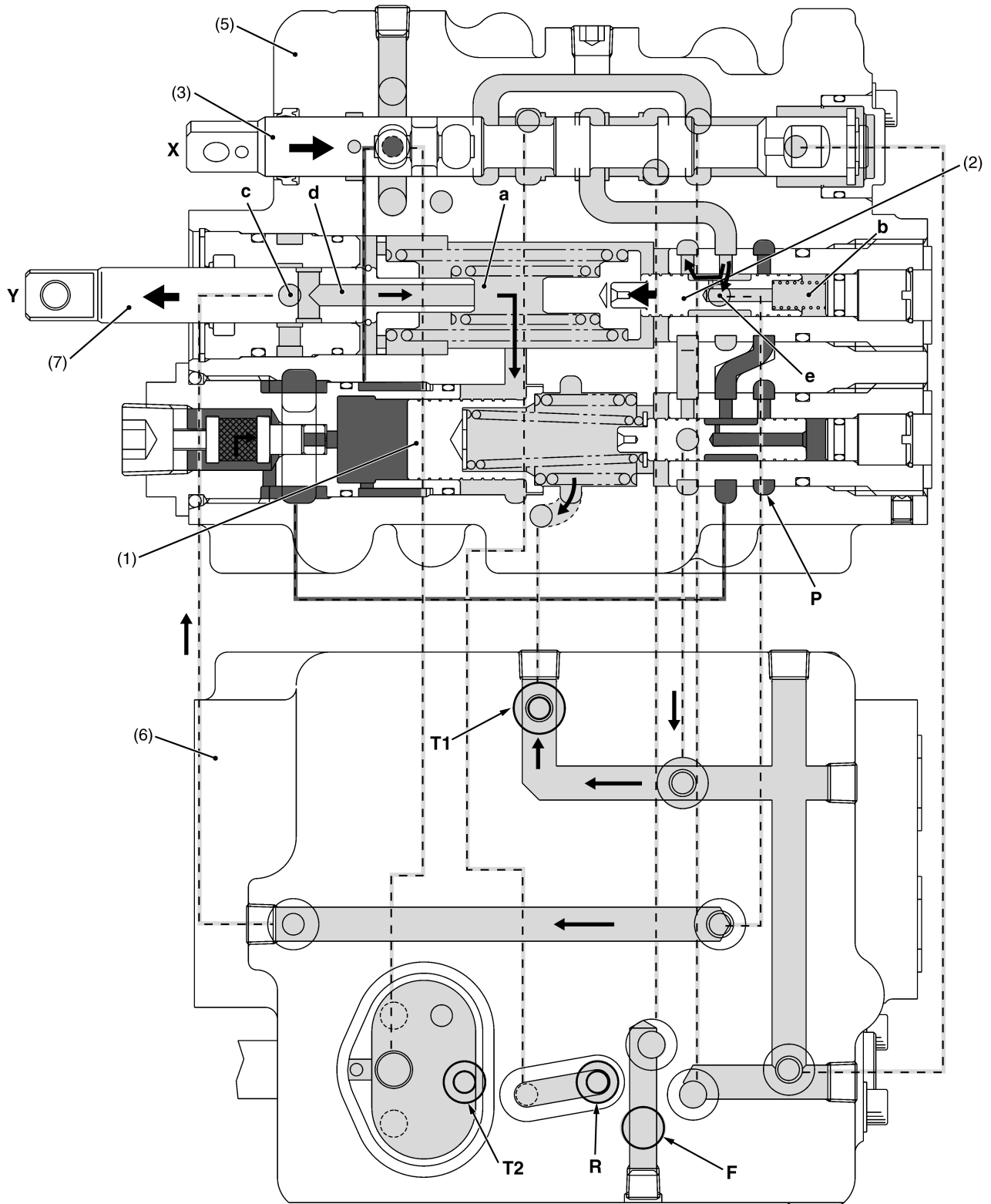
- | | | | |
|-----------------------------------|--------------------------|-------------------------------------|-------------------------------------|
| (1) Modulating Valve | (5) Shuttle Valve Case 1 | A : Check Port (Modulation) | R : To Clutch Body (Reverse) |
| (2) Proportionally Reducing Valve | (6) Shuttle Valve Case 2 | B : Check Port (Forward) | T1 : To Transmission Case |
| (3) Spool (Forward, Reverse) | (7) Shuttle Lever | C : Check Port (Reverse) | T2 : To Transmission Case |
| (4) Accumulate Valve | (8) Clutch Pedal | P : From Pump | a : Connect to Shuttle Lever |
| | | F : To Clutch Body (Forward) | b : Connect to Clutch Pedal |

When the shuttle lever have been setting on the **R** side, the oil pressure on **R** port is constantly controlled by proportionally reducing valve (2).

On the other hand, the oil in the **F** side of shuttle clutch returns to **T1** port through **F** port and spool (3).

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■ When Clutch Pedal is Depressed (with Shuttle Lever at Forward or Reverse Position)

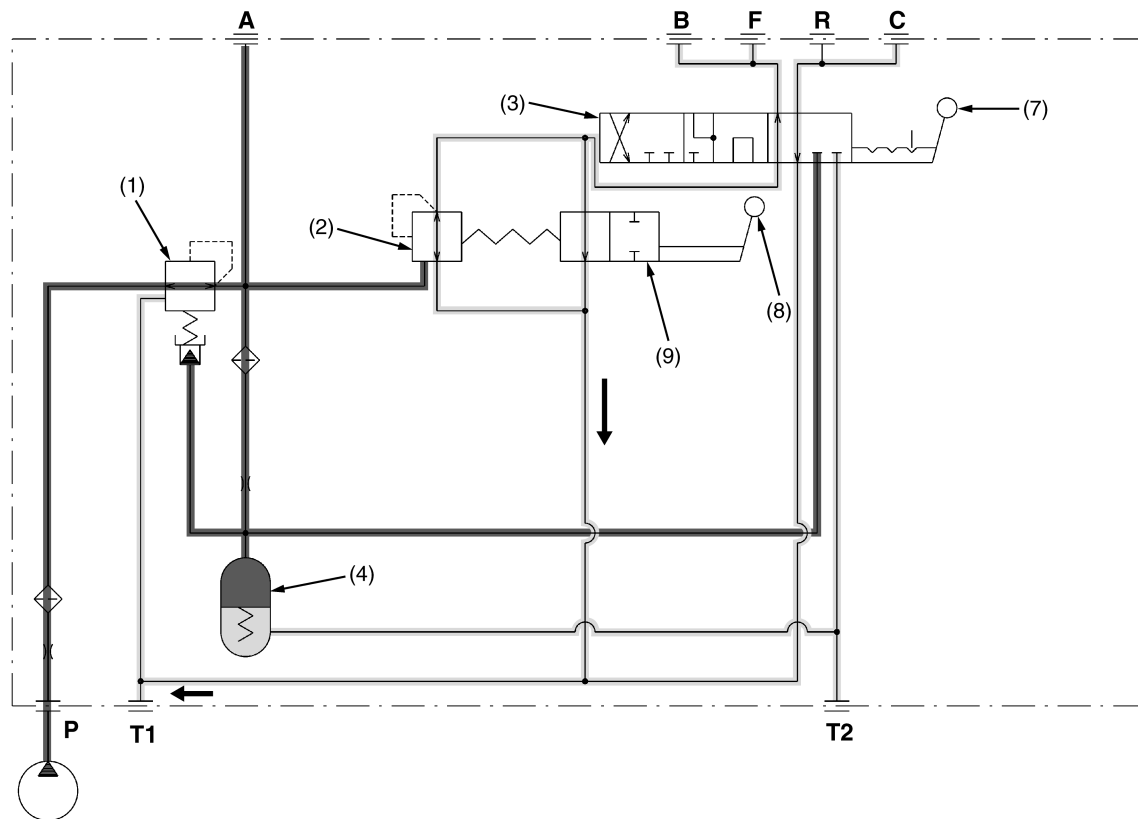


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X : Connect to Shuttle Lever Y : Connect to Clutch Pedal

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KiSC issued 04, 2006 A



3TMACAE8P013A

- | | | | |
|------------------------------|------------------------------------|-------------------------------------|----------------------|
| (1) Modulating Valve | A : Check Port (Modulation) | F : To Clutch Body (Forward) | a : Part a |
| (2) Spool 1 | B : Check Port (Forward) | R : To Clutch Body (Reverse) | b : Part b |
| (3) Spool (Forward, Reverse) | C : Check Port (Reverse) | T1 : To Transmission Case | c : Hole c |
| (4) Accumulate Valve | P : From Pump | T2 : To Transmission Case | d : Passage d |
| (5) Shuttle Valve Case 1 | | | e : Hole e |
| (6) Shuttle Valve Case 2 | | | |
| (7) Shuttle Lever | | | |
| (8) Clutch Pedal | | | |
| (9) Spool 2 | | | |

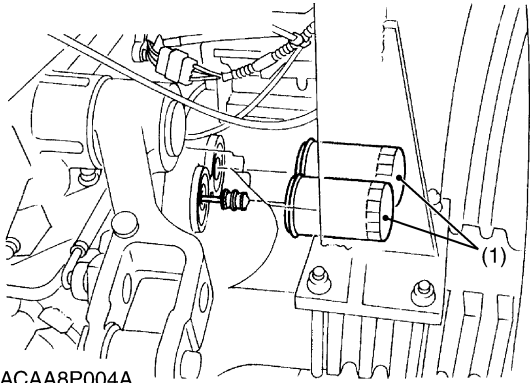
With the shuttle lever at **F** or **R** position, when the clutch pedal is depressed, the spool 2 (9) is moved to the left. And pressure difference between **a** part and **b** part is generated. As the spool 1 (2) is moved to the left by pressure difference, **F** port (or **R** port) and **T1** port are connected.

The oil in the shuttle clutch returns into the transmission case via **F** port (or **R** port), notched portion of spool 1 (2) and **T1** port. This cause the shuttle clutch to be set to off.

At the same time, as the hole **c** and passage **d** are connected, oil passage among the hole **e**, hole **c** and **T1** port are connected. As a result, even when the spool 1 (2) does not move, the oil passage from **F** port (or **R** side) to **T1** port is secured..

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5. OIL FILTER



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Two oil filter are located in parallel at the pump suction line. A permanent magnet, servicing as a magnet filter, is inserted in the paper type element of each cartridge, which ensures a filtration degree of b60 or BETA60 = 2.5 (MIN)*

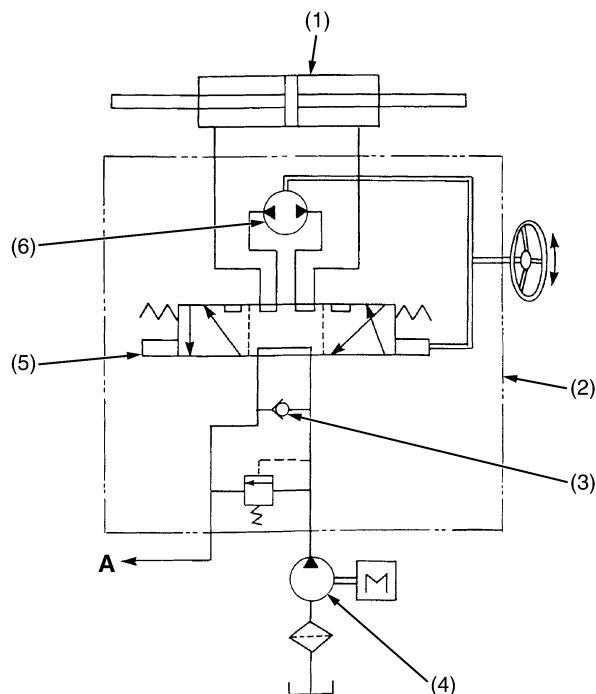
* This is authorized by ISO / 4572 Filter Element Multi Pass Test.

$\beta_a = (\text{The number of particles which are more than mm diameter before passage filter}) / (\text{The number of the same size of particles after passing filter})$

- (1) Hydraulic Oil Filter
Cartridge

000001716E

6. POWER STEERING



3TMACAE7P004A

Hydraulic Oil Flow

When the engine starts, the hydraulic pump (4) of the power steering system pressure-feeds the oil drawn from the transmission case through the suction pipe.

The oil which has entered steering controller (2) is directed to control valve (5).

As the steering wheel is turned, control valve (5) operates and the oil passes through gerotor (6) and into steering cylinder (1). The cylinder rod then moves to control the directional movement of the front wheels.

Return oil from steering cylinder (1) passes through control valve (5) is sent to the PTO clutch valve and shuttle valve.

When the engine is not operating, and the steering wheel is turned, gerotor (6) rotates to supply oil to steering cylinder (1). Thus the machine can be steered manually.

- (1) Steering Cylinder
- (2) Steering Controller
- (3) Check Valve
- (4) Hydraulic Pump
- (5) Control Valve
- (6) Gerotor

A : To PTO Clutch Valve and Shuttle Valve

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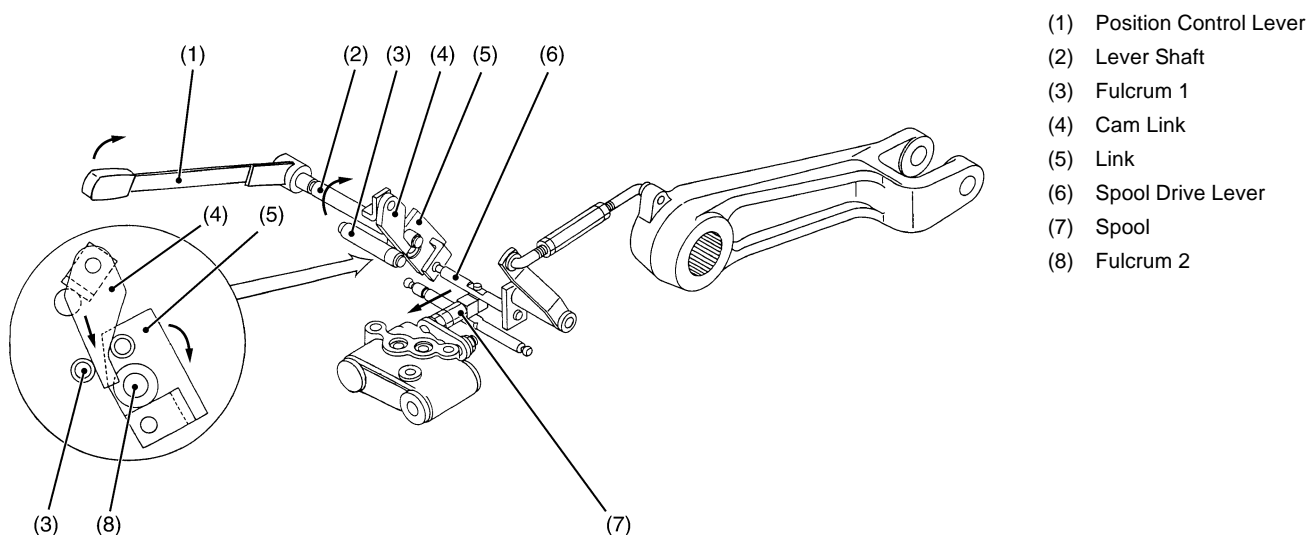
7. LINKAGE MECHANISM

[1] POSITION CONTROL

Position control is a linkage mechanism to raise or lower the implement attached to the tractor in proportion to the movement of the position control lever.

The implement can be positioned at any height by moving the position control lever. Fine position adjustment is also easy.

■ Lift

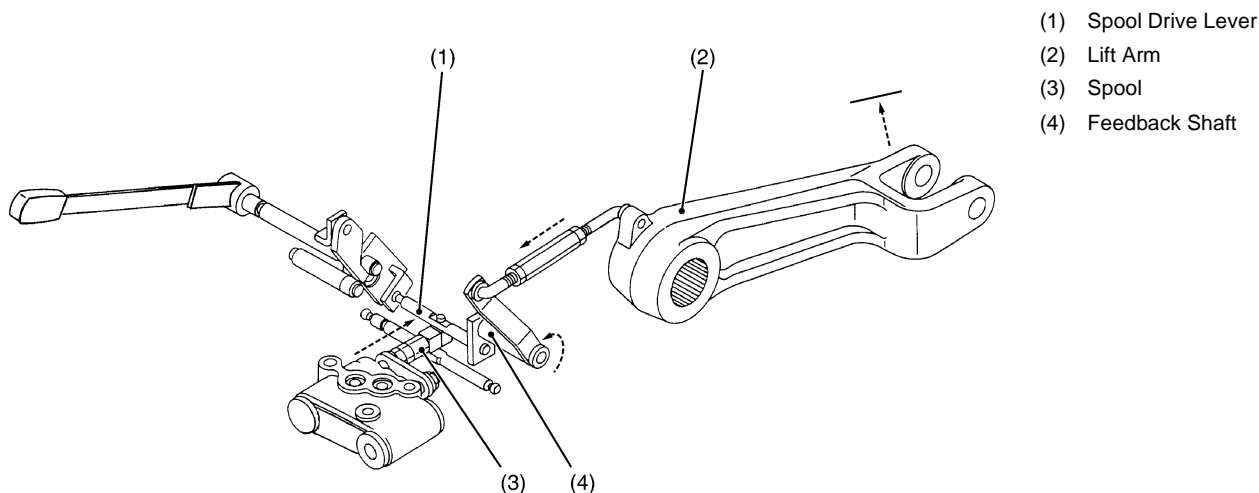


- (1) Position Control Lever
- (2) Lever Shaft
- (3) Fulcrum 1
- (4) Cam Link
- (5) Link
- (6) Spool Drive Lever
- (7) Spool
- (8) Fulcrum 2

3TMACAB8P007A

When the position control lever (1) is moved to the "LIFT" position, the lever shaft (2) rotates and press down the cam link (4) between the fulcrum 1 (3) and link (5).

The link (5) rotates around the fulcrum 2 (8) and pushes the spool (7) by the spool drive lever (6), opening the "LIFT" circuit.



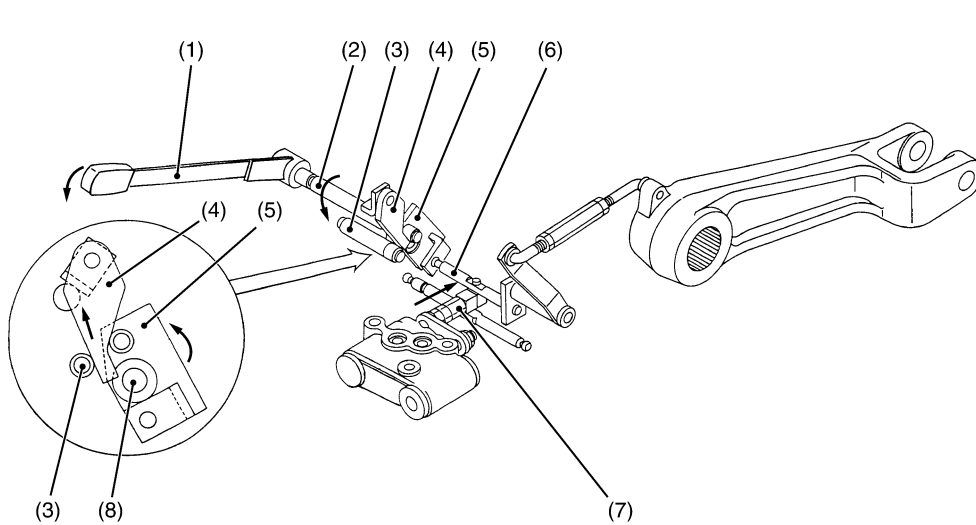
- (1) Spool Drive Lever
- (2) Lift Arm
- (3) Spool
- (4) Feedback Shaft

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When the lift arm (2) moves upward, feedback shaft (4) rotates and pulls the spool (3) by the spool drive lever (1). The lift arm stops when the spool returns to the neutral position.

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■ Down

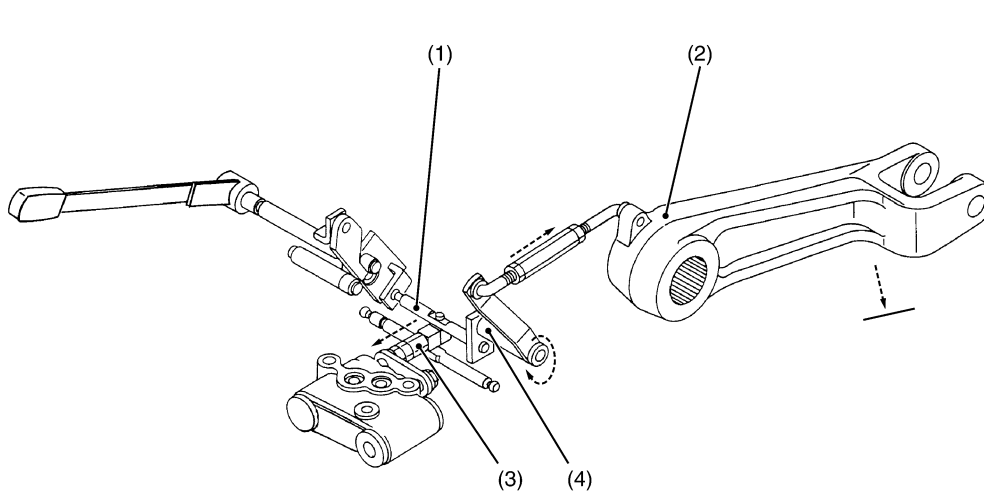


- (1) Position Control Lever
- (2) Lever Shaft
- (3) Fulcrum 1
- (4) Cam Link
- (5) Link
- (6) Spool Drive Lever
- (7) Spool
- (8) Fulcrum 2

3TMACAB8P007B

When the position control lever (1) is moved to the **"DOWN"** position, the lever shaft (2) rotates and pull up the cam link (4) between the fulcrum 1 (3) and link (5).

The link (5) rotates around the fulcrum 2 (8) and pull the spool (7) out by the spool drive lever (6), opening the **"DOWN"** circuit..



- (1) Spool Drive Lever
- (2) Lift Arm
- (3) Spool
- (4) Feedback Shaft

3TMACAB8P008B

When the lift arm (2) moves downward, feedback shaft (4) rotates and push the spool (3) by the spool drive lever (1).

The lift arm stops when the spool returns to the neutral position.

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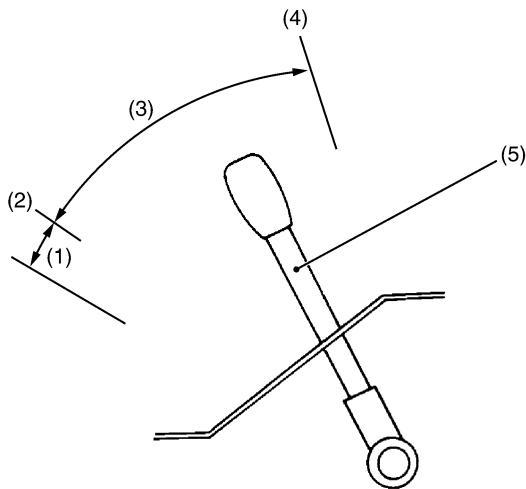
[2] DRAFT CONTROL

Draft control is a system which maintain a constant traction load, and is suited for the work which needs heavy traction load such as plowing.

The implement is automatically raised when its traction load is increased, and lowers when the traction load is decreased. By maintaining a constant load level, it prevents the tractor from slipping and being loaded excessively.

The setting traction load can be adjusted by changing the position of the draft control lever (5).

The draft control system uses the same control valve as the position control system. The traction load applied to the tractor is sensed and is fed back to the control valve by means of the other linkage mechanism.



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With this type of draft control, operation is as described below according to the position of the draft control lever.

1. When the draft control lever is positioned in the floating range, the implement lowers to the ground.
2. When the draft control lever is positioned in the draft control range, work is performed as follows.
 - As the traction load applied to the tractor from the implement increases, the implement is raised.
 - As the traction load decreases, the implement lowers to the position at which it matches the setting traction load.
3. When the implement is raised as described in 2 above, the force to raise the implement is applied to the rear wheels so that the ground pressure of the wheels is momentarily increased to prevent slippage.

(Reference)

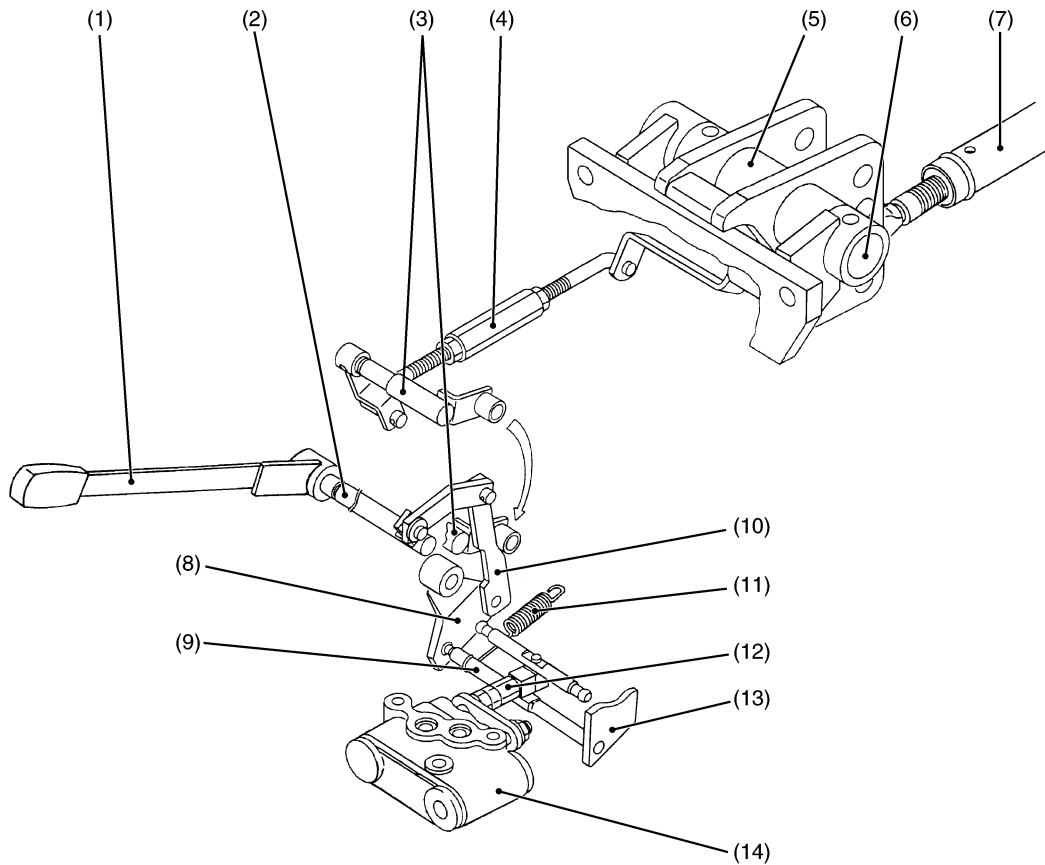
- When the draft control is used, the position control lever should be set at "**FLOATING**" range.
- If the position control lever is set at working range, both control systems operate performing mix control system. (See "**(3) Mixed Control**")

- | | |
|--------------------|-------------------------|
| (1) Floating Range | (4) Shallow |
| (2) Deep | (5) Draft Control Lever |
| (3) Draft Range | |

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■ Draft Control Operation



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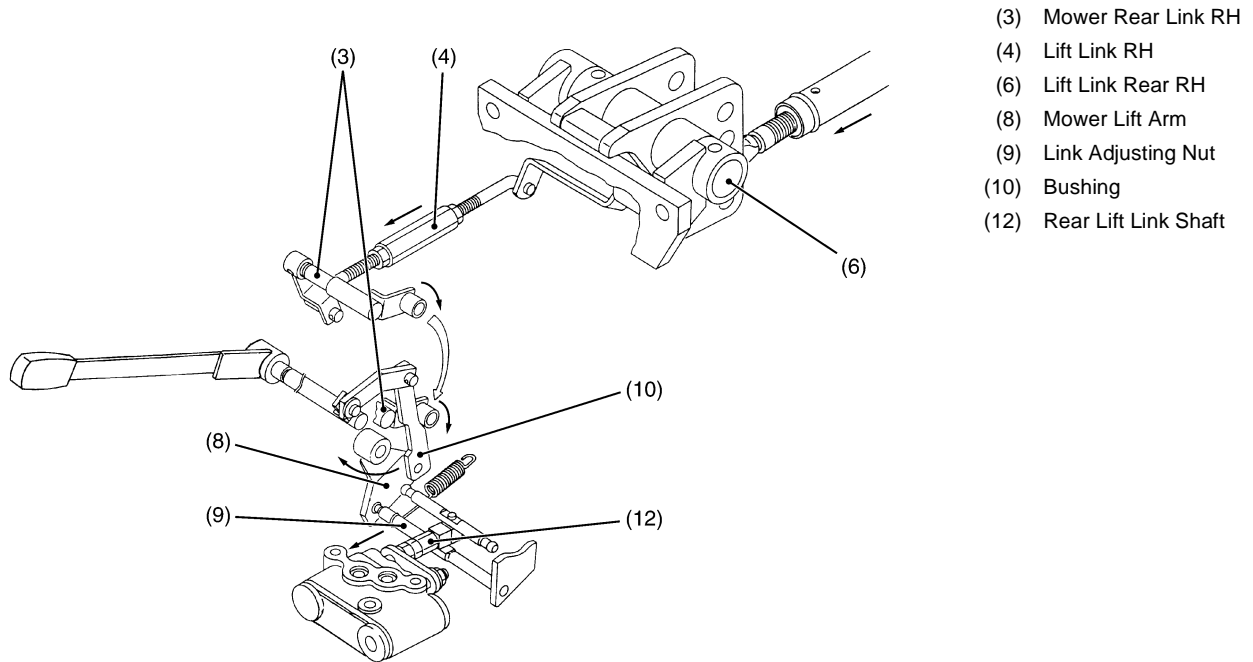
- | | | | |
|-------------------------|---------------------|-----------------------|--------------------|
| (1) Draft Control Lever | (5) Top Link Holder | (9) Spool Drive Lever | (12) Spool |
| (2) Lever Shaft | (6) Torsion Bar | (10) Link 1 | (13) Fixed Arm |
| (3) Feedback Shaft | (7) Top Link | (11) Spring | (14) Control Valve |
| (4) Feedback Rod | (8) Link 2 | | |

The traction load applied to the tractor from the implement act as a torsional force to the torsion bar (6) via the top link (7) and top link holder (5). When the torsion bar (6) is twisted, its displacement is transmitted to the feedback shaft (3) to rotate via the feedback rod (4). The feedback shaft rotates and push the link 1 (10) to rotate the link 2 (8). The end of the spool drive lever (9) is connected to the link 2 (8) and the other end is hold by the fixed arm (13), pulling out or pushing in the spool (12) by the rotation of the link 2 (8).

The spring (11) is pulling the spool drive lever (9) to keep the link 1 (10) coming in contact with the feedback shaft (3).

The angle of the link 1 (10) is controlled by the draft control lever (1) via the lever shaft (2).

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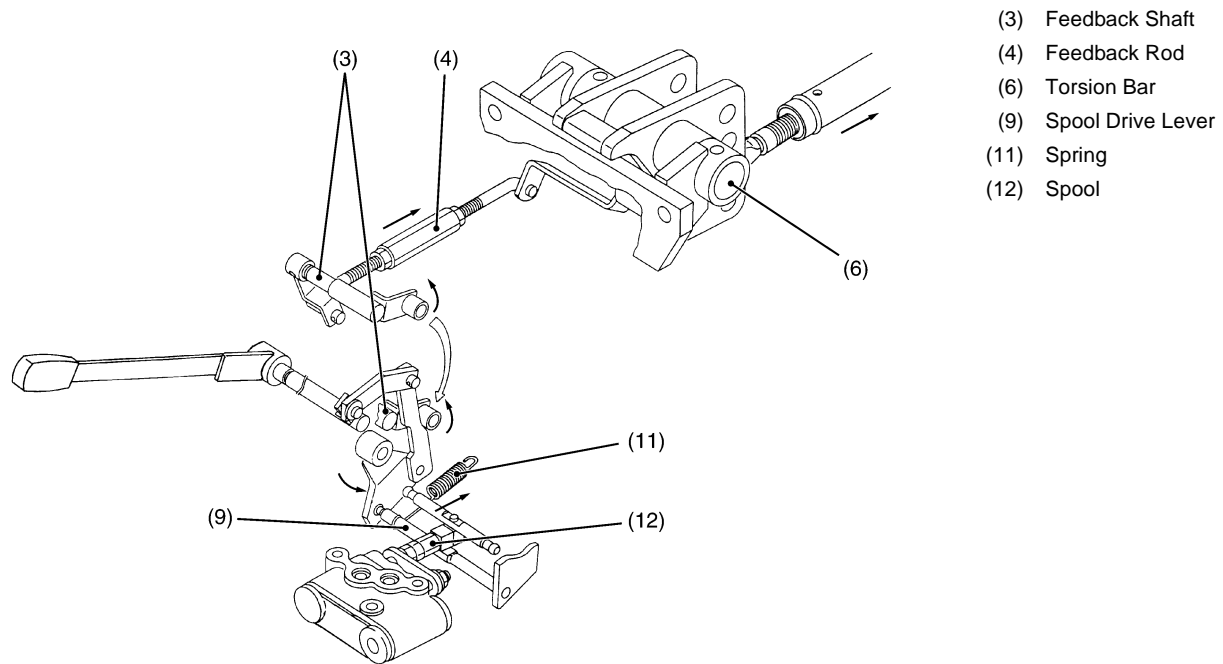


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When the traction load increases, the torsion bar (6) is twisted, and its displacement is transmitted to the feedback shaft (3) via the feedback rod (4). The feedback shaft (3) rotates clockwise and push the link 1 (10) to rotate the link 2 (8) clockwise.

The link 2 (8) pushes the spool (12) in via the spool drive lever (9) and the "**LIFT**" circuit is formed. As the implement is raised and the traction load decreases, the torsion bar (6) is restored to return the spool (12) to neutral.

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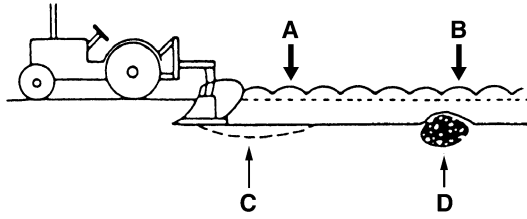
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When the traction load decreases, the torsion bar (6) is restored and its displacement is transmitted to the feedback shaft (3) via the feedback rod (4). As the feedback shaft (3) rotates counterclockwise, the spool drive lever (9) pulls the spool (12) out by the spring (11) to form the "**DOWN**" circuit.

As the implement lowers and the traction load increases, the torsion bar (6) is twisted to return the spool (12) to neutral.

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[3] MIXED CONTROL



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Mixed control is a system combining position control with draft control.

When traction load increases, the draft control functions to raise the lift arms (implement). When traction load reduces, the lift arms (implement) lower to the height set by the position control only, when traction load increases, slippage or engine stop may occur unless the implement is raised.

With the draft control only, plowing depth cannot be kept constant if soil hardness changes greatly.

The mixed control serves to eliminate such disadvantages.

- | | |
|---------------------------------------|--------------------------|
| A : Position Controlled | D : Shallow where |
| B : Draft Controlled | Resistance Occurs |
| C : Not Deep Even in Soft Soil | |

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8. OIL COOLER RELIEF VALVE

The oil cooler relief valve is located on the right hand side of the clutch housing case.

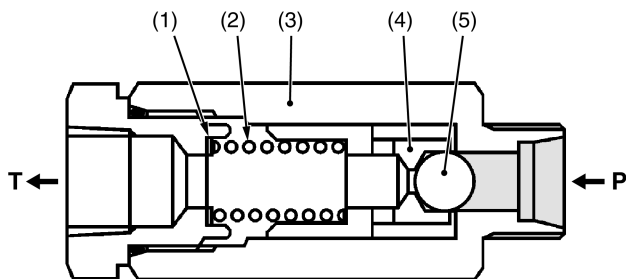
This valve uses a direct acting relief valve, which is suitable for low volume and less frequent operations.

This valve has a fast response, makes it ideal for relieving shock pressure caused by engine starting.

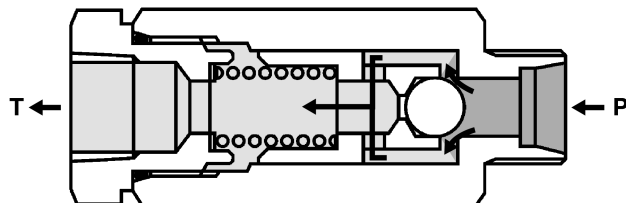
If pressure in the oil cooler line becomes to great, oil pressure forces the ball (5) off the seat of valve body (3), compressing the coil spring (2) and allows oil to flow to the transmission case through the T port.

(Reference)

- Oil cooler relief valve setting pressure.
 4.4 to 4.9 MPa
 45 to 50 kgf/cm²
 640 to 711 psi



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- (1) Shim
- (2) Spring
- (3) Valve Body
- (4) Poppet
- (5) Ball

- P : P Port (From Power Steering Controller)**
- T : Tank Port (To Transmission Case)**

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CONTENTS

1. TROUBLESHOOTING.....	8-S1
2. SERVICING SPECIFICATIONS.....	8-S3
3. TIGHTENING TORQUES.....	8-S6
4. CHECKING, DISASSEMBLING AND SERVICING.....	8-S7
[1] CHECKING AND ADJUSTING.....	8-S7
(1) PTO Clutch Valve.....	8-S7
(2) Shuttle Valve.....	8-S9
(3) Shuttle Lever (CABIN Type).....	8-S10
(4) Steering Controller.....	8-S14
(5) Power Steering Hydraulic Pump.....	8-S15
(6) Three Point System Hydraulic Pump.....	8-S17
(7) Position Control and Draft Control Linkage.....	8-S19
(8) Relief Valve for Three point System.....	8-S23
[2] DISASSEMBLING AND ASSEMBLING.....	8-S24
(1) PTO Valve.....	8-S24
(2) Steering Controller.....	8-S24
(3) Steering Cylinder.....	8-S27
(4) Hydraulic Pump (Power Steering and Three point System).....	8-S28
(5) Relief Valve.....	8-S31
(6) Removing hydraulic Cylinder Assembly (ROPS Type).....	8-S31
(7) Hydraulic Cylinder Assembly (CABIN Type).....	8-S33
(8) Position Control Valve.....	8-S35
(9) Disassembling Cylinder Safety Valve.....	8-S37
(10) Disassembling Hydraulic Cylinder Assembly.....	8-S38
[3] SERVICING.....	8-S40
(1) Steering Cylinder.....	8-S40
(2) Oil Cooler Relief Valve.....	8-S41
(3) Hydraulic Pump (Power Steering and Three Point Hydraulic System).....	8-S41
(4) Cylinder Safety Valve.....	8-S42
(5) Hydraulic Cylinder Assembly.....	8-S42

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Implement Does Not Rises (Not Noise)	● Control linkage improperly assembled or damaged	Repair or replace	8-S19 to S22
	● Control valve malfunctioning (unload valve, spool, check valve, poppet valve)	Repair or replace	8-S35, S36
	● Control valve broken	Replace	8-S35, S36
	● Control valve improperly adjusted	Adjust	8-S35
	● Relief valve spring damaged	Replace	8-S31
	● Hydraulic piston O-ring, cylinder damaged	Replace	8-S38
	● Safety valve damaged	Replace	8-S37
Implement Does Not Rises (Noise)	● Transmission fluid improper or insufficient	Change or replenish	G-8, 17
	● Oil filter clogged	Replace	G-16
	● Relief valve setting pressure too low	Adjust	8-S31
	● Relief valve spring weak or damaged	Replace	8-S31
	● Hydraulic pump malfunctioning	Repair or replace	8-S28
Implement Does Not Reach Maximum Height	● Position rod and feedback rod improperly adjusted	Adjust	8-S19 to S22
	● Draft rod and feedback rod improperly adjusted	Adjust	8-S19 to S22
	● Lever stopper position improper	Adjust	—
Implement Does Not Lower	● Control valve malfunctioning	Repair or replace	8-S35, S36
	● Spool damaged	Replace	8-S36
	● Poppet valve improperly adjusted (Adjusting screw of poppet valve)	Adjust	8-S36
	● Lowering speed adjusting valve closed	Open	8-S40
Implement Drops by Weight	● Hydraulic cylinder worn or damaged	Replace	8-S42
	● Hydraulic piston O-ring worn or damaged	Replace	8-S38
	● Safety valve damaged	Replace	8-S37
	● Lowering speed adjusting valve damaged	Replace	8-S40
	Control valve malfunctioning		
	● Check valve seat surface damaged	Replace	8-S36
	● Check valve O-ring damaged	Replace	8-S36
	● Poppet valve seat surface damaged	Replace	8-S36
	● Poppet valve O-ring damaged	Replace	8-S36
Implement Hunts (Moves Up and Down)	● Poppet valve, poppet seat surface damaged	Replace	8-S36
	● Check valve, check valve seat surface damaged	Replace	8-S36
	● Control valve O-ring worn or damaged	Replace	8-S36

Symptom	Probable Cause	Solution	Reference Page
Draft Control Malfunctioning	● Draft control linkage improperly adjusted	Adjust	8-S19 to S22
	● Torsion bar weak or broken	Replace	—

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2. SERVICING SPECIFICATIONS

PTO CLUTCH VALVE

Item		Factory Specification	Allowable Limit
PTO Clutch Valve	Relief Valve Setting Pressure	2.45 to 2.55 MPa 25 to 26 kgf/cm ² 355 to 370 psi	—

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STEERING CONTROLLER

Item		Factory Specification	Allowable Limit
Relief Valve	Setting Pressure	18.1 MPa 185 kgf/cm ² 2631 psi	—

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HYDRAULIC PUMP

Item		Factory Specification	Allowable Limit
Hydraulic Pump for Power Steering	Delivery	Above 21.1 L/min. 5.57 U.S.gals/min. 4.64 Imp.gals/min.	17.2 L/min. 4.54 U.S.gals/min. 3.78 Imp.gals/min.
Hydraulic Pump for 3 Point System	Delivery	Above 37.8 L/min. 9.9 U.S.gals/min. 8.32 Imp.gals/min.	31.2 L/min. 8.24 U.S.gals/min. 6.86 Imp.gals/min.
Housing Bore	Depth of Scratch	—	0.09 mm 0.0035 in.
Bushing to Gear Shaft	Clearance	—	0.15 mm 0.0059 in.
Gear Shaft	O.D.	—	17.968 mm 0.7074 in.
Bushing	Length	—	18.965 mm 0.74665 in.

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CONTROL LINKAGE

Item		Factory Specification	Allowable Limit
Position Control Feedback Rod	Length	125 mm 4.92 in.	—
Floating Position for Position Control	ROPS Type (Distance)	10 to 50 mm 0.39 to 1.97 in.	—
	CABIN Type (Distance)	20 to 40 mm 0.79 to 1.57 in.	—
Stopper to Top Link Holder	Clearance	7.0 to 8.0 mm 0.276 to 0.315 in.	—
Draft Control Rod	Length	215 mm 8.46 in.	—
Floating Position for Draft Control	ROPS Type (Distance L)	Approx. 10 mm 0.39 in.	—
	ROPS Type (Distance H)	Approx. 50 mm 1.97 in.	—
	CABIN Type (Distance L)	Approx. 20 mm 0.79 in.	—
	CABIN Type (Distance H)	Approx. 50 mm 1.97 in.	—

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RELIEF VALVE

Item		Factory Specification	Allowable Limit
Relief Valve	Setting Pressure	18.6 to 19.1 MPa 190 to 195 kgf/cm ² 2702 to 2773 psi	—

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STEERING CYLINDER

Item		Factory Specification	Allowable Limit
Steering Cylinder	I.D.	50.000 to 50.062 mm 1.96850 to 1.97094 in.	50.100 mm 1.97244 in.
Rod to Bushing	Clearance	0.009 to 0.127 mm 0.00035 to 0.00500 in.	0.135 mm 0.00531 in.

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POSITION CONTROL VALVE

Item		Factory Specification	Allowable Limit
Plate and Spool Joint	Distance	62.0 to 63.0 mm 2.44 to 2.48 in.	—

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OIL COOLER RELIEF VALVE

Item		Factory Specification	Allowable Limit
Relief Valve	Setting Pressure	4.4 to 4.9 MPa 45.0 to 50.0 kgf/cm ² 640 to 711 psi	—

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CYLINDER SAFETY VALVE

Item		Factory Specification	Allowable Limit
Cylinder Safety Valve	Operating Pressure	21.1 to 22.6 MPa 215 to 230 kgf/cm ² 3060 to 3277 psi	—

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HYDRAULIC CYLINDER

Item		Factory Specification	Allowable Limit
Cylinder Bore	I.D.	90.000 to 90.050 mm 3.54330 to 3.54527 in.	90.15 mm 3.5492 in.
Hydraulic Arm Shaft to Bushing	Clearance (Right)	0.049 to 0.154 mm 0.00193 to 0.00606 in.	0.50 mm 0.0197 in.
	Clearance (Left)	0.049 to 0.149 mm 0.00193 to 0.00587 in.	0.50 mm 0.0197 in.
	Hydraulic Arm Shaft O.D. (Right)	49.950 to 49.975 mm 1.96653 to 1.96752 in.	—
	Hydraulic Arm Shaft O.D. (Left)	44.950 to 44.975 mm 1.76968 to 1.77067 in.	—
	Bushing I.D. (Right)	50.024 to 50.104 mm 1.96944 to 1.97259 in.	—
	Bushing I.D. (Left)	45.024 to 45.099 mm 1.77259 to 1.77555 in.	—

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
Gerator assembly mounting screw	25.5 to 28.4	2.6 to 2.9	18.8 to 21.0
Hydraulic pipe mounting screw	17.7 to 20.6	1.8 to 2.1	13.0 to 15.2
Hydraulic pump assembly mounting screw and nut	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Housing cover mounting nut	39.2 to 44.1	4.0 to 4.5	28.9 to 32.5
Relief valve assembly	34.3 to 39.2	3.5 to 4.0	25.3 to 28.9
Rear wheel mounting nut	260 to 304	26.5 to 31.0	192 to 224
Delivery pipe retaining nut	107.9 to 117.7	11.0 to 12.0	79.6 to 86.8
Hydraulic cylinder assembly mounting screw and nut	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5
Control valve mounting screw	19.6 to 23.5	2.0 to 2.4	14.5 to 17.4
Control valve lock nut	17.7 to 21.6	1.8 to 2.2	13.0 to 15.9
Control valve plug (for poppet valve and unload valve)	68.6 to 88.3	7.0 to 9.0	50.6 to 65.1
Control valve seat plug (for check valve)	49.0 to 58.8	5.0 to 6.0	36.2 to 43.4
Bracket guide mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Cylinder safety valve	39.2 to 49.0	4.0 to 5.0	28.9 to 36.2
Cylinder safety valve lock nut	58.8 to 78.5	6.0 to 8.0	43.4 to 57.9
Hydraulic arm setting screw	39.2 to 45.1	4.0 to 4.6	28.9 to 33.3

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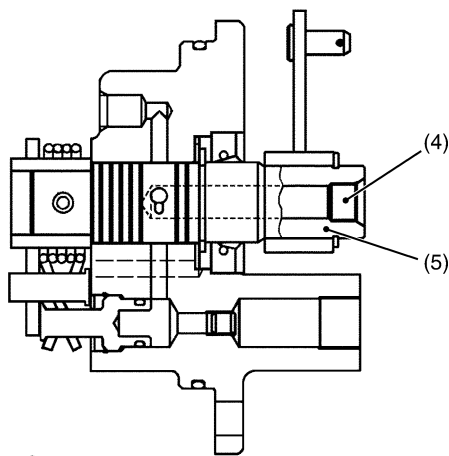
4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

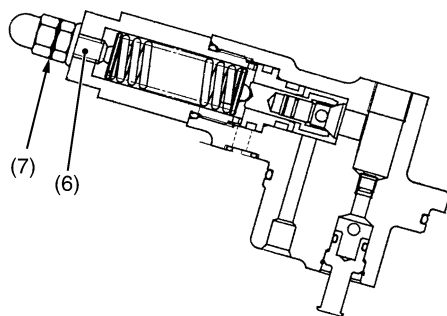
(1) PTO Clutch Valve



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Relief Valve Setting Pressure

1. Start the engine and warm up the transmission fluid, and then stop the engine.
2. Remove the plug (4) (PT 1/8) on the PTO valve spool (5).
3. Set the adaptor (PT 1/8) (Use the oil pressure tester for diesel engines, Code No. 07916-32032), threaded joint (3), cable (2) and pressure gauge (1).
4. Start the engine and set the engine speed maximum.
5. Move the PTO clutch lever to the "ON" position, and measure the pressure.
6. If only the pressure in the PTO clutch engaged position is low, check the hydraulic PTO clutch system.
7. If the measurement is not within the factory specifications, loosen the lock nut (7) and turn the screw (6) to adjust.

■ IMPORTANT

- Do not connect the universal joint of the implement to the tractor PTO shaft while testing.

PTO pressure(When PTO clutch lever is "Engaged" position)	Factory spec.	2.45 to 2.55 MPa 25.0 to 26.0 kgf/cm ² 356 to 370 psi
PTO pressure (When PTO clutch lever is "Disengaged" position)	Factory spec.	No pressure

Condition

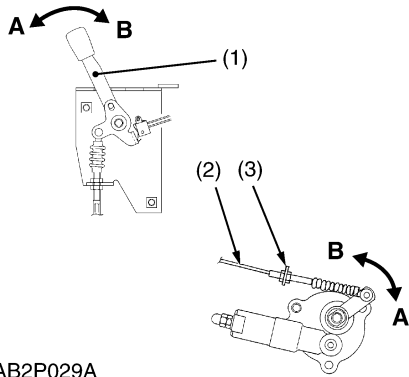
- Engine speed Maximum
- Oil temperature 45 to 55 °C
113 to 131 °F

(Reference)

- Turn the screw (6) to clockwise direction → Pressure increase
- Turn the screw (6) to counterclockwise direction → Pressure decrease

- | | |
|--------------------|--------------|
| (1) Pressure Gauge | (5) Spool |
| (2) Cable | (6) Screw |
| (3) Threaded Joint | (7) Lock Nut |
| (4) Plug (PT 1/8) | |

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PTO Clutch Lever Movement

1. Stop the engine and remove the key.
2. Check the PTO clutch lever (1) on the "ON" and "OFF" position of PTO clutch lever guide.
3. If adjustment is needed, loosen the lock nuts (3) and adjust the clutch control cable (2) length.
4. Retighten the lock nuts (3) firmly.

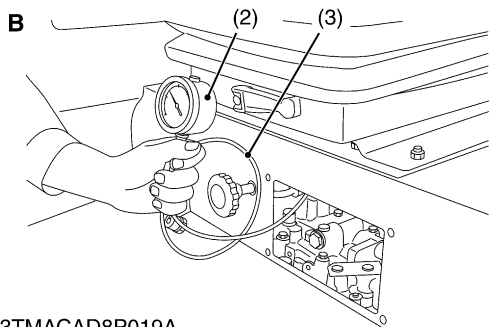
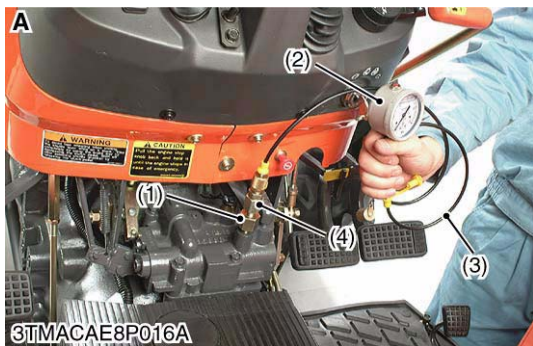
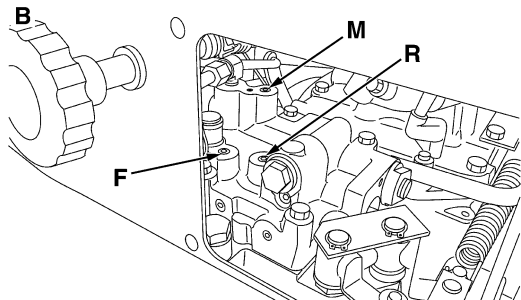
■ IMPORTANT

- Do not connect the universal joint of the implement to the tractor PTO shaft while testing.

- | | |
|--------------------------|----------------|
| (1) PTO Clutch Lever | A : OFF |
| (2) Clutch Control Cable | B : ON |
| (3) Lock Nut | |

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(2) Shuttle Valve



Checking of Shuttle Valve System Pressure

1. Remove the floor mat, housing cover, seat, fenders (RH and LH) and center frame.
2. Remove the each plugs of **F**, **R**, **M** and set the adaptor **D** (1), threaded joint (4), cable (3), and pressure gauge (Code No. : 07916-52961) (2).
3. Start the engine and measure the pressure of each port and each shuttle lever position as the pressure table.

Condition

- Engine speed..... Approx. 2800 min⁻¹ (rpm)
- Oil temperature...45 to 55 °C (113 to 131 °F)

Shuttle Lever	Clutch Pedal	F Port pressure	R port pressure	M port pressure
Forward	Fully pressed	0	0	2.45 to 2.55 MPa 25.0 to 26.0 kgf/cm ² 355 to 370 psi
	Free	1.6 to 1.9 MPa 13.6 to 19.4 kgf/cm ² 232 to 276psi	0	
Reverse	Fully pressed	0	0	0.26 to 0.28 MPa 2.7 to 2.9 kgf/cm ² 38 to 41 psi
	Free	0	1.6 to 1.9 MPa 13.6 to 19.4 kgf/cm ² 232 to 276psi	
Neutral	—	0	0	

NOTE

- Use valve adaptor (see page G-54) to inspect the port **F** and **R** for the cabin type.
- Pressure gauge is 5 MPa (50 kgf/cm², 700 psi) full scale.
- Apply Three Bond 2401 or equivalent to the plugs **F**, **R** and **M**, when install them.

- (1) Adaptor **D**
- (2) Pressure Gauge
- (3) Cable
- (4) Threaded Joint

Plug F : Operation Oil Pressure (For Forward)

Plug R : Operation Oil Pressure (For Reverse)

Plug M : Operation Oil Pressure (For Modulation Valve)

A : ROPS Type

B : CABIN Type

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(3) Shuttle Lever (CABIN Type)

(A) Adjusting Shuttle Valve Neutral Position and Lever Guide Neutral Position

CAUTION

- Park the machine on a firm, flat and level surface, set the parking brake and place the gear shift in neutral.
- Stop the engine and remove the key before checking and adjusting.

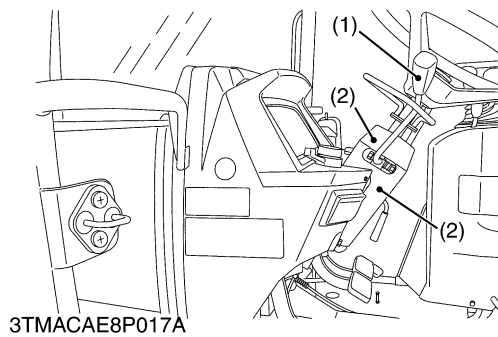
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Steering Post Cover

1. Remove the steering post cover (2).

- (1) Shuttle Lever
- (2) Steering Post Cover

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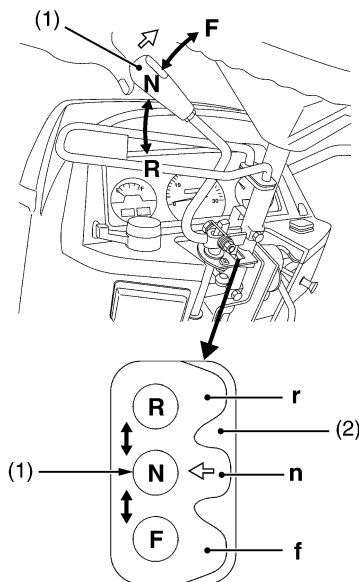
Checking Shuttle Valve Neutral Position and Lever Guide Neutral Position

1. The shuttle valve spool is provided with **F**, **N** and **R** ball detents. (Lift the shuttle lever (1) and slowly move it to the **F** and **R** directions until you feel the lever clicking at the ball detents.)
2. The steering column also has the **f**, **n** and **r** grooves for the shuttle lever.
3. In this adjustment procedure, make alignment between the shuttle valve **N** detent and shuttle lever guide **n** groove.

- (1) Shuttle Lever
- (2) Shuttle Lever Guide
- f** : Groove F
- n** : Groove N
- r** : Groove R

- F** : Forward
- R** : Rear
- N** : Neutral

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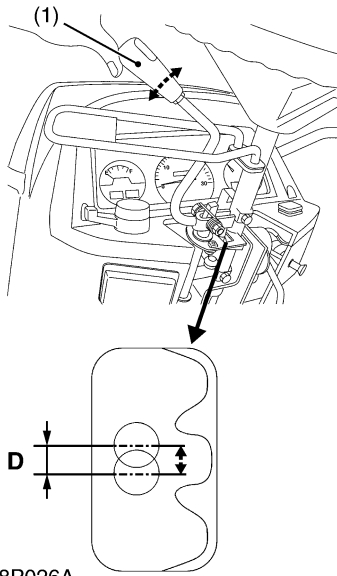
Shuttle Lever Free Play

1. Place the shuttle lever to the neutral position.
2. Lift the shuttle lever (1) then move it back and forth, and confirm the free play "D" of the shuttle lever (1) at neutral position.

(1) Shuttle Lever

D : Free Play

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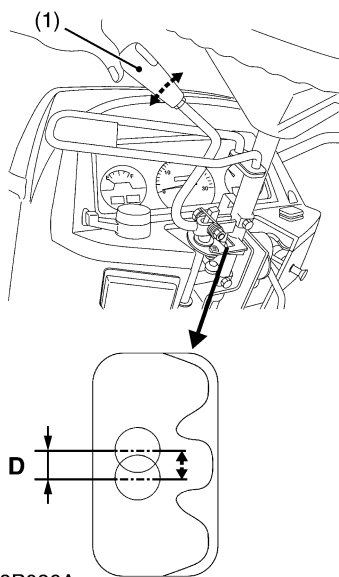
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Shuttle Lever Neutral Position

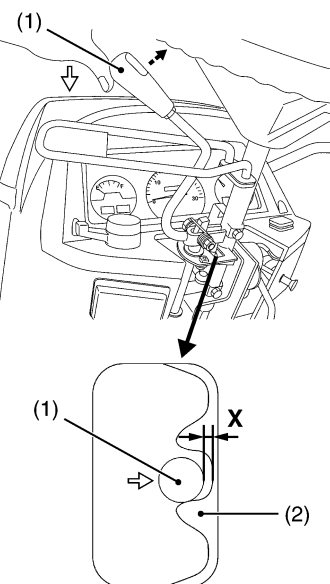
1. Shift the free play "D" toward the forward direction and slowly lower the shuttle lever as shown in the figure. And visually inspect the clearance "X".
2. Shift the free play "D" toward the rear direction and slowly lower the shuttle lever (1) as shown in the figure. And visually inspect the clearance "Y".
3. Make sure the two clearances "X" and "Y" are just the same.

■ **NOTE**

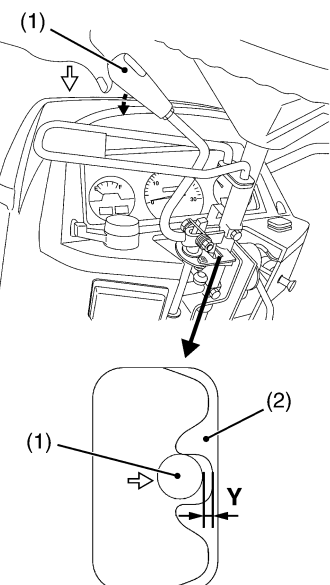
- The figure below is an example when the length of the cable is misadjusted.



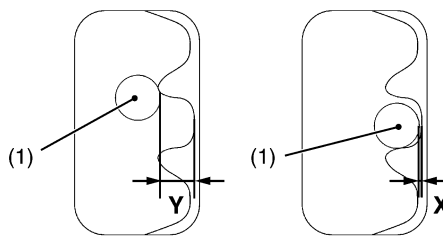
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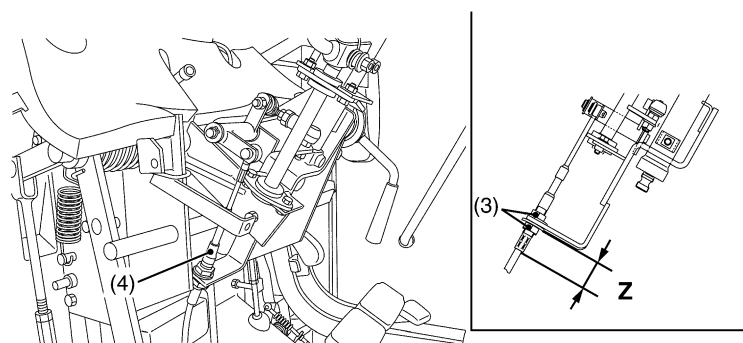
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■ **NOTE**

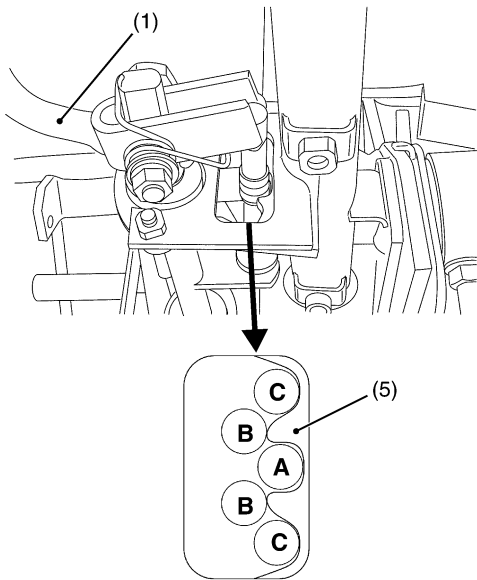
- Use two wrench to prevent the stay bends when adjust the length of the shuttle cable (4).
4. If these clearances are not the same, readjust the shuttle cable (4) length "Z" with the retaining nuts (3).
 5. If displaced too much in the F direction. Clearance $X > Y$: Shorten "Z"
 6. If displaced too much in the R direction. Clearance $X < Y$: Lengthen "Z"
 7. Adjust the length Z to become the clearances X and Y are same.



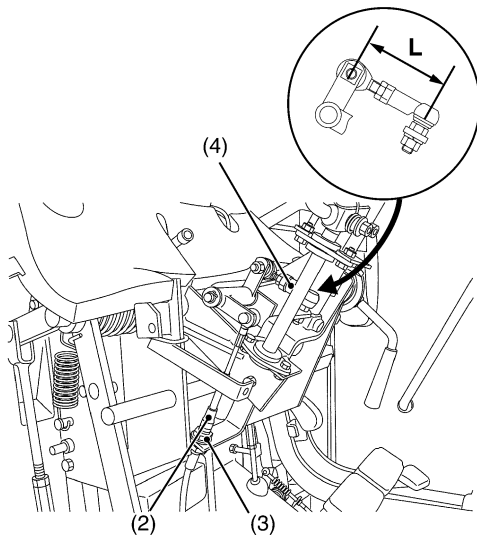
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- | | |
|-------------------------|----------------------|
| (1) Shuttle Lever | D : Free Play |
| (2) Shuttle Lever Guide | X : Clearance |
| (3) Retaining Nut | Y : Clearance |
| (4) Shuttle Cable | Z : Length |

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3TMACAD8P031A



3TMACAD8P032A

Engine Start Condition

■ **IMPORTANT**

- Before starting the engine, make sure the speed range lever and the gear shift lever are both at the neutral position.
- Place the PTO lever to the OFF position.
- Apply the parking brake.

1. Check the engine start condition as follows :

■ **NOTE**

- Do not touch the shuttle lever (1) when the shuttle lever (1) is at specified position as shown in figure.

(Reference)

Position **A** : Engine start

Position **B** : Engine does not start

Position **C** : Engine does not start

2. If the engine started at position **B** and / or **C**, adjust the shuttle cable (2) with retaining nut (3).

(Reference)

Shuttle rod length L	Factory spec.	65 mm 2.56 in.
----------------------	---------------	-------------------

(1) Shuttle Lever

(2) Shuttle Cable

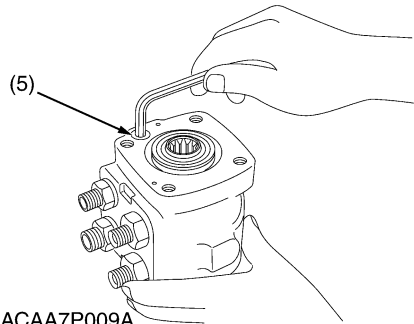
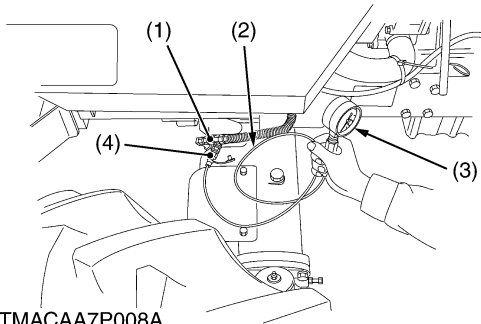
(3) Retaining Nut

(4) Shuttle Rod

(5) Shuttle Lever Guide

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(4) Steering Controller



Relief Valve Setting Pressure

1. Disconnect the delivery hose 1 (or 2) from steering cylinder and set a pressure gauge (3) (Code No. 07916-50321) between them using power steering adaptor (1) (Code No. 07916-54021), joint (Code No. 07916-50401) and cable (Code No. 07916-50331).
2. Start the engine and set the engine speed at maximum speed.
3. Fully turn the steering wheel to the left or right and read the pressure when the relief valve operates.
4. Return the steering wheel to the front position and read the pressure gauge when the steering control valve is in neutral.
5. If the difference between the relief pressure and the pressure in neutral is not within the factory specifications, adjust the relief pressure by the adjust plug (5).

Condition

- Engine speed Maximum
- Oil temperature 45 to 55 °C
113 to 131 °F

■ IMPORTANT

● (Air Bleeding)

Start the engine, then turn the steering wheel slowly in both directions all the way alternately a few times, and stop the engine.

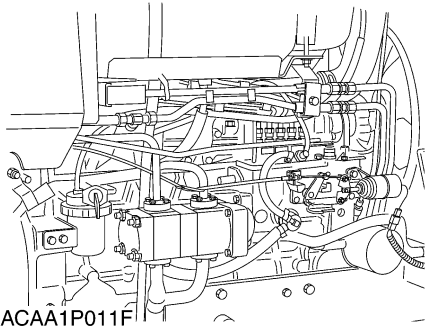
Relief valve setting pressure	Factory spec.	18.1 MPa 185 kgf/cm ² 2631 psi
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- | | |
|----------------------------|----------------------------------|
| (1) Power Steering Adaptor | (4) Joint |
| (2) Cable | (5) Adjust Plug for Relief Valve |
| (3) Pressure Gauge | |

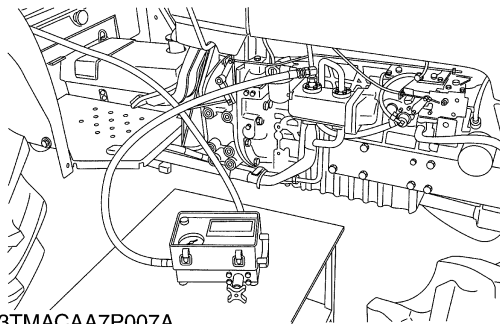
000002869E

(5) Power Steering Hydraulic Pump

A



B



Hydraulic Flow Test

■ IMPORTANT

- When using a flowmeter other than KUBOTA specified flowmeter (Code No. 07916-52792), be sure to use the instructions with the flowmeter.
 - Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.
1. Disconnect the delivery pipe which is connected from hydraulic pump to steering controller.
 2. Install the adaptor **53** and **54** to the pump discharge port. [Adaptor **53** and **54** are included in adaptor set (Code No. 07916-54301).]
 3. Connect the hydraulic test hose to the adaptor **53** and flowmeter inlet port.
 4. Connect the other hydraulic test hose to the flowmeter outlet and put the end of the hose into the transmission oil port.
 5. Open the flowmeter loading valve completely. (Turn counterclockwise.)
 6. Start the engine and set the engine speed at 2000 to 2200 min^{-1} (rpm).
 7. Slowly close the loading valve to generate pressure approx. 9.8 MPa (100 kgf/cm^2 , 1422 psi). Hold in this condition until oil temperature reaches approx. 50 °C (122 °F).
 8. Open the loading valve completely.
 9. Set the engine speed. (Refer to condition.)
 10. Read and note the pump delivery at no pressure.
 11. Slowly close the loading valve to increase rated pressure. (Refer to condition.) As the load is increased, engine speed drops, therefore, reset the engine speed.
 12. Read and note the pump delivery at rated pressure.
 13. Open the loading valve completely and stop the engine.
 14. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

A : ROPS Type

B : CABIN Type

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Hydraulic Flow Test (Continued)**Condition**

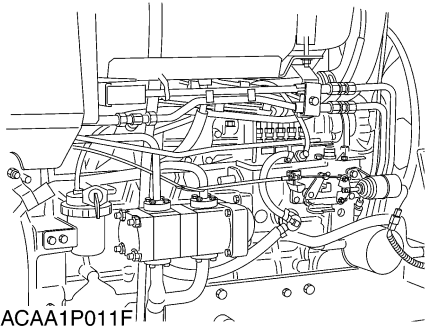
- Engine speed 2800 min⁻¹ (rpm)
- Rated pressure 16.8 MPa (170 kgf/cm², 2418 psi)
- Oil temperature 45 to 55 °C
113 to 131 °F

Hydraulic pump delivery at no pressure	Factory spec.	22.4 L/min. 5.92 U.S.gals/min. 4.93 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory spec.	21.1 L/min. 5.57 U.S.gals/min. 4.64 Imp.gals/min.
	Allowable limit	17.2 L/min. 4.54 U.S.gals/min. 3.78 Imp.gals/min.

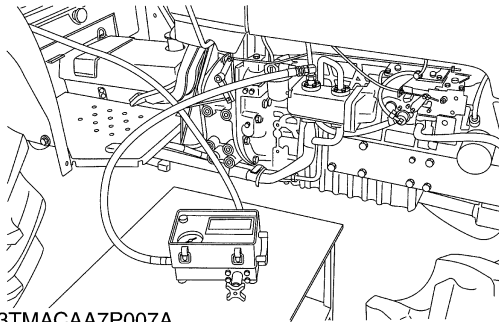
000002871E

(6) Three Point System Hydraulic Pump

A



B



Hydraulic Flow Test

■ IMPORTANT

- When using a flowmeter other than KUBOTA specified flowmeter (Code No. 07916-52792), be sure to use the instructions with the flowmeter.

- Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.

1. Disconnect the delivery pipe which is connected from hydraulic pump to hydraulic cylinder.
2. Install the adaptor **53** and **54** to the pump discharge port. [Adaptor **53** and **54** are included in adaptor set (Code No. 07916-54301).]
3. Install the adaptor **64** to the delivery pipe joint. [Hydraulic adaptor **64** is included in adaptor set (Code No. 07916-54031).]
4. Connect the hydraulic test hose to the adaptor **53** and flowmeter inlet port.
5. Connect the other hydraulic test hose to the flowmeter outlet and to hydraulic adaptor **64**.
6. Open the flowmeter loading valve completely. (Turn counterclockwise.)
7. Start the engine and set the engine speed at 2000 to 2200 min⁻¹ (rpm).
8. Slowly close the loading valve to generate pressure approx. 9.8 MPa (100 kgf/cm², 1422 psi). Hold in this condition until oil temperature reaches approx. 50 °C (122 °F).
9. Open the loading valve completely.
10. Set the engine speed. (Refer to condition.)
11. Read and note the pump delivery at no pressure.
12. Slowly close the loading valve to increase rated pressure. (Refer to condition.) As the load is increased, engine speed drops, therefore, reset the engine speed.
13. Read and note the pump delivery at rated pressure.
14. Open the loading valve completely and stop the engine.
15. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

A : ROPS Type

B : CABIN Type

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Hydraulic Flow Test (Continued)**Condition**

- Engine speed Approx. 2800 min⁻¹ (rpm)
- Rated pressure 19.1 MPa (195 kgf/cm², 2773 psi)
- Oil temperature 45 to 55 °C
113 to 131 °F

Hydraulic pump delivery at no pressure	Factory spec.	Above 40.3 L/min. 10.65 U.S.gals/min. 8.87 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory spec.	37.8 L/min. 9.90 U.S.gals/min. 8.32 Imp.gals/min.
	Allowable limit	31.2 L/min. 8.24 U.S.gals/min. 6.86 Imp.gals/min.

000002873E

(7) Position Control and Draft Control Linkage

Adjusting the Uppermost Position

1. Attach the weight (1) of 490 N (50 kgf, 110 lbs) to the end of lower link (2).
2. Set the position control lever (3) and draft control lever (4) to the lowest position.
3. Start the engine, and set the engine speed at the 1000 min⁻¹ (rpm).
4. Set the position control lever (3) to the uppermost position.
5. Shorten the feedback rod by turning the turnbuckle (5) until the relief valve begins to be operated.
6. From the feedback rod position obtained above 5, turn the turnbuckle by 1.5 turn to lengthen the feedback rod, then tighten the lock nut.
7. Move the position control lever down then all the way up. Stop the engine and check that the lift arm has 5 to 20 mm (0.20 to 0.79 in.) play upward on its edge.
8. If the specified play is not obtained, repeat from 4 again.

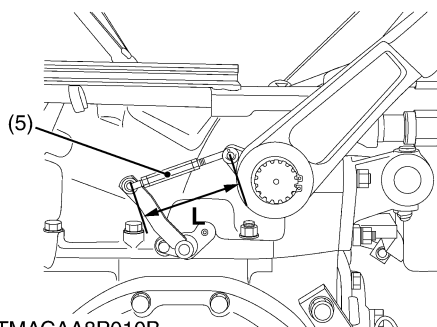


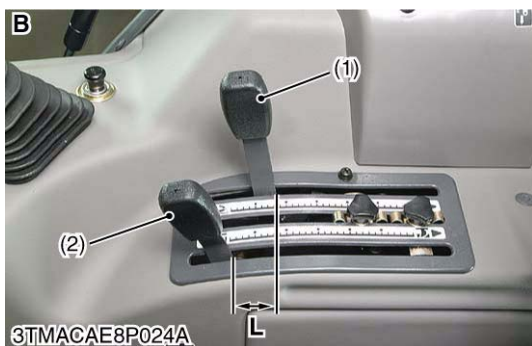
Position control feedback rod L	Factory spec.	Approx. 125 mm 4.92 in.
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- (1) Weight
- (2) Lower Link
- (3) Position Control Lever
- (4) Draft Control Lever
- (5) Turnbuckle

A : ROPS Type
B : CABIN Type

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Checking Floating Position

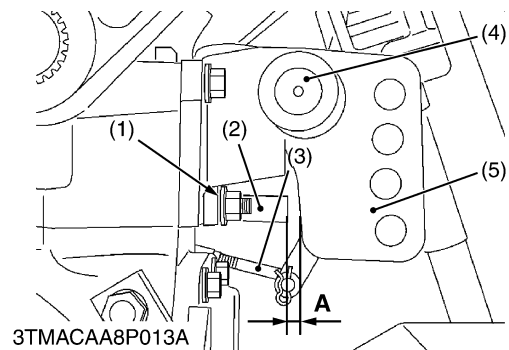
1. Attach the weight of 490 N (50 kgf, 110 lbs) to the end of lower link.
2. Set the position control lever (1) and draft control lever (2) to the lowest position, and set the engine speed at the maximum.
3. Gradually move the position control lever (1) until the lower link begins to rise.
4. Check the distance L.
5. If the specified play is not obtained, readjust the feedback rod. (Refer to Adjusting of uppermost position section.)

Distance L	Factory spec.	ROPS type	10 to 50 mm 0.39 to 1.97 in.
		CABIN type	20 to 40 mm 0.79 to 1.57 in.

- (1) Position Control Lever
- (2) Draft Control Lever

A : ROPS Type
B : CABIN Type

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Adjusting Top Link Bracket

1. Measure the clearance A between the stopper (2) and top link bracket (5).
If the clearance is not within the factory specifications, adjust with the shims (1) between the stopper (2) and top link bracket (5).

Clearance A	Factory spec.	7.0 to 8.0 mm 0.276 to 0.315 in.
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(Reference)

- Thickness of shim (1) : 0.5 mm (0.020 in.)
- (1) Shim
- (2) Stopper
- (3) Draft Control Rod
- (4) Torsion Bar
- (5) Top Link Bracket

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Adjusting Draft Control Rod

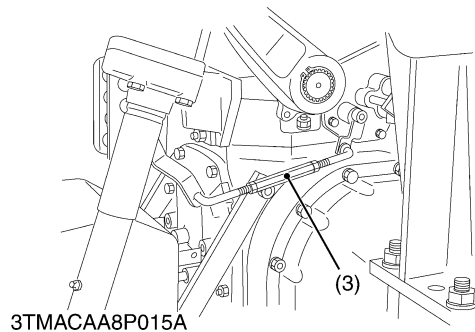
1. Attach a weight of approx. 490 N (50 kgf, 110 lbs) to the end of the lower link.
2. Set the position control lever (1) to the lowest position
3. Start the engine and set the speed at 1000 min⁻¹ (rpm).
4. Set the draft control lever (2) to the uppermost position.
5. Lengthen the draft control rod (3) by turning the turnbuckle until the relief valve begins to be operated.
6. From the draft control rod position obtained above 5, turn the turnbuckle by 1/2 turn to shorten the draft control rod, then tighten the lock nut.

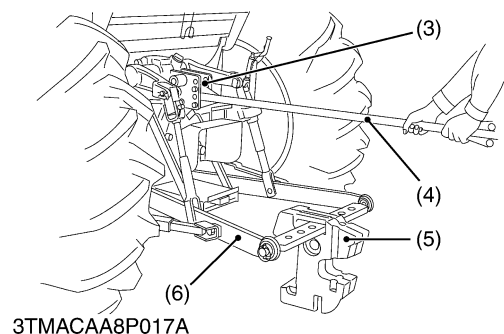
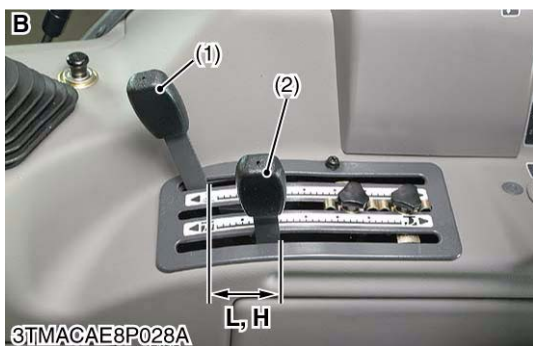
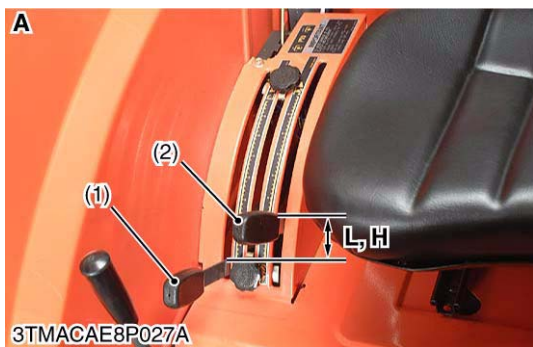


Draft control rod length	Factory spec.	Approx. 215 mm 8.46 in.
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- (1) Position Control Lever **A : ROPS Type**
- (2) Draft Control Lever **B : CABIN Type**
- (3) Draft Control Rod

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Checking Floating Position

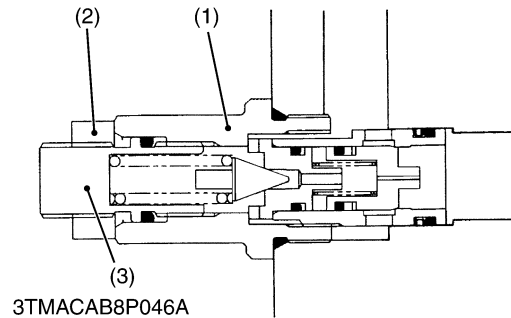
1. Attach the weight (5) of 490 N (50 kgf, 110 lbs) to the end of lower link (6).
2. Set the position control lever (1) and draft control lever (2) to the lowest position.
3. Attach the test bar (4) to the top link bracket (3).
4. Start the engine, and set the engine speed at the maximum.
5. Set the draft control lever upward by approx. **L** from the lowest position.
6. Press the test bar (4) downward until the top link bracket (3) comes in contact with the stopper.
7. Confirm that the lower link (draft control) will not operate.
8. Set the draft control lever upward by approx. **H** from the lowest position.
9. Press the test bar (4) downward until the top link bracket (3) comes in contact with the stopper.
10. Confirm that the lower link begin to rise.
11. After adjustment, tighten the lock nut firmly.
12. If the specified play is not obtained, readjust the feedback rod.
(Refer Adjusting Draft Control Position Section.)

Distance L	Factory spec.	ROPS Type	Approx. 10 mm 0.39 in.
		CABIN Type	Approx. 20 mm 0.79 in.
Distance H	Factory spec.		Approx. 50 mm 1.97 in.

- (1) Position Control Lever
 - (2) Draft Control Lever
 - (3) Top Link Bracket
 - (4) Test Bar
 - (5) Weight
 - (6) Lower Link
- A : ROPS Type**
B : CABIN Type

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(8) Relief Valve for Three point System



Relief Valve Setting Pressure Test Using Pressure Tester (Coupler)

1. Set the Relief Valve Set Pressure Adaptor **G** (Code No. 07916-52751) to the half male of the quick coupler and then set a pressure gauge (Code No. 07916-50321), Cable (Code No. 07916-50331).
2. Start the engine, set at maximum speed.
3. Set the auxiliary control valve operation lever to the **UP** position and read the pressure gauge when the relief valve is actuated.
4. If the pressure is not within the factory specification, adjust the relief valve adjuster (3).

Condition

- Engine speed Maximum
- Oil temperature 45 to 55 °C
113 to 131 °F

Relief valve setting pressure	Factory spec.	18.6 to 19.1 MPa 190 to 195 kgf/cm ² 2702 to 2773 psi
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- (1) Relief Valve **A : ROPS Type**
- (2) Lock Nut **B : CABIN Type**
- (3) Adjuster

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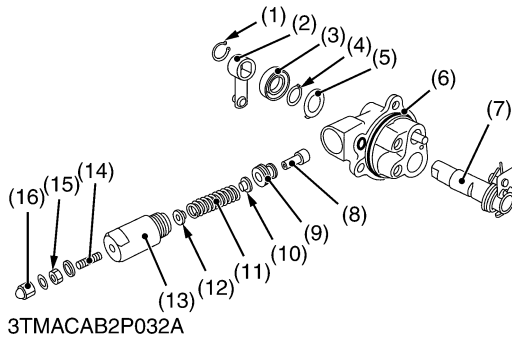
[2] DISASSEMBLING AND ASSEMBLING

(1) PTO Valve

■ NOTE

- For the removing procedure of PTO valve, refer to page 2-S7.

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Disassembling PTO Clutch Valve

1. Remove the external snap ring (1), lever (2) and oil seal (3).
2. Remove the external snap ring (4) and draw out the spool (7).
3. Remove the cap nut (16) and lock nut (15).
4. Remove the adjuster (14) and relief body (13).
5. Draw out the relief poppet (8) and relief bush (9).
6. Draw out the spring (11) and spring seat (10), (12).

(1) External Snap Ring	(9) Relief Bush
(2) Lever	(10) Spring Seat
(3) Oil Seal	(11) Spring
(4) External Snap Ring	(12) Spring Seat
(5) Collar	(13) Relief Body
(6) Control Valve Body	(14) Adjuster
(7) Spool	(15) Lock Nut
(8) Relief Poppet	(16) Cap Nut

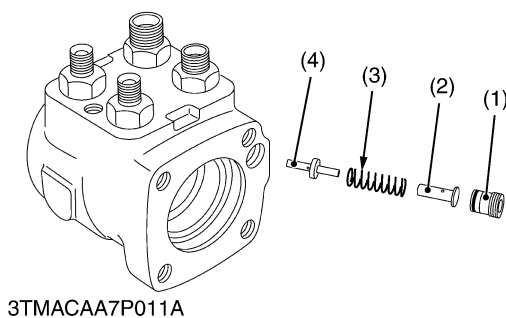
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(2) Steering Controller

■ NOTE

- For the removing procedure of steering controller, refer to page 7-S3 to S6.

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Relief Valve Assembly

1. Remove the adjust plug (1) and draw out the collar (2), spring (3) and poppet (4).

(When reassembling)

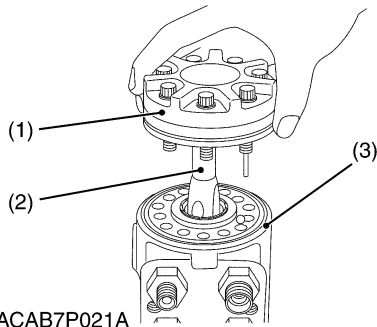
- Take care not to damage the O-ring.

■ IMPORTANT

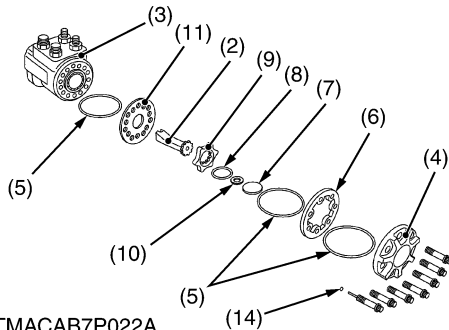
- After disassembling and assembling the relief valve, be sure to adjust the relief valve setting pressure.

(1) Adjust plug	(3) Spring
(2) Collar	(4) Poppet

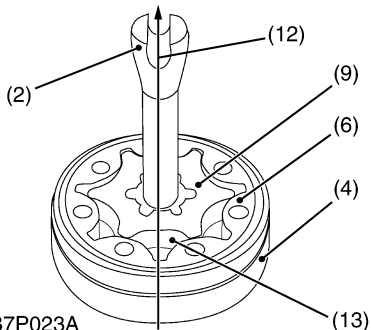
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3TMACAB7P021A



3TMACAB7P022A



3TMACAB7P023A

Removing Gerotor

1. Secure the housing (3) in a vise and remove seven gerotor mounting screws and gerotor assembly (1).
2. Remove the distributor plate (11) and drive shaft (2).
3. Remove the rotor (9), O-ring (5) between the distributor plate and stator (6).
4. Take out the spacer ring (10) and spacer (7).
5. Remove the O-ring (8) from the rotor (9).

(When reassembling)

1. Fit an O-ring into the groove of the end cap (4), insert 2 or 3 bolts.
2. Fit an O-ring into the groove of the stator (6), and put it on the end cap, with the O-ring upward.
3. Apply clean transmission fluid (specified fluid) to the rotor (9), fit an O-ring (8) into the groove of the rotor and put the spacer on it. Keeping the spacer on the rotor, fit it into the stator (6) with the spline bevelled side upward.
4. After putting the spacer into the rotor (9) insert the splines of drive shaft (2) into the rotor (9), aligning the direction of drive shaft pin groove (12) with the rotor tooth bottom (13).
5. Fit an O-ring into the groove of the housing (3).
Fit the pin groove of the drive shaft (2) to the dowel pin inside the housing

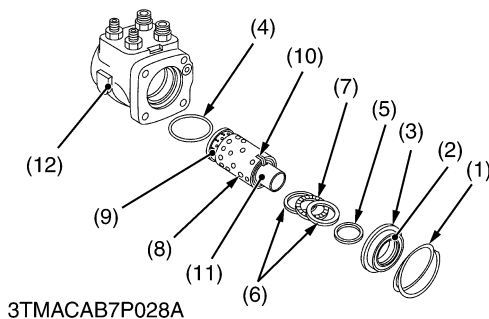
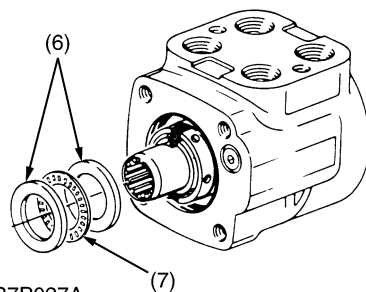
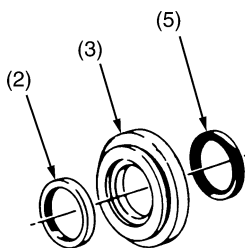
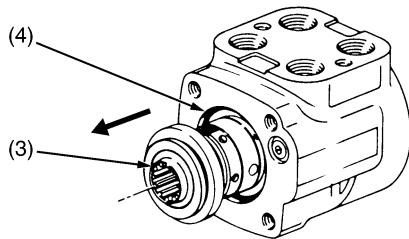
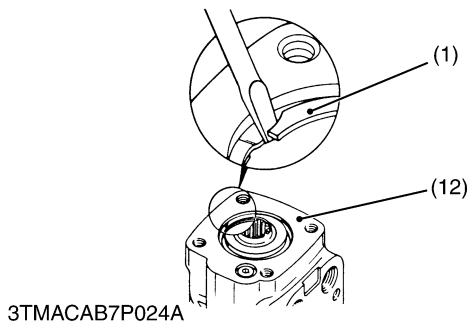
IMPORTANT

- Be sure to align the direction of the drive shaft pin groove (12) with the rotor tooth bottom (13).

Tightening torque	Gerotor assembly mounting screw (5/16")	25.5 to 28.4 N-m 2.6 to 2.9 kgf-m 18.8 to 21.0 ft-lbs
-------------------	---	---

- | | |
|----------------------|------------------------------|
| (1) Gerotor Assembly | (8) O-ring |
| (2) Driven Shaft | (9) Rotor |
| (3) Housing | (10) Spacer Ring |
| (4) End Cap | (11) Distributor Plate |
| (5) O-ring | (12) Direction of Pin Groove |
| (6) Stator | (13) Rotor Tooth Bottom |
| (7) Spacer | (14) Ball |

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Grand Seal, Needle Bearing, Sleeve and Spool

1. Remove the retaining ring (1) with a screw driver.
2. Hold the control valve unit vertically and spool and sleeve align the cross pin parallels to flat side of housing (flow priority valve mounting side), the cross pin is visible through open end of spool.
3. At this time, take care so as not to allow the cross pin to be caught in the groove of the housing. If the cross pin is caught, adjust its position with a fingertip.
4. Push the spool and sleeve to the allow direction and remove the seal grand bushing (3) with dust seal (2) and quad ring seal (5).
5. Remove the O-ring (4) from the housing (12).
6. Remove the dust seal from the seal grand bushing (3).
7. Remove the O-ring (4).

(When reassembling)

- Replace O-ring with new one.
Apply transmission oil to the dust seal, quad ring seal and O-ring.
- 8. Remove the quad ring seal (5) from the sleeve (9).
- 9. Remove the bearing races and needle bearing from valve assembly.

(When reassembling)

- Apply transmission oil to the bearing races and needle bearing.
- 10. Draw out the sleeve (9) and spool (11) assembly from the gerotor side, with the port surface of the housing downward. At this time, take care so as not to allow the dowel pin to be caught in the groove of the housing (12). If the dowel pin is caught, adjust its position with a fingertip and draw out the sleeve and spool assembly slowly.

■ IMPORTANT

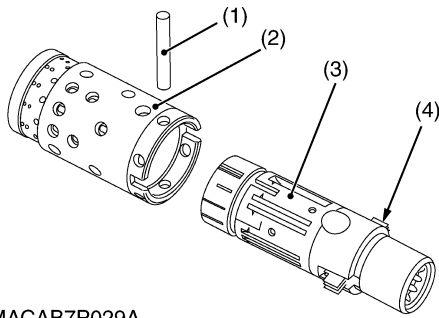
- **As the clearance between the housing and sleeve is very narrow, do not forcibly draw out the sleeve.**

(When reassembling)

- When fitting the sleeve (9) and spool (11) assembly into the housing (12), apply clean transmission fluid to the assembly and then insert it while turning it slowly, taking care so that the parts are not inclines. Also, pay attention to the dowel pin so that it is not caught in the housing grooves. If the pin is caught, adjust its position with a fingertip.

- | | |
|------------------------|-----------------------|
| (1) Retaining Ring | (7) Needle Bearing |
| (2) Dust Seal | (8) Pin |
| (3) Seal Grand Bushing | (9) Sleeve |
| (4) O-ring | (10) Centering Spring |
| (5) Quad Ring Seal | (11) Spool |
| (6) Bearing Race | (12) Housing |

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3TMACAB7P029A

Sleeve and Spool

1. Draw out the dowel pin (1).
2. Draw out the spool (3) from the sleeve (2).
3. Push out the centering spring (4).

■ **IMPORTANT**

- **As the clearance between the sleeve (2) and spool (3) is very narrow, draw out the spool by turning it slowly with due care.**

(When reassembling)

- For easier assembly, first insert a couple of centering springs assembled back to back and then fit springs in one after another.
- Align the centering spring notch with the sleeve notch.

(1) Dowel Pin

(3) Spool

(2) Sleeve

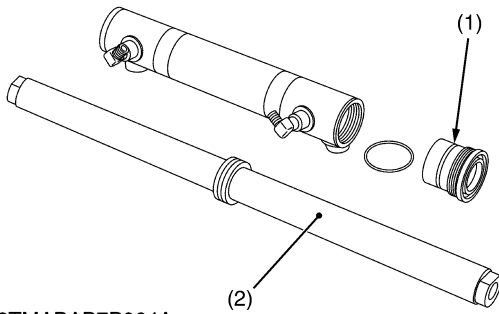
(4) Centering Spring

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(3) Steering Cylinder■ **NOTE**

- For the removing procedure of steering cylinder, refer to page 7-S7.

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Disassembling Steering Cylinder

1. Remove the guide assembly (1) and draw out the piston rod (2).

(When reassembling)

- Apply transmission fluid to the oil seal and O-ring.

(1) Guide Assembly

(2) Piston Rod

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(4) Hydraulic Pump (Power Steering and Three point System)

■ IMPORTANT

- The hydraulic pump is precision machined and assembled : if disassembled once, it may be unable to maintain its original performance. Therefore, when the hydraulic pump fails, replacement should be carried out with the hydraulic pump assembly except when emergency repair is unavoidable.
- When repair is required, follow the disassembly and servicing procedures shown below with utmost care.
- Be sure to test the hydraulic pump with a flowmeter before disassembling.
- After reassembling, be sure to perform break-in operation and ensure that there is nothing abnormal with the hydraulic pump.

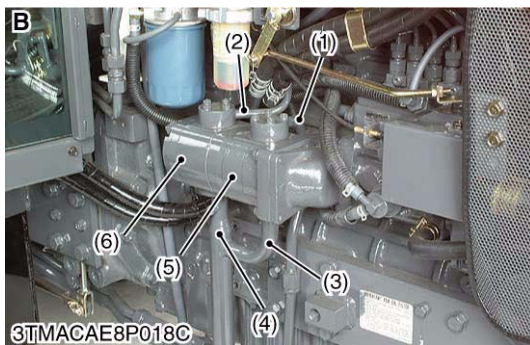
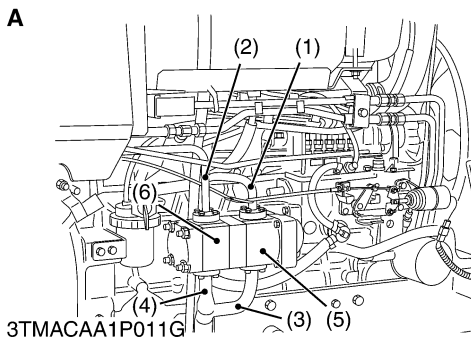
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Removing Three Point System Hydraulic Pump and Power Steering Hydraulic Pump

1. Disconnect the delivery pipe (1), (2) from the hydraulic pump.
2. Disconnect the suction pipe (3), (4) from the hydraulic pump.
3. Remove the hydraulic pump assembly mounting screws and nuts.
4. Take out the hydraulic pump assembly.

(When reassembling)

- Apply grease to the O-ring and take care not to damage it.

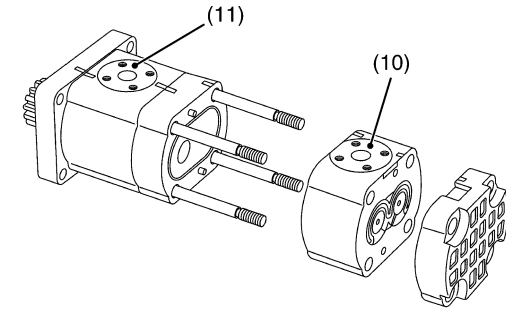
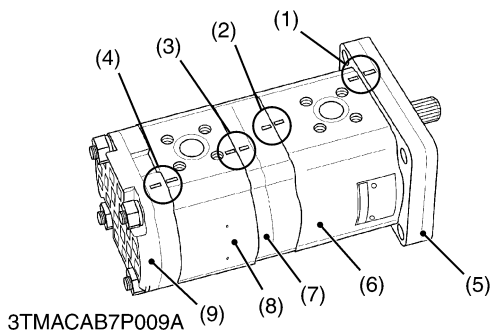


Tightening torque	Hydraulic pipe mounting screw	17.7 to 20.6 N·m 1.8 to 2.1 kgf·m 13.0 to 15.2 ft-lbs
	Hydraulic pump assembly mounting screw and nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs

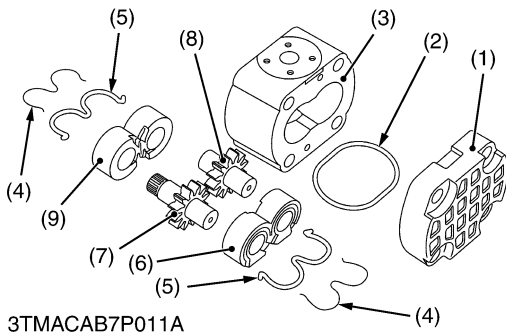
- | | |
|---|---|
| (1) Delivery Pipe
(Three Point Hydraulic Pump) | (4) Suction Pipe
(Power Steering Pump) |
| (2) Delivery Pipe
(Power Steering Pump) | (5) Three Point Hydraulic Pump |
| (3) Suction Pipe
(Three Point Hydraulic Pump) | (6) Power Steering Pump |

A : ROPS Type
B : CABIN Type

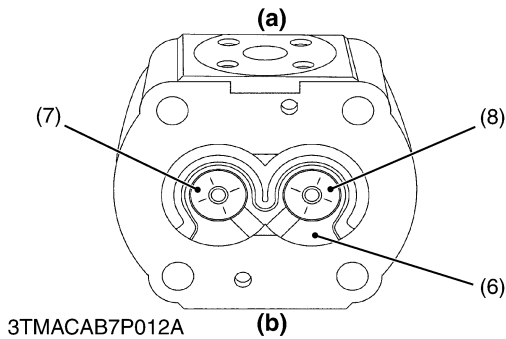
000002894E



3TMACAB7P010A



3TMACAB7P011A



3TMACAB7P012A

Separating Hydraulic Pump

1. Put the parting marks (1), (2), (3), (4) on the flange (5), front housing (6), center plate (7), housing (8) and housing cover (9).
2. Unscrew the housing cover mounting nuts and separate the three point system hydraulic pump (11) from the power steering pump (10).

(When reassembling)

- Take care not to damage the O-rings.

Tightening torque	Housing cover mounting nut	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 ft-lbs
-------------------	----------------------------	---

- | | |
|---|--|
| (1) Parting Mark | (7) Center Plate |
| (2) Parting Mark | (8) Housing (Power Steering Pump) |
| (3) Parting Mark | (9) Housing Cover |
| (4) Parting Mark | (10) Power Steering Pump |
| (5) Flange | (11) Three Point System Hydraulic Pump |
| (6) Front Housing (Three Point System Hydraulic Pump) | |

000002895E

Disassembling Power Steering Hydraulic Pump

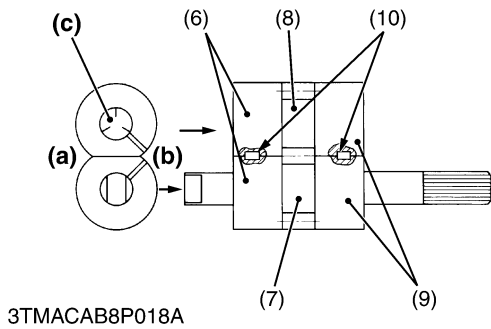
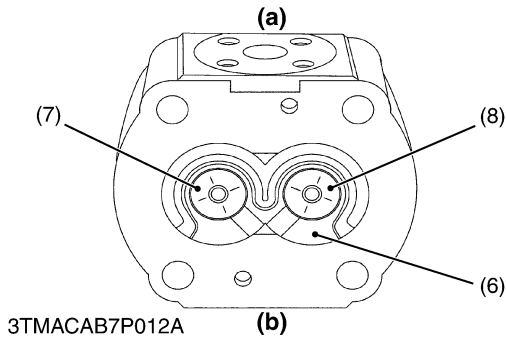
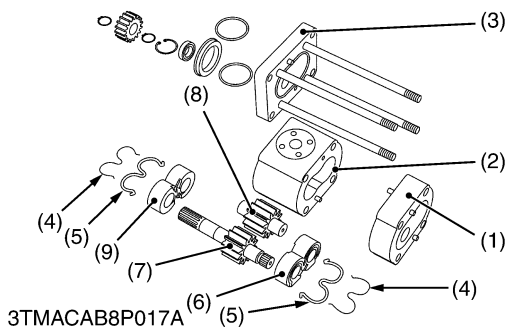
1. Remove the housing cover (1).
2. Remove the backup elements (4) and seal elements (5).
3. Take out bushings (6), (9) and gears (7), (8).

(When reassembling)

- Install the driven gear (8), noting its direction as shown in the figure.
- When installing the bushings (6) and (9), be sure to reassemble them to the each original position.
- Take care not to damage the seal elements and O-rings.
- After reassembly, check the smooth rotation of the hydraulic pump (for example, mount arm an approx. 100 mm (3.94 in.) long to the drive gear and rotate its arm slowly for smooth rotation).

- | | |
|--------------------|-------------------|
| (1) Housing Cover | (7) Drive Gear |
| (2) O-ring | (8) Driven Gear |
| (3) Housing | (9) Bushing |
| (4) Backup Element | |
| (5) Seal Element | (a) Inlet |
| (6) Bushing | (b) Outlet |

000002896E



Disassembling Three Point System Hydraulic Pump

1. Remove the flange (3) and center plate (1).
2. Remove the backup element (4) and seal element (5).
3. Remove the bushings (6) and (9).
4. Remove the drive gear (7) and driven gear (8).

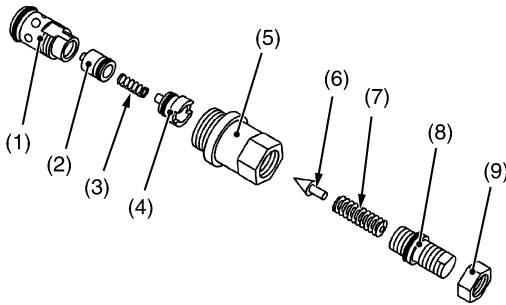
(When reassembling)

- When installing the bushing (6) and (9), be sure to reassemble them to the each original position and direct bushing grooves to inlet side as shown in the figure.
- Install the driven gear (8) in the correct direction as shown in the figure.
- Take care not to damage the seal element (5), backup element (4) and O-ring.
- Take care not to lose or damage the keys (10) joining the two bushings.

- | | |
|--------------------|----------------------|
| (1) Center Plate | (8) Driven Gear |
| (2) Housing | (9) Bushing |
| (3) Flange | (10) Key |
| (4) Backup Element | |
| (5) Seal Element | (a) Inlet |
| (6) Bushing | (b) Outlet |
| (7) Drive Gear | (c) Mark Side |

000002898E

(5) Relief Valve



3TMACAB8P050A

Disassembling Relief Valve

1. Remove the relief valve assembly from the hydraulic block.
2. Remove the lock nut (9).
3. Remove the adjuster (8) and draw out the spring (7) and the pilot valve (6).
4. Remove the valve seat (1), and draw out the valve seat (4), the spring (3) and the main valve (2).

(When reassembling)

- Take care not to damage the O-rings.

Tightening torque	Relief valve assembly	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 25.3 to 28.9 ft-lbs
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■ IMPORTANT

- After disassembling and assembling the relief valve, be sure to adjust the relief valve setting pressure.

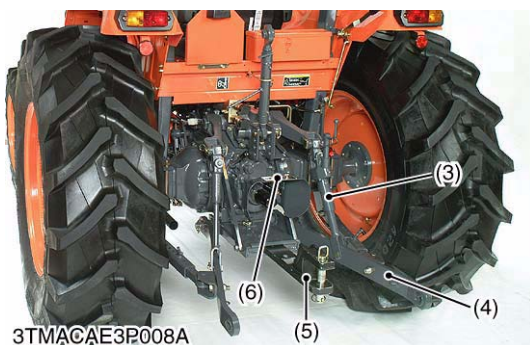
- | | |
|----------------|-----------------|
| (1) Valve Seat | (6) Pilot Valve |
| (2) Main Valve | (7) Spring |
| (3) Spring | (8) Adjuster |
| (4) Valve Seat | (9) Lock Nut |
| (5) Valve Body | |

000002899E

(6) Removing hydraulic Cylinder Assembly (ROPS Type)



3TMACAE2P010B



3TMACAE3P008A

Rear Wheels, Fenders and 3-Point Linkage

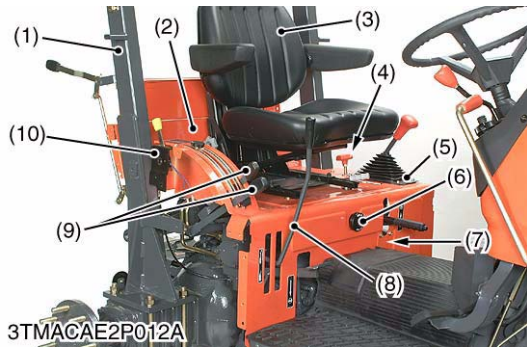
1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Remove the rear wheels (2).
3. Disconnect the jumper leads for hazard and tail light.
4. Disconnect the jumper leads for PTO safety switch.
5. Remove the fenders (1).
6. Remove the lift rods (3).
7. Remove the lower link (4) with stabilizer.
8. Remove the drawbar (5).
9. Remove the PTO shaft cover (6).

(When reassembling)

Tightening torque	Rear wheel mounting nut	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft-lbs
-------------------	-------------------------	---

- | | |
|----------------|---------------------|
| (1) Fender | (4) Lower Link |
| (2) Rear Wheel | (5) Drawbar |
| (3) Lift Rod | (6) PTO Shaft Cover |

000002724E



ROPS, Seat and Center Frame

1. Remove the seat (3).
2. Remove the draft and position control lever grips (9).
3. Remove the auxiliary speed change lever plate (5), DT shift lever grip (4) and 3-point hitch lowering speed control grip (6).
4. Remove the auxiliary control valve lever assembly (8).
5. Remove the parking brake lever (if equipped).
6. Remove the center frame (2).

- | | |
|--|---|
| (1) ROPS | (6) 3-Point Hitch Lowering Speed Control Grip |
| (2) Center Frame | (7) Plate |
| (3) Seat | (8) Auxiliary Control Valve Lever Assembly |
| (4) DT Shift Lever Grip | (9) Lever Grip |
| (5) Auxiliary Speed Change Control Lever Plate | (10) PTO Lever |

000002908E



Hydraulic Cylinder Assembly

1. Remove the delivery pipe (1).
2. Disconnect the draft control rod from the top link bracket.
3. Remove the lift rods from lift arms.
4. Remove the parking brake lever (2).
5. Remove the hydraulic cylinder assembly mounting screws and nuts.
6. Support the hydraulic cylinder assembly with nylon lift strap and hoist, and then remove it.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.

Tightening torque	Delivery pipe retaining nut	107.9 to 117.7 N-m 11.0 to 12.0 kgf-m 79.6 to 86.8 ft-lbs
	Hydraulic cylinder assembly mounting screw and nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs

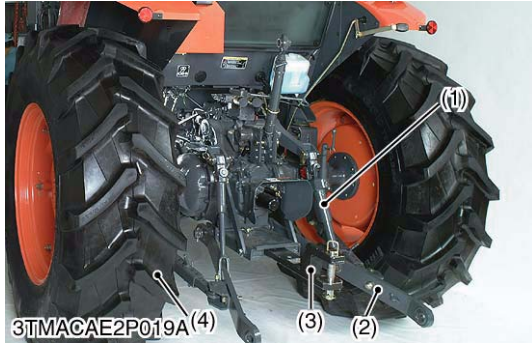
NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod and draft control rod.

- | | |
|-------------------|-------------------------|
| (1) Delivery Pipe | (2) Parking Brake Lever |
|-------------------|-------------------------|

000002909E

(7) Hydraulic Cylinder Assembly (CABIN Type)



Lift Rods and Lower Links

1. Remove the lift rods (1).
2. Remove the lower links (2) with stabilizer.
3. Remove the drawbar (3).
4. Remove the rear wheels (4).

Tightening torque	Rear wheel mounting nut	260 to 304 N·m 26.5 to 31.0 kgf·m 192 to 224 ft-lbs
-------------------	-------------------------	---

- | | |
|----------------|----------------|
| (1) Lift Rod | (3) Drawbar |
| (2) Lower Link | (4) Rear Wheel |

000002596E

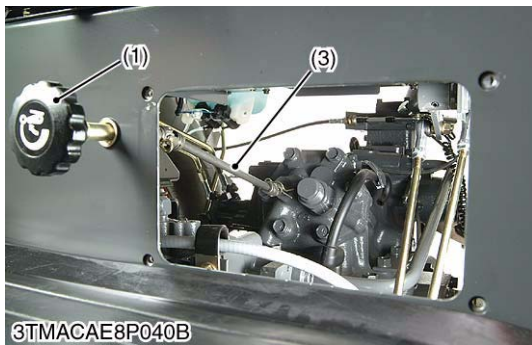


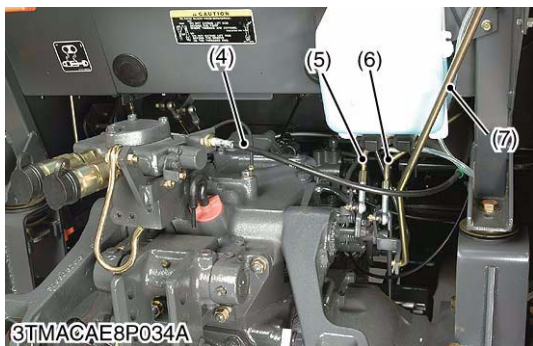
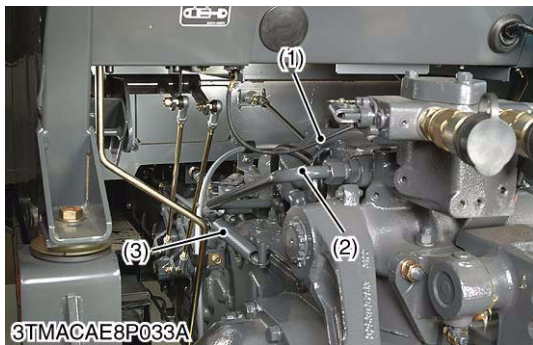
3-Point Hitch Lowering Speed Control Rod

1. Remove the Lowering speed control grip (1).
2. Remove the plate (2).
3. Remove lowering speed control rod (3).

- | | |
|---------------------------------|--------------------------------|
| (1) Lowering Speed Control Grip | (3) Lowering Speed Control Rod |
| (2) Plate | |

000003156E





Hydraulic Cylinder Assembly

1. Disconnect the delivery pipe (2).
2. Disconnect the wireharness (1) and auxiliary control valve cable (4).
3. Disconnect the position control rod (6), draft control rod (5) and additional control lever (7).
4. Remove the spring (3).
5. Remove the hydraulic cylinder assembly mounting screws and nut.
6. Set the hydraulic cylinder block tool set (8). (See page G-59.)
7. Dismounting the hydraulic cylinder assembly from transmission case.

(When reassembling)

- Apply liquid gasket (Three Bond 1216 or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.

Tightening torque	Delivery pipe retaining nut	107.9 to 117.7 N·m 11.0 to 12.0 kgf·m 79.6 to 86.8 ft-lbs
	Hydraulic cylinder assembly mounting screw and nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 ft-lbs

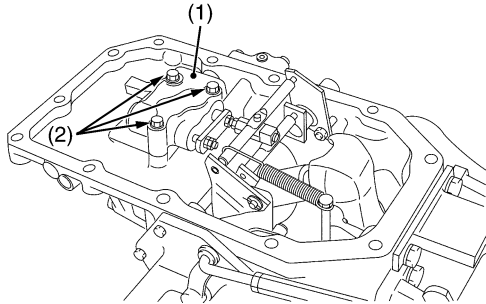
■ **NOTE**

- **Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod and draft control rod.**

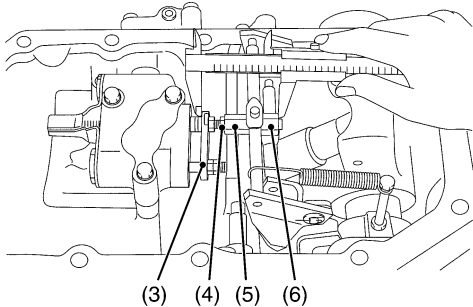
- | | |
|-------------------------|-----------------------------------|
| (1) Wireharness | (5) Draft Control Rod |
| (2) Delivery Pipe | (6) Position Control Rod |
| (3) Spring | (7) Additional Control Lever |
| (4) Control Valve Cable | (8) Hydraulic Cylinder Block Tool |

000002910E

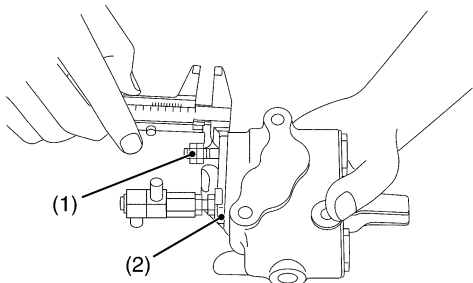
(8) Position Control Valve



3TMACAE8P036A



3TMACAE8P037A



3TMACAB8P054A

Removing Control Valve

1. Remove the return pipe.
2. Remove the control valve mounting screws (2).
3. Remove the control valve (1).

NOTE

- Do not loosen adjusting section at the end of the spool unless necessary.

(When reassembling)

- If the spool joint (6) is removed, be sure to adjust its position according to the following procedure.

Tightening torque	Control valve mounting screw	19.6 to 23.5 N-m 2.0 to 2.4 kgf-m 14.5 to 17.4 ft-lbs
-------------------	------------------------------	---

Adjusting Spool Joint

1. Measure the distance between plate (3) and spool joint (6).
2. If the measurement is not within the factory specifications, loosen the lock nut (4) and adjust by the turnbuckle (5).

Distance between plate and spool joint	Factory spec.	62.0 to 63.0 mm 2.44 to 2.48 in.
--	---------------	-------------------------------------

- (1) Control Valve
- (2) Control Valve Mounting Screw
- (3) Plate
- (4) Lock Nut
- (5) Turnbuckle
- (6) Spool Joint

000002900E

Recording Distance between Plate Lock Nut

NOTE

- Before disassembling spool, be sure to record the lock nut position.

1. Press the plate (2) on to the valve body, and measure the distance between the plate (2) and lock nut (1) for poppet valve.

(When reassembling)

- After assembling the control valve, be sure to check the function of it by air-blowing.

If neutral, lift and down circuit can not be obtained properly, adjust the position of lock nut following the instructions given below.

If the function is proper, stake the lock nut with a punch.

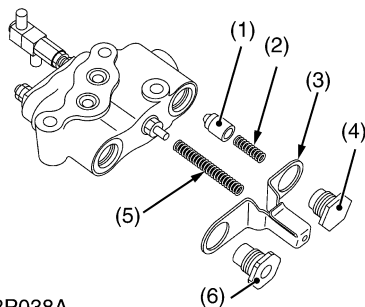
Adjusting Lock Nut

1. Turn the adjusting nuts all the way in, apply compressed air to the pump port while covering the cylinder port.
2. Move the adjusting nuts slowly out until you hear a loud hiss of air (unload valve opens).
3. Turn the nuts another 1/4 turn and lock.

Tightening torque	Lock nut	17.7 to 21.6 N-m 1.8 to 2.2 kgf-m 13.0 to 15.9 ft-lbs
-------------------	----------	---

- (1) Lock Nut
- (2) Plate

000002901E



3TMACAE8P038A

Plug and Unload Valve

1. Secure the control valve with a vise.
2. Remove the seat plug (6) for poppet valve.
3. Remove the plug (4) for unload valve (1).
4. Remove the plate (3) and return spring (5).
5. Draw out the spring (2) and unload valve (1).

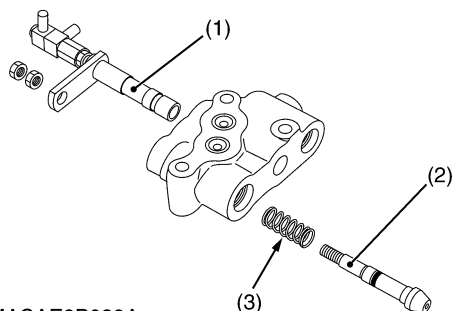
(When reassembling)

- Install the plug, noting O-ring.

Tightening torque	Plug	68.6 to 88.3 N-m 7.0 to 9.0 kgf-m 50.6 to 65.1 ft-lbs
-------------------	------	---

- | | |
|------------------|-------------------|
| (1) Unload Valve | (4) Plug |
| (2) Spring | (5) Return Spring |
| (3) Plate | (6) Plug |

000002902E



3TMACAE8P039A

Spool and Poppet Valve

1. Remove the lock nut for poppet valve (2).
2. Draw out the spool (1).
3. Push the poppet valve toward the seat plug to remove.

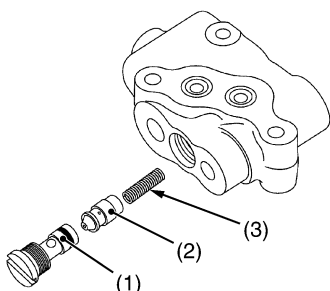
(When reassembling)

- Install the poppet valve, noting O-ring and backup ring.
- Install the lock nut so that the distance between the plate and lock nut is same as the recorded valve before disassembling the spool.

Tightening torque	Lock nut	17.7 to 21.6 N-m 1.8 to 2.2 kgf-m 13.0 to 15.9 ft-lbs
-------------------	----------	---

- | | |
|------------------|------------|
| (1) Spool | (3) Spring |
| (2) Poppet Valve | |

000002903E



3TMACAB8P057A

Check Valve

1. Remove the seat plug (1).
2. Draw out the check valve (2) and spring (3).

(When reassembling)

- Install the seat, noting O-ring.
- After tightening the seat plug, stake it with a punch.

Tightening torque	Seat plug	49.0 to 58.8 N-m 5.0 to 6.0 kgf-m 36.2 to 43.4 ft-lbs
-------------------	-----------	---

- | | |
|-----------------|------------|
| (1) Seat Plug | (3) Spring |
| (2) Check Valve | |

000002905E

(9) Disassembling Cylinder Safety Valve



Cylinder Safety Valve

1. Remove the cylinder safety valve assembly (1).
2. Secure the cylinder safety valve assembly in a vise.
3. Loosen the lock nut (7), and remove the adjust screw (2).
4. Draw out the spring (6), seat (5), and ball (4).

(When reassembling)

- Install the cylinder safety valve to the hydraulic cylinder block, taking care not to damage the O-ring.

Tightening torque	Cylinder safety valve assembly	39.2 to 49.0 N-m 4.0 to 5.0 kgf-m 28.9 to 36.2 ft-lbs
	Cylinder safety valve lock nut	58.8 to 78.5 N-m 6.0 to 8.0 kgf-m 43.4 to 57.9 ft-lbs

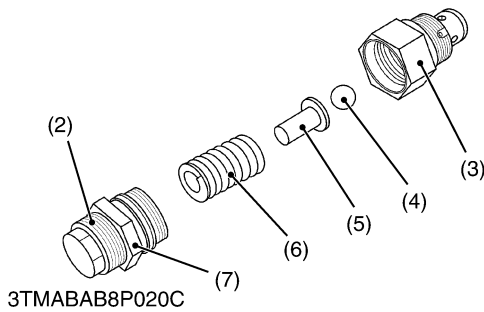
■ IMPORTANT

- After disassembling and assembling the cylinder safety valve assembly, be sure to check the operating pressure.

- | | |
|---------------------------|--------------|
| (1) Safety Valve Assembly | (6) Spring |
| (2) Adjust Screw | (7) Lock Nut |
| (3) Housing | |
| (4) Ball | |
| (5) Seat | |

A : ROPS Type
B : CABIN Type

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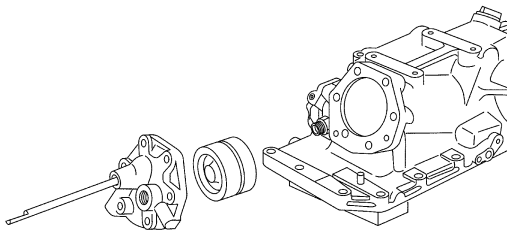
(10)Disassembling Hydraulic Cylinder Assembly

Hydraulic Cylinder Cover and Hydraulic Piston

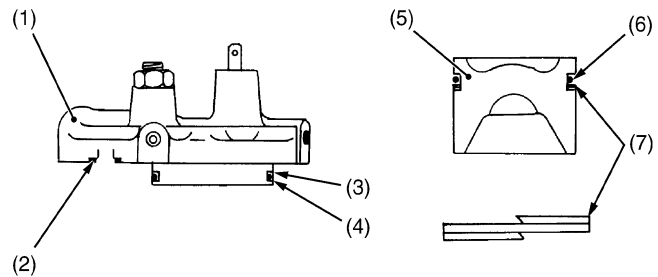
1. Remove the hydraulic cylinder cover (1).
2. Push out the hydraulic piston (5) from the hydraulic cylinder.

(When reassembling)

- Install the hydraulic piston, noting O-ring (6) and backup ring (7).
- Install the hydraulic cylinder cover, noting O-ring (2), (4) and backup ring (3).
- Apply grease to the hydraulic piston bottom contacts with hydraulic rod.



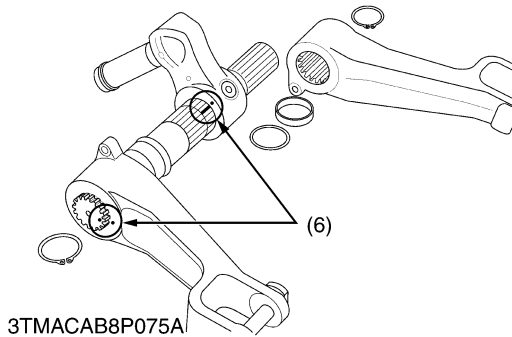
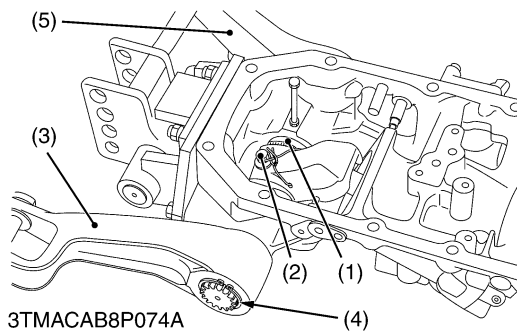
3TMACAB8P072A



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- | | |
|------------------------------|----------------------|
| (1) Hydraulic Cylinder Cover | (5) Hydraulic Piston |
| (2) O-ring | (6) O-ring |
| (3) Backup Ring | (7) Backup Ring |
| (4) O-ring | |

000002667E



Lift Arm and Hydraulic Arm Shaft

1. Disconnect the feedback rod from the lift arm L.H. (3).
2. Remove the wire and unscrew the setting screw (2).
3. Remove the external snap ring (4).
4. Draw out the hydraulic arm shaft (1) and lift arm R.H. (5) as a unit.
5. Remove the collar and O-ring.

(When reassembling)

- Align the alignment marks of the hydraulic arm and hydraulic arm shaft.
- Align the alignment marks of the lift arm and hydraulic arm shaft.
- Apply grease to the right and left bushings of hydraulic cylinder body and O-ring.
- Take care not to damage the O-ring.
- After tightening the hydraulic arm setting screw to the specified torque, insert a wire through the holes of the screw head and hydraulic arm.

Tightening torque	Hydraulic arm setting screw	39.2 to 45.1 N-m 4.0 to 4.6 kgf-m 28.9 to 33.3 ft-lbs
-------------------	-----------------------------	---

- | | |
|-------------------------|------------------------|
| (1) Hydraulic Arm Shaft | (4) External Snap Ring |
| (2) Setting Screw | (5) Lift Arm R.H. |
| (3) Lift Arm L.H. | (6) Alignment Mark |

000002907E

Hydraulic Arm and Hydraulic Rod

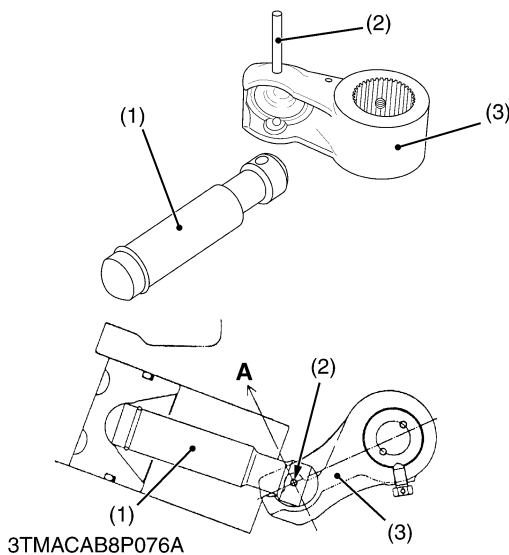
1. Remove the spring pin (2), and separate the hydraulic arm (3) and the hydraulic rod (1).

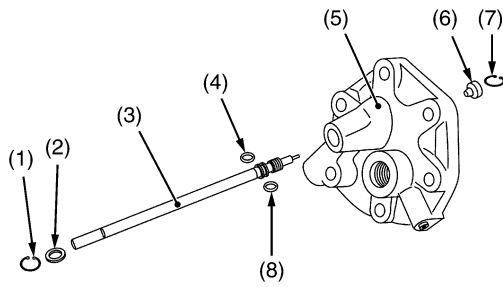
(When reassembling)

- Apply grease to the joints of the hydraulic arm, hydraulic rod, set pin and piston.
- Be sure to fix the spring pin (2), its sprits must face the direction **A** as shown in figure.

- | | |
|-------------------|-------------------|
| (1) Hydraulic Rod | (3) Hydraulic Arm |
| (2) Spring Pin | |

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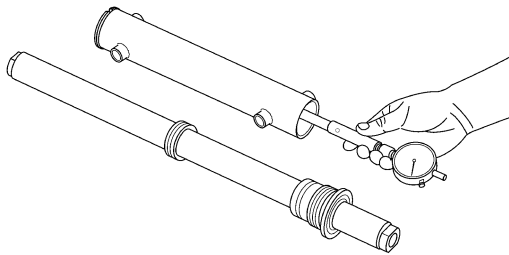
Lowering Speed Adjusting Valve

1. Remove the internal snap ring (1) and adjusting screw (3).
2. Remove the internal snap ring (7), and draw out the poppet valve (6).

- | | |
|------------------------|------------------------------|
| (1) Internal Snap Ring | (5) Hydraulic Cylinder Cover |
| (2) Plane Washer | (6) Poppet Valve |
| (3) Adjusting Screw | (7) Internal Snap Ring |
| (4) O-ring | (8) O-ring |

000002670E

[3] SERVICING
(1) Steering Cylinder



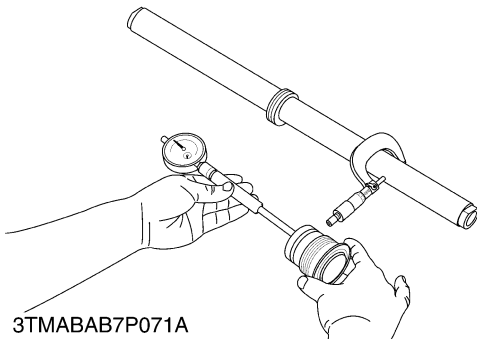
3TMABAB7P070A

Steering Cylinder I.D.

1. Measure the steering cylinder I.D. with a cylinder gauge.
2. If the cylinder I.D. exceed the allowable limit, replace the cylinder barrel.

Steering cylinder I.D.	Factory spec.	50.000 to 50.062 mm 1.96850 to 1.97094 in.
	Allowable limit	50.100 mm 1.97244 in.

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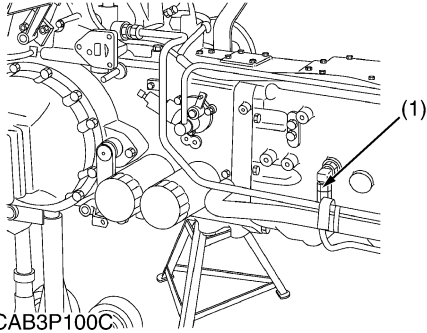
Clearance between Rod and Bushing

1. Measure the bushing I.D. with a cylinder gauge.
2. Measure the rod O.D. with an outside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace as a unit.

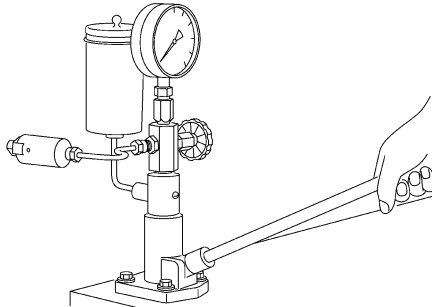
Clearance between rod and bushing	Factory spec.	0.009 to 0.127 mm 0.00035 to 0.00500 in.
	Allowable limit	0.135 mm 0.00531 in.

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(2) Oil Cooler Relief Valve



3TMACAB3P100C



3TMABAB8P021A

Operating Pressure of Oil Cooler Relief Valve

1. Attach the oil cooler relief valve to an injection nozzle tester with a oil cooler relief valve setting adaptor. (See page G-58.)
2. Measure the operating pressure of the oil cooler relief valve.

Oil cooler relief valve operating pressure	Factory spec.	4.4 to 4.9 MPa 45.0 to 50.0 kgf/cm ² 640 to 711 psi
--	---------------	--

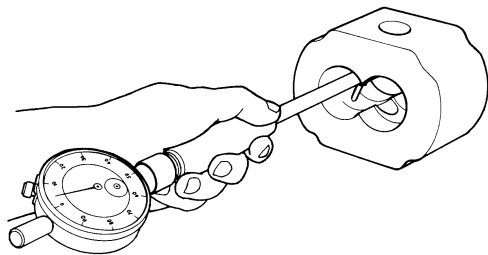
NOTE

- Use specified transmission fluid (see page G-8) to test the operating pressure of the oil cooler relief.

(1) Oil Cooler Relief Valve

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(3) Hydraulic Pump (Power Steering and Three Point Hydraulic System)



3TMABAB7P011A

Housing Bore

1. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
2. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

(Reference)

- Use a cylinder gauge to measure the housing I.D..

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
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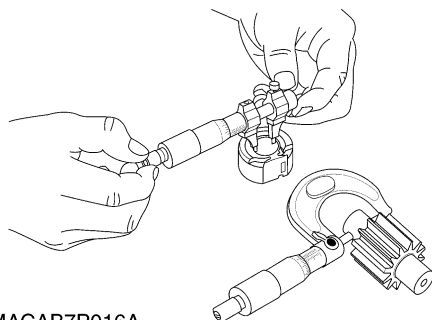
Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the gear shaft and the bushing as a unit.

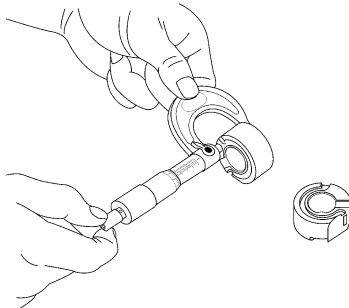
Clearance between bushing and gear shaft	Allowable limit	0.15 mm 0.0059 in.
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Gear shaft O.D.	Allowable limit	17.968 mm 0.7074 in.
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3TMACAB7P016A



3TMACAB7P017A

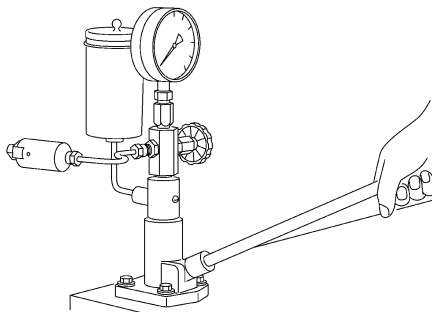
Bushing Length

1. Measure the bushing length with an outside micrometer.
2. If the length is less than the allowable limit, replace it.

Bushing length	Allowable limit	18.965 mm 0.74665 in.
----------------	-----------------	--------------------------

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(4) Cylinder Safety Valve



3TMABAB8P021A

Operating Pressure of Cylinder Safety Valve

1. Attach the cylinder safety valve to an injection nozzle tester with a safety valve setting adaptor. (See page G-55.)
2. Measure the operating pressure of the cylinder safety valve.
3. If the operating pressure is not within the factory specifications, adjust by turning the adjusting screw. (See page 8-S37.)
4. After adjustment, tighten the lock nut firmly.

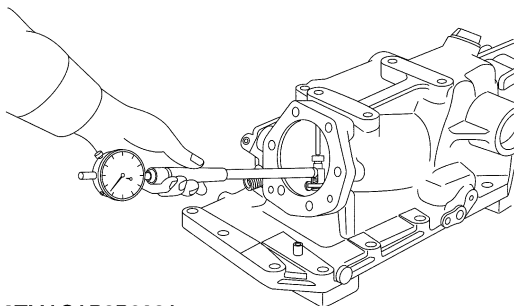
Cylinder safety valve operating pressure	Factory spec.	21.1 to 22.6 MPa 215 to 230 kgf/cm ² 3060 to 3277 psi
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NOTE

- Use specified transmission fluid (see page G-8) to test the operating pressure of the cylinder safety valve.

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(5) Hydraulic Cylinder Assembly



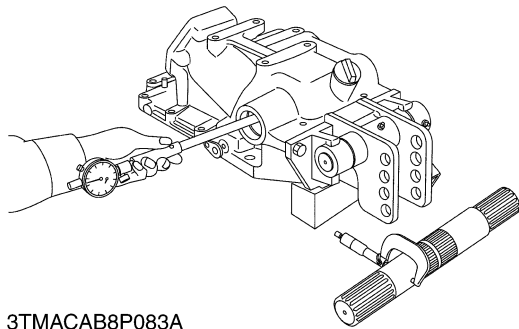
3TMACAB8P082A

Hydraulic Cylinder Bore

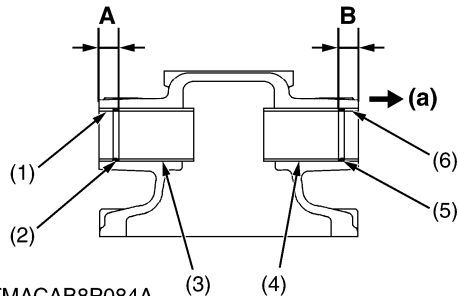
1. Check the cylinder internal surface for scoring or damage.
2. Measure the cylinder I.D. with a cylinder gauge.
3. If the measurement exceeds the allowable limit, replace it.

Cylinder I.D.	Factory spec.	90.000 to 90.050 mm 3.54330 to 3.54527 in.
	Allowable limit	90.15 mm 3.5492 in.

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3TMACAB8P083A



3TMACAB8P084A

Clearance between Hydraulic Arm Shaft and Bushing

1. Measure the hydraulic arm shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with a cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bushing.

(When reassembling)

- When press-fitting a new bushing with a press-fitting tool (see page G-53), observe the dimensions described in the figure.
- When press-fitting a new bushing, apply transmission fluid to the hydraulic cylinder liner boss and bushing.
- When press-fitting a new bushing, press-fit it so that each seam faces up.

Clearance between hydraulic arm shaft and bushing (Right side)	Factory spec.	0.049 to 0.154 mm 0.00193 to 0.00606 in.
	Allowable limit	0.50 mm 0.0197 in.

Hydraulic arm shaft O.D. (Right side)	Factory spec.	49.950 to 49.975 mm 1.96653 to 1.96752 in.
---------------------------------------	---------------	---

Bushing I.D. (After press-fitted) (Right side)	Factory spec.	50.024 to 50.104 mm 1.96944 to 1.97259 in.
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Clearance between hydraulic arm shaft and bushing (Left side)	Factory spec.	0.049 to 0.149 mm 0.00193 to 0.00587 in.
	Allowable limit	0.50 mm 0.0197 in.

Hydraulic arm shaft O.D. (Left side)	Factory spec.	44.950 to 44.975 mm 1.76968 to 1.77067 in.
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Bushing I.D. (After press-fitted) (Left side)	Factory spec.	45.024 to 45.099 mm 1.77259 to 1.77555 in.
---	---------------	---

Press-fit location of bushing (A)	Factory spec.	14.5 to 15.5 mm 0.5315 to 0.5709 in.
-----------------------------------	---------------	---

Press-fit location of bushing (B)	Factory spec.	22.5 to 23.5 mm 0.8858 to 0.9252 in.
-----------------------------------	---------------	---

- (1) Collar (Left)
- (2) O-ring
- (3) Bushing (Left)
- (4) Bushing (Right)
- (5) O-ring
- (6) Collar (Right)

(a) Right Side

* **Flush the end of collar with the end of hydraulic cylinder body.**

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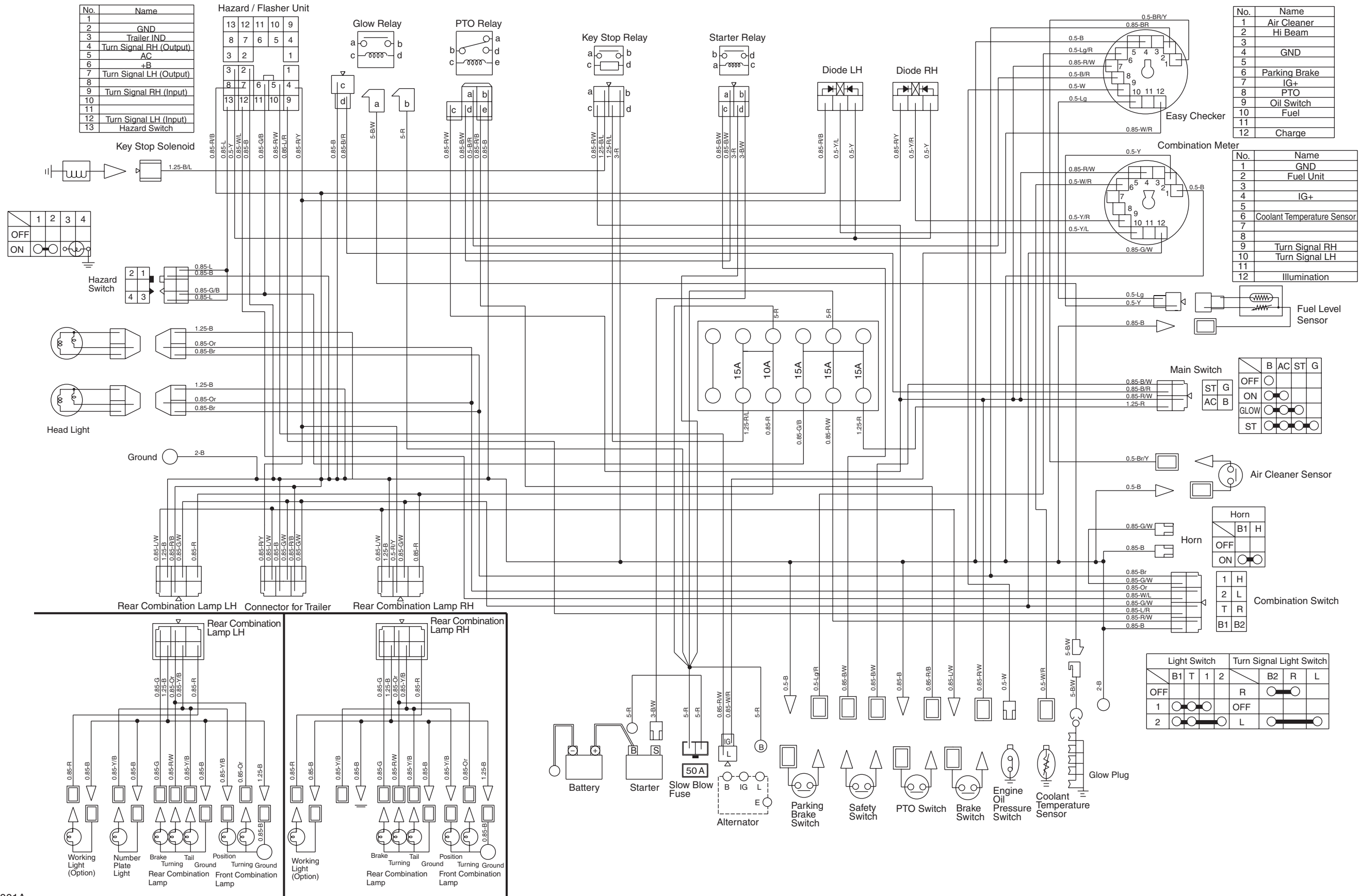
9 ELECTRICAL SYSTEM

CONTENTS

1. WIRING DIAGRAM.....	9-M1
[1] ROPS TYPE	9-M1
[2] CABIN TYPE.....	9-M2
(1) Engine Harness	9-M2
(2) Body Harness	9-M3
(3) Cabin Harness.....	9-M4
[3] COLOR OF WIRING.....	9-M5
2. LIGHTING SYSTEM	9-M6
[1] HAZARD / Flasher UNIT	9-M6
[2] WORKING LIGHT SWITCH (CABIN TYPE).....	9-M6
[3] ROOM LAMP (CABIN TYPE)	9-M7
3. EASY CHECKER.....	9-M8
[1] INDICATION ITEMS	9-M8
(1) ROPS Type	9-M8
(2) CABIN Type.....	9-M8
4. TRAILER SOCKET	9-M9
5. OTHERS.....	9-M10

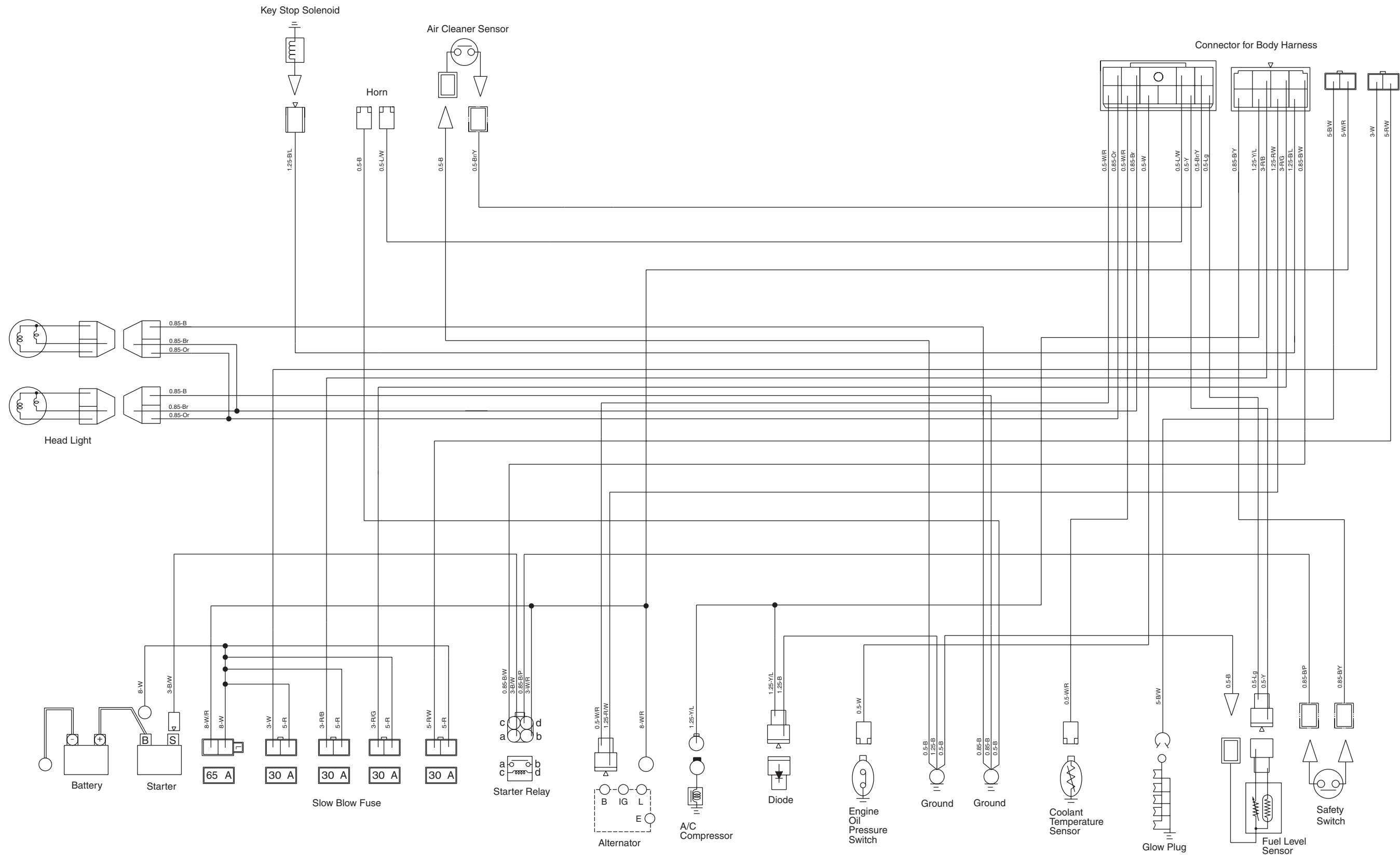
1. WIRING DIAGRAM

[1] ROPS TYPE

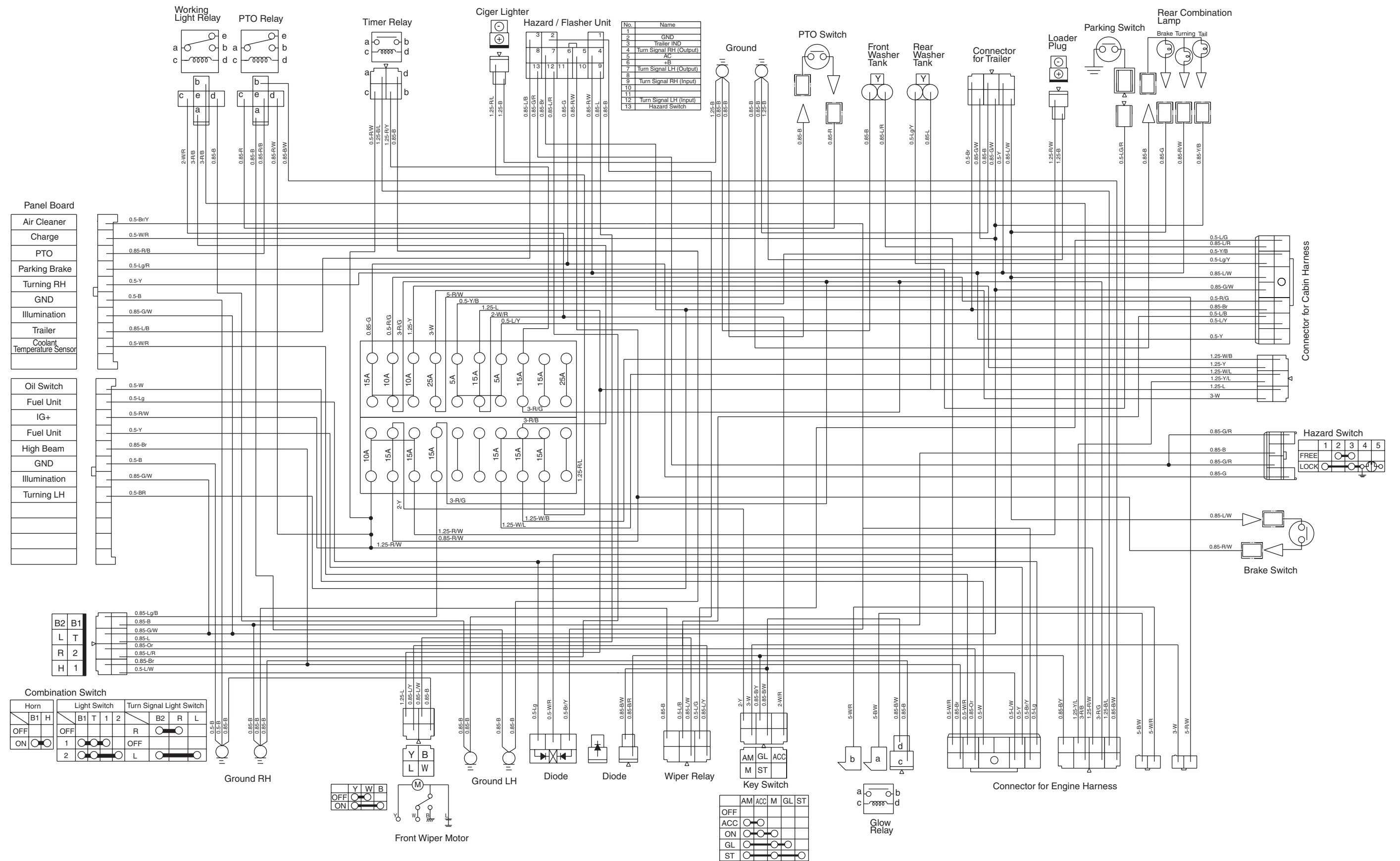


[2] CABIN TYPE

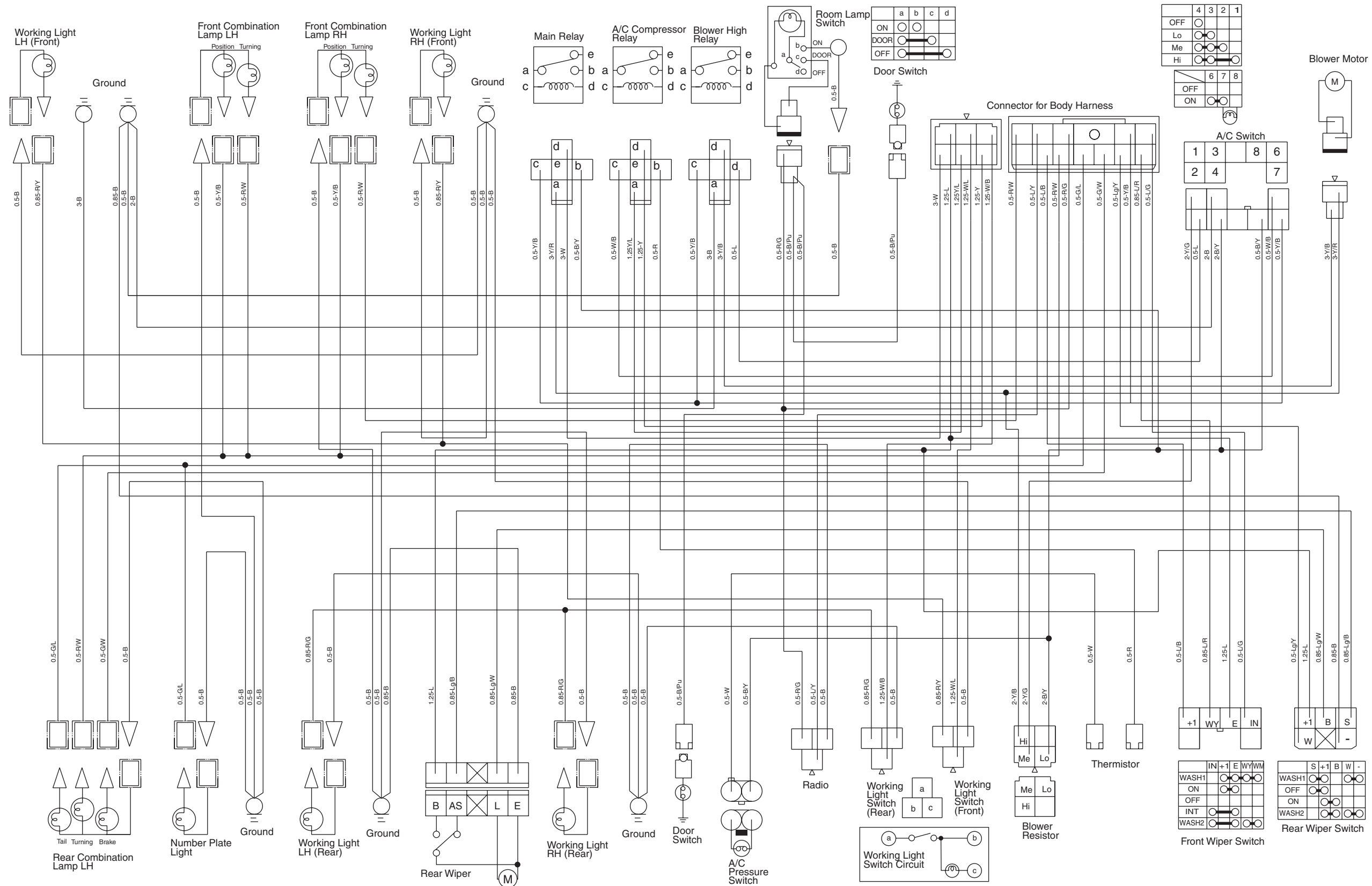
(1) Engine Harness



(2) Body Harness



(3) Cabin Harness



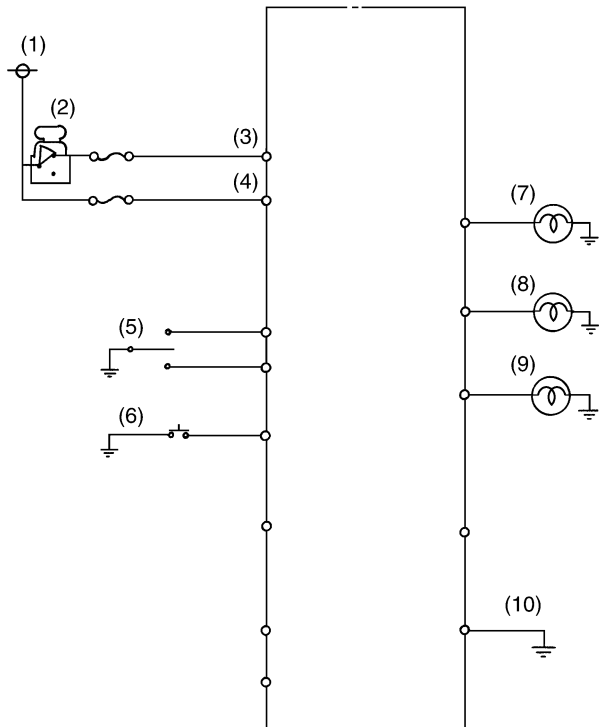
[3] COLOR OF WIRING

B Black	B/Y Black / Yellow	Lg/Y Light Green / Yellow
G Green	Br/B Brown / Black	Or/W Orange / White
L Blue	Br/Y Brown / Yellow	R/B Red / Black
P Pink	G/B Green / Black	R/G Red / Green
R Red	G/L Green / Blue	R/L Red / Blue
W White	G/R Green / Red	R/W Red / White
Y Yellow	G/W Green / White	R/Y Red / Yellow
Br Brown	G/Y Green / Yellow	W/B White / Black
Lg Light Green	L/B Blue / Black	W/G White / Green
Or Orange	L/G Blue / Green	W/L White / Blue
Sb Sky Blue	L/Or Blue / Orange	W/R White / Red
B/G Black / Green	L/R Blue / Red	W/Y White / Yellow
B/L Black / Blue	L/W Blue / White	Y/B Yellow / Black
B/P Black / Pink	L/Y Blue / Yellow	Y/G Yellow / Green
B/Pu Black / Purple	Lg/B Light Green / Blue	Y/L Yellow / Blue
B/R Black / Red	Lg/R Light Green / Red	Y/R Yellow / Red
B/W Black / White	Lg/W Light Green / White	

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2. LIGHTING SYSTEM

[1] HAZARD / Flasher UNIT



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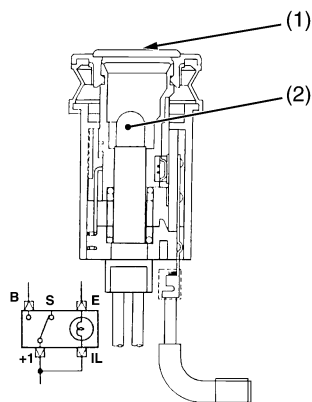
■ Hazard / Flasher Unit

This hazard / flasher unit is a summary to one as for past hazard / flasher unit, hazard relay, and charge relay.

- (1) Battery
- (2) Main Switch
- (3) AC Terminal
- (4) B Terminal
- (5) Turn Signal Switch
- (6) Hazard Switch
- (7) Trailer Indicator Lamp
- (8) Turning Lamp RH
- (9) Turning Lamp LH
- (10) Ground

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[2] WORKING LIGHT SWITCH (CABIN TYPE)



3TMACAD9P006A

■ Working Light Switch (Front, Rear)

When the switch (1) is pushed once, the lamp (2) lights on and working light switch is set to **ON** position.

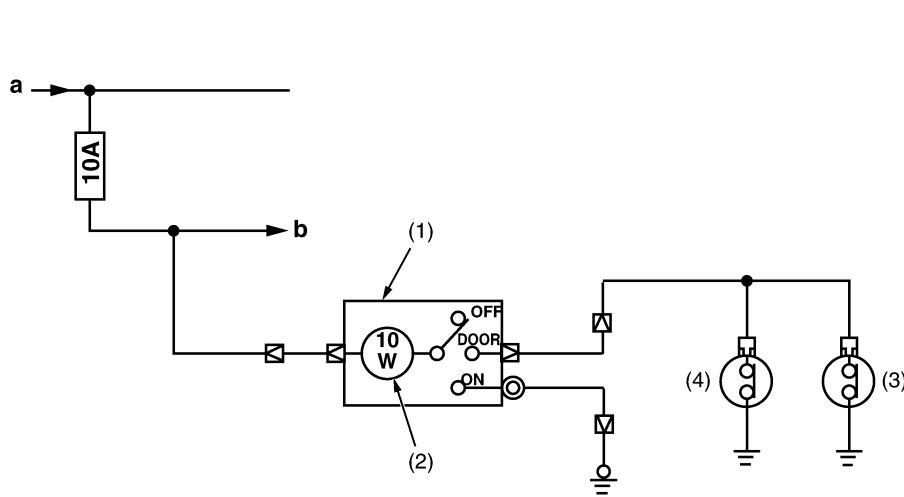
When it is pushed once more, the lamp lights off and working light switch is set to **OFF** position.

	+B	S	+1	IL	E
FREE (OFF)		●	●	●	●
LOCKED (ON)	●		●	●	●

- (1) Working Light Switch
- (2) Lamp

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[3] ROOM LAMP (CABIN TYPE)



- (1) Room Lamp Switch
- (2) Room Lamp
- (3) Door Switch RH
- (4) Door Switch LH

- (a) From Battery
- (b) To Radio

3TMACAD9P007A

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■ Room Lamp Switch

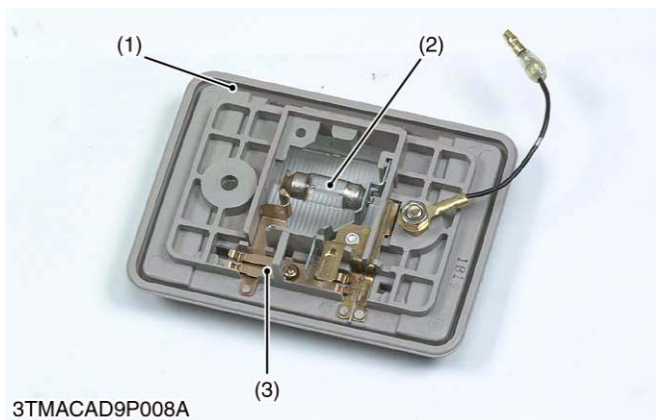
This switch is slide type switch.

When switch (3) slide to the **ON** position, room lamp (2) lights on without any relation to **DOOR** position.

When switch (3) slide to the **DOOR** position, room lamp (2) lights on, at the door switch comes close position.

- (1) Room Lamp Switch Assembly
- (2) Room Lamp
- (3) Switch

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3TMACAD9P008A

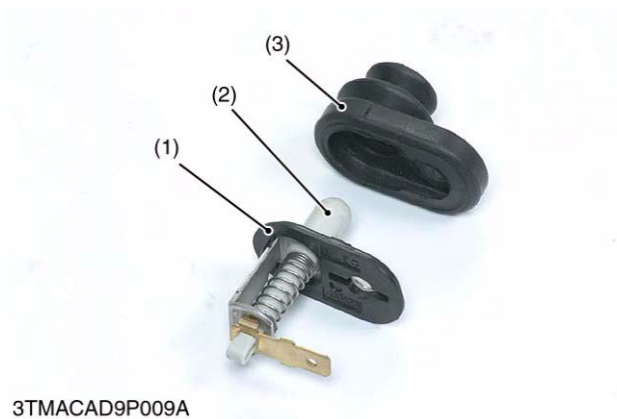
■ Door Switch

When the door is closed, the push rod (2) is pushed by door frame, so that the door switch comes open position.

Both R.H. and L.H. door should close to lights off the room lamp.

- (1) Door Switch
- (2) Push Rod
- (3) Cover

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3TMACAD9P009A

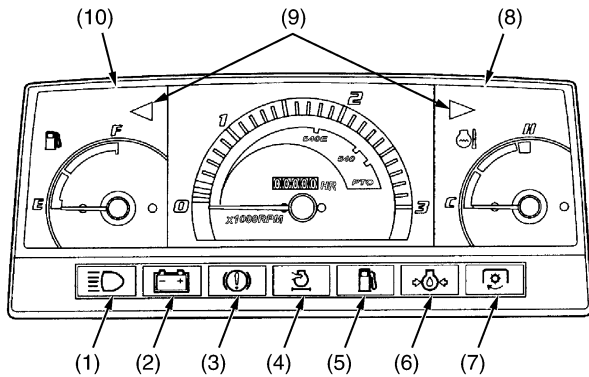
3. EASY CHECKER

[1] INDICATION ITEMS

The operator must check the conditions of the tractor before and during operation. To facilitate checking, the Easy Checker-combination of lamps on the panel board is provided.

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(1) ROPS Type



3TMACAE9P005A

1. When the key is turned "ON" electrical charge lamp (2), air cleaner lamp (4), fuel level lamp (5) and engine oil pressure lamp (6) should come on. After started the engine those lamps should come off.
2. If trouble occur at any location while the engine is running, the warning lamp corresponding to that location comes on.
3. If the turn signal indicator (9) starts flashing, the front or rear turn signal light bulb may be broken.

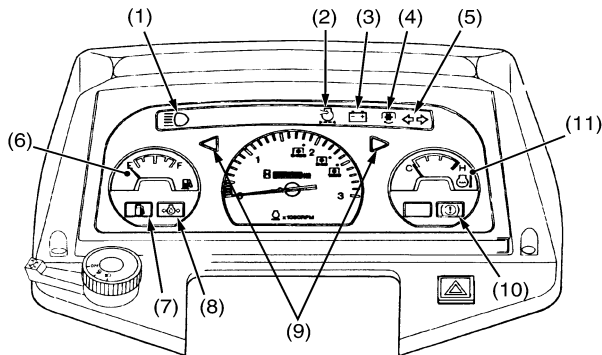
NOTE

- When use the turn signal light switch with the trailer power connector connected, both the indicators (9) start flashing.

- | | |
|-----------------------|------------------------------------|
| (1) High Beam | (7) PTO Clutch |
| (2) Electrical Charge | (8) Coolant Temperature Gauge |
| (3) Parking Brake | (9) Hazard / Turn Signal Indicator |
| (4) Air Cleaner | (10) Fuel Gauge |

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(2) CABIN Type



3TMACAE9P006A

1. When the key is turned "ON" electrical charge lamp (3), air cleaner lamp (2), fuel level lamp (7) and engine oil pressure lamp (8) should come on. After started the engine those lamps should come off.
2. If trouble occur at any location while the engine is running, the warning lamp corresponding to that location comes on.
3. If the turn signal indicator (9) starts flashing, the front or rear turn signal light bulb may be broken.

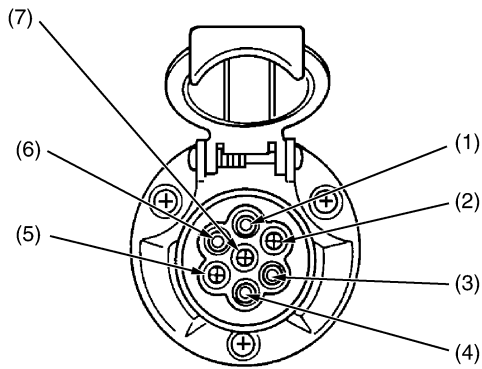
NOTE

- When use the turn signal light switch with the trailer power connector connected, the trailer indicator (5) start flashing.

- | | |
|-----------------------|------------------------------------|
| (1) High Beam | (8) Engine Oil Pressure |
| (2) Air Cleaner | (9) Hazard / Turn Signal Indicator |
| (3) Electrical Charge | (10) Parking Brake |
| (4) PTO Clutch | (11) Coolant Temperature Gauge |
| (5) Trailer Indicator | |
| (6) Fuel Gauge | |
| (7) Fuel Level | |

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4. TRAILER SOCKET



3TRAAAA9P030B

The trailer socket is provided to take out the electrical power from tractor to trailer or implement.

The function of each terminal is shown below.

Terminal	Function	Color of wire harness
(1)	Turn Signal Light (LH)	Green / White
(2)	—	—
(3)	Ground	Black
(4)	Turn Signal Light (RH)	Red / White
(5)	Tail Light Sidemarker Light Parking Light	Yellow / Red
(6)	Brake Stop Light	Yellow
(7)	Number Plate Light	Yellow / White

(1) 1 Terminal

(2) 2 Terminal

(3) 3 Terminal

(4) 4 Terminal

(5) 5 Terminal

(6) 6 Terminal

(7) 7 Terminal

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5. OTHERS

Refer to Workshop Manual for Diesel Engine Mechanism (Code No. 97897-01872) and Tractor Mechanism (Code No. 97897-18200) as following terms.

[1] STARTING SYSTEM

- (1) Main Switch : Refer to Workshop Manual for Tractor Mechanism.
 - * ROPS Type (Type 5)
 - * CABIN Type (Type 6)
- (2) Starter Motor (Reduction Type) : Refer to Workshop Manual for Engine Mechanism.
- (3) Starter Relay : Refer to Workshop Manual for Tractor Mechanism.
- (4) Glow Control System : Refer to Workshop Manual for Engine Mechanism.
- (5) Safety Switch : Refer to Workshop Manual for Tractor Mechanism.
 - * Safety Switch for PTO (Lever Type 1)
 - * Safety Switch for Shuttle Neutral (Push Type 2)
- (6) Engine Stop Solenoid : Refer to Workshop Manual for Engine Mechanism.

[2] CHARGING SYSTEM

- (1) Alternator with IC Regulator - Type 2 : Refer to Workshop Manual for Tractor Mechanism.

[3] LIGHTING SYSTEM

- (1) Combination Switch (Type 3) : Refer to Workshop Manual for Tractor Mechanism.
- (2) Hazard Switch : Refer to Workshop Manual for Tractor Mechanism.
- (3) Brake Switch (Type 3) : Refer to Workshop Manual for Tractor Mechanism.

[4] EASY CHECKER

- (1) Engine Oil Pressure Switch (Type 1) : Refer to Workshop Manual for Tractor Mechanism.
- (2) Air Cleaner Sensor : Refer to Workshop Manual for Tractor Mechanism.
- (3) Fuel Limit Sensor : Refer to Workshop Manual for Tractor Mechanism.
- (4) PTO Operation Lamp : Refer to Workshop Manual for Tractor Mechanism.
- (5) Parking Brake Switch : Refer to Workshop Manual for Tractor Mechanism.

[5] GAUGES

- (1) Fuel Level Sensor (Type 2) : Refer to Workshop Manual for Tractor Mechanism.
- (2) Coolant Temperature Sensor : Refer to Workshop Manual for Tractor Mechanism.

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CONTENTS

1. TROUBLESHOOTING.....	9-S1
2. SERVICING SPECIFICATIONS.....	9-S6
3. TIGHTENING TORQUES.....	9-S7
4. CHECKING, DISASSEMBLING AND SERVICING.....	9-S8
[1] BATTERY.....	9-S8
(1) Checking.....	9-S8
(2) Servicing.....	9-S10
[2] STARTING SYSTEM.....	9-S11
(1) Checking.....	9-S11
(2) Disassembling and Assembling.....	9-S22
(3) Servicing.....	9-S23
[3] STOPPING SYSTEM.....	9-S26
(1) Checking.....	9-S26
[4] CHARGING SYSTEM.....	9-S28
(1) Checking.....	9-S28
(2) Disassembling and Assembling.....	9-S29
(3) Servicing.....	9-S32
[5] LIGHTING SYSTEM.....	9-S34
(1) Checking.....	9-S34
[6] WARNING LAMPS.....	9-S42
(1) Checking.....	9-S42
[7] GAUGES.....	9-S45
(1) Checking.....	9-S45
[8] TRAILER SOCKET.....	9-S47
(1) Checking.....	9-S47

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipments Do Not Operate	● Battery discharged or defective	Recharge or replace	9-S10
	● Battery positive cable disconnected or improperly connected	Repair or replace	9-S8
	● Battery negative cable disconnected or improperly connected	Repair or replace	9-S8
	● Slow blow fuse blown	Replace	G-35, 36
Fuse Blown Frequently	● Short-circuited	Repair or replace	—

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BATTERY

Battery Discharges Too Quickly	● Battery defective	Replace	9-S10
	● Alternator defective	Repair or replace	9-S29 to S31
	● Wiring harness disconnected or improperly connected (between battery positive terminal and alternator B terminal)	Repair or replace	—
	● Cooling fan belt slipping	Adjust tension	G-23

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STARTING SYSTEM

Starter Motor Does Not Operate	● Battery discharged or defective	Recharge or replace	9-S10
	● Slow blow fuse blown	Replace	G-35, 36
	● Starter relay defective	Replace	9-S14
	● Safety switch defective	Replace	9-S19, S20
	● Wiring harness disconnected or improperly connected (between main switch ST terminal and PTO switch, between PTO switch and safety switch, between safety switch and starter relay, between starter relay and ground, between main switch B terminal and starter relay, between starter relay and starter motor S terminal, between battery positive terminal and starter motor B terminal)	Repair or replace	—
	● Starter motor defective	Repair or replace	9-S22 to S25
	● Main switch defective	Replace	9-S11 to S13

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CHARGING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Charging Lamp Does Not Light When Main Switch Is Turned ON	● Fuse blown	Replace	G-35 ,36
	● Wiring harness disconnected or improperly connected (between main switch AC terminal and panel board, between panel board and alternator L terminal)	Repair or replace	—
Charging Lamp Does Not Go Off When Engine Is Running	● Short circuit between alternator L terminal lead and chassis	Repair or replace	—
	● Alternator defective	Repair or replace	9-S29 to S33

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LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	● Fuse blown (15 A)	Replace	G-35, 36
	● Bulb blown	Replace	G-37
	● Wiring harness disconnected or improperly connected (between main switch AC terminal and combination switch B1 terminal, between combination switch 1 terminal and head light, between combination switch 2 terminal and head light)	Repair or replace	—
Illumination Light Does Not Light	● Fuse blown (15 A)	Replace	G-35, 36
	● Bulb blown	Replace	G-37
	● Wiring harness disconnected or improperly connected (between combination switch T terminal and panel board)	Repair or replace	—
Tail Light Does Not Light	● Fuse blown	Replace	G-35, 36
	● Wiring harness disconnected or improperly connected (between combination switch T terminal and tail light)	Repair or replace	—
Stop Light Does Not Light	● Fuse blown (15 A)	Replace	G-35, 36
	● Brake switch defective	Replace	9-S37
	● Bulb blown	Replace	G-37
	● Wiring harness disconnected or improperly connected (between main switch and brake switch, between brake switch and stop light)	Repair or replace	—
	● Ground of stop lights are improperly connected	Replace	G-37

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LIGHTING SYSTEM (Continued)

Symptom	Probable Cause	Solution	Reference Page
Hazard Light Does Not Light	● Fuse blown (10 A)	Replace	G-35, 36
	● Bulb blown	Replace	G-37
	● Wiring harness disconnected or improperly connected (between main switch B terminal and hazard unit, between hazard unit and combination switch B2 terminal, between combination switch R terminal and hazard lights)	Repair or replace	—
	● Hazard / Flasher unit defective	Replace	9-S36
	● Combination switch defective	Replace	9-S34 to S36
Hazard and Turn Signal Indicator Lamp Does Not Light	● Bulb blown	Replace	G-37
	● Wiring harness disconnected or improperly connected	Repair or replace	—
Hazard and Turn Signal Light Does Not Go ON and OFF	● Hazard / Flasher unit defective	Replace	9-S36
Work Light Does Not Light (CABIN Type)	● Fuse blown	Replace	G-35, 36
	● Bulb blown	Replace	G-37
	● Wiring harness disconnected or improperly connected (between starter motor B terminal and work light)	Repair or replace	—

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HORN

Horn Does Not Sound when Horn Button Is Pushes	● Horn switch defective	Replace	9-S34 to S36
	● Horn defective	Replace	9-S34 to S36
	● Wiring harness disconnected or improperly connected (between combination switch terminal H terminal and horn)	Repair or replace	—

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EASY CHECKER

Symptom	Probable Cause	Solution	Reference Page
Parking Brake Indicator Lamp Does Not Light When Main Switch Is Turned ON and Pull Parking Brake Lever	● Bulb blown	Replace	G-37
	● Parking brake switch defective	Replace	9-S38
Engine Oil Pressure Lamp Lights Up When Engine Is Running	● Engine oil pressure too low	Repair engine	—
	● Engine oil insufficient	Replenish	G-8
	● Engine oil pressure switch defective	Replace	9-S42
	● Short circuit between engine oil pressure switch lead and chassis	Repair	9-S42
	● Circuit in panel board defective	Replace	—
Engine Oil Pressure Lamp Does Not Light When Main Switch Is Turned ON and Engine Is Not Running	● Bulb blown	Replace	G-37
	● Engine oil pressure switch defective	Replace	9-S42
	● Wiring harness disconnected or improperly connected (between panel board and engine oil pressure switch)	Repair or replace	—
	● Circuit in panel board defective	Clean or replace	—
Air Cleaner Clogged Lamp Lights Up	● Air cleaner clogged	Replace	G-30
	● Air cleaner sensor defective	Repair or replace	9-S43
	● Short circuit between air cleaner sensor lead and chassis	Replace	9-S43
	● Circuit panel board defective	Repair or replace	—
Air Cleaner Clogged Lamp Does Not Light When Air Cleaner Clogged	● Bulb blown	Replace	G-37
	● Air Cleaner sensor defective	Replace	9-S43
	● Wiring harness disconnected or improperly connected (between panel board and air cleaner sensor, between air cleaner sensor and ground)	Repair or replace	—

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GAUGES

Symptom	Probable Cause	Solution	Reference Page
Fuel Gauge Does Not Function	● Fuel gauge defective	Replace	—
	● Fuel level sensor (tank unit) defective	Replace	9-S44, S45
	● Wiring harness disconnected or improperly connected (between panel board and fuel level sensor)	Repair or replace	—
	● Circuit in panel board defective	Replace	—
Coolant Temperature Gauge Does Not Function	● Coolant temperature gauge defective	Replace	9-S45
	● Coolant temperature sensor defective	Replace	9-S45
	● Wiring harness disconnected or improperly connected (between panel board and coolant temperature sensor)	Repair or replace	—
	● Circuit in panel board defective	Replace	—

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2. SERVICING SPECIFICATIONS

STARTER MOTOR

Item		Factory Specification	Allowable Limit
Commutator	O.D.	30.0 mm 1.181 in.	29.0 mm 1.142 in.
Mica	Undercut	0.50 to 0.80 mm 0.0197 to 0.0315 in.	0.2 mm 0.0079 in.
Brush	Length	14.0 mm 0.551 in.	9.0 mm 0.354 in.

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GLOW PLUG

Glow Plug	Resistance	Approx. 0.5 Ω	—
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ALTERNATOR

Slip Ring	O.D.	14.4 mm 0.567 in.	12.8 mm 0.504 in.
Brush	Length	10.5 mm 0.413 in.	8.4 mm 0.331 in.

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FUEL LEVEL SENSOR

Float at Uppermost Position	Resistance	1.0 to 5.0 Ω	—
Float at Lowermost Position	Resistance	103 to 117 Ω	—

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COOLANT TEMPERATURE SENSOR

Coolant Temperature at 120 °C (248 °F)	Resistance	Approx. 16 Ω	—
Coolant Temperature at 80 °C (176 °F)	Resistance	Approx. 50 Ω	—
Coolant Temperature at 50 °C (122 °F)	Resistance	Approx. 149 Ω	—

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.

(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
Pulley nut (Alternator)	58.3 to 78.9	5.95 to 8.05	43.0 to 58.2

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4. CHECKING, DISASSEMBLING AND SERVICING

CAUTION

- To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.
- Never remove the battery cap while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are splattered with it, wash it away completely with water immediately.
- Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.

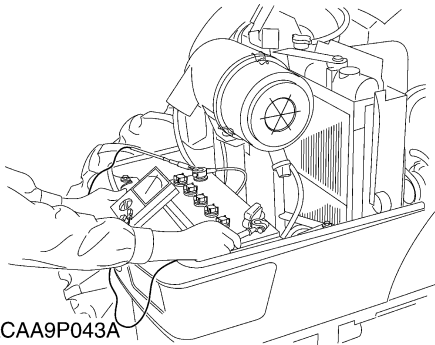
■ IMPORTANT

- If the machine is to be operated for a short time without battery (using a slave battery for starting), use additional current (lights) while engine is running and insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.
- Insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.

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[1] BATTERY

(1) Checking

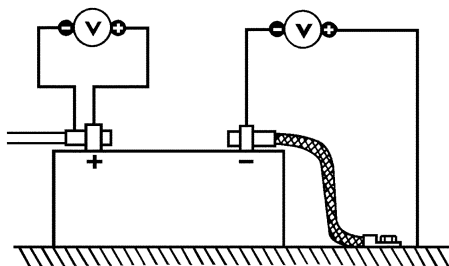


Battery Voltage

1. Stop the engine and turn the main switch off.
2. Connect the COM (-) lead of the voltmeter to the battery's negative terminal post and the (+) lead to the positive terminal post, and measure the battery voltage.
3. If the battery voltage is less than the factory specification, check the battery specific gravity and recharge the battery.

Battery voltage	Factory spec.	More than 12 V
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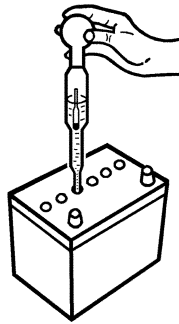


Battery Terminal Connection

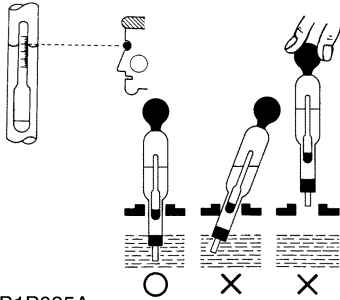
1. Turn the main switch on, and turn on the head light.
2. Measure the voltage with a voltmeter across the battery's positive terminal post and the cable terminal, and the voltage across the battery's negative terminal post and the chassis.
3. If the measurement exceeds the factory specification, clean the battery terminal posts and cable clamps, and tighten them firmly.

Potential difference	Factory spec.	Less than 0.1 V
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3EEABAB1P035A

Battery Specific Gravity

1. Check the specific gravity of the electrolyte in each cell with a hydrometer.
2. When the electrolyte temperature differs from that at which the hydrometer was calibrated, correct the specific gravity reading following the formula mentioned in **(Reference)**.
3. If the specific gravity is less than 1.215 (after it is corrected for temperature), charge or replace the battery.
4. If the specific gravity differs between any two cells by more than 0.05, replace the battery.

NOTE

- **Hold the hydrometer tube vertical without removing it from the electrolyte.**
- **Do not suck too much electrolyte into the tube.**
- **Allow the float to move freely and hold the hydrometer at eye level.**
- **The hydrometer reading must be taken at the highest electrolyte level.**

(Reference)

- Specific gravity slightly varies with temperature. To be exact, the specific gravity decreases by 0.0007 with an increase of 1 °C (0.0004 with an increase of 1 °F) in temperature, and increases by 0.0007 with a decreases of 1 °C (0.0004 with a decrease of 1 °F).

Therefore, using 20 °C (68 °F) as a reference, the specific gravity reading must be corrected by the following formula :

-Specific gravity at 20 °C = Measured value + 0.0007 x (electrolyte temperature - 20 °C)

-Specific gravity at 68 °F = Measured value + 0.0004 x (electrolyte temperature - 68 °F)

Specific Gravity	State of Charge
1.260 Sp. Gr.	100 % Charged
1.230 Sp. Gr.	75 % Charged
1.200 Sp. Gr.	50 % Charged
1.170 Sp. Gr.	25 % Charged
1.140 Sp. Gr.	Very Little Useful Capacity
1.110 Sp. Gr.	Discharged

At an electrolyte temperature of 20 °C (68 °F)

000001142E

(2) Servicing

Recharging



CAUTION

- When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.
- When charging battery, remove battery vent plugs.
- 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) Slow Charging

1. Add distilled water if the electrolyte level is low. When charging, the amount of electrolyte should be slightly lower than the specified level to prevent overflow.
2. Connect the battery to the charging unit, following the manufacture's instructions.
3. As the electrolyte generates gas while charging, remove all port caps.
4. The electrolyte temperature must not exceed 40 °C (105 °F) during charging.
If it exceed 40 °C (105 °F), decrease the charging amperage or stop charging for a while.
5. When charging several batteries in series, charge at the rate of the smallest battery in the line.

2) Quick Charging

1. Determine the proper charging current and charging time with the tester attached to the quick charger.
2. Determine the proper charging current as 1/1 of the battery capacity. If the battery capacity exceeds 50 Ah, consider 50 A as the maximum.

■ Precaution for Operating a Quick Charger

- Operation with a quick charger differs according to the type. Consult the instruction manual and use accordingly.

Battery type	105E41R
Volts (V)	12 V

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Directions for Storage

1. When shutting down the tractor for long periods of time, remove the battery from the tractor, adjust the electrolyte to the proper level, and after fully charging, store the battery in a well ventilated place where it is not exposed to direct sunlight.
2. Since the battery self-discharges by approx. 0.5 % per day even in storage, it must be once every two months in cold season.
3. When storing the battery mounted on the tractor, disconnect the ground cable from the battery's negative terminal post.

(Reference)

- Self-discharge Rate

Temperature	Self-discharge rate
30 °C (86 °F)	Approx. 1.0 % per day
20 °C (68 °F)	Approx. 0.5 % per day
10 °C (50 °F)	Approx. 0.25 % per day

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[2] STARTING SYSTEM

(1) Checking

(A) Main Switch (ROPS Type)



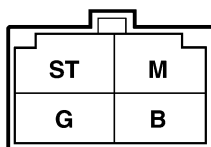
Remove the Main Switch

1. Remove the steering wheel.
2. Remove the shuttle grip, and main shift lever.
3. Remove the meter panel, and disconnect the hourmeter cable, hazard switch connector and the main switch connectors after turning the main switch off.
4. Perform the following checking.

- (1) Main Switch

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A



Connector Voltage

1. Measure the voltage with a voltmeter across the connector **B** terminal and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector B terminal -Chassis	Approx. battery voltage
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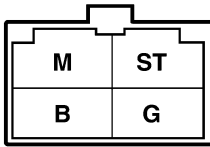
A : Wire Harness Side Connector

4C

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A



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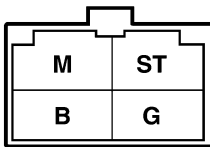
Main Switch at ON Position

1. Turn the main switch **ON** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **M** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	B terminal - M terminal	0 Ω
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A : **Main Switch Side Connector**
4C

A



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Main Switch at START Position

1. Turn and hold the main switch at the **START** position.
2. Measure the resistances with an ohmmeter across the **B** terminal and the **M** terminal, across the **B** terminal the **G** terminal, and across the **B** terminal, and the **ST** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	B terminal - M terminal	0 Ω
	B terminal - G terminal	0 Ω
	B terminal - ST terminal	0 Ω

A : **Main Switch Side Connector**
4C

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(B) Main Switch (CABIN Type)

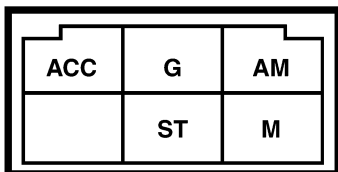


Main Switch (CABIN Type)

1. Remove the meter panel, and disconnect the hourmeter cable and the main switch connectors after turning the main switch off.
2. Perform the following checking.
 - (1) Main Switch

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A



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Connector Voltage

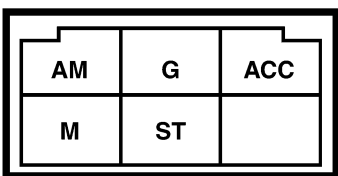
1. Measure the voltage with a voltmeter across the connector **6G** **AM** terminal and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector AM terminal -Chassis	Approx. battery voltage
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A : **Wire Harness Side Connector**
6G

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A



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Main Switch at ON Position

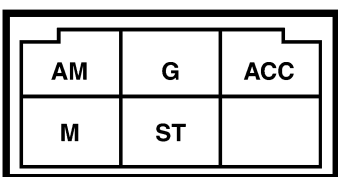
1. Turn the main switch **ON** position.
2. Measure the resistance with an ohmmeter across the **AM** terminal and the **ACC** terminal and **AM** terminal and **M** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	AM terminal - ACC terminal	0 Ω
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A : Main Switch Side Connector
6G

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A



3TMACAA9P047B

Main Switch at key PREHEAT Position

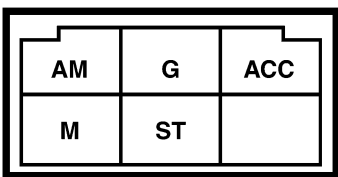
1. Turn and hold the main switch at the **PREHEAT** position.
2. Measure the resistances with an ohmmeter across the **AM** terminal and the **M** terminal and across **AM** terminal and **GL** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	AM terminal - M terminal	0 Ω
	AM terminal - GL terminal	0 Ω

A : Main Switch Side Connector
6G

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A



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Main Switch at START Position

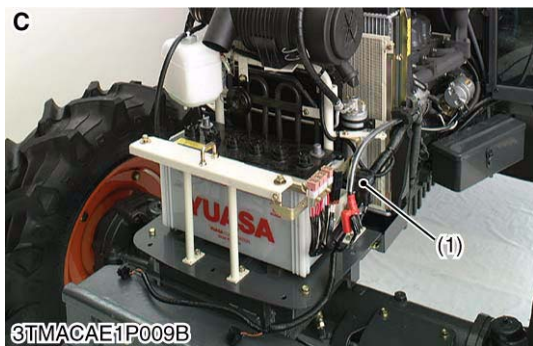
1. Turn and hold the main switch at the **START** position.
2. Measure the resistances with an ohmmeter across the **3** terminal and the **B** terminal, and across the **AM** terminal, and the **ST** terminal.
3. If 0 ohm is not indicated, renew the main switch.

Resistance	AM terminal - M terminal	0 Ω
	AM terminal - ST terminal	0 Ω

A : Main Switch Side Connector
6G

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(C) Starter Relay



Connector Voltage

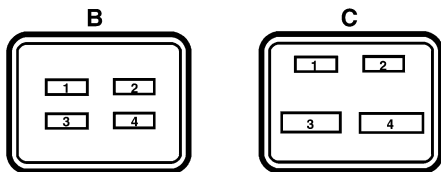
1. Disconnect the starter relay (1) connector **4B**.
2. Shift the shuttle lever in neutral position.
3. **(ROPS Type)**
Measure the voltage across **3** terminal and **4** terminal (wire harness side).
- (CABIN Type)**
Measure the voltage across **1** terminal and **2** terminal (wire harness side).
4. If the voltage differs from the battery voltage, check the wiring harness.

(1) Starter Relay

A : Wire Harness Side Connector 4B
B : ROPS Type
C : CABIN Type

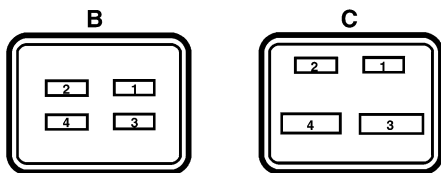
0000002937E

A



3TMACAA9P048A

A



3TMACAA9P048B

Starter Relay Test

(ROPS Type)

1. Apply battery voltage across **3** and **4** terminals, and check for continuity across **1** and **2** terminals.

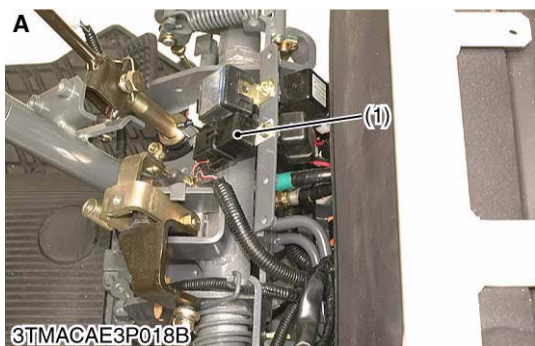
(CABIN Type)

1. Apply battery voltage across **1** and **2** terminals, and check for continuity across **3** and **4** terminals.
2. If 0 ohm is not indicated, renew the starter relay.

A : Relay Side Connector 4B **C : CABIN Type**
B : ROPS Type

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(D) PTO Relay



Connector Voltage

1. Disconnect the PTO relay connector **5A** (ROPS Type), **5X** (CABIN Type).
2. Shift the PTO clutch lever to **OFF** position and turn the main switch to **ON** position.
3. **(ROPS Type)**
Measure the voltage across **1** terminal and **2** terminal (wire harness type).
(CABIN Type)
Measure the voltage across **2** terminal and **4** terminal.
4. If the voltage differs from the battery voltage, check the wiring harness.

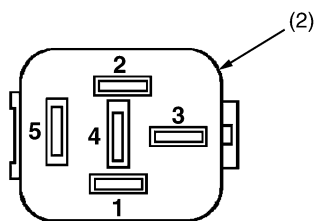
Voltage	Connector 1 terminal and 2 terminal	Battery voltage (11 to 14 V)
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- (1) PTO Relay
- (2) Connector 5A
- (3) Connector 5X

- A : ROPS Type**
(Wire Harness Side Connector)
- B : CABIN Type**
(Wire Harness Side Connector)

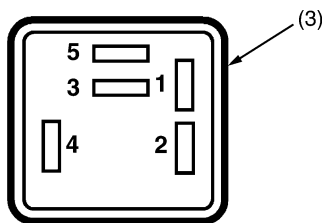
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A



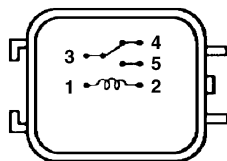
3TMACAA9P049C

B



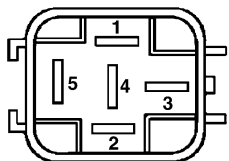
3TMACAA9P050C

A



3TMACAA9P051A

B



PTO Relay Test

(ROPS Type)

1. Apply battery voltage across **1** and **2** terminals, and check for continuity across **3** and **5** terminals.

(CABIN Type)

1. Apply battery voltage across **2** and **4** terminals, and check for continuity across **1** and **3** terminals.
2. If 0 ohm is not indicated, renew the PTO relay.

A : ROPS Type

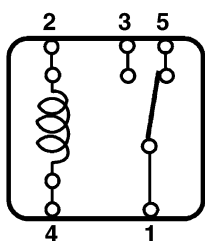
C : CABIN Type

B : PTO Relay Side Connector 5A

D : PTO Relay Side Connector 5X

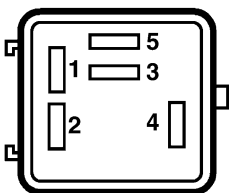
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C

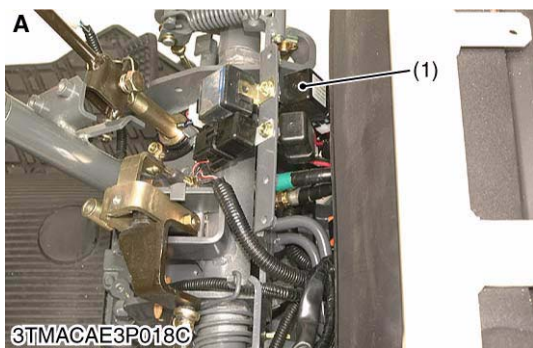


3TMACAA9P052A

D



(E) Glow Relay



Connector Voltage

1. Turn the main switch **OFF** position.
2. Disconnect the **1P** connectors and connector **2A** from glow relay (1).
3. Measure the voltage with a voltmeter across the **1P** connector **R** terminal (Positive) and chassis (Negative).
4. If the voltage differs from the battery voltage, check the wiring harness.
5. Turn the main switch **ON** position.
6. Measure the voltage with a voltmeter across the connector **2A** **BW** terminal (Positive) and chassis (Negative).
7. If the voltage differs from the battery voltage, check the wiring harness.

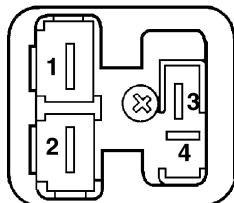
(1) Glow Relay

A : ROPS Type

B : CABIN Type

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A



Glow Relay Test

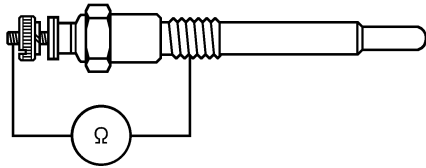
1. Remove the glow relay.
2. Apply battery voltage across **3** and **4** terminals, and check for continuity across **1** and **2** terminals.
3. If continuity is not established across **1** and **2** terminals, renew the glow relay.

A : Glow Relay Side

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(F) Glow Plug



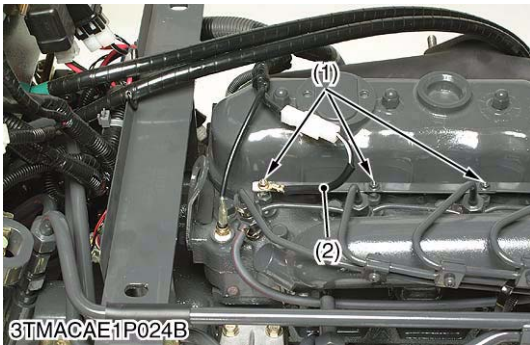
3TMABAB9P012A

Glow Plug

1. Disconnect the leads from the glow plugs.
2. Measure the resistance with an ohmmeter across the glow plug terminal and chassis.
3. If 0 ohm is indicated, the screw at the tip of the glow plug and the housing are short-circuited.
4. If the factory specification is not indicated, renew the glow plug.

Glow plug resistance	Factory spec.	Approx. 0.5 Ω
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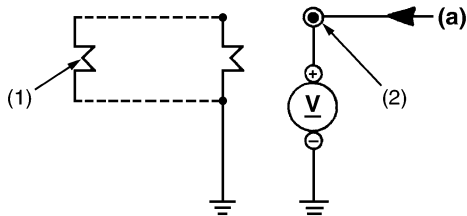


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Pre-heating (Lead Terminal Voltage)

1. Disconnect the wiring lead (2) from glow plug after turning the main switch off.
2. Turn the main switch to the **PREHEAT** position, and measure the voltage across the lead terminal and the chassis.
3. Make sure that the shuttle shift lever is in the neutral position and the PTO control lever to **OFF** position.
4. Turn the main switch to the **START** position, and measure the voltage with a voltmeter across the lead terminal and the chassis.
5. If the voltage at either position differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage (Lead terminal - Chassis)	Main switch at PREHEAT	Approx. battery voltage
	Main switch at START	Approx. battery voltage



- (1) Glow Plug
- (2) Wiring Lead

(a) From Main Switch G Terminal and Glow Relay

3TMACAB9P036A

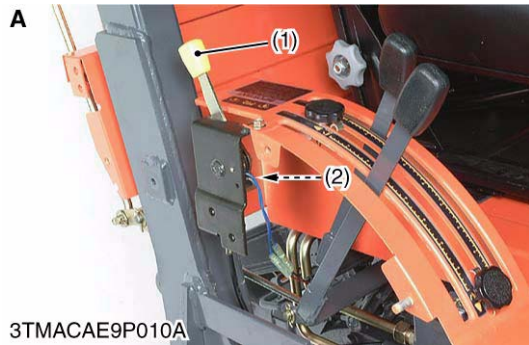
0000002947E

(G) Safety Switch and PTO Clutch Safety Switch

PTO Clutch Safety Switch

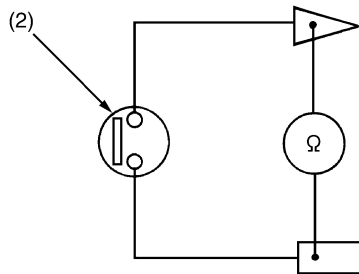
1. Remove the PTO clutch safety switch leads.
2. Connect the circuit tester to the PTO clutch safety switch leads.
3. Measure the resistance between leads.
4. If the PTO clutch safety switch is defective, replace it.

Resistance (Across switch terminal)	When switch push is pushed	0 Ω
	When switch push is released	Infinity



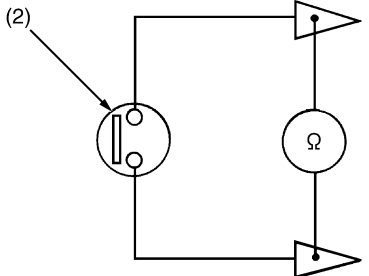
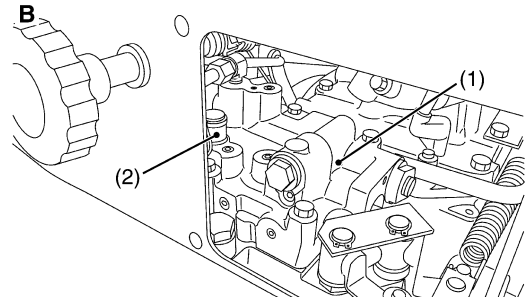
- (1) PTO Clutch Lever **A : ROPS Type**
- (2) PTO Clutch Safety Switch **B : CABIN Type**

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3TMACAB9P041A

(H) Shuttle Valve Safety Switch



Shuttle Neutral Switch

1. Remove the safety switch (shuttle neutral switch) leads.
2. Connect the circuit tester to the safety switch (shuttle neutral switch) leads.
3. Measure the resistance between leads.
4. If the safety switch (shuttle neutral switch) is defective, replace it.

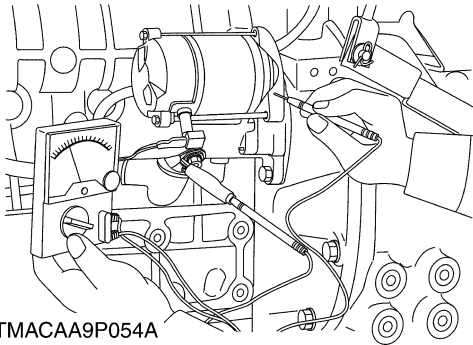
Resistance (Across switch terminal)	When operate the shuttle lever to the forward or reverse	0 Ω
	Shuttle lever at neutral	Infinity

- (1) Shuttle Valve
- (2) Safety Switch

A : ROPS Type
B : CABIN Type

000002951E

(I) Starter



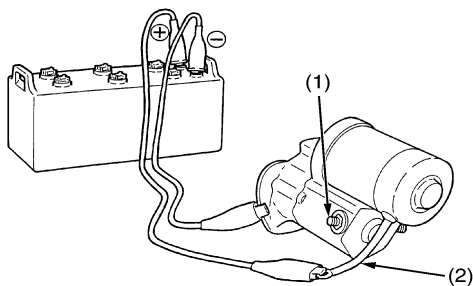
3TMACAA9P054A

Starter Motor B Terminal Voltage

1. Measure the voltage with a voltmeter across the **B** terminal and chassis.
2. If the voltage differs from the battery voltage, the battery's positive cable or the battery negative cable is faulty.

Voltage	Factory spec.	Approx. battery voltage
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3TMABAB9P007A

Motor Test

⚠ CAUTION

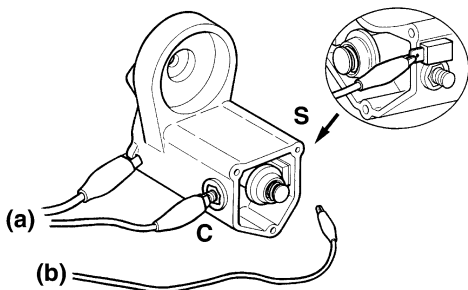
- **Secure the starter to prevent it from jumping up and down while testing the motor.**

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter **C** terminal (1).
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter **C** terminal (1).
5. Connect a jumper lead from the connecting lead (2) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter motor housing and the battery negative terminal post.
7. If the motor does not run, check the motor.

(1) **C** Terminal

(2) Connecting Lead

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3TMABAB9P008A

Magnetic Switch Test (Pull-in, Holding Coils)

1. Remove the motor from the starter housing.
2. Prepare a 6 V battery for the test.
3. Connect jumper leads from the battery negative terminal to the housing and the starter **C** terminal.
4. The plunger should be attached and the pinion gear should pop out when a jumper lead is connected from the battery positive terminal to the **S** terminal. It's a correct.
5. Disconnect the jumper lead to the starter **C** terminal. Then the pinion gear should remain popped out. It's a correct.

■ IMPORTANT

- **Testing time must be 3 to 5 sec.**

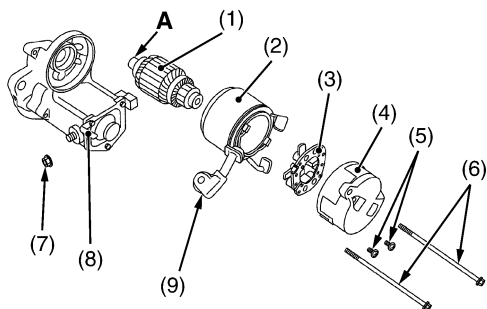
(a) **To Negative Terminal**

(b) **To Positive Terminal**

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(2) Disassembling and Assembling

(A) Starter



3TMABAB9P013A

Disassembling Motor

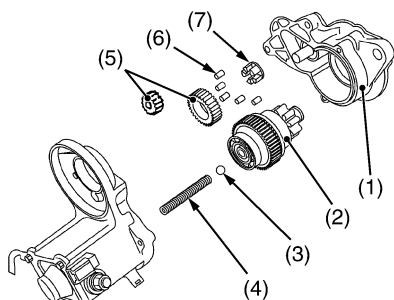
1. Disconnect the connecting lead (9) from the magnet switch (8).
2. Remove the screws (6), and then separate the end frame (4), yoke (2) and armature (1).
3. Remove the two screws (5), and then take out the brush holder (3) from the end frame (4).

(When reassembling)

- Apply grease to the spline teeth **A** of the armature (1).

- | | |
|------------------|-------------------------|
| (1) Armature | (7) Nut |
| (2) Yoke | (8) Magnet Switch |
| (3) Brush Holder | (9) Connecting Lead |
| (4) End Frame | |
| (5) Screw | |
| (6) Screw | A : Spline Teeth |

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Disassembling Magnet Switch

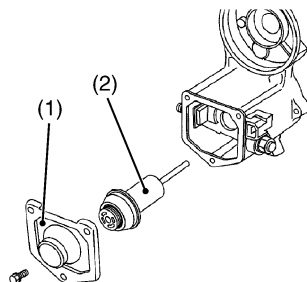
1. Remove the drive end frame (1) mounting screws.
2. Take out the overrunning clutch (2), ball (3), spring (4), gears (5), rollers (6) and retainer (7).

(When reassembling)

- Apply grease to the gear teeth of the gears (5) and overrunning clutch (2), and ball (3).

- | | |
|------------------------|--------------|
| (1) Drive End Frame | (5) Gear |
| (2) Overrunning Clutch | (6) Roller |
| (3) Ball | (7) Retainer |
| (4) Spring | |

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Plunger

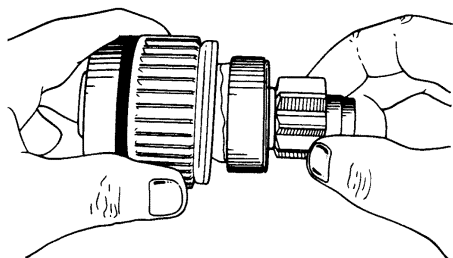
1. Remove the end cover (1).
2. Take out the plunger (2).

- | | |
|---------------|-------------|
| (1) End Cover | (2) Plunger |
|---------------|-------------|

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(3) Servicing

(A) Starter

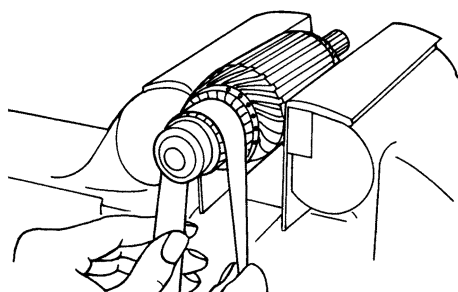


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Overrunning Clutch

1. Inspect the pinion for wear or damage.
2. If there is any defect, replace the overrunning clutch assembly.
3. Check that the pinion turns freely and smoothly in the overrunning direction and does not slip in the cranking direction.
4. If the pinion slips or does not rotate in the both directions, replace the overrunning clutch assembly.

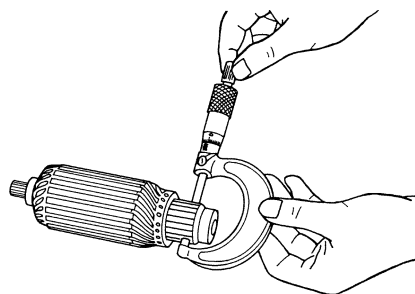
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Commutator and Mica

1. Check the contact face of the commutator for wear, and grind the commutator with emery paper if it is slightly worn.
2. Measure the commutator O.D. with an outside micrometer at several points.
3. If the minimum O.D. is less than the allowable limit, replace the armature.
4. If the difference of the O.D.'s exceeds the allowable limit, correct the commutator on a lathe to the factory specification.
5. Measure the mica undercut.
6. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.

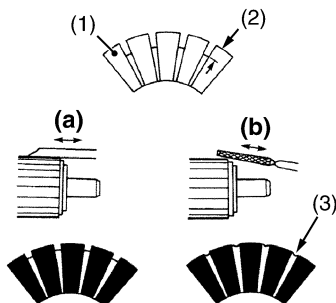


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Commutator O.D.	Factory spec.	30.0 mm 1.181 in.
	Allowable limit	29.0 mm 1.142 in.

Difference of O.D.'s	Factory spec.	Less than 0.02 mm 0.0008 in.
	Allowable limit	0.05 mm 0.0020 in.

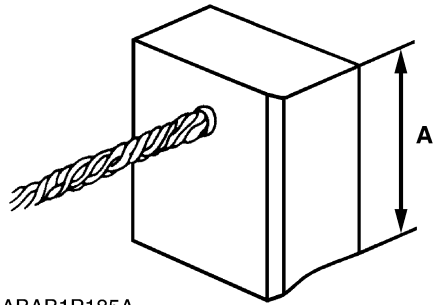
Mica undercut	Factory spec.	0.50 to 0.80 mm 0.0197 to 0.0315 in.
	Allowable limit	0.20 mm 0.0079 in.



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- | | |
|--------------|----------------------|
| (1) Segment | (a) Correct |
| (2) Undercut | (b) incorrect |
| (3) Mica | |

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Brush Wear

1. If the contact face of the brush is dirty or dusty, clean it with emery paper.
2. Measure the brush length (**A**) with vernier calipers.
3. If the length is less than the allowable limit, replace the yoke assembly and brush holder.

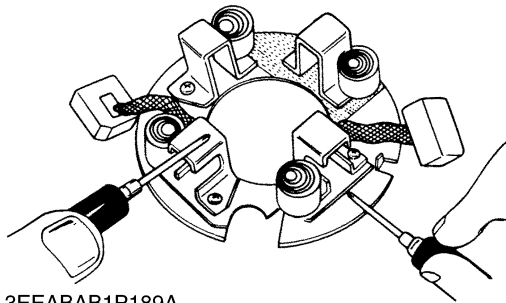
Brush length (A)	Factory spec.	14.0 mm 0.551 in.
	Allowable limit	9.0 mm 0.354 in.

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Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

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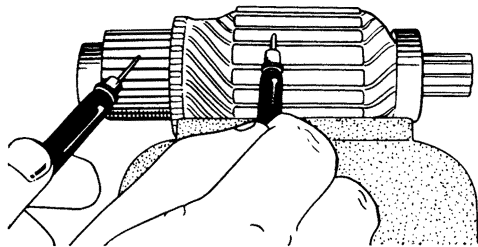
3EEABAB1P189A

Armature Coil

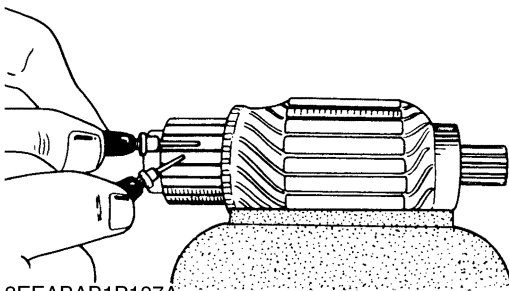
1. Check the continuity across the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

Resistance	Commutator - Armature coil core	Infinity
	Commutator segment	0 Ω

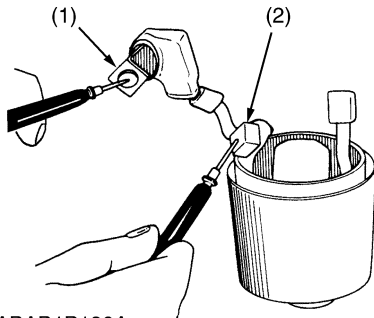
0000001754E



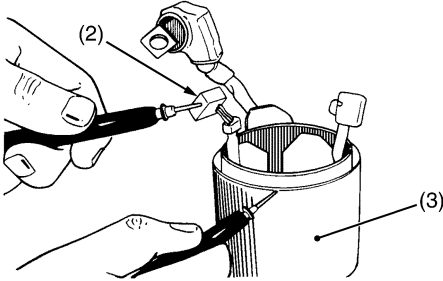
3EEABAB1P186A



3EEABAB1P187A



3EEABAB1P190A



3EEABAB1P191A

Field Coil

1. Check the continuity across the lead (1) and brush (2) with an ohmmeter.
2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush (2) and yoke (3) with an ohmmeter.
4. If it conducts, replace the yoke assembly.

Resistance	Lead (1) - Brush (2)	0 Ω
	Brush (2) - Yoke (3)	Infinity

- (1) Lead
- (2) Brush

(3) Yoke

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[3] STOPPING SYSTEM

(1) Checking

(A) Timer Relay



Connector Voltage

1. Disconnect the connector **4A** from the timer relay (1) after turning the main switch **OFF** position.
2. Measure the voltage with a voltmeter across the connector **3** terminal and chassis.
3. Turn the main switch **ON** position, and measure the voltage across the connector **4** terminal and chassis.
4. If these voltages differ from the battery voltage, check the wiring harness.

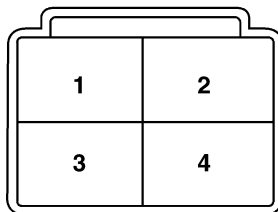
Voltage	Connector 3 terminal -chassis (Main Switch OFF)	Approx. battery voltage
	Connector 4 terminal -chassis (Main Switch ON)	Approx. battery voltage

(1) Timer Relay

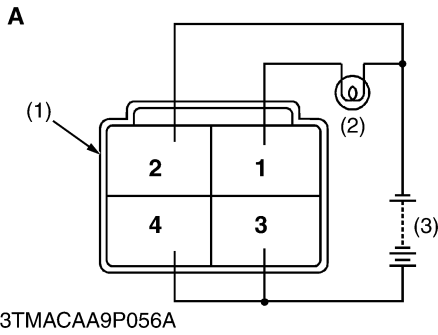
- A : ROPS Type**
- B : CABIN Type**
- C : Wire Harness Side Connector 4A**

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C



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Test of Timer Relay

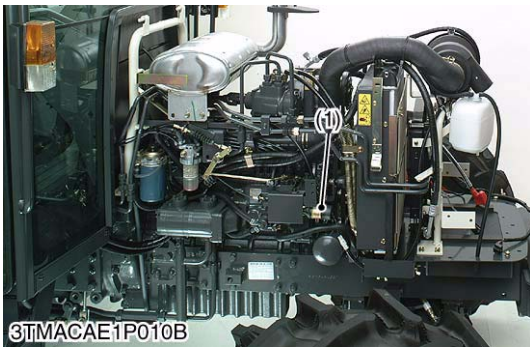
1. Remove the timer relay.
2. Connect jumper leads across the battery positive terminal and the timer relay **3** terminal, and across the battery positive terminal and the timer relay **4** terminal.
3. Connect jumper leads across the battery negative terminal and the timer relay **2** terminal, and across the battery negative terminal and the bulb terminal.
4. Connect jumper lead across the timer relay **1** terminal and the bulb terminal.
5. The bulb lights up when disconnecting a jumper lead from the **3** terminal and goes off 6 to 13 seconds later, the timer relay is proper.

- (1) Timer Relay
- (2) Load (Lamp)
- (3) Battery (12 V)

**A : Timer Relay Side Connector
4A**

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(B) Engine Stop Solenoid

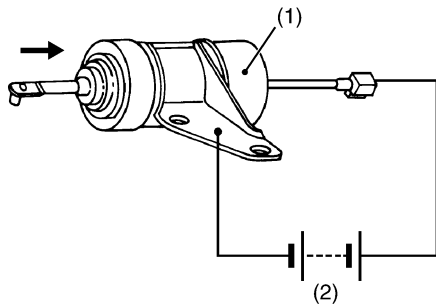


Engine Stop Solenoid Test

1. Disconnect the **1P** connector from the engine stop solenoid.
2. Remove the engine stop solenoid from the engine.
3. Connect the jumper leads from the battery positive terminal to the **1P** connector, and from the battery negative terminal to the engine stop solenoid body.
4. If the solenoid plunger is not attracted, check the engine stop solenoid.

- (1) Engine Stop Solenoid
- (2) Battery (12V)

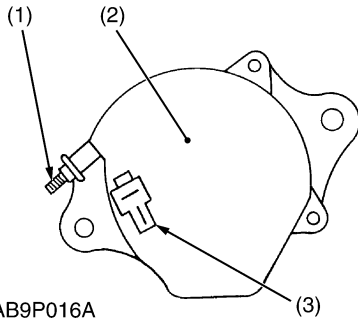
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[4] CHARGING SYSTEM

(1) Checking

(A) Alternator



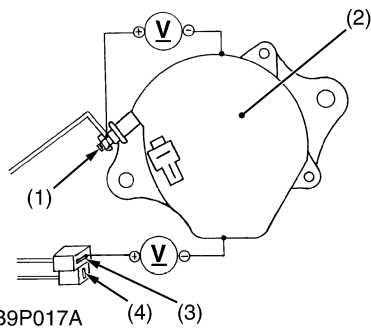
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Alternator

1. Disconnect the **2P** connector (3) from alternator after turning the main switch **OFF**.
2. Perform the following checkings.

- (1) **B** Terminal
- (2) Alternator
- (3) **2P** Connector

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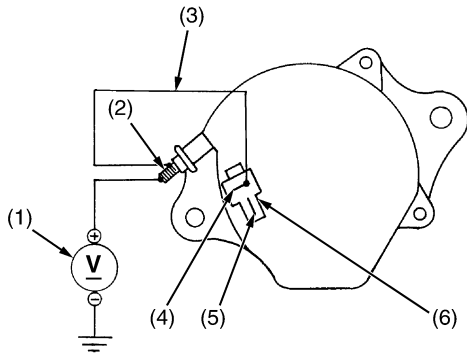
Connector Voltage

1. Turn the main switch **OFF**. Measure the voltage between the **B** terminal (1) and the chassis.
2. Turn the main switch **ON**. Measure the voltage between the **IG** terminal (3) and the chassis.

Voltage (Main switch at OFF)	B terminal - Chassis	Approx. battery voltage
Voltage (Main switch at ON)	IG terminal - Chassis	Approx. battery voltage

- (1) **B** Terminal
- (2) Alternator
- (3) **IG** Terminal
- (4) **L** Terminal

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No-Load Test

1. Connect the **2P** connector (6) to previous positions of the alternator after turning the main switch **OFF**.
2. Connect the jumper lead (3) between **IG** terminal (4) and **B** terminal (2).
3. Start the engine and then set at idling speed.
4. Disconnect the negative cable from the battery.
5. Measure the voltage between the **B** terminal (2) and the chassis.
6. If the measurement is less than the factory specification, disassemble the alternator and check the IC regulator.

Voltage	Factory spec.	More than 14 V
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(Reference)

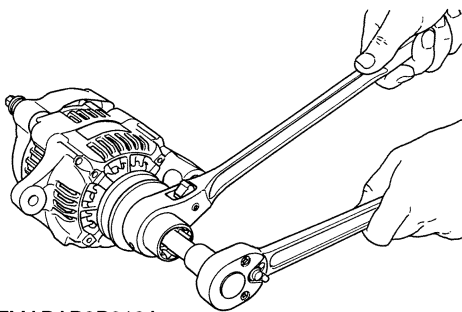
- Once the engine has started, the alternator temperature rises quickly up to an ambient temperature of 70 to 90 °C (158 to 194 °F). As the temperature goes higher than 50 °C (122 °F), the alternator voltage slowly drops; at higher than 100 °C (212 °F), it drops by about 1 V.

- | | |
|-----------------------|-------------------------|
| (1) Voltmeter | (4) IG Terminal |
| (2) B Terminal | (5) L Terminal |
| (3) Jumper Lead | (6) 2P Connector |

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(2) Disassembling and Assembling

(A) Alternator



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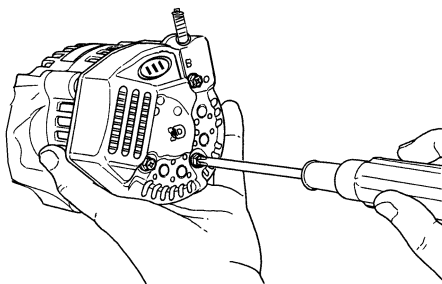
Pulley

1. Secure the hexagonal end of the pulley shaft with a double-ended ratchet wrench as shown in the figure, loosen the pulley nut with a socket wrench and remove it.

(When reassembling)

Tightening torque	Pulley nut	58.3 to 78.9 N·m 5.95 to 8.05 kgf·m 43.0 to 58.2 ft-lbs
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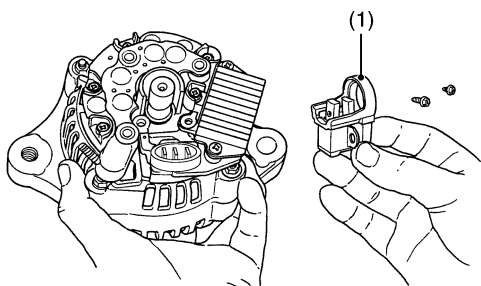


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Rear End Cover

1. Unscrew the three rear end cover screws and the **B** terminal nut, and remove the rear end cover.

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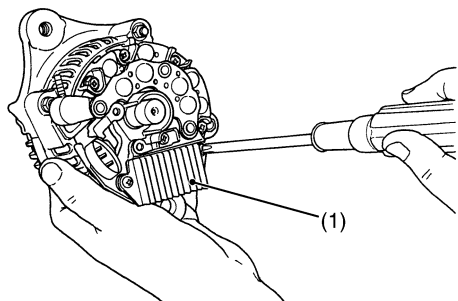
3TMABAB9P021A

Brush Holder

1. Unscrew the two screws holding the brush holder, and remove the brush holder (1).

(1) Brush Holder

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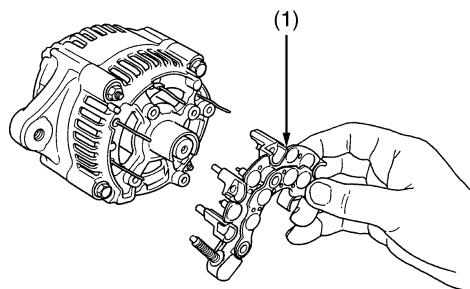
3TMABAB9P022A

IC Regulator

1. Unscrew the three screws holding the IC regulator, and remove the IC regulator (1).

(1) IC Regulator

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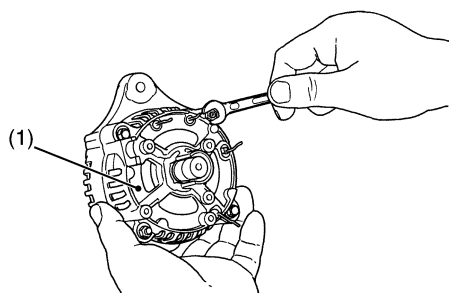
3TMABAB9P023A

Rectifier

1. Remove the four screws holding the rectifier and the stator lead wires.
2. Remove the rectifier (1).

(1) Rectifier

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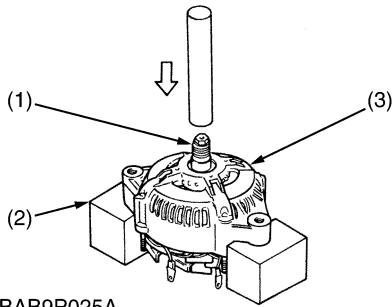
3TMABAB9P024A

Rear End Frame

1. Unscrew the two nuts and two screws holding the drive end frame and the rear end frame.
2. Remove the rear end frame (1).

(1) Rear End Frame

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Rotor

1. Press out the rotor (1) from drive end frame (3).

■ **IMPORTANT**

- **Take special care not to drop the rotor and damage the slip ring or fan, etc..**

- | | |
|-----------|---------------------|
| (1) Rotor | (3) Drive End Frame |
| (2) Block | |

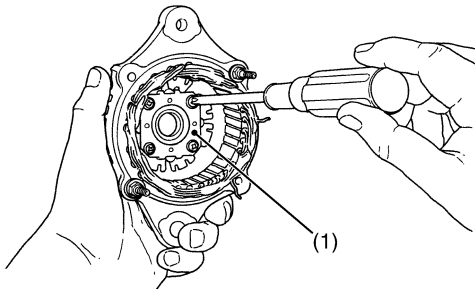
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Retainer Plate

1. Unscrew the four screws holding the retainer plate, and remove the retainer plate (1).

- | |
|--------------------|
| (1) Retainer Plate |
|--------------------|

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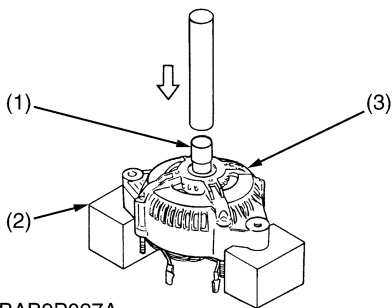
3TMABAB9P026A

Bearing on Drive End Side

1. Press out the bearing from drive end frame (3) with a press and jig (1).

- | | |
|-----------|---------------------|
| (1) Jig | (3) Drive End Frame |
| (2) Block | |

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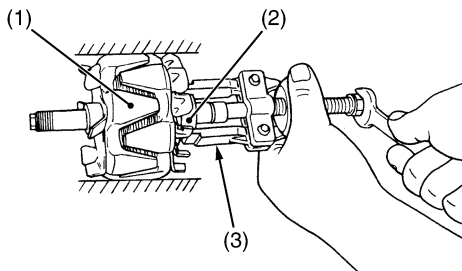
3TMABAB9P027A

Bearing at Slip Ring Side

1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

- | | |
|-------------|------------|
| (1) Rotor | (3) Puller |
| (2) Bearing | |

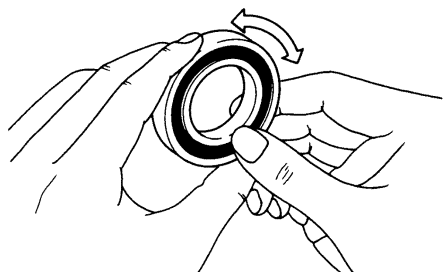
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(3) Servicing

(A) Alternator

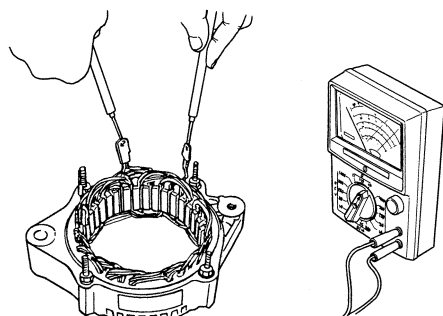


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Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

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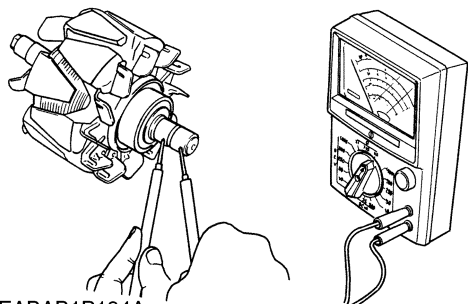
3EEABAB1P193A

Stator

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory spec.	Less than 1.0 Ω
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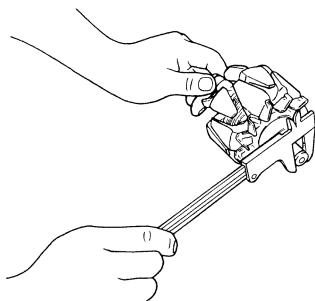
3EEABAB1P194A

Rotor

1. Measure the resistance across the slip rings with an ohmmeter.
2. If the resistance is not the factory specification, replace it.
3. Check the continuity across the slip ring and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory spec.	2.9 Ω
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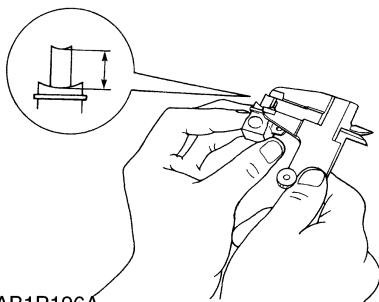
3EEABAB1P195A

Slip Ring

1. Check the slip ring for score.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the allowable limit, replace it.

Slip ring O.D.	Factory spec.	14.4 mm 0.567 in.
	Allowable limit	14.0 mm 0.551 in.

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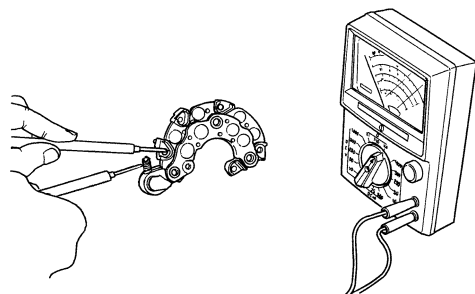
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Brush Wear

1. Measure the brush length with vernier calipers.
2. If the measurement is less than allowable limit, replace it.
3. Make sure that the brush moves smoothly.
4. If the brush is defective, replace it.

Brush length	Factory spec.	10.5 mm 0.413 in.
	Allowable limit	8.4 mm 0.331 in.

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Rectifier

1. Check the continuity across each diode of rectifier with an analog ohmmeter. Conduct the test in the (R x 1) setting.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

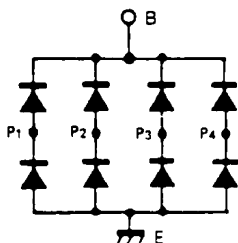
■ **IMPORTANT**

- Do not use a 500 V megger for measuring because it will destroy the rectifier.

■ **NOTE**

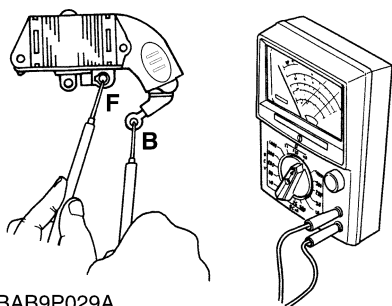
- Do not use an auto digital multimeter. Because it's very hard to check the continuity of rectifier by using it.

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(B) IC Regulator



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IC Regulator

1. Check the continuity across the **B** terminal and the **F** terminal of IC regulator with an analog ohmmeter. Conduct the test in the (R x 1) setting.
2. The IC regulator is normal if the IC regulator conducts in one direction and does not conduct in the reverse direction.

■ **IMPORTANT**

- Do not use a 500 V megger for measuring because it will destroy the IC regulator.

■ **NOTE**

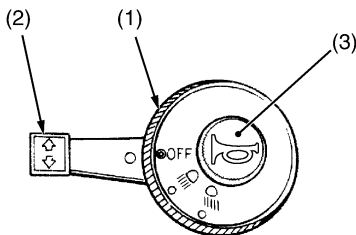
- Do not use an auto digital multimeter. Because it's very hard to check the continuity of IC regulator by using it.

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[5] LIGHTING SYSTEM

(1) Checking

(A) Combination Switch



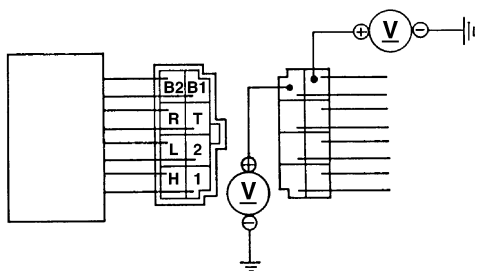
Combination Switch

1. Remove the switch board, and disconnect the combination switch connector after turning the main switch off.
2. Perform the following checkings.

- (1) Light Switch
- (2) Turn Signal Light Switch
- (3) Horn Switch

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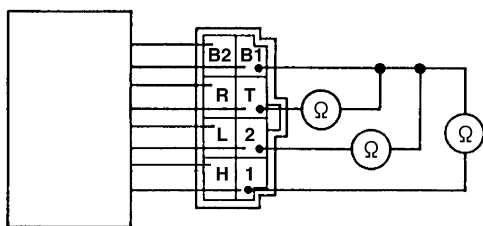
1) Connector Voltage

1. Disconnect the **8P** connector from the combination switch.
2. Measure the voltage with a voltmeter across the connector **B1** terminal to chassis and the **B2** terminal to chassis when the main switch is "OFF" position.
3. If the voltage differs from the battery voltage, the wiring harness is faulty.

Voltage	Main switch at "OFF" position	B1 terminal - Chassis	Battery voltage
		B2 terminal - Chassis	

3TLABAB9P041B

000001775E



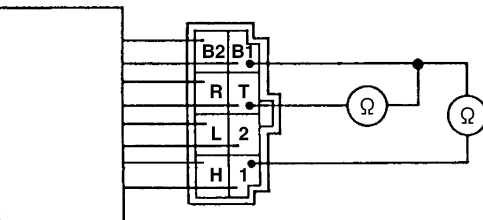
2) Light Switch Continuity when Setting Switch at OFF Position

1. Disconnect the combination switch connector.
2. Set the light switch to the **OFF** position.
3. Measure the resistance with an ohmmeter across the **B1** terminal to the **T** terminal, the **B1** terminal to the **1** terminal and the **B1** terminal to the **2** terminal.
4. If infinity is not indicated, the head light switch is faulty.

Resistance(Switch at OFF position)	B1 terminal - T terminal	Infinity
	B1 terminal - 1 terminal	
	B1 terminal - 2 terminal	

3TLABAB9P042B

000001776E



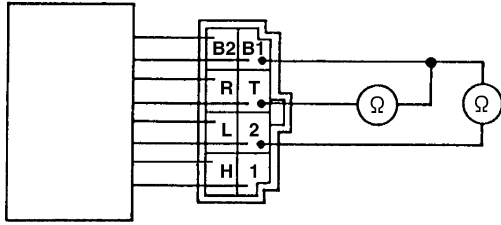
3) Light Switch Continuity when Setting Switch at HIGH-BEAM

1. Measure the resistance with an ohmmeter across the **B1** terminal to the **T** terminal and the **B1** terminal to the **1** terminal.
2. If 0 ohm is not indicated, the head light switch is faulty.

Resistance (Switch at HIGH-BEAM position)	B1 terminal - T terminal	0 Ω
	B1 terminal - 1 terminal	

3TLABAB9P043B

000001777E



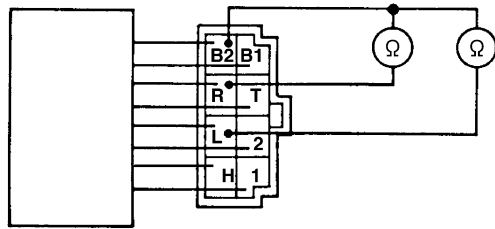
3TLABAB9P044B

4) Light Switch Continuity when Setting Switch at LOW-BEAM Position

1. Measure the resistance with an ohmmeter across the **B1** terminal to the **T** terminal and the **B1** terminal to the **2** terminal.
2. If 0 ohm is not indicated, the head light switch is faulty.

Resistance (Switch at LOW-BEAM position)	B1 terminal - T terminal	0 Ω
	B1 terminal - 2 terminal	

000001778E



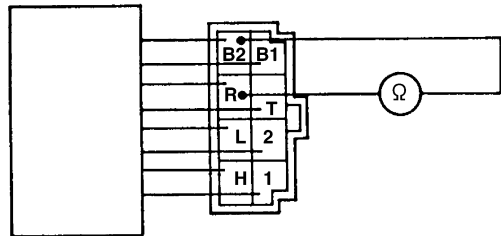
3TLABAB9P045B

5) Turn Signal Light Switch when Setting Switch Knob at OFF Position

1. Set the turn signal light switch to the **OFF** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal to the **R** terminal and the **B2** terminal to the **L** terminal.
3. If infinity is not indicated, the turn signal light switch is faulty.

Resistance (Switch at OFF position)	B2 terminal - R terminal	Infinity
	B2 terminal - L terminal	

000001779E



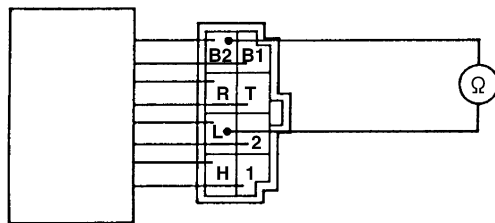
3TLABAB9P046B

6) Turn Signal Light Switch when Setting Switch Knob at R Position

1. Set the turn signal light switch to the **R** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal to the **R** terminal.
3. If 0 ohm is not indicated, the turn signal light switch is faulty.

Resistance (Switch at R position)	B2 terminal - R terminal	0 Ω
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3TLABAB9P047B

7) Turn Signal Light Switch when Setting Switch Knob at L Position

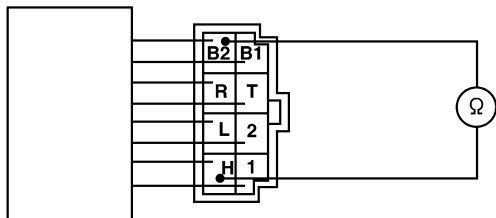
1. Set the turn signal light switch to the **L** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal to the **L** terminal.
3. If 0 ohm is not indicated, the turn signal light switch is faulty.

Resistance (Switch at L position)	B2 terminal - L terminal	0 Ω
--	--	-----

000001781E

8) Horn Switch Continuity

1. Measure the resistance with an ohmmeter across the **B2** terminal to the **H** terminal.
2. If measurement is not following below, the horn switch is faulty.

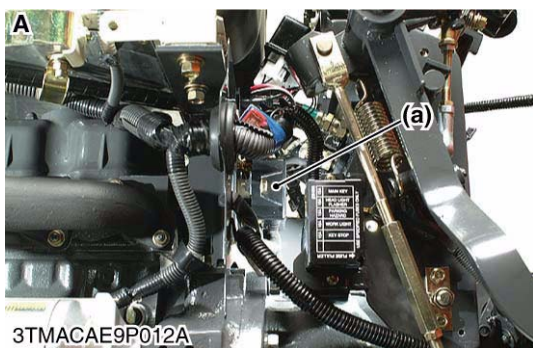


3TMACAD9P029A

Resistance (Switch at OFF)	B2 terminal - T terminal	Infinity
Resistance (Switch at ON)	B2 terminal - 2 terminal	0 Ω

0000001782E

(B) Hazard / Flasher Unit



Hazard / Flasher Unit

1. Remove the instrument panel.
2. Measure the voltage with a voltmeter across the GB terminal (6) and chassis.
3. If the voltage differ from the battery voltage, the wiring harness is faulty.

Voltage	GB Terminal - Chassis	Approx. battery voltage
---------	-----------------------	-------------------------

(Reference)

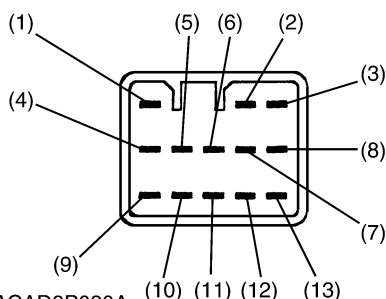
1	-	Vacancy
2	0.85GB	Ground
3	0.5Y	Trailer Indicator
4	0.85RY	Turn Signal RH (Output)
5	0.85RW	Battery Voltage (AC)
6	0.85GB	Battery Voltage
7	0.85RB	Turn Signal LH (Output)
8	-	Vacancy
9	0.85LR	Turn Signal RH (Input)
10	-	Vacancy
11	-	Vacancy
12	0.85WL	Turn Signal LH (Input)
13	0.85L	Hazard Switch

a : Hazard / Flasher Unit

A : ROPS Type

B : CABIN Type

0000002981E



3TMACAD9P030A

(C) Brake Switch



Brake Switch

1) Wiring Harness

1. Disconnect the leads from the brake switch (1).
2. Connect the wiring harness lead terminals to each other and turn the main switch **ON**.
3. If the stop lights do not light, the fuse, wiring harness or bulb is faulty.

2) Brake Switch Continuity

1. Remove the brake switch (1).
2. Check the continuity with an ohmmeter across the switch terminals.
3. If it does not conduct or any value is indicated when the switch is released, the switch is faulty.
4. If infinity is not indicated when the switch is pushed, the switch is faulty.

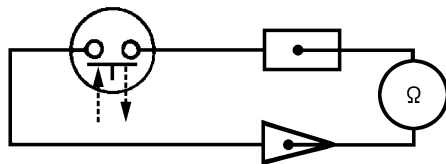
Resistance (Across switch terminals)	Reference value	When switch is pushed	Infinity
		When switch is released	0 Ω

(1) Brake Switch

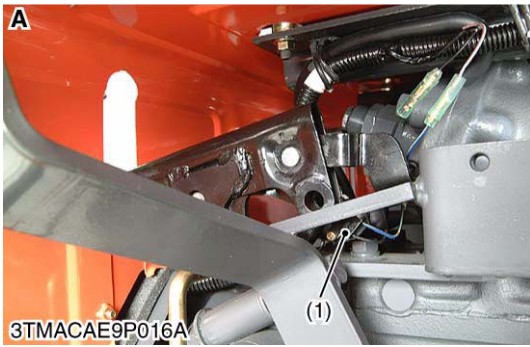
A : ROPS Type

B : CABIN Type

000002983E



3TMACAB9P056A



Parking Brake Switch

1) Wiring Harness

1. Disconnect the leads from the parking brake switch (1).
2. Connect the wiring harness lead terminals to each other and turn the main switch on.
3. If the indicator do not light, the fuse, wiring harness or bulb is faulty.

2) Parking Brake Switch Continuity

1. Check the continuity with an ohmmeter across the switch terminals.
2. If it does not conduct or any value is indicated when the switch is pushed, the switch is faulty.
3. If infinity is not indicated when the switch is released, the switch is faulty.

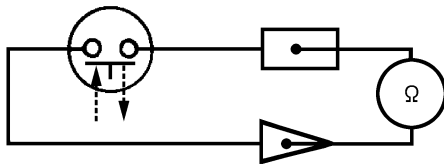
Resistance (Across switch terminals)	Reference value	When switch is pushed	0 Ω
		When switch is released	Infinity

(1) Parking Brake Switch

A : ROPS Type

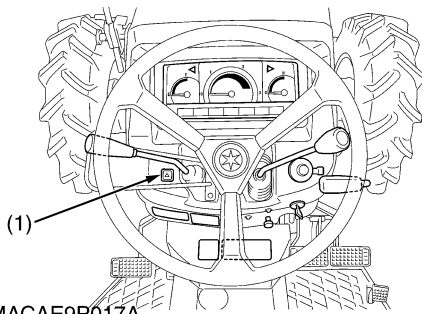
B : CABIN Type

000002984E



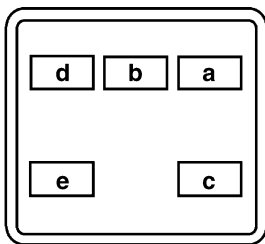
3TMACAB9P056A

(D) Hazard Switch (ROPS Type)



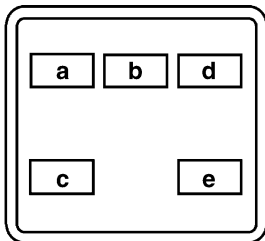
3TMACAE9P017A

A



3TMACAA9P060A

A



3TMACAA9P060B

Hazard Switch

1. Connect the battery negative code, then measure the voltage with a voltmeter across the **a** terminal a and chassis.
2. If the voltage differ from the battery voltage, the wiring harness is faulty.

Voltage	a Terminal	Approx. battery voltage
---------	-------------------	-------------------------

(1) Hazard Switch

A : Wire Harness Connector 52

0000002986E

Hazard Switch Continuity

1. Measure the resistance with ohmmeter across the **a** terminal and **c** terminal, and across the **d** terminal and **e** terminal.
2. If the measurement is not following below, the hazard switch or the bulb are faulty.

Resistance (Switch at OFF)	a terminal - c terminal	Infinity
Resistance (Switch at ON)	a terminal - c terminal	0 Ω
Resistance (Bulb)	d terminal - e terminal	Approx. 13 Ω

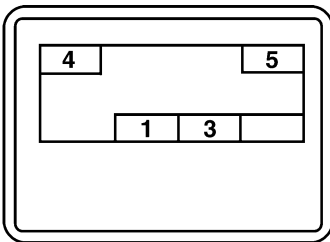
A : Hazard Switch Side

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(E) Hazard Switch (CABIN Type)

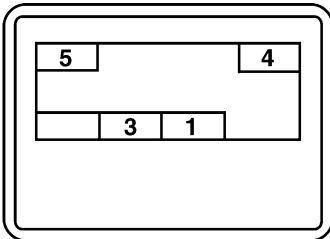


A



3TMACAA9P061A

A



3TMACAA9P062A

Connector Voltage

1. Disconnect the connector **5Y** from hazard switch.
2. Measure the voltage with a voltmeter across the connector **3** terminal and chassis when the main switch is **OFF** position.
3. If the voltage differs from the battery voltage, check the wiring harness.

Voltage	3 terminal - Chassis	Approx. battery voltage
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(1) Hazard Switch

A : Wire Harness Side Connector 5Y

0000002989E

Hazard Switch Continuity

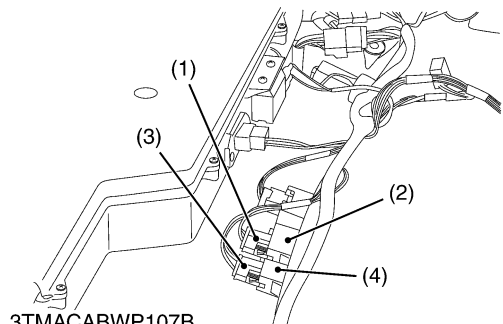
1. Measure the resistance with ohmmeter across the **1** terminal and **3** terminal, and across the **4** terminal and **5** terminal.
2. If the measurement is not following below, the hazard switch or the bulb are faulty.

Resistance (Switch at OFF)	1 terminal - 3 terminal	Infinity
Resistance (Switch at ON)	1 terminal - 3 terminal	0 Ω
Resistance (Bulb)	4 terminal - 5 terminal	Approx. 13 Ω

A : Hazard Switch Side

0000002990E

(F) Working Light (CABIN Type)

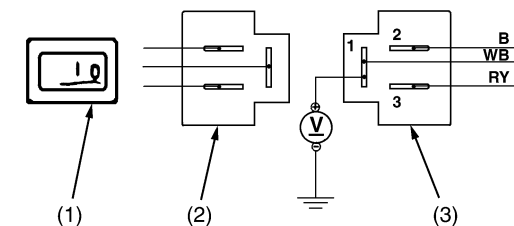


Working Light Switch

1. Remove the outer roof, and disconnect the working light switch connector (1) from the switch (2) connector.
2. Perform the following checkings **1)** and **2)**.

- | | |
|--|---|
| (1) Working Light Switch Connector (Front) | (3) Working Light Switch Connector (Rear) |
| (2) Working Light Switch (Front) | (4) Working Light Switch (Rear) |

0000001794E



1) Connector Voltage

1. Turn the main switch **ON**.
2. Measure the voltage with a voltmeter across the connector 1 terminal and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	1 terminal - Chassis	Approx. battery voltage
---------	----------------------	-------------------------

2) Working Light Switch

1. Check the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated.

Terminal		1	2	3
Working light switch	OFF		●	●
	ON	●	●	●

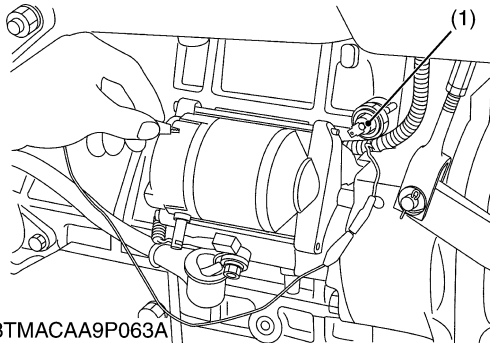
- | | |
|--|--|
| (1) Working Light Switch Connector (Switch Side) | (3) Working Light Switch Connector (Wiring Harness Side) |
|--|--|

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[6] WARNING LAMPS

(1) Checking

(A) Engine Oil Pressure

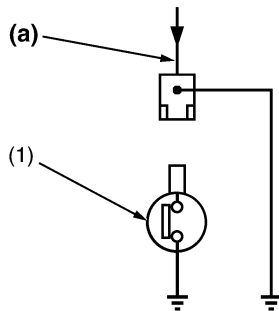


Engine Oil Pressure Switch Panel Board and Wiring Harness

1. Disconnect the lead from the engine oil pressure switch (1) after turning the main switch **OFF**.
2. Turn the main switch **ON** and connect a jumper lead from the lead to the chassis.
3. If the engine oil pressure indicator lamp does not light, the panel board circuit or the wiring harness is faulty.

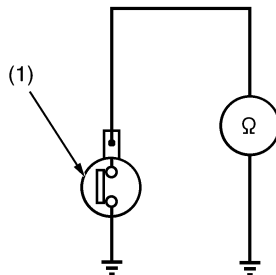
(1) Engine Oil Pressure Switch (a) From Oil Pressure Lamp

0000001796E



Engine Oil Pressure Switch Continuity

1. Measure the resistance with an ohmmeter across the switch terminal and the chassis.
2. If 0 ohm is not indicated in the normal state, the switch is faulty.
3. If infinity is not indicated at pressure over 4.9 kPa (0.5 kgf/cm², 7 psi), the switch is faulty.



Resistance (Switch terminal - Chassis)	In normal state	0 Ω
	At pressure over approx. 4.9 kPa (0.5 kgf/cm ² , 7 psi)	Infinity

(1) Engine Oil Pressure Switch

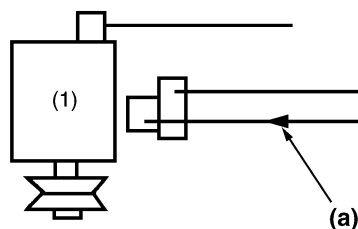
0000001797E

Charging Circuit (Panel Board and Wiring Harness)

1. Disconnect the **2P** connector from the alternator after turning the main switch **OFF**.
2. Turn the main switch **ON** and connect a jumper lead from the wiring harness connector terminal **WR** terminal to the chassis.
3. If the charge lamp does not light, the panel board circuit, alternator, wiring harness, or fuse is fault.

(1) Alternator (a) From Charge Lamp

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(B) Air Cleaner Sensor

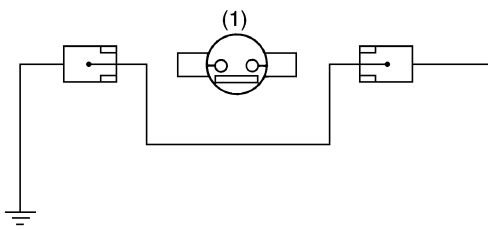


Air Cleaner Sensor Panel Board and Wiring Harness

1. Disconnect the leads from the air cleaner sensor (1) after turning the main switch **OFF**.
2. Turn the main switch **ON** and connect a jumper lead between the leads.
3. If the air cleaner clogged lamp does not light, the panel board circuit or wiring harness is faulty.

(1) Air Cleaner Sensor

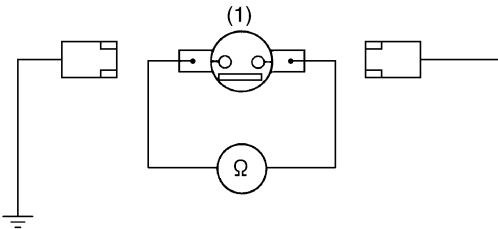
000001799E



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Air Cleaner Sensor Continuity

1. Disconnect the leads from the air cleaner sensor (1) after turning the main switch **OFF**.
2. Measure the resistance with an ohmmeter across the air cleaner sensor terminals.
3. If infinity is not indicated, the sensor is faulty.

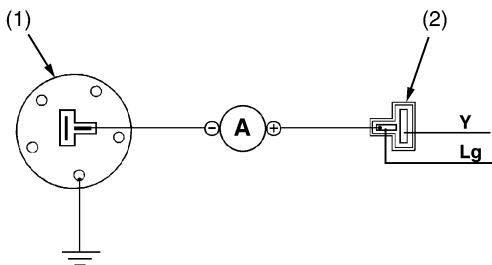
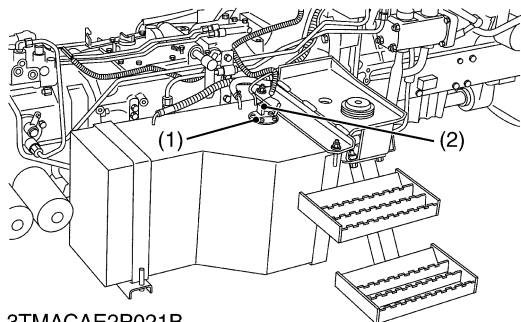


3TMACAB9P060A

Resistance (Across sensor terminals)	In normal state	Infinity
--------------------------------------	-----------------	----------

(1) Air Cleaner Sensor

000001800E



3TMACAD9P034A

Fuel Limit Sensor

1) Panel Board and Wiring Harness

1. Start the engine and check the easy checker.
2. Disconnect the **2P** connector (2) from the fuel limit sensor.
3. If the fuel limit indicator lamp does not light on when **2P** connector (2) is connected to the chassis, the panel board circuit or wiring harness is faulty.

2) Sensor Continuity

1. Check the continuity.
2. If a certain value is not indicated, the thermistor of the fuel limit sensor is faulty.

Resistance	Factory spec.	Across 2P terminal and chassis	A certain value is indicated. Its value depends on fuel quantity.
------------	---------------	---------------------------------------	---

3) Sensor Performance

1. Start the engine.
2. Connect the ammeter **COM** (-) lead to the sensor terminal and che (+) lead to the coupler terminal, and measure the thermistor amperage with an ammeter.
3. **(ROPS Type)**

If the measurement is less than 80 mA when the thermistor is in fuel and more than 130 mA when it is in the air, the thermistor is working properly

Thermistor amperage	Factory spec.	When thermistor is in fuel	Less than 80 mA
		When thermistor is in the air	More than 130 mA

4. (CABIN Type)

If the measurement is less than 60 mA when the thermistor is in fuel and more than 130 mA when it is in the air, the thermistor is working properly.

Thermistor amperage	Factory spec.	When thermistor is in fuel	Less than 60 mA
		When thermistor is in the air	More than 130 mA

■ **NOTE**

- The thermistor must be in the air for more than 7 minutes, in order to adjust to the atmospheric temperature, before the in-air amperage is measured.

(1) Fuel Unit

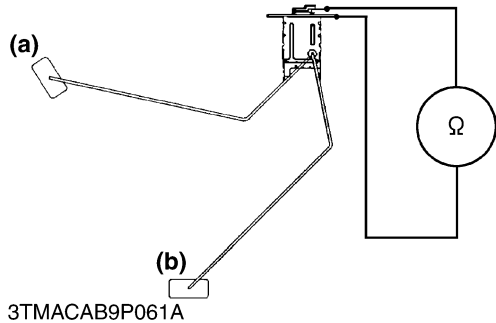
(2) **2P** Connector

000002994E

[7] GAUGES

(1) Checking

(A) Fuel Level Sensor



Fuel Level Sensor Continuity

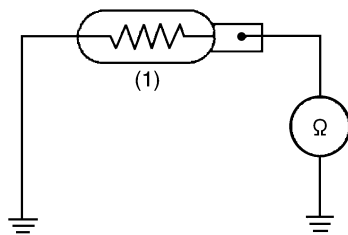
1. Remove the fuel level sensor from the fuel tank.
2. Measure the resistance with an ohmmeter across the sensor terminal and its body.
3. If the measurement are not indicated, the sensor is faulty.

Resistance (Sensor terminal - Its body)	Factory spec.	Float at uppermost position	1.0 to 5.0 Ω
		Float at lowermost position	103 to 117 Ω

(a) Float at Uppermost Position (b) Float at Lowermost Position

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(B) Coolant Temperature Sensor



3TMABAB9P042A

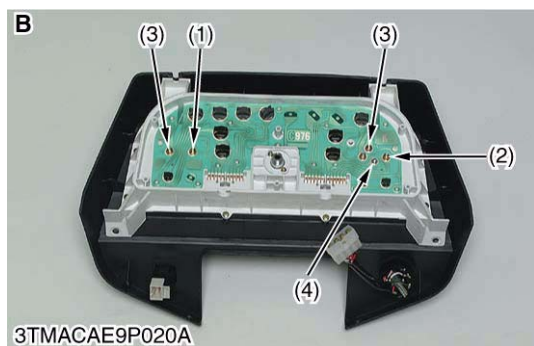
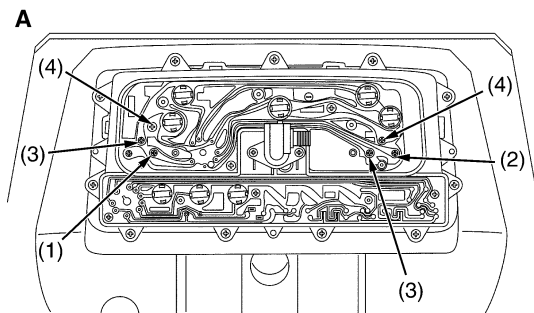
Coolant Temperature Sensor Continuity

1. Measure the resistance with an ohmmeter across the sensor terminal and the chassis.
2. If the measurement is not indicated, the sensor is faulty.

Resistance (Sensor terminal - Chassis)	Reference value	Approx. 16 Ω at 120 °C (248 °F) Approx. 50 Ω at 80 °C (176 °F) Approx. 149 Ω at 50 °C (122 °F)
--	-----------------	--

(1) Coolant Temperature Sensor

0000001803E

(C) Fuel Gauge and Coolant Temperature GaugeFuel Gauge and Coolant Temperature Gauge Continuity

1. Remove the panel board from the tractor.
2. Check the continuity with an ohmmeter across the **FU** terminal (2) and **IG** terminal (3) and across the **FU** terminal (2) and **GND** terminal (4).
3. If infinity is indicated, the fuel gauge is faulty.
4. Check the continuity with an ohmmeter across the **TU** terminal (1) and **IG** terminal (3) and across the **TU** terminal (1) and **GND** terminal (4).
5. If infinity is indicated, the coolant temperature gauge is faulty.

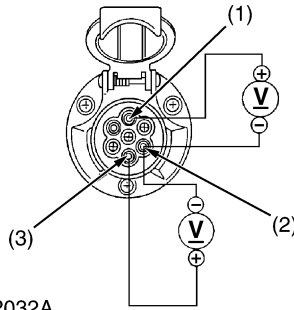
- (1) **TU** Terminal
 (2) **FU** Terminal
 (3) **IG** Terminal
 (4) **GND** Terminal

A : ROPS Type
B : CABIN Type

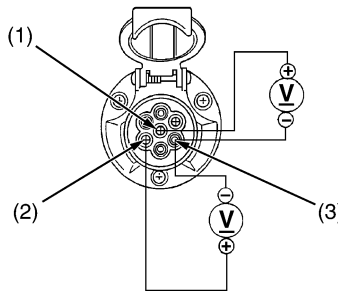
000002998E

[8] TRAILER SOCKET

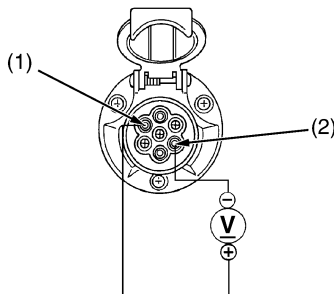
(1) Checking



3TGAAAB9P032A



3TGAAAB9P033A



3TGAAAB9P034A

Trailer Socket

1) Turning Signal Terminals

1. Turn the main switch **ON**, and measure the voltage with voltmeter across the **1** terminal (1) and **3** terminal (2), and across the **4** terminal (3) and **3** terminal (2).
2. If the voltage differs from the battery voltage, the wiring harness or switches for turning signal are faulty.

Voltage (Turning signal switch at L or hazard switch at ON)	1 Terminal (Green / White) - 3 Terminal (Black)	Approx. battery voltage (Intermittently)
Voltage (Turning signal switch at R or hazard switch at ON)	4 Terminal (Red / White) - 3 Terminal (Black)	Approx. battery voltage (Intermittently)

(1) **1** Terminal

(3) **4** Terminal

(2) **3** Terminal

0000001805E

2) Tail Terminals

1. Turn the main switch **ON**, and measure the voltage with voltmeter across the **7** terminal (1) and **3** terminal (3), and across the **5** terminal (2) and **3** terminal (3).
2. If the voltage differs from the battery voltage, the wiring harness or switches for tail lights are faulty.

Voltage (Head light switch at ON , or position switch at ON)	7 Terminal (Yellow / Blue) - 3 Terminal (Black)	Approx. battery voltage
Voltage (Head light switch at ON , or position switch at ON)	5 Terminal (Blue / White) - 3 Terminal (Black)	Approx. battery voltage

(1) **7** Terminal

(3) **3** Terminal

(2) **5** Terminal

0000001806E

3) Brake Light Terminals

1. Turn the main switch **ON**, and measure the voltage with voltmeter across the **6** terminal (1) and **3** terminal (2).
2. If the voltage differs from the battery voltage, the wiring harness or switch for brake lights are faulty.

Voltage (When stepping the brake pedal)	6 Terminal (Yellow / Black) - 3 Terminal (Black)	Approx. battery voltage
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(1) **6** Terminal

(2) **3** Terminal

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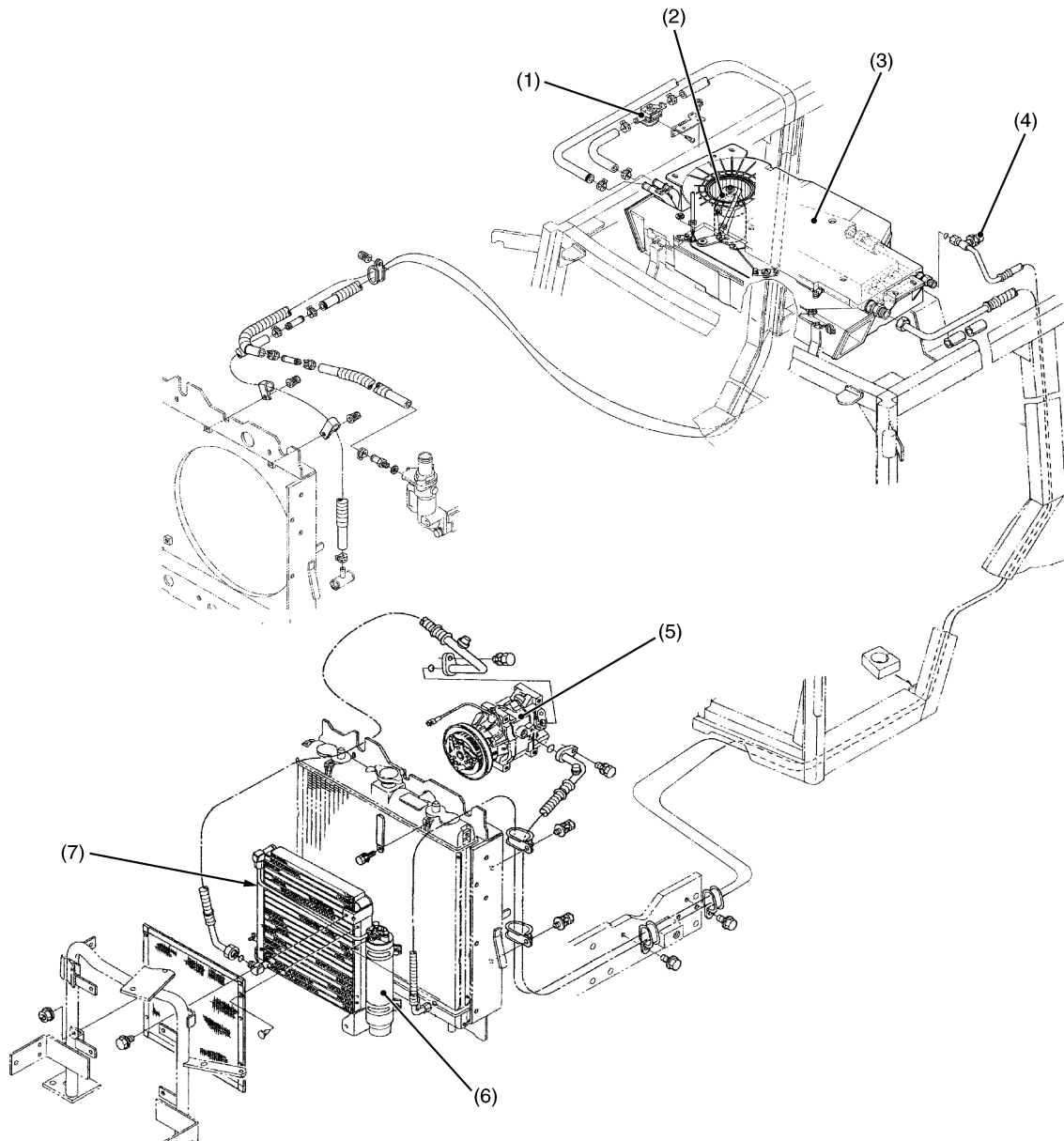
10 CABIN

CONTENTS

1. AIR CONDITIONING SYSTEM	10-M1
[1] STRUCTURE	10-M1
[2] OUTLINE OF AIR CONDITIONING SYSTEM	10-M2
[3] SYSTEM CONTROL.....	10-M3

1. AIR CONDITIONING SYSTEM

[1] STRUCTURE

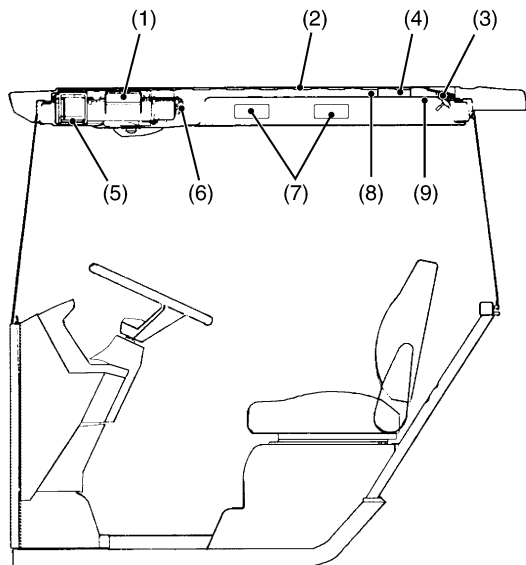


3TMACAEWP001A

- | | | | |
|------------------|--------------------------|----------------|---------------|
| (1) Water Valve | (3) Air Conditioner Unit | (5) Compressor | (7) Condenser |
| (2) Blower Motor | (4) Pressure Switch | (6) Receiver | |

000002999E

[2] OUTLINE OF AIR CONDITIONING SYSTEM



3TMACABWP035A

The machine is equipped with a thin large-capacity air conditioner with outside air intake. Through the inside air filter (9) as well as the outside air filter (4), the roof (8) and reaches the air conditioner unit (1). The air is cooled and dehumidified by this unit.

The resulting air is heated to a comfortable level. In this way, the air being blown via the blow port can be kept at comfortable temperature and humidity.

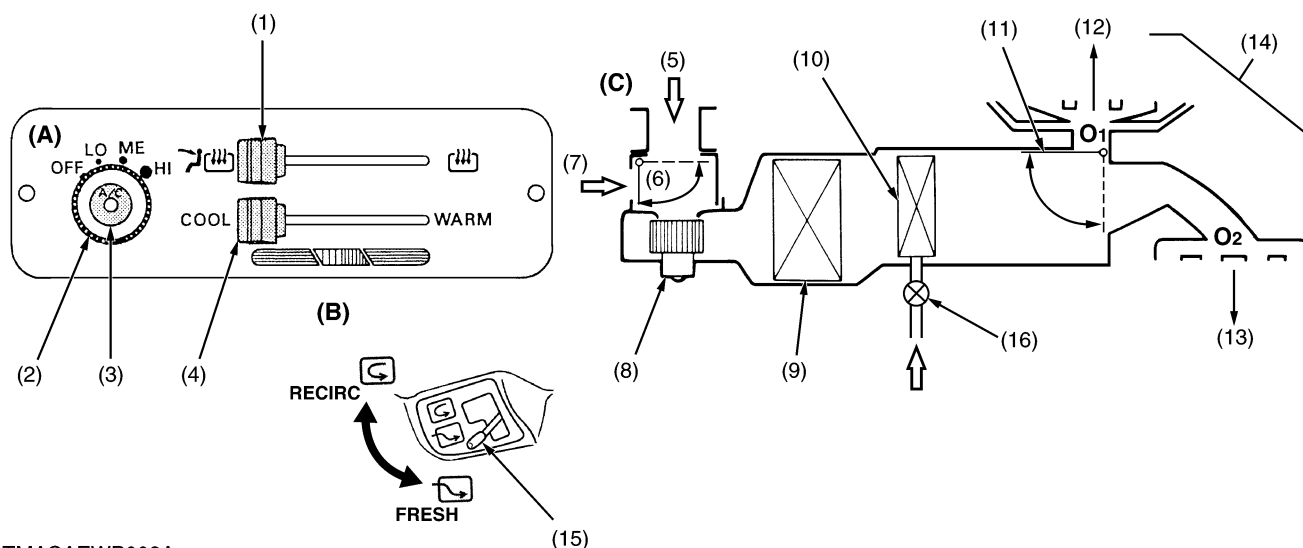
The 3 front blow ports (5) can be opened and closed using the center knob of each port. The 4 side blow ports (7) are opened and closed using the mode lever on the control panel (6). With these ports open or closed, you can feel your head cool and your feet warm.

Capacity (Cooling)	Factory spec.	3.3 kW
Capacity (Warming)	Factory spec.	4.34 kW
Kinds of refrigerant (Charge amount)	Factory spec.	R134a 0.95 to 1.05 kg 2.09 to 2.31 lbs
Pressure sensor (Low)	Factory spec.	0.196 MPa 2.0 kgf/cm ² 28.4 psi
Pressure sensor (High)	Factory spec.	3.14 MPa 32.0 kgf/cm ² 455 psi

- (1) Air Conditioner Unit
- (2) Outer Roof
- (3) Inside / Outside Air Selection Damper
- (4) Outside Air Filter
- (5) Front Blow Port
- (6) Control Panel
- (7) Side Blow Port
- (8) Inner Roof
- (9) Inside Air Filter

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[3] SYSTEM CONTROL



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- | | | | |
|-------------------------------|-------------------------------------|--------------------------|---------------------------------------|
| (1) Air Mode Lever | (7) Recirculated Air | (12) DEFOGGER | (A) Control Plate |
| (2) Blow Switch | (8) Blower | (13) FACE | (B) Air Selection Lever |
| (3) Air Conditioner Switch | (9) Evaporator | (14) DEF and FACE | (C) Block Diagram of Air Flow Passage |
| (4) Temperature Control Lever | (10) Heater | (15) Air Selection Lever | O1: Front air outlet |
| (5) Fresh Air | (11) Air Outlet Door D3 (Mode Door) | (16) Water Valve | O2: Side air outlet |
| (6) Air Intake Door D1 | | | |

1. Selection of recirculated air (7) or fresh air (5) is done with door D1.

■ RECIRC

By setting the air selection lever (15) in rear control panel to **RECIRC** position, door **D1** (6) shuts the fresh air inlet port. Air inside the cabin is recirculated.

■ FRESH

By moving the air selection lever (15) to **FRESH** position, door **D1** opens the fresh air inlet port. Outside air comes into cabin.

2. Temperature control of outlet air is done with water valve.

■ COOL

By setting the temperature control lever (4) in control panel to **COOL** position, water valve closed. The air flows to door **D3** (12) side without passing the heater core.

■ WARM

By moving the temperature lever to **WARM** position water valve is opened. The air flows to door **D3** (12) side passing through the heater core.

3. Outlet air flow is controlled by door D3.

Moving the air mode lever (1) opens and shuts door **D3** and establishes the air passage according to the lever position.

■ DEF + FACE

Moving the mode lever to **DEF + FACE** position, the door **D3** is moved to establish the air passages to outlets **O1** and **O2**. Air comes out from both outlets.

■ DEF

Moving the mode lever to **DEF** position, door **D3** is moved to set up the air passage to outlet **O1**. Air comes out from outlet **O1**.

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CONTENTS

1. TROUBLESHOOTING.....	10-S1
2. SERVICING SPECIFICATIONS.....	10-S7
3. TIGHTENING TORQUES.....	10-S8
4. PRECAUTIONS AT REPAIRING REFRIGERANT CYCLE.....	10-S9
[1] HANDLING OF SERVICE TOOLS	10-S10
(1) Manifold Gauge Set.....	10-S10
(2) Refrigerant Charging Hose.....	10-S12
(3) Vacuum Pump Adaptor	10-S13
(4) Electric Gas Leak Tester	10-S13
(5) Can Tap Valve.....	10-S14
(6) T-joint.....	10-S14
(7) R134a Refrigerant Recovery and Recycling Machine.....	10-S14
5. CHECKING AND CHARGING REFRIGERANT CYCLE	10-S15
[1] CHECKING WITH MANIFOLD GAUGE	10-S15
[2] DISCHARGING, EVACUATING AND CHARGING	10-S19
(1) Discharging the System.....	10-S19
(2) Evacuating the System.....	10-S20
(3) Charging the System.....	10-S21
(4) Checking Charge Refrigerant Amount.....	10-S23
6. CHECKING, DISASSEMBLING AND SERVICING	10-S24
[1] SEPARATING CABIN FROM TRACTOR BODY.....	10-S24
(1) Disassembling and Assembling.....	10-S24
[2] COMPRESSOR	10-S30
(1) Checking.....	10-S30
(2) Disassembling and Assembling.....	10-S31
(3) Servicing.....	10-S33
[3] AIR CONDITIONING SYSTEM AND FRONT WINDSHIELD WIPER	10-S34
(1) Checking.....	10-S34
(2) Disassembling and Assembling.....	10-S41
(3) Servicing.....	10-S48
[4] OTHERS	10-S48
(1) Checking.....	10-S48
(2) Disassembling and Assembling.....	10-S49

1. TROUBLESHOOTING

COMPRESSOR

Symptom	Probable Cause	Solution	Reference Page
Noisy(Compressor ON)	● Bearing of compressor worn or damaged	Replace	10-S31
	● Valves in compressor damaged	Replace	10-S31
	● Belt slipping	Adjust or replace	G-28
	● Compressor bracket mounting screws loosen	Tighten	—
	● Piping resonant	Tighten or add clamp	—
(Compressor OFF)	● Blower defective	Repair or replace	10-S36
	● Bearings of magnetic clutch, idle pulley or crank pulley worn or damaged	Replace	10-S32, S33

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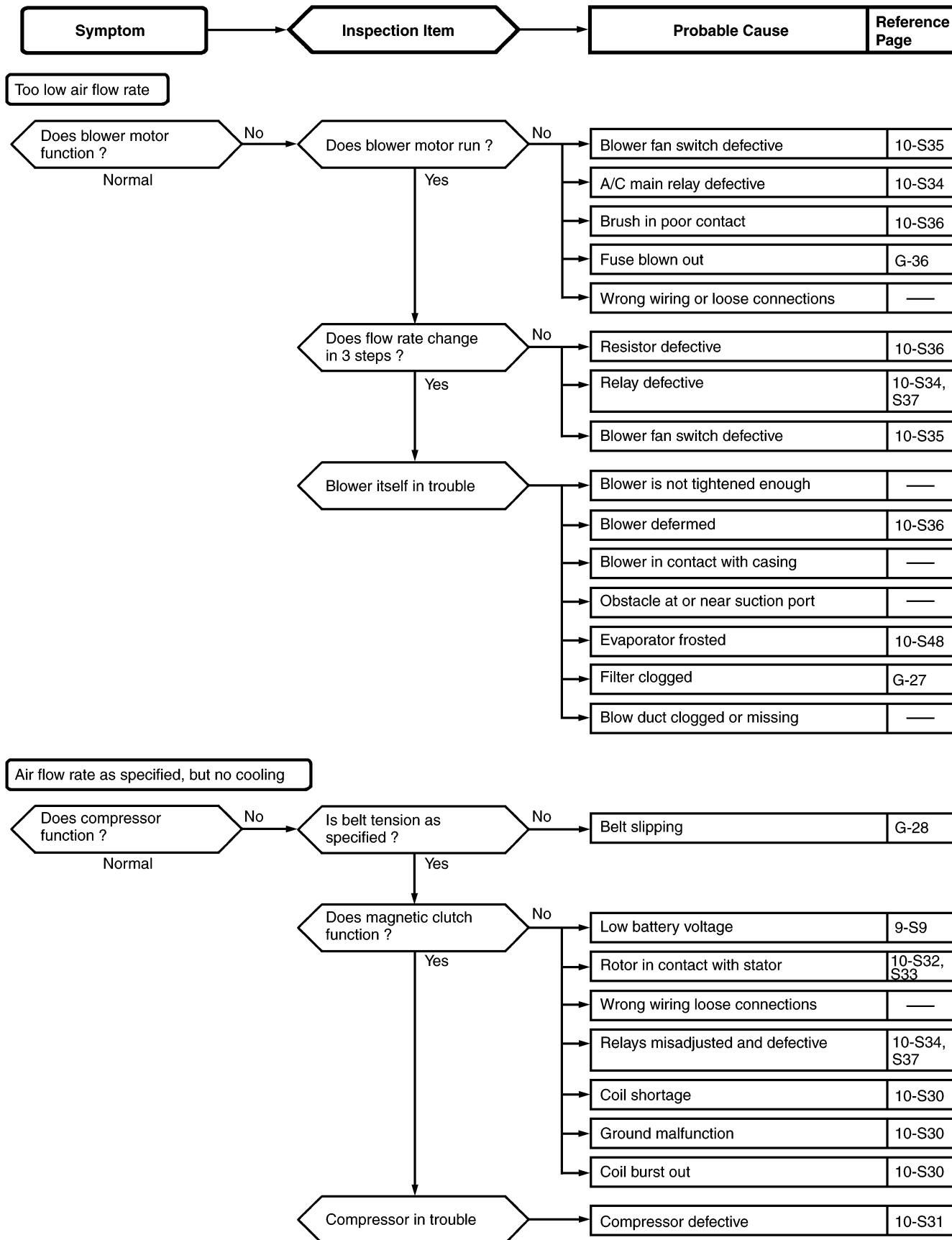
AIR CONDITIONING SYSTEM

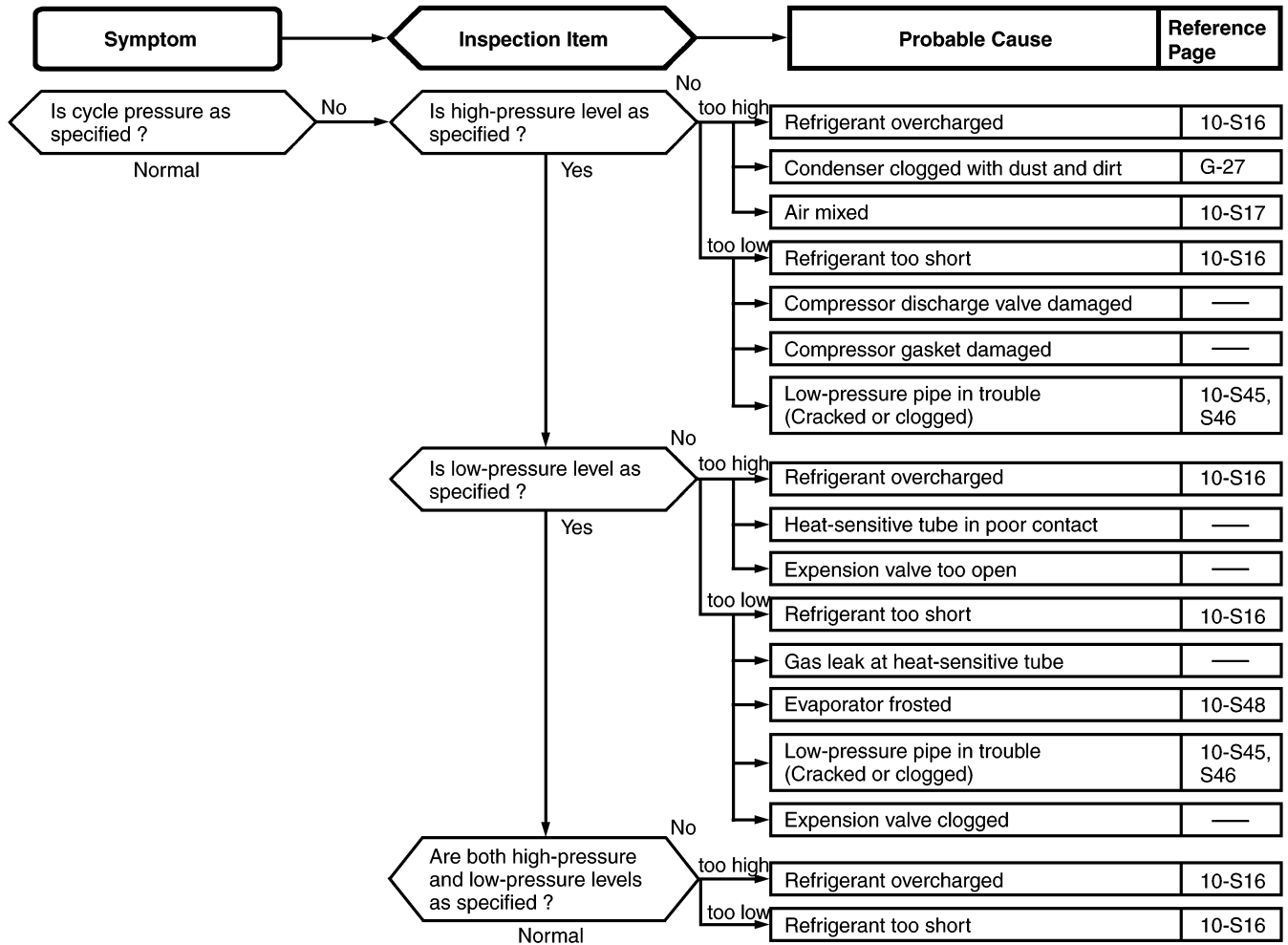
Symptom	Probable Cause	Solution	Reference Page
Does Not Cool(No Air Flow)	● Fuse blown	Replace	G-36
	● A/C main relay defective	Repair or replace	10-S34
	● Blower high relay defective	Replace	10-S37
	● Blower motor defective	Replace	10-S36
	● Blower switch defective	Replace	10-S35
	● Wiring harness disconnected or improperly connected	Repair	—
(Compressor Does Not Rotate)	● Fuse blown	Replace	G-36
	● Magnetic clutch defective	Repair or replace	10-S32
	● A/C switch defective	Replace	10-S38
	● Pressure switch defective	Replace	10-S39
	● Belt slipping	Adjust or replace	G-28
(Others)	● Insufficient refrigerant	Check with manifold gauge	10-S15
	● Expansion valve defective	Replace	—
	● Compressor defective	Replace	10-S31
Insufficient Cooling(Insufficient Air Flow)	● Air filter clogged	Clean or replace	G-27
	● Evaporator frosted	Clean or replace thermo switch	10-S43
	● Blower motor defective	Replace	10-S36
	● Blower resistor defective	Replace	10-S36

Symptom	Probable Cause	Solution	Reference Page
(Many Bubbles in Sight Glass)	● Insufficient refrigerant	Check with manifold gauge	10-S15
	● Gas leaking from some place in refrigerating cycle	Repair and charge refrigerant	10-S13
	● Air mixed in	Check with manifold gauge	10-S17
(No Bubbles in Sight Glass)	● Too much refrigerant	Check with manifold gauge	10-S18
Insufficient Cooling (Compressor Does Not Rotate Properly)	● Belt slipping	Adjust or replace	G-28
	● Magnetic clutch defective	Repair or replace	10-S32
	● Compressor defective	Replace	10-S31
(Others)	● Thermostat defective	Replace	—
	● Water valve defective	Replace	10-S43
	● Condenser fin clogged with dust	Clean	G-27
	● Expansion valve defective	Replace	—
Insufficient Heating	● Water valve defective	Replace	10-S43
	● Air mix door malfunctioning	Adjust control cable	10-S42
	● Insufficient coolant	Replenish	G-31
Insufficient Cooling (Compressor Does Not Rotate Properly)	● Belt slipping	Adjust or replace	G-27
	● Magnetic clutch defective	Repair or replace	10-S32
	● Compressor defective	Replace	10-S31
(Others)	● Condenser fin clogged with dust	Clean	G-27
	● Expansion valve defective	Replace	—

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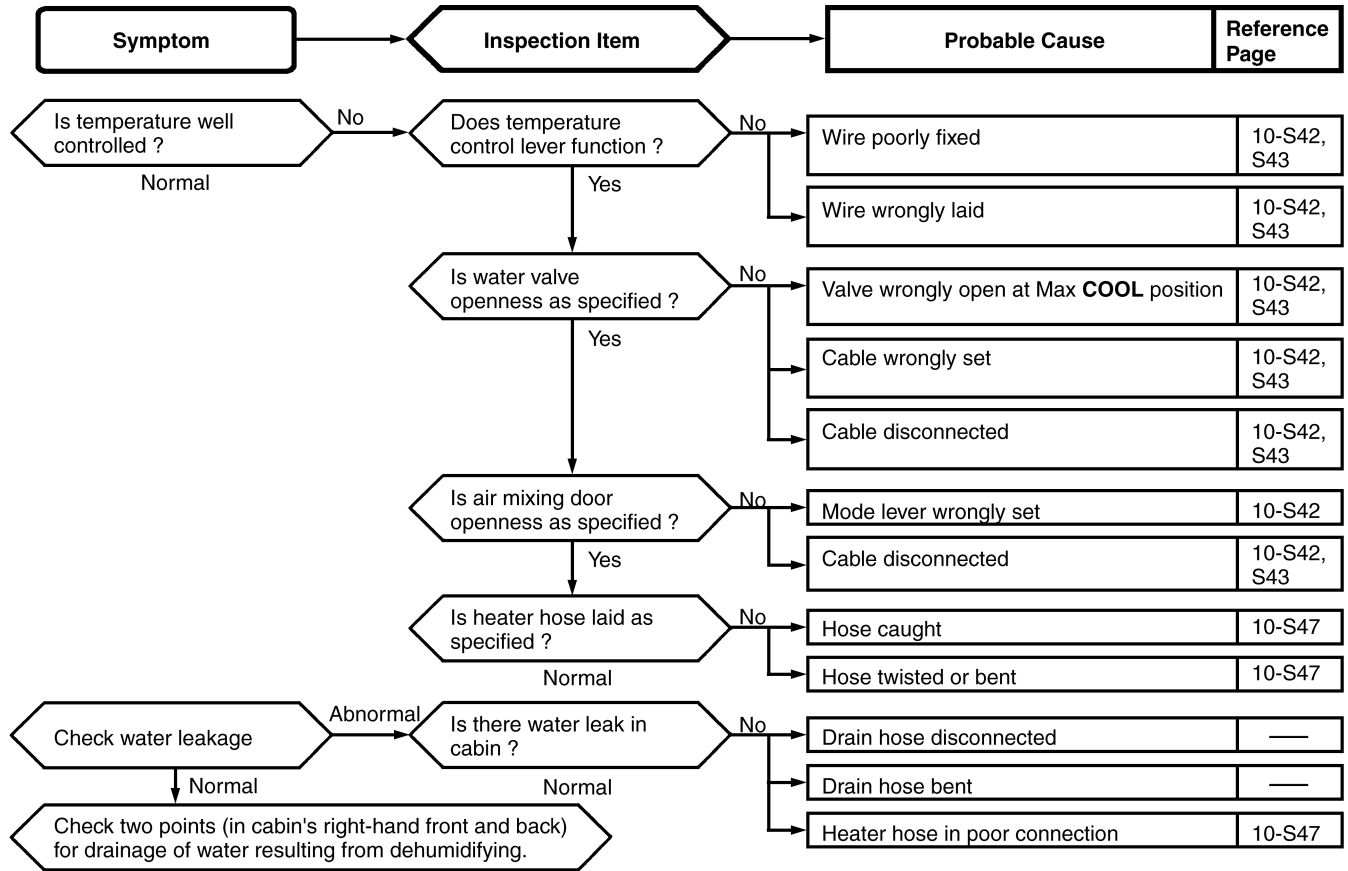
Air Conditioning System (Continued)





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WINDSHIELD WIPER

Symptom	Probable Cause	Solution	Reference Page
Windshield Wiper Does Not Operate	● Wiring defective	Check and repair	—
	● Fuse blown (Short-circuit, burnt component inside motor or other part for operation)	Correct cause and replace	G-36
	● Wiper motor defective (Broken armature, worn motor brush or seized motor shaft)	Replace	10-S44
	● Wiper switch defective	Replace	10-S40
	● Wiper arm seized or rusted	Lubricate or replace	10-S44
Windshield Wiper Operating Speed Is Too Low	● Wiper motor defective (Short-circuit of motor armature, worn motor brush or seized motor shaft)	Replace	10-S44
	● Low battery voltage	Recharge or replace	9-S8
	● Humming occurs on motor in arm operating cycle due to seized arm shaft	Lubricate or replace	10-S44
	● Wiper switch contact improper	Replace	10-S40
Windshield Wiper Does Not Stop Correctly	● Wiper motor defective (Contaminated auto-return contacts or improper contact due to foreign matter)	Replace	10-S44

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WASHER MOTOR

Symptom	Probable Cause	Solution	Reference Page
Washer Motor Does Not Operate	● Fuse blown	Correct cause and replace	G-36
	● Washer switch defective	Replace	10-S40
	● Washer motor defective	Replace	—
	● Wiring defective	Repair	—
Washer Motor Operate but Washer Fluid Is Not Ejected	● No washer fluid	Replenish	G-37
	● Clogged washer nozzle	Clean or replace	—

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Refrigerating Cycle (Refrigerating Cycle is Normal Operating)	Pressure (LO Pressure Side)	0.15 to 0.20 MPa 1.5 to 2.0 kgf/cm ² 21 to 28 psi	—
	Pressure (HI Pressure Side)	1.27 to 1.66 MPa 13 to 17 kgf/cm ² 185 to 242 psi	—
Brake Pedal	Free Travel	40 to 45 mm 1.57 to 1.77 in.	—
Shift Rod	Length	Approx. 275 mm 10.8 in.	—
Position Rod	Length	Approx. 362 mm 14.25 in.	—
Draft Rod	Length	Approx. 362 mm 14.25 in.	—
Allowance Wire	Stroke	5.0 to 7.0 mm 0.20 to 0.28 in.	—
Operation Lever and Stopper	Clearance	0.0 to 1.0 mm 0.0 to 0.04 in.	—
A/C Compressor Magnet Clutch	Air-gap	0.25 to 0.50 mm 0.01 to 0.02 in.	—
Pressure Switch (Dual Type) (When pressure switch is turned OFF)	Setting Pressure (LO Pressure Side)	Less than approx. 0.196 MPa 2.0 kgf/cm ² 28.4 psi	—
	Setting Pressure (HI Pressure Side)	More than approx. 3.14 MPa 32 kgf/cm ² 455 psi	—

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-10.)

Item	N·m	kgf·m	ft-lbs
High pressure pipe : between receiver and A/C unit (High pressure pipe 2) retaining nut	11.8 to 14.7	1.2 to 1.5	8.7 to 10.8
Low pressure pipe between A/C unit and compressor bolts	7.8 to 11.8	0.8 to 1.2	5.8 to 8.7
Cabin mounting screws and nuts	123.6 to 147.1	12.6 to 15.0	91.1 to 108.5
High pressure pipe : between compressor and condenser (High pressure pipe 1) screw	7.8 to 11.8	0.8 to 1.2	5.8 to 8.7
Compressor mounting screw	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Clutch mounting screw	10.8 to 16.2	1.10 to 1.65	8.0 to 11.9
A/C unit mounting screws (M6)	3.9 to 6.9	0.4 to 0.7	2.9 to 5.1
A/C unit mounting screws (M8)	9.8 to 15.7	1.0 to 1.6	7.2 to 11.6
Low pressure pipe between A/C unit and compressor retaining nut	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3
Wiper arm mounting nut (Front)	6.37 to 9.32	0.65 to 0.95	4.7 to 6.9
High pressure pipe : between compressor and condenser (High pressure pipe 1) retaining nut	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Wiper arm mounting nut (Rear)	7.8 to 9.3	0.8 to 0.95	5.79 to 6.87
Rear wiper motor mounting screw	7.8 to 9.3	0.8 to 0.95	5.79 to 6.87

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4. PRECAUTIONS AT REPAIRING REFRIGERANT CYCLE

When checking or repairing the air conditioning system, the following precautions and rules must be observed. And it is of first importance that no other personnel than a well-trained serviceman should be allowed to handle the refrigerant.



CAUTION

- Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Always wear goggles to protect your eyes when working around the system.
- The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never heat the refrigerant container above 40 °C (104 °F) or drop it from a high height.
- Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.
- If you improperly connect the hose between the service valve of compressor and gauge manifold, or incorrectly handle the valves, the refrigerant service container or charging hose will explode. When connecting the hose or handling the valve, be sure to check the high pressure side or low pressure side.
- In case the refrigerant is charged while the compressor is operated, do not open the high pressure valve of the gauge manifold.
- Beware of the toxicity of the gas. The gas is harmless and nontoxic in its original state, however it produces a toxic substance when it comes in contact with high temperature parts and decomposes.
- Do not heat the service can unless necessary. When it has to be heated, use warm water of 40 °C (104 °F) or lower. Do not heat using boiling water.

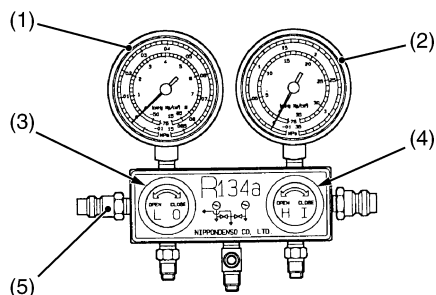
IMPORTANT

- If the refrigerant, O-rings, etc. for R12 are used in the R134a air conditioner system, problems such as refrigerant leakage or cloudiness in the sight glass may occur. Therefore, in order to prevent charging of refrigerant or erroneous connections, the shapes of the piping joint as well as the shapes of the service valve and the service tools have been changed.
- Always keep the working place clean and dry and free from dirt and dust. Wipe off water from the line fittings with a clean cloth before disconnecting.
- Use only for R134a refrigerant service tool.
- Use for R134a refrigerant recovery and recycling machine when discharging the refrigerant.
- Before attaching the charging hose to the can tap valve of the refrigerant container, check each packing for clogging.
- When disconnecting the charging hose from the charging valve of compressor and receiver, remove it as quick as possible so that gas leakage can be minimized.
- Be sure to charge the specified amount of refrigerant, but not excessively. Over-charging of the refrigerant in particular may cause insufficient cooling, etc..
- Since the charging hose can be connected to can tap valve by hand, do not use a pliers for tightening it.
- Keep refrigerant containers in a cool and dark place avoiding such place which are subject to strong sunlight or high temperature.
- R134a compressor oil absorbs moisture easily, so that be sure to seal after disconnecting the each parts.
- Do not use old-type refrigerant R12a or compressor oil for old-type refrigerant.
- When replacing the condenser, evaporator and receiver, etc., replenish the compressor oil to compressor according to the table below.

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[1] HANDLING OF SERVICE TOOLS

(1) Manifold Gauge Set

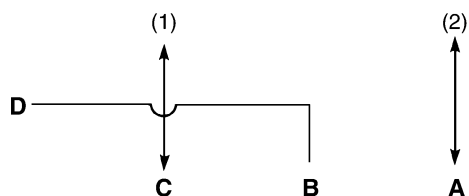


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The hand valves on the manifold gauge set are used to open and close the valve. The hand valve inscribed **LO** is for the low pressure side valve (3) and **HI** is for the high pressure side valve (4). By opening or closing the high and low pressure hand valves, the following circuits are established.

- (1) **LO** Pressure Gauge
- (2) **HI** Pressure Gauge
- (3) **LO** Pressure Side Valve
- (4) **HI** Pressure Side Valve
- (5) Schrader Valve

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■ When LO Pressure Side Valve and HI Pressure Side Valve are Closed

Two circuits are established.

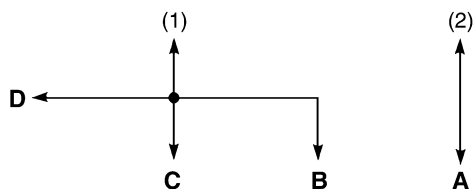
Port (C) → **LO** pressure gauge (1)

Port (A) → **HI** pressure gauge (2)

■ NOTE

- Schrader valve (D) must be opened.

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■ When LO Valve is Opened and HI Valve is Closed

Two circuits are established.

Port (C) → **LO** pressure gauge (1)

→ Port (B)

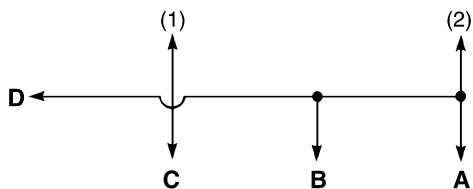
→ Port (D)

Port (A) → **HI** pressure gauge (2)

■ NOTE

- Schrader valve (D) must be opened.

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■ When LO Valve is Closed and HI Valve is Opened

Two circuits are established.

Port (C) → **HI** pressure gauge (2)

→ Port (B)

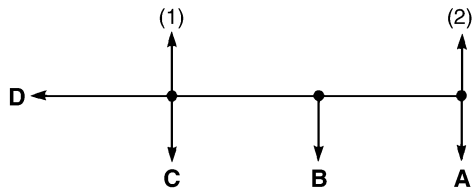
→ Port (D) (Schrader valve must be opened)

Port (A) → **LO** pressure gauge (1)

■ NOTE

- Schrader valve (D) must be opened.

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**■ When LO and HI Valve is Opened**

Two circuits are established.

- Port (A) → HI pressure gauge (2)
- LO pressure gauge (1)
- Port (B)
- Port (C)
- Port (D) (Schrader valve must be opened)

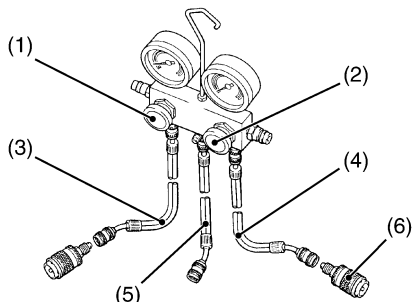
■ NOTE

- Schrader valve (D) must be opened.

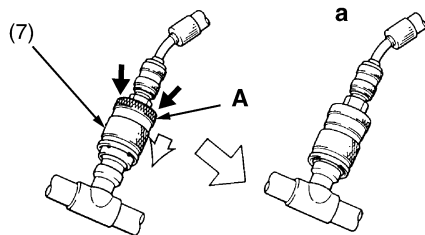
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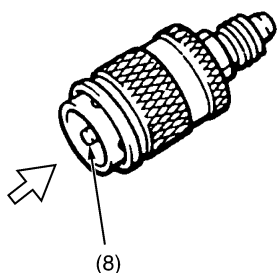
(2) Refrigerant Charging Hose



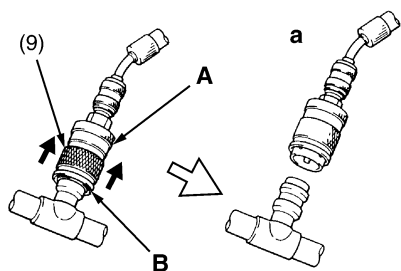
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3TLABABWP010A



3TLABABWP011A

The charging hoses are classified into three colors. Each charging hose must be handled as follows :

- The air conditioner manufacture recommends that the blue hose (3) is used for the **LO** pressure side (suction side), the green hose (5) for refrigeration side (center connecting port) and the red hose (4) for **HI** pressure side (discharged side).

(When connecting)

- Push the quick disconnect adaptor (6) into the charging valve, and push on part **A** until a click is heard.

■ NOTE

- **When connecting, push carefully so the pipe doesn't bend.**
- **When connecting the quick disconnect connector, should the sleeve (7) move before the quick link connector can be connected to the charging valve, move the quick sleeve to its original position and try again.**
- **When some refrigerant remains in the charging hose at the time of connections, it may be difficult to connect the quick link connector. In this case, perform the operation after removing any residual pressure in the hose. (Remove the residual pressure by pushing the pusher (8).)**

(When reassembling)

- While holding on to part **A** of the quick disconnect adaptor, slide part **B** up.

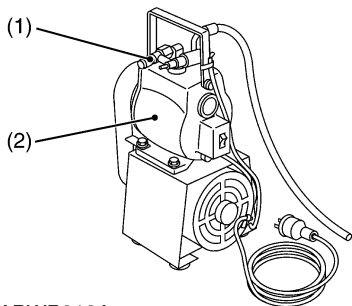
■ NOTE

- **After removing the adaptor, ensure to cap the quick disconnect adaptor service valve.**

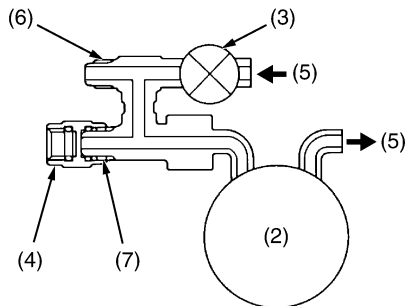
- | | |
|------------------------------|------------------|
| (1) LO Pressure Side Valve | (7) Sleeve |
| (2) HI Pressure Side Valve | (8) Pusher |
| (3) Blue Hose | (9) Sleeve |
| (4) Red Hose | |
| (5) Green Hose | a : CLICK |
| (6) Quick Disconnect Adaptor | |

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(3) Vacuum Pump Adaptor



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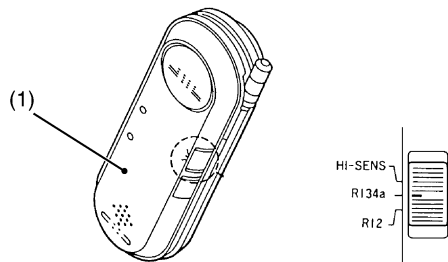
Objective of the Vacuum Pump Adaptor

1. After vacuum has been created in the air conditioning cycle, when the vacuum pump is stopped, since there is vacuum in hoses within the gauge manifold, the vacuum pump oil flows back into the charging hose. If the refrigerant is refilled with the system still in this state, the vacuum pump oil left in the charging hose enters the air conditioner cycle together with the refrigerant. Vacuum pump adaptor with a solenoid valve is used to prevent this back-flow of oil from the vacuum pump. The role of the solenoid valve is that when the current passes through the solenoid valve, the valve closes to keep out the outside air and allow the vacuum to build up, but when the current stops, the valve opens to allow in air and end the vacuum.
2. Attaching this adaptor to the R12 vacuum pump currently being used allows the pump to be used with both R134a and R12.

- | | |
|-------------------------|---------------|
| (1) Vacuum Pump Adaptor | (5) Air |
| (2) Vacuum Pump | (6) For R134a |
| (3) Magnetic Valve | (7) For R12 |
| (4) Blind Cap | |

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(4) Electric Gas Leak Tester



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The current R12 gas leak tester has poor sensitivity for R134a and cannot be used. Therefore, a new electric gas leak tester with greater sensitivity has been designed and can be used with both R134a and R12.

(Reference)

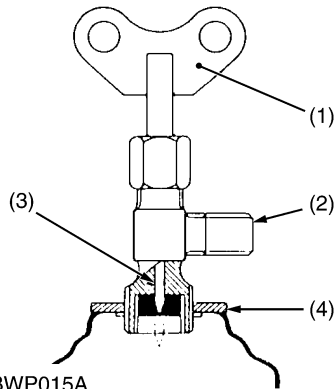
Leak tester with halide torch

- Since the reaction with chlorine within the refrigerant is used to detect gas leaks, R134a, which contains no chlorine, cannot be detected.

- (1) Electric Gas Leak Tester

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(5) Can Tap Valve



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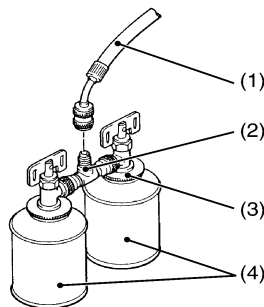
The can tap valve that is used to charge the refrigerant into the air conditioning system, should be used as follows :

1. Before putting the can tap valve on the refrigerant container, turn the handle (1) counterclockwise till the valve needle is fully retracted.
2. Turn the plate nut (disc) (4) counterclockwise till it reaches its highest position, then screw down the can tap valve into the sealed tap.
3. Turn the plate nut clockwise fully, and fix the center charging hose to the valve.
4. Tighten the plate nut firmly by hand.
5. Turn the handle (1) clockwise, thus making a hole in the sealed tap.
6. To charge the refrigerant into the system, turn the handle (1) counterclockwise. To stop charging, turn it clockwise.

- | | |
|----------------------|------------|
| (1) Butterfly Handle | (3) Needle |
| (2) Connection | (4) Disc |

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(6) T-joint



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T-joint (2) is used to increase efficiency of gas charging using two refrigerant containers (4) at a time.

1. Install two refrigerant container service valves to T-joint (2) sides and connect the charging hose (1) to it.

- | | |
|---------------------------|---------------------------|
| (1) Charging Hose (Green) | (3) Can Tap Valve |
| (2) T-joint | (4) Refrigerant Container |

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(7) R134a Refrigerant Recovery and Recycling Machine

When there is necessity of discharging the refrigerant on repairing the tractor, it should use recovery and recycling machine. (Don't release the refrigerant into the atmosphere.)

■ IMPORTANT

- Use only R134a refrigerant recovery and recycling machine, eliminate mixing R134a equipment, refrigerant and refrigerant oils with R12 systems to prevent compressor damage.

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5. CHECKING AND CHARGING REFRIGERANT CYCLE

[1] CHECKING WITH MANIFOLD GAUGE

IMPORTANT

- The gauge indications described in the following testing are those taken under the same condition, so it should be noted that the gauge readings will differ somewhat with the ambient conditions.

Condition

- Ambient temperature : 30 to 35 °C (86 to 95 °F)
- Engine speed : Approx. 1500 min⁻¹ (rpm)
- Temperature control lever : **Maximum cooling position**
- Blower switch : **HI position**

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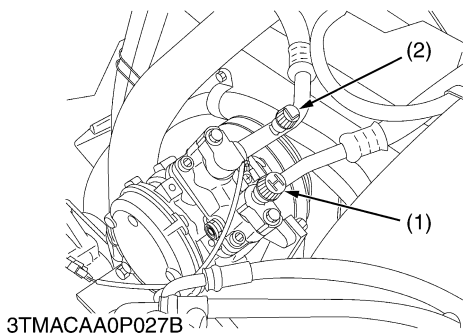
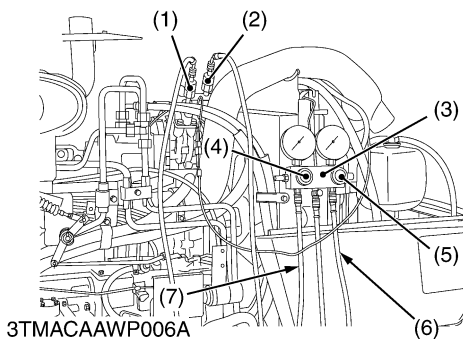
Manifold Gauge Connecting and Test Preparation

1. Close the manifold gauge **HI** and **LO** pressure side valve (4), (5) tightly.
2. Connect the charging hose (6) (red) to the **HI** pressure side charging valve (1) and connect the charging hose (7) (blue) to the **LO** pressure side charging valve (2).

NOTE

- Be sure to drive out the air in the charging hoses at the manifold gauge connection end by utilizing the refrigerant pressure in the refrigerating cycle.
3. Start the engine and set at approx. 1500 min⁻¹ (rpm).
 4. Turn on the A/C switch and set the temperature control lever to **maximum cooling** position.
 5. Set the blower switch to **HI** position.

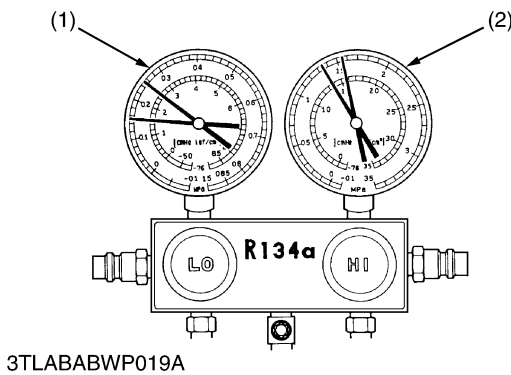
- | | |
|--|-----------------------------------|
| (1) HI Pressure Side Charging Valve | (4) LO Pressure Side Valve |
| (2) LO Pressure Side Charging Valve | (5) HI Pressure Side Valve |
| (3) Manifold Gauge | (6) Charging Hose (Red) |
| | (7) Charging Hose (Blue) |



000003009E

Normal Operating

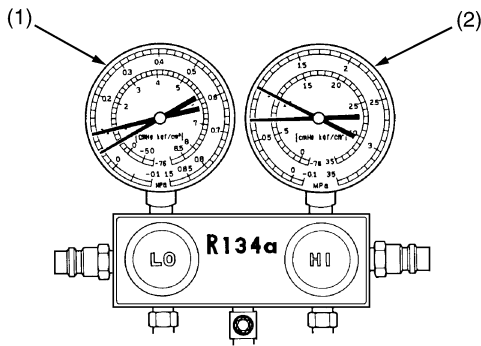
If the refrigerating cycle is operating normally, the reading at the **LO** pressure side (1) should be generally by around 0.15 to 0.2 MPa (1.5 to 2.0 kgf/cm², 21 to 28 psi) and that at the **HI** pressure side (2) around 1.27 to 1.66 MPa (13 to 17 kgf/cm², 185 to 242 psi).



Gas pressure	Factory spec.	Low pressure side	0.15 to 0.20 MPa 1.5 to 2.0 kgf/cm ² 21 to 28 psi
		High pressure side	1.27 to 1.66 MPa 13 to 17 kgf/cm ² 185 to 242 psi

- | | |
|-----------------------------|-----------------------------|
| (1) LO Pressure Side | (2) HI Pressure Side |
|-----------------------------|-----------------------------|

000002156E



3TLABABWP020A

Insufficient Refrigerant

1. Symptoms seen in refrigerating cycle

- Both **LO** and **HI** pressure side (1), (2) pressures too low.
LO pressure side (1) : 0.05 to 0.1 MPa
 (0.5 to 1.0 kgf/cm², 7.1 to 14.2 psi)
HI pressure side (2) : 0.69 to 0.98 MPa
 (7 to 10 kgf/cm², 99.6 to 142.2 psi)

- Bubbles seen in sight glass.
- Air discharged from air conditioner slightly cold.

2. Probable cause

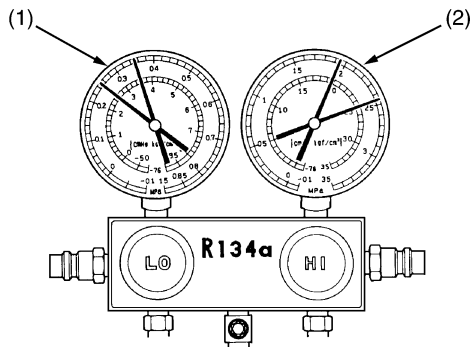
- Gas leaking from some place in refrigerant cycle.

3. Solution

- Check for leakage with electric gas leak tester (see page 10-S13) and repair.
- Recharge refrigerant to the proper level. (See page 10-S23.)

(1) **LO** Pressure Side(2) **HI** Pressure Side

000003010E



3TLABABWP021A

Excessive Refrigerant or Insufficient Condenser Cooling

1. Symptoms seen in refrigerating cycle

- Both **LO** and **HI** pressure side (1), (2) pressures too high.
LO pressure side (1) : 0.2 to 0.35 MPa
 (2.0 to 3.5 kgf/cm², 28 to 49.8 psi)
HI pressure side (2) : 1.96 to 2.45 MPa
 (20 to 25 kgf/cm², 284.5 to 355.6 psi)

2. Probable cause

- Overcharging refrigerant into cycle.
- Condenser cooling faulty.

3. Solution

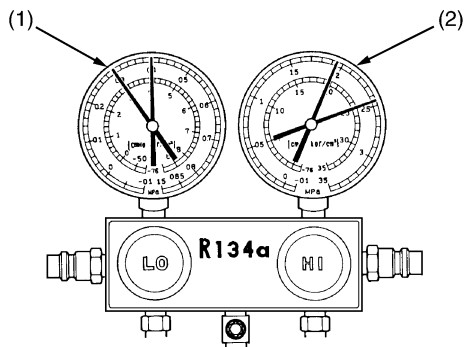
- Clean condenser. (See page G-27.)
- Adjust air conditioner belt to proper tension. (See page G-28.)
- If the above two items are in normal condition, check refrigerant quantity. (See page 10-S23.)

■ NOTE

- If excessive refrigerant is to be discharged, loosen manifold gauge **LO** pressure side valve and vent out slowly.

(1) **LO** Pressure Side(2) **HI** Pressure Side

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3TLABABWP022A

Air Entered in the Cycle

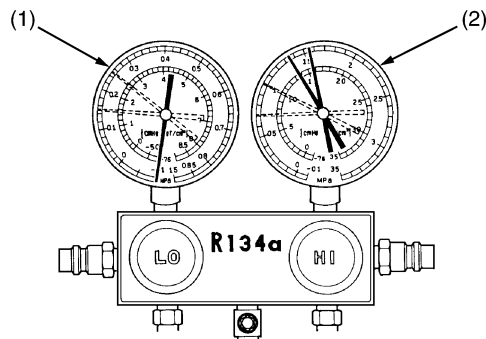
1. Symptoms seen in refrigerating cycle
 - Both **LO** and **HI** pressure side (1), (2) pressures too high.
LO pressure side (1) : 0.2 to 0.35 MPa
 (2.0 to 3.5 kgf/cm², 28 to 49.8 psi)
HI pressure side (2) : 1.96 to 2.45 MPa
 (20 to 25 kgf/cm², 284.5 to 355.6 psi)
 - **LO** pressure side (1) piping not cold when touched.
2. Probable cause
 - Air entered in refrigerating cycle.
3. Solution
 - Replace receiver.
 - Check compressor oil contamination and quantity.
 - Evacuate and recharge new refrigerant. (See page 10-S20 to S22.)

■ NOTE

- The above cycle can be seen when the cycle is charged without evacuation.

(1) **LO** Pressure Side(2) **HI** Pressure Side

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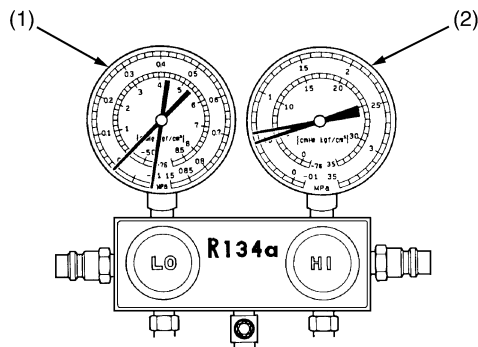
3TLABABWP023A

Moisture Entered in the Cycle

1. Symptoms seen in refrigerating cycle
 - The air conditioner operates normally at the beginning, but over time, **LO** pressure side (1) pressure is **vacuum** and **HI** pressure side (2) is low pressure.
LO pressure side (1) : Vacuum
HI pressure side (2) : 0.69 to 0.98 MPa
 (7 to 10 kgf/cm², 99.6 to 142.2 psi)
2. Probable cause
 - The moisture in the refrigerating cycle freezes in the expansion valve orifice and causes temporary blocking. After a time, the ice melts and condition returns to normal.
3. Solution
 - Replace receiver.
 - Remove moisture in cycle by means of repeated evacuation. (See page 10-S20.)
 - Recharge new refrigerant to the proper level. (See page 10-S23.)

(1) **LO** Pressure Side(2) **HI** Pressure Side

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3TLABABWP024A

Refrigerant Fails to Circulate

1. Symptoms seen in refrigerating cycle

- **LO** pressure side (1) pressure is vacuum and, **HI** pressure side (2) is low pressure.

LO pressure side (1) : Vacuum

HI pressure side (2) : 0.49 to 0.59 MPa

(5 to 6 kgf/cm², 71.2 to 85.3 psi)

2. Probable cause

- Refrigerant flow obstructed by moisture or dirt in the refrigerating cycle freezing or sticking on the expansion valve orifice.

3. Solution

Allow to stand for same time and then resume operation to decide whether the plugging is due to moisture or dirt.

- If caused by moisture, correct by referring to instructions in previous.
- If caused by dirt, remove the expansion valve and blow out the dirt with compressed air.
- If unable to remove the dirt, replace the expansion valve. Replace the receiver. Evacuate and charge in proper amount of new refrigerant. (See page 10-S20 to S22.)
- If caused by gas leakage in heat sensitizing tube, replace the expansion valve.

(1) **LO** Pressure Side

(2) **HI** Pressure Side

000003014E

Expansion Valve Opens Too Far or Improper Installation of Heat Sensitizing Tube

1. Symptoms seen in refrigerating cycle

- Both **LO** and **HI** pressure side (1), (2) pressures too high.

LO pressure side (1) : 0.29 to 0.39 MPa

(3.0 to 4.0 kgf/cm², 42.71 to 56.9 psi)

HI pressure side (2) : 1.96 to 2.45 MPa

(20 to 25 kgf/cm², 284.5 to 355.6 psi)

- Frost or heavy dew on low pressure side piping.

2. Probable cause

- Expansion valve trouble or heat sensitizing tube improperly installed.
- Flow adjustment not properly done.

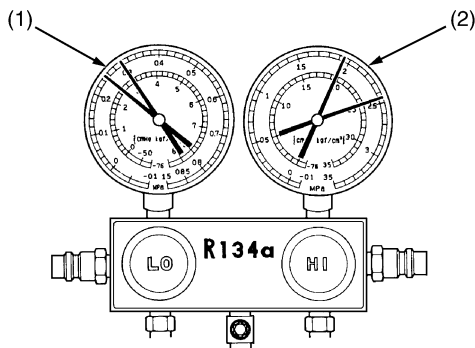
3. Solution

- Check installed condition of heat sensitizing tube.
- If installation of heat sensitizing tube is correct, replace the expansion valve.

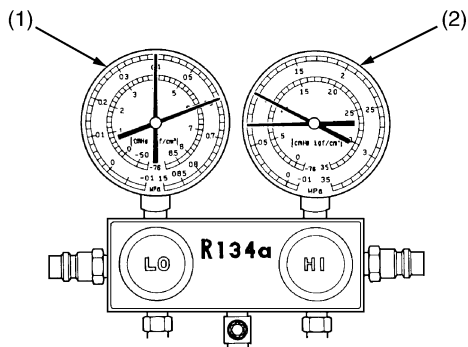
(1) **LO** Pressure Side

(2) **HI** Pressure Side

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3TLABABWP026A

Faulty Compression of Compressor

1. Symptoms seen in refrigerating cycle
 - **LO** pressure side (1) : 0.39 to 0.59 MPa
(4 to 6 kgf/cm², 56.9 to 85.3 psi)
 - **HI** pressure side (2) : 0.69 to 0.98 MPa
(7 to 10 kgf/cm², 99.6 to 142.2 psi)
2. Probable cause
 - Leak in compressor.
3. Solution
 - Replace compressor. (See page 10-S31.)

NOTE

- **Manifold gauge indications (left side figure) at faulty compressing by compressor.**

(1) LO Pressure Side

(2) HI Pressure Side

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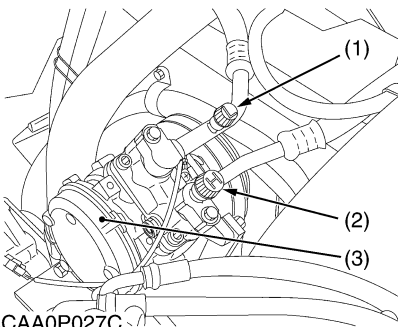
[2] DISCHARGING, EVACUATING AND CHARGING

IMPORTANT

- When discharging, evacuating or charging the refrigerating system, be sure to observe the "PRECAUTION AT REPAIRING REFRIGERANT CYCLE". (See page 10-S9.)

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(1) Discharging the System



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Prepare for the R134a refrigerant recovery and recycling machine.

1. Connect low pressure side hose (blue) from the recovery and recycling machine to **LO** pressure side charging valve (1) on the compressor (3). Connect high pressure side hose (red) to **HI** pressure side charging valve (2) on the compressor (3).
2. Follow the manufacturers instructions and discharge the system.

IMPORTANT

- **Use only R134a refrigerant recovery and recycling machine. Eliminate mixing R134a equipment, refrigerant, and refrigerant oils with R12 systems to prevent compressor damage.**



CAUTION

- **Protect fingers with cloth against frostbite by refrigerant when disconnecting the hose to the charging valve.**

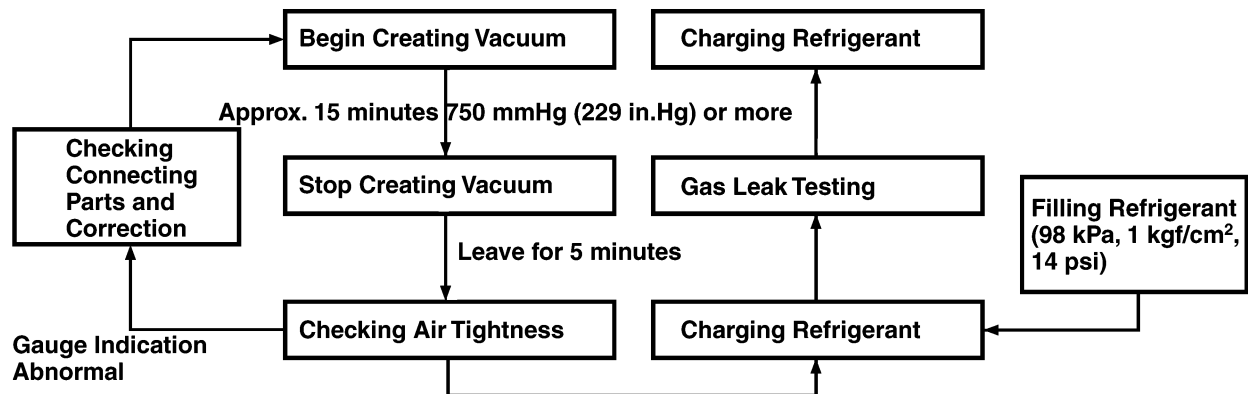
(1) LO Pressure Side Charging Valve

(3) Compressor

(2) HI Pressure Side Charging Valve

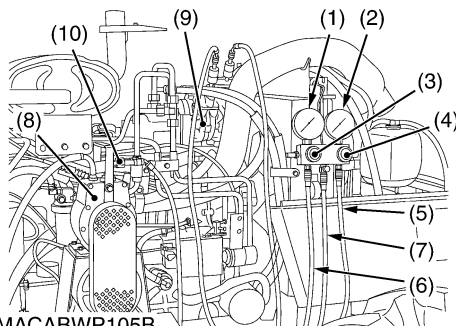
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(2) Evacuating the System



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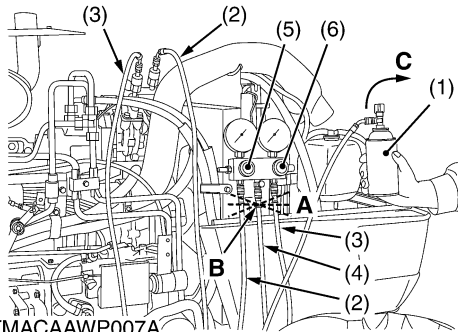
Evacuating the System

1. Discharge refrigerant from the system by R134a refrigerant recovery and recycling machine. (Refer to "**Discharging the system**".)
2. Connect the charging hose (5) (red) to the **HI** pressure side charging valve and connect the charging hose (6) (blue) to the **LO** pressure side charging valve.
3. Connect the center charging hose (7) (green) to a vacuum pump inlet.
4. Open both valves (3), (4) of manifold gauge fully. Then run the vacuum pump (8) to evacuate the refrigerant cycle. (For approx. **15 minutes**.)
5. When **LO** pressure gauge (1) reading is more than **750 mmHg (299 in.Hg)**, stop the vacuum pump (8) and close both valves (3), (4) of manifold gauge fully.
6. Wait for over 5 minutes with the **HI** and **LO** pressure side valves (4), (3) of gauge manifold closed, and then check that gauge indicator does not return to 0.
7. If the gauge indicator is going to approach to 0, check whether there is a leaking point and repair if it is, and then evacuate it again.

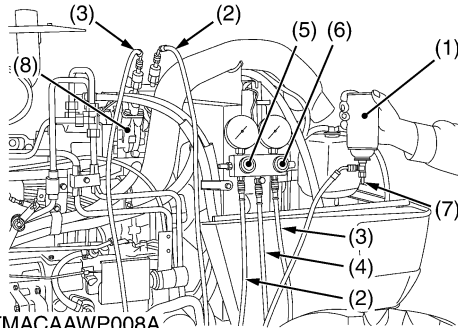
- | | |
|---|---------------------------|
| (1) LO Pressure Gauge | (6) Blue Hose |
| (2) HI Pressure Gauge | (7) Green Hose |
| (3) LO Pressure Side Valve (Close) | (8) Vacuum Pump (Running) |
| (4) HI Pressure Side Valve (Open) | (9) Compressor |
| (5) Red Hose | (10) Vacuum Pump Adaptor |

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(3) Charging the System



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3TMACAAWP008A

Charging an Empty System (Liquid)

This procedure is for charging an empty system through the **HI** pressure side with the refrigerant in the liquid state.

⚠ CAUTION

- Never run the engine when charging the system through the **HI** pressure side.
- Do not open the **LO** pressure valve when refrigerant R134a is being charged in the liquid state (refrigerant container is placed upside-down).

■ IMPORTANT

- After charging the refrigerant in the liquid state with approx. 500 g (1.1 lbs) through the **HI** pressure side, be sure to recharge the refrigerant in the vapor state to specified amount through the **LO** pressure side.

1. Close the **HI** and **LO** pressure side valves (6), (5) of manifold gauge after the system is evacuated completely.
2. Connect the center charging hose (4) to the can tap valve (7) fitting, and then loosen the center charging hose at the center fitting of manifold gauge until hiss can be heard.

Allow the air to escape for few seconds and tighten the nut.

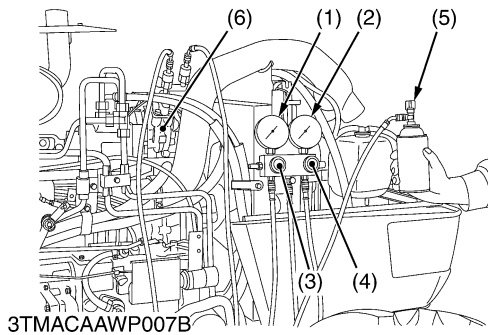
3. Open the **HI** pressure side valve (6) fully, and keep the container upside-down to charge the refrigerant in the liquid state from the **HI** pressure side.
4. Charge the refrigerant in the liquid state with approx. 500 g (1.1 lbs) from the **HI** pressure side.

■ NOTE

- If **LO** pressure gauge does not show a reading, the system is clogged and must be repaired.
5. Close the **HI** pressure side valve (6) of manifold gauge and can tap valve of refrigerant container.

- | | |
|------------------------------------|-----------------------------------|
| (1) Refrigerant Container (R134a) | (7) Can Tap Valve (Open) |
| (2) Blue Hose | (8) Compressor |
| (3) Red Hose | |
| (4) Green Hose | A : Air Purge |
| (5) LO Pressure Side Valve (Close) | B : Loosen the Nut |
| (6) HI Pressure Side Valve (Open) | C : Open the Can Tap Valve |

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Charging an Empty or Partially Charged System (Vapor)

This procedure is to charge the system through the LO pressure side with refrigerant in the vapor state. When the refrigerant container is placed right side up, refrigerant will enter the system as a vapor.



CAUTION

- Never open the HI pressure valve of manifold gauge while the engine is running.

NOTE

- Do not turn the refrigerant container upside-down when charging the system by running the engine.
- Put refrigerant container into a pan of warm water (maximum temperature 40 °C (104 °F)) to keep the vapor pressure in the container slightly higher than vapor pressure in the system.

1. Check that the HI pressure valve (4) is closed.
2. Start the engine and set an approx. 1500 min⁻¹ (rpm).
3. Turn on the A/C switch.
Set the temperature control lever to **maximum cooling** position and the blower switch to **HI** position.
4. Open the LO pressure valve (3) of manifold gauge and the can tap valve (5) on refrigerant container and charge the refrigerant until air bubbles in the sight glass of the receiver vanish.
5. After charging the specified amount of refrigerant into the system, close the LO pressure valve (3) of manifold gauge and can tap valve (5), then stop the engine.
6. Check for gas leak with an electric gas leak tester (see page 10-S13).

(Reference)

- Specified amount of refrigerant (total) :
- 900 to 1000 g (2.0 to 2.2 lbs) [Refrigerant R134a]
- Manifold gauge indication at fully charged system (at ambient temperature : 30 °C (86 °F))

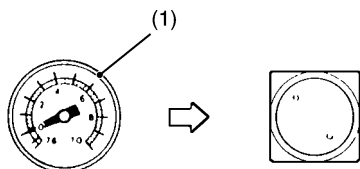
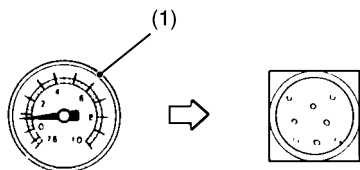
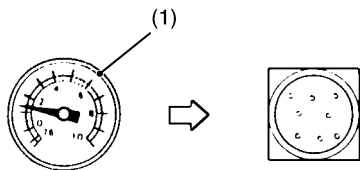
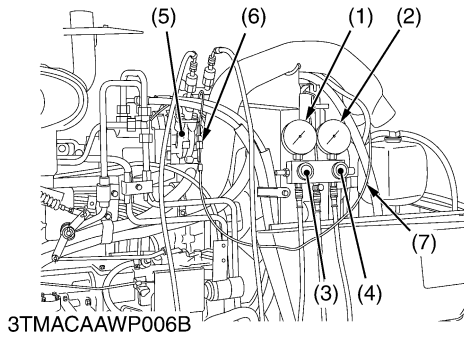
HI pressure side : 1.27 to 1.66 MPa
13 to 17 kgf/cm²
185 to 242 psi

LO pressure side : 0.15 to 0.20 MPa
1.5 to 2.0 kgf/cm²
21 to 28 psi

- | | |
|------------------------------|-------------------------------|
| (1) LO Pressure Gauge | (4) HI Pressure Valve (Close) |
| (2) HI Pressure Gauge | (5) Can Tap Valve |
| (3) LO Pressure Valve (Open) | (6) Compressor (Running) |

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(4) Checking Charge Refrigerant Amount



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After charging the refrigerant, check for amount of charging refrigerant as follows.

■ NOTE

- The pressure on the following checking are the gauge indications at ambient temperature 30 °C (86 °F), so it should be noted that the pressure will differ some what with the ambient temperature.

1. Disconnect the **1P** connector (6) of magnetic clutch.
2. Start the engine and set a approx. **1500 min⁻¹ (rpm)**.
3. Connect the **1P** connector (6) of magnetic clutch to battery directly, and then set the blower switch to **HI** position.
4. Leave the system for approx. **5 minutes** until the refrigerant cycle becomes stable, keeping pressure on the **HI** pressure side from 1.27 to 1.66 MPa (13 to 17 kgf/cm², 185 to 242 psi).
5. When the refrigerant cycle is stabilizer, turn off the blower switch and let the compressor alone to run. Then pressure on the **LO** pressure side gradually drops. At this time, if pressure on the **HI** pressure side is maintained from 1.27 to 1.66 MPa (13 to 17 kgf/cm², 185 to 242 psi), air bubbles which pass through the sight glass becomes as stated below depending on refrigerant charged amount.

■ Insufficient refrigerant charge

Air bubbles pass continuously the sight glass when pressure on the **LO** pressure side is over 99.0 kPa (1.01 kgf/cm², 14.4 psi). In this case, charge the refrigerant from the **LO** pressure side.

■ Properly refrigerant charge

Air bubbles pass through the sight glass continuously when pressure on the **LO** pressure side is within 59 to 98 kPa (0.6 to 1.0 kgf/cm², 9 to 14 psi).

If the charge refrigerant amount is proper, no air bubble is observed on the sight glass at pressure on the **LO** pressure side over 99.0 kPa (1.01 kgf/cm², 14.4 psi) when the blower switch is turned on. When the blower switch is turned off, bubbles pass through the sight glass in case pressure on the **LO** pressure side is within 59 to 98 kPa (0.6 to 1.0 kgf/cm², 9 to 14 psi).

■ Excessive refrigerant charge

Air bubbles pass through the sight glass time to time or no air bubble is observed when pressure on the **LO** pressure side is under 59 kPa (0.6 kgf/cm², 9 psi).

In this case, discharge excessive refrigerant gradually from the **LO** pressure side.

- | | |
|--------------------------------------|-------------------------|
| (1) LO Pressure Gauge | (5) To Battery |
| (2) HI Pressure Gauge | (6) 1P Connector |
| (3) LO Pressure Valve (Close) | (7) To Battery |
| (4) HI Pressure Valve (Close) | |

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6. CHECKING, DISASSEMBLING AND SERVICING

[1] SEPARATING CABIN FROM TRACTOR BODY

(1) Disassembling and Assembling

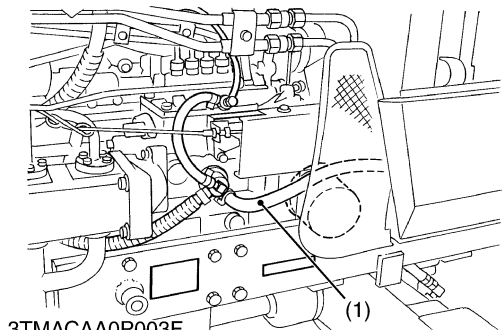
Draining Coolant



CAUTION

- Never remove the radiator cap until coolant temperature is well below its boiling point. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.

1. Stop the engine and let cool down.
2. Remove the radiator hose (1) from the engine side to drain the coolant.
3. Remove the radiator cap to completely drain the coolant.
4. After all coolant is drained, reinstall the radiator hose.



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Coolant	Capacity	7.3 L 7.7 U.S.qts 6.4 Imp.qts

(1) Radiator Hose

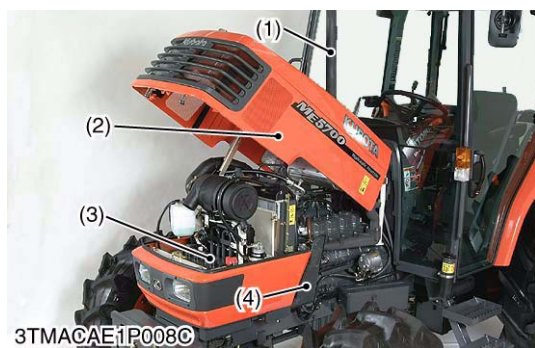
000003022E

Preparation 1

1. Remove the muffler (1).
2. Remove the bonnet (2).
3. Disconnect the battery's cable.
4. Remove the side covers (4) and stop cable cover (5).

- | | |
|-------------|----------------------|
| (1) Muffler | (4) Side Cover |
| (2) Bonnet | (5) Stop Cable Cover |
| (3) Battery | |

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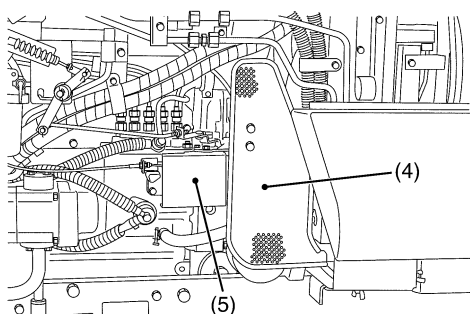
Discharging Refrigerant

1. Refer to "Discharging the System". (See page 10-S19.)

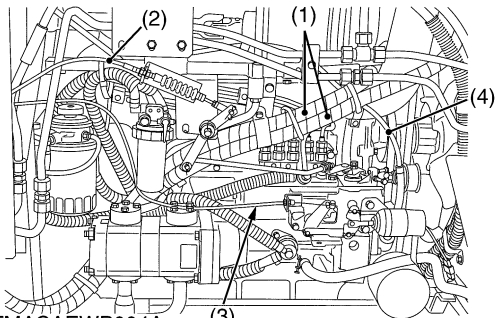
(When reassembling)

- Charge the refrigerant to the air conditioner system, refer to "Charging the System". (See page 10-S21,S22.)

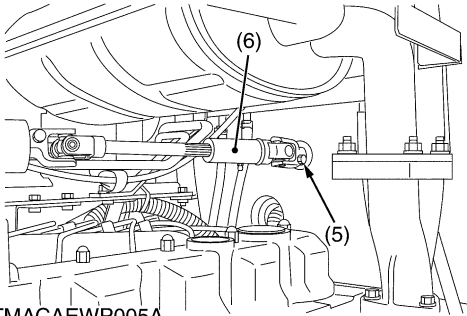
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3TMACAEWP004A (3)



3TMACAEWP005A

Preparation 2

1. Disconnect the heater hoses (1).
2. Disconnect the accelerator wire (2) and engine stop wire (3).
3. Disconnect the hour meter cable (4).
4. Remove the screw (5).
5. Pull out the steering joint (6).

(When reassembling)

- Connect the heater hose with blue paint one which comes from cabin to the radiator lower hose side.

- | | |
|----------------------|----------------------|
| (1) Heater Hose | (4) Hour Meter Cable |
| (2) Accelerator Wire | (5) Screw |
| (3) Engine Stop Wire | (6) Steering Joint |

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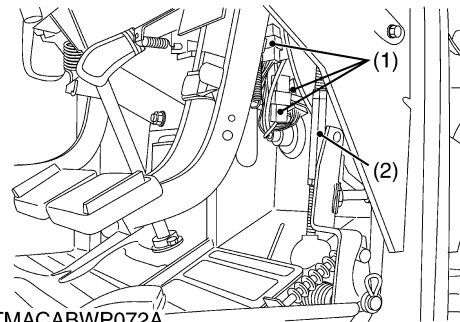
Preparation 3

1. Disconnect the connectors (1) and pull out them from cabin.
2. Disconnect the brake rods (2) from turnbuckle and remove it.

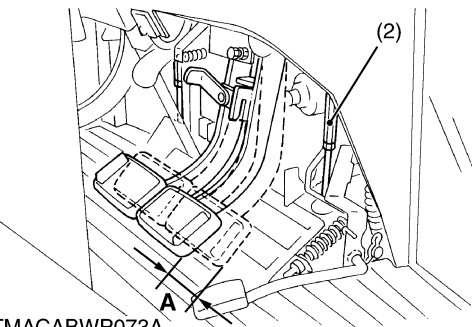
(When reassembling)

- Be sure to adjust the brake pedal free travel.

Proper brake pedal free travel A	Factory spec.	40 to 45 mm (1.57 to 1.77 in.) in the pedal. Keep the free travel in the right and left brake pedals equal.
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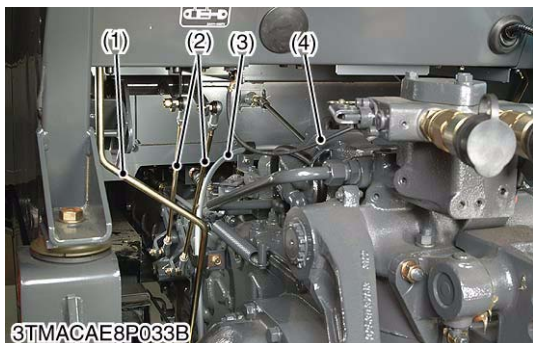
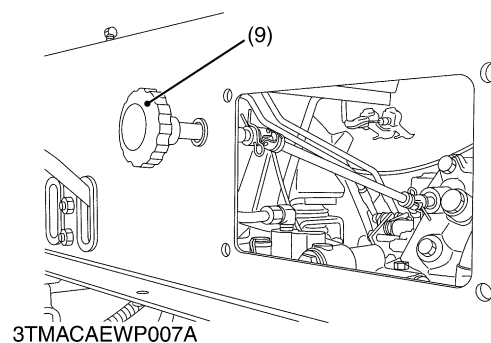
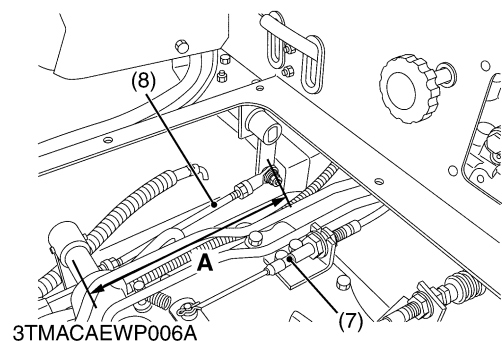
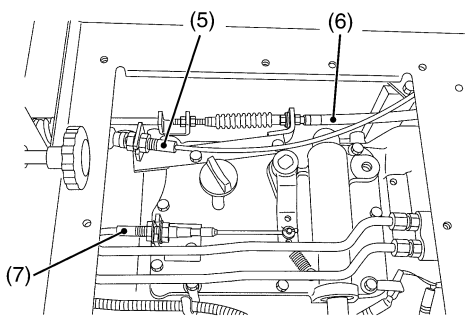
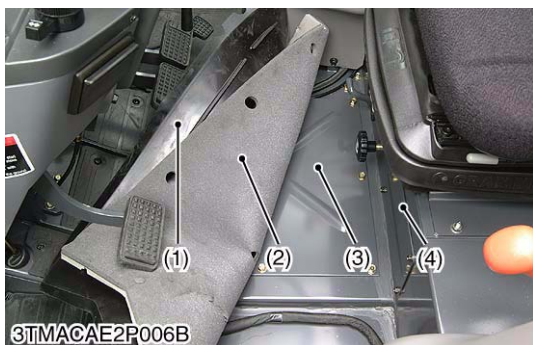


3TMACABWP073A

- (1) Connector
- (2) Brake Rod

A : Brake Pedal Free Travel

000003026E



Preparation 4

1. Remove the floor mat 1 (1), floor mat 2 (2), cover 1 (3) and cover 2 (4).
2. Disconnect the main shift rod (8).
3. Disconnect the shift wire (7).
4. Disconnect the lowering speed adjusting rod (9).
5. Disconnect the shuttle cable (5).
6. Disconnect the clutch cable (6).

(When reassembling)

- Be sure to adjust the shuttle neutral position (see page 8-S10 to S13).
- Be sure to adjust the clutch pedal free travel (see page 2-S5, S6).

Shift rod length A	Factory spec.	Approx. 275 mm 10.8 in.
--------------------	---------------	----------------------------

- | | |
|-------------------|----------------------------------|
| (1) Floor Mat 1 | (6) Clutch Cable |
| (2) Floor Mat 2 | (7) Shift Wire |
| (3) Cover 1 | (8) Main Shift Rod |
| (4) Cover 2 | (9) Lowering Speed Adjusting Rod |
| (5) Shuttle Cable | |

000003027E

Preparation 3

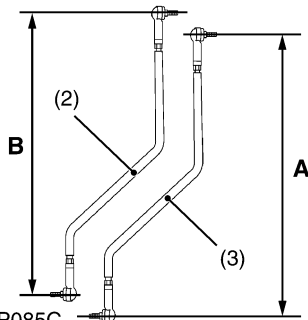
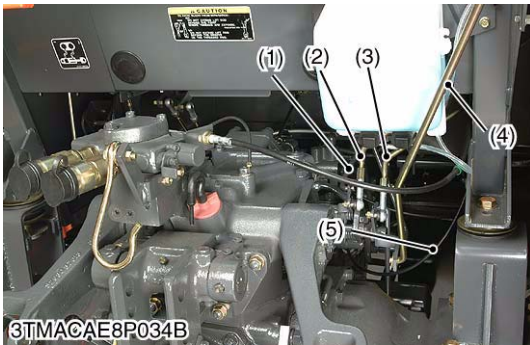
1. Disconnect the auxiliary speed change rods (2).
2. Disconnect the DT shift rod (1).
3. Disconnect the earth harness (4).
4. Disconnect the parking brake cable (3).

(When reassembling)

- Be sure to adjust the parking lever free play. (See page 5-S5, S6.)

- | | |
|--------------------------------|-------------------------|
| (1) DT Shift Rod | (3) Parking Brake Cable |
| (2) Auxiliary Speed Change Rod | (4) Earth Harness |

000003028E



Preparation 6

1. Disconnect the differential lock rods (1).
2. Disconnect the position control rod (3) and draft control rod (2).
3. Disconnect the PTO wire (5).
4. Disconnect the additional position control lever (4).

(When reassembling)

- Be sure to adjust the position rod length **A** and draft rod length **B**.

Position rod length A	Factory spec.	Approx. 362 mm 14.25 in.
Draft rod length B	Factory spec.	Approx. 362 mm 14.25 in.

- | | |
|---------------------------|---------------------------------------|
| (1) Differential Lock Rod | (4) Additional Position Control Lever |
| (2) Draft Control Rod | (5) PTO Wire |
| (3) Position Control Rod | |

000003029E



Preparation 7

1. Disconnect the auxiliary control valve wire (2).

(When reassembling)

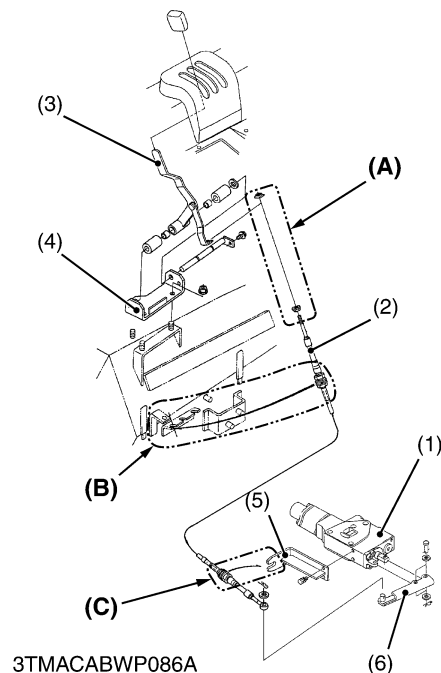
- Be sure to fix the auxiliary control valve wire (2) within allowance wire stroke **S1**, and clearance **S2** properly.

Allowance wire stroke : S1	Factory spec.	5.0 to 7.0 mm 0.20 to 0.28 in.
Clearance between operation lever and stopper : S2	Factory spec.	0.0 to 1.0 mm 0.0 to 0.04 in.

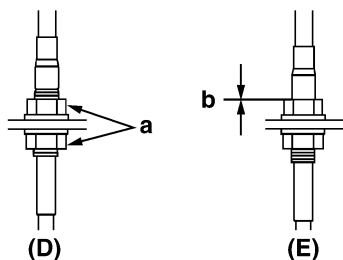
1. Secure the wire fixing position **B** according to the type of the valve as shown in figure.
2. Temporarily secure the wire fixing position **C** at the center of the thread allowance to the holder (5).
3. Pull the auxiliary control valve support (6) and the auxiliary control valve wire (2) all the way, and finely adjust the allowance wire stroke **S1** within the factory specification, with fixing nuts (7) of fixing position **C**. (Keep the fixing position **A** open.)
Tighten the fixing nuts (7) securely.
4. Connect the auxiliary control valve's wire end to the auxiliary control valve support (6).
5. Connect the auxiliary control valve's wire end to the operation lever (3). (Fixing position **A**)
6. Pull the operation lever (3) and finely adjust the clearance **S2** within the factory specification, with fixing nuts (8) of fixing position **A**.

■ **NOTE**

- If the bracket (4) has not welded the stopper (9), adjust the thread length of c to 5.0 mm (0.20 in.) with fixing nuts (8) at fixing position **A**.

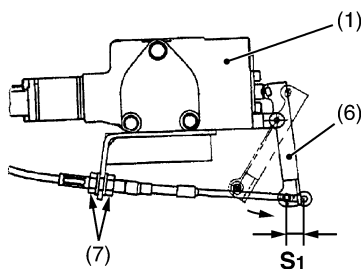


(B)

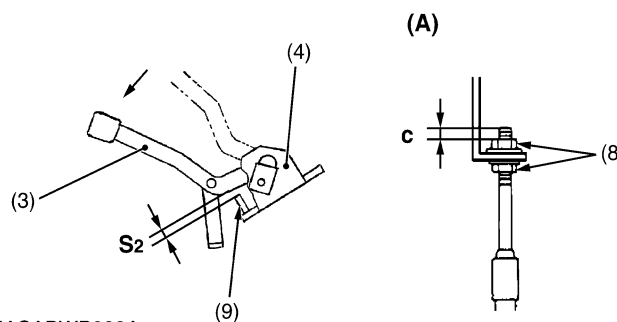


3TMACABWP087A

(C)

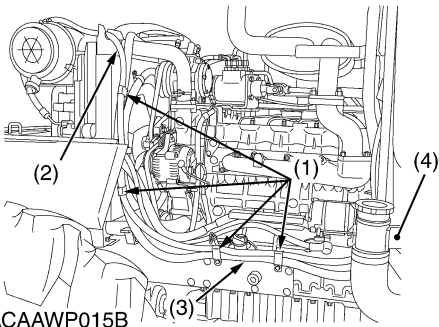


3TMACABWP088A



3TMACABWP089A

- | | |
|-------------------------------------|---------------------------------------|
| (1) Auxiliary Control Valve | (A) Fixing Position A |
| (2) Auxiliary Control Valve Wire | (B) Fixing Position B |
| (3) Operation Lever | (C) Fixing Position C |
| (4) Bracket | (D) SCD, SCD/FC, SD Type Valve |
| (5) Holder | (E) FD Type Valve |
| (6) Auxiliary Control Valve Support | a : Center |
| (7) Fixing Nut | b : 0.0 mm (0.0 in.) |
| (8) Fixing Nut | c : 5.0 mm (0.20 in.) |
| (9) Stopper | |



Preparation 8

1. Remove the hose clamps (1).
2. Disconnect the low pressure pipe (2) from receiver.
3. Disconnect the high pressure pipe (3) from compressor.
4. Remove the cap stay (4).

(When reassembling)

Tightening torque	High pressure pipe 2 mounting nut	11.8 to 14.7 N·m 1.2 to 1.5 kgf·m 8.7 to 10.8 ft-lbs
	Low pressure pipe retaining bolts	7.8 to 11.8 N·m 0.8 to 1.2 kgf·m 5.8 to 8.7 ft-lbs

- | | |
|--------------------------|-----------------------|
| (1) Hose Clamp | (3) Low Pressure Pipe |
| (2) High Pressure Pipe 2 | (4) Cap Stay |

000003031E

Dismounting Cabin

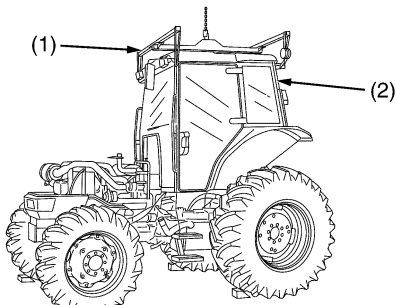
1. Set the cabin dismounting tool (1).
2. Remove the cabin mounting bolts and nuts.
3. Dismounting the cabin from tractor body (2).

(When reassembling)

Tightening torque	Cabin mounting screws and nuts	123.6 to 147.1 N·m 12.6 to 15.0 kgf·m 91.1 to 108.5 ft-lbs
-------------------	--------------------------------	--

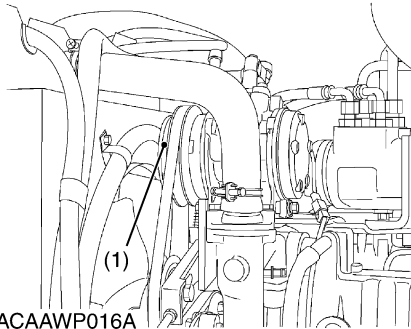
- | | |
|----------------------|----------------|
| (1) Dismounting Tool | (2) Cabin Body |
|----------------------|----------------|

000003032E



[2] COMPRESSOR

(1) Checking



3TMACAAWP016A

Operation of Magnetic Clutch

1. Start the engine.
2. Check whether abrasion or abnormal noise is heard when only the magnetic clutch pulley is running while the A/C switch is turned **OFF**.
3. Check that the magnetic clutch (1) does not slip when the A/C switch and blower switch are turned **ON** (when the air conditioner is in operation).
4. If anything abnormal is found, repair or replace.

(1) Magnetic Clutch

000002182E

Stator Coil

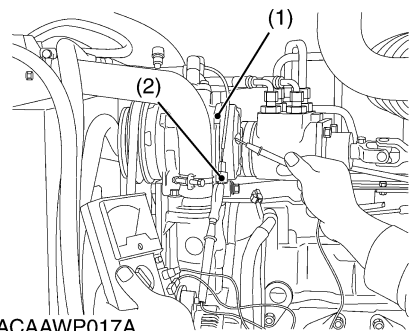
1. Measure the resistance of the stator coil with an ohmmeter across the **1P** connector of magnetic clutch and stator body.
2. If the measurement is not within the factory specifications, replace the stator coil.

Stator coil resistance	Factory spec.	3.0 to 3.4 Ω
------------------------	---------------	---------------------

(1) **1P** Connector

(2) Stator Body

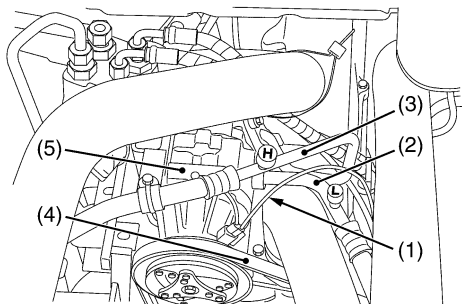
000002183E



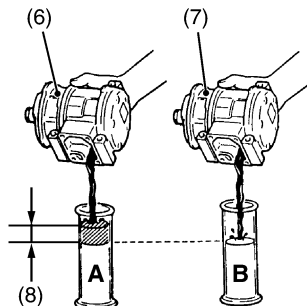
3TMACAAWP017A

(2) Disassembling and Assembling

Compressor Assembly



3TMACABWP094B



3TLABABWP034A

1. Discharge the refrigerant from the system. (Refer to "Discharging the System" : See page 10-S19.)
2. Disconnect the low pressure pipe (suction) (2) and high pressure pipe (discharge) (3) from the compressor, then cap the open fittings immediately to keep moisture out of the system.
3. Disconnect the **1P** connector (1) of magnetic clutch.
4. Remove the air conditioner belt (4) and remove the compressor (5).

(When reassembling)

- After reassembling the compressor, be sure to adjust the air conditioner belt tension (see page G-28) and recharge the refrigerant to the system. (Refer to "Charging the System" : See page 10-S21, S22.)
- Apply compressor oil (DENSO CO. ND-OIL8 or equivalent) to the O-rings and take care not to damage them.

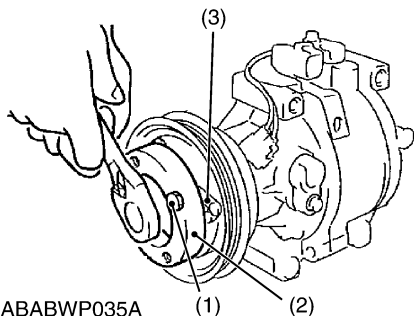
(When replacing compressor)

- When replacing the compressor with a new one, meet the oil amount with old one.

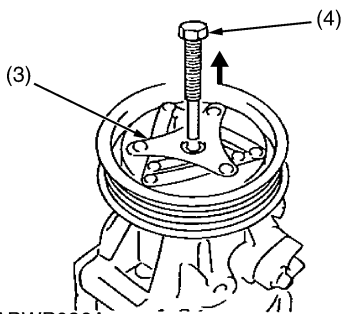
Tightening torque	High pressure pipe 1 and low pressure pipe mounting screw	7.8 to 11.8 N·m 0.8 to 1.2 kgf·m 5.8 to 8.7 ft-lbs
	Compressor mounting screws	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 ft-lbs

- | | |
|---------------------------------|---------------------------------|
| (1) 1P Connector Harness | (5) Compressor |
| (2) Low Pressure Pipe | (6) New Compressor |
| (3) High Pressure Pipe 1 | (7) Old Compressor |
| (4) Air-conditioner Belt | (8) Remove the Excess Oil (A-B) |

000003033E



3TLABABWP035A



3TLABABWP036A

Hub Plate

1. Three stopper bolts (1) are set in stopper magnet clutch (2) at the position corresponding to the shape of compressor. (See page G-56.)
2. The stopper magnet clutch (2) is hung on hub plate (3) and it is fixed that the compressor rotates.
3. Remove the magnet clutch mounting screw.
4. Remove the hub plate (3).
 - Scroll type compressor is used remover magnet clutch (4). (See page G-57.)
5. Remove the shims.

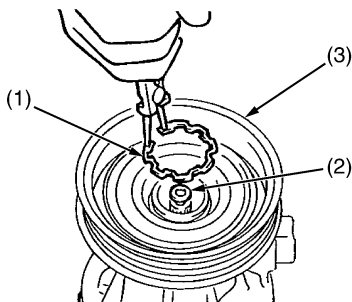
(When reassembling)

- Do not apply grease or oil on the hub plate facing.
- Do not use the screw again.
- It is confirmed to turn rotor by hand after assembling and not contact with stator and hub plate.
- Check and adjust the air gap before tight the magnet clutch mounting screw to the specified torque.

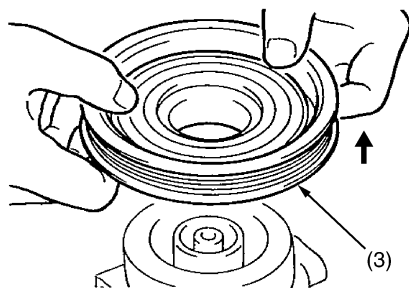
Tightening torque	Clutch mounting screw	10.8 to 16.2 N·m 1.10 to 1.65 kgf·m 8.0 to 11.9 ft-lbs
-------------------	-----------------------	--

- (1) Stopper Bolt
- (2) Stopper Magnet Clutch
- (3) Hub Plate
- (4) Remover Magnet Clutch

000003034E



3TLABABWP037A



3TLABABWP038A

Rotor

1. Remove the cir-clip (1).
2. Remove the rotor (3).

(When reassembling)

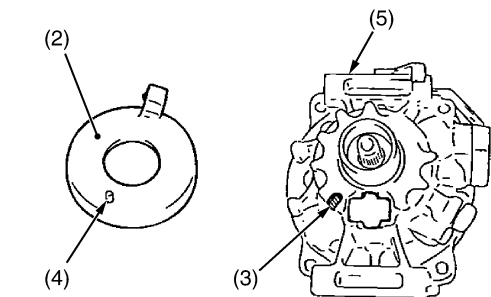
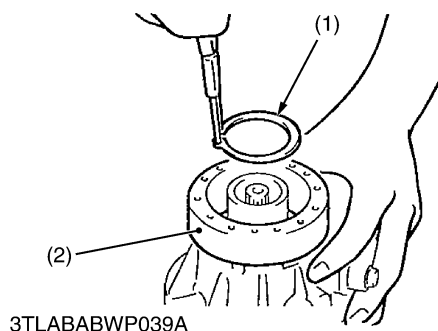
- Do not use the cir-clip again.
- Assemble the cir-clip for the tapered side to become outside of rotor.
- The width of expanding of cir-clip is set in boss of shaft as a minimum.

(Reference)

- Code No. for circlip : T1065-87450

- (1) Cir-Clip
- (2) Shim
- (3) Rotor

000002186E



3TLABABWP040A

Stator

1. Remove the lead wire from compressor body.
2. Remove the external circlip (1).
3. Remove the stator (2).

(When reassembling)

- Do not use the cir-clip again.
- Assemble the cir-clip for the tapered side to become outside of front housing.
- The width of expanding of cir-clip is set is boss of shaft as a minimum.
- Match and assemble the concave part (3) of the front housing (5) and the pin (4) of stator.

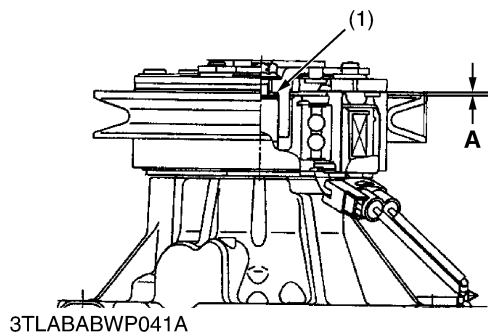
(Reference)

- Code No. for circlip : T1065-87440

- | | |
|----------------------|-------------------|
| (1) External Circlip | (4) Pin |
| (2) Stator | (5) Front Housing |
| (3) Concave Part | |

000002187E

(3) Servicing



3TLABABWP041A

Adjustment of Air-gap

1. Measure the air-gap with a feeler gauge.
2. When the measurement value comes off from factory specification, adjustment shim is added or deleted.

Air-gap (A)	Factory spec.	0.25 to 0.50 mm 0.01 to 0.02 in.
-------------	---------------	-------------------------------------

(Reference)

	Adjustment shim
0.10 mm (0.0039 in.)	T1065-87340
0.15 mm (0.0059 in.)	T1065-87350
0.40 mm (0.016 in.)	T1065-87360
0.60 mm (0.024 in.)	T1065-87370
1.0 mm (0.0394 in.)	T1065-87380

- (1) Shim

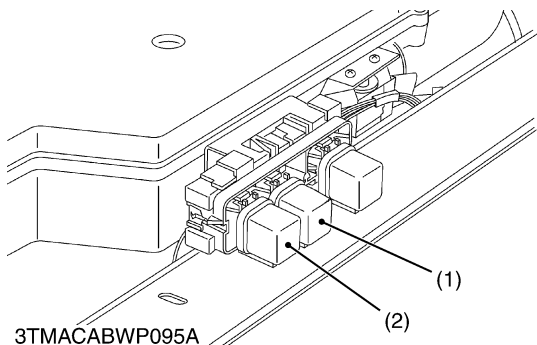
A : Air-Gap

000002188E

[3] AIR CONDITIONING SYSTEM AND FRONT WINDSHIELD WIPER

(1) Checking

(A) Air Conditioner Unit

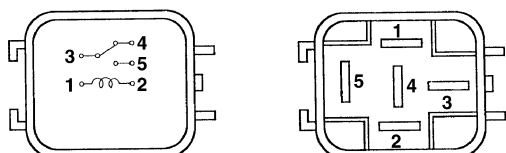


1) Connector Voltage (A/C Main Relay, Compressor Relay)

1. When turning the main switch "ON" and voltage across the 1 terminal and chassis should be approx. battery voltage.
2. The voltage across the 4 terminal and chassis should be approx. battery voltage.

- (1) Compressor Relay (2) A/C Main Relay

000002190E

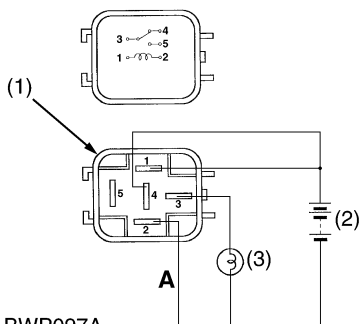


3TMACABWP096A

2) Relay Test (A/C Main Relay, Compressor Relay)

1. Remove the relay (1).
2. Connect the battery (2) and bulb (3) with the relay (1) as shown in the figure left.
3. If the bulb on when disconnecting the jumper lead (A) from the relay terminal and if the bulb off when connecting the jumper lead (A) to the relay 2 terminal, the relay is proper.

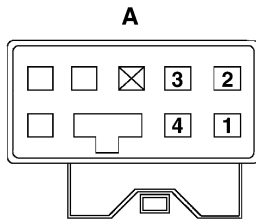
- (1) Relay **A : Jumper Lead**
 (2) Battery
 (3) Bulb



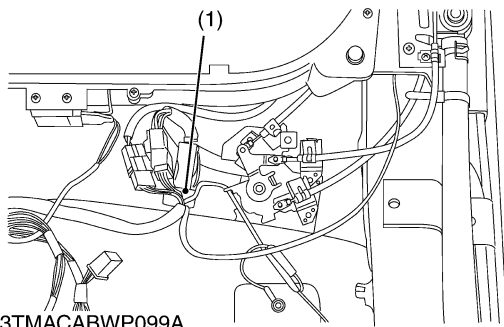
3TMACABWP097A

000002191E

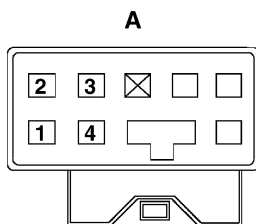
(B) Blower Switch



3TMACABWP098A



3TMACABWP099A



3TMACABWP100A

Connector Voltage

1. Disconnect the blower switch connector **8D**.
2. Turn the main switch **ON** position.
3. Measure the voltage with a voltmeter across the connector **3** terminal and **4** terminal.
4. If the voltage differs from the battery voltage, the wiring harness, A/C relay, fuse or main switch is faulty.

Voltage	3 terminal - 4 terminal	Approx. battery voltage
---------	-------------------------	-------------------------

**A : Wire Harness Side Connector
8D**

0000002193E

Blower Switch Test

1. Check the continuity through the switch with an ohmmeter.
2. If the continuity specified below are not indicated, the switch is faulty.

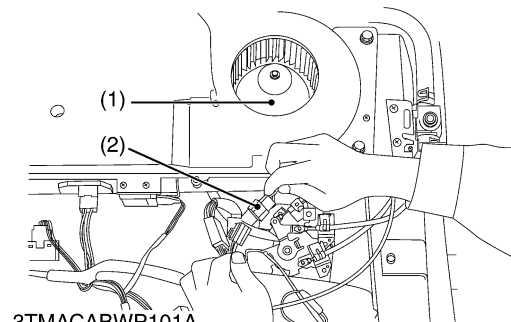
Position		Terminal			
		4	3	2	1
Blower switch	OFF	●			
	Low	●	●		
	Medium	●	●	●	
	High	●	●		●

(1) Blower Switch

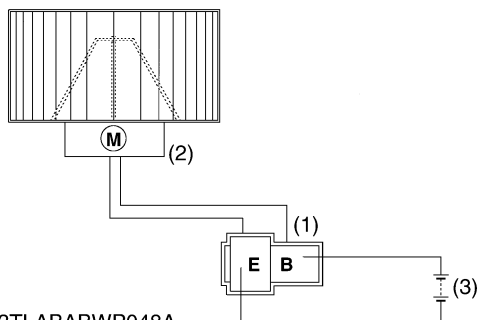
A : Switch Side

0000002194E

(C) Blower Motor



3TMACABWP101A



3TLABABWP048A

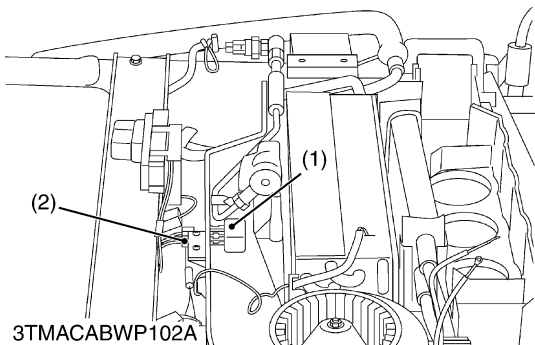
Blower Motor Test

1. Remove the outer roof.
2. Turn the blower motor (1) by hand and check whether it turns smoothly.
3. Disconnect the connector (2) of blower motor (1).
4. Connect a jumper lead from battery (3) positive terminal to connector **B** terminal.
5. Connect a jumper lead from battery negative terminal to connector **E** terminal momentarily.
6. If the blower motor does not run, check the motor.

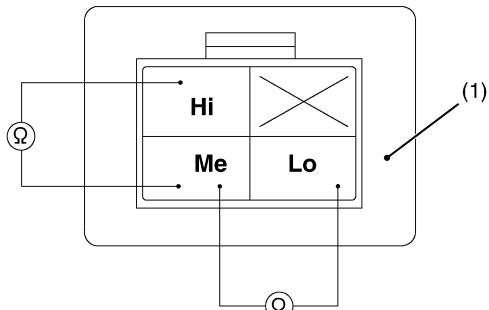
- (1) Blower Motor (3) Battery (12 V)
 (2) Blower Motor Connector

000002196E

(D) Blower Resistor



3TMACABWP102A



3TLABABWP050B

Blower Resistor Check

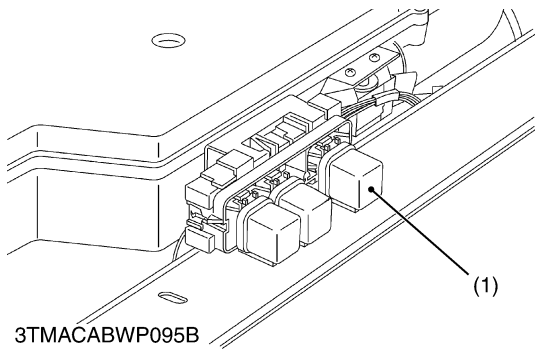
1. Disconnect the **4P** connector (2) for blower resistor (1).
2. Measure the resistance with an ohmmeter across the **Hi** terminal and **Me** terminal, and across the **Lo** terminal and **Me** terminal.
3. If the factory specifications are not indicated, renew blower resistor.

Resistance	Factory spec.	Hi terminal - Me terminal	Approx. 0.9 Ω
		Lo terminal - Me terminal	Approx. 1.8 Ω

- (1) Blower Resistor (2) Blower Resistor Connector

000002198E

(E) Blower High Relay

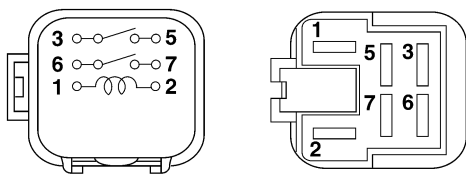


1) Connector Voltage

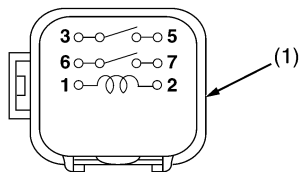
1. When turning the main switch "ON" and voltage across the 1 terminal and chassis should be approx. battery voltage.
2. The voltage across the 5, 7 terminal and chassis should be approx. battery voltage.

(1) Blower High Relay

000002200E



3TMACABWP103A

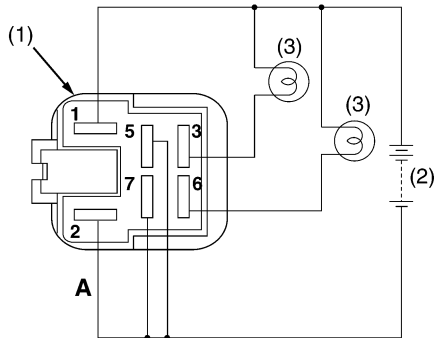


2) Relay Test

1. Remove the relay (1).
2. Connect the battery (2) and bulb (3) with the relay (1) as shown in the figure left.
3. If the bulb on when disconnecting the jumper lead (A) from the relay 2 terminal and if the bulb off when connecting the jumper lead (A) to the relay 2 terminal, the relay is proper.

(1) Relay
 (2) Battery
 (3) Bulb

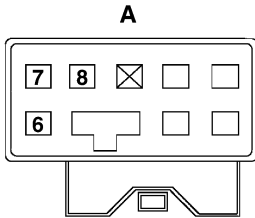
A : Jumper Lead



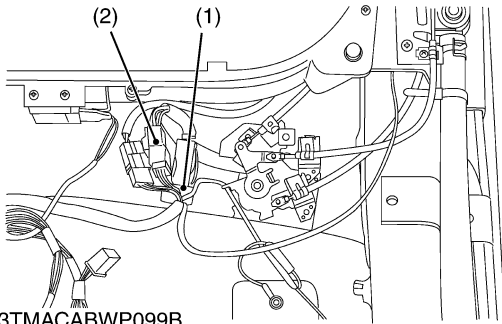
3TMACABWP104A

000002201E

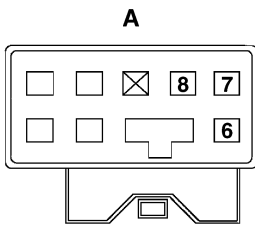
(F) A/C Switch



3TMACABWP098B



3TMACABWP099B



3TMACABWP100B

Connector Voltage

1. Disconnect the A/C switch connector **8D**.
2. Turn the main switch **ON** position.
3. Measure the voltage with a voltmeter across the connector **6** terminal and **7** terminal.
4. If the voltage differs from the battery voltage, the wiring harness, A/C relay or fuse is faulty.

Voltage	6 terminal - 7 terminal	Approx. battery voltage
---------	--	-------------------------

**A : Wire Harness Side Connector
8D**

000002203E

A/C Switch Check

1. Check the continuity through the switch with an ohmmeter.
2. If the continuity specified below are not indicated, check the switch.

Position \ Terminal		6	7	8
		A/C switch		
	OFF (*2)			
	ON (*1)	●	●	●

*1 : Push the A/C switch button on **ON** position.

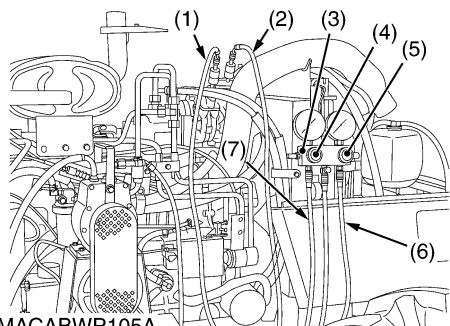
*2 : Push again the A/C switch button to **OFF** position.

- (1) A/C Switch
- (2) A/C Switch Connector

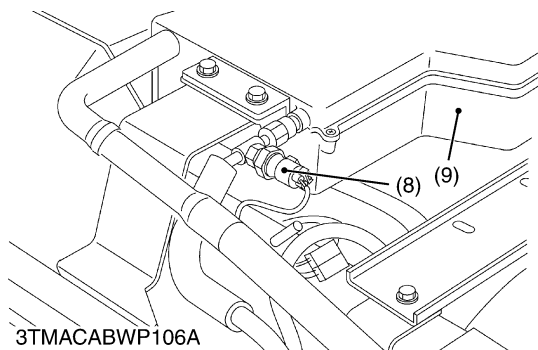
A : A/C Switch Side

000002204E

(G) A/C Pressure Switch



3TMACABWP105A



3TMACABWP106A

HI Pressure Side

1. Connect the manifold gauge (3) to compressor as following procedure.
Close the **HI** and **LO** pressure valves (4), (5) of manifold gauge tightly, and connect the charging hoses (red and blue) (6), (7) to the respective compressor service valves. (Refer to **HANDLING OF SERVICE TOOLS** : See page 10-S10.)

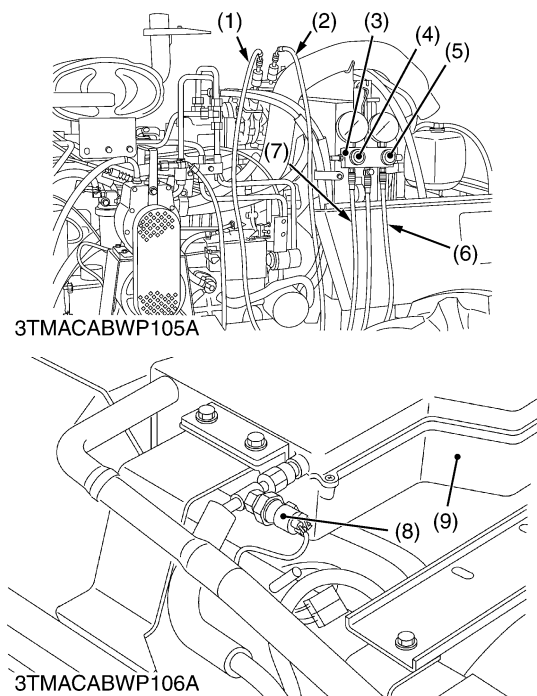
■ **NOTE**

- **Be sure to blow out the air in the charging hoses at the manifold gauge connection end by utilizing the refrigerant pressure in the refrigerant cycle.**
2. Start the engine and set at approx. 1500 min⁻¹(rpm). Turn on the A/C switch, then set the blower switch to **HI** position.
 3. Raise pressure on the **HI** pressure side of the refrigerant cycle by covering the condenser front with a corrugated carboard, and the pressure switch (8) is activated and the compressor magnetic clutch is turned off. At this time, read the **HI** pressure gauge of the manifold gauge. If this pressure reading differs largely with the setting pressure, replace the pressure switch with a new one.

Setting Pressure	Factory spec.	Dual switch OFF	More than approx. 3.14 MPa 32 kgf/cm ² 455 psi
------------------	---------------	------------------------	---

- | | |
|---|------------------------------|
| (1) HI (High Pressure Side) Charging Valve | (5) HI Pressure Valve |
| (2) LO (Low Pressure Side) Charging Valve | (6) Charging Hose (Red) |
| (3) Manifold gauge | (7) Charging Hose (Blue) |
| (4) LO Pressure Valve | (8) Pressure Switch |
| | (9) Air Conditioner Unit |

000003043E



LO Pressure Side

1. Disconnect **2P** connector of pressure switch.
2. Measure the resistance with an ohmmeter across the connector terminals.
3. If 0 ohm is not indicated at normal condition, there is no refrigerant in the refrigerating cycle because gas leaks or pressure switch is defective.

(Reference)

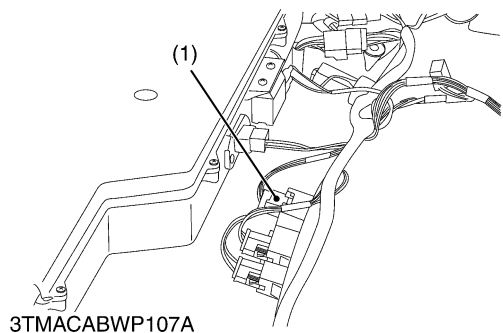
Setting Pressure	Factory spec.	Dual switch OFF	More than approx. 0.196 MPa 2.0 kgf/cm ² 28.4 psi
------------------	---------------	------------------------	--

- The resistance of dual switch is 0 ohm in normal running, but is becomes infinity if the pressure is abnormal (out of factory spec.). Because the dual switch starts to work.

- | | |
|---|------------------------------|
| (1) HI (High Pressure Side) Charging Valve | (5) HI Pressure Valve |
| (2) LO (Low Pressure Side) Charging Valve | (6) Charging Hose (Red) |
| (3) Manifold Gauge | (7) Charging Hose (Blue) |
| (4) LO Pressure Valve | (8) Pressure Switch |
| | (9) Air Conditioner Unit |

000003035E

(H) Front Windshield Wiper



Front Wiper Switch

1. Remove the outer roof, and disconnect the front wiper connector (1).
2. Perform the following checkings **1)** and **2)**.

1) Connector Voltage

1. Turn the main switch **ON**.
2. Measure the voltage with a voltmeter across the connector 4 terminal and chassis.
3. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness, fuse or main switch is faulty.

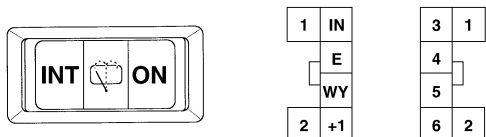
Voltage	4 terminal - Chassis	Approx. battery voltage
---------	----------------------	-------------------------

2) Front Wiper Switch

1. Check the continuity through the switch with an ohmmeter.
2. If the continuity specified below are not indicated, the switch is faulty.

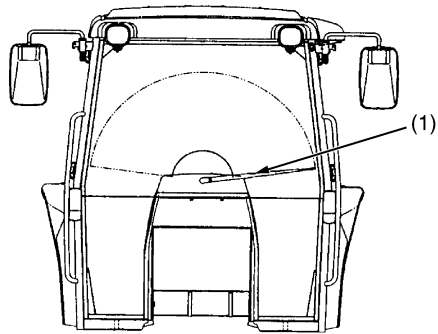
	IN	+1	E	WY	WM
WASH I		●	●	●	●
ON		●	●		
OFF					
INT	●		●		
WASH II	●		●	●	●

3TMACABWP108A



(1) Front Wiper Switch Connector

000002209E



3TMACABWP109A

Front Wiper Motor

1. Raise up the front wiper arm (1).
2. Turn the main switch **ON**.
3. Push the front wiper switch to **ON** position.
4. Count the number of wiper arm moving per minutes.
5. If the number differs from the factory specifications, replace the wiper motor assembly.

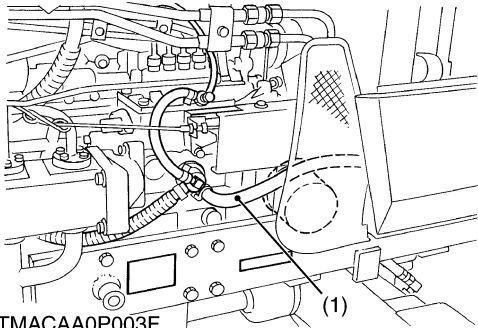
Wiper arm moving at no load	Factory spec.	33 to 43 times / min.
-----------------------------	---------------	-----------------------

(1) Wiper Arm

000002210E

(2) Disassembling and Assembling

(A) Removing Air Conditioner Unit and Front Wiper Motor



3TMACAAOP003F

Draining Coolant

⚠ CAUTION

- **Never remove the radiator cap until coolant temperature is well below its boiling point. Then loosen cap slightly to relieve any excess pressure before removing cap completely.**

1. Stop the engine and let cool down.
2. Remove the hose (1) to drain the coolant. When removing the drain plug, set the hose to drain port.
3. Remove the radiator cap to completely drain the coolant.
4. After all coolant is drained, reinstall the hose.

Coolant	Capacity	7.3 L 7.7 U.S.qts 6.4 Imp.qts
---------	----------	-------------------------------------

(1) Hose

000003036E

Discharging Refrigerant

1. Refer to "**Discharging the System**". (See page 10-S19.)

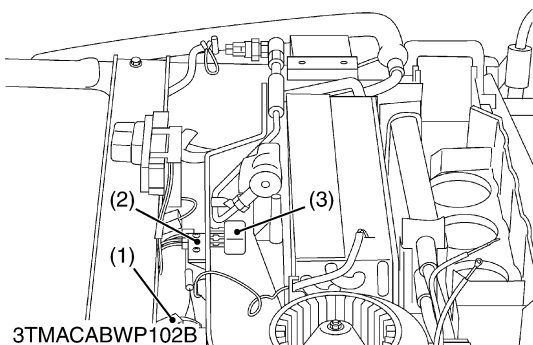
000003037E

Preparation 1

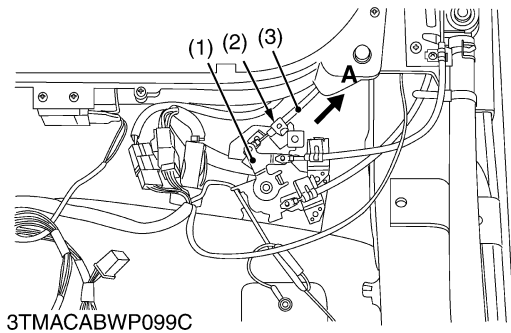
1. Remove the outer roof.
2. Disconnect the battery negative cable.
3. Disconnect the A/C blower motor connector (1).
4. Disconnect the **4P** connector for A/C blower resistor (2).

- (1) A/C Blower Motor Connector (3) A/C Blower Resistor Connector
 (2) A/C Blower Resistor

000002214E



3TMACABWP102B



Air Mixing Door Control Cable (Blue Cable)

1. Disconnect the air mixing door control cable (3) from the damper lever (1) of air conditioner control panel side.

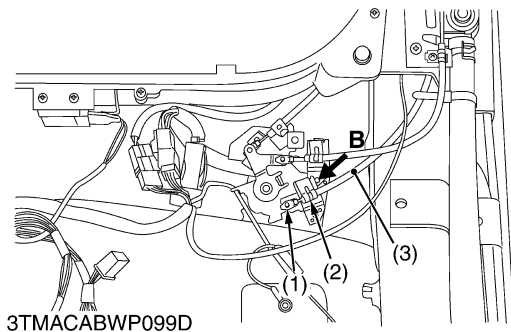
(When reassembling)

- Set the damper lever (1) of the air conditioner unit at **MAX HOT** position. Reconnect the cable.
- Move the control to **MAX HOT** position. Fit the inner cable in position, and press the fix the outer cable by the cable clip (2) in the direction of arrow (**A**) as shown at left.
- Move the temperature control lever several times, and finally set it to **MAX HOT** position to make sure the damper lever is at **HOT** position too.

- (1) Damper Lever
- (2) Cable Clip
- (3) Air Mixing Door Control Cable

A : Direction of Pulling Outer Cable

000002215E



A/C Mode Door Control Cable (Yellow Cable)

1. Disconnect the air conditioner mode door control cable (3) from the def. control lever (1) of A/C control panel side.

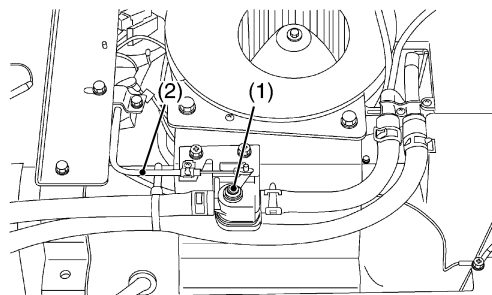
(When reassembling)

- Set the air conditioner unit to **DEF** mode position and reconnect the cable (3).
- Set the control at **DEF** position. Fit the inner cable in position, and press and fix the outer cable by the cable clip (2) in the direction of arrow (**B**) as shown at left.
- Move the mode lever several times and finally set it to **DEF** position to make sure the air conditioner unit is at **DEF** mode position.
- Lay and fix the mode door control cable over the water valve cable.

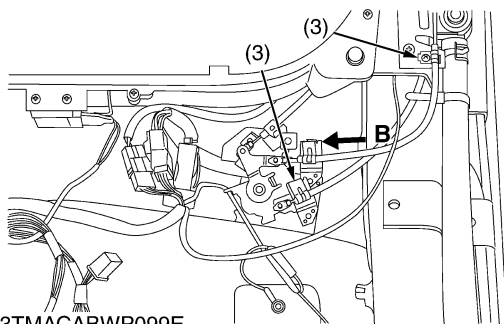
- (1) DEF. Control Lever
- (2) Cable Clip
- (3) Mode Door Control Cable

B : Direction of Pushing Outer Cable

000002216E



3TMACABWP110A



3TMACABWP099E

Water Valve Control Cable (White Cable)

1. When disconnecting the water valve cable (2), follow the next reassembly procedure.

(When reassembling)

- Fully close the water valve (1) and reconnect the cable (2).
- Set the control at **MAX COOL** position. Fit the inner cable in position, and press and fix the outer cable by the cable clip (3) in the direction of arrow (B) as shown at left.
- Move the temperature control lever several times to make sure the water valve is fully closed at **MAX COOL** position.
- Do not allow the water valve cable to bend just away from the control, not to get caught by the outer roof.

- (1) Water Valve
 - (2) Water Valve Control Cable
 - (3) Cable Clip
- B : Direction of Pushing Outer Cable**

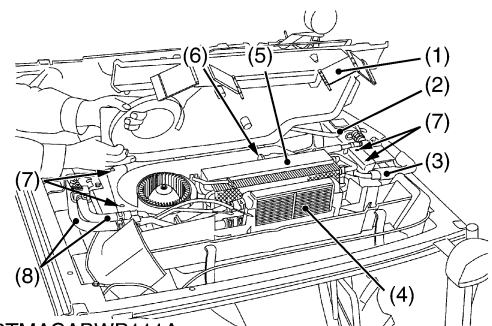
000002217E

Air Conditioning Unit

1. Remove the unit cover (1).
2. Disconnect the heater hoses (8).
3. Disconnect the cooler pipe (liquid) (2) and cooler pipe (suction side) (3).
4. Remove the five screws (7) and take off the unit.
5. Remove the duct hoses.

(When reassembling)

- When reconnecting the cooler pipes with the unit, apply compressor oil (DENSO CO. ND-OIL8) to O-rings.
- When remounting the unit, tighten five screws by hand and finally retighten them after aligning the inner roof duct with the unit duct.

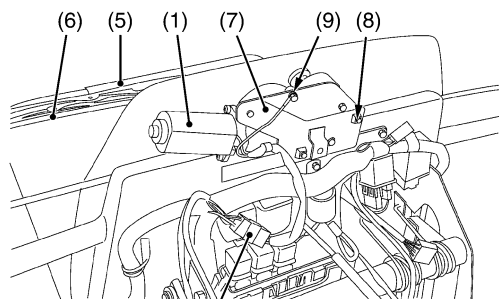


3TMACABWP111A

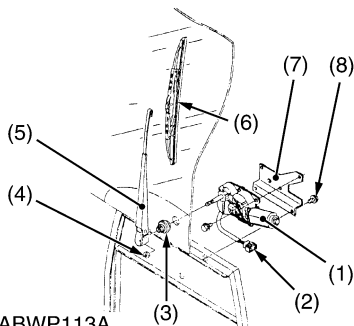
Tightening torque	A/C unit mounting screw (M6)	3.9 to 6.9 N-m 0.4 to 0.7 kgf-m 2.9 to 5.1 ft-lbs
	A/C unit mounting screw (M8)	9.8 to 15.7 N-m 1.0 to 1.6 kgf-m 7.2 to 11.6 ft-lbs
	Low pressure pipe (Cooler pipe (suction)) retaining nut	29.4 to 34.3 N-m 3.0 to 3.5 kgf-m 21.7 to 25.3 ft-lbs
	High pressure pipe 2 (Cooler pipe (liquid)) retaining nut	11.8 to 14.7 N-m 1.2 to 1.5 kgf-m 8.7 to 10.8 ft-lbs

- (1) Unit Cover
- (2) High Pressure Pipe 2 (Cooler Pipe (Liquid))
- (3) Low Pressure Pipe (Cooler Pipe (Suction Side))
- (4) Heater Core
- (5) Evaporator
- (6) Expansion Valve
- (7) Screws
- (8) Heater Hoses

000002218E



3TMACABWP112A (2)



3TMACABWP113A

Front Wiper Motor

1. Remove the steering wheels and steering post under covers.
2. Remove the meter panel.
3. Remove the panel under cover.
4. Disconnect the front wiper motor **4P** connector (2).
5. Remove the wiper arm mounting nut (4) and wiper arm (5).
6. Remove the wiper link cap (3).
7. Disconnect the earth lead setting screw.
8. Remove the front wiper motor bracket (7) mounting screw (8), then take out the front wiper motor (1).

(When reassembling)

Tightening torque	Wiper arm mounting nut	6.37 to 9.32 N·m 0.65 to 0.95 kgf·m 4.7 to 6.9 ft·lbs
-------------------	------------------------	---

- | | |
|---|--|
| (1) Front Wiper Motor | (6) Wiper Blade |
| (2) Front Wiper Motor Connector 4P | (7) Wiper Motor Mounting Bracket |
| (3) Wiper Link Cap | (8) Wiper Motor Bracket Mounting Screw |
| (4) Nut | (9) Ground Wire Mounting Screw |
| (5) Wiper Arm | |

000002219E

(B) Removing Air Conditioner Pipes

Discharging Refrigerant

1. Refer to "**Discharging the System**". (See page 10-S19.)

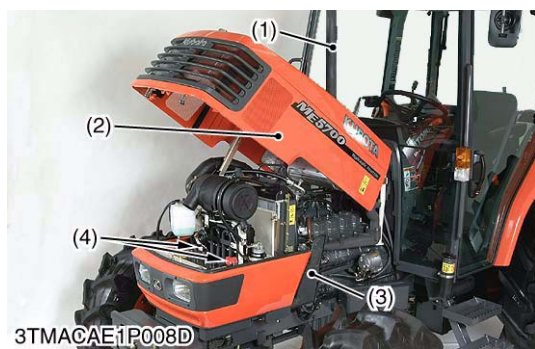
000003038E

Muffler and Bonnet

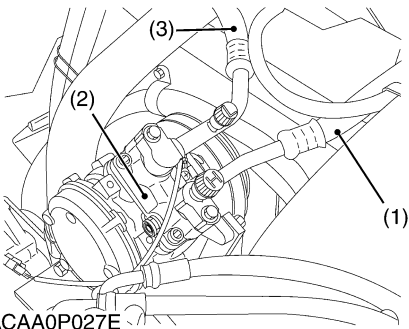
1. Disconnect the battery's cable (4).
2. Remove the muffler (1).
3. Remove the bonnet (2).
4. Remove the side cover (3).

- | | |
|-------------|-------------------|
| (1) Muffler | (3) Side Cover |
| (2) Bonnet | (4) Battery Cable |

000002228E



3TMACAE1P008D



High Pressure Pipe 1 and Low Pressure Pipe

1. Disconnect the low pressure pipe (3) from the compressor (2) and cap the open fittings immediately to keep moisture out of the system.
2. Disconnect the high pressure pipe 1 (1) from the compressor (2) and condenser.

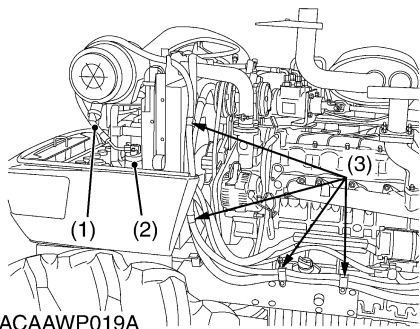
(When reassembling)

- Apply compressor oil (DENSO CO. ND-OIL8) to the O-rings and take care not to damage them.

Tightening torque	Low pressure pipe mounting screw (compressor side)	7.8 to 11.8 N-m 0.8 to 1.2 kgf-m 5.8 to 8.7 ft-lbs
	High pressure pipe 1 mounting screw (compressor side)	7.8 to 11.8 N-m 0.8 to 1.2 kgf-m 5.8 to 8.7 ft-lbs
	High pressure pipe 1 retaining nut (condenser side)	19.6 to 24.5 N-m 2.0 to 2.5 kgf-m 14.5 to 18.1 ft-lbs

- (1) High Pressure Pipe 1 (3) Low Pressure Pipe
(2) Compressor

000002222E



High Pressure Pipe 2

1. Remove the pipe clamps (3).
2. Disconnect the high pressure hose 2 (1) from the receiver (2) and cap the open fittings immediately to keep moisture out of the system.

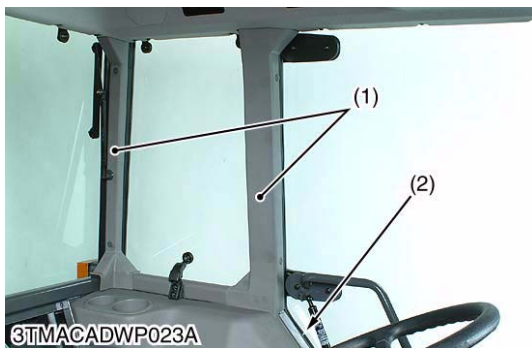
(When reassembling)

- Apply compressor oil (DENSO CO. ND-OIL8) to the O-rings and take care not to damage them.

Tightening torque	High pressure pipe 2 retaining nut (Receiver side)	11.8 to 14.7 N-m 1.2 to 1.5 kgf-m 8.7 to 10.8 ft-lbs
-------------------	--	--

- (1) High Pressure Hose 2 (3) Clamp
(2) Receiver

000002223E

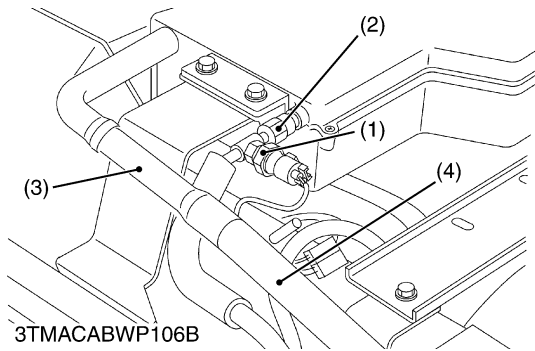


Inner Covers

1. Remove the inner covers (1) and (2).
2. Remove the seat.

- (1) Inner Cover (Upper) (2) Inner Cover (Lower)

000002224E



Removing High Pressure and Low Pressure Pipes

1. Remove the outer roof.
2. Disconnect the pressure switch (1) connector.
3. Disconnect the high pressure pipe 2 (2), then cap the open fitting immediately to keep moisture out of the system.
4. Remove the rubber (3) and disconnect the low pressure pipe (4), then cap the open fittings immediately to keep moisture out of the system.
5. Pull out the pressure pipes (2) and (4) from the bottom of the cabin.
6. Take out the pressure pipes (2) and (4).

(When reassembling)

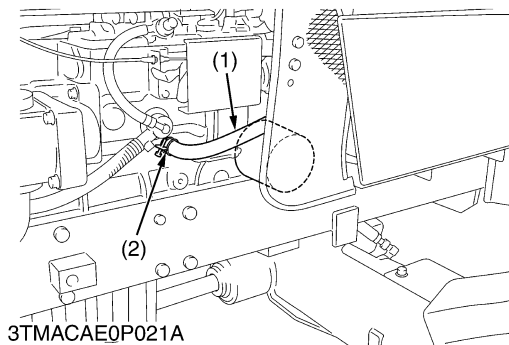
- Replace the rubber (3) with a new one.
- Apply compressor oil (DENSO CO. ND-OIL8) to the O-rings and take care not to damage them.

Tightening torque	High pressure pipe 2 retaining nut	11.8 to 14.7 N·m 1.2 to 1.5 kgf·m 8.7 to 10.8 ft-lbs
	Low pressure pipe retaining nut	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 21.7 to 25.3 ft-lbs

- (1) Pressure Switch
- (2) High Pressure Pipe 2
- (3) Rubber
- (4) Low Pressure Pipe

000002225E

(C) Removing Heater Hoses



Draining Coolant

CAUTION

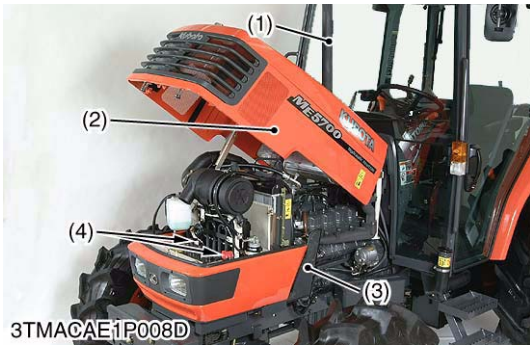
- **Never remove the radiator cap until coolant temperature is well below its boiling point. Then loosen cap slightly to relieve any excess pressure before removing cap completely.**

1. Stop the engine and let cool down.
2. Remove the hose (1) to drain the coolant. When removing the drain plug, set the hose to drain port.
3. Remove the radiator cap to completely drain the coolant.
4. After all coolant is drained, reinstall the hose.

Coolant	Capacity	7.3 L 7.7 U.S.qts 6.4 Imp.qts
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- (1) Hose
- (2) Clamp

000003039E

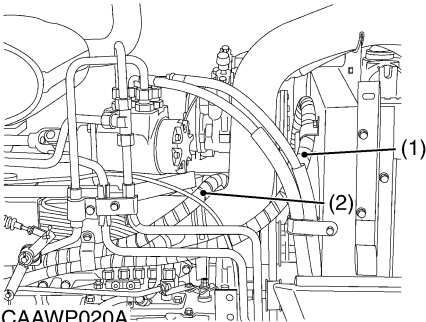


Muffler and Bonnet

1. Disconnect the battery's cable (4).
2. Remove the muffler (1).
3. Remove the bonnet (2).
4. Remove the side cover (3).

- | | |
|-------------|-------------------|
| (1) Muffler | (3) Side Cover |
| (2) Bonnet | (4) Battery Cable |

000002229E



Heater Hoses

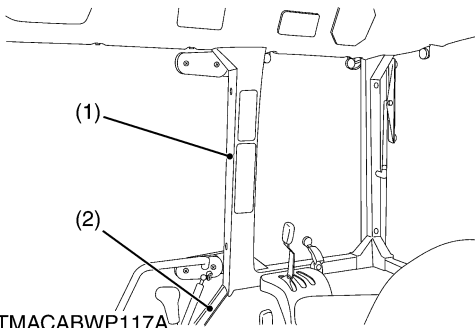
1. Disconnect the heater hoses (1), (2), and take out them under the cabin.

■ **NOTE**

- **Connect the heater hose (1) to the heat hose which comes from cabin with blue painted hose.**

- | | |
|-------------------|-------------------|
| (1) Heater Hose 1 | (2) Heater Hose 2 |
|-------------------|-------------------|

000002230E

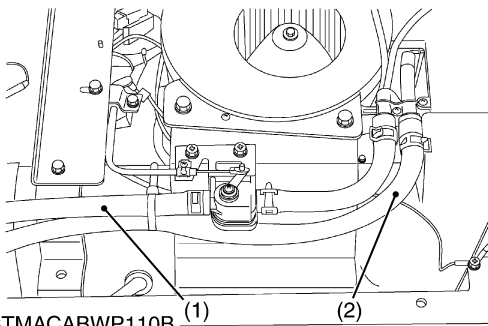


Inner Covers

1. Remove the inner covers (1) and (2).

- | | |
|-------------------------|-------------------------|
| (1) Inner Cover (Upper) | (2) Inner Cover (Lower) |
|-------------------------|-------------------------|

000002231E



Removing Heater Hoses

1. Remove the outer roof.
2. Disconnect the heater hoses (1), (2).
3. Pull out the heater hoses (1), (2) from the bottom of the cabin.
4. Take out the heater hoses (1), (2).

(When reassembling)

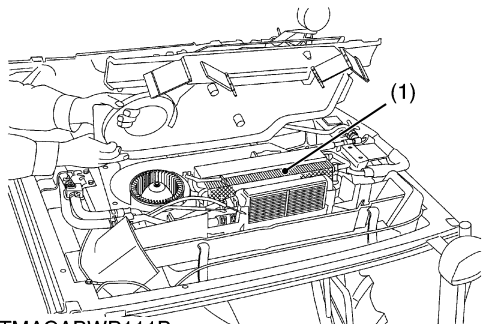
- When connecting the heater hose with A/C unit, hose should be put into the A/C unit pipe more than 30 mm (1.2 in.).
- Be sure to fix the heater hose (2) to the original position.

- | | |
|-------------------|-----------------------------------|
| (1) Heater Hose 1 | (2) Heater Hose 2 with Blue Paint |
|-------------------|-----------------------------------|

000002232E

(3) Servicing

(A) Air Conditioning Unit



3TMACABWP111B

Evaporator

1. Check whether white powder or dust is attached to the evaporator (1). If they are attached, wash them off with warm water and blow them off with compressed air.

NOTE

- In case the evaporator is cleaned with warm water, cap the evaporator pipe ends so that water does not enter it.

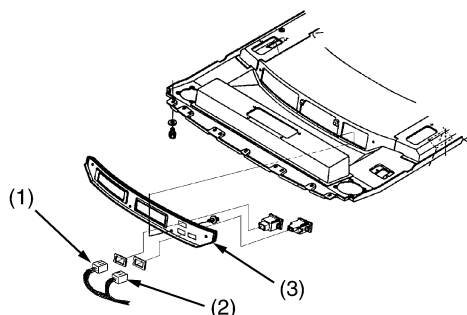
- (1) Evaporator

000002234E

[4] OTHERS

(1) Checking

(A) Rear Windshield Wiper



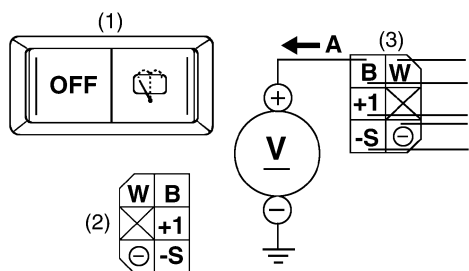
3TMACABWP119A

Rear Wiper Switch

1. Remove the inner panel (3), and disconnect the rear wiper switch connector (2).
2. Perform the following checkings **1)** and **2)**.

- (1) Front Wiper Switch Connector (3) Inner Panel
 (2) Rear Wiper Switch Connector

000002236E



3TMACABWP120A

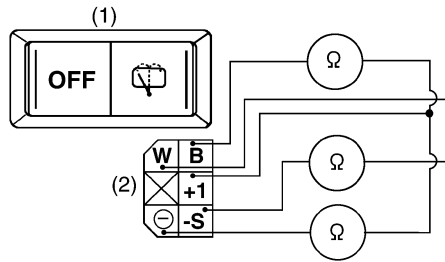
1) Connector Voltage

1. Turn the main switch **ON**.
2. Measure the voltage with a voltmeter across the connector **B** terminal and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	B terminal - Chassis	Approx. battery voltage
---------	----------------------	-------------------------

- (1) Rear Wiper Switch (3) Rear Wiper Switch Connector
 (2) Rear Wiper Switch Connector (Wiring Harness Side)
A : From Main Switch AC Terminal

000002237E



3TMACABWP121A

2) Rear Wiper Switch

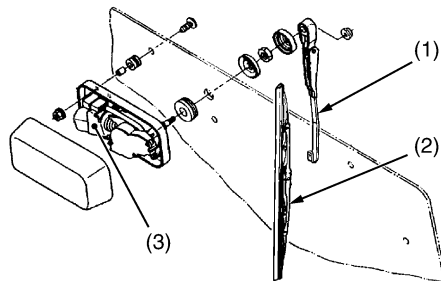
1. Check the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated, the switch is faulty.

Position \ Terminal		-S	+1	B	W	-
		Front wiper switch	WASH I	●	●	
OFF	●		●			
ON			●	●		
WASH II			●	●	●	●

(1) Rear Wiper Switch

(2) Rear Wiper Switch Connector (Switch Side)

000002238E



3TMACABWP122A

Rear Wiper Motor

1. Raise up the rear wiper arm (1).
2. Turn the main switch **ON**.
3. Push the rear wiper switch to **ON** position.
4. Count the number of wiper arm rocking per minutes.
5. If the number differs from the factory specifications, replace the wiper motor (3) assembly.

No. of wiper arm swing frequency at no load	Factory spec.	36 to 50 times / min.

(1) Wiper Arm

(3) Wiper Motor

(2) Wiper Blade

000002239E

(2) Disassembling and Assembling

(A) Cab Windshield

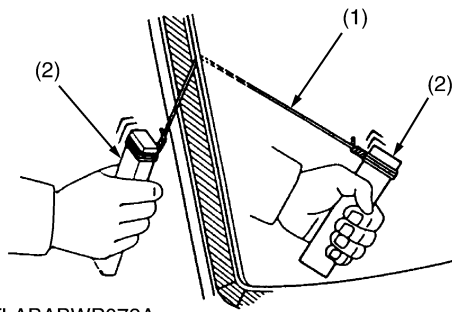
Preparation

1. Prepare the followings.
 - Cutter knife 1 piece
 - Scraper 1 piece
 - Gun for coating 1 piece
 - Sika Tack-Ultrafast or equivalent
 - Sika-cleaner No. 1
 - Gummed tape

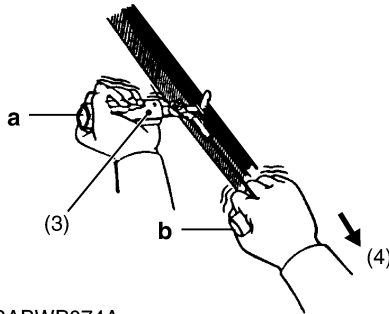
NOTE

- Sika Tack-Ultrafast and cleaner No. 1 are made by Sika Corporation.
- These materials can't be provided by Kubota Corporation.
- Therefore, please find the local made equivalent materials in your country and use them when you need.

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3TLABABWP073A



3TLABABWP074A

Before Replacing Windshields (1)

[In case of using piano wire (When glass is cracked)]

1. Thread the piano wire from the inside of cabin. Tie its both ends to a wooden blocks or the like. (See the left figure.)
2. Pull the piano wire inward/outward alternately to cut the adhered part.

■ NOTE

- Do not let the piano wire make sliding contact with the edge of glass plate forcibly.

[In case of using cutter knife (When glass is totally crushed finely)]

1. Insert the knife (3) into the adhered part.
2. Keep the edge of knife blade square to the glass edge at the part (a). Slide the knife blade along the glass surface and the edge. Pull the part (b) in the direction parallel to the glass edge to cut them off.

■ NOTE

- Find a wider gap between the glass and body.
- Take care of handling the cutter knife not to damage your hand.

- (1) Piano Wire
(2) Wood Piece

- (3) Cutter Knife
(4) Pulling

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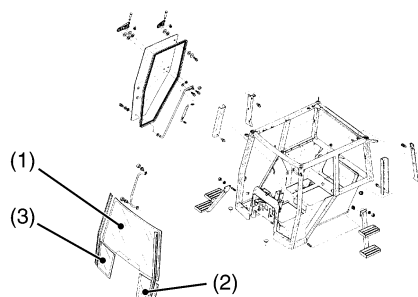
Before Replacing Windshields (2)

1. When the Sika Tack-Ultrafast or equivalent attached to the cabin frame and the glass are reused, remove the bond clearly.
2. Clean the frame surface with Sika-cleaner No. 1.

■ NOTE

- Remove the bond completely.

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3TMACABWP123A

Before Replacing Windshields (3)

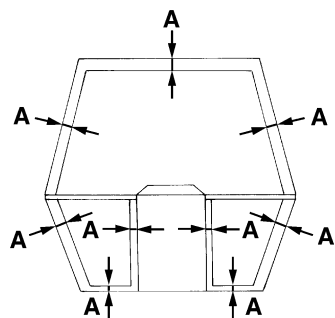
1. Check that the glasses are not damaged and cracked.
2. Turn over the glass and clean this surface of the glass by Sika-cleaner No. 1.
3. The cleaning area of the rear surface is indicated "A" in the figure left.

NOTE

- If not cleaning the glass, it may result in adhesive failure.

- | | |
|------------------------------|---------------------|
| (1) Upper Windshield | A : 25 mm (1.0 in.) |
| (2) Lower Windshield (Left) | |
| (3) Lower Windshield (Right) | |

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3TLABABWP076C

Applying Sika Tack-Ultrafast

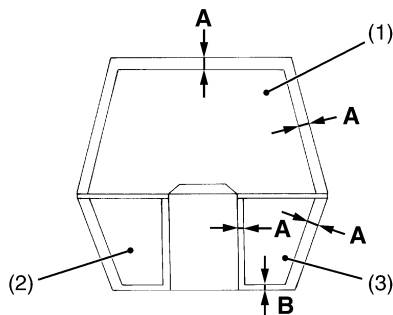
1. Apply a Sika Tack-Ultrafast (or equivalent) on the glasses as shown in the figure left.

NOTE

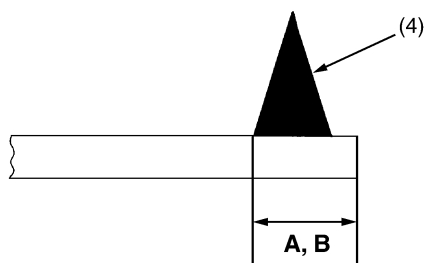
- Apply the Sika Tack-Ultrafast (or equivalent) with the jig having the specified tip shape as shown in the figure left.
- Apply it with a uniform speed to minimize unevenness.
- Follow the instruction manual of Sika Tack-Ultrafast.

- | | |
|------------------------------|--------------------------|
| (1) Upper Windshield | A : 10 mm (0.39 in.) |
| (2) Lower Windshield (Left) | B : 12 mm (0.47 in.) |
| (3) Lower Windshield (Right) | E : Dia. 8 mm (0.31 in.) |
| (4) Sika Tack-Ultrafast | F : 12 mm (0.47 in.) |
| (5) Jig | |

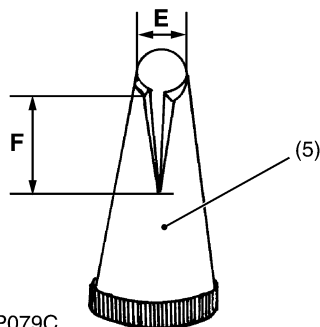
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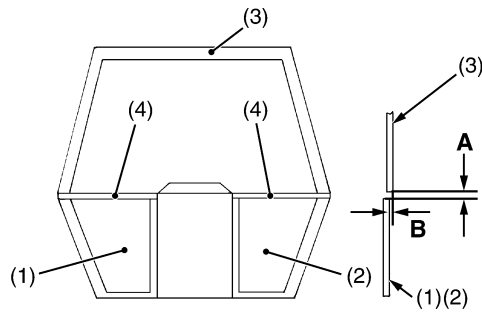
3TLABABWP076D



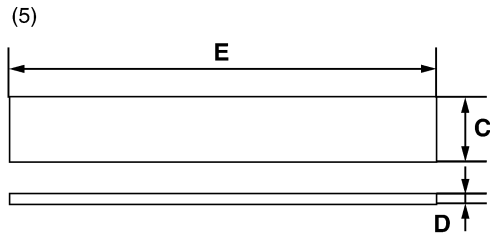
3TLABABWP078C



3TLABABWP079C



3TLABABWP080B



3TLABABWP081B

Installing Windshield

1. Install the lower (left or right) windshield (1), (2) to the cabin and fix it with a gummed taped. Leave it for one hour.
2. Set the upper windshield (3) to the cabin and fix it with a gummed tape. Leave it for one hour.
3. Install the H rubber (4) between the lower and upper windshield.

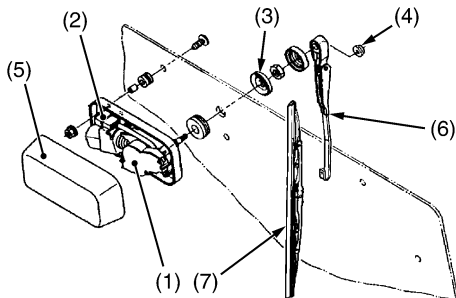
NOTE

- Use a jig A (5) shown in the figure to create even clearance (5 mm (0.2 in.) approx.) between the lower and upper windshield.
- The level unevenness between the upper and lower windshields should be -1 to +1 mm (-0.04 to +0.04 in.) or less at the glass surface.
- When the gummed tape is removed, the glass may be displaced. In this case fix it again.
- Remove the gummed tape (adhesive tape) little by little to confirm the bonding condition.

- | | |
|------------------------------|------------------------|
| (1) Lower Windshield (Right) | A : 5 mm (0.2 in.) |
| (2) Lower Windshield (Left) | B : -1.0 to +1.0 mm |
| (3) Upper Windshield | (-0.04 to +0.04 in.) |
| (4) H Rubber | C : 20 mm (0.79 in.) |
| (5) Jig A | D : 5 mm (0.2 in.) |
| | E : 300 mm (11.81 in.) |

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(B) Rear Windshield Wiper



3TMACABWP122B

Rear Wiper Motor

1. Remove the wiper motor cover (5).
2. Disconnect the rear wiper motor 4P connector (2).
3. Remove the wiper arm mounting nut (4) and wiper arm (6).
4. Remove the wiper link cap (3) and nut.
5. Remove the rear wiper motor mounting screws, then take out the rear wiper motor (1).

Tightening torque	Wiper arm mounting nut	7.8 to 9.3 N-m 0.8 to 0.95 kgf-m 5.79 to 6.87 ft-lbs
	Wiper motor mounting screw	7.8 to 9.3 N-m 0.8 to 0.95 kgf-m 5.79 to 6.87 ft-lbs

- | | |
|--------------------------------|-----------------------|
| (1) Rear Wiper Motor | (5) Wiper Motor Cover |
| (2) Rear Wiper Motor Connector | (6) Wiper Arm |
| (3) Wiper Link Cap | (7) Wiper Blade |
| (4) Nut | |

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