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WSM

WORKSHOP MANUAL
TRACTOR

B1830,B2230,B2530,B3030

Kubota

KiSC issued 03, 2007 A

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TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of KUBOTA Tractor B1830, B2230, B2530 and B3030. It is divided into three parts, “General”, “Mechanism” and “Servicing” for each section.

■ **General**

Information on the tractor identification, the general precautions, maintenance check list, check and maintenance and special tools are described.

■ **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. 9Y021-01874 / 9Y021-18201) for the one which has not been described to this workshop manual.

■ **Servicing**

Information on the troubleshooting, servicing specification lists, tightening torque, 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.

January 2007

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KiSC issued 03, 2007 A

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.

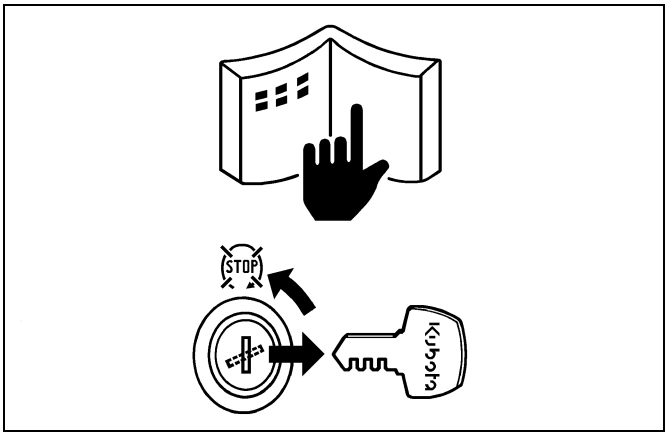
DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

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.

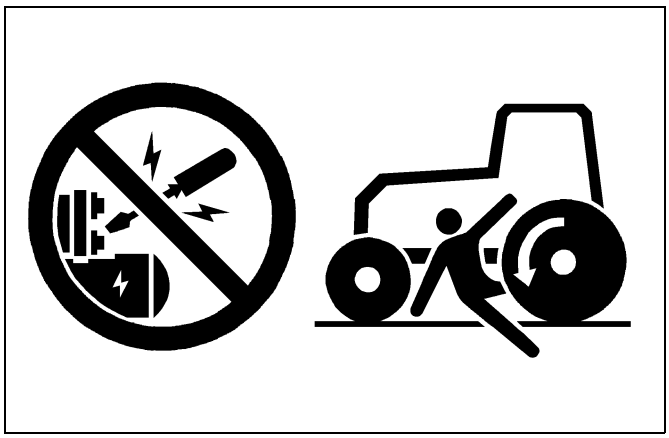
■ IMPORTANT : Indicates that equipment or property damage could result if instructions are not followed.

■ NOTE : Gives helpful information.



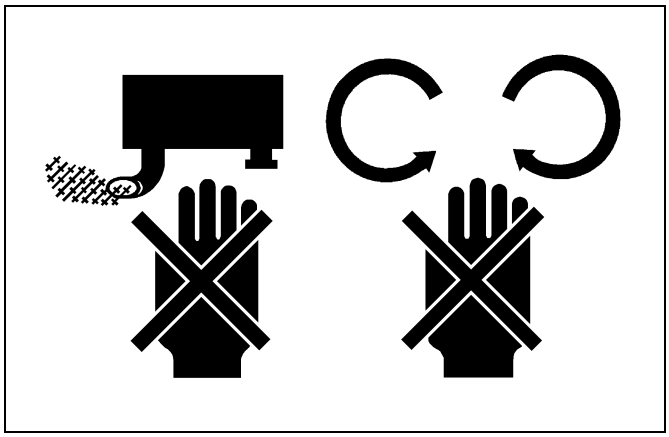
BEFORE SERVICING AND REPAIRING

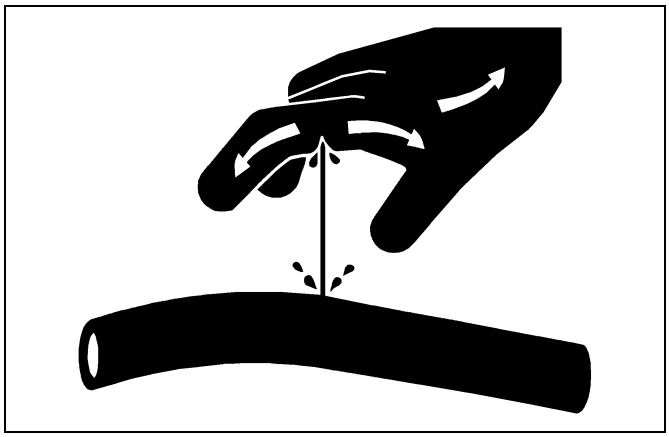
- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key.
- Disconnect the battery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



SAFETY STARTING

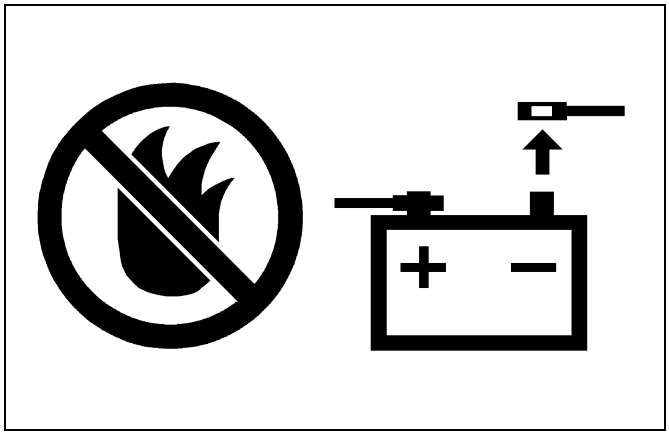
- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine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





SAFETY WORKING

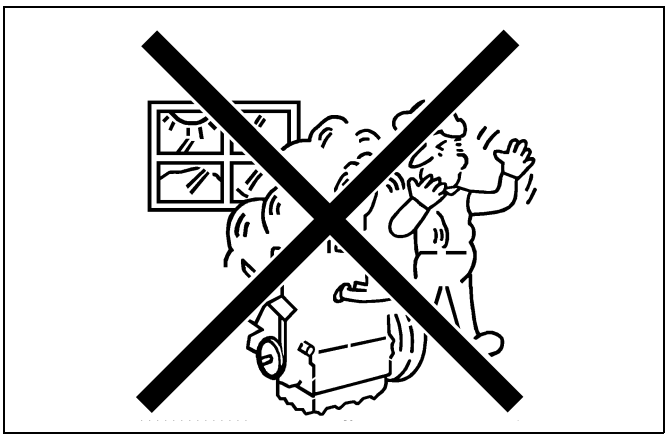
- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing 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.



AVOID FIRES

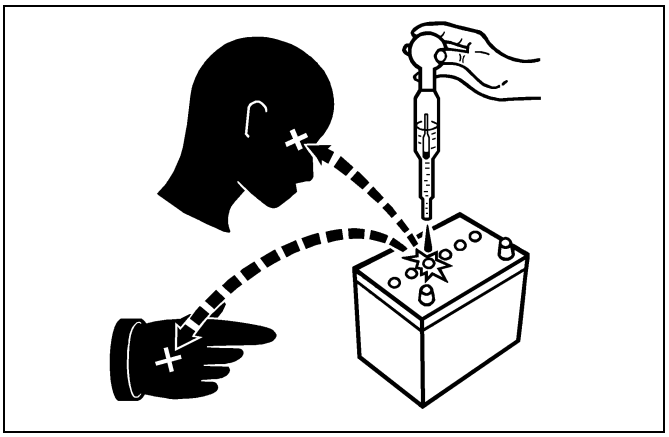
- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open 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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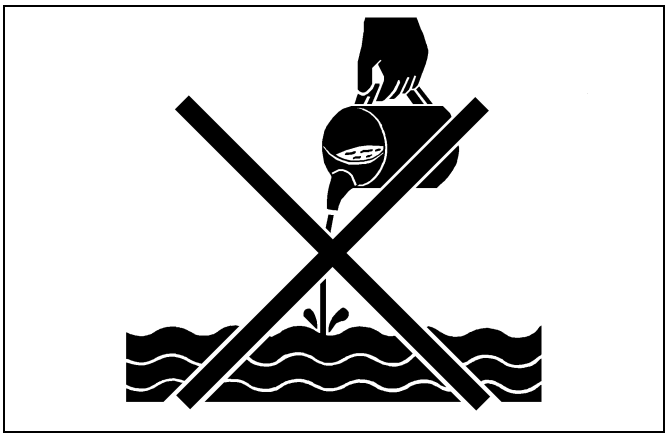
VENTILATE WORK AREA

- 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.



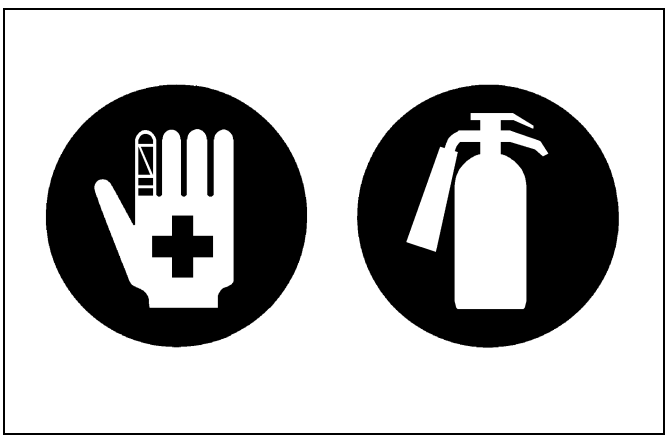
PREVENT ACID BURNS

- 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.



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.



PREPARE FOR EMERGENCIES

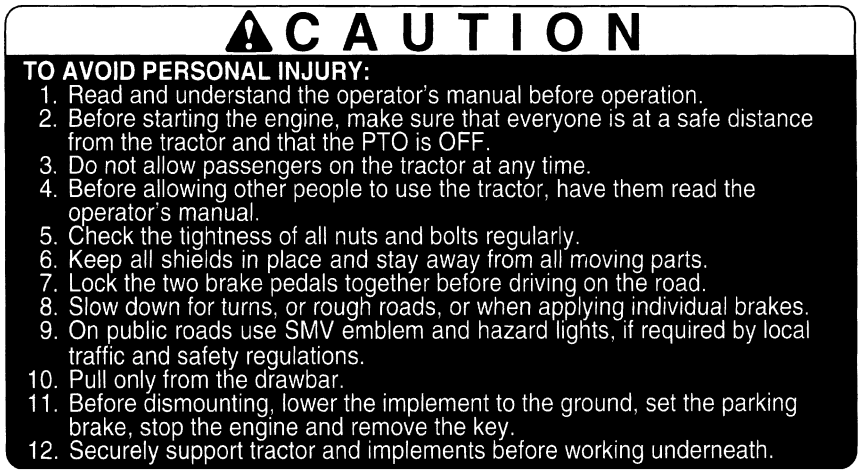
- Keep a first aid kit and fire extinguisher handy at all times.
- Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

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 and CABIN**

(1) Part No. 6C070-4742-2

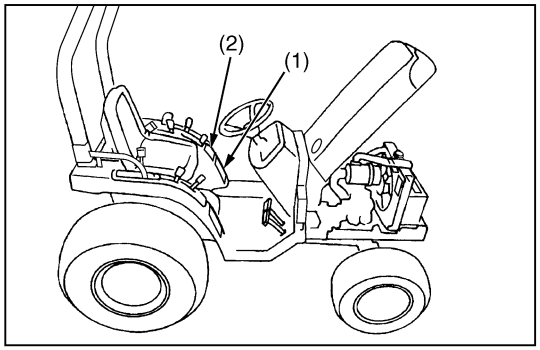


1AGAEBMAP068E

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



1AGAEBMAP069E



3TBAAAJCP001A

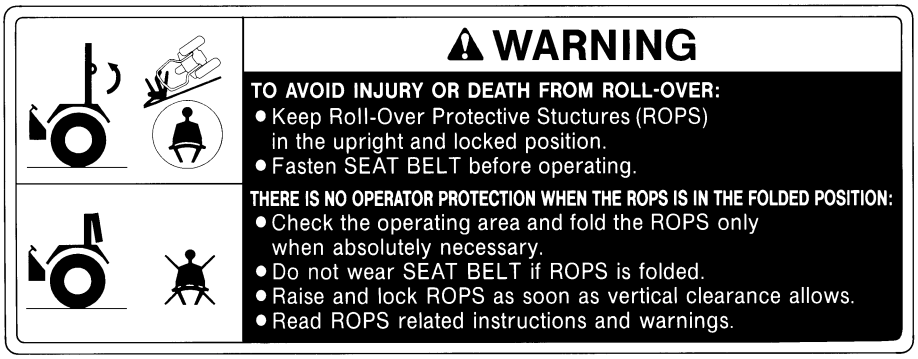
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(1) Part No. TA040-4932-2 [Rigid ROPS type]



1AGAEBMAP070E

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



1AGAEBMAP071E

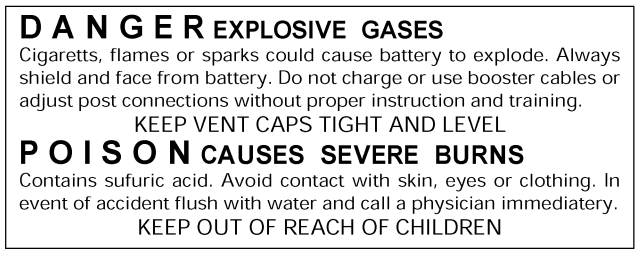
(2) Part No. 32751-4958-1

Stay clear of engine fan and fanbelt

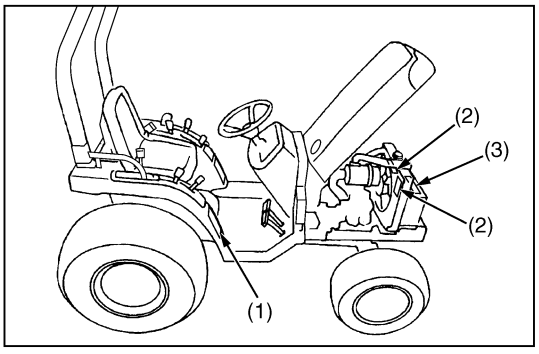


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(3) Part No. 6C040-5559-1



1AGAEBMAP072E



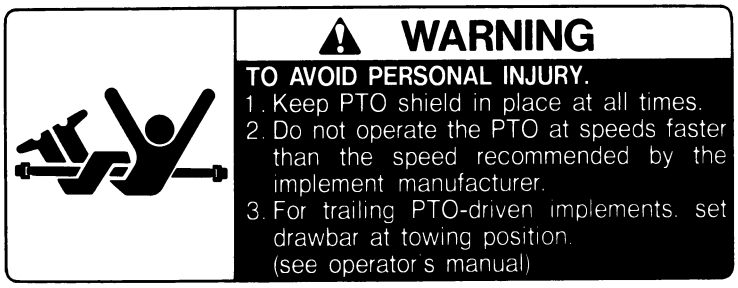
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(1) Part No. 6C090-4965-1



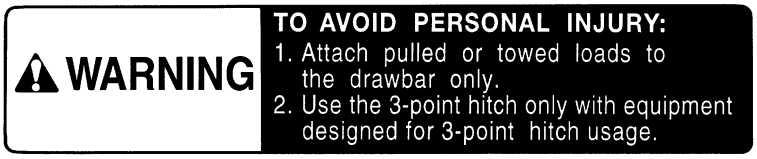
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(2) Part No. TA040-4959-3



1AGAEBMAP075E

(4) Part No. 6C140-4744-1



1AGAEBMAP076E

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

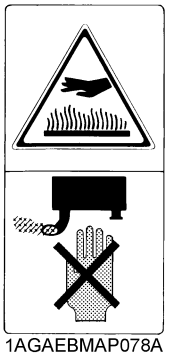
No fire



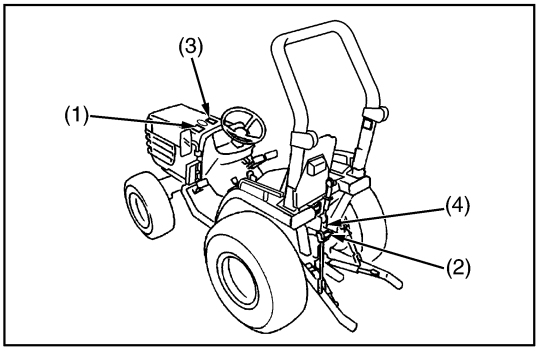
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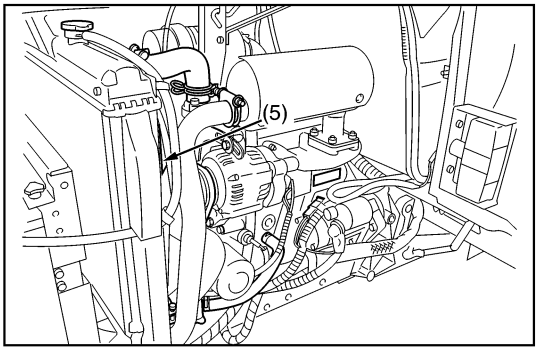
(5) Part No. TA040-4958-1

Do not touch hot surface like muffler, etc.



1AGAEBMAP078A





3TBAAAJCP003A

(1) Part No. 3A111-6554-1

⚠ WARNING

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

⚠ CAUTION

TO AVOID INJURY WHEN RAISING OR FOLDING ROPS:

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

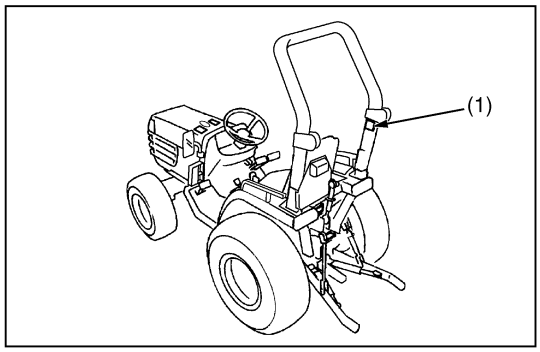
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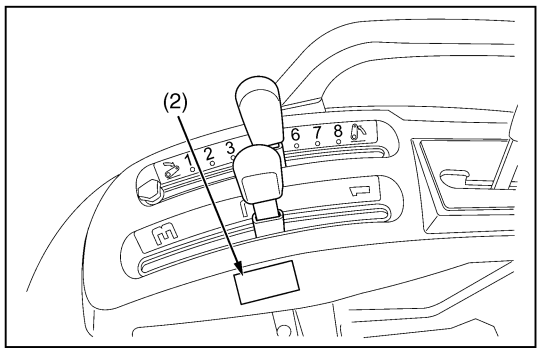
(2) Part No. 6C200-4751-1

⚠ CAUTION

TO AVOID PERSOAL INJURY:
BEFORE STARTING THE ENGINE
1. Make sure the parking brake is set.
2. Make sure the range gear shift lever (L-M-H) is in "NEUTRAL" position.
3. Make sure the cruise control lever is in "NEUTRAL" position (Far back position).

1AGAEBNAP004E





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.

3TBAAAJCP004A

■ CABIN

Careful operation is your best insurance against an accident.

Read and understand carefully this section of the separately issued operator's manual before operating the tractor.

(1) Part No. TA040-4902-1

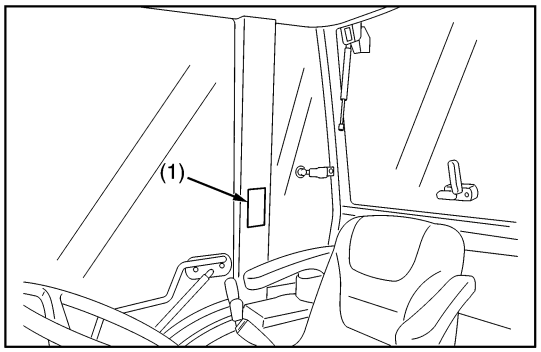


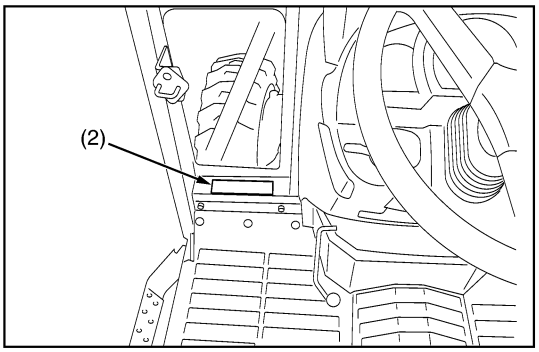
1AGAMAOAP0780

(2) Part No. 6C230-4743-1



1AGAMAOAP0790





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.

3TBAAAGCP008A

SPECIFICATIONS

[HST Model]

Model			B2230			B2530		B3030	
PTO power			12.5 kW (17.0 PS)*			14.0 kW (19.0 PS)*		16.9 kW (23.0 PS)*	
Engine	Maker		KUBOTA						
	Model		D1105-E2-D21-EU			D1105-E2-D21-EU		V1505-E2-D21-EU	
	Type		E-TVCS, water-cooled, 4-cycle diesel						
	Number of cylinders		3					4	
	Bore and stroke		76 × 73.6 mm (3.0 × 2.9 in.)			78 × 78.4 mm (3.1 × 3.1 in.)		78 × 78.4 mm (3.1 × 3.1 in.)	
	Total displacement		1001 cm^3 (61.1 cu.in.)			1123 cm^3 (68.5 cu.in.)		1498 cm^3 (91.4 cu.in.)	
	Engine gross power		16.2 kW (22.0 PS)*			18.4 kW (25.0 PS)*		22.1 kW (30.0 PS)*	
	Rated revolution		2700 min^{-1} (rpm)					2600 min^{-1} (rpm)	
	Maximum torque		62 N·m (6.3 kgf·m, 13.9 lbf·ft)			72 N·m (7.3 kgf·m, 16.2 lbf·ft)		92 N·m (9.4 kgf·m, 20.7 lbf·ft)	
	Battery		12 V, RC : 79 min, CCA : 433 A						
	Starting system		Electric starting with cell starter 12 V, 1.4 kW						
	Lubricating system		Forced lubrication by trochoidal pump						
	Cooling system		Pressurized radiator, forced circulation with water pump						
	Fuel		Diesel fuel No. 2-D [above –10 °C (14 °F)], Diesel fuel No. 1 [below –10 °C (14 °F)]						
Capacities	Fuel tank		28 L (7.4 U.S.gals, 6.2 Imp.gals)					31 L (8.1 U.S.gals, 6.8 Imp.gals)	
	Engine crankcase (with filter)		3.0 L (3.2 U.S.qts, 2.6 Imp.qts)					4.1 L (4.3 U.S.qts, 3.6 Imp.qts)	
	Engine coolant		5.2 L (5.5 U.S.qts, 4.6 Imp.qts)						
	Transmission case		17 L (4.5 U.S.gals, 3.7 Imp.qts)						
	Front axle case		3.7 L (3.9 U.S.qts, 3.3 Imp.qts)					4.7 L (5.0 U.S.qts, 4.1 Imp.qts)	
	Tire		Farm				Turf	Farm	Turf
		Front	6 - 12B	6 - 12	6.00- 2	7.00-12	22 x 8.50-12	24 x 8.5-12	7-12	24 x 8.5-12
		Rear	8 - 16	9.5 - 16	9.5 - 18	10.5-18	31 x 13.5-15	315/ 75D-15	12.4-16	13.6-16
Dimensions	Overall length (with 3P)	ROPS	2735 mm (107.7 in.)					2900 mm (114.2 in.)	
		CABIN	2835 mm (111.6 in.)					3010 mm (118.6 in.)	
	Overall width (min. tread)		1105 mm (43.5 in.)			1095 mm (43.1 in.)		1365 mm (53.7 in.)	
	Overall height	ROPS	2260 mm (89.0 in.)			2290 mm (90.2 in.)		2320 mm (91.3 in.)	
		CABIN	2060 mm (81.1 in.)			2090 mm (82.3 in.)		2125 mm (83.7 in.)	
	Wheel base		1500 mm (59.1 in.)					1666 mm (65.6 in.)	
	Minimum ground clearance		240 mm (9.5 in.)			270 mm (10.6 in.)		315 mm (12.4 in.)	
	Tread	Front	835 mm (32.9 in.)					935 mm (36.8 in.)	
		Rear	855 to 1075 mm (33.7 to 42.3 in.)			850 to 1095 mm (33.5 to 43.1 in.)		1050 mm (41.3 in.)	
Weight	ROPS		745 kg (1643 lbs)			750 kg (1654 lbs)		840 kg (1852 lbs)	
	CABIN		955 kg (2106 lbs)			960 kg (2117 lbs)		1035 kg (2282 lbs)	
Travelling system	Clutch		N/A						
	Steering		Hydrostatic power steering						
	Transmission		Main-hydrostatic transmission, 3 range gear shift (3 forward and 3 reverse)						
	Brake		Wet disk type						
	Min. turning radius (with brake)		2.1 m (6.9 feet)						
	Differential		Bevel gear						

NOTE: * Manufacture's estimate

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

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[HST Model] (Continued)

Model			B2230	B2530	B3030
Hydraulic system	Hydraulic control system		Position control		
	Pump capacity		3P : 20.5 L/min (5.4 gals/min) Power steering : 15.4 L/min (1.4 gals/min)		3P: 19.7 L/min (5.2 gals/min) Power steering: 14.8 L/min (3.9 gals/min)
	Three point hitch		SAE Category 1		
	Max. lift force	At lift points	970 kg (2139 lbs)		
		24 in. behind lift points	760 kg (1676 lbs)		
PTO system	Rear	PTO shaft	SAE 1-3/8, 6 splines		
		Revolution	1 speed (540 min^{-1} (rpm) at 2592 engine min^{-1} (rpm))		
	Mid	PTO shaft	U.S.A. No.5 (KUBOTA 10-tooth) involute spline		
		Revolution	1 speed (2500 min^{-1} (rpm) at 2600 engine min^{-1} (rpm))		

W1032807

[Manual Transmission Model]

Model			B1830		B2230		B2530	
PTO power			11.0 kW (15.0 PS)*		13.2 kW (18.0 PS)*		14.7 kW (20.0 PS)*	
Engine	Maker		KUBOTA					
	Model		D905-E2-D21-EU		D1005-E2-D21-EU		D1105-E2-D21-EU	
	Type		E-TVCS, water-cooled, 4-cycle diesel					
	Number of cylinders		3					
	Bore and stroke		72 × 78.4 mm (2.8 × 3.1 in.)		76 × 73.6 mm (3.0 × 2.9 in.)		78 × 78.4 mm (3.1 × 3.1 in.)	
	Total displacement		898 cm^3 (54.8 cu.in.)		1001 cm^3 (61.1 cu.in.)		1123 cm^3 (68.5 cu.in.)	
	Engine gross power		13.2 kW (18.0 PS)*		16.2 kW (22.0 PS)*		18.4 kW (25.0 PS)*	
	Rated revolution		2700 min^{-1} (rpm)					
	Maximum torque		54 N·m (5.5 kgf·m, 12.1 lbf·ft)		62 N·m (6.3 kgf·m, 13.9 lbf·ft)		72 N·m (7.3 kgf·m, 16.2 lbf·ft)	
	Battery		12 V, RC : 79 min, CCA : 433 A					
	Starting system		Electric starting with cell starter 12 V, 1.4 kW					
	Lubricating system		Forced lubrication by trochoidal pump					
	Cooling system		Pressurized radiator, forced circulation with water pump					
	Fuel		Diesel fuel No. 2-D [above −10 °C (14 °F)], Diesel fuel No. 1 [below −10 °C (14 °F)]					
Capacities	Fuel tank		28 L (7.4 U.S.gals, 6.2 Imp.gals)					
	Engine crankcase (with filter)		3.0 L (3.2 U.S.qts, 2.6 Imp.qts)					
	Engine coolant	ROPS	4.5 L (4.7 U.S.qts, 4.0 Imp.qts)					
		CABIN	–		5.2 L (5.5 U.S.qts, 4.6 Imp.qts)			
	Transmission case		Bi-Speed : 16.5 L (4.4 U.S.gals, 3.6 Imp.qts), No Bi-Speed : 15 L (4.0 U.S.gals, 3.3 Imp.qts)					
	Front axle case		3.7 L (3.9 U.S.qts, 3.3 Imp.qts)					
	Tire		Farm				Turf	
		Front	6 - 12B	6 - 12	6.00 - 12	7.00 - 12	22 x 8.50-12	24 x 8.5-12
		Rear	8 - 16	9.5 - 16	9.5 - 18	10.5 - 18	31 x 13.5-15	315/75D-15
Dimensions	Overall length (with 3P)	ROPS	2735 mm (107.7 in.)					
		CABIN	–		2835 mm (111.6 in.)			
	Overall width (min-tread)		1025 mm (40.4 in.)		1105 mm (43.5 in.)		1095 mm (43.1 in.)	
	Overall height	ROPS	2240 mm (88.2 in.)		2260 mm (89.0 in.)		2290 mm (90.2 in.)	
		CABIN	–		2060 mm (81.1 in.)		2090 mm (82.3 in.)	
	Wheel base		1500 mm (59.1 in.)					
	Minimum ground clearance		220 mm (8.7 in.)		240 mm (9.5 in.)		270 mm (10.6 in.)	
	Tread	Front	835 mm (32.9 in.)					
		Rear	800 to 970 mm (31.5 to 38.2 in.)		855 to 1075 mm (33.7 to 42.3 in.)		850 to 1095 mm (33.5 to 43.1 in.)	
Weight	ROPS		705 kg (1555 lbs)		720 kg (1588 lbs)		725 kg (1599 lbs)	
	CABIN		–		930 kg (2051 lbs)		935 kg (2062 lbs)	
Travelling system	Clutch		SAE 1-3/8, 6 splines					
	Steering		Hydrostatic power steering					
	Transmission		Gear shift (9 forward and 9 reverse)					
	Brake		Wet disk type					
	Min. turning radius (with brake)		2.1 m (6.9 feet)					
	Differential		Bevel gear					
Hydraulic system	Hydraulic control system		Position control					
	Pump capacity		3P : 20.5 L/min (5.4 gals/min) Power steering :15.4 L/min (4.1 gals/min)					
	Three point hitch		SAE Category 1					
	Max. lift force	At lift points	970 kg (2139 lbs)					
		24 in. behind lift points	760 kg (1676 lbs)					

NOTE: * Manufacture's estimate

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

W1037169

[Manual Transmission Model] (Continued)

Model			B1830	B2230	B2530
PTO system	Rear	PTO shaft	SAE 1-3/8, 6 splines		
		Revolution	1 speed (540 min^{-1} (rpm) at 2592 engine min^{-1} (rpm))		
	Mid	PTO shaft	U.S.A. No.5 (KUBOTA 10-tooth) involute spline		
		Revolution	1 speed (2500 min^{-1} (rpm) at 2600 engine min^{-1} (rpm))		

W1036972

TRAVELLING SPEEDS

[HST Model]

Model		B2230 / B2530					
Tire size (Rear)		8 - 16 Farm	9.5 - 16 Farm	9.5 - 18 Farm	10.5 - 18 Farm	31 × 13.5 -15 Turf	315 /75D -15 Turf
	Range gear shift lever	km/h (mile/h)					
Forward	Low	0 to 3.95 (0 to 2.5)	0 to 4.18 (0 to 2.6)	0 to 4.49 (0 to 2.8)	0 to 4.69 (0 to 2.9)	0 to 3.87 (0 to 2.4)	0 to 4.22 (0 to 2.6)
	Middle	0 to 7.35 (0 to 4.6)	0 to 7.77 (0 to 4.8)	0 to 8.34 (0 to 5.2)	0 to 8.73 (0 to 5.4)	0 to 7.19 (0 to 4.5)	0 to 7.85 (0 to 4.9)
	High	0 to 19.05 (0 to 11.8)	0 to 20.14 (0 to 12.5)	0 to 21.63 (0 to 13.4)	0 to 22.63 (0 to 14.1)	0 to 18.65 (0 to 11.6)	0 to 20.34 (0 to 12.6)
	Max. Speed (at 2850 engine rpm)	20.10 (12.5)	21.26 (13.2)	22.83 (14.2)	23.88 (14.8)	19.69 (12.2)	21.47 (13.3)
Reverse	Low	0 to 3.16 (0 to 2.0)	0 to 3.34 (0 to 2.1)	0 to 3.59 (0 to 2.2)	0 to 3.75 (0 to 2.3)	0 to 3.09 (0 to 1.9)	0 to 3.37 (0 to 2.1)
	Middle	0 to 5.88 (0 to 3.7)	0 to 6.21 (0 to 3.9)	0 to 6.68 (0 to 4.2)	0 to 6.98 (0 to 4.3)	0 to 5.75 (0 to 3.6)	0 to 6.28 (0 to 3.9)
	High	0 to 15.24 (0 to 9.5)	0 to 16.11 (0 to 10.0)	0 to 17.31 (0 to 10.8)	0 to 18.10 (0 to 11.2)	0 to 14.92 (0 to 9.3)	0 to 16.27 (0 to 10.1)
	Max. Speed (at 2850 engine rpm)	16.08 (10.0)	17.01 (10.6)	18.27 (11.4)	19.11 (11.9)	15.75 (9.8)	17.18 (10.7)

W1035065

Model		B3030	
Tire size (Rear)		12.4 - 16 Farm	13.6 - 16 Turf
	Range gear shift lever	km/h (mile/h)	
Forward	Low	0 to 4.59 (0 to 2.9)	0 to 4.73 (0 to 2.9)
	Middle	0 to 8.54 (0 to 5.3)	0 to 8.79 (0 to 5.5)
	High	0 to 22.15 (0 to 13.8)	0 to 22.80 (0 to 14.2)
	Max. Speed (at 2750 engine rpm)	23.43 (14.6)	24.11 (15.0)
Reverse	Low	0 to 3.67 (0 to 2.3)	0 to 3.78 (0 to 2.3)
	Middle	0 to 6.83 (0 to 4.2)	0 to 7.03 (0 to 4.4)
	High	0 to 17.72 (0 to 11.0)	0 to 18.24 (0 to 11.3)
	Max. Speed (at 2750 engine rpm)	18.74 (11.6)	19.29 (12.0)

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

W1033865

[Manual Transmission Model]

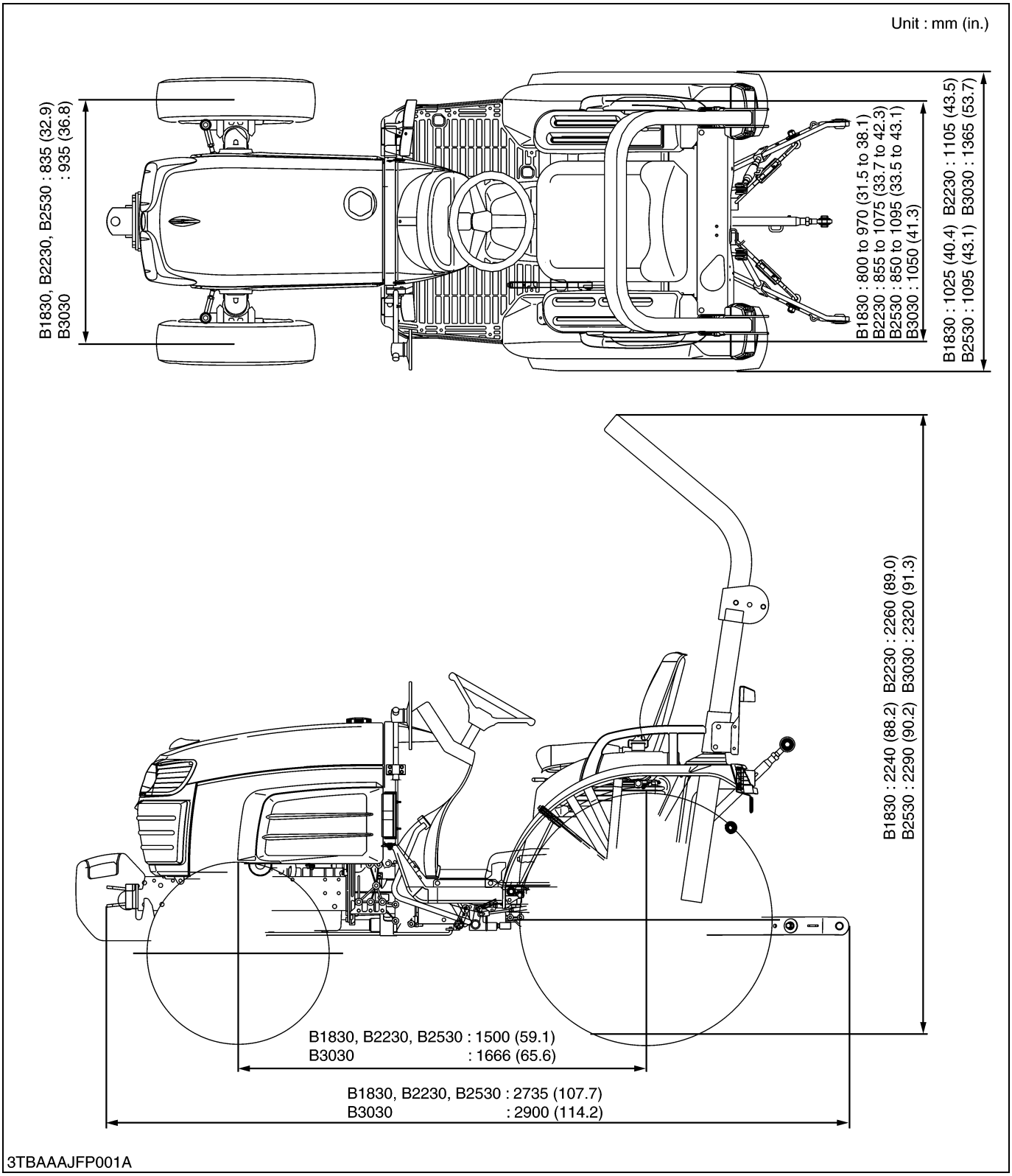
Model			B1830 / B2230 / B2530					
Tire size (Rear)			8 - 16 Farm	9.5 - 16 Farm	9.5 - 18 Turf	10.5 - 18 Farm	31 × 13.5-15 Turf	315 /75D-15 Turf
		Range gear shift lever	km/h (mile/h)					
Forward	1	Low	1.00 (0.6)	1.05 (0.7)	1.13 (0.7)	1.18 (0.7)	0.98 (0.6)	1.06 (0.7)
	2		1.65 (1.0)	1.75 (1.1)	1.88 (1.2)	1.96 (1.2)	1.62 (1.0)	1.77 (1.1)
	3		2.57 (1.6)	2.71 (1.7)	2.91 (1.8)	3.05 (1.9)	2.51 (1.6)	2.74 (1.7)
	4	Middle	1.85 (1.1)	1.96 (1.2)	2.11 (1.3)	2.20 (1.4)	1.82 (1.1)	1.98 (1.2)
	5		3.07 (1.9)	3.25 (2.0)	3.49 (2.2)	3.65 (2.3)	3.01 (1.9)	3.28 (2.0)
	6		4.77 (3.0)	5.05 (3.1)	5.42 (3.4)	5.67 (3.5)	4.67 (2.9)	5.10 (3.2)
	7	High	6.65 (4.1)	7.03 (4.4)	7.55 (4.7)	7.90 (4.9)	6.51 (4.0)	7.10 (4.4)
	8		11.03 (6.9)	11.67 (7.3)	12.53 (7.8)	13.11 (8.1)	10.80 (6.7)	11.78 (7.3)
	9		17.12 (10.6)	18.10 (11.2)	19.44 (12.1)	20.34 (12.6)	16.76 (10.4)	18.28 (11.4)
		Max. Speed (at 2850 engine rpm)	18.07 (11.2)	19.11 (11.9)	20.52 (12.8)	21.47 (13.3)	17.69 (11.0)	19.30 (12.0)
Reverse	1	Low	1.01 (0.6)	1.07 (0.7)	1.14 (0.7)	1.20 (0.7)	0.99 (0.6)	1.08 (0.7)
	2		1.67 (1.0)	1.77 (1.1)	1.90 (1.2)	1.99 (1.2)	1.64 (1.0)	1.78 (1.1)
	3		2.59 (1.6)	2.74 (1.7)	2.95 (1.8)	3.08 (1.9)	2.54 (1.6)	2.77 (1.7)
	4	Middle	1.87 (1.2)	1.98 (1.2)	2.13 (1.3)	2.23 (1.4)	1.84 (1.1)	2.00 (1.2)
	5		3.11 (1.9)	3.29 (2.0)	3.53 (2.2)	3.69 (2.3)	3.04 (1.9)	3.32 (2.1)
	6		4.82 (3.0)	5.10 (3.2)	5.48 (3.4)	5.73 (3.6)	4.72 (2.9)	5.15 (3.2)
	7	High	6.73 (4.2)	7.11 (4.4)	7.64 (4.7)	7.99 (5.0)	6.58 (4.1)	7.18 (4.5)
	8		11.15 (6.9)	11.80 (7.3)	12.67 (7.9)	13.25 (8.2)	10.92 (6.8)	11.91 (7.4)
	9		17.31 (10.8)	18.30 (11.4)	19.66 (12.2)	20.56 (12.8)	16.95 (10.5)	18.49 (11.5)
		Max. Speed (at 2850 engine rpm)	18.27 (11.4)	19.32 (12.0)	20.75 (12.9)	21.71 (13.5)	17.89 (11.1)	19.51 (12.1)

W1034824

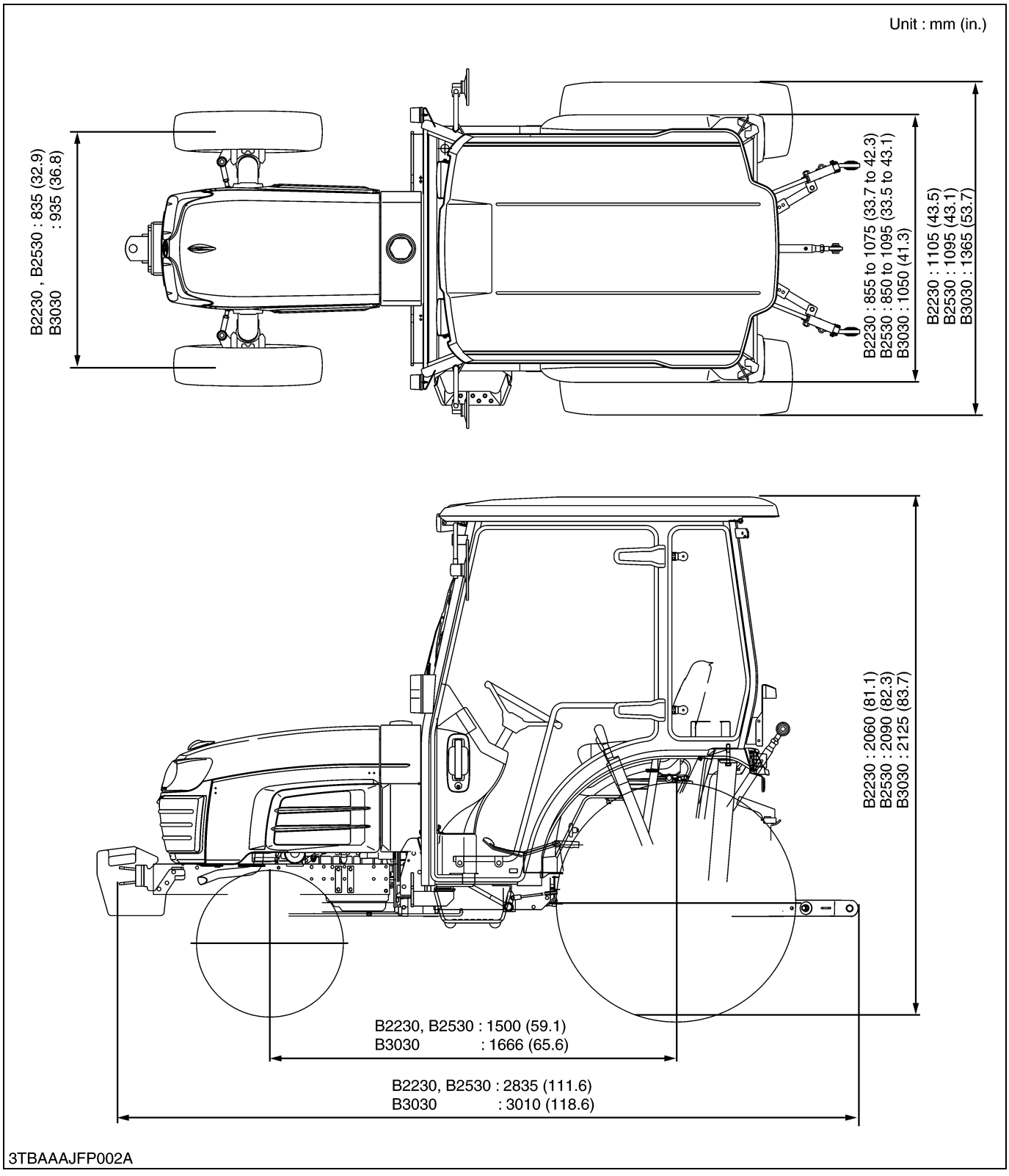
https://truckmanualshub.com/

DIMENSIONS

[ROPS]



[CABIN]


Unit : mm (in.)
B2230 , B2530 : 835 (32.9)
B3030 : 935 (36.8)
B2230 : 855 to 1075 (33.7 to 42.3)
B2530 : 850 to 1095 (33.5 to 43.1)
B3030 : 1050 (41.3)
B2230 : 1105 (43.5)
B2530 : 1095 (43.1)
B3030 : 1365 (53.7)
B2230 : 2060 (81.1)
B2530 : 2090 (82.3)
B3030 : 2125 (83.7)
B2230, B2530 : 1500 (59.1)
B3030 : 1666 (65.6)
B2230, B2530 : 2835 (111.6)
B3030 : 3010 (118.6)
3TBAAAJFP002A

https://truckmanualshub.com/

G GENERAL

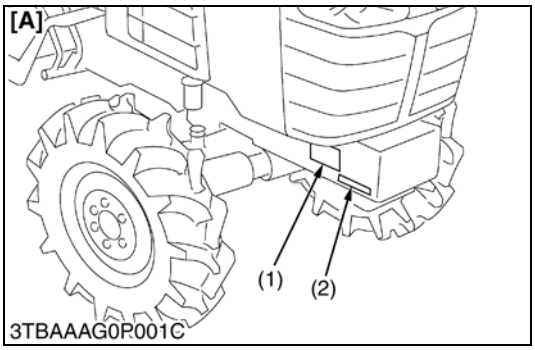
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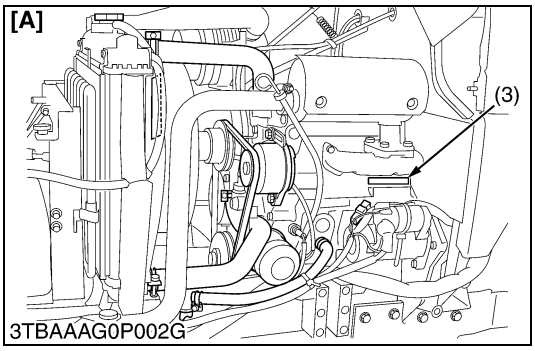
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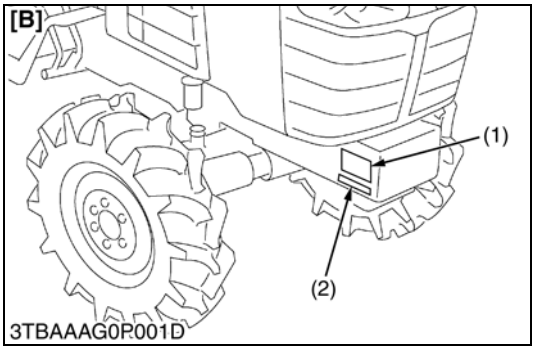
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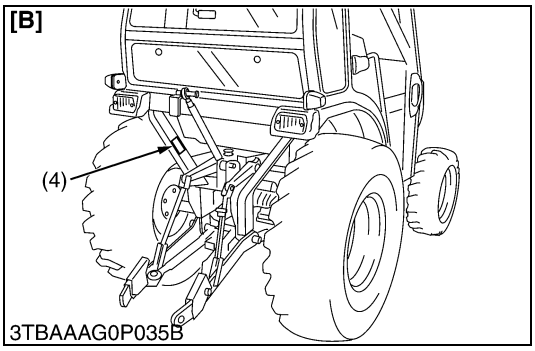
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1. TRACTOR IDENTIFICATION











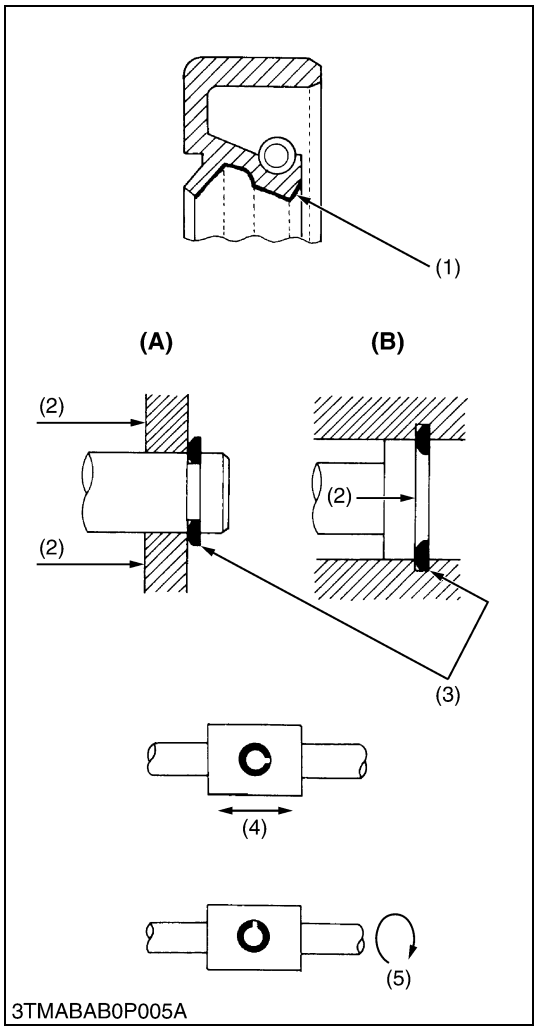
When contacting your local KUBOTA distributor, always specify engine serial number, tractor serial number and hour meter reading.

(1) Tractor Identification Plate
(2) Tractor Serial Number
(3) Engine Serial Number
(4) CABIN Identification Plate (CABIN Serial Number)

[A] ROPS
[B] CABIN

W1010590

2. GENERAL PRECAUTIONS



3TMABAB0P005A

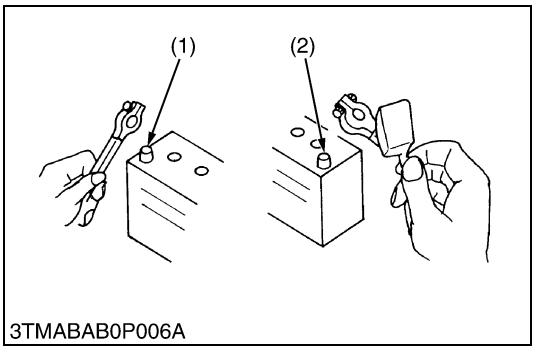
- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be installed in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently 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

W10109040

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



3TMABAB0P006A

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

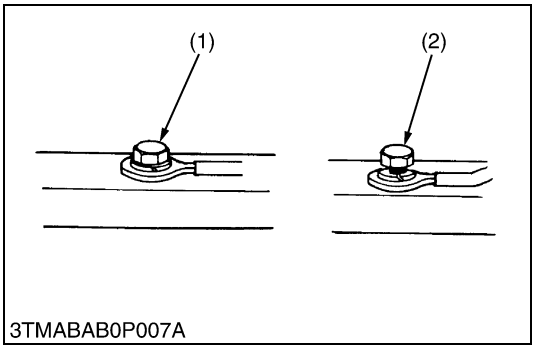
■ **IMPORTANT**

- **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.**

(1) Negative Terminal (2) Positive Terminal

W10111140

[1] WIRING

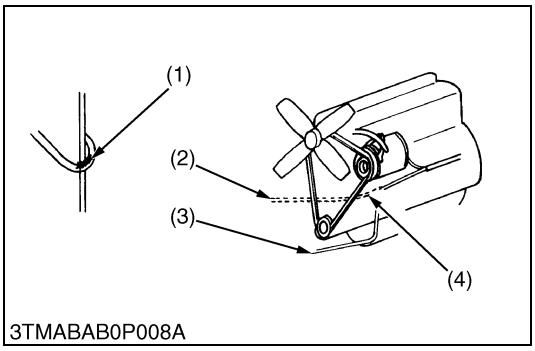


3TMABAB0P007A

- Securely tighten wiring terminals.

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

W10112160

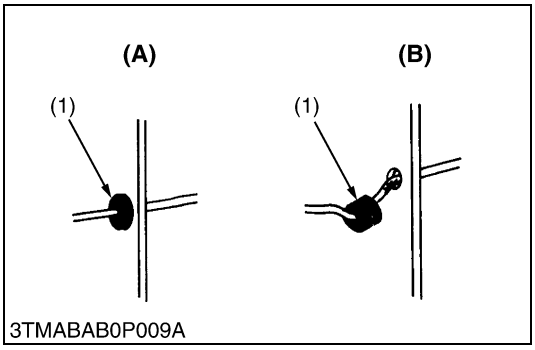


3TMABAB0P008A

- Do not let wiring contact dangerous part.

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

W10113130

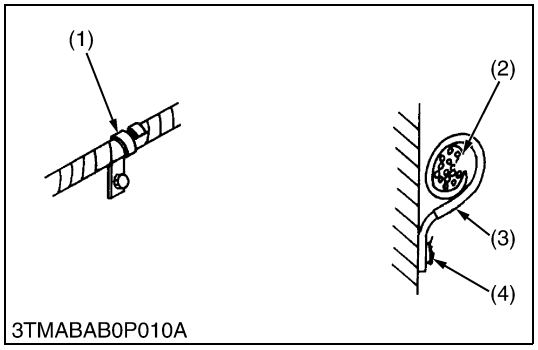


3TMABAB0P009A

- Securely insert grommet.

(1) Grommet **(A) Correct** **(B) Incorrect**

W10113880

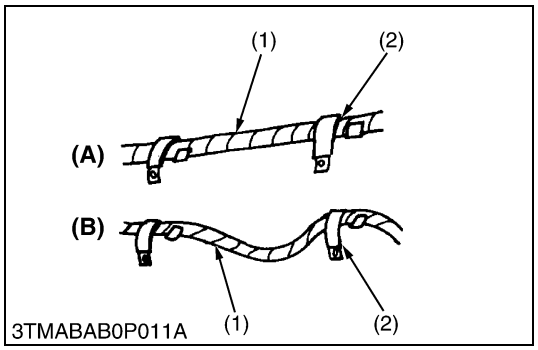


3TMABAB0P010A

- Securely clamp, being careful not to damage wiring.

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

W10114580

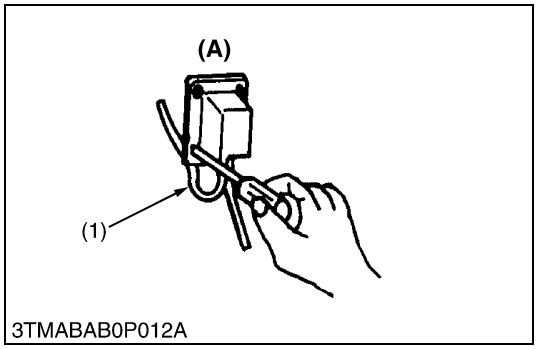


3TMABAB0P011A

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

(1) Wiring
(2) Clamp
(A) Correct
(B) Incorrect

W10115870

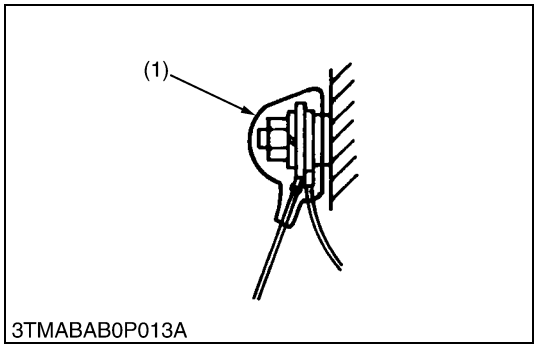


3TMABAB0P012A

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

(1) Wiring
(A) Incorrect

W10116700



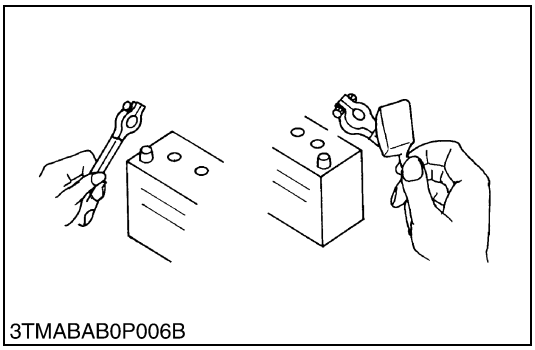
3TMABAB0P013A

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

(1) Cover
  • Securely Install Cover

W10117350

[2] BATTERY


3TMABAB0P006B

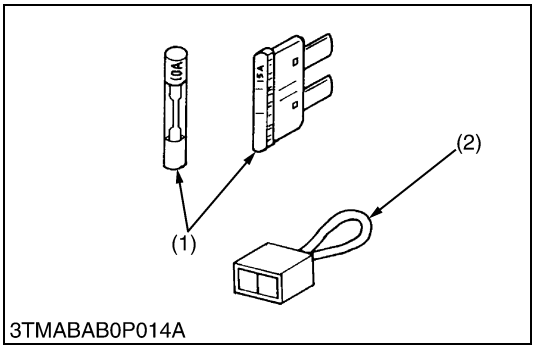
- Take care not to confuse positive and negative terminal posts.
- When removing battery cables, disconnect negative cable first. When installing battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After connecting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

W10118160

[3] FUSE



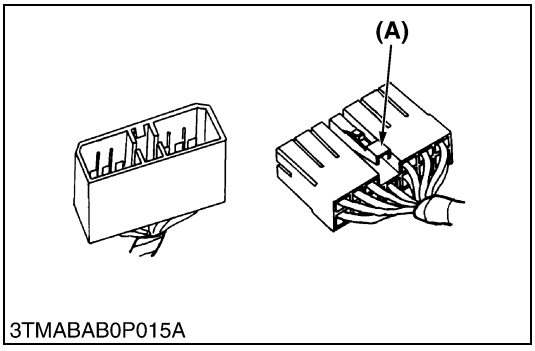
3TMABAB0P014A

- 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

W10120920

[4] CONNECTOR

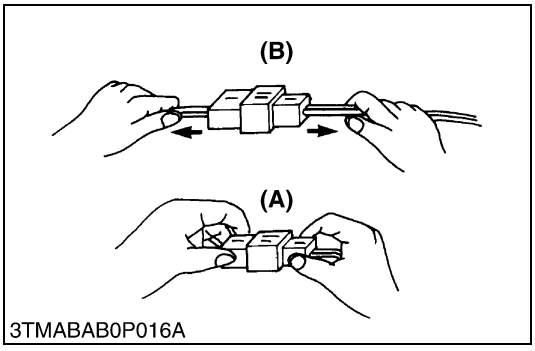


3TMABAB0P015A

- For connector with lock, push lock to separate.

(A) Push

W10122110

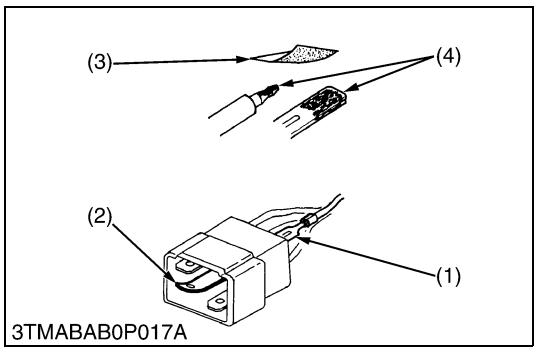


3TMABAB0P016A

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

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

W10122720

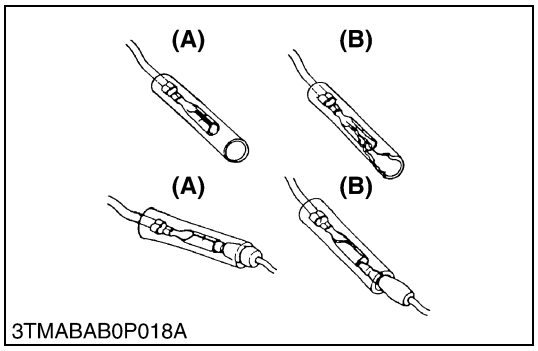


3TMABAB0P017A

- 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

W10123460

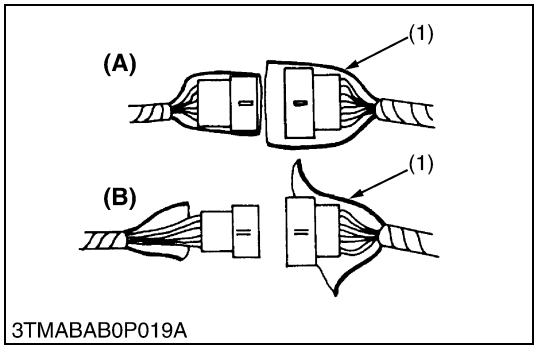


3TMABAB0P018A

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

(A) Correct
(B) Incorrect

W10124300



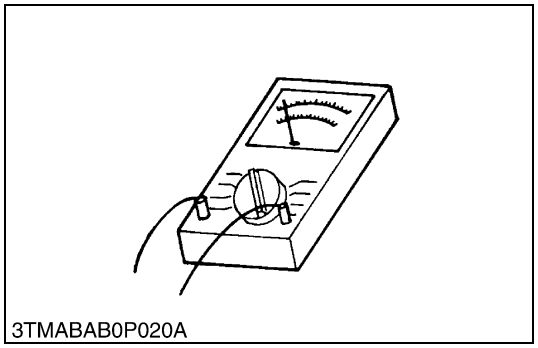
3TMABAB0P019A

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

(1) Cover
(A) Correct
(B) Incorrect

W10125190

[5] HANDLING OF CIRCUIT TESTER


3TMABAB0P020A

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

W10126840

4. LUBRICANTS FUEL AND COOLANT

No.	Place		Capacity				Lubricants, fuel and coolant
			B1830 B2230 B2530 ROPS	B2230 B2530 CABIN	B3030 ROPS	B3030 CABIN	
1	Fuel tank		27 L 7.1 U.S.gals 5.9 lmp.gals		31 L 8.1 U.S.gals 6.8 lmp.gals		No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below –10 °C (14 °F)
2	Coolant (with recovery tank)		4.5 L 4.7 U.S.qts 4.0 lmp.qts	5.2 L 5.5 U.S.qts 4.6 lmp.qts	4.5 L 4.7 U.S.qts 4.0 lmp.qts	5.2 L 5.5 U.S.qts 4.6 lmp.qts	Fresh clean water with anti-freeze
3	Engine crankcase (with filter)		3.0 L 3.2 U.S.qts 2.6 lmp.qts		4.1 L 4.3 U.S.qts 3.6 lmp.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
4	Trans-mission case	HST Type	17 L 4.5 U.S.gals 3.7 lmp.gals		17 L 4.5 U.S.gals 3.7 lmp.gals		KUBOTA UDT or KUBOTA SUPER UDT fluid*
		Manual Transmission Type [with Bi-Speed Turn]	16.5 L 4.4 U.S.gals 3.6 lmp.gals		–		
		Manual Transmission Type [without Bi-Speed Turn]	15 L 4.0 U.S.gals 3.3 lmp.gals		–		
5	Front axle case		3.7 L 3.9 U.S.qts 3.3 lmp.qts		4.7 L 5.0 U.S.qts 4.1 lmp.qts		KUBOTA UDT or KUBOTA SUPER UDT fluid or SAE80, SAE90 gear oil
6	Washer liquid tank		–	1.5 L 0.40 U.S.qts 0.33 lmp.qts	–	1.5 L 0.40 U.S.qts 0.33 lmp.qts	Automobile washer liquid

Greasing

	Place	No. of greasing point	Capacity	Type of grease
7	Top link	1	Until grease overflows.	Multi-purpose type grease NLGI-2 or NLGI-1 (GC-LB)
	Lift rod [RH]	1		
	Speed control pedal	1 [HST Type]		
	Battery terminals	2	Moderate amount	

* KUBOTA original transmission hydraulic fluid.

5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Screws, bolts and nuts whose tightening torques 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	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6 (6 mm, 0.24 in.)	7.85 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

W1034542

[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit / Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
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 CHECK LIST

No.	Item \ Period		Service Interval														Interval	Important		Reference page
			Daily	50	100	150	200	250	300	350	400	450	500	550	600	650				
1	Clogging of air conditioner condenser screen ▲	Clean	☆														Daily			G-12
2	Engine oil	Change		★	☆		☆		☆		☆		☆		☆		every 100 Hr			G-13, G-19
3	Engine oil filter	Replace		★			☆				☆				☆		every 200 Hr			G-13, G-26
4	Transmission oil filter	Replace		★					☆						☆		every 300 Hr			G-14, G-30
5	Transmission fluid	Change		★					☆						☆		every 300 Hr			G-15, G-29
6	Front axle case oil	Change							☆						☆		every 300 Hr			G-30
7	Front axle pivot	Adjust									☆						every 400 Hr			G-31
8	Engine start system	Check		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr			G-17
9	Greasing	–		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr			G-18
10	Wheel bolt torque	Check		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr			G-18
11	Battery condition	Check			☆		☆		☆		☆		☆		☆		every 100 Hr	*4		G-20
12	Air cleaner element [Double element type] Primary element	Clean			☆		☆		☆		☆		☆		☆		every 100 Hr	*1	@	G-22
		Replace															every 1 year	*2		G-35
	Air cleaner element [Double element type] Secondary element	Replace															every 1 year			G-35
13	Fuel filter element	Check			☆		☆		☆		☆		☆		☆		every 100 Hr		@	G-23
		Replace									☆						every 400 Hr			G-31
14	Fan belt	Adjust			☆		☆		☆		☆		☆		☆		every 100 Hr			G-23
15	Clutch	Adjust		★	☆		☆		☆		☆		☆		☆		every 100 Hr			G-16 G-19
16	Brake	Adjust			☆		☆		☆		☆		☆		☆		every 100 Hr			G-24
17	Parking brake	Adjust			☆		☆		☆		☆		☆		☆		every 100 Hr			G-24
18	Radiator hose and clamp	Check					☆				☆				☆		every 200 Hr			G-26
		Replace															every 2 years			G-37
19	Fuel line	Check			☆		☆		☆		☆		☆		☆		every 100 Hr		@	G-25
		Replace															every 2 years	*3		G-37
20	Intake air line	Check					☆				☆				☆		every 200 Hr		@	G-27
		Replace															every 2 years	*3		G-37

W1035769

No.	Item / Period		Service Interval														Interval	Important		Reference page
			Daily	50	100	150	200	250	300	350	400	450	500	550	600	650				
21	Toe-in	Adjust					☆				☆				☆		every 200 Hr			G-27
22	Tension of air conditioner drive belt ▲	Adjust					☆				☆				☆		every 200 Hr			G-27
23	Clogging of inner air filter ▲	Clean					☆				☆				☆		every 200 Hr			G-28
24	Clogging of fresh air filter ▲	Clean					☆				☆				☆		every 200 Hr			G-28
25	Clogging of air conditioner condenser ▲	Check					☆				☆				☆		every 200 Hr			G-28
26	Engine valve clearance	Adjust															every 800 Hr			G-32
27	Air conditioner pipes and hoses ▲	Check															every 1 year			G-36
28	CAB isolation cushion ▲	Check															every 1 year			G-36
29	Fuel injection nozzle injection	Check															every 1500 Hr		@	G-34
30	Injection pump	Check															every 3000 Hr		@	–
31	Cooling system	Flush															every 2 years			G-38
32	Coolant	Change															every 2 years			G-38
33	Fuel system	Bleed															Service as required			G-41
34	Clutch housing water	Drain																		G-41
35	Fuse	Replace																		G-42
36	Light bulb	Replace																		G-44
37	Washer liquid ▲	Check																		G-41
38	Amount of refrigerant (gas) ▲	Check																		G-46

■ IMPORTANT

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

W1052606

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.**

[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 condition of seat belt and ROPS attaching hardware.
7. Check and clean the radiator screen and grill.
8. Check the screws and nuts of tires are tight.
9. Check the number plate.
10. Care of danger, warning and caution labels.
11. Clean around the exhaust manifold and the muffler of the engine.

- While sitting on the operator's seat

1. Check the HST pedal, brake pedals.
2. Check the parking brake.
3. Check the steering wheel.

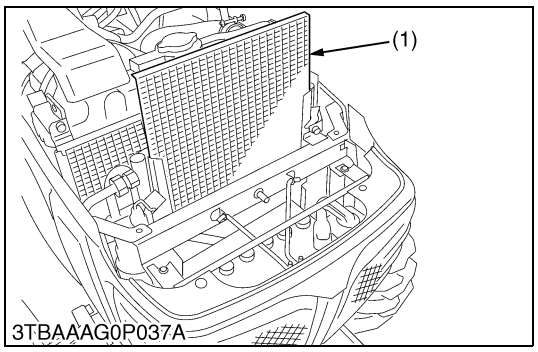
- Turning the key switch

1. Check the performance of the easy checker lights.
2. Check the 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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Cleaning Air Conditioner Condenser Screen (CABIN)

CAUTION

- **Be sure to stop the engine before removing the screen.**

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

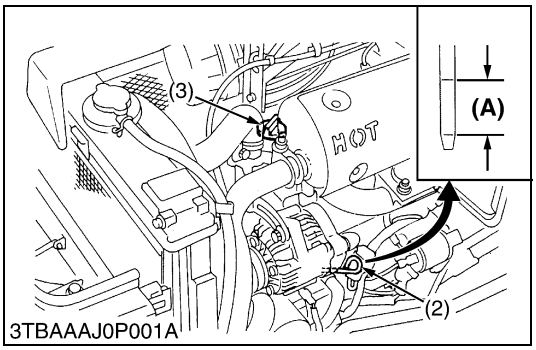
■ **IMPORTANT**

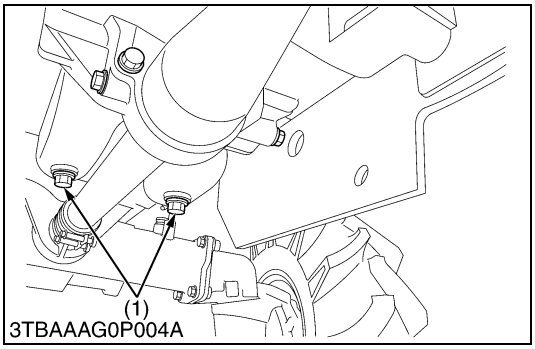
- **Grill and screen must be clean from debris to prevent engine from overheating and to allow good air intake for air cleaner.**

(1) Air Conditioner Condenser Screen

W1057600

[2] CHECK POINTS OF INITIAL 50 HOURS





Changing Engine Oil

CAUTION

- **Before changing oil, be sure to stop the engine.**

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw in the drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

■ **IMPORTANT**

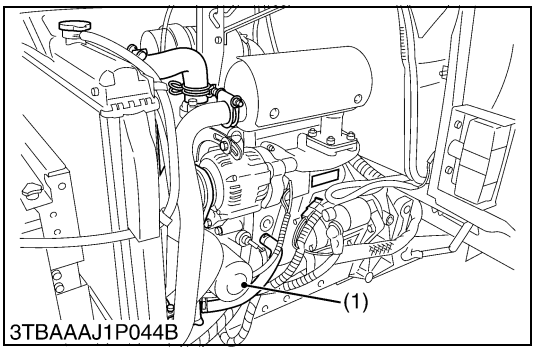
- **When using an oil of different manufacture or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Use the proper SAE Engine Oil according to ambient temperatures.**
- **Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)**

Engine oil capacity	B1830, B2230, B2530	3.0 L 3.2 U.S.qts 2.6 Imp.qts
	B3030	4.1 L 4.3 U.S.qts 3.6 Imp.qts

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

(A) Oil level is acceptable within this range.

W1014065



Replacing Engine Oil Filter Cartridge

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.**

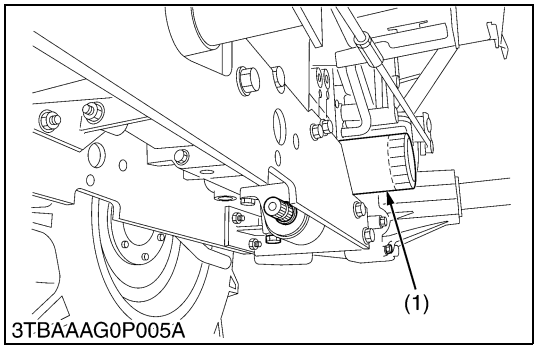
1. Remove the oil filter cartridge with the filter wrench.
2. Apply a slight coat of oil onto the rubber seal of new filter.
3. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
4. After the new cartridge has been replaced, the engine oil normally decrease a little. Thus see that the engine oil does not leak through the seal and be sure to read the oil level on the dipstick. Then, replenish the engine oil up to the specified level.

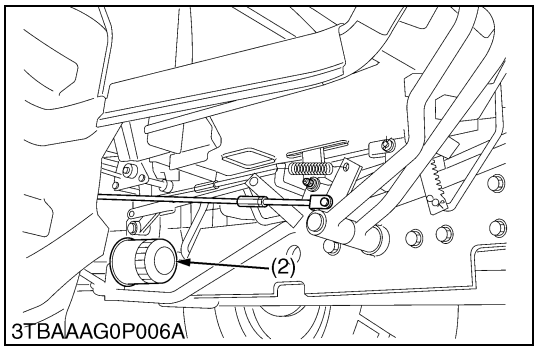
■ **IMPORTANT**

- **To prevent serious damage to the engine, replacement filter must be highly efficient. Use only a KUBOTA genuine filter or its equivalent.**

(1) Engine Oil Filter Cartridge

W1014316





Replacing Transmission Oil Filter Cartridge

CAUTION

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

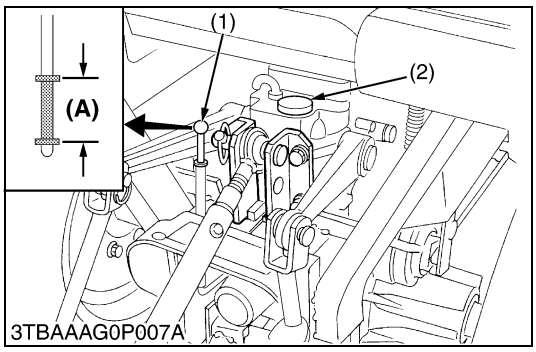
1. Drain the transmission fluid.
2. Remove the both oil filter cartridges by using a filter wrench.
3. Apply a slight coat of oil onto the new cartridge gasket.
4. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
5. After the new cartridge has been replaced, the transmission fluid level will normally decrease slightly. Make sure that the transmission fluid does not leak through the seal. Check the fluid level.

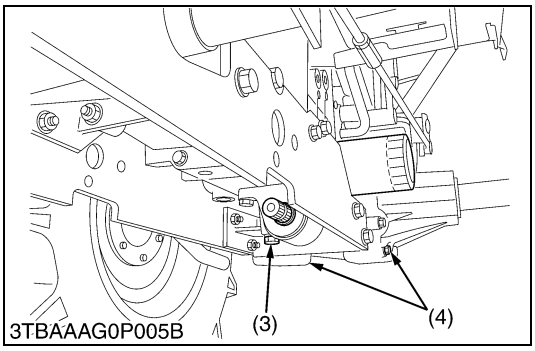
■ **IMPORTANT**

- **To prevent serious damage to the hydraulic system. Use only a genuine KUBOTA filter or its equivalents.**

(1) Hydraulic Oil Filter Cartridge (for HST)
(2) Hydraulic Oil Filter Cartridge

W1014458





Changing Transmission Fluid

CAUTION

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

1. Place an oil pan under the tractor.
2. Remove the drain plugs (3), (4) at the bottom of the transmission case and the rear axles.
3. Drain the transmission fluid.
4. After draining, screw in the drain plug.
5. Fill new oil from filling port after removing the filling plug (2) up to the upper notch on the dipstick (1).
6. After running the engine for a few minutes, stop it and check the oil level again, if low, add oil to the prescribed level.

■ IMPORTANT

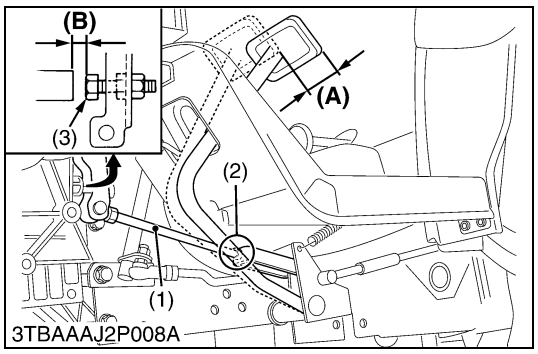
- **Use only multi-grade transmission oil. Use of other oils may damage the transmission or hydraulic system.**
  Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7.)
- **Never work the tractor immediately after changing the transmission oil. Keeping the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030HST	17 L 4.5 U.S.gals 3.7 Imp.gals

(1) Dipstick
(2) Filling Plug
(3) Drain Plug
(4) Drain Plug (Rear Axle Case)

(A) Oil level is acceptable within this range.

W1014665



Adjusting Clutch Pedal Free Travel

1. Stop the engine and remove the key.
2. Slightly depress the clutch pedal and measure free travel at the top of pedal stroke.
3. If adjustment is needed, loosen the lock nut (2) and turn the clutch rod (1) to adjust the rod length within acceptable limits.
4. Retighten the lock nut (2).
5. After adjusting, release the clutch pedal and check the clearance **(B)**. If adjustment is needed, adjust the clearance B with the bolt (3).

■ **NOTE**

- **After adjustment, sure the stopper bolt with the lock nut (3).**

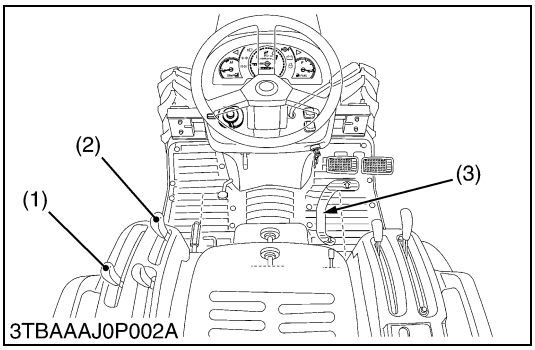
Clutch pedal free travel **(A)**	Factory spec.	20 to 30 mm 0.79 to 1.18 in.

(1) Clutch Pedal Rod
(2) Lock Nut
(3) Bolt

(A) Clutch pedal free travel
(B) Clearance (About 8.5 mm, 0.34 in.)

W10317160

[3] CHECK POINTS OF EVERY 50 HOURS



Checking Engine Start System (HST Model)

CAUTION

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

■ **Preparation before testing.**

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

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

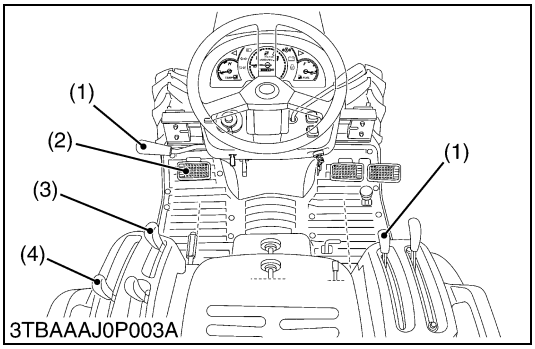
1. Depress the speed control pedal.
2. Turn the key to "**START**" position.
3. The engine must not crank.

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

1. Place the speed control pedal in "**NEUTRAL**" position.
2. Shift the PTO clutch lever to "**ON**" position.
3. Turn the key to "**START**" position.
4. The engine must not crank.

(1) Range Gear Shift Lever (L-M-H)
(2) PTO Clutch Lever
(3) Speed Control Pedal

W1014904



Checking Engine Start System (Manual Transmission Model)

CAUTION

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

■ **Preparation before testing.**

1. Sit on the operator's seat.
2. Set the parking brake and stop the engine.
3. Place the shuttle shift lever in "**NEUTRAL**" position.
4. Shift the PTO ON-OFF lever to "**OFF**" position.

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

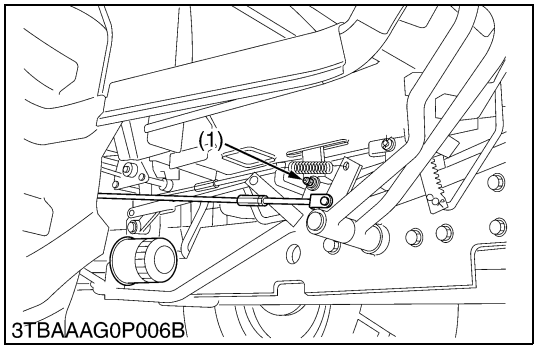
1. Shift the shuttle shift lever to the forward or reverse position.
2. Fully depress the clutch pedal and turn the key to "**START**" position.
3. The engine must not crank.

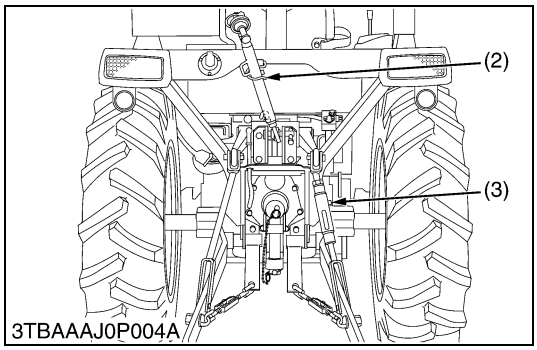
■ **Test : Switch for the PTO ON-OFF lever**

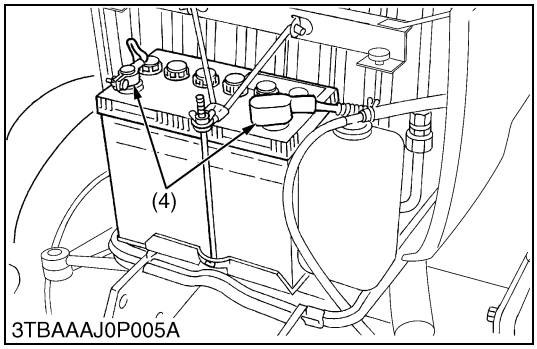
1. Engage the PTO ON-OFF lever to "**ON**" position.
2. Shift the shuttle shift lever to the "**NEUTRAL**" position.
3. Turn the key to "**START**" position.
4. The engine must not crank.

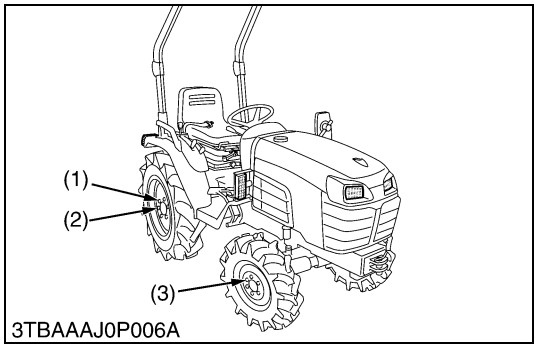
(1) Shuttle Shift Lever
(2) Clutch Pedal
(3) PTO ON-OFF Lever
(4) Range Gear Shift Lever (L-M-H)

W1032247









Greasing

1. Apply a small amount of multipurpose grease to the positions as shown in the figures.

(1) Speed Control Pedal (HST Pedal)
(2) Top Link
(3) Lifting Rod (RH)
(4) Battery Terminal

W1015242

Checking Wheel Mounting Bolts and Nuts Tightening Torques

CAUTION

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

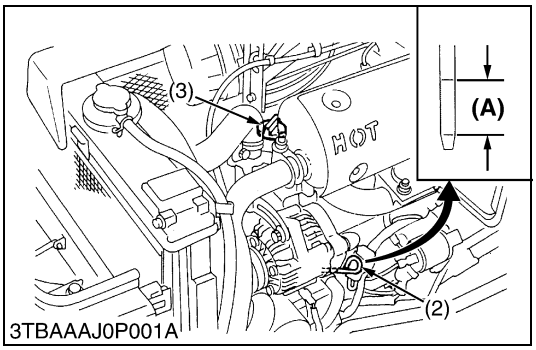
1. Check wheel bolts and nuts regularly especially when new. If they are loose, tighten them as follows.

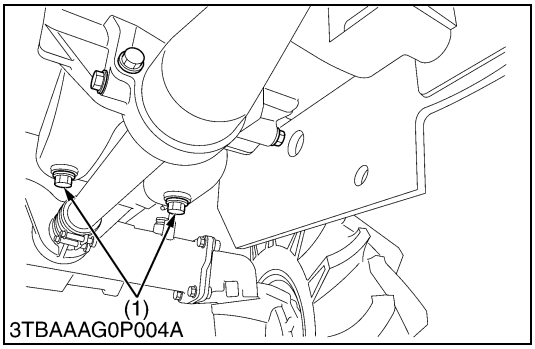
Tightening torque	Front wheel mounting nut	77 to 90 N·m 7.9 to 9.2 kgf·m 57 to 67 lbf·ft
	Rear wheel mounting bolt	196 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nut	167 to 191 N·m 17 to 19.5 kgf·m 123 to 141 lbf·ft

(1) Rear Wheel Mounting Bolt
(2) Rear Wheel Mounting Nut
(3) Front Wheel Mounting Nut

W1015311

[4] CHECK POINTS OF EVERY 100 HOURS





Changing Engine Oil

CAUTION

- **Before changing oil, be sure to stop the engine.**

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw in the drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

■ **IMPORTANT**

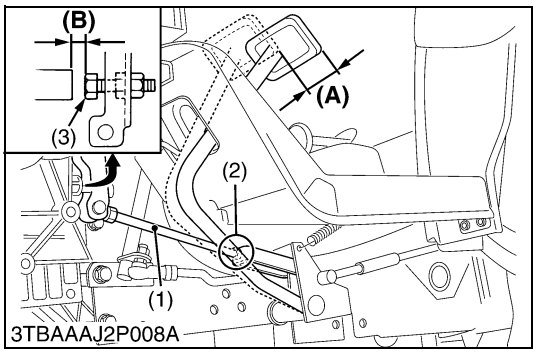
- **When using an oil of different manufacture or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Use the proper SAE Engine Oil according to ambient temperatures.**
- **Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)**

Engine oil capacity	B1830, B2230, B2530	3.0 L 3.2 U.S.qts 2.6 lmp.qts
	B3030	4.1 L 4.3 U.S.qts 3.6 lmp.qts

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

(A) Oil level is acceptable within this range.

W1032767



Adjusting Clutch Pedal Free Travel

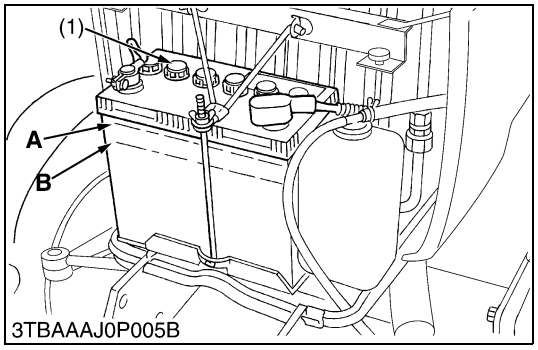
1. Stop the engine and remove the key.
2. Slightly depress the clutch pedal and measure free travel at the top of pedal stroke.
3. If adjustment is needed, loosen the lock nut (2) and turn the clutch rod (1) to adjust the rod length within acceptable limits.
4. Retighten the lock nut (2).
5. After adjusting, release the clutch pedal and check the clearance **(B)**. If adjustment is needed, adjust the clearance B with the bolt (3).

Clutch pedal free travel **(A)**	Factory spec.	20 to 30 mm 0.79 to 1.18 in.

(1) Clutch Pedal Rod
(2) Lock Nut
(3) Bolt

(A) Clutch pedal free travel
(B) Clearance (About 8.5 mm, 0.34 in.)

W10329950



Checking Battery Condition

DANGER

- **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.**
- **Wear eye protection and rubber gloves when working around battery.**

■ **NOTE**

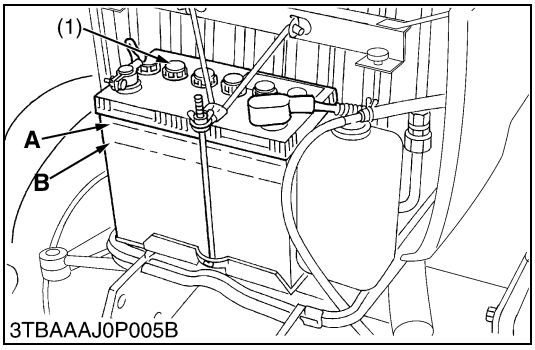
- **The factory-installed battery is of non-refillable type. If the indicator turns white, do not charge the battery but replace it with new one.**

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

(1) Vent Cap

A : Upper Level
B : Lower Level

W1015551



Checking Battery Condition (Continued)

CAUTION

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

1. Make sure each electrolyte level is to the bottom of vent wells, if necessary add distilled water in a well-ventilated area.
2. The water in the electrolyte evaporates during recharging. Liquid shortage damages the battery. Excessive liquid spills over and damages the tractor body.
3. To slow charge the battery, connect the battery positive terminal to the charger positive terminal and the negative to the negative, then recharge in the normal manner.
4. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in s short time.
   When using a boost-charged battery, it is necessary to recharge the battery as early as possible.
   Failure to do this will shorten the battery's service life.
5. When the specific gravity of electrolyte is between 1.27 and 1.29, the charging is completed.
6. When exchanging an old battery for a new one, use battery of equal specification shown in **TABLE 1**.

Table 1

Battery type	Volts (V)	Capacity at 5H.R	Reserve at (min)	Cold cranking amps	Normal charging rate (A)
55B24L (S)-MF	12	36	79	433	4.5

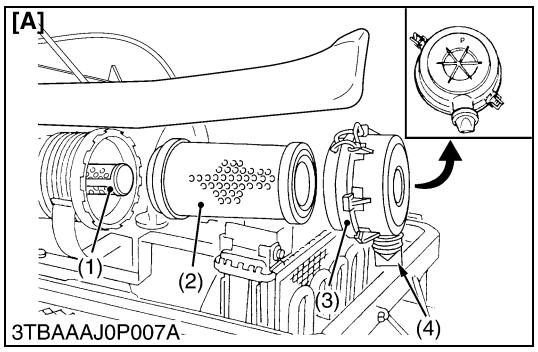
■ Battery Storage

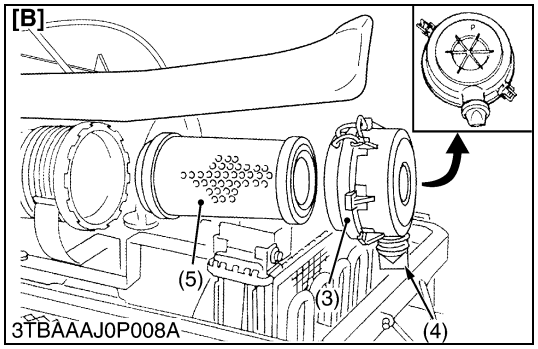
1. When storing the tractor for a long period, remove the battery from tractor, adjust the electrolyte to the proper level and store in a dry place out of direct sunlight.
2. The battery self-discharges while it is stored.
   Recharge it once every three months in hot seasons and once every six months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

(1) Vent Cap

A : Upper Level
B : Lower Level

W1019057





Cleaning Air Cleaner Primary Element

1. Remove the air cleaner cover (3) and element (primary) (5) or (2).
2. Clean the element (primary) (2) :
   - When dry dust adheres to the element, blow compressed air from the inside, turning the element. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2, 30 psi).
   - When carbon or oil adheres to the element, soak the element in detergent for 15 minutes then wash it several times in water, rinse with clean water and dry it naturally. After element is fully dried, inspect inside of the element with a light and check if it is damaged or not.
3. When replacing the air cleaner element (primary) (2), replace the secondary element (4) as well :
   Once a year or after every six times of cleaning, whichever comes first.

■ **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 cup) upright. If the dust cup 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.**
- **To prevent serious damages to the engine, use only a KUBOTA genuine filter.**

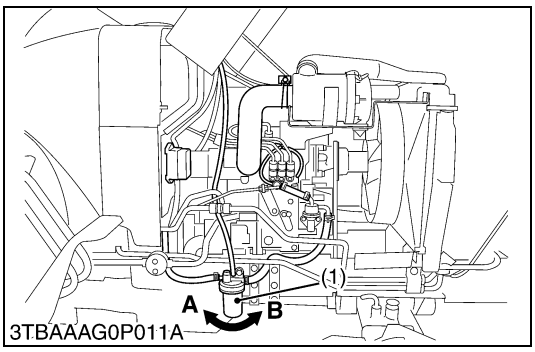
■ **Evacuator Valve**

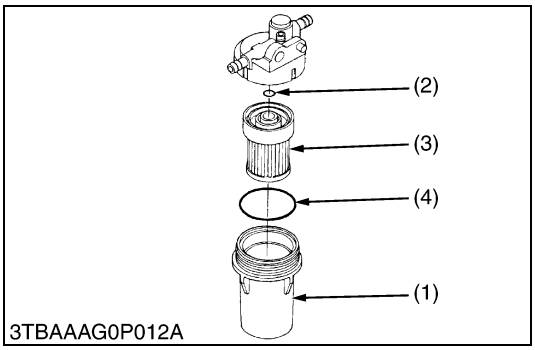
Open the evacuator valve (4) once a week under ordinary conditions or daily when used in a dusty place to get rid of large particles of dust and dirt.

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

[A] Double Element Type
[B] Single Element Type

W1017166





Cleaning Fuel Filter Element

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

1. Place the oil pan underneath the fuel filter.
   Loosen and remove the filter bowl, and rinse the inside with kerosene.
2. Take out the element and dip it in the kerosene to rinse.
3. After cleaning, reassemble the fuel filter, keeping out dust and dirt.
4. Bleed the fuel system. (Refer to page G-41.)

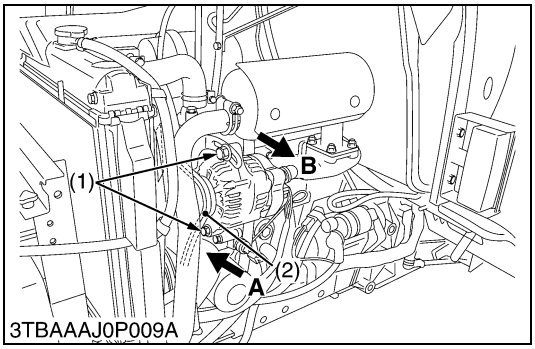
■ **IMPORTANT**

- **When the fuel filter bowl has been removed, fuel stops flowing from the fuel tank. If the fuel tank is almost full, however, the fuel will flow back from the fuel return pipe to the fuel filter. Before checking, make sure the fuel tank is less than half-full.**
- **If dust, dirt or water 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 Filter Bowl
(2) O-ring
(3) Fuel Filter Element
(4) O-ring

A : Loosen
B : Tighten

W1017546



Adjusting Fan Belt Tension

CAUTION

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

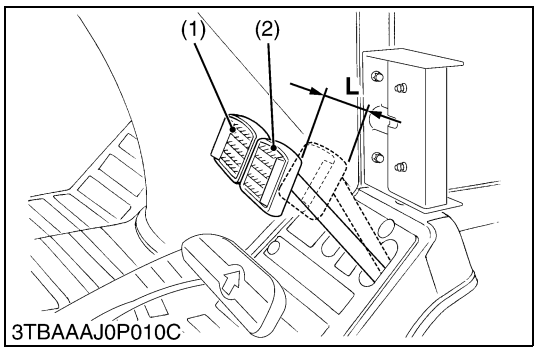
1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within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

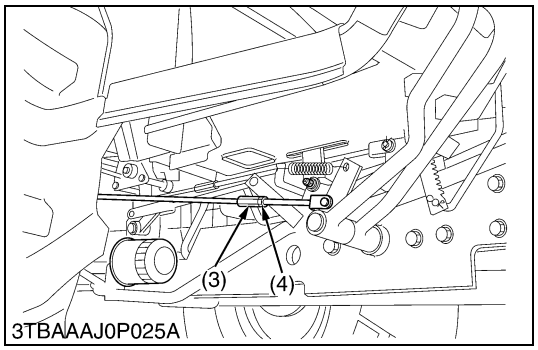
Fan belt tension	Factory spec.	A deflection of between 7 to 9 mm (0.28 to 0.34 in.) when the belt is pressed in the middle of the span.

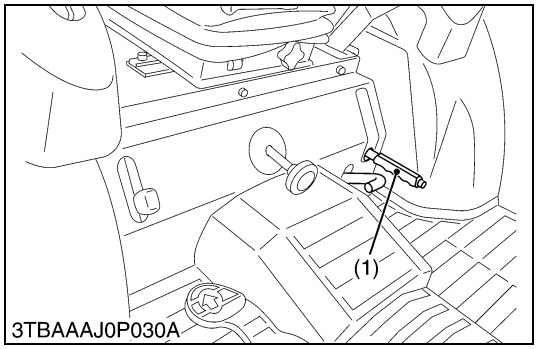
(1) Adjusting Screw
(2) Fan Belt

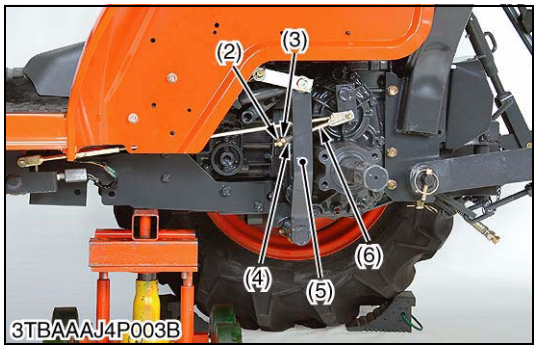
A : Check the belt tension
B : To tighten

W1017708









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 at the top of pedal stroke.
3. If adjustment is needed, loosen the lock nut and turn the turnbuckle to adjust the rod length within acceptable limits.
4. Retighten the lock nut.

Proper brake pedal free travel	30 to 40 mm on the pedal
	Keep the free travel in the right and left brake pedals equal.

(1) Brake Pedal (LH)
(2) Brake Pedal (RH)
(3) Turnbuckle
(4) Lock Nut

L : Free Travel

W1055914

Checking Parking Brake Lever Travel

1. Pull the parking brake lever (1) to the parking position while counting the ratchet sound made by the parking brake lever (1).
2. If the counted ratchet sound is not within the factory specification, adjust the parking brake lever travel.

CAUTION

- **Stop the engine and remove the key, and the chock wheels before checking parking brake.**

Parking brake lever travel	Factory spec.	4 to 5 notches

(When adjusting)

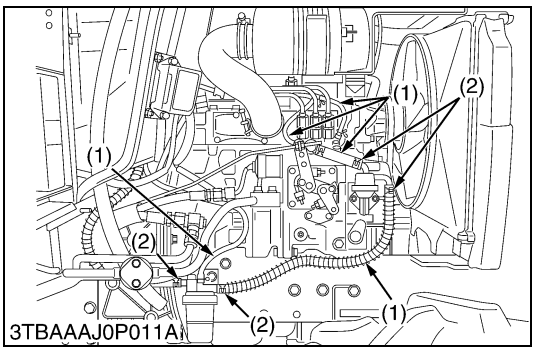
1. Release the parking brake lever.
2. Be sure to adjust the free travel of the right and left brake pedals.
3. Place the jack under the transmission case, then remove the rear tires and set the rigid rack under the rear axles.
4. Loosen the lock nuts (2) of the right and left rods (6).
5. Tighten the adjusting nut (3) of the right rod (6) by hand until the collar (4) comes into contact with the arm (5). Make half and one more turn of the nut.
6. Tighten the adjusting nut (3) of the left rod (6) by hand until the collar (4) comes into contact with the arm (5).
7. Tighten up the lock nuts (2) of right and left rods.
8. Make sure the parking brake lever gets locked at the its 4th or 5th notch.
9. Install the right and left tires.

■ **NOTE**

- **After adjusting the parking brake lever free travel :**
  - **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) Lock Nut
(3) Adjusting Nut
(4) Collar
(5) Parking Brake Arm
(6) Parking Brake Rod

W10258110



Checking Fuel Line

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

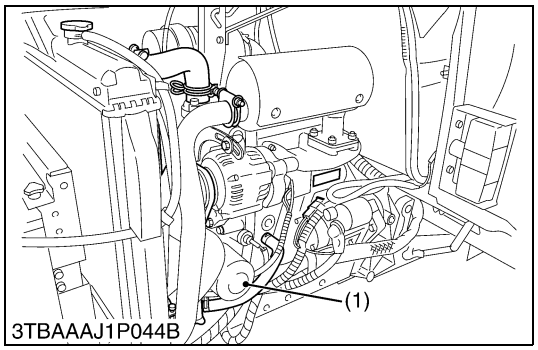
■ **NOTE**

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

(1) Fuel Line (2) Clamp Band

W1062890

[5] CHECK POINTS OF EVERY 200 HOURS



Replacing Engine Oil Filter Cartridge

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.**

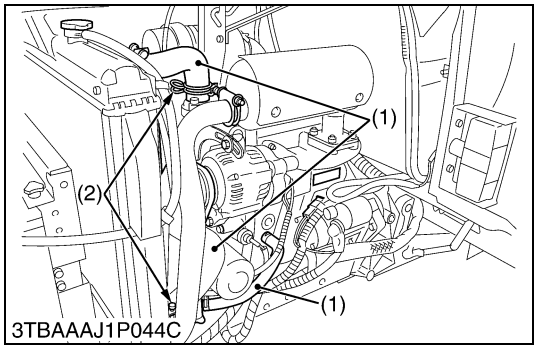
1. Remove the oil filter cartridge with the filter wrench.
2. Apply a slight coat of oil onto the rubber seal of new filter.
3. To install the new cartridge, screw it in by hand an additional 1/2 turn only. Over tightening may cause deformation of rubber gasket.
4. After the new cartridge has been replaced, the engine oil normally decrease a little. Thus see that the engine oil does not leak through the seal and be sure to read the oil level on the dipstick. Then, replenish the engine oil up to the specified level.

■ **IMPORTANT**

- **To prevent serious damage to the engine, replacement filter must be highly efficient. Use only a KUBOTA genuine filter or its equivalent.**

(1) Engine Oil Filter Cartridge

W1033527



Checking Radiator Hoses and Clamp

Check to see if radiator hoses (1) are properly fixed every 200 hours of operation or six months, whichever comes first.

1. If clamp bands (2) are loose or water leaks, tighten clamp bands (2) securely.
2. Replace radiator hoses (1) and tighten clamp bands (2) securely, if radiator hoses (1) are swollen, hardened or cracked.

Replace radiator hoses (1) and clamp bands (2) every 2 years or earlier if checked and found that radiator hoses (1) are swollen, hardened or cracked.

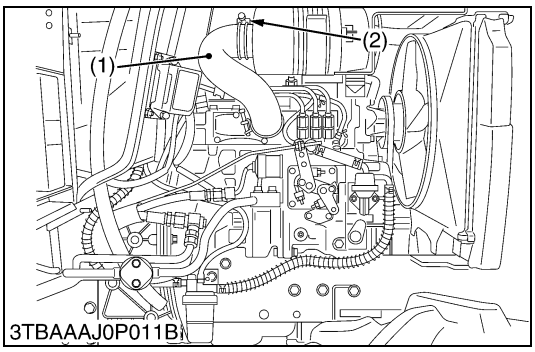
■ **Precaution at Overheating**

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

1. Park the tractor in a safe place and keep the engine unloaded idling.
2. Do not stop the engine suddenly, but stop it after about 5 minutes of unloaded idling.
3. Keep yourself well away from the machine for further 10 minutes or while the steam blows out.
4. Check that there are no dangers such as burns. Get rid of the causes of overheating according to the manual, see "**TROUBLESHOOTING**" section, and then, start again the engine.

(1) Radiator Hose (2) Clamp Band

W1018562

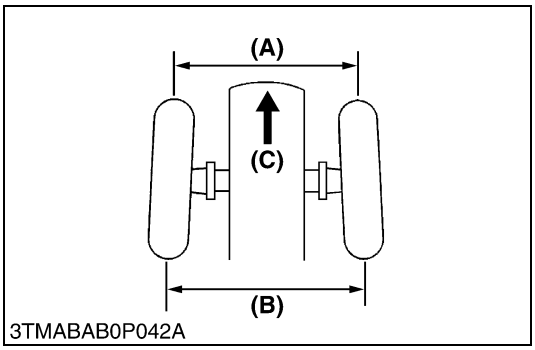


Checking Intake Air Line

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

(1) Hose
(2) Hose Clamp

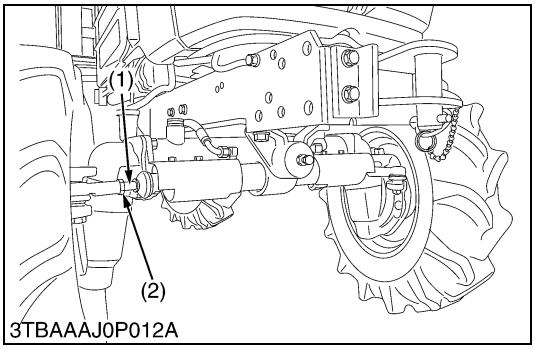
W1018915



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, hub height.
5. Measure distance between tire beads at rear of tire, hub height.
6. Front distance should be 0 to 10 mm (0 to 0.39 in.) less than rear distance. If not, adjust tie-rod length.

Toe-in **(B)** – **(A)**	Factory spec.	0 to 10 mm 0 to 0.39 in.

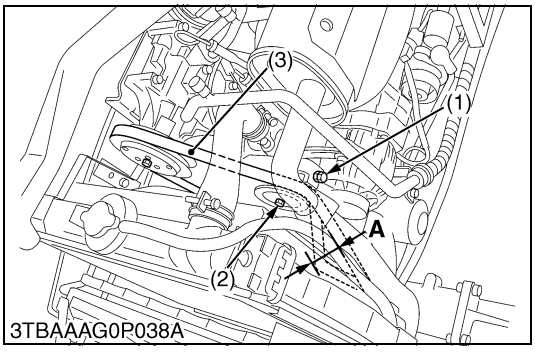


■ Adjusting procedure

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

(1) Tie-rod Joint
(2) Tie-rod Nut
(A) Wheel to Wheel Distance at Front
(B) Wheel to Wheel Distance at Rear
(C) Front

W1019009



Adjusting Air Conditioner Belt Tension (CABIN)

CAUTION

- **Apply the parking brake and stop the engine and remove the key.**

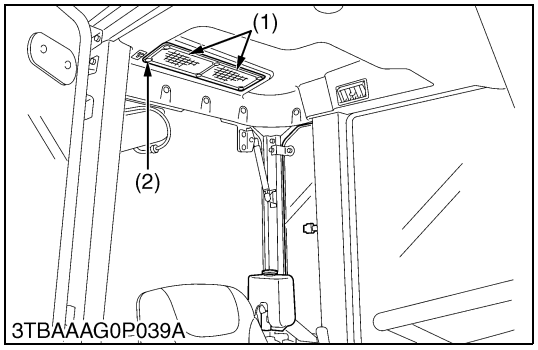
1. Measure the deflection **A**, depressing the air conditioner belt halfway between the fan belt drive pulley and the air conditioner tension pulley at specified force (98 N, 10 kgf, 22 lbf).
2. If the measurement is not within the factory specifications, loosen the nut (2) and adjust the adjusting bolt (1).

Deflection **A**	Factory spec.	10 to 12 mm 0.40 to 0.48 in.

(1) Adjusting Bolt
(2) Nut
(3) Air Conditioner Belt

A : Deflection

W1063888

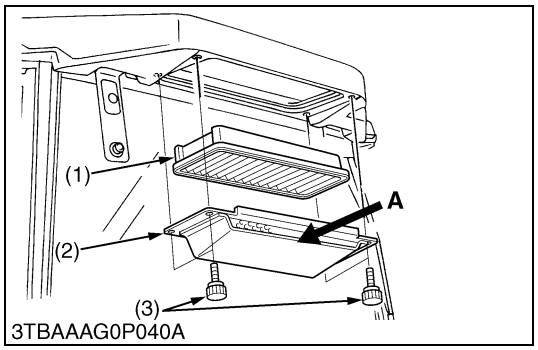


Cleaning the Inner Air Filter (CABIN)

1. Remove the screws (2).
2. Remove the inner filter (1), and blow air from the opposite direction to the filter's normal air flow.
3. pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2).

(1) Inner Air Filter
(1) Screw

W1064732



Cleaning the Fresh Air Filter (CABIN)

1. Remove the knob bolts (3) and pull out the fresh air filter (1).
2. Blow air from the opposite direction to the filter's normal air flow.

■ **IMPORTANT**

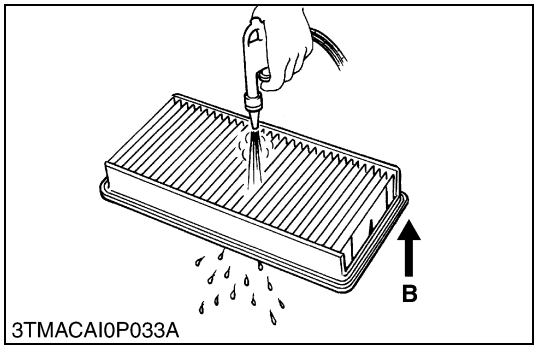
- **Do not hit the fresh air filter. If the fresh air filter becomes deformed, dust may enter into the air-conditioner, which may cause damage and malfunction.**

■ **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**

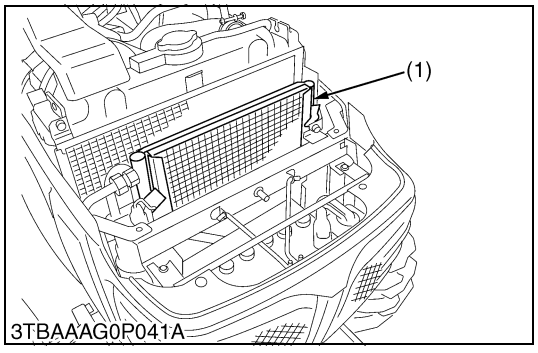
- **Do not use gasoline, thinner or similar chemicals to clean the filter as damage to the filter may occur.**
- **It may also cause an unpleasant odor in the CABIN when the system is used next.**



(1) Fresh Air Filter
(2) Cover
(3) Knob Bolt

A : Air Inlet Port
B : Air Conditioner Airflow

W1065118



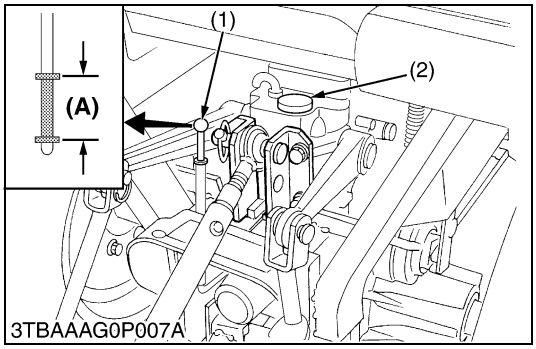
Checking the Air Conditioner Condenser (CABIN)

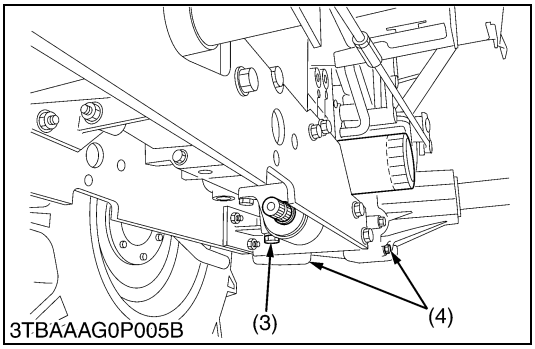
1. Check air conditioner condenser (1) to be sure that it is clean of debris.

(1) Air Conditioner Condenser

W1065380

[6] CHECK POINTS OF EVERY 300 HOURS





Changing Transmission Fluid

CAUTION

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

1. Place an oil pan under the tractor.
2. Remove the drain plugs (3), (4) at the bottom of the transmission case and the rear axles.
3. Drain the transmission fluid.
4. After draining, screw in the drain plug.
5. Fill new oil from filling port after removing the filling plug (2) up to the upper notch on the dipstick (1).
6. After running the engine for a few minutes, stop it and check the oil level again, if low, add oil to the prescribed level.

■ IMPORTANT

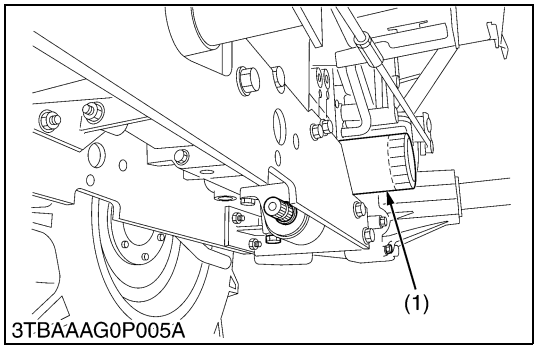
- **Use only multi-grade transmission oil. Use of other oils may damage the transmission or hydraulic system.**
  Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7.)
- **Never work the tractor immediately after changing the transmission oil. Keeping the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

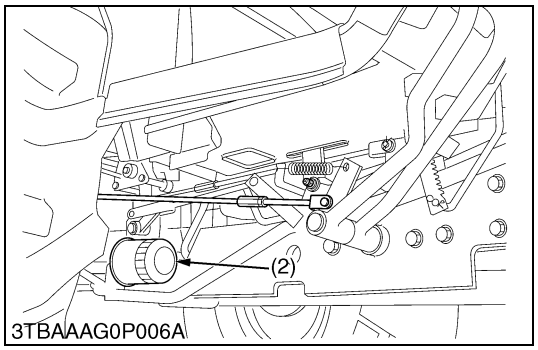
Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030HST	17 L 4.5 U.S.gals 3.7 Imp.gals

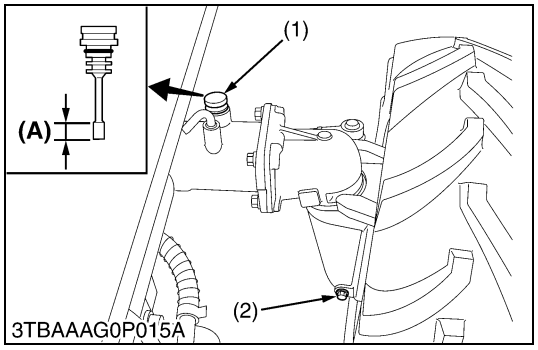
(1) Dipstick
(2) Filling Plug
(3) Drain Plug
(4) Drain Plug (Rear Axle Case)

(A) Oil level is acceptable within this range.

W1033996







Replacing Transmission Oil Filter Cartridge

CAUTION

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

1. Drain the transmission fluid.
2. Remove the both oil filter cartridges by using a filter wrench.
3. Apply a slight coat of oil onto the new cartridge gasket.
4. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
5. After the new cartridge has been replaced, the transmission fluid level will normally decrease slightly. Make sure that the transmission fluid does not leak through the seal. Check the fluid level.

■ **IMPORTANT**

- **To prevent serious damage to the hydraulic system. Use only a genuine KUBOTA filter or its equivalents.**

(1) Hydraulic Oil Filter Cartridge (for HST)
(2) Hydraulic Oil Filter Cartridge

W1065875

Changing Front Axle Case Oil

1. Park the tractor on a firm, flat and level surface.
2. To drain the used oil, remove the right and left drain plugs and filling plug at the front axle case and drain the oil completely into the oil pan.
3. After draining, reinstall the drain plugs.
4. Fill with new oil up to the upper notch on the dipstick.
   Refer to "**LUBRICANTS, FUEL AND COOLANT**". (See page G-7.)

■ **IMPORTANT**

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

5. After filling, reinstall the filling plug.
6. Properly dispose of used oil.

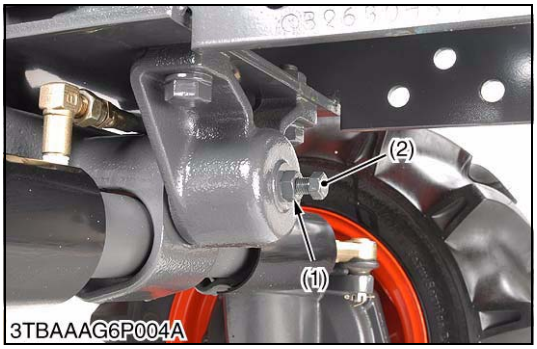
Front axle case oil capacity	B1830, 2230, B2530	3.7 L 3.9 U.S.qts 3.8 Imp.qts
	B3030	4.7 L 5.0 U.S.qts 4.1 Imp.qts

(1) Filling Plug with Dipstick
(2) Drain Plug
(A) Oil level is acceptable within this range.

W1019508

[7] CHECK POINTS OF EVERY 400 HOURS

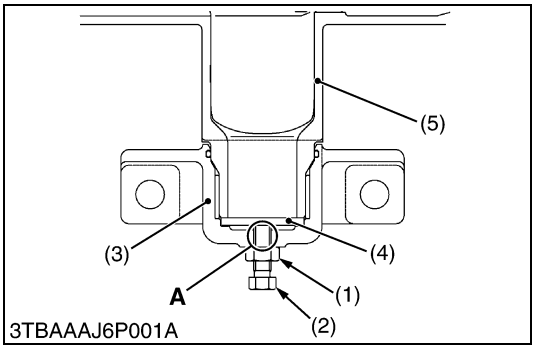




Adjusting Front Axle Pivot (Front Axle Locking Force)

1. Jack up the front side of tractor.
2. Set a spring balance to the front axle flange.
3. Measure the front axle locking force.
4. If the measurement is not within the factory specifications, adjust with the adjusting screw (2). After applying liquid gasket Three Bond 1206D or equivalent to the thread portion of the adjusting screw (2) to prevent front axle oil from leaking out of the front axle holder (3).
5. Tighten the lock nut (2) firmly.

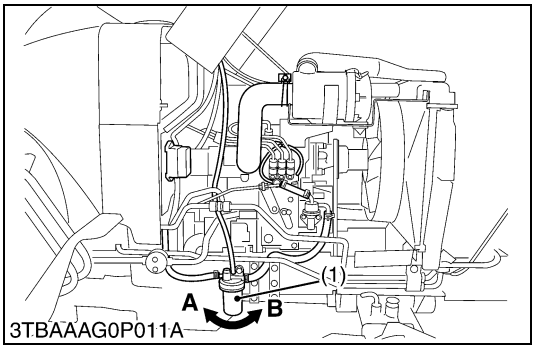
Front axle locking force	Factory spec.	50.0 to 100.0 N 5.1 to 10.2 kgf 12.8 to 22.4 lbf

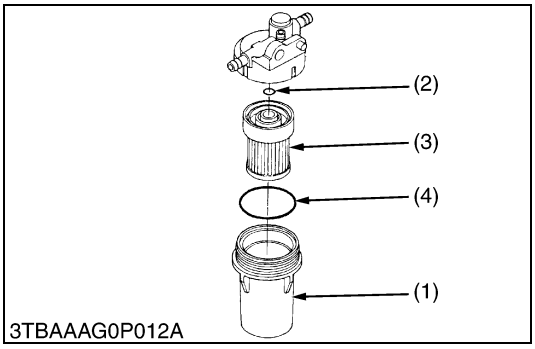


(1) Lock Nut
(2) Adjusting Screw
(3) Holder
(4) Thrust Collar
(5) Front Axle Case

A : Thread Portion

W1062574





Replacing Fuel Filter Element

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

1. Place the oil pan underneath the fuel filter.
   Loosen and remove the filter bowl, and rinse the inside with kerosene.
2. Take out the element and dip it in the kerosene to rinse.
3. After cleaning, reassemble the fuel filter, keeping out dust and dirt.
4. Bleed the fuel system. (Refer to page G-40.)

■ **IMPORTANT**

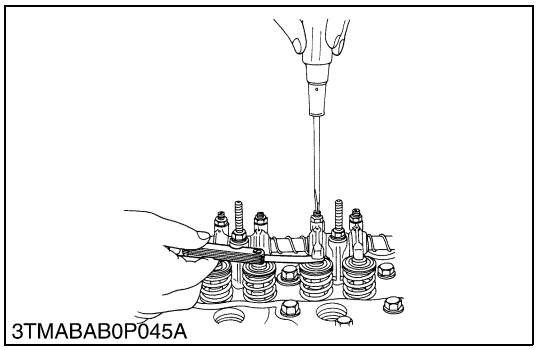
- **To prevent serious damage to the fuel system, use only a KUBOTA genuine fuel filter element.**
- **When the fuel filter bowl has been removed, fuel stops flowing from the fuel tank. If the fuel tank is almost full, however, the fuel will flow back from the fuel return pipe to the fuel filter. Before checking, make sure the fuel tank is less than half-full.**
- **If dust, dirt or water 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.**

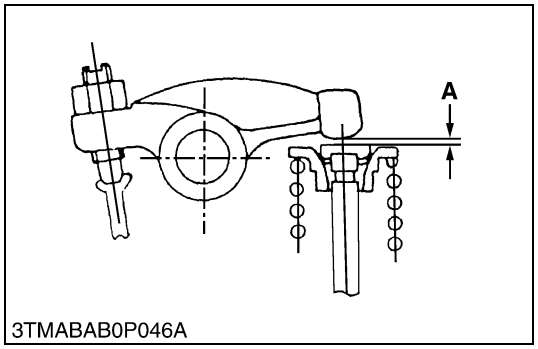
(1) Fuel Filter Bowl
(2) O-ring
(3) Fuel Filter Element
(4) O-ring

A : Loosen
B : Tighten

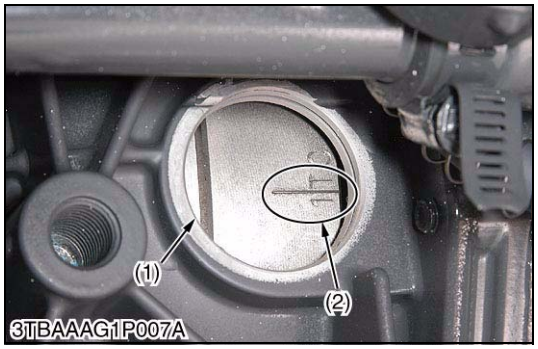
W1066709

[8] CHECK POINT OF EVERY 800 HOURS


3TMABAB0P045A



3TMABAB0P046A



3TBAAAG1P007A

Valve Clearance 1 (ROPS Model)

■ **IMPORTANT**

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

1. Remove the head cover, the glow plugs and the timing window cover on the clutch housing.
2. Align the **"1TC"** mark line on the flywheel and center of timing window so that the No. 1 piston comes to the compression top dead center.
3. Check the following valve clearance marked with "☆" using a feeler gauge.
4. If the clearance is not within the factory specifications, adjust with the adjusting screw.

Valve clearance	Factory spec.	0.145 to 0.185 mm 0.0057 to 0.0073 in.

■ **NOTE**

- **The "TC" marking line on the flywheel is just for No. 1 cylinder. There is no "TC" marking for the other cylinders.**
- **No. 1 piston comes to the T.D.C. position when the "TC" marking line is aligned with center of timing window on front case. Turn the flywheel 0.26 rad (15 °) clockwise and counterclockwise to see if the piston is at the compression top dead center or the overlap position. Now referring to the table below, readjust the valve clearance. (The piston is at the compression top dead center when both the IN. and EX. valves do not move; it is at the overlap position when both the valves move.)**
- **Finally turn the flywheel 6.28 rad (360 °) and align the "TC" marking line and the center of timing window. Adjust all the other valve clearance as required**
- **After turning the flywheel counterclockwise twice or three times, recheck the valve clearance, firmly tighten the lock nut of the adjusting screw.**

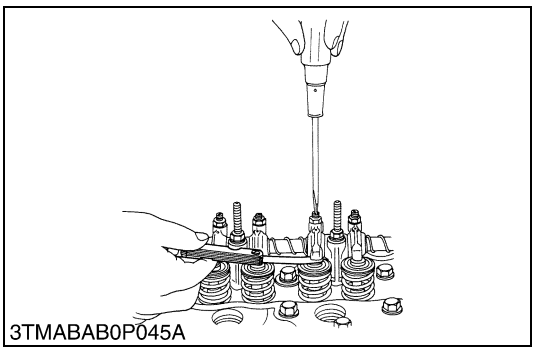
Number of cylinders / Valve arrangement / Adjustable cylinder location of piston		3-cylinder		4-cylinder	
		IN.	EX.	IN.	EX.
When No. 1 piston comes to compression top dead center	No. 1	☆	☆	☆	☆
	No. 2		☆	☆	
	No. 3	☆			☆
	No. 4				
When No. 1 piston comes to overlap position	No. 1				
	No. 2	☆			☆
	No. 3		☆	☆	
	No. 4			☆	☆

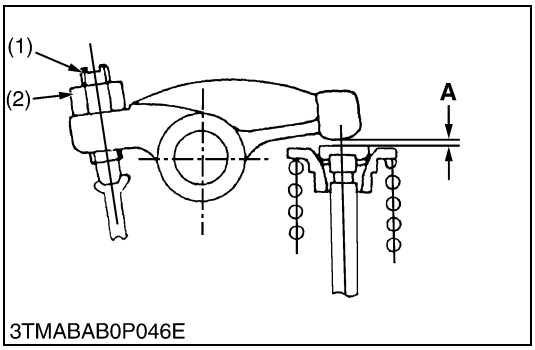
☆ : Valve clearance is adjustable.

(1) Timing Window
(2) TC Mark Line

A : Valve Clearance

W10507730


3TMABAB0P045A



3TMABAB0P046E

Valve Clearance 2 (CABIN Model)

■ **IMPORTANT**

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

1. Remove the head cover and the glow plugs.
2. Check and adjust the valve clearance at the both valves compression top dead center.
3. If the clearance is not within the factory specifications, adjust with the adjusting screw.

- Firing order
  3-cylinder : 1 → 2 → 3
  4-cylinder : 1 → 3 → 4 → 2
- Check and adjust the valve clearance following the firing order shown above.

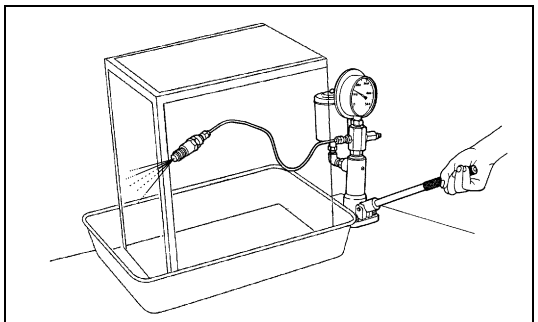
Valve clearance	Factory spec.	0.145 to 0.185 mm 0.0057 to 0.0073 in.

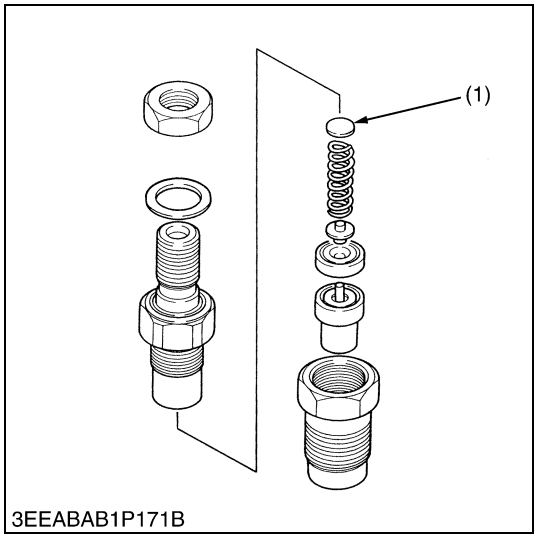
(1) Adjusting Screw
(2) Lock Nut

A : Valve Clearance

W10589350

[9] CHECK POINT OF EVERY 1500 HOURS


3GZAAAB1P025A



3EEABAB1P171B

Fuel Injection Pressure

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

Fuel injection pressure	Factory spec.	13.7 to 14.7 MPa 140 to 150 kgf/cm^2 1991 to 2134 psi

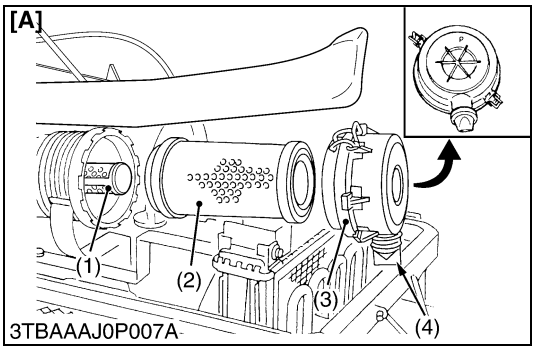
(Reference)

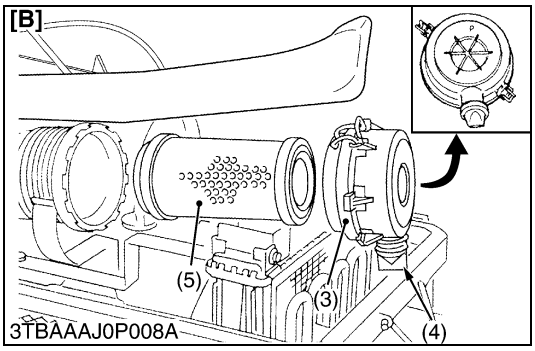
- Pressure variation with 0.01 mm (0.0004 in.) difference of adjusting washer thickness
  Approx. 235 kPa (2.4 kgf/cm^2, 34 psi)
- Pressure with 0.01 mm (0.0004 in.) difference of adjusting washer thickness varies approx. 235 KPa (2.4 kgf/cm^2, 34 psi)

(1) Adjusting Washer

W10182100

[10] CHECK POINT OF EVERY 1 YEAR





Replacing Air Cleaner Element

1. Remove the air cleaner cover (3) and element (5) (or primary (2)).
2. When replacing the air cleaner element (5) (or primary (2)), replace the secondary element (4) as well :
   Once a year or after every six times of cleaning, whichever comes first.

■ **IMPORTANT**

- **To prevent serious damage to the air intake system, use only a KUBOTA genuine air element.**
- **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 cup) upright. If the dust cup 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.**
- **To prevent serious damages to the engine, use only a KUBOTA genuine filter.**

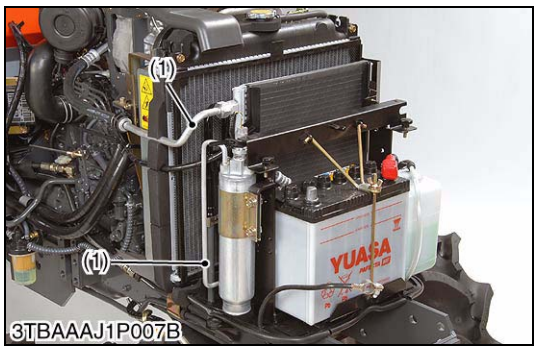
■ **Evacuator Valves**

Open the evacuator valve (2) once a week under ordinary conditions or daily when used in a dusty place to get rid of large particles of dust and dirt.

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

[A] Double Element Type
[B] Single Element Type

W10720460

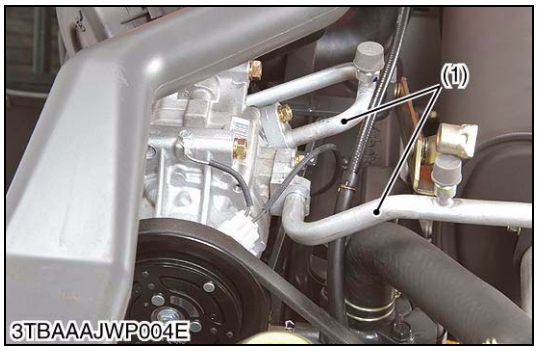


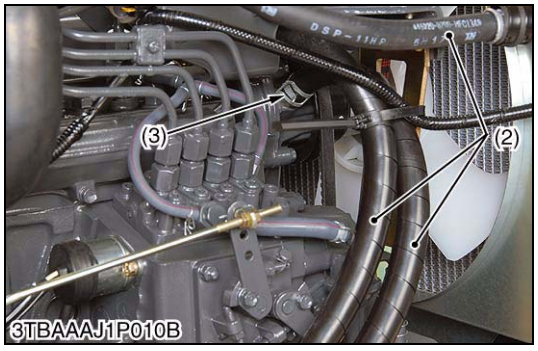
Checking the Air Conditioner Pipe and Hose (CABIN)

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

(1) Pipe
(2) Hose
(3) Clamp

W10724920



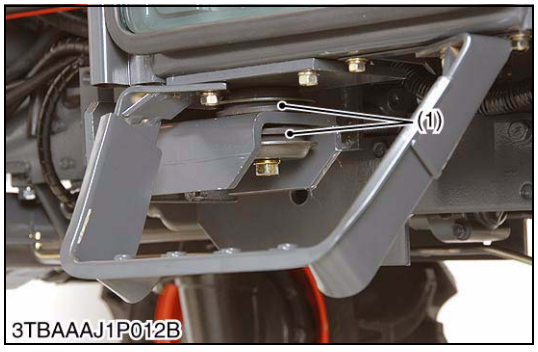


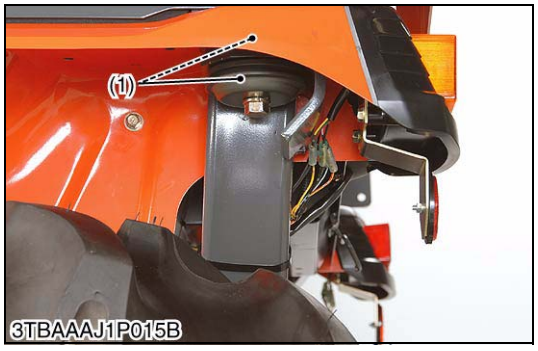
Checking the CAB Isolation Cushion (CABIN)

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

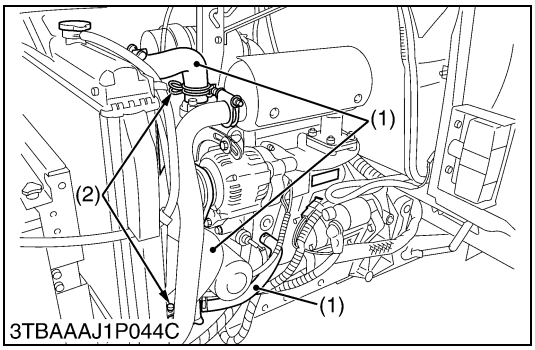
(1) Cushion

W10730940





[11] CHECK POINTS OF EVERY 2 YEARS

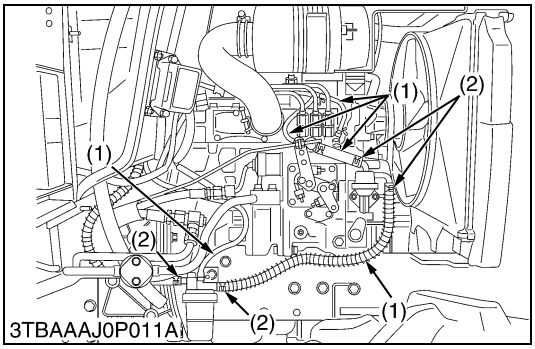


Replacing Radiator Hose and Clamp Band

1. Replace the radiator hoses (1) and tighten the clamp bands (2) securely if the radiator hoses (1) are swollen, hardened or cracked.

(1) Radiator Hose (2) Clamp Band

W10739500



Replacing Fuel Line

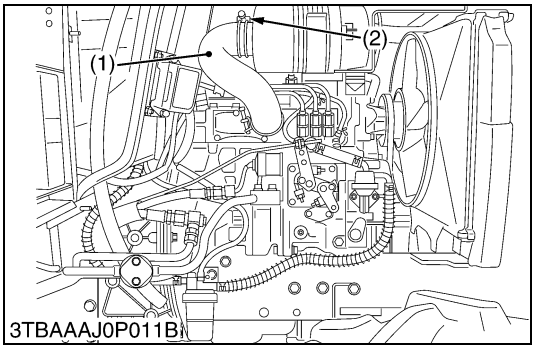
1. If fuel line (1) and clamp bands (2) are found worn or damaged, replace them at once.

■ **NOTE**

- **If the fuel line is replaced, be sure to properly bleed the fuel system. Refer to page G-40.**

(1) Fuel Line (2) Clamp Band

W10744930

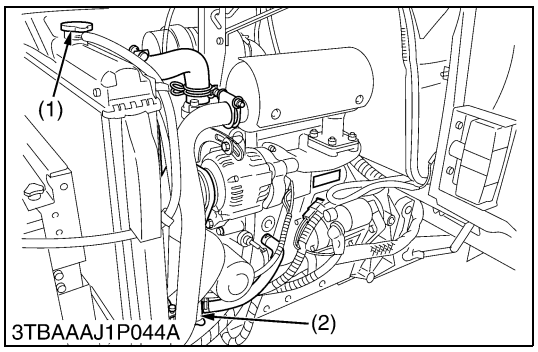


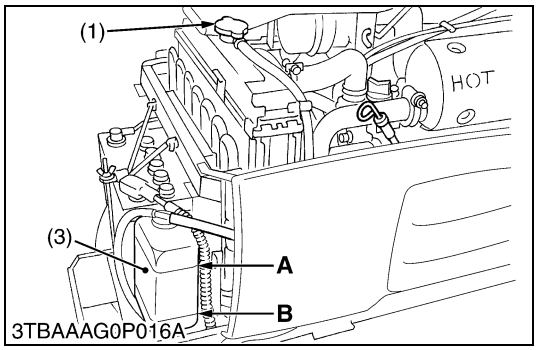
Replacing Intake Air Line

1. If hoses (1) and hose clamps (2) are found worn or damaged, replace them at once.

(1) Hose (2) Hose Clamp

W10748030





Flushing Cooling System and Changing Coolant

CAUTION

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

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

■ **IMPORTANT**

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

Coolant capacity (with recovery tank)	B1830 B2230 B2530	ROPS	4.5 L 4.7 U.S.qts 4.0 Imp.qts
	B2230 B2530	CABIN	5.2 L 5.5 U.S.qts 4.6 Imp.qts
	B3030	ROPS	4.5 L 4.7 U.S.qts 4.0 Imp.qts
	B3030	CABIN	5.2 L 5.5 U.S.qts 4.6 Imp.qts

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

A : FULL
B : LOW

W1021307

Flushing Cooling system and Changing Coolant (Continued)

■ **Anti-Freeze**

CAUTION

- **When using antifreeze, put on some protection such as rubber gloves (Anti-freeze contains position).**
- **If should drink anti-freeze, throw up at once and take medical attention.**
- **When anti-freeze comes in contact with the skin or clothing, wash it off immediately.**
- **Do not mix different types od Anti-freeze.**
  The mixture can produce chemical reaction causing harmful substances.
- **Anti-freeze is extremely flammable and explosive under certain conditions. Keep fire and children away from anti-freeze.**
- **When draining fluids from the engine, place some container underneath the engine body.**
- **Do not pour water onto the grounds, down a drain, or into any water source.**
- **Also, observe the relevant environmental protection regulations when disposing of anti-freeze.**

If it freezes, coolant can damage the cylinders and radiator. If the ambient temperature falls below 0 °C (32 °F) or before a long-term storage, let out 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.
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 water and anti-freeze differs according to the make of the anti-freeze and the ambient temperature. Refer to SAE J1034 standard, more specifically also to SAE J814c.

W1022492

Flushing Cooling system and Changing Coolant (Continued)

■ **IMPORTANT**

- **When the anti-freeze is mixed with water, the anti-freeze mixing ratio must be less than 50 %.**

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

* At 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

1. Adding the LLC.
   - Add only water if the mixture reduces in amount by evaporation.
   - If there is a mixture leak, add the LLC of the same manufacture and type in the same mixture percentage.

   * Never add any long-life coolant of different manufacturer.

(Different bands may have different additive components, and the engine may fail to perform as specified.)

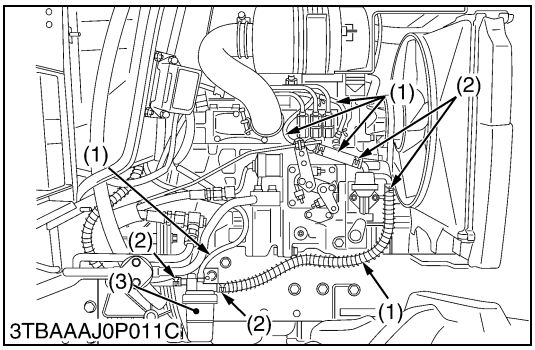
2. When the LLC is mixed, do not employ any radiator cleaning agent. The LLC contains anticorrosive agent. If mixed with the cleaning agent, sludge may build up, adversely affecting the engine parts.
3. Kubota's genuine long-life coolant has a service life of 2 years. Be sure to change the coolant every 2 years.

■ **NOTE**

- **The above data represent industry standards that necessitate a minimum glycol content in the concentrated anti-freeze.**
- **When the coolant level drops due to evaporation, add water only to keep the anti-freeze mixing ratio less than 50 %. In case of leakage, add anti-freeze and water in the specified mixing ratio before filling in to the radiator.**

W1032576

[12] OTHERS



Bleeding Fuel

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:**

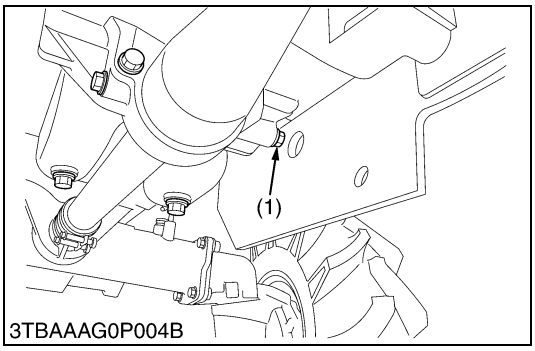
1. Fill the fuel tank with fuel.
2. Start the engine and run for about 30 seconds, and then stop the engine.

■ **NOTE**

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

(1) Fuel Pump
(2) Clamp Band
(3) Fuel Filter

W1021149



Draining Clutch Housing Water

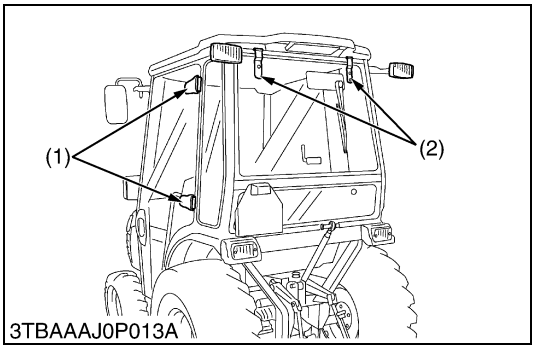
■ **NOTE**

- **The tractor is equipped with drain plug (1) under the clutch housing.**
- **After operating in rain, snow or tractor has been washed, water may get into the clutch housing.**

1. Remove the drain plug (1) and drain the water, then install the plug again.

(1) Water Drain Plug

W1075871

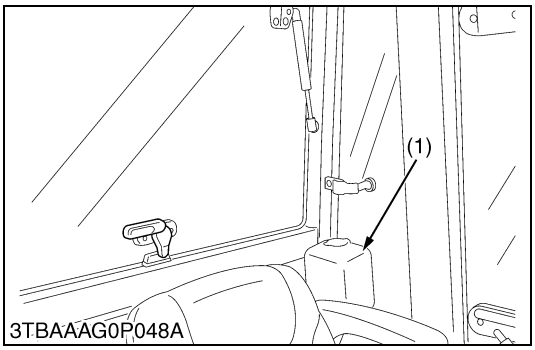


Lubricating Hinges (CABIN)

1. Lubricate the door hinges (1) and the rear window hinges (2) with a proper amount of grease.

(1) Door Hinge
(2) Rear Window Hinge

W1076146



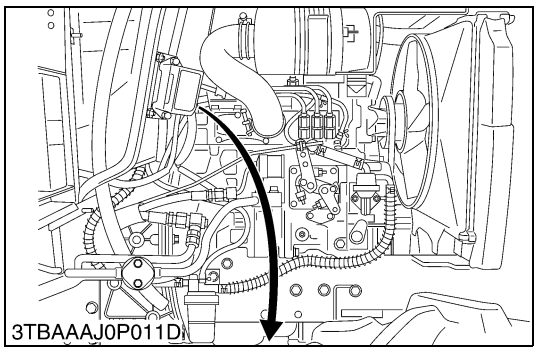
Adding the Washer Liquid (CABIN)

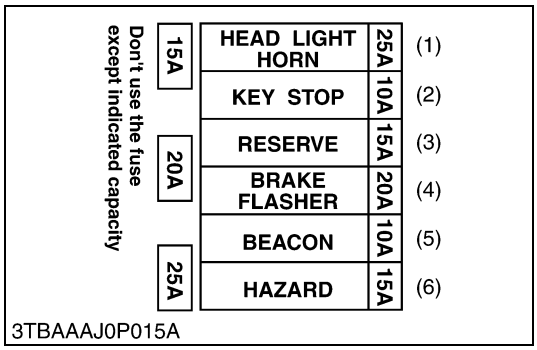
1. Add a proper amount of automobile washer liquid.

Washer liquid tank	Capacity	1.5 L 0.40 U.S.qts 0.33 Imp.qts

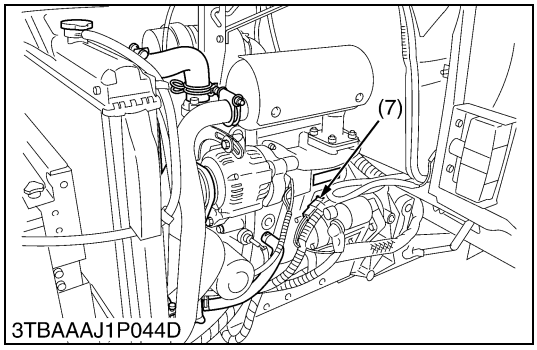
(1) Washer Liquid Tank

W1076428


3TBAAAJ0P011D



3TBAAAJ0P015A



3TBAAAJ1P044D

Replacing Fuse (ROPS)

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**

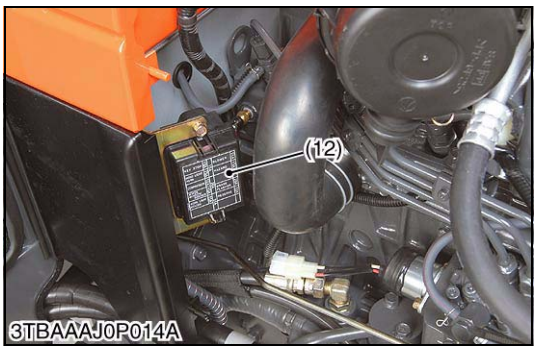
- **Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system. Refer to troubleshooting section of this manual.**
  If any of them should blow, replace with a new one of the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

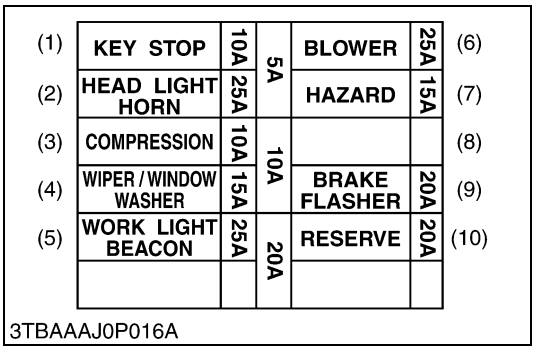
■ **Protected Circuit**

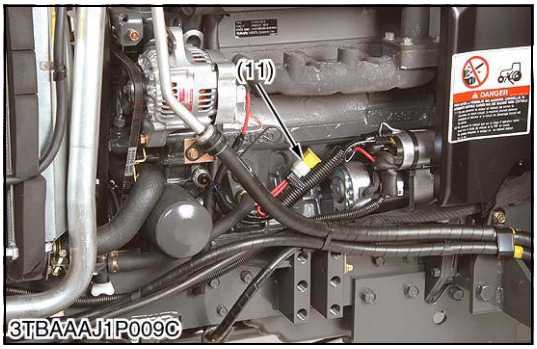
Fuse No.	Capacity (A)	Protected circuit
(1)	25	Head light, Horn, Instrument Cluster
(2)	10	Key stop
(3)	15	Auxiliary (Reserve)
(4)	20	Flasher / Brake
(5)	10	Beacon
(6)	15	Hazard
(7)	50 Slow blow fuse	Check circuit against wrong battery connection

(1) Fuse (for Head Light, Horn)
(2) Fuse (for Key Stop)
(3) Fuse (for Reserve)
(4) Fuse (for Flasher / Brake)
(5) Fuse (for Beacon)
(6) Fuse (for Hazard)
(7) Slow Blow Fuse

W1023430







Replacing Fuse (CABIN)

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

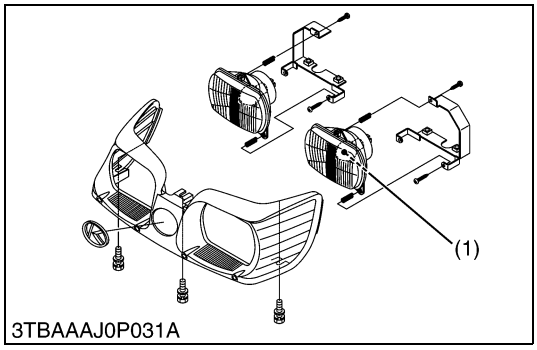
- **Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system. Refer to troubleshooting section of this manual.**
  If any of them should blow, replace with a new one of the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

■ Protected Circuit

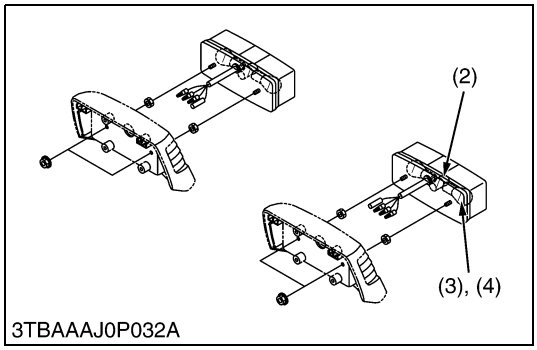
Fuse No.	Capacity (A)	Protected circuit
(1)	10	Key Stop
(2)	25	Head Light, Horn, Instrument Cluster
(3)	10	Air Compression
(4)	15	Wiper
(5)	25	Work light / Beacon
(6)	25	Aircon Blower
(7)	15	Hazard
(8)	–	Vacant
(9)	20	Flasher / Brake
(10)	20	Auxiliary (Reserve)
(11)	60 Slow blow fuse	Check circuit against wrong battery connection

(1) Fuse (for Key Stop)
(2) Fuse (for Head Light, Horn Instrument Cluster)
(3) Fuse (for Air Compression)
(4) Fuse (for Wiper)
(5) Fuse (for Work light / Beacon)
(6) Fuse (for Aircon Blower
(7) Fuse (for Hazard)
(8) Vacant
(9) Fuse (for Flasher / Brake)
(10) Fuse (for Auxiliary)
(11) Slow Blow Fuse

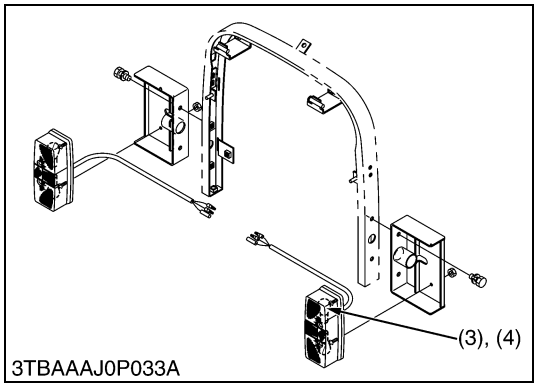
W1076635



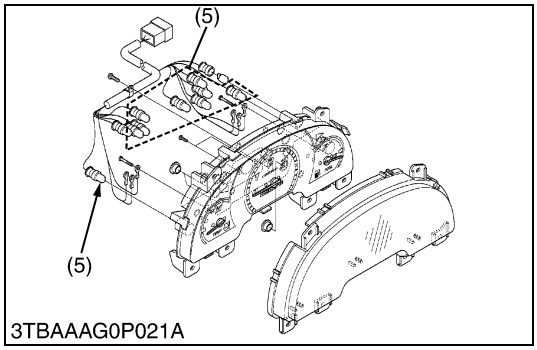
3TBAAAJ0P031A



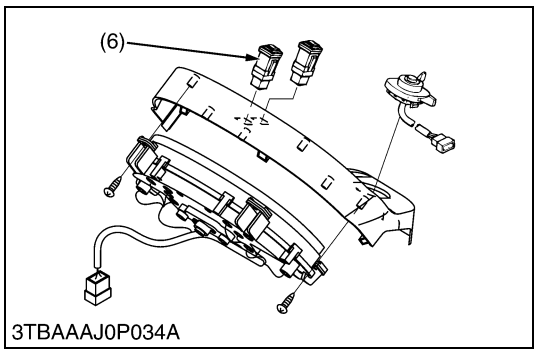
3TBAAAJ0P032A



3TBAAAJ0P033A



3TBAAAG0P021A



3TBAAAJ0P034A

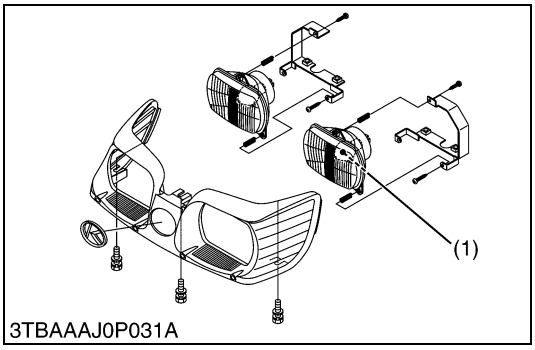
Replacing Light Bulb (ROPS)

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

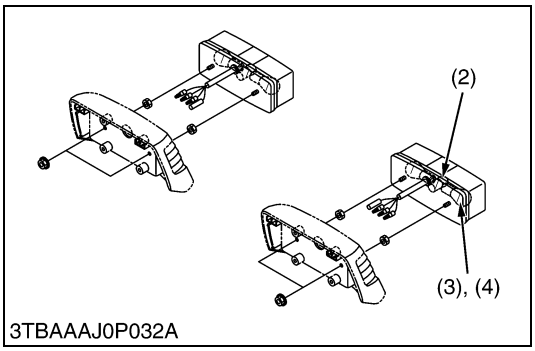
Light	Capacity
Head lights	40 W / 45 W
Tail light	10 W
Turn signal / Hazard light	21 W
Instrument panel light	1.7W
Hazard light switch indicator	0.6 W
Brake stop light	21 W
Front position light	5 W
Number plate light	10 W

(1) Head Light Bulb
(2) Tail Light Bulb
(3) Turn Signal Bulb
(4) Hazard Light Bulb
(5) Instrument Panel Lamp
(6) Hazard Switch Indicator Lamp

W1023802



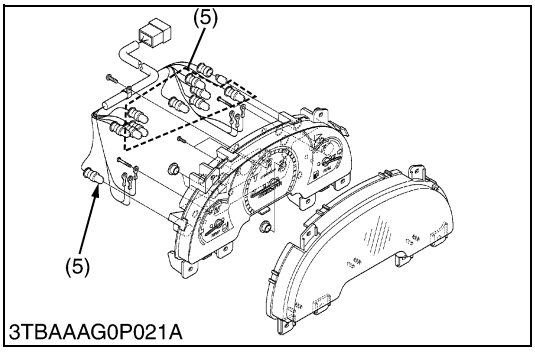
3TBAAAJ0P031A



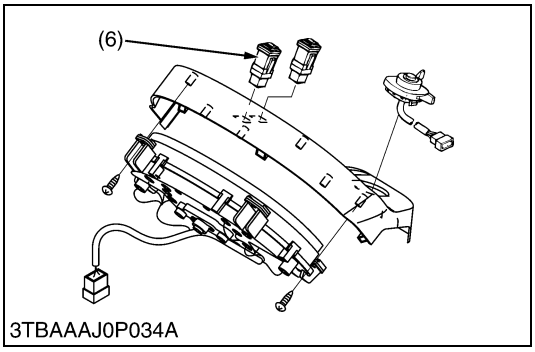
3TBAAAJ0P032A



3TBAAAG0P052A



3TBAAAG0P021A



3TBAAAJ0P034A

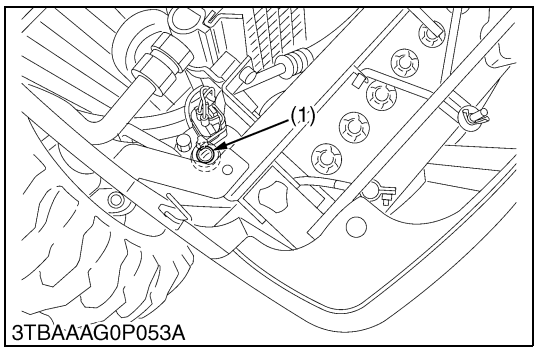
Replacing Light Bulb (CABIN)

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

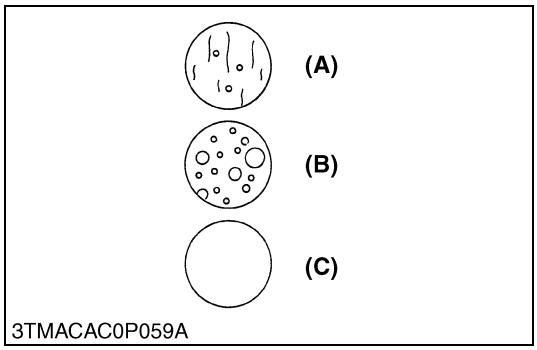
Light	Capacity
Head lights	40 W / 45 W
Tail light	10 W
Turn signal / Hazard light	21 W
Instrument panel light	1.7W
Hazard light switch indicator	0.6 W
Work light	35 W
Brake stop light	21 W
Front position light	5 W
Number plate light	10 W

(1) Head Light Bulb
(2) Tail Light Bulb
(3) Turn Signal Bulb
(4) Hazard Light Bulb
(5) Instrument Panel Lamp
(6) Hazard Switch Indicator Lamp
(7) Work Light Bulb

W1078876



3TBAAAG0P053A



3TMACAC0P059A

Checking Refrigerant (Gas) (CABIN)

CAUTION

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

■ **Checking procedure**

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

■ **IMPORTANT**

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

(Reference)

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

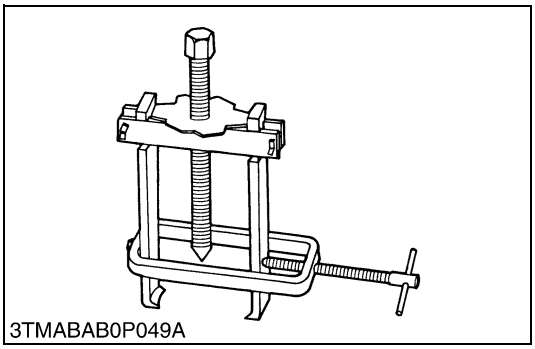
(1) Sight Glass

(A) Proper
(B) Low
(C) Overfull or no refrigerant

W1077954

8. SPECIAL TOOLS

[1] SPECIAL TOOLS FOR ENGINE

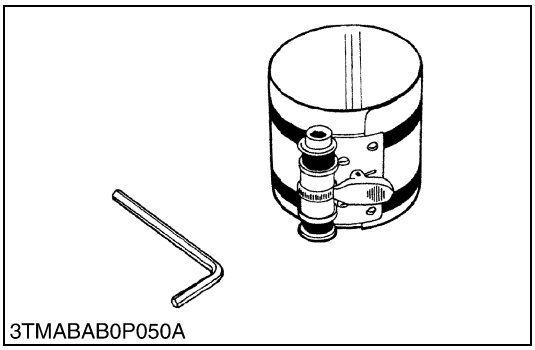

3TMABAB0P049A

Special Use Puller Set

Code No.: 07916-09032

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

W1024050

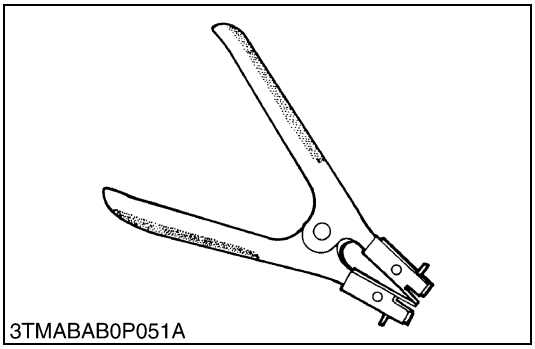

3TMABAB0P050A

Piston Ring Compressor

Code No.: 07909-32111

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

W1024100

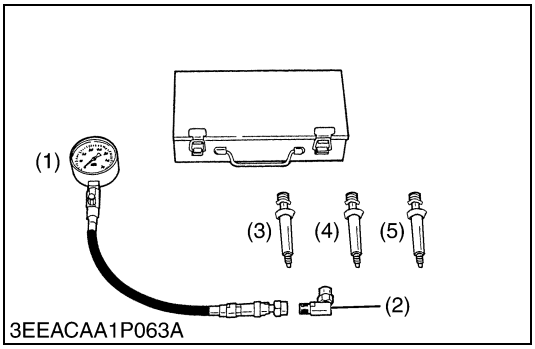

3TMABAB0P051A

Piston Ring Tool

Code No.: 07909-32121

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

W1024150



3EEACAA1P063A

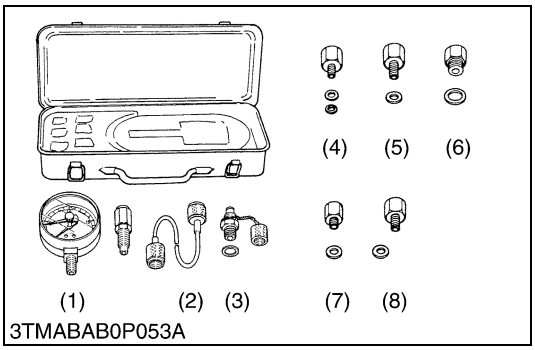
Diesel Engine Compression Tester (for Glow Plug)

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

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

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

0000001398E



3TMABAB0P053A

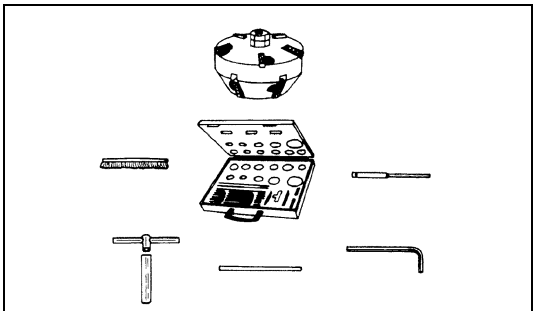
Oil Pressure Tester

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**

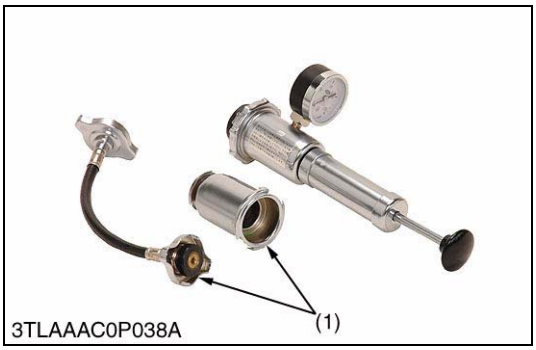
W1024318


3TMABAB0P054A

Valve Seat Cutter

Code No.: 07909-33102
Application: Use to reseat 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.)

W1024458

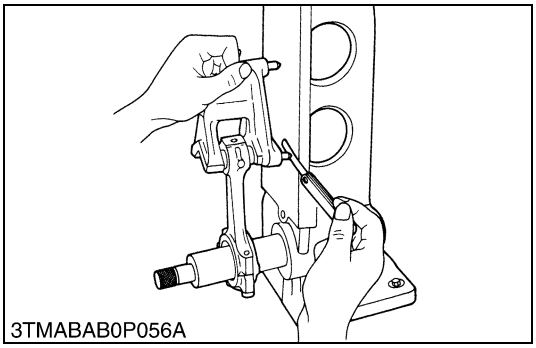


3TLAAAC0P038A

Radiator Tester

Code No.: 07909-31551
Application: Use to check of radiator cap pressure, and leaks from cooling system.
Remarks: Adaptor (1) BANZAI Code No. RCT-2A-30S

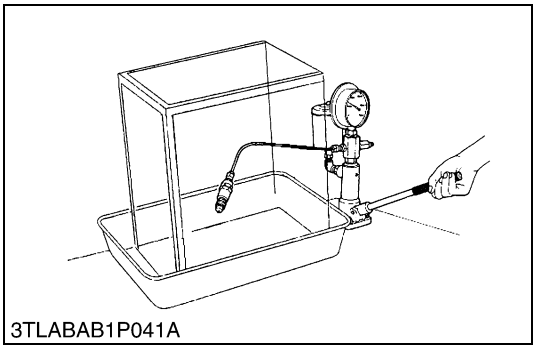
W1024532


3TMABAB0P056A

Connecting Rod Alignment Tool

Code No.: 07909-31661
Application: Use to check the connecting rod alignment.
Applicable range: Connecting rod big end I.D.
30 to 75 mm (1.18 to 2.95 in.) dia.
Connecting rod length
65 to 300 mm (2.56 to 11.81 in.)

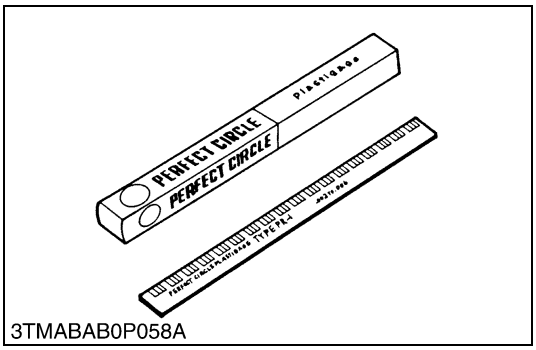
W1024583


3TLABAB1P041A

Nozzle Tester

Code No.: 07909-31361
Application: Use to check the fuel injection pressure and spray pattern of nozzle.
Measuring range: 0 to 50 MPa
(0 to 500 kgf/cm^2, 0 to 7000 psi)

W1024653

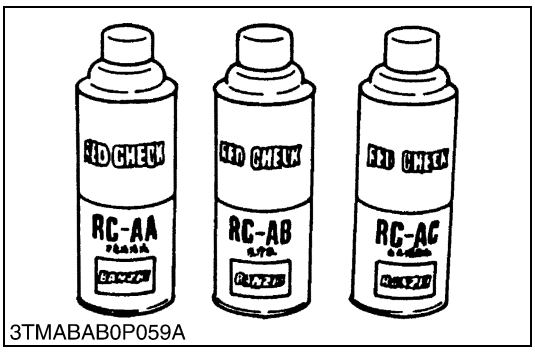


3TMABAB0P058A

Plastigage

Code No.: 07909-30241
Application: Use to check the oil clearance between crankshaft and bearing, etc..
Measuring range: Green 0.025 to 0.076 mm (0.001 to 0.003 in.)
Red 0.051 to 0.152 mm (0.002 to 0.006 in.)
Blue0.102 to 0.229 mm (0.004 to 0.009 in.)

W1024719



3TMABAB0P059A

Red Check

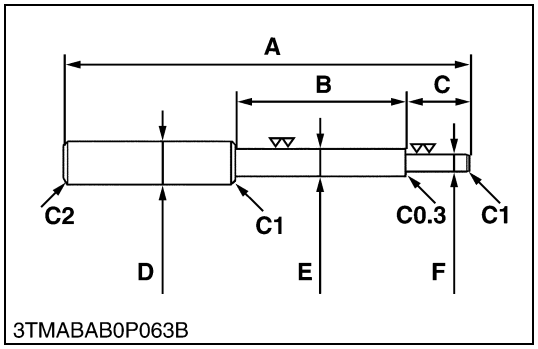
Code No.: 07909-31371

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

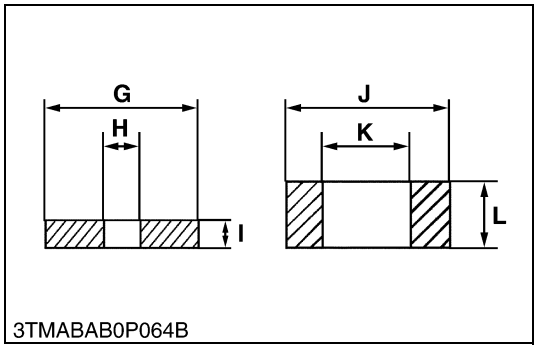
W1024909

■ **NOTE**

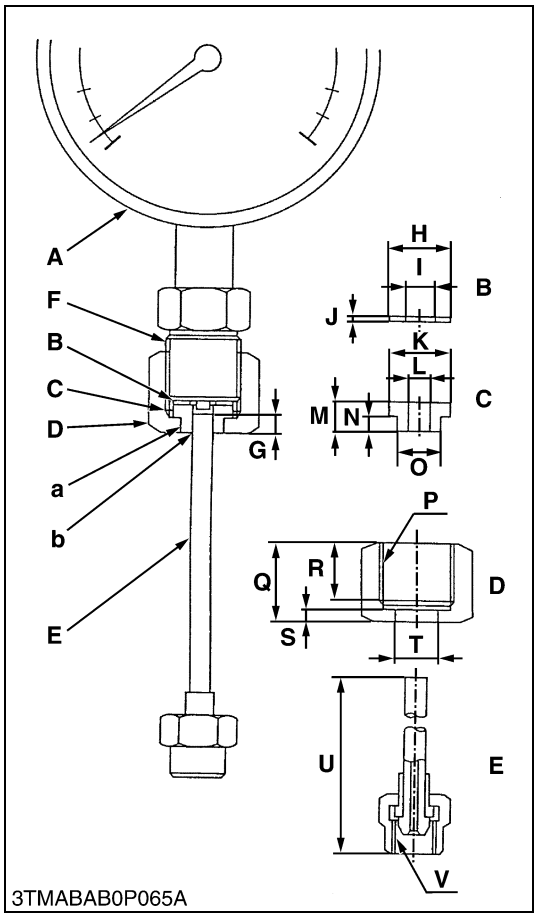
- **The following special tools are not provided, so make them referring to the figure.**



3TMABAB0P063B



3TMABAB0P064B



3TMABAB0P065A

Valve Guide Replacing Tool

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

A	225 mm (8.86 in.)
B	70 mm (2.8 in.)
C	45 mm (1.8 in.)
D	20 mm dia. (0.79 in. dia.)
E	11.7 to 11.9 mm dia. (0.461 to 0.469 in. dia.)
F	6.50 to 6.60 mm dia. (0.256 to 0.260 in. dia.)
G	25 mm (0.98 in.)
H	6.70 to 7.00 mm dia. (0.264 to 0.276 in. dia.)
I	5 mm (0.2 in.)
J	20 mm dia. (0.79 in. dia.)
K	12.5 to 12.8 mm dia. (0.493 to 0.503 in. dia.)
L	8.90 to 9.10 mm (0.351 to 358 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.01 in.)

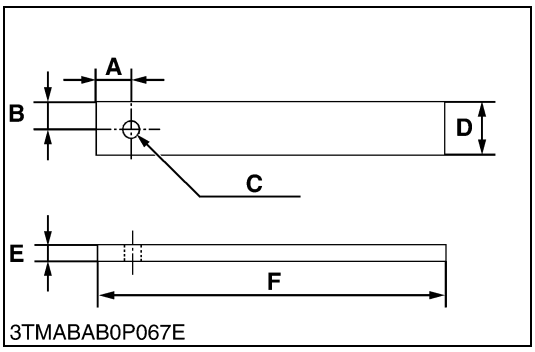
W10250170

Injection Pump Pressure Tester

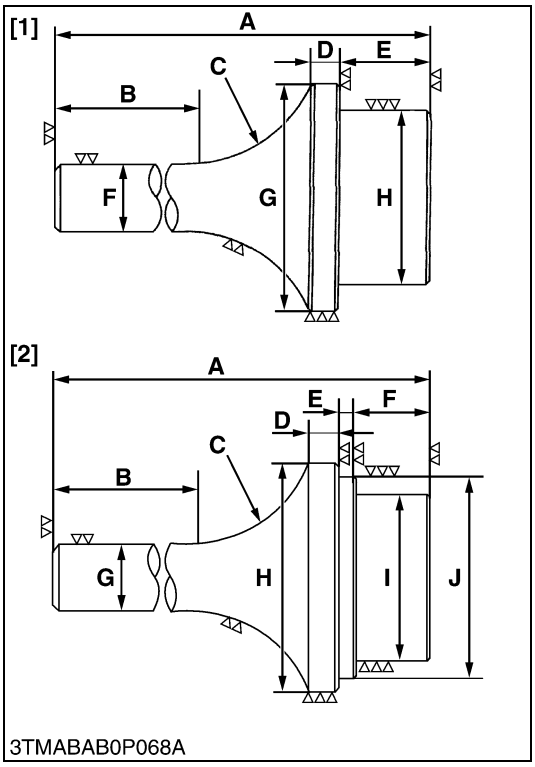
Application: Use to check fuel tightness of injection pumps.

A	Pressure gauge full scale : More than 29.4 MPa (300 kgf/cm^2, 4267 psi)
B	Copper gasket
C	Flange (Material : Steel)
D	Hex. nut 27 mm (1.1 in.) across the plat
E	Injection pipe
F	PF 1/2
G	5 mm (0.2 in.)
H	17 mm dia. (0.67 in. dia.)
I	8 mm dia. (0.3 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. (0.241 to 0.244 in. dia.)
M	8 mm (0.3 in.)
N	4 mm (0.2 in.)
O	11.97 to 11.99 mm dia. (0.4713 to 0.4720 in. dia.)
P	PF 1/2
Q	23 mm (0.91 in.)
R	17 mm (0.67 in.)
S	4 mm (0.2 in.)
T	12.00 to 12.02 mm dia. (0.4725 to 0.4732 in. dia.)
U	100 mm (3.94 in.)
V	M12 × 1.5
a	Adhesive application
b	Fillet welding on the enter circumference

W10252400



3TMABAB0P067E



3TMABAB0P068A

Flywheel Stopper

Application: Use to loosen and tighten the flywheel screw.

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

W10259480

Crankshaft Bearing 1 Replacing Tool

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

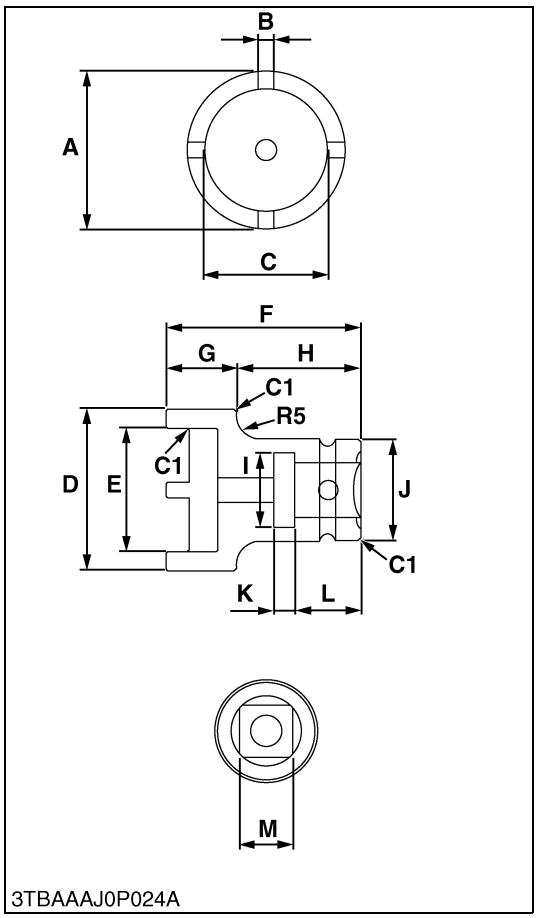
1. Extracting tool

A	135 mm (5.31 in.)
B	72 mm (2.8 in.)
C	40 mm radius (1.6 in. radius)
D	10 mm (0.39 in.)
E	20 mm (0.79 in.)
F	20 mm dia. (0.79 in. dia.)
G	56.80 to 56.90 mm dia. (2.237 to 2.240 in. dia.)
H	51.80 to 51.90 mm dia. (2.040 to 2.043 in. dia.)

2. Inserting tool

A	130 mm (5.12 in.)
B	72 mm (2.8 in.)
C	40 mm radius (1.6 in. radius)
D	9 mm (0.4 in.)
E	4 mm (0.2 in.)
F	20 mm (0.79 in.)
G	20 mm dia. (0.79 in. dia.)
H	68 mm dia. (2.7 in. dia.)
I	51.80 to 51.90 mm dia. (2.040 to 2.043 in. dia.)
J	56.80 to 56.90 mm dia. (2.237 to 2.240 in. dia.)

W1026139



3TBAAAJ0P024A

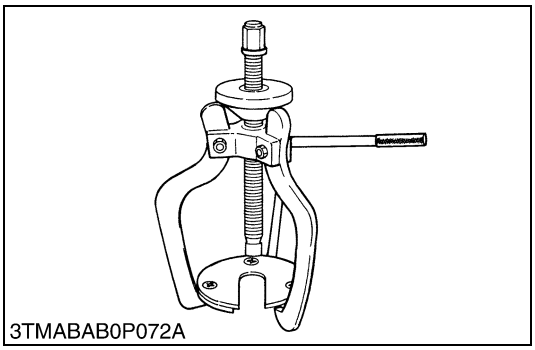
Socket

Application: Use to loosen and tighten the idle gear 2 bearing lock nut.

A	28.5 to 28.8 mm (1.12 to 1.13 in.)
B	3.5 to 3.7 mm (0.14 to 0.15 in.)
C	28.5 to 28.8 mm (0.12 to 1.13 in.)
D	38 mm dia. (1.50 in. dia.)
E	28.5 to 29.0 mm dia. (1.12 to 1.14 in. dia.)
F	47.5 mm (1.87 in.)
G	17.5 mm (0.69 in.)
H	30 mm (1.18 in.)
I	18 mm dia. (0.71 in. dia.)
J	24.5 mm dia. (0.96 in. dia.)
K	5.0 mm (0.21 in.)
L	16 mm (0.63 in.)
M	12.8 to 13.0 mm (0.50 to 0.51 in.)
C1	Chamfer 1.0 mm (0.039 in.)
R5	5.0 mm radius (0.20 in. radius)

W10497240

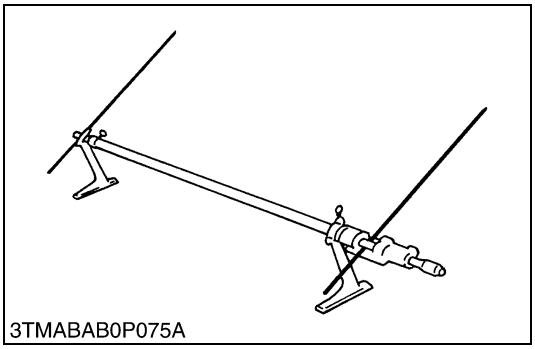
[2] SPECIAL TOOLS FOR TRACTOR


3TMABAB0P072A

Steering Wheel Puller

Code No: 07916-51090
Application: Use for removing the steering wheel without damaging the steering shaft.

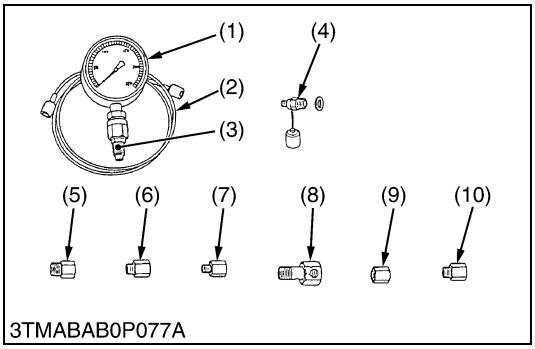
W10265330


3TMABAB0P075A

Toe-in Gauge

Code No: 07909-31681
Application: This allows easy measurement of toe-in for all machine models.

W10266890



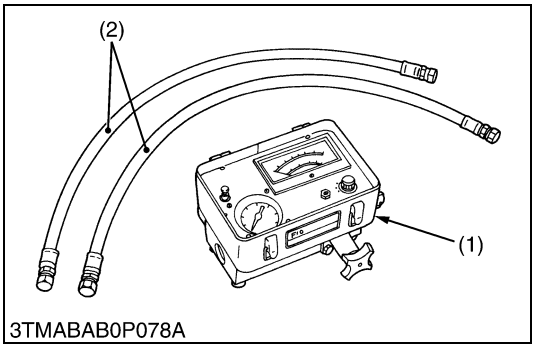
3TMABAB0P077A

Relief Valve Pressure Tester

Code No.: 07916-50045
Application: This allows easy measurement of relief set pressure.

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

W1026741



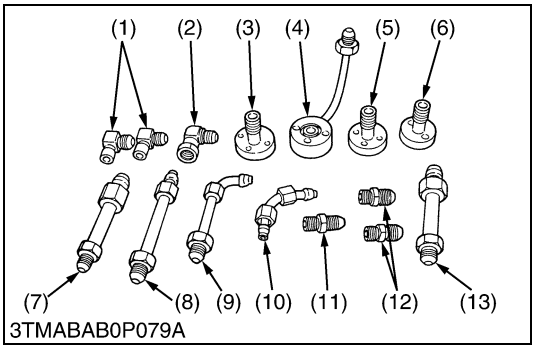
3TMABAB0P078A

Flow Meter

Code No: 07916-52791 (Flow Meter)
07916-52651 (Hydraulic Test Hose)
Application: This allows easy testing of hydraulic system.

(1) Flow Meter
(2) Hydraulic Test Hose

W10313180



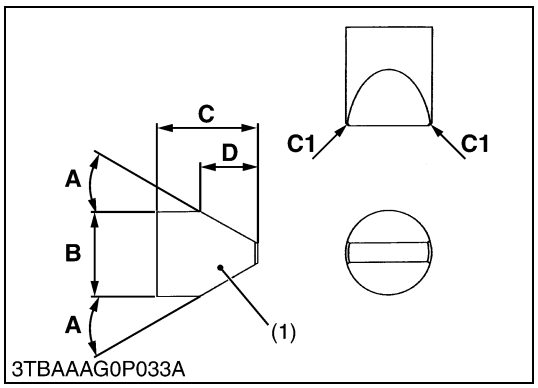
3TMABAB0P079A

Adaptor Set for Flow Meter

Code No: 07916-54031
Application: Use for testing the hydraulic system.

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

W10313960



3TBAAAG0P033A

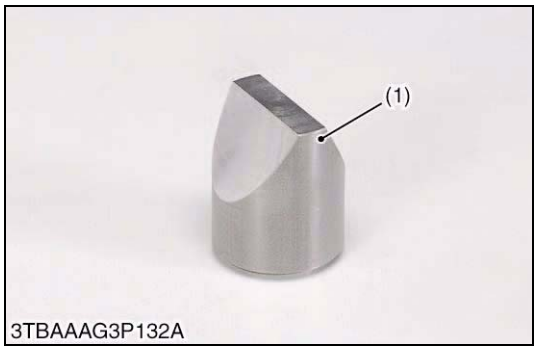
PTO Shift Arm Ball Guide

Application: Use for compressing the ball and spring into the transmission case.

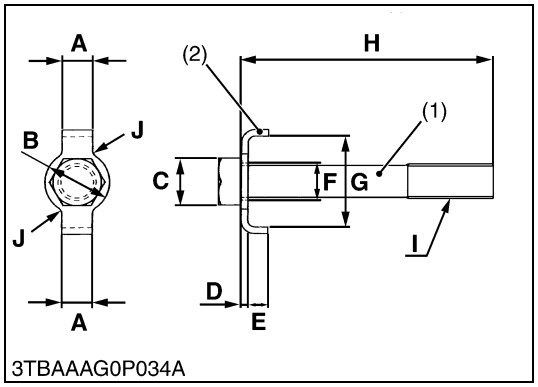
A	0.51 rad (30 °)
B	29.95 to 29.98 mm dia. (1.179 to 1.180 in. dia.)
C	35 mm (1.38 in.)
D	20 mm (0.79 in.)
C1	Chamfer 1 mm (0.039 in.)

(1) PTO Shift Arm Ball Guide

W10824210



3TBAAAG3P132A



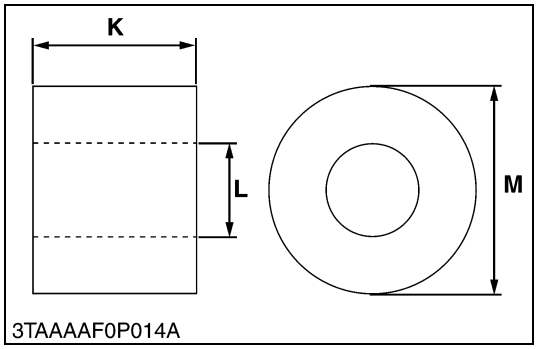
3TBAAAG0P034A

Independent PTO Clutch Spring Compression Tool

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

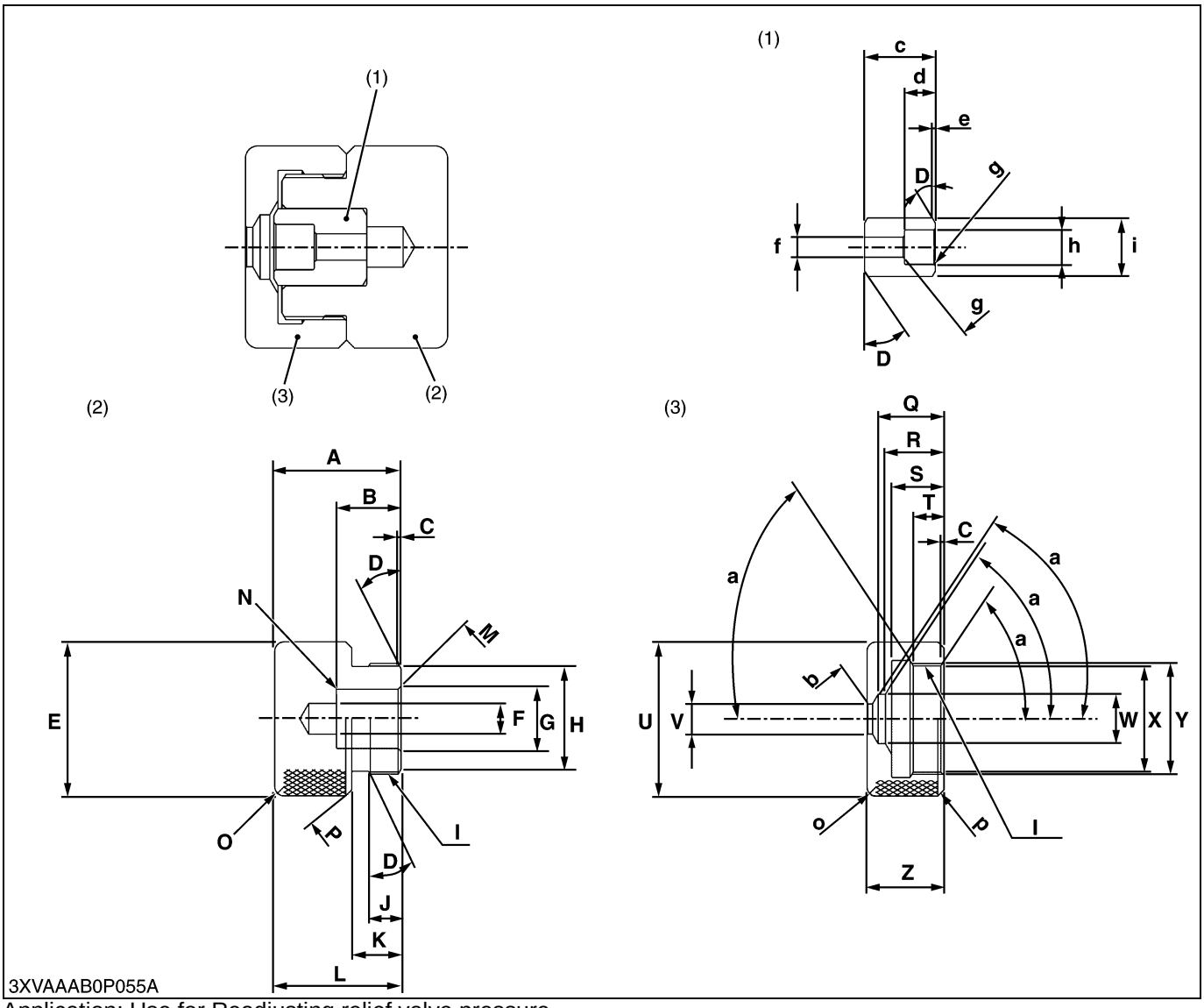
A	12 mm (0.47 in.)
B	25.4 mm (1.00 in.)
C	19 mm radius (0.75 in.) Hex.
D	2.7 mm (0.11 in.)
E	8 mm (0.3 in.)
F	15 mm dia. (0.59 in. dia.)
G	37 mm (1.5 in.)
H	70 mm (2.76 in.)
I	M14 ×1.5
J	R 3.0 mm (0.12 in.)
K	30 mm (1.18 in.)
L	17 mm (0.67 in.)
M	38 mm (1.50 in.)

W10495600



3TAAAAF0P014A

Check and High Pressure Relief Valve Assembly Tool



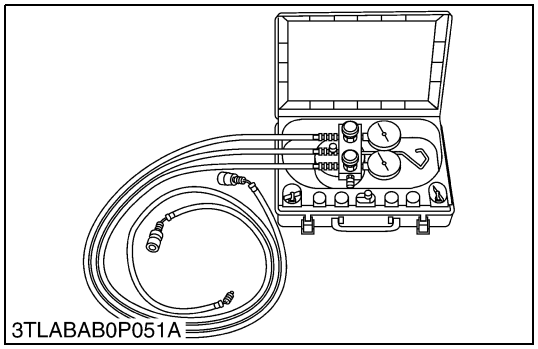
Application: Use for Readjusting relief valve pressure.

A	30.0 mm (1.18 in.)	**N**	Chamfer 0.4 mm (0.12 in.)	**a**	1.05 rad (60.0 °)
B	21.0 mm (0.827 in.)	**O**	Chamfer 3.0 mm (0.12 in.)	**b**	Chamfer 0.3 mm (0.01 in.)
C	1 mm (0.04 in.)	**P**	Chamfer 2.0 mm (0.079 in.)	**c**	23.0 mm (0.906 in.)
D	0.52 rad (30 °)	**Q**	21.4 mm (0.843 in.)	**d**	10.0 mm (0.394 in.)
E	50.0 mm dia. (1.97 in. dia.)	**R**	19.0 mm (0.748 in.)	**e**	1 mm (0.039 in.)
F	10.0 mm dia. (0.39 in. dia.)	**S**	17.0 mm (0.669 in.)	**f**	6.5 mm (0.26 in.)
G	9.10 to 9.30 mm dia. (0.359 to 0.366 in.)	**T**	10.0 mm (0.394 in.)	**g**	Chamfer 0.5 mm (0.02 in.)
H	34.0 mm dia. (1.34 in. dia.)	**U**	50.0 mm dia. (1.97 in. dia.)	**h**	11.1 to 11.3 mm (0.437 to 0.444 in.)
I	M36 x 1.5 mm Pitch	**V**	9.8 mm dia. (0.39 in. dia.)	**i**	18.8 to 19.0 mm (0.741 to 0.748 in.)
J	10.0 mm (0.39 in.)	**W**	16.0 mm dia. (0.630 in. dia.)		
K	16.0 mm (0.63 in.)	**X**	34.5 mm dia. (1.36 in. dia.)	(1)	Spacer (for ZD and ZG Series)
L	41.0 mm (1.61 in.)	**Y**	38.0 mm dia. (1.50 in. dia.)	(2)	Block
M	Chamfer 1 mm (0.04 in.)	**Z**	25.0 mm (0.984 in.)	(3)	Cap

[3] SPECIAL TOOLS FOR CABIN

■ **NOTE**

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

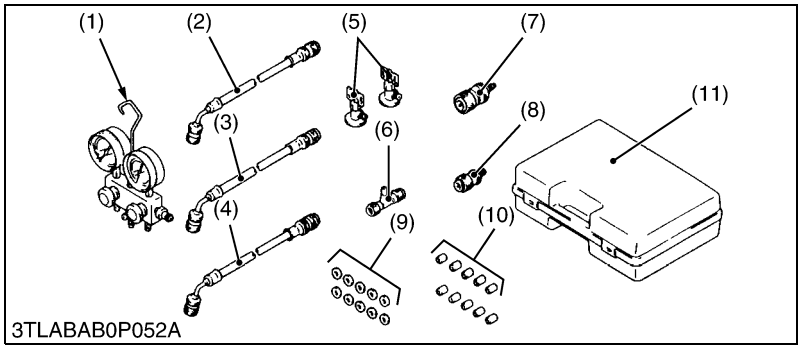


Air Conditioner Service Tool

Code No: DENSO.CO. 95048-00061

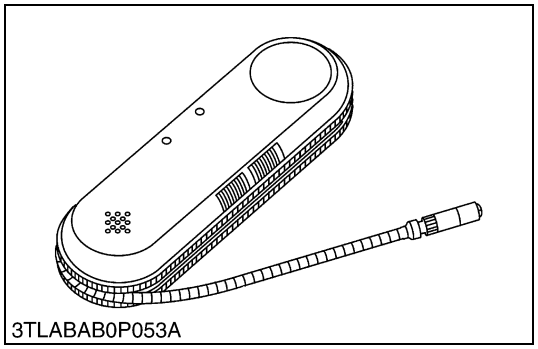
Application: Use for charging, testing or discharging the air conditioning system.

W10839110



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

W1014733

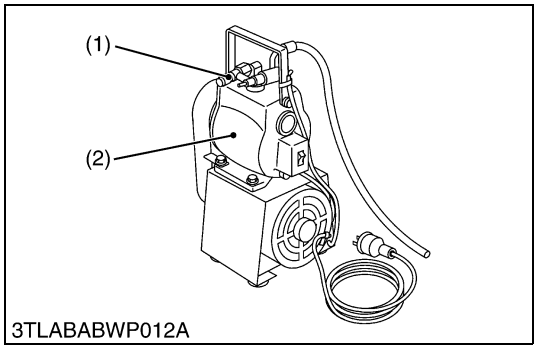


Electric Gas Leak Tester

Code No: DENSO 95146-00060

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

W1013817



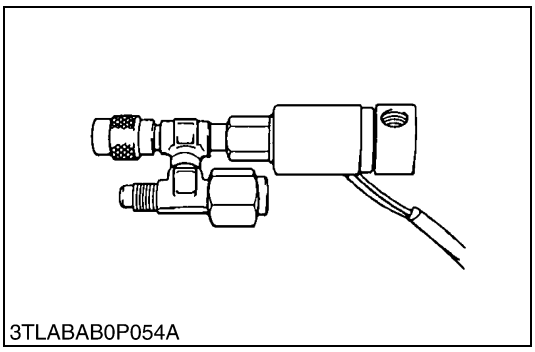
Vacuum Pump

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

Application: Use for evacuating the air conditioning system.

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

W1013764


3TLABAB0P054A

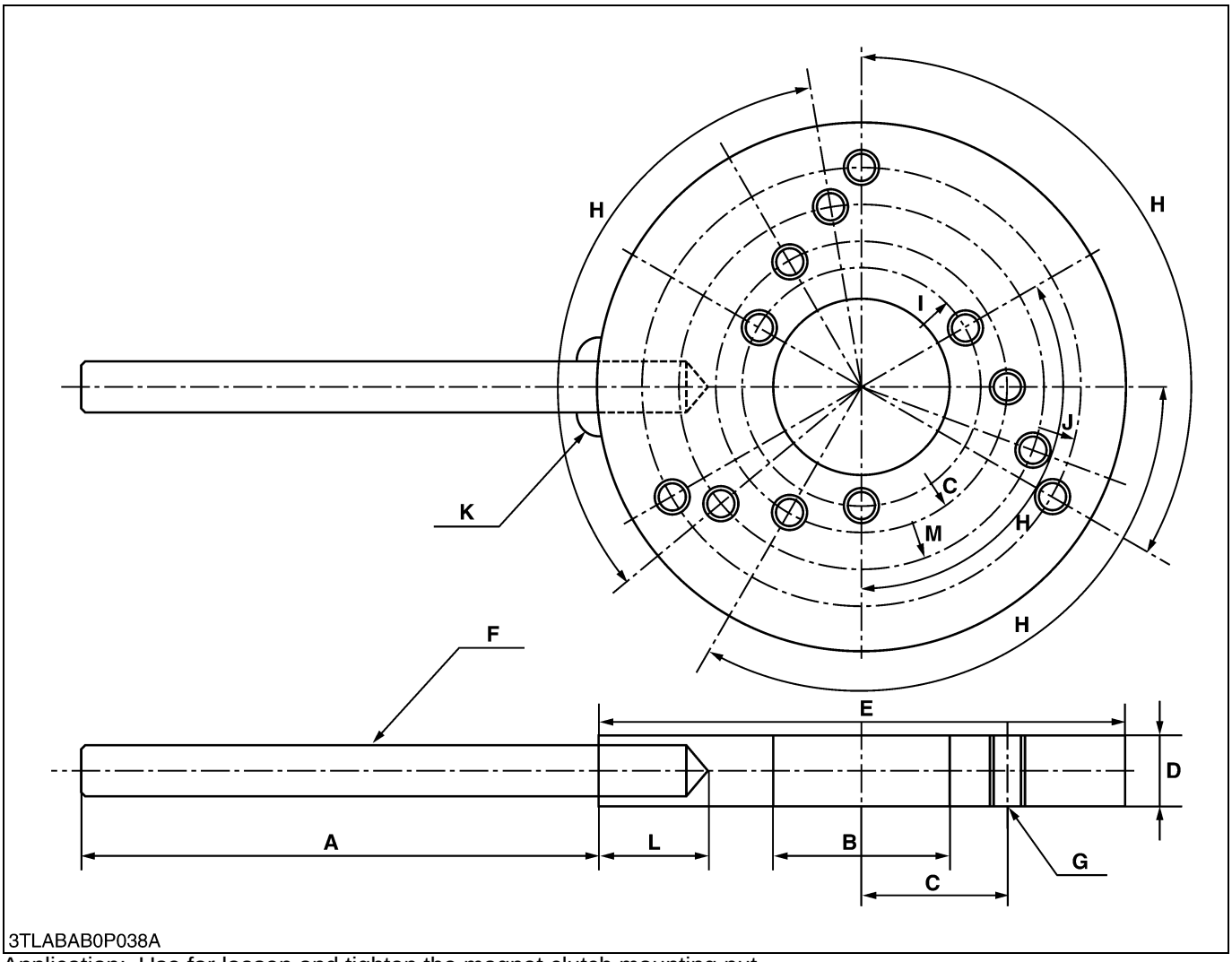
Adaptor (For R134a)

Code No: DENSO 95048-10190 (AC220V)
95048-10200 (AC240V)

Application: Use for evacuating the air conditioning system.

W1013888

Stopper Magnet Clutch (For A/C Compressor)



3TLABAB0P038A

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

■ **NOTE**

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

A	125 mm (4.92 in.)	**G**	3 × M8 × 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**	Weld all around
F	12 mm dia. (0.47 in. dia.)	**L**	20 mm (0.78 in.)

https://truckmanualshub.com/

9. TIRES

[1] TIRE PRESSURE

WARNING

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

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

[B1830, B2230, B2530]

	Tire sizes	Inflation pressure
Rear	8-16, 4PR	160 kPa (1.6 kgf/cm^2, 23 psi)
	9.5-16, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)
	9.5-18, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)
	10.5-18, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)
	315/75D-15, 4PR	100 kPa (1.0 kgf/cm^2, 14 psi)
	31 x 13.5-15, 4PR	140 kPa (1.4 kgf/cm^2, 20 psi)
Front	6-12B, 4PR	200 kPa (2.0 kgf/cm^2, 28 psi)
	6-12, 4PR	200 kPa (2.0 kgf/cm^2, 28 psi)
	6.00-12, 4PR	180 kPa (1.8 kgf/cm^2, 26 psi)
	7.00-12, 4PR	170 kPa (1.7 kgf/cm^2, 24 psi)
	24 x 8.50-12, 4PR	160 kPa (1.6 kgf/cm^2, 23 psi)
	22 x 8.50-12, 4PR	160 kPa (1.6 kgf/cm^2, 23 psi)

[B3030]

	Tire sizes	Inflation pressure
Rear	12.4-16, 4PR	110 kPa (1.1 kgf/cm^2, 16 psi)
	13.6-16, 4PR	100 kPa (1.0 kgf/cm^2, 14 psi)
Front	7-12, 4PR	170 kPa (1.7 kgf/cm^2, 24 psi)
	24 x 8.50-12, 4PR	150 kPa (1.5 kgf/cm^2, 22 psi)

■ **NOTE**

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

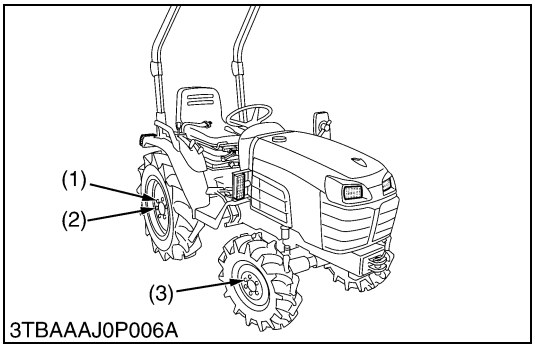
■ **Dual Tires**

Dual tires are not approved.

[2] TREAD

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

■ **IMPORTANT**
- **Always attach tires as shown in the figure.**
- **If not attached as the figure, transmission parts may be damaged.**
- **Do not use tires larger than specified.**



3TBAAAJ0P006A

Wheel Mounting Bolts and Nuts

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

Check wheel bolts and nuts regularly especially when new. If they are loose, tighten them as follows.

Tightening torque	Front wheel mounting nut	77 to 90 N·m 7.9 to 9.2 kgf·m 57 to 67 lbf·ft
	Rear wheel mounting bolt	196 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nut	167 to 191 N·m 17 to 19.5 kgf·m 123 to 141 lbf·ft

(1) Rear Wheel Mounting Bolt
(2) Rear Wheel Mounting Nut
(3) Front Wheel Mounting Nut

W1085050

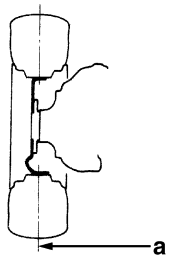
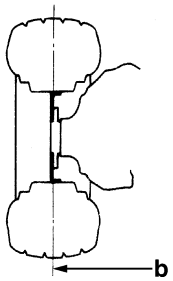
(1) Front Wheels

Front wheel tread can not be adjusted.

■ **IMPORTANT**

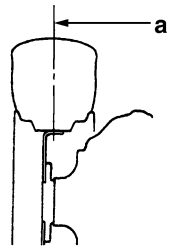
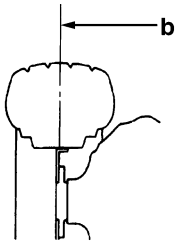
- **Do not turn front discs to obtain wider tread. In setting up the front wheels, make sure that the inflation valve stem of the tires face outward.**

■ **B1830, B2230 and B2530**

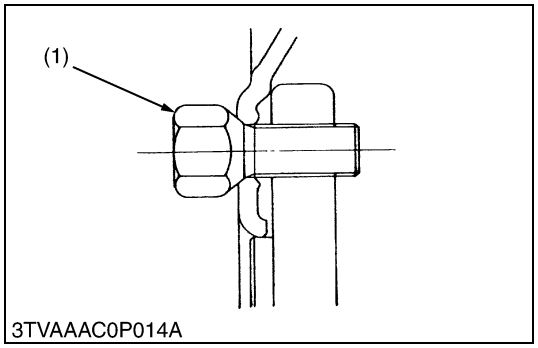
Models	B1830	B2230	B2530	B1830 / B2230	B2530
Tire	6-12B Farm	6-12 Farm	6.00-12 Farm	22 x 8.50 - 12 Turf	24 x 8.50 - 12 Turf
Tread	 3TBAAAJ0P026A			 3TBAAAJ0P027A	

a : 835 mm (32.9 in.) **b : 870 mm (34.3 in.)**

■ **B3030**

Tire	7 - 12 Farm	24 x 8.50 - 14 Turf
Tread	 3TBAAAG0P025B	 3TBAAAG0P026B

a : 935 mm (36.8 in.) **b : 970 mm (38.2 in.)**



3TVAAAC0P014A

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

(1) Wheel Mounting Screw

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(2) Rear Wheels

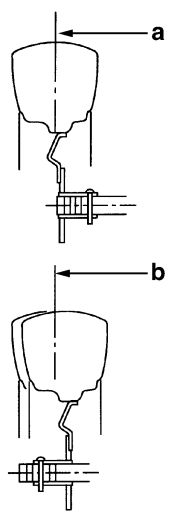
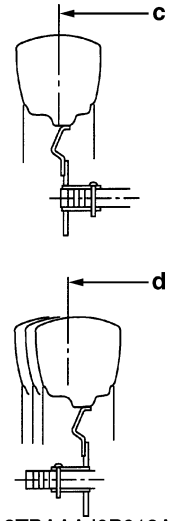
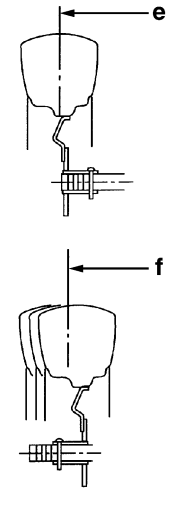
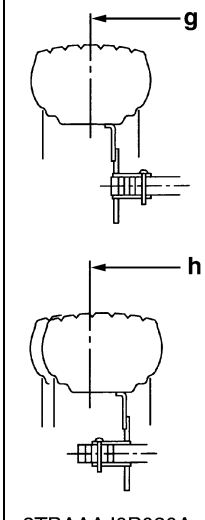
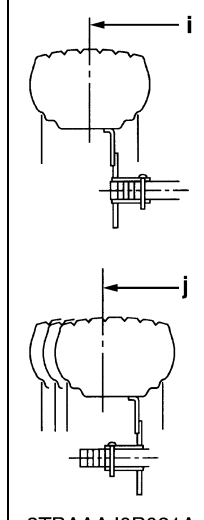
■ **IMPORTANT**

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

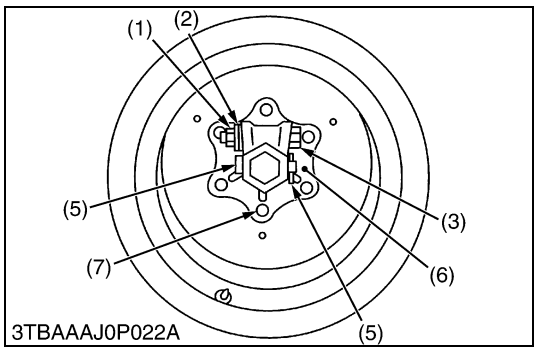
  Rear tread can be adjusted as shown with the standard equipped tires to change tread.

1. Loosen the nut of cotter pin bolt.
2. Remove the snap pin and wheel hub pin.
3. Change the tread to the desired position.
4. Re-set the wheel hub pin, snap pin and cotter pin bolt.

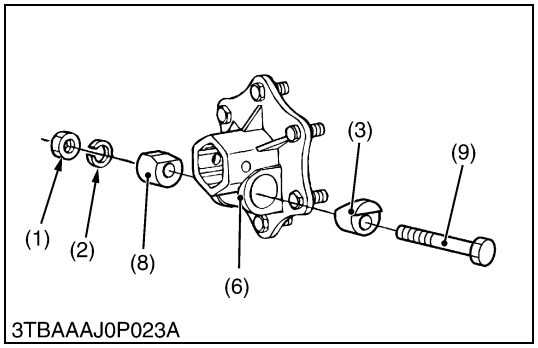
■ **B1830, B2230, B2530**

Models	B1830	B2230	B2530	B1830 / B2230	B2530
Tire	8-16B Farm	9.5-16 Farm	9.5-18 Farm	31 x 13.5-15 Turf	315/75D-15 Turf
Tread	 3TBAAAJ0P017A	 3TBAAAJ0P018A	 3TBAAAJ0P019A	 3TBAAAJ0P020A	 3TBAAAJ0P021A

a : 970 mm (42.3 in.)
b : 800 mm (31.5 in.)
c : 1075 mm (42.3 in.)
d : 855 mm (33.7 in.)
e : 1095 mm (43.1 in.)
f : 850 mm (33.5 in.)
g : 1145 mm (45.1 in.)
h : 975 mm (38.4 in.)
i : 1145 mm (45.1 in.)
j : 925 mm (36.4 in.)



3TBAAAJ0P022A



3TBAAAJ0P023A

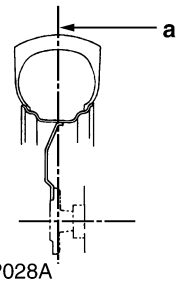
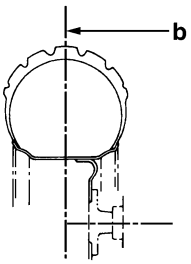
■ **IMPORTANT**
- **Always attach tires as shown in the drawings.**
- **If not attached as illustrated, transmission parts may be damaged.**
- **When re-fitting or adjusting a wheel, tighten the bolts to the following torques the recheck after driving the tractor 200 m 200 yards) and thereafter according to service interval.**
- **Insert the bolt from the indented side of the cotter as shown.**

Tightening torque	Rear wheel hub nut	123 to 147 N·m 12.6 to 15.0 kgf·m 91.1 to 108.5 lbf·ft
	Rear wheel hub stud bolt	108 to 125 N·m 11.0 to 12.8 kgf·m 79.6 to 92.6 lbf·ft

(1) Nut
(2) Spring Washer
(3) Cotter 1
(4) Wheel Hub Pin
(5) Snap Pin
(6) Hub
(7) Stud Bolt
(8) Cotter 2
(9) Bolt

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■ **B3030**

Tire	12.4-16 Farm	13.6-16 Turf
Tread	 3TBAAAJ0P028A	 3TBAAAJ0P029A

a : 1050 mm (41.3 in.) **b : 1050 mm (41.3 in.)**

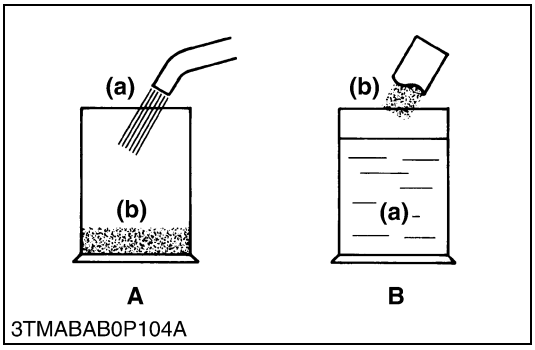
[3] TIRE LIQUID INJECTION AND BALLAST

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

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

■ **IMPORTANT**

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



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Preparation of Calcium Chloride Solution

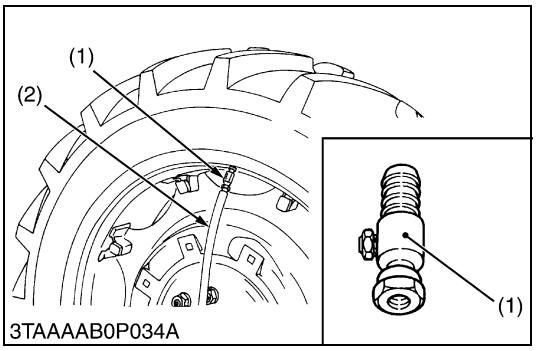
CAUTION

- **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.**

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

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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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Fig. 1

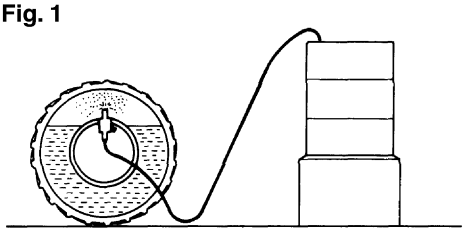


Fig. 2

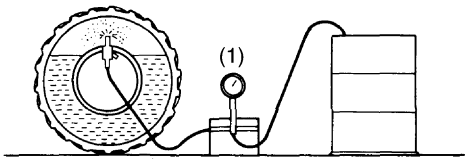
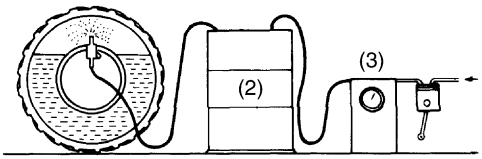
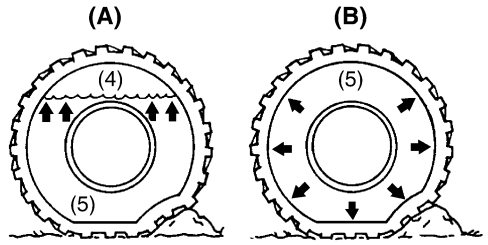


Fig. 3



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Injection and Rear Ballast

CAUTION

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

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

1. Gravity injection (Fig. 1)
2. Pump injection (Fig. 2)
3. Pressure tank injection (Fig. 3)
4. Injection directly from top (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.**

■ **Liquid Ballast in Rear Tires : Liquid weight pen tire (75 % filled)**

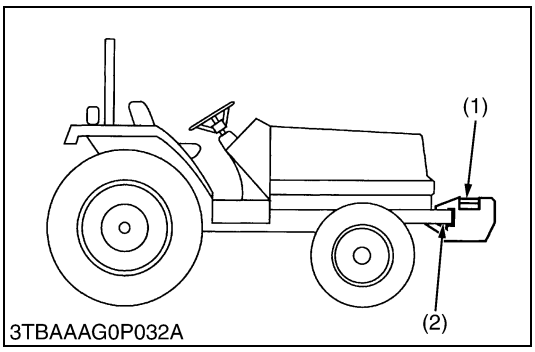
Tire sizes	9.5 - 22
Slush free at –10 °C (14 °F) Solid at –30 °C (–22 °F) [Approx. 1 kg (2 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	85 kg (187 lbs)
Slush free at –24 °C (–11 °F) Solid at –47 °C (–52 °F) [Approx. 1.5 kg (3.5 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	89 kg (196 lbs)
Slush free at –47 °C (–53 °F) Solid at –52 °C (–62 °F) [Approx. 2.25 kg (5 lbs) $CaCl_2$ per 4 L (1 gal.) of water]	94 kg (207 lbs)

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

(A) Correct : 75 % Full Air Compresses Like a Cushion
(B) Incorrect : 100 % Water can not be compressed

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Front Ballast

Add weights in needed for stability and improving traction. Heavy pulling and heavy rear mounted implements tend to lift front wheels. Add enough ballast to maintain steering control and prevent tip over.

Remove weight when no longer needed.

■ **Front End Weights (option)**

The front end weights can be attached to the bumper.

See your implement operator's manual for required number of weights.

■ **NOTE**

- **[For installation of up to three weights]**
  Besides the weight, mounting bolt kit(s) are required for mounting the weight.
- **[For installation of up to five weights]**
  Besides the weight, a front weight bracket and mounting bolt kit(s) are required for mounting the weight.

■ **IMPORTANT**

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

Maximum front weight	75 kg 165 lbs

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

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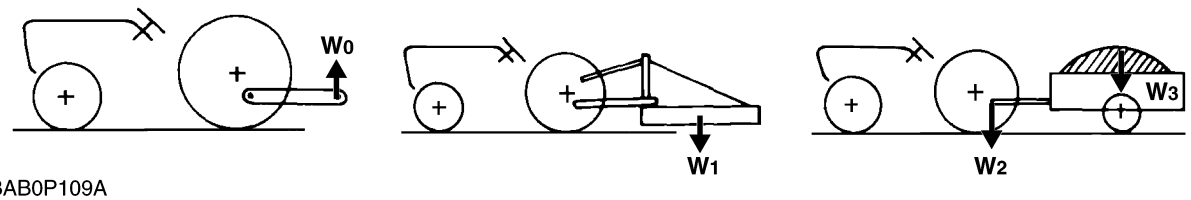
10. IMPLEMENT LIMITATIONS

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.]

Model	Tread (max. width)		Lower link end max. loading weight W_0
	Front	Rear	
B1830	835 mm (32.9 in.)	1025 mm (40.4 in.)	970 kg (2139 lbs)
B2230		1105 mm (43.5 in.)	
B2530		1095 mm (43.1 in.)	
B3030	935 mm (36.8 in.)	1365 mm (53.7 in.)	

Model	Actual figures		
	Implement weight W_1 and / or size	Max. drawbar load W_2	Trailer loading weight W_3 Max. capacity
B1830 B2230 B2530 B3030	As in the following list (Shown in the next page)	500 kg (1100 lbs)	1500 kg (3300 lbs)

Lower link end max. loading capacity.....The max. allowable load which can be put on the lower link end : W_0
Implement weight.....The implement's weight which can be put on the lower link : W_1
Max. drawbar load.....W_2
Trailer loading weight.....The max. loading weight for trailer (without trailer's weight) : W_3



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

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1 ENGINE

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MECHANISM

NOTICE

Regarding engine mechanism information, please refer to Workshop Manual DIESEL ENGINE, MECHANISM (Code No. 9Y021-01874).

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SERVICING

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      (6) Oil Pump 1-S67

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	G-7
	Air in the fuel system	Bleed	G-40
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel hose clogged	Clean	G-24, 36
	Fuel filter clogged	Change	G-30
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-7
	Fuel with low cetane number	Use specified fuel	–
	Incorrect injection timing	Adjust	1-S16
	Injection nozzle clogged	Repair or replace	1-S17, S18
	Injection pump malfunctioning	Replace	1-S44
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair	1-S45 to S50
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S41 to S42
	Improper valve timing	Correct or replace timing gear	1-S45
	Piston ring and cylinder worn	Replace	1-S48, S66
	Excessive valve clearance	Adjust	1-S12, S13
	ST terminal lead not connected	Connect	1-S37
	Stop solenoid lead not connected	Connect	1-S37
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-30
	Air cleaner clogged	Clean or replace	G-21
	Fuel leak due to loosing injection pipe retaining nut	Tighten retaining nut	1-S39
	Injection pump malfunctioning	Replace	1-S44
	Incorrect nozzle injection pressure	Adjust	1-S18
	Injection nozzle stuck or clogged	Repair or replace	1-S18
	Governor malfunctioning	Repair	–
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to specified level	G-13
	Piston ring and cylinder worn or stuck	Repair or replace	1-S48, S66
	Incorrect injection timing	Adjust	1-S16
	Deficient compression	Repair	1-S11, S61, S66

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Symptom	Probable Cause	Solution	Reference Page
Either Black or Dark Gray Exhaust Gas Is Observed	Overload	Reduce the load	–
	Low grade fuel used	Use specified fuel	–
	Fuel filter clogged	Replace	G-30
	Air cleaner clogged	Clean or replace	G-21
	Deficient nozzle injection	Repair or replace nozzle	1-S17, S18
Deficient Output	Incorrect injection timing	Adjust	1-S16
	Engine's moving parts seem to be seizing	Repair or replace	–
	Uneven fuel injection	Replace injection pump	1-S44
	Deficient nozzle injection	Repair or replace nozzle	1-S17, S18
	Compression leak	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S39 to S41
Excessive Lubricant Oil Consumption	Piston ring's gap facing the same direction	Shift ring gap direction	1-S47
	Oil ring worn or stuck	Replace	1-S48
	Piston ring groove worn	Replace piston	1-S47
	Valve stem and valve guide worn	Replace	1-S53
	Oil leaking due to defective seals or packing	Replace	–
Fuel Mixed into Lubricant Oil	Injection pump's plunger worn	Replace injection pump	1-S44
	Deficient nozzle injection	Repair or replace nozzle	1-S17, S18
	Injection pump broken	Replace	1-S44
Water Mixed into Lubricant Oil	Head gasket defective	Replace	1-S41
	Cylinder block or cylinder head flawed	Replace	1-S41
Low Oil Pressure	Engine oil insufficient	Replenish	G-13
	Oil strainer clogged	Clean	1-S46
	Oil filter cartridge clogged	Replace	G-13
	Relief valve stuck with dirt	Clean	–
	Relief valve spring weaken or broken	Replace	–
	Excessive oil clearance of crankshaft bearing	Replace	1-S64
	Excessive oil clearance of crankpin bearing	Replace	1-S63
	Excessive oil clearance of rocker arm	Replace	1-S55
	Oil passage clogged	Clean	–
	Different type of oil	Use specified type of oil	G-7
	Oil pump defective	Repair or replace	1-S67

Symptom	Probable Cause	Solution	Reference Page
High Oil Pressure	Different type of oil	Use specified type of oil	G-7
	Relief valve defective	Replace	–
Engine Overheated	Engine oil insufficient	Replenish	G-13
	Fan belt broken or tensioned improperly	Replace or adjust	1-S14
	Coolant insufficient	Replenish	G-37
	Radiator net and radiator fin clogged with dust	Clean	–
	Inside of radiator corroded	Clean or replace	G-37
	Coolant flow route corroded	Clean or replace	G-37
	Radiator cap defective	Replace	1-S15
	Radiator hose damaged	Replace	G-36
	Overload running	Reduce the load	–
	Head gasket defective	Replace	1-S41
	Incorrect injection timing	Adjust	1-S16
	Unsuitable fuel used	Use specified fuel	G-7

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2. SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Valve Clearance (Cold)		0.145 to 0.185 mm 0.0057 to 0.0073 in.	–
Compression Pressure		2.84 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 412 to 469 psi	2.25 MPa 23.0 kgf/cm^2 327 psi
Variance Among Cylinders		–	10 % or less
Top Clearance		0.55 to 0.70 mm 0.0217 to 0.0276 in.	–
Cylinder Head Surface	Flatness	–	0.05 mm 0.0020 in.
Valve Recessing	Intake and Exhaust	0.05 to 0.25 mm 0.0020 to 0.0098 in.	0.40 mm 0.0157 in.
Valve Stem to Valve Guide	Clearance	0.035 to 0.065 mm 0.0014 to 0.0025 in.	0.10 mm 0.0039 in.
Valve Stem	O.D.	6.960 to 6.975 mm 0.2741 to 0.2746 in.	–
Valve Guide	I.D.	7.010 to 7.025 mm 0.2760 to 0.2765 in.	–
Valve Face	Angle (Intake)	1.047 rad 60 °	–
	Angle (Exhaust)	0.785 rad 45 °	–
Valve Guide (Intake and Exhaust)		7.010 to 7.025 mm 0.2760 to 0.2765	–
Valve Seat	Angle (Intake)	1.047 rad 60 °	–
	Angle (Exhaust)	0.785 rad 45 °	–
	Width	2.12 mm 0.0835 in.	
Valve Spring	Free Length	37.0 to 37.5 mm 1.457 to 1.476 in.	36.5 mm 1.437 in.
	Tilt	–	1.0 mm 0.039 in.
	Setting Load	117.4 N / 31.0 mm 11.97 kgf / 31.0 mm 26.4 lbf / 1.22 in.	100.0 N / 31.0 mm 10.2 kgf / 31.0 mm 22.5 lbf / 1.22 in.

W10138740

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Rocker Arm Shaft to Rocker Arm	Clearance	0.016 to 0.045 mm 0.00063 to 0.00177 in.	0.10 mm 0.0039 in.
Rocker Arm Shaft	O.D.	11.973 to 11.984 mm 0.4714 to 0.4718 in.	–
Rocker Arm	I.D.	12.000 to 12.018 mm 0.4724 to 0.4731 in.	–
Push Rod	Alignment	–	0.25 mm 0.0098 in.
Tappet to Tappet Guide Bore	Clearance	0.020 to 0.062 mm 0.0008 to 0.0024 in.	0.07 mm 0.0028 in.
Tappet	O.D.	19.959 to 19.980 mm 0.7858 to 0.7866 in.	–
Tappet Guide	I.D.	20.000 to 20.021 mm 0.7874 to 0.7882 in.	–
Idle Gear			
Crank Gear to Idle Gear 1	Backlash	0.032 to 0.115 mm 0.0013 to 0.0045 in.	0.15 mm 0.0059 in.
Idle Gear 1 to Cam Gear	Backlash	0.036 to 0.114 mm 0.0014 to 0.0045 in.	0.15 mm 0.0059 in.
Idle Gear 1 to Injection Pump Gear	Backlash	0.034 to 0.116 mm 0.0013 to 0.0046 in.	0.15 mm 0.0059 in.
Idle Gear 1 to Idle Gear 2	Backlash	0.033 to 0.117 mm 0.0013 to 0.0046 in.	0.15 mm 0.0059 in.
Idle Gear Shaft to Gear Bushing			
Idle Gear 1	Clearance	0.020 to 0.054 mm 0.0008 to 0.0021 in.	0.10 mm 0.0039 in.
Idle Gear Bushing	I.D.	26.000 to 26.021 mm 1.0236 to 1.0244 in.	–
Idle Gear Shaft 1	O.D.	25.967 to 25.980 mm 1.0223 to 1.0228 in.	–
Idle Gear 2	Clearance	0.020 to 0.054 mm 0.0008 to 0.0021 in.	0.10 mm 0.0039 in.
Idle Gear Bushing	I.D.	26.000 to 26.021 mm 1.0236 to 1.0244 in.	–
Idle Gear Shaft 2	O.D.	25.967 to 25.980 mm 1.0223 to 1.0228 in.	–

W1013874

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Idle Gear			
Idle Gear 1	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.0201 in.	0.80 mm 0.0315 in.
Idle Gear 2	Side Clearance	0.20 to 0.51 mm 0.0079 to 0.0201 in.	0.80 mm 0.0315 in.
Camshaft	Side Clearance	0.07 to 0.22 mm 0.0028 to 0.0087 in.	0.30 mm 0.0118 in.
	Alignment	–	0.01 mm 0.0004 in.
Cam Height	Intake	28.80 mm 1.1339 in.	28.75 mm 1.1319 in.
	Exhaust	29.0 mm 1.1417 in.	28.95 mm 1.1398 in.
Camshaft Journal to Cylinder Block Bore	Oil Clearance	0.050 to 0.091 mm 0.00197 to 0.00358 in.	0.15 mm 0.0059 in.
Camshaft Journal	O.D.	35.934 to 35.950 mm 1.4147 to 1.4153 in.	–
Cylinder Block Bore	I.D.	36.000 to 36.025 mm 1.4173 to 1.4183 in.	–
Piston Pin Bore	I.D.	22.000 to 22.013 mm 0.8661 to 0.8667 in.	22.03 mm 0.8673 in.
Piston Pin to Small End Bushing	Clearance	0.014 to 0.038 mm 0.00055 to 0.00150 in.	0.15 mm 0.0059 in.
Piston Pin	O.D.	22.002 to 22.011 mm 0.8662 to 0.8666 in.	–
Small End Bushing	I.D.	22.025 to 22.040 mm 0.8671 to 0.8677 in.	–
Piston Pin to Small End Bushing (Spare Parts)	Clearance	0.015 to 0.075 mm 0.00059 to 0.00295 in.	0.15 mm 0.0059 in.
Small End Bushing	I.D.	22.062 to 22.077 mm 0.7885 to 0.7904 in.	–
Piston Ring Gap [D905-E2]			
Top Ring		0.25 to 0.40 mm 0.0098 to 0.0157 in.	1.25 mm 0.0492 in.
Second Ring		0.25 to 0.40 mm 0.0098 to 0.0157 in.	1.25 mm 0.0492 in.
Oil Ring		0.25 to 0.40 mm 0.0098 to 0.0157 in.	1.25 mm 0.0492 in.

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Piston Ring Gap [D1005-E2, D1105-E2, V1505-E2]]			
Top Ring		0.30 to 0.45 mm 0.0118 to 0.0177 in.	1.25 mm 0.0492 in.
Second Ring		0.30 to 0.45 mm 0.0118 to 0.0177 in.	1.25 mm 0.0492 in.
Oil Ring		0.25 to 0.40 mm 0.0098 to 0.0157 in.	1.25 mm 0.0492 in.
Piston Ring to Piston Ring Groove			
Second Ring	Clearance	0.085 to 0.112 mm 0.0033 to 0.0044 in.	0.2 mm 0.0079 in.
Oil Ring	Clearance	0.020 to 0.055 mm 0.0008 to 0.0021 in.	0.15 mm 0.0059 in.
Connecting Rod	Alignment	–	0.05 mm 0.0020 in.
Crankshaft	Side Clearance	0.15 to 0.31 mm 0.0059 to 0.0122 in.	0.50 mm 0.0197 in.
	Alignment	–	0.02 mm 0.0008 in.
Crankshaft to Crankshaft Bearing 1	Oil Clearance	0.034 to 0.114 mm 0.0013 to 0.0045 in.	0.20 mm 0.0079 in.
Crankshaft	O.D.	47.934 to 47.950 mm 1.8872 to 1.8878 in.	–
Crankshaft Bearing 1	I.D.	47.984 to 48.048 mm 1.8891 to 1.8916 in.	–
Crankshaft to Crankshaft Bearing 2	Oil Clearance	0.034 to 0.095 mm 0.0013 to 0.0037 in.	0.20 mm 0.0079 in.
Crankshaft Journal	O.D.	47.934 to 47.950 mm 1.8872 to 1.8878 in.	–
Crankshaft Bearing 2	I.D.	47.984 to 48.029 mm 1.8891 to 1.8909 in.	–
Crankshaft to Crankshaft Bearing 3	Oil Clearance	0.034 to 0.098 mm 0.0013 to 0.0039 in.	0.20 mm 0.0079 in.
Crankshaft Journal	O.D.	51.921 to 51.940 mm 2.0441 to 2.0449 in.	–
Crankshaft Bearing 3	I.D.	51.974 to 52.019 mm 2.0462 to 2.0480 in.	–

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Crankpin to Crankpin Bearing	Oil Clearance	0.029 to 0.091 mm 0.0011 to 0.0036 in.	0.20 mm 0.0079 in.
Crankpin	O.D.	39.959 to 39.975 mm 1.5732 to 1.5738 in.	–
Crankpin Bearing	I.D.	40.004 to 40.050 mm 1.5750 to 1.5768 in.	–
Crankshaft	Side Clearance	0.15 to 0.31 mm 0.0059 to 0.0122 in.	0.50 mm 0.0197 in.
Cylinder Liner I.D.	D905-E2	72.000 to 72.019 mm 2.8346 to 2.8354 in.	72.15 mm 2.8406 in.
	D1005-E2	76.000 to 76.019 mm 2.9921 to 2.9929 in.	76.15 mm 2.9980 in.
	D1105-E2B V1505-E2B	78.000 to 78.019 mm 3.0709 to 3.0716 in.	78.15 mm 3.0768 in.
Cylinder Liner I.D. (Oversized)	D905-E2	72.500 to 72.519 mm 2.85433 to 2.85507 in.	72.65 mm 2.8602 in.
	D1005-E2	76.500 to 76.519 mm 3.0118 to 3.0126 in.	76.65 mm 3.0177 in.
	D1105-E2B V1505-E2B	78.500 to 78.519 mm 3.0906 to 3.0913 in.	78.65 mm 3.0965 in.

W11340480

LUBRICATING SYSTEM

Item		Factory Specification	Allowable Limit
Engine Oil Pressure	At Idle Speed	More than 49 kPa 0.5 kgf/cm^2 7 psi	–
	At Rated Speed	196 to 441 kPa 2.0 to 4.5 kgf/cm^2 36 to 64 psi	147 kPa 1.5 kgf/cm^2 27 psi
Inner Rotor to Outer Rotor	Clearance	0.06 to 0.18 mm 0.0024 to 0.0071 in.	–
Outer Rotor to Pump Body	Clearance	0.100 to 0.180 mm 0.0039 to 0.0071 in.	–
Inner Rotor to Cover	Clearance	0.025 to 0.075 mm 0.0010 to 0.0030 in.	–

W10139730

COOLING SYSTEM

Item		Factory Specification	Allowable Limit
Fan Belt	Tension	7 to 9 mm / 98 N 0.28 to 0.35 in. / 98 N (10 kgf, 22 lbf)	–
Thermostat	Valve Opening Temperature (At Beginning)	69.5 to 72.5 °C 157.1 to 162.5 °F	–
	Valve Opening Temperature (Opened Completely)	85 °C 185 °F	–
Radiator Cap	Pressure Falling Time	10 seconds or more 88 → 59 kPa 0.9 → 0.6 kgf/cm^2 13 → 9 psi	–
Radiator	Water Leakage Test Pressure	No leak at specified pressure 137 kPa 1.4 kgf/cm^2 20 psi	–

W10135990

FUEL SYSTEM

Item		Factory Specification	Allowable Limit
Injection Pump	Injection Timing	0.27 to 0.31 rad (16 to 18 °) before T.D.C.	–
Pump Element	Fuel Tightness	–	13.73 MPa 140 kgf/cm^2 1991 psi
Delivery Valve	Fuel Tightness	10 seconds or more for pressure falling from 13.73 → 12.75 MPa from 140 → 130 kgf/cm^2 from 1991 → 1849 psi	5 seconds or more for pressure falling from 13.73 → 12.75 MPa from 140 → 130 kgf/cm^2 from 1991 → 1849 psi
Injection Nozzle	Injection Pressure	13.73 to 14.71 MPa 140 to 150 kgf/cm^2 1990 to 2130 psi	–
Injection Nozzle Valve Seat	Valve Seat Tightness	When the pressure is 12.75 MPa (130 kgf/cm^2, 1849 psi)	–

W10139730

3. TIGHTENING TORQUES

Tightening torque of screws, bolts and nuts on the table below are specially specified. (For general use screws, bolts and nuts : See page G-8.)

■ **NOTE**

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

[1] TRACTOR SECTION

Item	N·m	kgf·m	lbf·ft
Steering wheel mounting nut	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Cabin mounting bolts and nuts (M14)	100 to 120	10.2 to 12.2	73.8 to 88.5
Cabin support mounting bolt	100 to 110	10.2 to 11.2	73.8 to 81.1
ROPS mounting bolt (for middle and lower frame 9/16-18UNF)	124 to 147	12.6 to 15.0	91.2 to 108
ROPS mounting bolt (M12)	90 to 95	9.2 to 9.7	66.4 to 70.1
Sub-frame mounting bolt (M10) for alminum	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2
Sub-frame mounting bolt (M12) for alminum	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5
Sub-frame mounting bolt for ordinary material (M12)	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Sub-frame mounting bolt for ordinary material (M14)	126 to 150	12.9 to 15.3	93 to 111
Engine and front case mounting bolt and nut (M8)	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2
Engine and front case mounting stud bolt (M10)	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Engine and front axle frame mounting bolt (M10)	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2

W1120105

[2] ENGINE SECTION

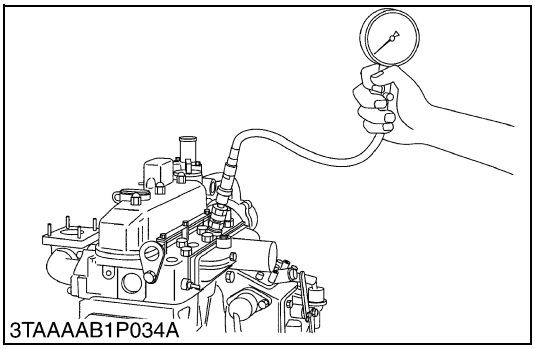
Item	Size x Pitch	N·m	kgf·m	lbf·ft
Oil pressure switch	–	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5
Nozzle holder	–	34.3 to 39.2	3.5 to 4.0	25.3 to 28.9
Overflow pipe nut	–	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Nozzle holder assembly	–	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
*Cylinder head cover nuts	M7 x 1.0	6.9 to 8.8	0.70 to 0.90	5.1 to 6.5
Injection pipe retaining nuts	M12 x 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
*Rocker arm bracket nuts	M7 x 1.0	21.6 to 26.5	2.2 to 2.7	15.9 to 19.5
*Cylinder head screw	M10 x 1.25	63.7 to 68.6	6.5 to 7.0	47.0 to 50.6
*Fan drive pulley screw	M14 x 1.5	235.4 to 245.2	24.0 to 25.0	173.6 to 180.8
Idle gear 2 lock nut	–	25 to 29	2.5 to 3.0	18 to 21
Idle gear 2 bearing nut	–	35 to 39	3.5 to 4.0	26 to 28
*Connecting rod screw	M8 x 1.0	41.2 to 46.1	4.2 to 4.7	30.4 to 34.0
*Flywheel screw	M10 x 1.25	53.9 tos 58.8	5.5 to 6.0	39.8 to 43.4
*Bearing case cover screws	M6 x 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Main bearing case screw 2	M9 x 1.25	49.0 to 53.9	5.0 to 5.5	36.2 to 39.8
*Main bearing case screw 1	M8 x 1.25	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3

W1013236

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Engine Body



Compression Pressure

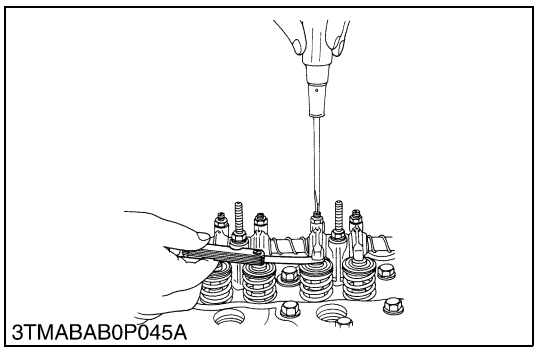
1. Run the engine until it is warmed up.
2. Stop the engine.
3. Remove the air cleaner, the muffler and all glow plugs (or nozzles).
4. Set a compression tester with the adaptor to the glow plug hole (or nozzle hole).
   Nozzle Hole : Adaptor H
   Glow Plug Hole : Adaptor L
5. After making sure that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

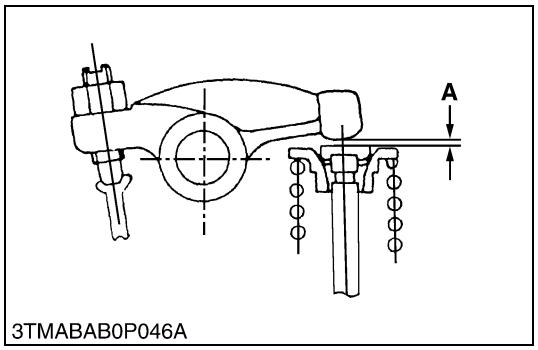
■ **NOTE**

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

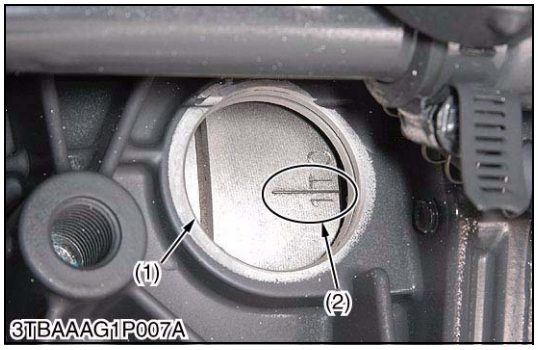
Compression pressure	Factory spec.	2.84 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 412 to 469 psi
	Allowable limit	2.25 MPa 23.0 kgf/cm^2 327 psi

W1013828


3TMABAB0P045A



3TMABAB0P046A



3TBAAAG1P007A

Valve Clearance 1 (ROPS Model)

■ **IMPORTANT**

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

1. Remove the head cover, the glow plugs and the timing window cover on the clutch housing.
2. Align the **"1TC"** mark line on the flywheel and center of timing window so that the No. 1 piston comes to the compression top dead center.
3. Check the following valve clearance marked with "☆" using a feeler gauge.
4. If the clearance is not within the factory specifications, adjust with the adjusting screw.

Valve clearance	Factory spec.	0.145 to 0.185 mm 0.0057 to 0.0073 in.

■ **NOTE**

- **The "TC" marking line on the flywheel is just for No. 1 cylinder. There is no "TC" marking for the other cylinders.**
- **No. 1 piston comes to the T.D.C. position when the "TC" marking line is aligned with center of timing window on front case. Turn the flywheel 0.26 rad (15 °) clockwise and counterclockwise to see if the piston is at the compression top dead center or the overlap position. Now referring to the table below, readjust the valve clearance. (The piston is at the compression top dead center when both the IN. and EX. valves do not move; it is at the overlap position when both the valves move.)**
- **Finally turn the flywheel 6.28 rad (360 °) and align the "TC" marking line and the center of timing window. Adjust all the other valve clearance as required**
- **After turning the flywheel counterclockwise twice or three times, recheck the valve clearance, firmly tighten the lock nut of the adjusting screw.**

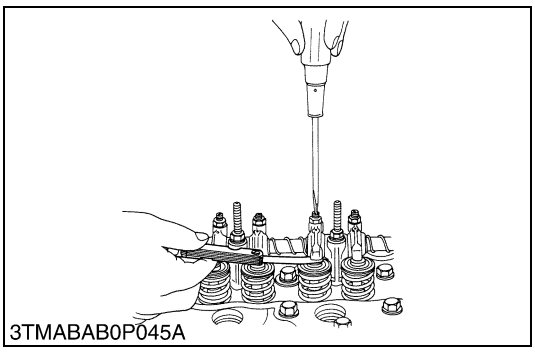
Number of cylinders / Valve arrangement / Adjustable cylinder location of piston		3-cylinder		4-cylinder	
		IN.	EX.	IN.	EX.
When No. 1 piston comes to compression top dead center	No. 1	☆	☆	☆	☆
	No. 2		☆	☆	
	No. 3	☆			☆
	No. 4				
When No. 1 piston comes to overlap position	No. 1				
	No. 2	☆			☆
	No. 3		☆	☆	
	No. 4			☆	☆

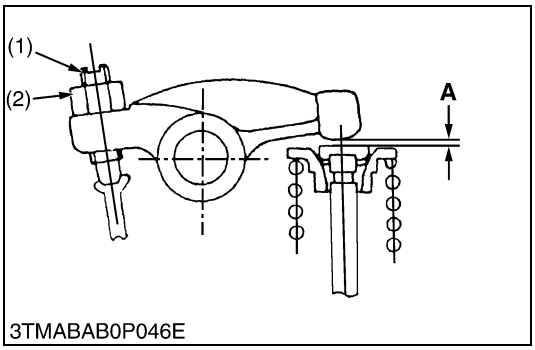
☆ : Valve clearance is adjustable.

(1) Timing Window
(2) TC Mark Line

A : Valve Clearance

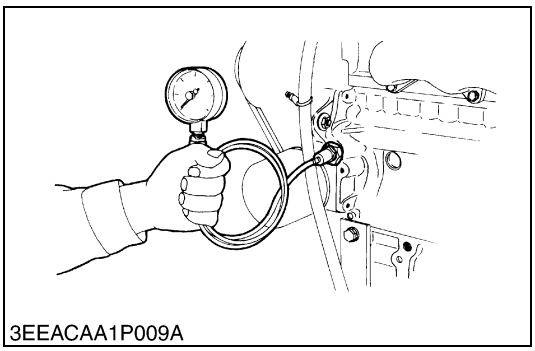
W10507730


3TMABAB0P045A



3TMABAB0P046E

(2) Lubricating System


3EEACAA1P009A

Valve Clearance 2 (CABIN Model)

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

1. Remove the head cover and the glow plugs.
2. Check and adjust the valve clearance at the both valves compression top dead center.
3. If the clearance is not within the factory specifications, adjust with the adjusting screw.
- Firing order
  3-cylinder : 1 → 2 → 3
  4-cylinder : 1 → 3 → 4 → 2
- Check and adjust the valve clearance following the firing order shown above.

Valve clearance	Factory spec.	0.145 to 0.185 mm 0.0057 to 0.0073 in.

(1) Adjusting Screw
(2) Lock Nut
A : Valve Clearance

W10302340

Engine Oil Pressure

1. Remove the engine oil pressure switch, and set an oil pressure tester.
2. Start the engine. After warming up, measure the oil pressure of both idling and rated speeds.
3. If the oil pressure is less than the allowable limit, check the following.
- Engine oil insufficient
- Oil pump defective
- Oil strainer clogged
- Oil filter cartridge clogged
- Oil gallery clogged
- Excessive oil clearance
- Foreign matter in the relief valve

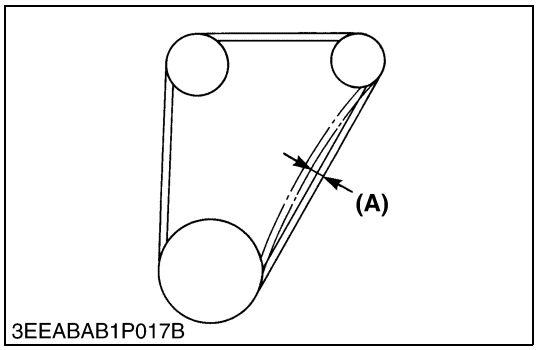
Engine oil pressure	At idle speed	Factory spec.	More than 49 kPa 0.5 kgf/cm^2 7 psi
	At rated speed	Factory spec.	196 to 441 kPa 2.0 to 4.5 kgf/cm^2 36 to 64 psi
		Allowable limit	147 kPa 1.5 kgf/cm^2 27 psi

(When reassembling)
- After checking the engine oil pressure, tighten the engine oil pressure switch to the specified torque.

Tightening torque	Oil pressure switch	14.7 to 19.6 N·m 1.5 to 2.0 kgf·m 10.8 to 14.5 lbf·ft

W10539350

(3) Cooling System



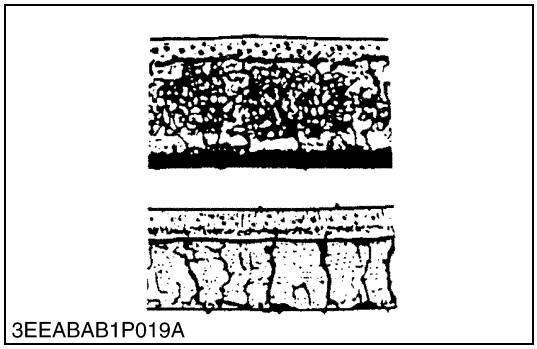
3EEABAB1P017B

Fan Belt Tension

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

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

W1036412

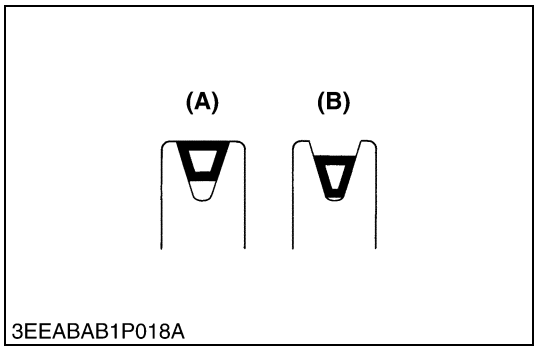

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Fan Belt Damage and Wear

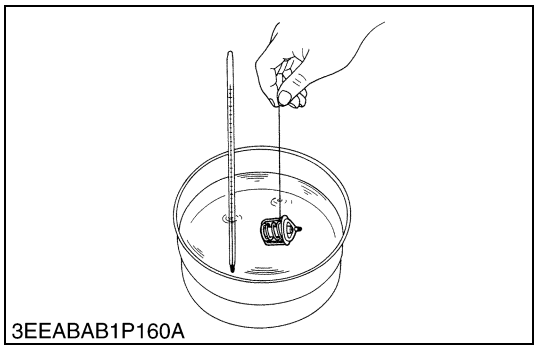
1. Check the fan belt for damage.
2. If the fan belt is damaged, replace it.
3. Check if the fan belt is worn and sunk in the pulley groove.
4. If the fan belt is nearly worn out and deeply sunk in the pulley groove, replace it.

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

W1025874



3EEABAB1P018A


3EEABAB1P160A

Thermostat Valve Opening Temperature

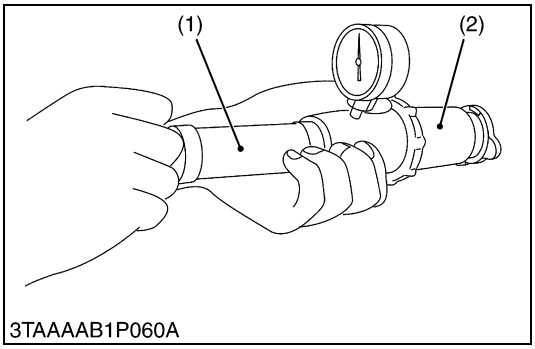
1. Suspend the thermostat in the water by a string with its end inserted between the valve and seat.
2. Heating the water gradually, read the temperature when the valve opens and leaves the string.
3. Continue heating and read the temperature when the valve opens approx. 8 mm (0.315 in.).
4. If the measurement is not within the factory specifications, replace the thermostat.

Thermostat'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

W10548440

CAUTION

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



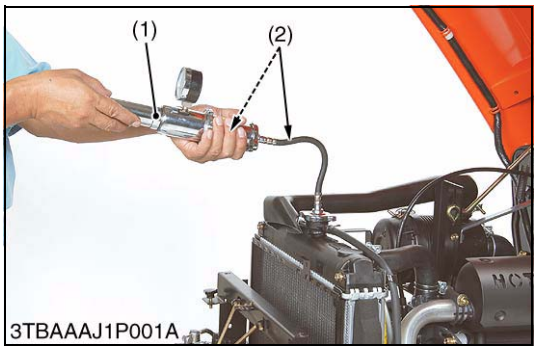
Radiator Cap Air Leakage

1. Set a radiator tester (1) and adaptor (2) on the radiator cap.
2. Apply the specified pressure 88 kPa (0.9 kgf/cm^2, 13 psi), and measure the time for the pressure to fall to 59 kPa (0.6 kgf/cm^2, 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 to 59 kPa (from 0.9 to 0.6 kgf/cm^2, from 13 to 9 psi)

(1) Radiator Tester (2) Adaptor

1025874



Radiator Water Leakage

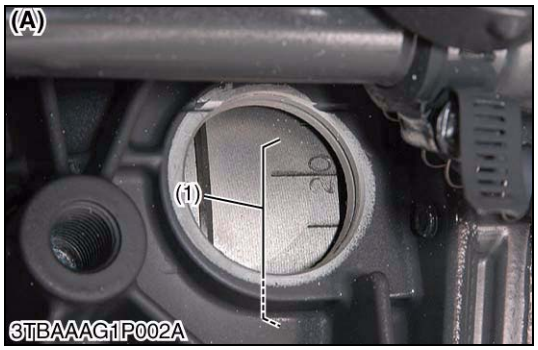
1. Pour a specified amount of water into the radiator.
2. Set a radiator tester (1) and an adaptor (2) and raise the water pressure to the specified pressure.
3. Check the radiator for water leaks.
4. For water leak from the pinhole, repair with the radiator cement. When water leak is excessive, replace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

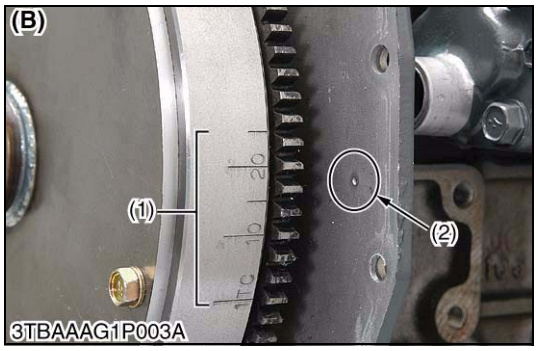
Radiator water leakage test pressure	Factory spec.	137 kPa 1.4 kgf/cm^2 20 psi

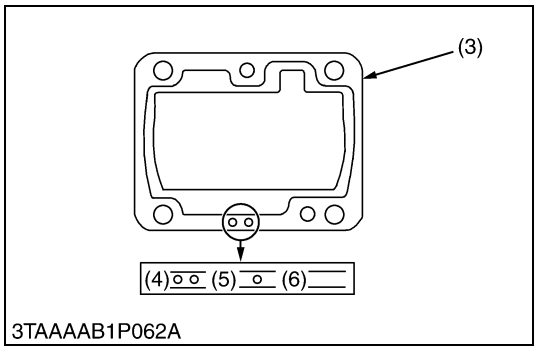
(1) Radiator Tester (2) Adaptor

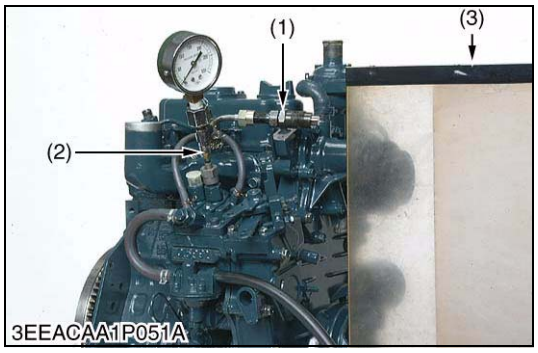
W10553600

(4) Fuel System









Injection Timing

1. Remove the injection pipes.
2. Remove the engine stop solenoid.
3. Turn the flywheel counterclockwise (facing the flywheel) until fuel flows from the delivery valve holder.
4. Continue to turn the flywheel slowly, and stop it as soon as the fuel level at the tip of the delivery valve holder begins to increase.
5. Check to see if the timing angle lines on the flywheel is aligned with the alignment mark (2).
6. If the injection timing is out of adjustment, readjust the timing with shims.

Injection timing	Factory spec.	0.27 to 0.31 rad (16 to 18 °) before T.D.C.

■ **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 Line
(2) Alignment Mark
(3) Shim (Soft Metal Gasket Shim)
(4) Two-holes : 0.20 mm (0.0079 in.)
(5) One-hole : 0.25 mm (0.0098 in.)
(6) Without hole : 0.30 mm (0.0118 in.)

(A) Engine mounted on the tractor (ROPS model)
(B) Engine only (ROPS and CABIN model)

W1045781

Fuel Tightness of Pump Element

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

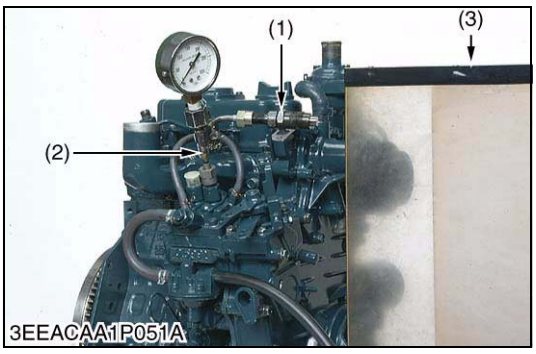
Fuel tightness of pump element	Allowable limit	13.73 MPa 140 kgf/cm^2 1991 psi

■ **NOTE**

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

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

W1045879



Fuel Tightness of Delivery Valve

1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Set a pressure tester to the fuel injection pump.
4. Install the injection nozzle (1) jetted with the proper injection pressure to the injection pump pressure tester (2).
5. Run the starter to increase the pressure.
6. Stop the starter when the fuel jets from the injection nozzle. After that, turn the flywheel by the hand and raise the pressure to approx. 13.73 MPa (140 kgf/cm^2, 1991 psi).
7. 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 13.73 to 12.75 MPa (from 140 to 130 kgf/cm^2, from 1991 to 1849 psi).
8. Measure the time needed to decrease the pressure from 13.73 to 12.75 MPa (from 140 to 130 kgf/cm^2, from 1991 to 1849 psi).
9. If the measurement is less than allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

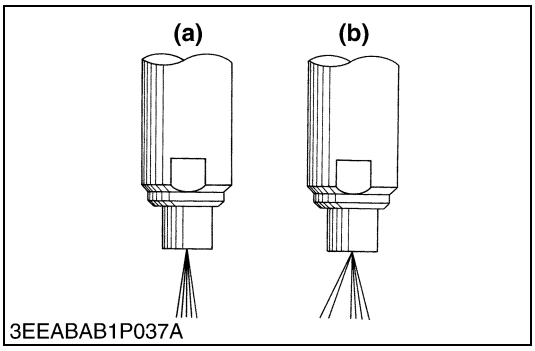
Fuel tightness of delivery valve	Factory spec.	10 seconds 13.73 → 12.75 MPa 140 → 130 kgf/cm^2 1991 → 1849 psi
	Allowable limit	5 seconds 13.73 → 12.75 MPa 140 → 130 kgf/cm^2 1991 → 1849 psi

■ **NOTE**

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

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

W10563160



Nozzle Spraying Condition

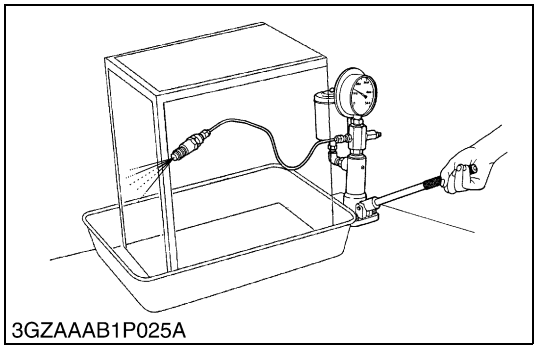
CAUTION

- **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 injects the human body, cells may be destroyed and blood poisoning may be caused.**

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

(a) Good
(b) Bad

W1047856


3GZAAAB1P025A

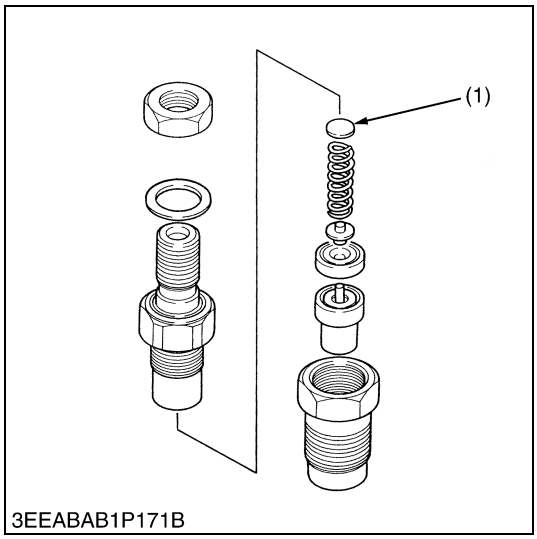
Fuel Injection Pressure

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

Fuel injection pressure	Factory spec.	13.73 to 14.71 MPa 140 to 150 kgf/cm^2 1990 to 2130 psi

(Reference)

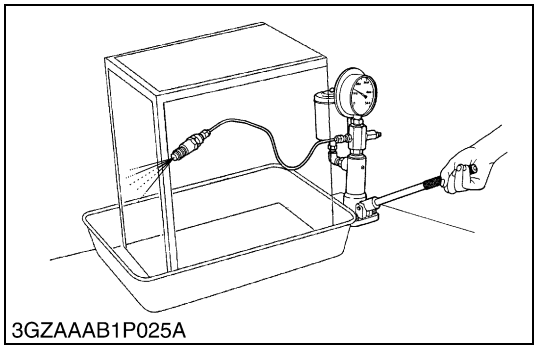
- Pressure variation with 0.01 mm (0.0004 in.) difference of adjusting washer thickness
  Approx. 235 kPa (2.4 kgf/cm^2, 34 psi)
- Pressure with 0.01 mm (0.0004 in.) difference of adjusting washer thickness varies approx. 235 KPa (2.4 kgf/cm^2, 34 psi)



3EEABAB1P171B

(1) Adjusting Washer

W1056842

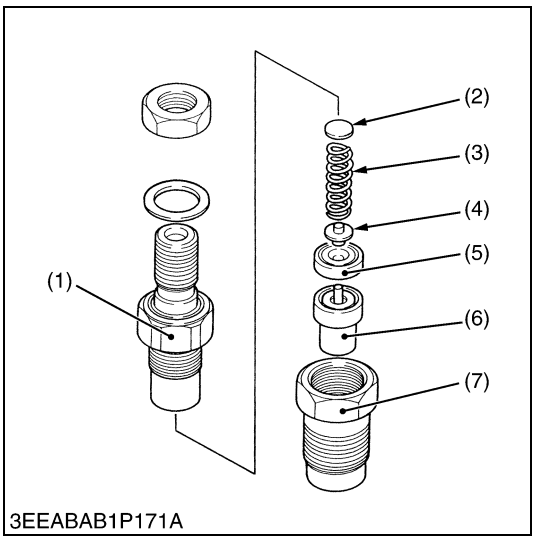

3GZAAAB1P025A

Valve Seat Tightness

1. Set the injection nozzle to a nozzle tester.
2. Raise the fuel pressure, and keep at 12.75 MPa (130 kgf/cm^2, 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

W10581240



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.

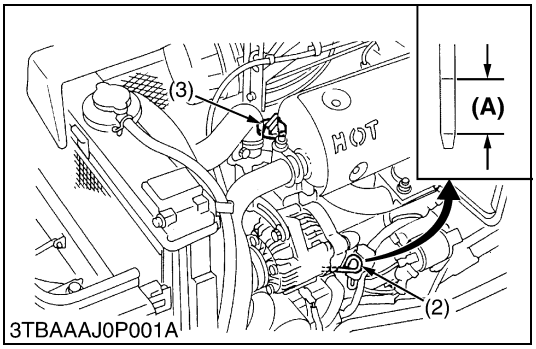
Tightening torque	Nozzle holder	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 25.3 to 28.9 lbf·ft
	Overflow pipe nut	19.6 to 24.5 N·m 2.0 to 2.5 kgf·m 14.5 to 18.1 lbf·ft
	Nozzle holder assembly	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 lbf·ft

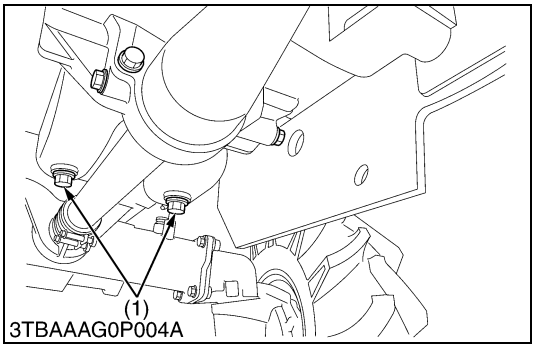
(1) Nozzle Holder
(2) Adjusting Washer
(3) Nozzle Spring
(4) Push Rod
(5) Distance Piece
(6) Nozzle Piece
(7) Nozzle Retaining Nut

W10586760

[2] PREPARATION

(1) Draining Lubricants and Coolant





Draining Engine Oil

CAUTION

- **Before changing oil, be sure to stop the engine.**

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw in the drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

■ IMPORTANT

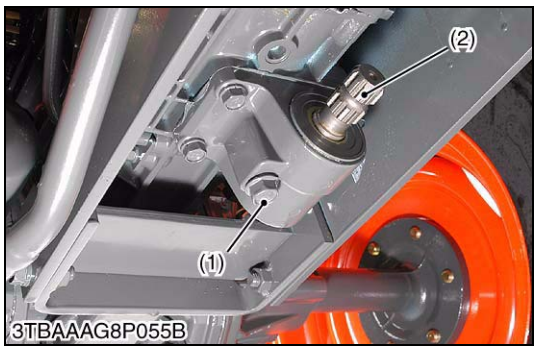
- **When using an oil of different manufacture or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Use the proper SAE Engine Oil according to ambient temperatures.**
- **Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)**

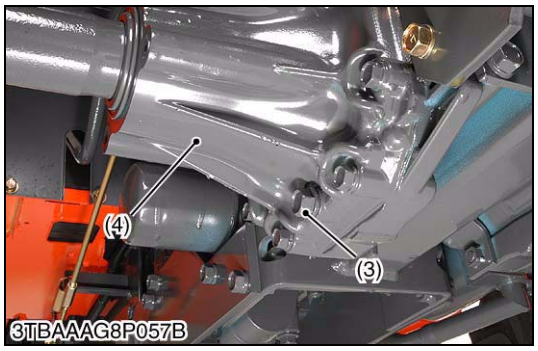
Engine oil capacity	B1830, B2230, B2530	3.0 L 3.2 U.S.qts 2.6 lmp.qts
	B3030	4.1 L 4.3 U.S.qts 3.6 lmp.qts

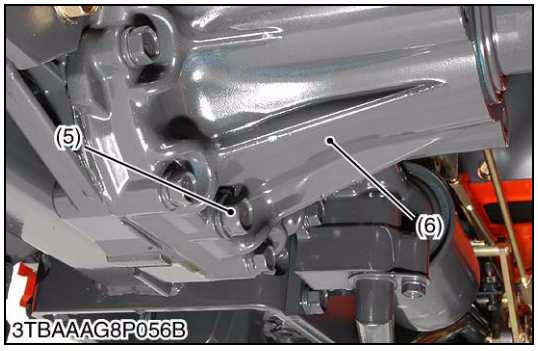
(1) Drain Plug
(2) Dipstick
(3) Oil Inlet Plug

(A) Oil level is acceptable within this range.

W1111105







Draining Transmission Fluid

CAUTION

- **Stop the engine before checking and changing the transmission fluid.**

1. Place the oil pan under the tractor.
2. Remove the drain plugs (1) (3) (5) at the mid-PTO shaft and at the bottom of the rear axle cases (4) (6).
3. Drain the transmission fluid.
4. After draining the transmission fluid, reinstall the drain plugs (1), (3), (5).

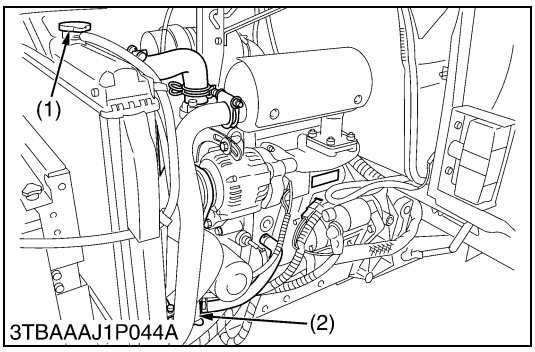
IMPORTANT

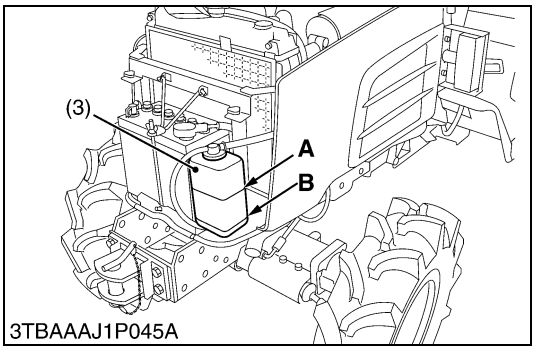
- **Use only KUBOTA UDT oil. Use of other oils may damage the transmission or hydraulic system.**
  Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7).
- **Never work the tractor immediately after changing the transmission oil. Keep the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030HST	17 L 4.5 U.S.gals 3.7 Imp.gals

(1) Drain Plug
(2) Mid-PTO Shaft
(3) Drain Plug
(4) Rear Axle Case (LH)
(5) Drain Plug
(6) Rear Axle Case (RH)

W1126654





Draining Coolant

CAUTION

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

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

■ **IMPORTANT**

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

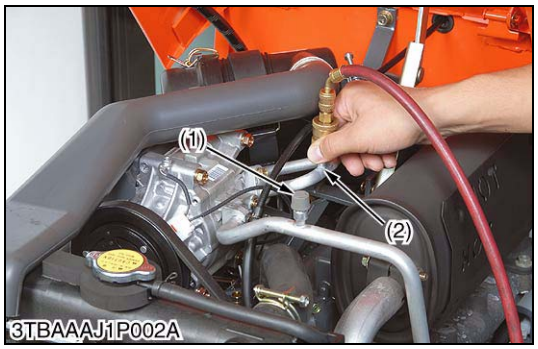
Coolant capacity (with recovery tank)	B1830, B2230, B2530, B3030	4.5 L 4.7 U.S.qts 4.0 Imp.qts
	B2230 CABIN B2530 CABIN B3030 CABIN	5.2 L 6.3 U.S.qts 4.8 Imp.qts

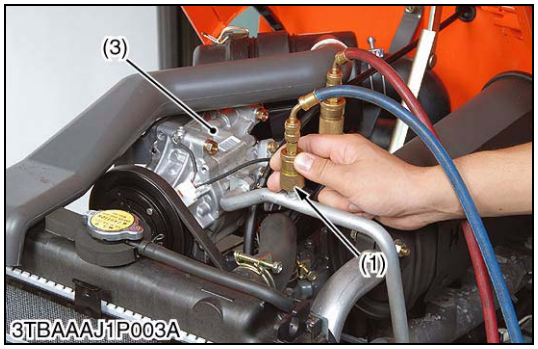
(1) Radiator Cap
(2) Drain Cock
(3) Recovery Tank

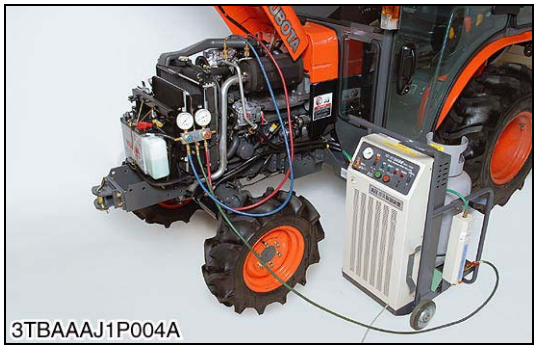
A : FULL
B : LOW

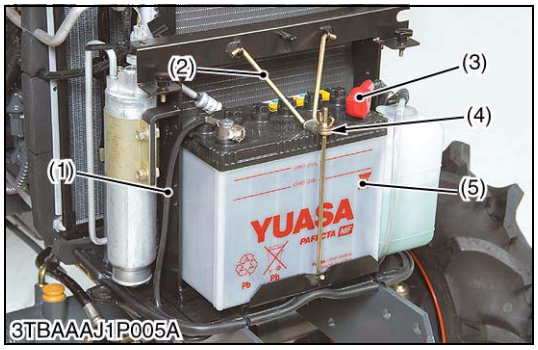
W1021307

(2) Separating Cabin from Tractor Body (CABIN)









Discharging R134a Refrigerant

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
(2) **HI** Pressure Side Charging Valve
(3) Compressor

W1077370

Removing Battery

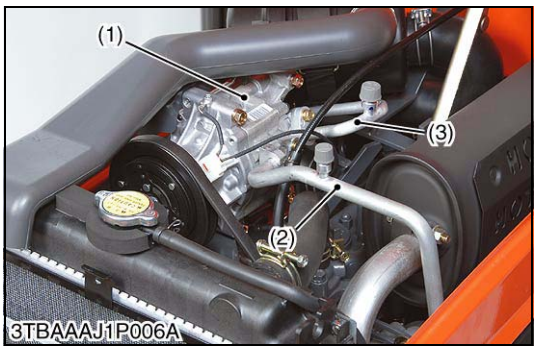
1. Removing the wing nut (4).
2. Remove the battery retainer (2).
3. Disconnect the battery negative cable (1) from the battery (5).
4. Disconnect the battery positive cable (3) from the battery (5).
5. Remove the battery (5).

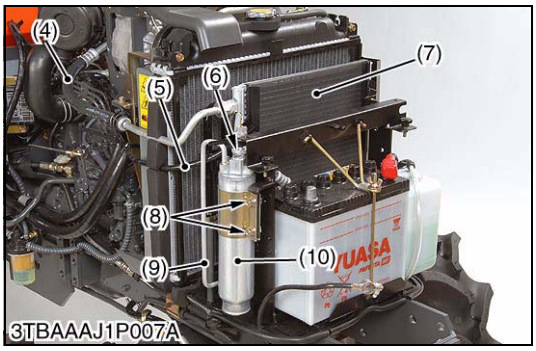
(When reassembling)

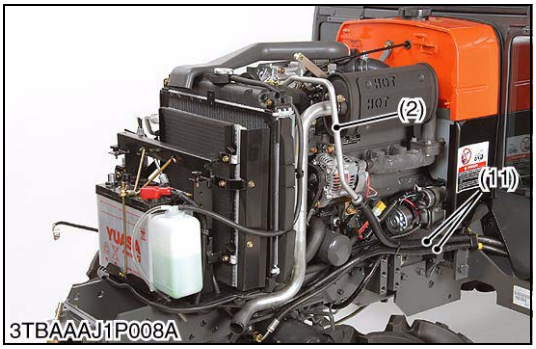
- Connect the battery positive cable first.
- Connect the battery negative cable second.

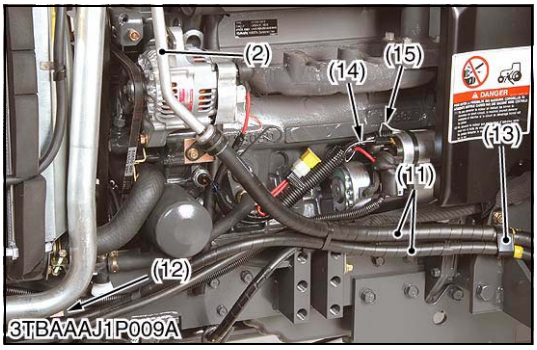
(1) Battery Negative Cable
(2) Battery Retainer
(3) Battery Positive Cable
(4) Wing Nut
(5) Battery

W1077632









Removing Receiver, Condenser and Refrigerant Hoses

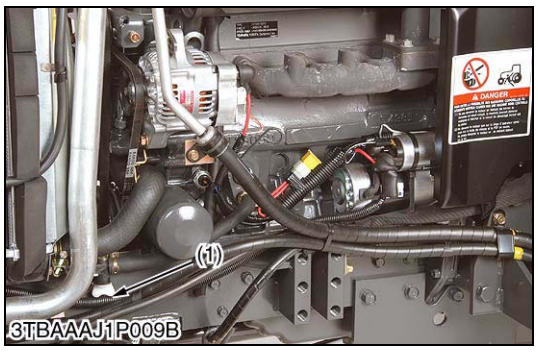
1. Disconnect the high pressure pipe (3) and the low pressure pipe (2) from the compressor.
2. After removing the battery, disconnect the connector from the receiver pressure switch. Remove the bolts (8) and the receiver (10).
3. Remove the condenser (7).
4. Remove the refrigerant clamps (12) (13).
5. Dismount the receiver, the condenser with the refrigerant hose (1) not to bend or not to damage the refrigerant pipes connected to the receiver.

(When reassembling)

- Connect the battery positive cable first.
- Connect the battery negative cable second.

(1) Compressor
(2) Low Pressure Pipe
(3) High Pressure Pipe
(4) Refrigerant Hose
(5) Wiring Harness
(6) Pressure Switch
(7) Condenser
(8) Bolt
(9) Refrigerant Pipe
(10) Receiver
(11) Refrigerant Hose
(12) Clamp
(13) Clamp
(14) **ST** Terminal Lead
(15) Stop Solenoid Lead

W1039311



Disconnecting Water Hoses

1. Loosen the water drain cock (1).
2. Drain the coolant.
3. Remove the hose clamps (3). Disconnect the water hoses (2) from the engine.

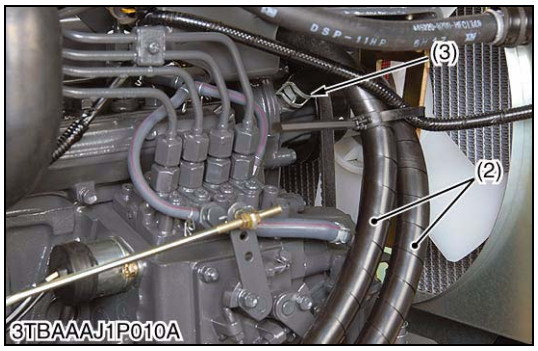
(When reassembling)

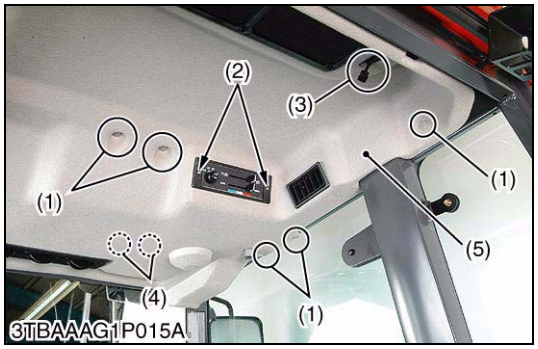
- Fill the coolant to the specified capacity.

Coolant	Capacity	5.2 L 5.5 U.S.qts 4.6 Imp.qts

(1) Water Drain Cock
(2) Water Hose
(3) Hose Clamp

W1043014



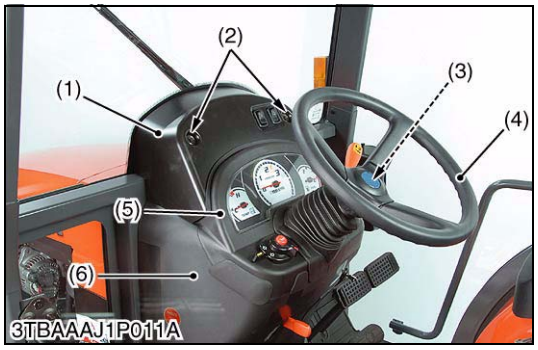


Removing Inner Roof

1. Remove the screws (2) from the control panel.
2. Remove the knob (3).
3. Remove the rivets (1) and the screws (4) from the inner roof (5).

(1) Rivet
(2) Screw
(3) Knob
(4) Screw
(5) Inner Roof

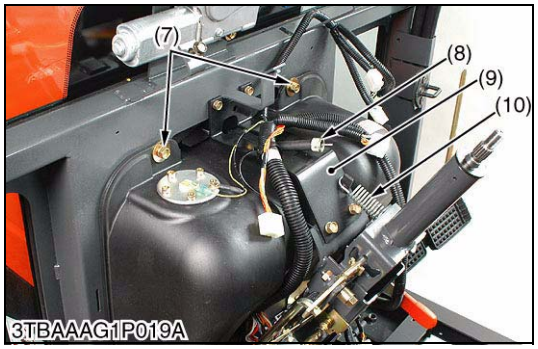
W1078469



Removing Steering Wheel and Meter Panel

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut (3).
3. Remove the steering wheel with a steering wheel puller (Code No. 07916-51090).
4. Remove the bolts (2) and the front wiper cover (1).
5. Disconnect the coupler.
6. Remove the meter panel (5).
7. Disconnect the hour-meter cable (8) from the meter panel.
8. Remove the panel lower cover (6).
9. Remove the spring (10) and the steering post stay (9).
10. Remove the bolts (7) from the cabin frame.

(When reassembling)

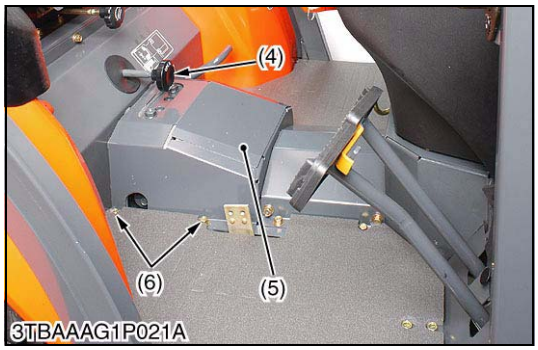


Tightening torque	Steering wheel mounting nut	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft

(1) Front Wiper Cover
(2) Bolt
(3) Nut
(4) Steering Wheel
(5) Meter Panel
(6) Panel Lower Cover
(7) Bolt
(8) Hour-meter Cable
(9) Steering Post Stay
(10) Spring

W1079311





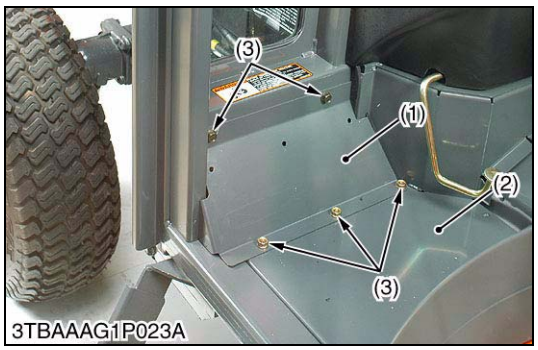


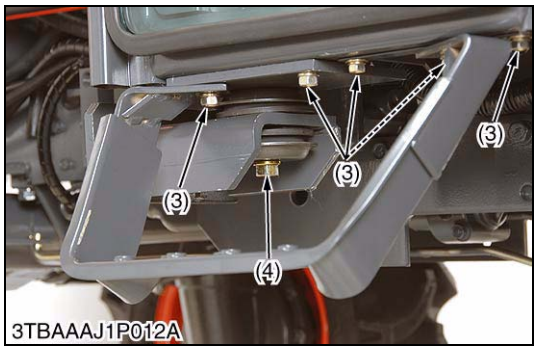
Removing HST Pedal, Floor Mat and Seat Front Cover

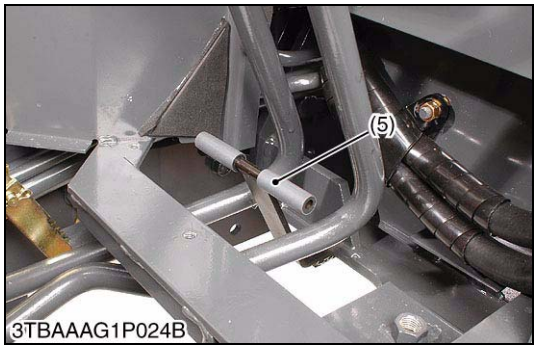
1. Remove the bolts (2) and the HST pedal (1).
2. Remove the grip (4). Remove the differential lock pin at the right side rear axle shaft.
3. Remove the bolts (6) and the seat front cover (5) from the fenders and the steps.

(1) HST Pedal
(2) Bolt
(3) Floor Mat
(4) Grip
(5) Seat Front Cover
(6) Bolt

W1080336







Removing Cover, Step and Stopper

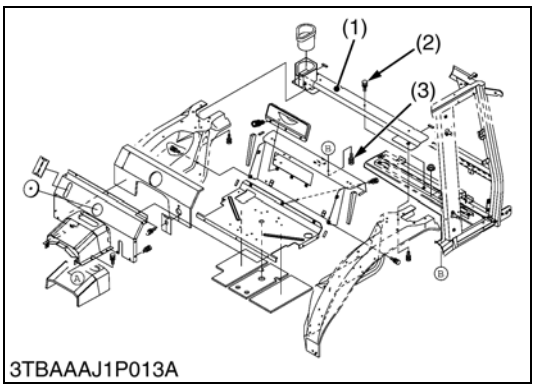
1. Remove the bolts (3).
2. Remove the cover (1).
3. Remove the bolts and the step (2).
4. Remove the bolt and the stopper (5).
5. Remove the cabin mounting bolts and the nuts.

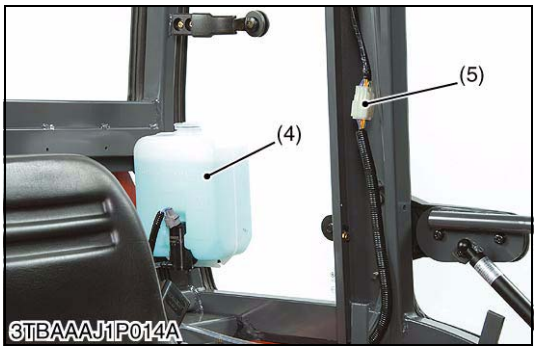
(When reassembling)

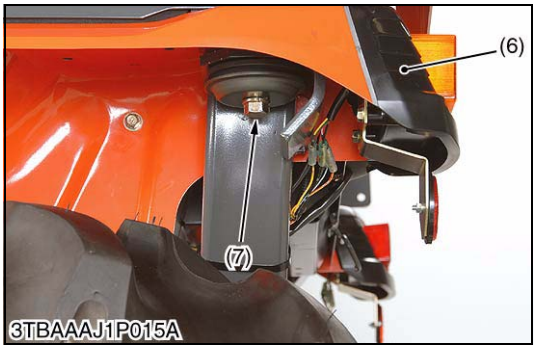
Tightening torque	Cabin mounting bolts and nuts (M14)	100 to 120 N·m 10.2 to 12.2 kgf·m 73.8 to 88.5 lbf·ft

(1) Cover
(2) Step
(3) Bolt
(4) Bolt and Nut
(5) Stopper

W1080434







Disconnecting Wiring Harness and Removing Cabin Mounting Bolt

1. After removing the seat, remove the bolts (2) and the rear fender cover (1).
2. Remove the bolts (3) from the cabin frame.
3. Disconnect the connector from the window washer tank (4).
4. Disconnect the cabin connector (5).
5. After disconnecting the leads from tail light body (6), remove the tail light body (6) from the fenders.
6. Remove the cabin mounting bolts and nuts (7)

(When reassembling)

Tightening torque	Cabin mounting bolts and nuts (M14)	100 to 120 N·m 10.2 to 12.2 kgf·m 73.8 to 88.5 lbf·ft

(1) Rear Fender Cover
(2) Bolt
(3) Bolt
(4) Window Washer Tank
(5) cabin Connector
(6) Tail Light Body
(7) Cabin Mounting Bolt and Nut

W1049727





Dismounting Cabin

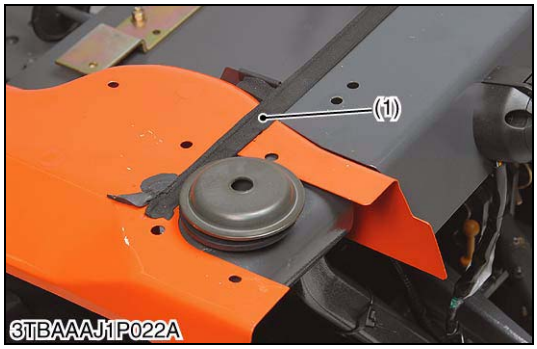
1. Hook the cabin with the nylon slings not to damage the other roof.
2. Dismount the cabin from the tractor body.
3. Support the cabin with the rigid jacks.

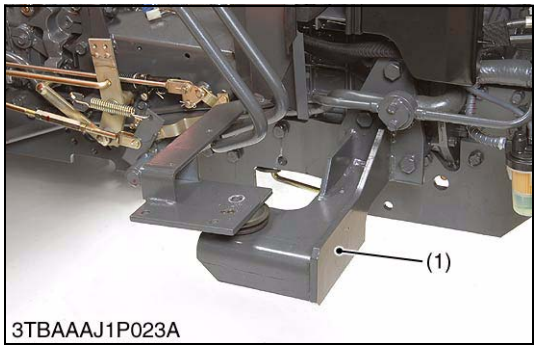
(When reassembling)

- If the beam shield (1) is damaged, replace it with a new one.

(1) Beam Shield
(2) Bolt and Nut
(3) Bolt and Nut
(4) Bolt

W1081774





Removing Cabin Support

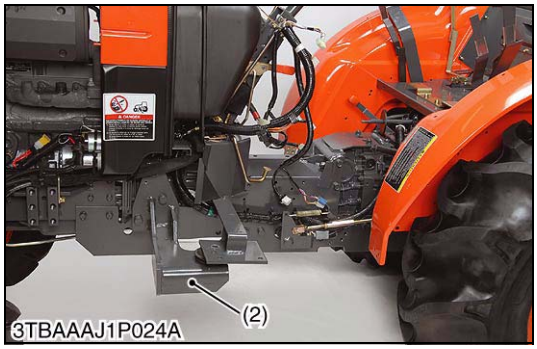
1. Remove the cabin support (RH) (1) and the cabin support (LH) (2).

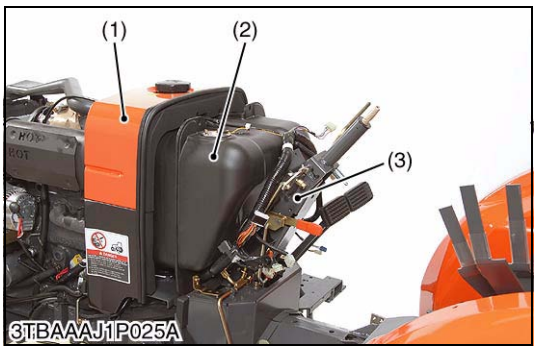
(When reassembling)

Tightening torque	Cabin support mounting bolt	100 to 110 N·m 10.2 to 11.2 kgf·m 73.8 to 81.1 lbf·ft

(1) Cabin Support (RH)
(2) Cabin Support (LH)

W1084673





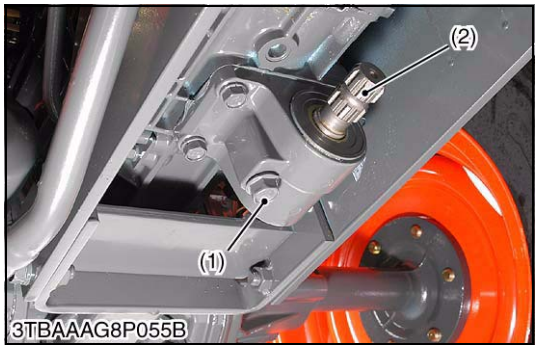
Removing Center Pillar, Fuel Tank and Steering Post Assembly

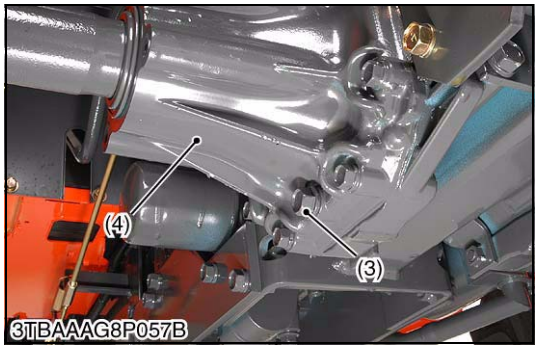
1. Remove the center pillar (1).
2. Remove the fuel tank (2) and shutter plate.
3. Disconnect the power steering hoses and pipes.
4. Remove the steering post assembly (3).

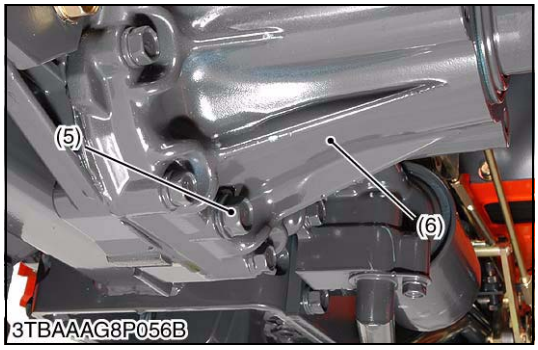
(1) Center Pillar
(2) Fuel Tank
(3) Steering Post Assembly

W1084824

(3) Separating Engine and Front Case from Tractor







Draining Transmission Fluid

CAUTION

- **Stop the engine before checking and changing the transmission fluid.**

1. Place the oil pan under the tractor.
2. Remove the drain plugs (1) (3) (5) at the mid-PTO shaft and at the bottom of the rear axle cases (4) (6).
3. Drain the transmission fluid.
4. After draining the transmission fluid, reinstall the drain plugs (1), (3), (5).

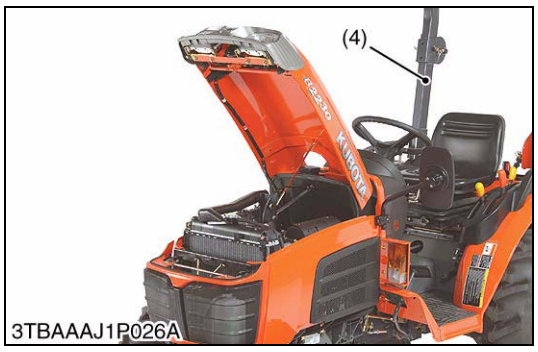
IMPORTANT

- **Use only KUBOTA UDT oil. Use of other oils may damage the transmission or hydraulic system. Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7).**
- **Never work the tractor immediately after changing the transmission oil. Keep the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030HST	17 L 4.5 U.S.gals 3.7 Imp.gals

(1) Drain Plug
(2) Mid-PTO Shaft
(3) Drain Plug
(4) Rear Axle Case (LH)
(5) Drain Plug
(6) Rear Axle Case (RH)

W1014624

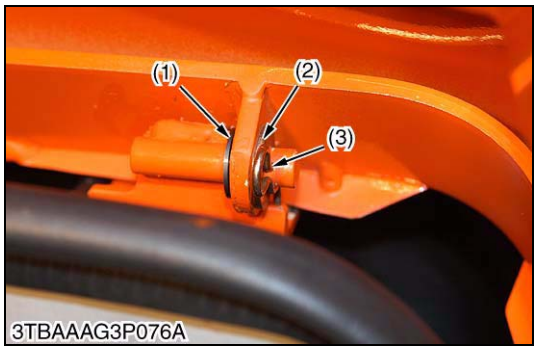


Bonnet, Front Grille, Side Covers and ROPS

1. Open the bonnet.
2. Remove the pin (3) and the plain washer (2).
3. Remove the wiring harness from the bonnet.
4. Remove the hood.
5. Remove the front grille and the side covers.
6. Remove the ROPS (4).

(When reassembling)

1. Install the bush (1) to the bonnet securely.
2. Install the hood.
3. Don't damage the bonnet when installing it.



Tightening torque	ROPS mounting bolt (for middle and lower frames, 9/16-18 UNF)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
	ROPS mounting bolt (M12)	90 to 95 N·m 9.2 to 9.7 kgf·m 66.4 to 70.1 lbf·ft

(1) Bush
(2) Plain Washer
(3) Pin
(4) ROPS

W1039829

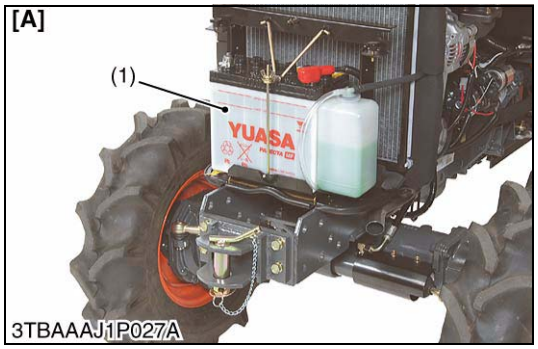


Battery

1. Disconnect the battery negative cable first.
2. Disconnect the battery positive cable second.
3. Remove the battery (1).
4. Remove the front hitch.

(When reassembling)

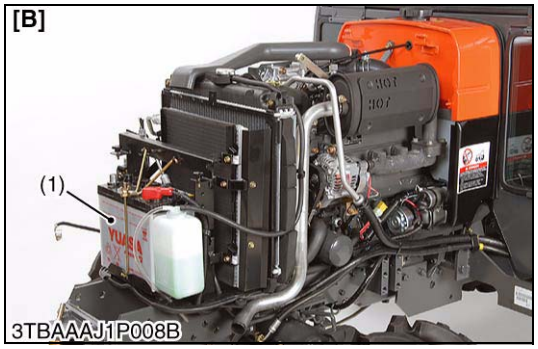
- Connect the battery positive cable first.
- Connect the battery negative cable second.

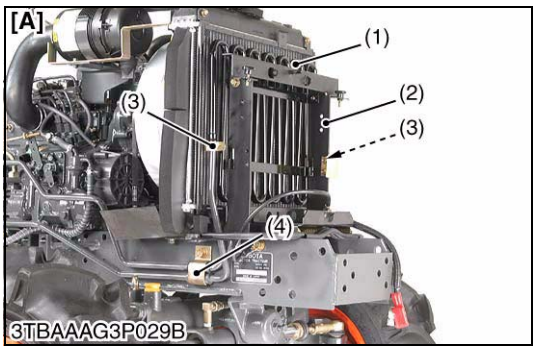


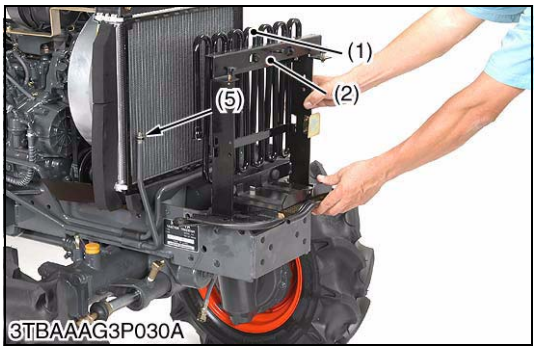
(1) Battery

[A] Manual Transmission Model
[B] HST Model

W1014971







Oil Cooler and Battery Stay (HST)

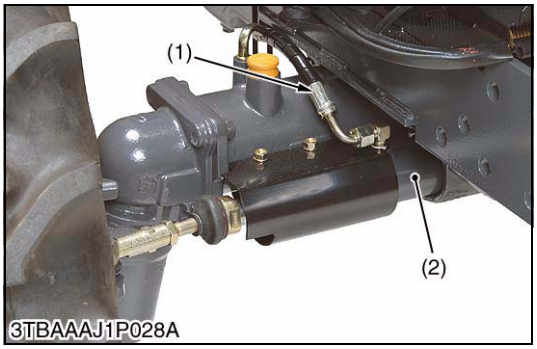
1. Remove the oil cooler pipe plate spring (3).
2. Remove the clamp(4).
3. Remove the battery stay (2).

■ **NOTE**
- **Don't damage the o-ring (5).**
- **Don't damage the oil cooler pipe and delivery pipes.**

(1) Oil Cooler
(2) Battery Stay
(3) Plate Spring
(4) Clamp
(5) O-ring

[A] HST Model

W1040071



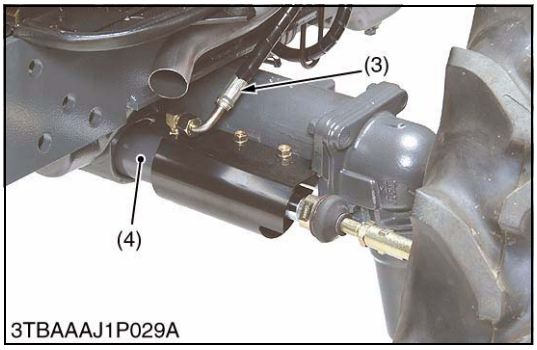
Hydraulic Hoses from Power Steering Cylinder

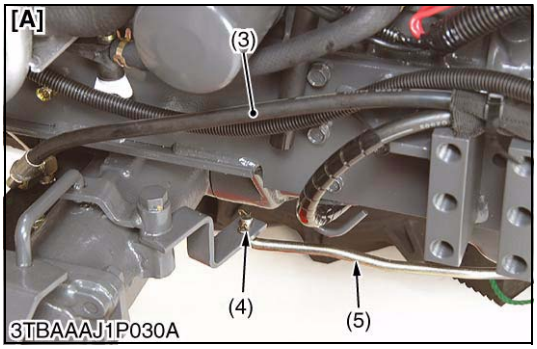
1. Disconnect the hydraulic hoses (1) (3) from the power steering cylinder (2).
2. Removing the snap pin (4) and disconnect the bi-speed rod (5).

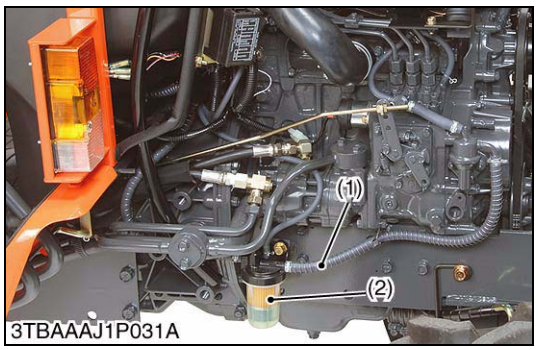
(1) Hydraulic Hose (RH)
(2) Power Steering Cylinder
(3) Hydraulic Hose (LH)
(4) Snap Pin
(5) Bi-speed Rod

[A] Bi-speed Turn Model

W1015210





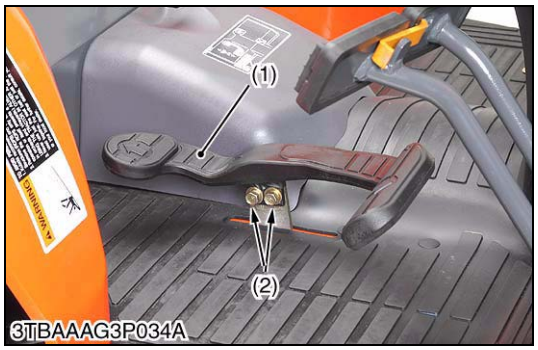


Fuel

1. Disconnect the fuel hose (1) from the fuel filter (2).
2. Drain the fuel to the fuel tank completely.

(1) Fuel Hose (from Fuel Tank) (2) Fuel Filter

W1015336

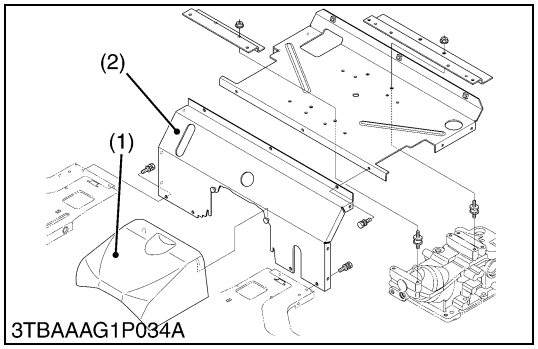


HST Pedal and Floor Mat

1. Remove the HST pedal mounting bolts (2).
2. Remove the HST pedal (1).
3. Remove the floor mat.

(1) HST Pedal (2) Bolt

W1015419



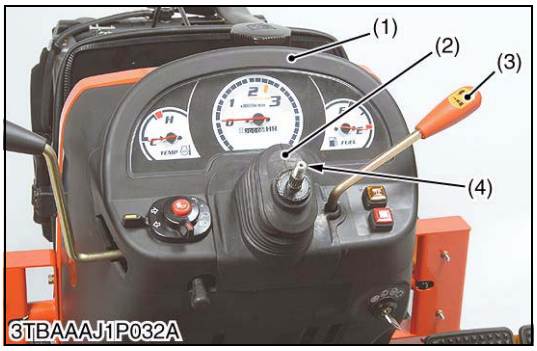
Front Cover

1. Remove the front cover (1) (2).

(1) Front Cover (2) Front Cover

W1015531









Steering Wheel, Meter Panel, Shuttle Lever and Panel Lower Cover

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut.
3. Remove the steering wheel with a steering wheel puller (Code No. 07916-51090).
4. Remove the accelerator lever grip (3) and the steering boot (2).
5. Disconnect the hour meter cable and wiring harness connectors.
6. Remove the meter panel (1) not to damage with the steering shaft (4).
7. Remove the shuttle lever (5).
8. Remove the panel lower cover (6).

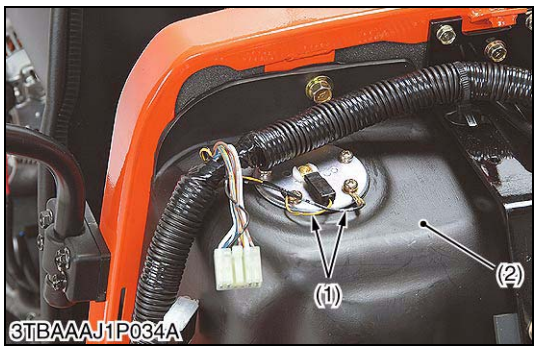
(When reassembling)

- Tighten the steering wheel mounting nut securely.

Tightening torque	Steering wheel mounting nut	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft

(1) Meter Panel
(2) Steering Boot
(3) Accelerator Lever Grip
(4) Steering Shaft
(5) Shuttle Lever
(6) Panel Lower Cover
(7) Meter Panel Hook

W1015674







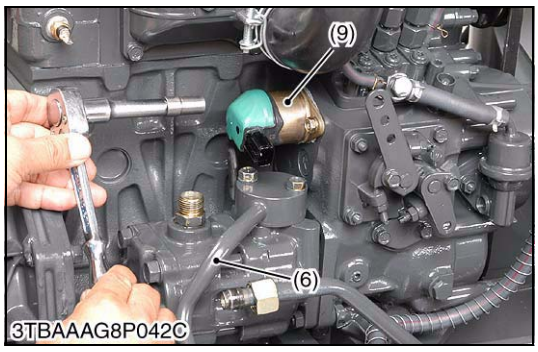


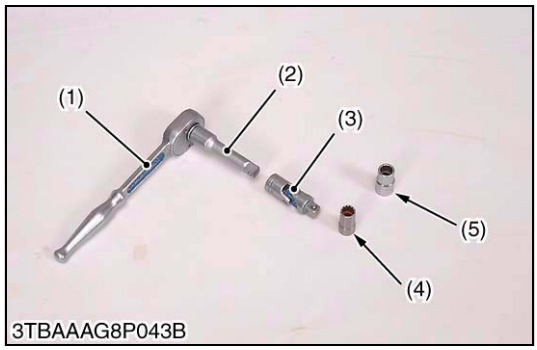
Fuel Tank

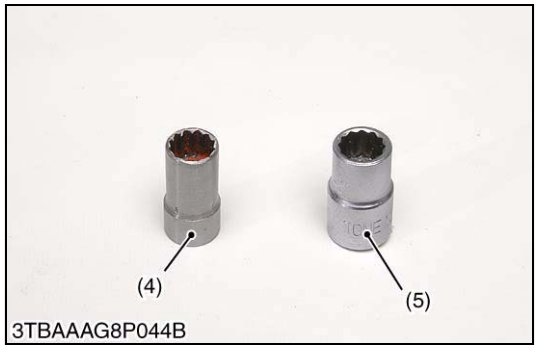
1. Disconnect the leads (1) from the fuel tank (2).
2. Disconnect the overflow hoses from the fuel tank (2).
3. Remove the shutter plate (6) and the fuel tank (2).

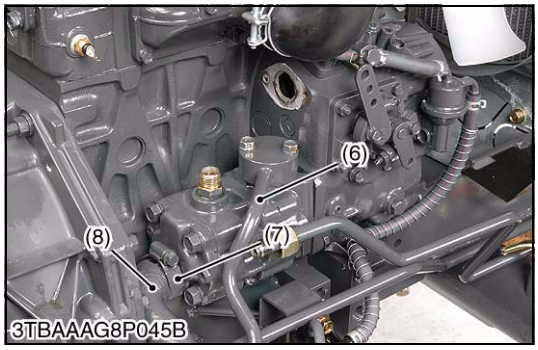
(1) Lead
(2) Fuel Tank
(3) Steering Post Stay
(4) Bolt
(5) Center Pillar
(6) Shuttle Plate

W1112218









Key Stop Solenoid and Hydraulic Delivery Pipe

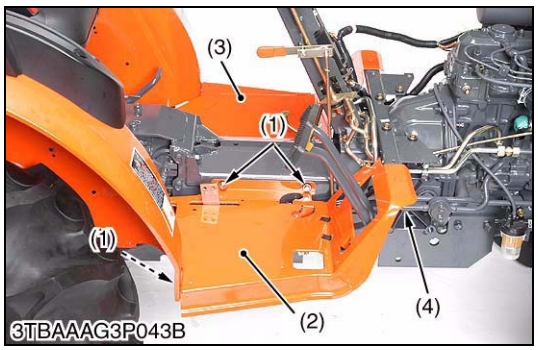
1. Remove the key stop solenoid connector.
2. Remove the engine stop solenoid (9) using a small size rachet handle (1), the extension joint (2), the universal joint (3) and the thinner socket (10 mm).
3. Remove the hydraulic delivery pipe mounting nuts.
4. Slide the hydraulic delivery pipe.
5. Loosen the hose band (7).
6. Disconnect the suction hose (8) from the hydraulic pump.

(When reassembling)

- Apply the liquid gasket (Three Bond 1206D or equivalent) to the joint face of the key stop solenoid and the engine.

(1) Rachet Handle
(2) Extension Joint
(3) Universal Joint
(4) Thinner Socket (10 mm, 0.39 in)
(5) Standard Socket (10 mm)
(6) Hydraulic Delivery Pipe
(7) Hose Band
(8) Suction Hose
(9) Engine Stop Solenoid

W1113020

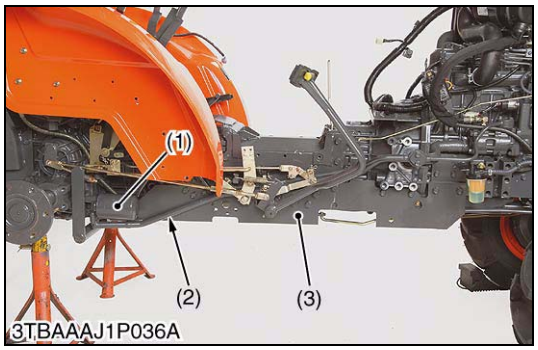


Steps (4-cylinder Engine, ROPS Model)

1. Remove the bolts (1) and the nut (4).
2. Remove the brake spring from the step (RH) (2). Remove the brake spring and the clutch spring from the step (LH) (3).
3. Remove the steps (2) (3).

(1) Bolt
(2) Step (RH)
(3) Step (LH)
(4) Nut

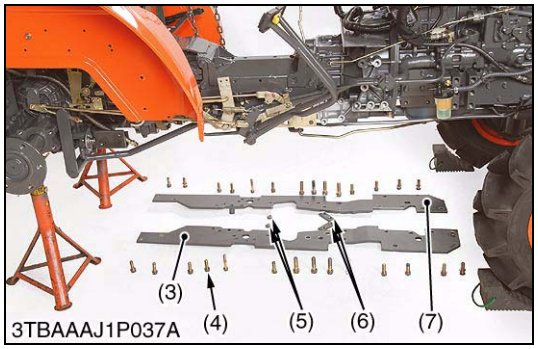
W1016404



Sub-Frames (4-cylinder Engine Model)

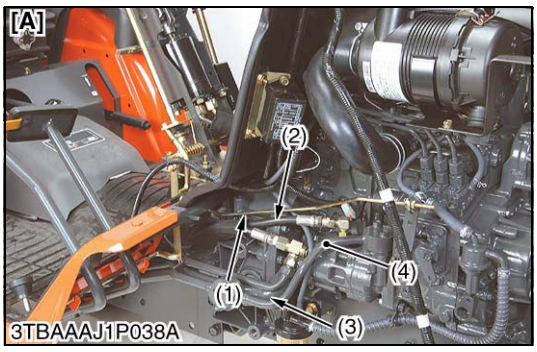
1. Place the rigid jack under the rear axle shaft.
2. Remove the transmission oil filter cartridge (1).
3. Loosen the sub-frame mounting bolts.
4. Remove the sub-frames (3) (7).

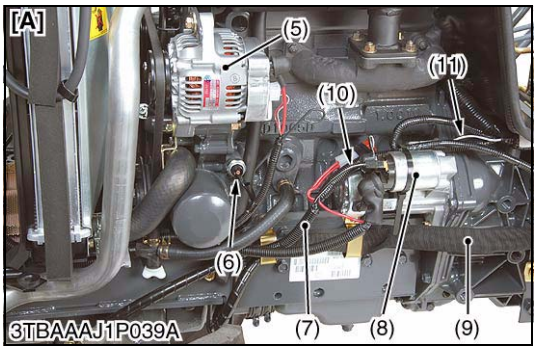
Tightening torque	Sub-frame mounting bolt for aluminum (M10)	39.3 to 45.1 N·m 4.0 to 4.6 kgf·m 29.0 to 33.2 lbf·ft
	Sub-frame mounting bolt for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft
	Sub-frame mounting bolt for ordinary material (M12)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 lbf·ft
	Sub-frame mounting bolt for ordinary material (M14)	126 to 150 N·m 12.9 to 15.3 kgf·m 93 to 111 lbf·ft

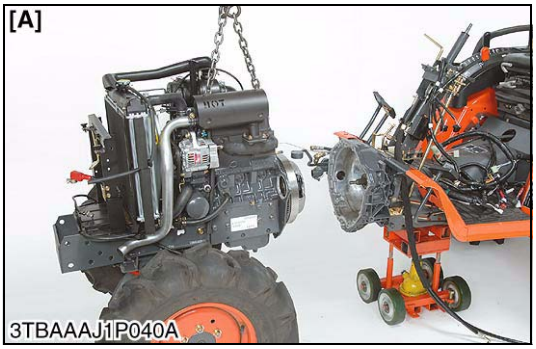


(1) Transmission Oil Filter Cartridge
(2) Suction Pipe
(3) Sub-frame (RH)
(4) Bolt
(5) Nut
(6) Steel Plate
(7) Sub-frame (LH)

W1143618







Separating Engine with Front Axle

1. Reinstall the rear tires.
2. Support the transmission with a disassembling stand.
3. Hook the engine with a hoist.
4. Place the disassembling stand under the main frame.
5. Disconnect the power steering hoses (2).
6. Loose the hydraulic inlet hose band. Disconnect the hydraulic inlet hose (3) from the hydraulic pump.
   Disconnect the hydraulic delivery pipe (4) from the hydraulic pump.
7. Disconnect the wiring leads from the alternator (5), the engine oil pressure switch (6) and the starter motor (8).
   Disconnect the wiring harness (7) and the power steering hoses (9) from the engine body.
8. Remove the docking bolts between the engine and the front case.

(When reassembling)

- Align the spline between the front wheel drive shaft and the universal joint securely.
- Tighten the docking bolts between the engine and the front case securely.

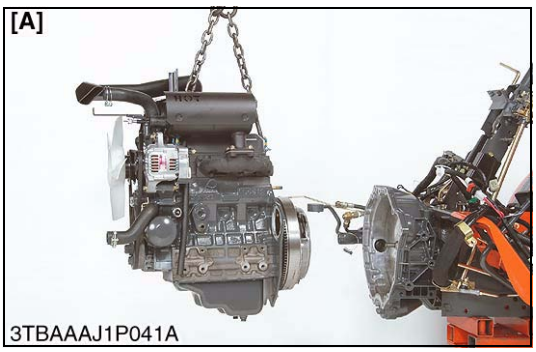
Tightening torque	Engine and front case mounting bolt and nut (M8)	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft
	Engine and front case mounting stud bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

(1) Accelerator Rod
(2) Power Steering Hose
(3) Hydraulic Inlet Hose
(4) Hydraulic Delivery Pipe
(5) Alternator
(6) Engine Oil Pressure Switch
(7) Wiring Harness
(8) Starter Motor
(9) Power Steering Hoses
(10) **ST** Terminal Lead
(11) Stop Solenoid Lead

[A] ROPS, Manual Transmission Model

W1093199





Separating Front Axle from Engine

1. Remove the exhaust pipe.
2. Disconnect the radiator hoses.
3. Remove the front axle frame mounting bolts.
4. Separate the front axle from the engine.

(When reassembling)

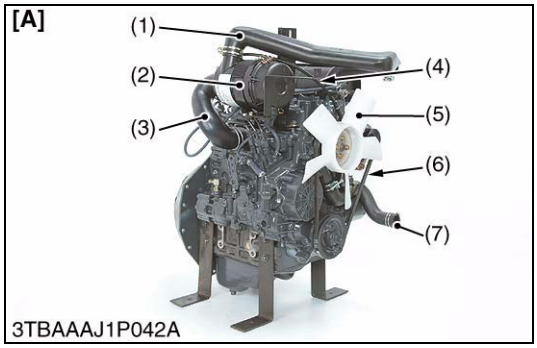
Tightening torque	Engine and front axle frame mounting bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

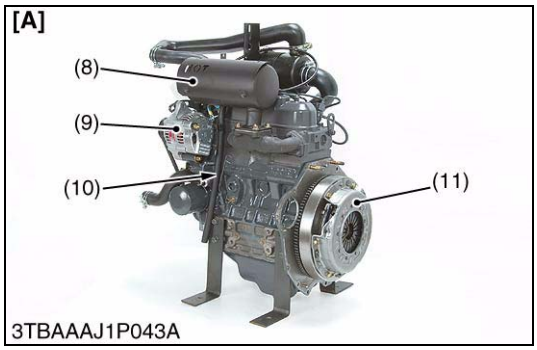
[A] ROPS, Manual Transmission Model

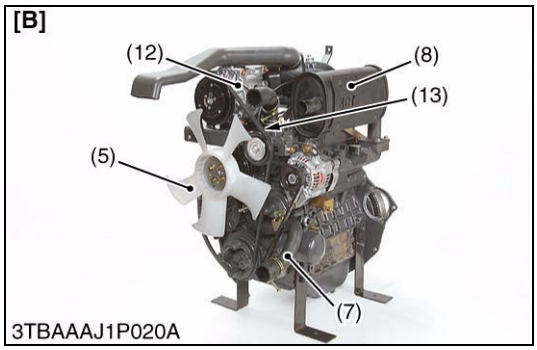
W1069085

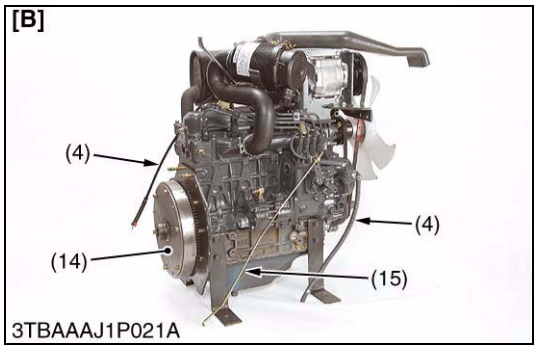
[3] DISASSEMBLING AND ASSEMBLING

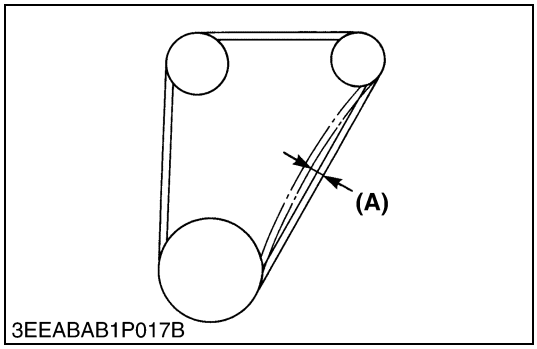
(1) External Components











Fan, Water Hose, Fan Belt, Alternator, Muffler, Meter Cable, Air Cleaner, Air Cleaner Bracket, Inlet Hose, Air Conditioner, Compressor and etc.

1. Remove the external components as shown in the picture.

(When reassembling)

- Check to see that there are no crack on the fan belt surface.

■ **IMPORTANT**

- **When installing the fan belt (6), be sure to adjust the fan belt tension.**

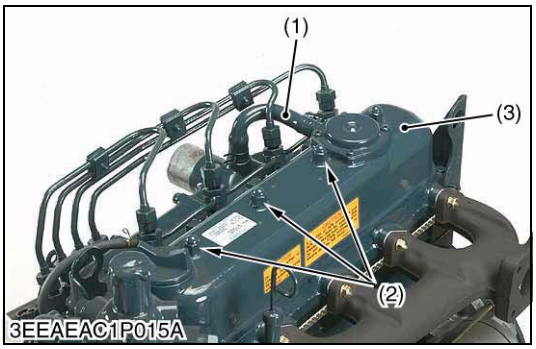
Fan belt deflection **(A)**	Factory spec.	7 to 9 mm 0.28 to 0.35 in.
Air conditioner fan belt deflection	Factory spec.	10 to 12 mm 0.39 to 0.47 in.

(1) Inlet Hose
(2) Air Cleaner
(3) Inlet Hose
(4) Meter Cable
(5) Fan
(6) Fan Belt
(7) Water Hose
(8) Muffler
(9) Alternator
(10) Breath Hose
(11) Clutch Assembly
(12) Air Conditioner Compressor Assembly
(13) Air Conditioner Belt
(14) Steel Plate
(15) Accelerator Rod

[A] ROPS Model
[B] CABIN Model
(A) Deflection

W10178940

(2) Cylinder Head and Valve and Oil Pan



Cylinder Head Cover

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

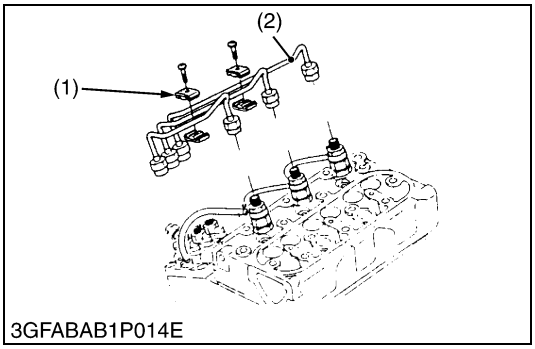
(When reassembling)

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

Tightening torque	Cylinder head cover nut	6.9 to 8.8 N·m 0.70 to 0.90 kgf·m 5.1 to 6.5 lbf·ft

(1) Breather Hose
(2) Head Cover Screws
(3) Cylinder Head Cover

W1103532



Injection Pipes

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

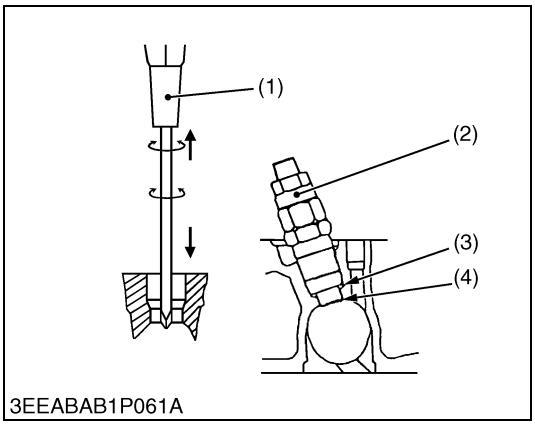
(When reassembling)

- 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 lbf·ft

(1) Pipe Clamp
(2) Injection Pipe

W1113866



Nozzle Heat Seal Service Removal Procedure

■ **IMPORTANT**

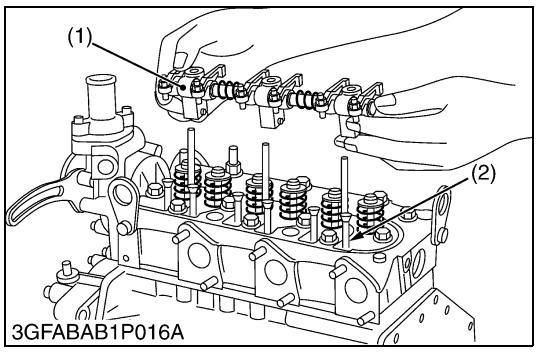
- **Use a plus (phillips head) screw driver that has a Dia. which is bigger than the heat seal hole (Approx. 6 mm (1/4 in.)).**

1. Drive screw driver 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 out together with the injection nozzle gasket.

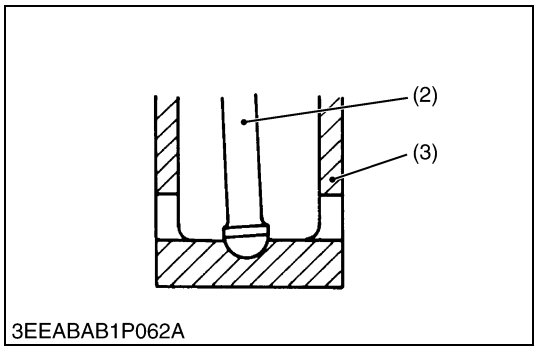
If the heat seal drops, repeat the above procedure. Heat seal and injection nozzle gasket must be changed when the injection nozzle is removed for cleaning or for service

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

W1104847



3GFABAB1P016A



3EEABAB1P062A

Rocker Arm and Push Rod

1. Remove the rocker arm bracket nut.
2. Detach the rocker arm assembly (1).
3. Remove the push rods (2).

(When reassembling)

- When putting the push rods (2) onto the tappets (3), check to see if their ends are properly engaged with the dimples.

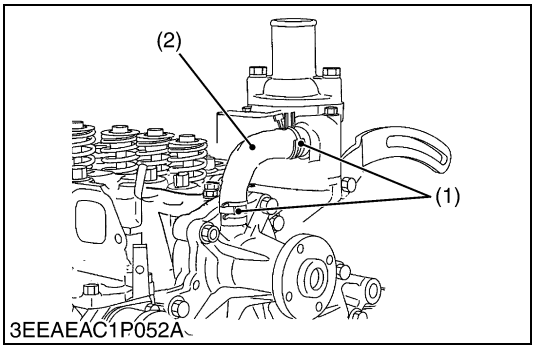
■ **IMPORTANT**

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

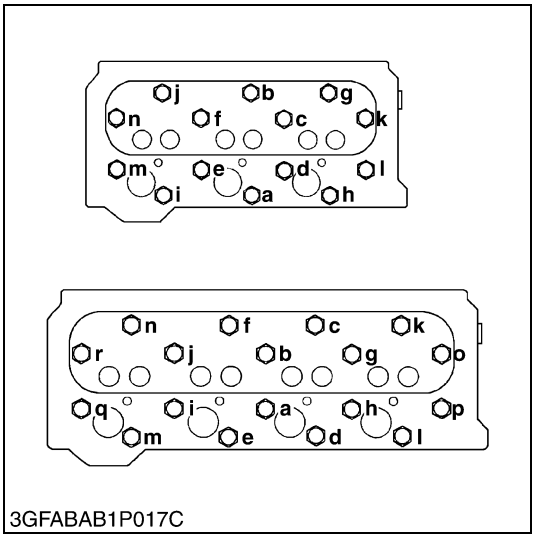
Tightening torque	Rocker arm bracket nut	21.6 to 26.5 N·m 2.2 to 2.7 kgf·m 15.9 to 19.5 lbf·ft

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

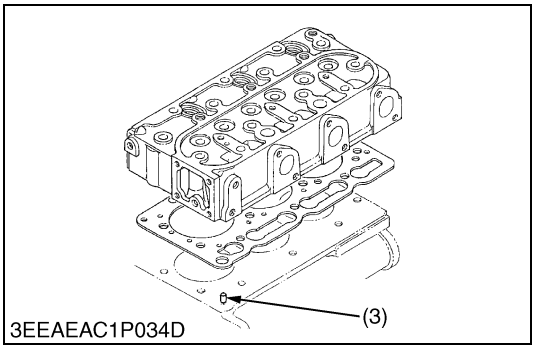
W1104997



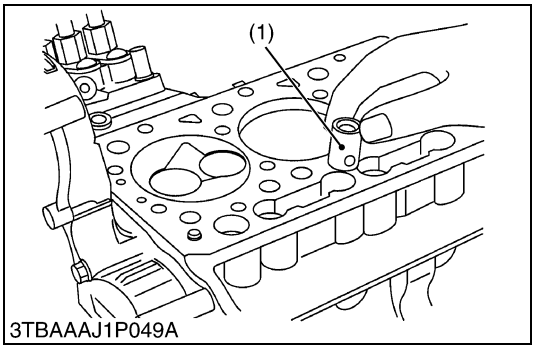
3EEAEAC1P052A



3GFABAB1P017C



3EEAEAC1P034D



3TBAAAJ1P049A

Cylinder Head

1. Loosen the hose clamps (1), and remove the water return hose (2).
2. Remove the cylinder head screw in the order of (**n** or **r**) to (**a**).
3. Lift up the cylinder head to detach.
4. Remove the cylinder head gasket.

(When reassembling)

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

■ **NOTE**

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

Tightening torque	Cylinder head screw	63.7 to 68.6 N·m 6.5 to 7.0 kgf·m 47.0 to 50.6 lbf·ft

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

(n or r) to (a) : To Loosen
(a) to (n or r) : To Tighten

W1105524

Tappets

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

(When reassembling)

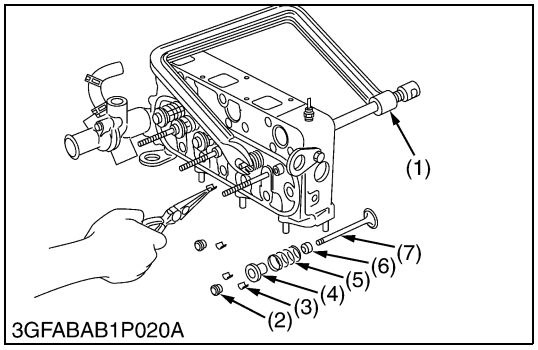
- Visually check the contact between tappets and cams for proper rotation. If defect is found, replace tappets.
- Before installing the tappets, apply engine oil thinly around them.

■ **IMPORTANT**

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

(1) Tappet

W1109239



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)

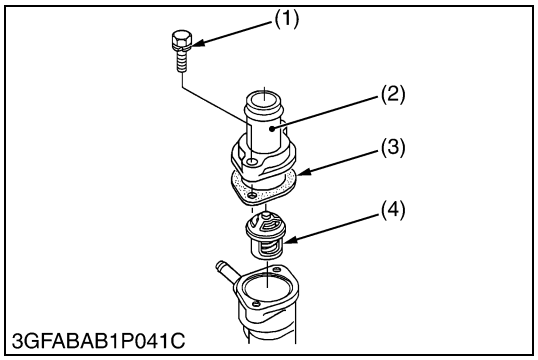
- Wash the valve stem seal and valve guide hole, and apply engine oil sufficiently.
- After installing the valve spring collets, lightly tap the stem to assure proper fit with a plastic hammer.

■ **IMPORTANT**

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

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

W1110374



Thermostat Assembly

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

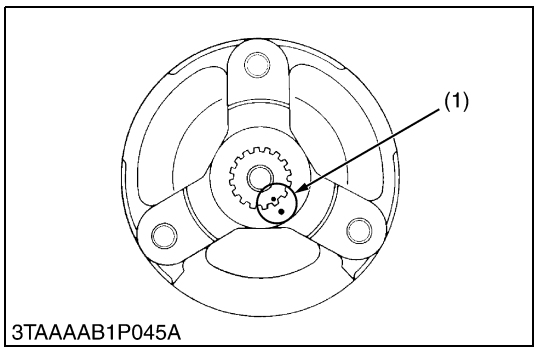
(When reassembling)

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

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

W1130733

(3) Gear Case



Fan Drive Pulley

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

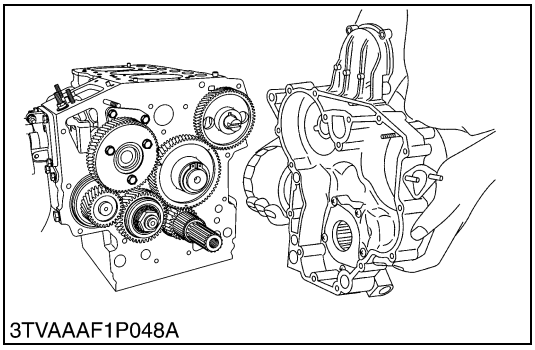
(When reassembling)

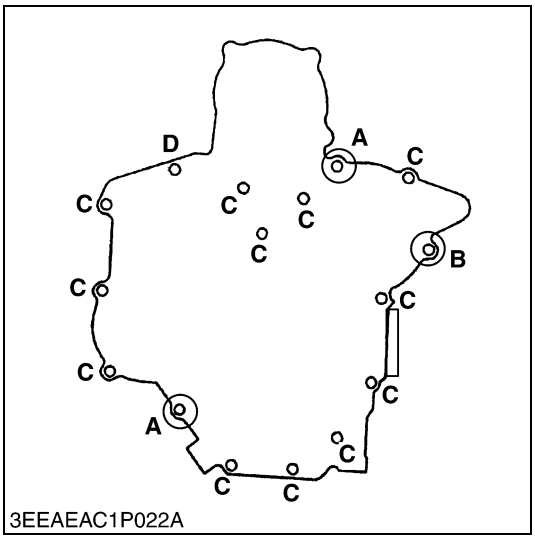
- Install the pulley (D1105) to the crankshaft, aligning the mark (1) on them.
- Apply engine oil to the fan drive pulley retaining screws. And tighten them.

Tightening torque	Fan drive pulley screw	235.4 to 245.2 N·m 24.0 to 25.0 kgf·m 173.6 to 180.8 lbf·ft

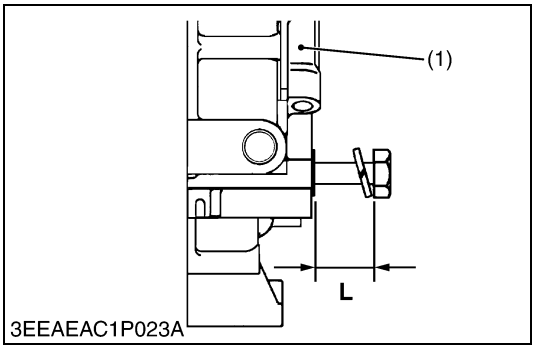
(1) Alignment Mark

W11412430

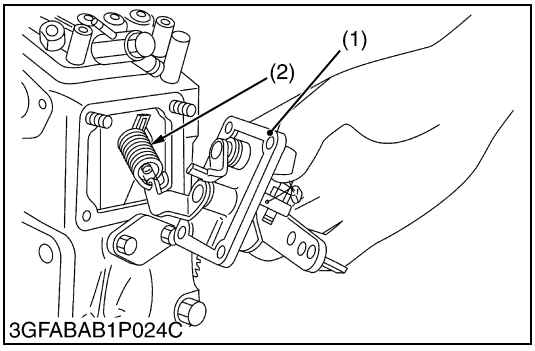

3TVAAAF1P048A



3EEAEAC1P022A



3EEAEAC1P023A



3GFABAB1P024C

Gear Case

1. Remove the gear case (1).

(When reassembling)

- Grease thinly to the oil seal, and install it, ensuring the lip does not come off.
- Measure the length (**L**) when the gear case mounting bolt is inserted in the gear case bolt hole and judge the installation position of the mounting bolt when you do not understand the installation position of the mounting bolt.
  A : L= 18 mm (0.71 in.) (Pipe Pin Position)
  B : L= 13 mm (0.51 in.) (Water Pipe Mounting)
  C : L= 10 mm (0.39 in.)
  D : Nut
  L : Length between the mounting bolt and the gear case surface

(1) Gear Case

W11462290

Engine Stop Solenoid and Speed Control Plate

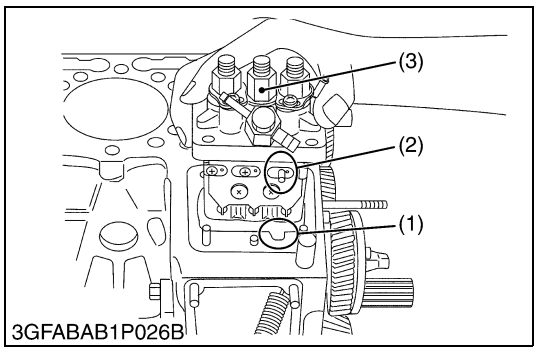
1. Remove the engine stop solenoid.
2. Disconnect the governor spring (2) from the speed control plate (1).
3. Remove the speed control plate.

(When reassembling)

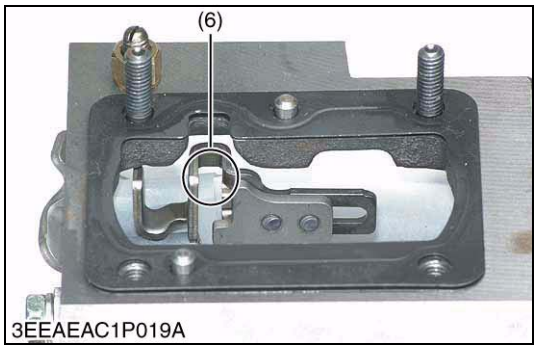
- Apply a liquid gasket (Three Bond 1215 or equivalent) to both sides of the solenoid cover gasket and control plate gasket.
- Be careful not to drop the governor springs into the crankcase.

(1) Speed Control Plate (2) Governor Spring

W11477990







Injection Pump

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

(When reassembling)

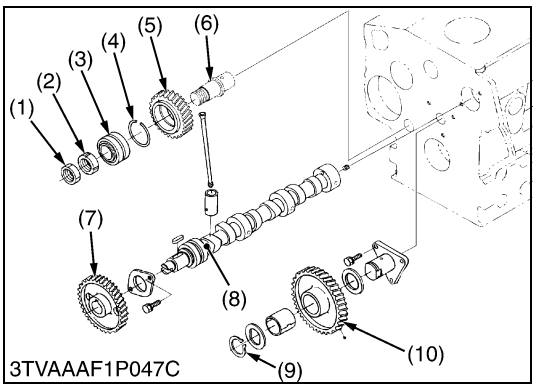
- When installing the injection pump, insert the control rack pin (2) firmly into the groove (6) of the thrust lever of fork lever.

■ **NOTE**

- **The sealant is applied to both sides of the soft metal gasket shim. The liquid gasket is not required for assembling.**
- **Addition or reduction of shim (0.05 mm, 0.002 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 or new gasket shims with the same thickness.**

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

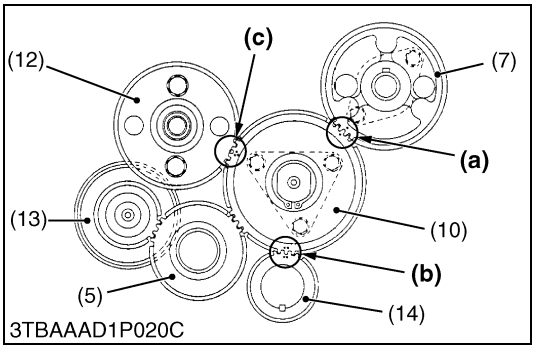
W11484020



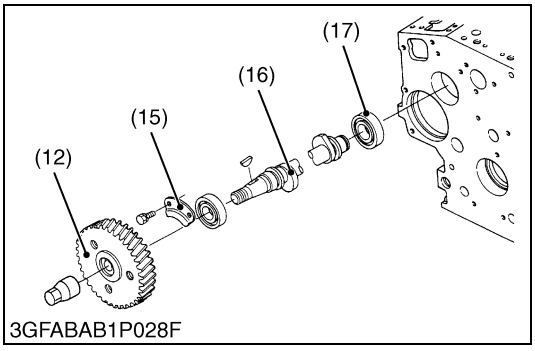
3TVAAAF1P047C



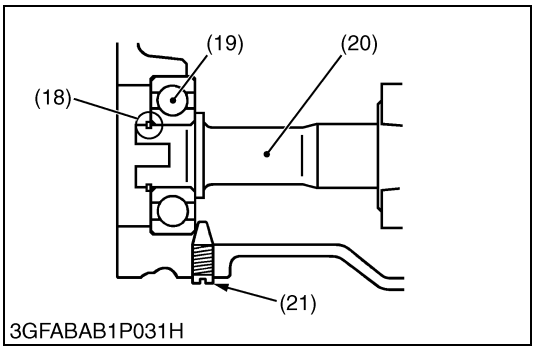
3TBAAAJ1P048A



3TBAAAD1P020C



3GFABAB1P028F



3GFABAB1P031H

Cam Gear, Idle Gear 1, 2 and Governor Gear

1. Remove the external snap ring (9), and then remove the idle gear 1 (10).
2. Remove the lock nut (1), and then remove the bearing nut (2) with a bearing nut finger socket (11).
3. Remove the idle gear 2 (5) with taper roller bearings.
4. Remove the fuel camshaft stopper (14).
5. Draw out the fuel cam gear (12) with fuel camshaft (15).
6. Remove the camshaft stopper bolt.
7. Remove the cam gear (7) with camshaft.
8. Remove the external snap ring (17) from the governor shaft (19).
9. Remove the governor gear (13) with governor shaft (19).

■ **NOTE**

- **Three-lever type fork lever**
  To remove the governor shaft, follow the procedures in 8, 9 above and never remove fork lever and the max torque limiter.

(When reassembling)

- Apply engine oil thinly to the fuel camshaft before installation.
- Make sure to assemble the external snap ring of the governor shaft.
- Check the governor shaft for smooth rotation.
- Tighten the idle gear 2 bearing nut and the idle gear lock nut to the specified tightening torque.

■ **IMPORTANT**

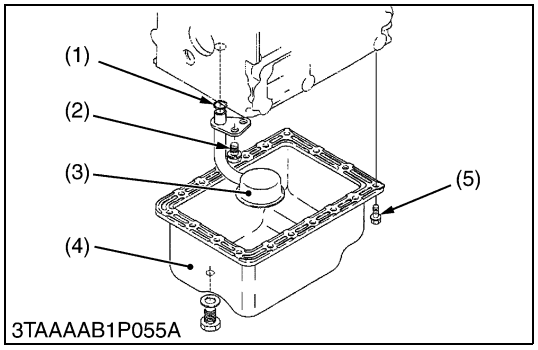
- **When replacing the ball bearing of governor shaft, securely fit the ball bearing (18) to the crankcase, apply an adhesive (Three Bond 1324B or equivalent) to the set screw (20), and fasten the screw until its tapered part contacts the circumferential end of the ball bearing.**
- **When installing the idle gear 1, be sure to align the alignment marks on each gears.**

Tightening torque	Idle gear 2 lock nut	25 to 29 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft
	Idle gear 2 bearing nut	35 to 39 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft

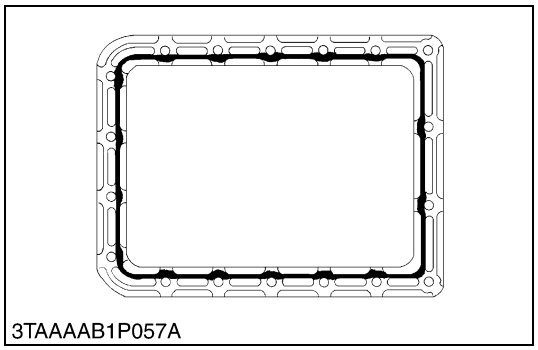
(1) Lock Nut
(2) Bearing Nut
(3) Taper Roller Bearing
(4) Cir-Clip
(5) Idle Gear 2
(6) Idle Gear Shaft
(7) Cam Gear
(8) Camshaft
(9) External Snap Ring
(10) Idle Gear 1
(11) Bearing Nut Finger Socket
(12) Fuel Cam Gear
(13) Governor Gear
(14) Crank Gear
(15) Stopper
(16) Fuel Camshaft
(17) Ball Bearing
(18) External Snap Ring
(19) Ball Bearing
(20) Governor Shaft
(21) Set Screw

(a) Alignment Mark : Idle Gear 1 and Cam Gear
(b) Alignment Mark : Idle Gear 1 and Crank Gear
(c) Alignment Mark : Idle Gear 1 and Fuel Cam Gear

W1033942



3TAAAAB1P055A


3TAAAAB1P057A

Oil Pan and Oil Strainer

1. Remove the oil pan mounting screws (5).
2. Remove the oil pan (4).
3. Remove the oil strainer (3).

(When reassembling)

- After cleaning the oil strainer, check to see that the filter mesh is clean, and install it.
- Visually check the O-ring (1), apply engine oil, and install it.
- Securely fit the O-ring to the oil strain.
- To avoid uneven tightening, tighten oil pan mounting screws in diagonal order from the center.

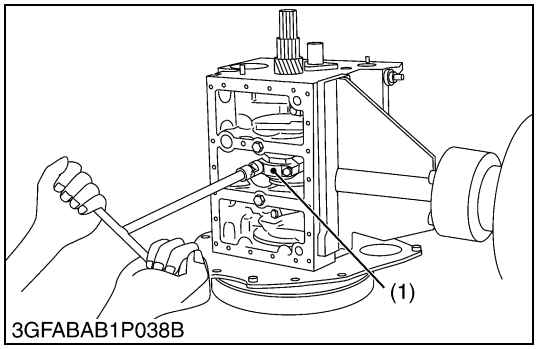
■ **IMPORTANT**

- **Scrape off the old adhesive completely. Wipe the sealing surface clean using waste cloth soaked with gasoline. Now apply new adhesive 3 to 5 mm (0.12 to 0.20 in.) thick all over the contact surface. Apply the adhesive also on the center of the flange as well as on the inner wall of each screw hole.**
- **Cut the nozzle of the "liquid gasket" container at its second notch. Apply "liquid gasket" about 5 mm (0.2 in.) thick. Within 20 minutes after the application of fluid sealant, reassemble the components. Wait then for about 30 minutes, and pour oil in the crankcase.**

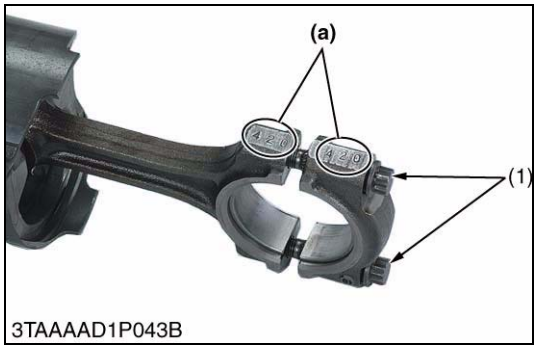
(1) O-ring
(2) Screw
(3) Oil Strainer
(4) Oil Pan
(5) Oil Pan Mounting Screws

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(4) Piston and Connecting Rod



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3TAAAAD1P043B

Connecting Rod

1. Remove the connecting rod cap.

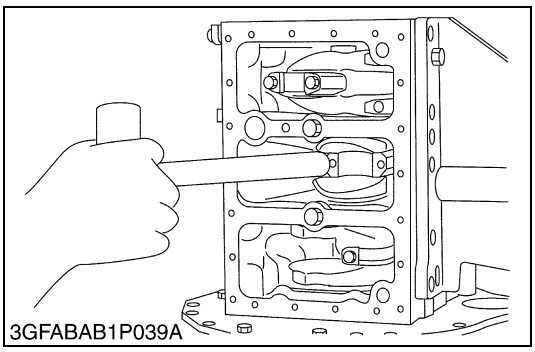
(When reassembling)

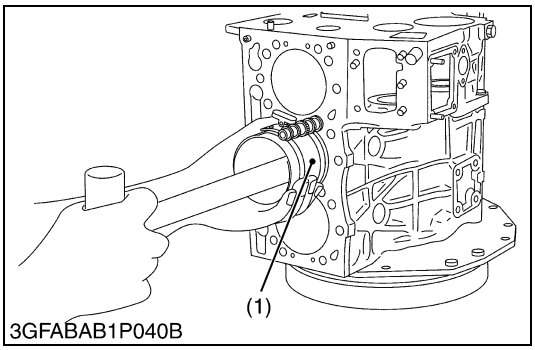
- Align the marks **(a)** with each other. (Face the marks toward the injection pump.).
- Apply engine oil to the connecting rod screws (1) and lightly screw it in by hand, then tighten it to the specified torque.
  If the connecting rod screw won't be screwed in smoothly, clean the threads.
  If the connecting rod screw (1) is still hard to screw in, replace it.

Tightening torque	Connecting rod screw	41.2 to 46.1 N·m 4.2 to 4.7 kgf·m 30.4 to 34.0 lbf·ft

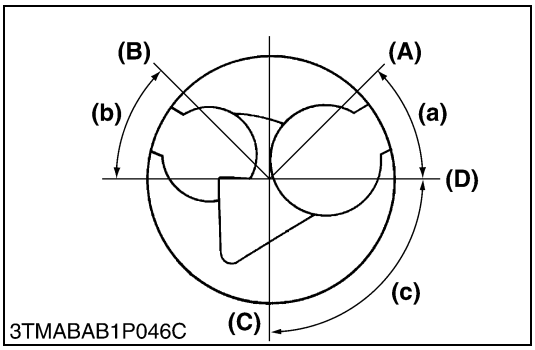
(1) Connecting Rod Screw
(a) Mark

W11652500


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3GFABAB1P040B



3TMABAB1P046C

Piston

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

(When reassembling)

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

■ **IMPORTANT**

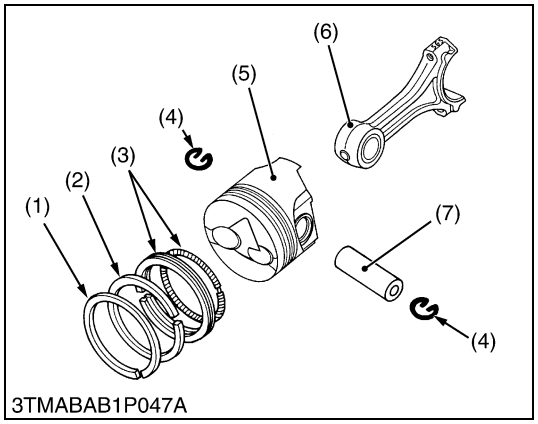
- **Do not change the combination of cylinder and piston. Make sure of the position of each piston by marking. For example, mark "1" on the No.1 piston.**
- **When installing the piston into the cylinder, place the gaps of all the piston rings as shown in the figure.**
- **Carefully insert the piston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

(1) Piston Ring Compressor

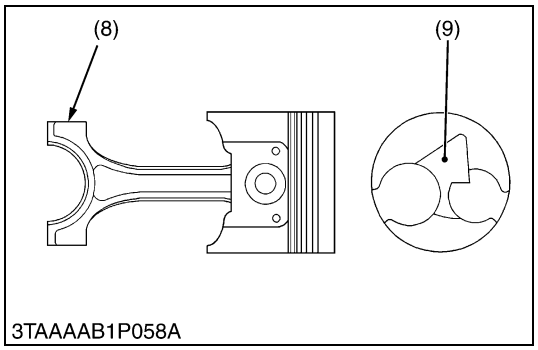
(A) Top Ring Gap
(B) Second Ring Gap
(C) Oil Ring Gap
(D) Piston Pin Hole

(a) 0.785 rad (45 °)
(b) 0.785 rad (45 °)
(c) 1.57 rad (90 °)

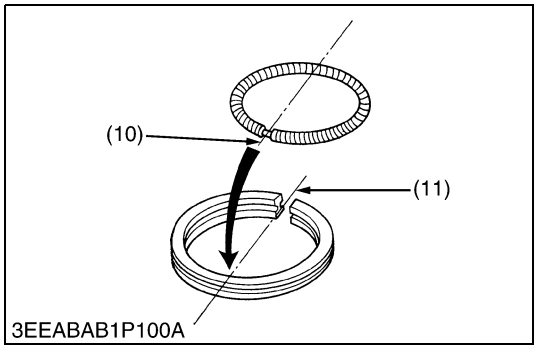
W11665130



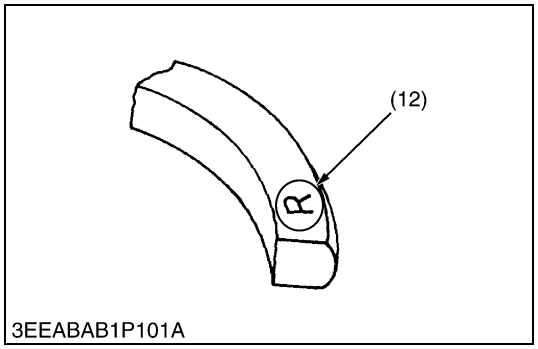
3TMABAB1P047A



3TAAAAB1P058A



3EEABAB1P100A



3EEABAB1P101A

Piston Ring and Connecting Rod

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

(When reassembling)

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

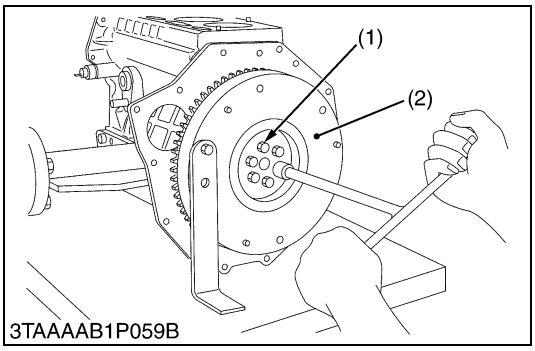
■ **NOTE**

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

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

W11728660

(5) Crankshaft



Flywheel

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

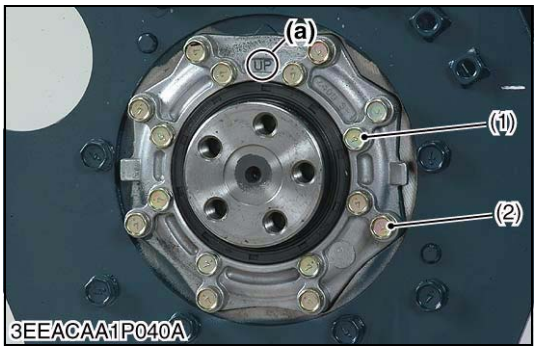
(When reassembling)

- Apply engine oil to the threads and the undercut surface of the flywheel screw and fit the screw.

Tightening torque	Flywheel screw	53.9 to 58.8 N·m 5.5 to 6.0 kgf·m 39.8 to 43.4 lbf·ft

(1) Flywheel Screw (2) Flywheel

W11754860



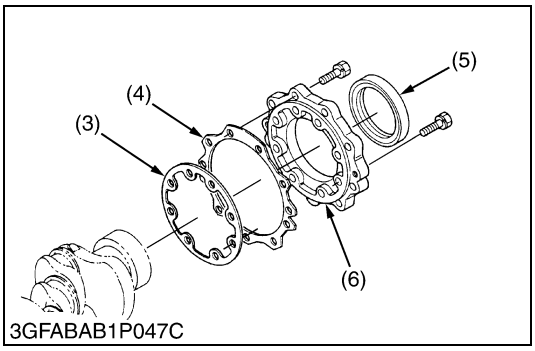
Bearing Case Cover

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

(When reassembling)

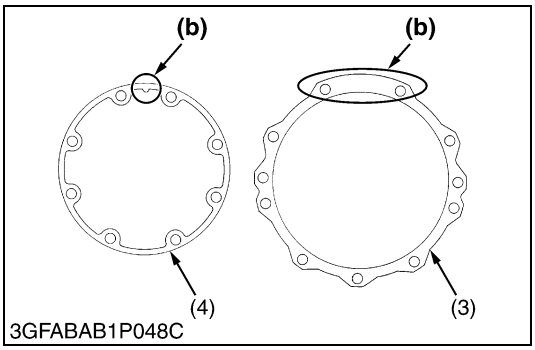
- Fit the bearing case gasket (3) and the bearing case cover gasket (4) with correct directions.
- Install the bearing case cover (6) to position the casting mark "**UP**" **(a)** on it upward.
- Apply engine oil to the oil seal (5) lip and take care that it is not rolled when installing.
- Tighten the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

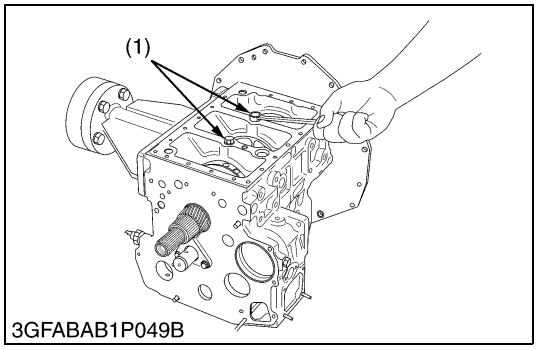
Tightening torque	Bearing case cover screw	9.8 to 11.3 N·m 1.00 to 1.15 kgf·m 7.2 to 8.3 lbf·ft



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

W11791000





Crankshaft Assembly

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

■ **IMPORTANT**

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

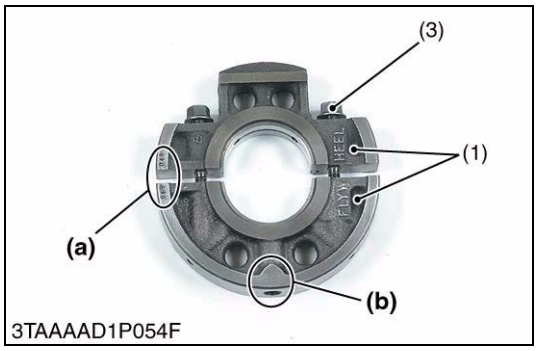
(When reassembling)

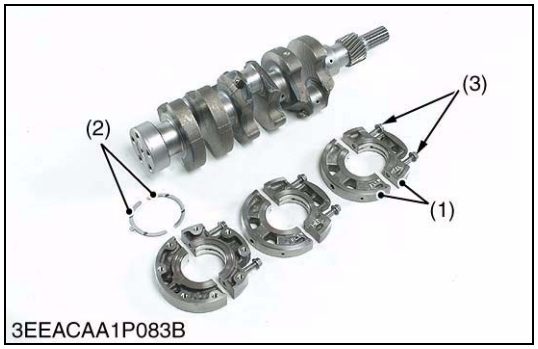
- Clean the oil passage of the crankshaft with compressed air.
- Apply oil to the main bearing case screw 2 (1).
- Install the crankshaft assembly, aligning the screw hole of main bearing case with the screw hole of crankcase.
- Clean the oil passage of the crankshaft with compressed air.

Tightening torque	Main bearing case screw 2	49.0 to 53.9 N·m 5.0 to 5.5 kgf·m 36.2 to 39.8 lbf·ft

(1) Main Bearing Case Screw 2

W11820180





Main Bearing Case Assembly

1. Remove the two main bearing case screws 1 (3) of each main bearing cases.
2. Remove the main bearing case from crankshaft.

(When reassembling)

- Clean the oil passage in the main bearing cases.
- Apply clean engine oil on the bearings.
- Install the main bearing case assemblies in original positions. Since diameters of main bearing cases vary, install them in order to marking **(c)** (**A**, **B**, **C**) from the gear case side.
- Match the alignment numbers **(a)** on the main bearing case assembly 1.
- When installing the main bearing case 1 and 2, face the mark **"FLYWHEEL"** to the flywheel.
- Install the thrust bearing (2) 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.

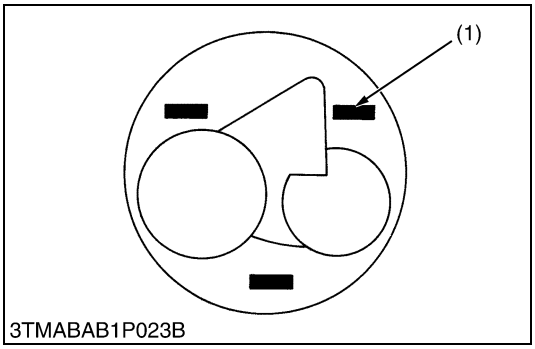
Tightening torque	Main bearing case screw 1	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 21.7 to 25.3 lbf·ft

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

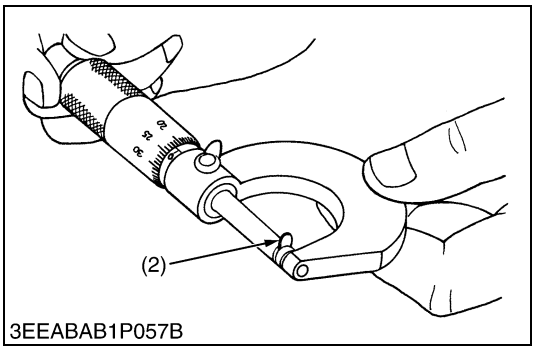
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[4] SERVICING

(1) Cylinder Head and Valves



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3EEABAB1P057B

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.), 5.0 to 7.0 mm long (0.20 to 0.27 in. long)] on the piston head at three positions with grease so as to avoid the intake valve and the exhaust valve 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 flywheel until the piston exceeds 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 the crankpin bearing and between the piston pin and the small end bushing.

■ **NOTE**

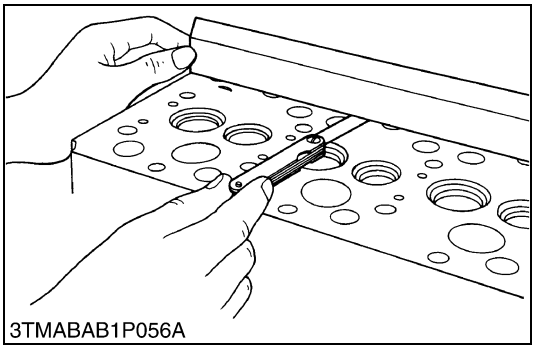
- **After checking the top clearance, be sure to assemble the cylinder head with a new cylinder head gasket.**

Top clearance	Factory spec.	0.55 to 0.70 mm 0.0217 to 0.0276 in.

Tightening torque	Cylinder head screws	63.7 to 68.6 N·m 6.5 to 7.0 kgf·m 47.0 to 50.6 lbf·ft

(1) Fuse (2) Fuse

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Cylinder Head Surface Flatness

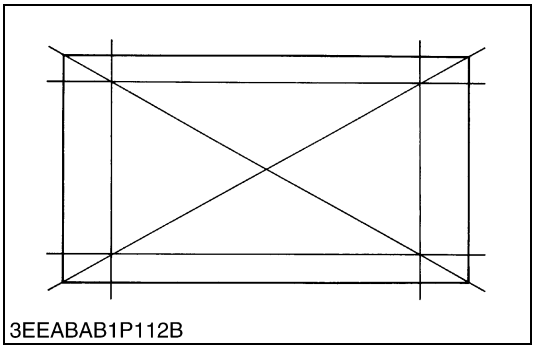
1. Clean the cylinder head surface.
2. Place a straightedge on the cylinder head's four sides and two diagonal as shown in the figure.
3. Measure the clearance with a thickness gauge.
4. If the measurement exceeds the allowable limit, correct it with a surface grinder.

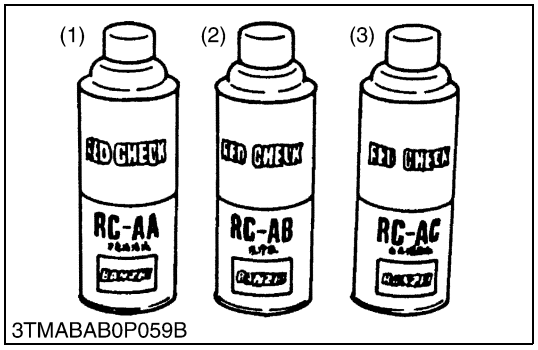
■ **IMPORTANT**

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

Cylinder head surface flatness	Allowable limit	0.05 mm 0.0020 in.

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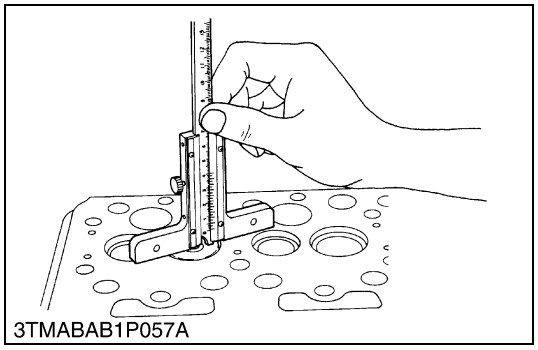
3TMABAB0P059B

Cylinder Head Flaw

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

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

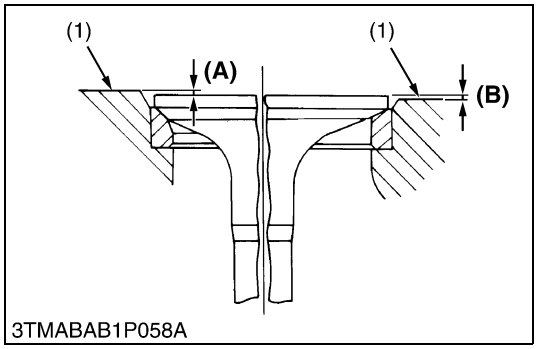
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Valve Recessing

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

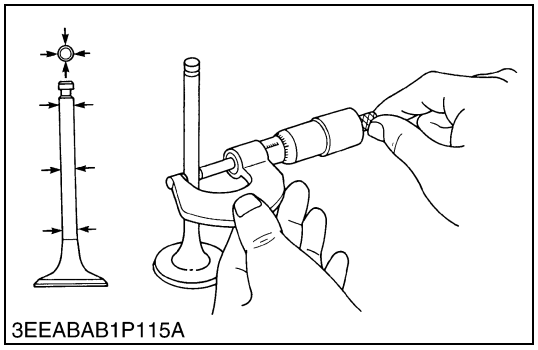
Valve recessing	Factory spec.	0.05 (protrusion) to 0.25 (recessing) mm 0.0020 (protrusion) to 0.0098 (recessing) in.
	Allowable limit	0.40 (recessing) mm 0.0157 (recessing) in.



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

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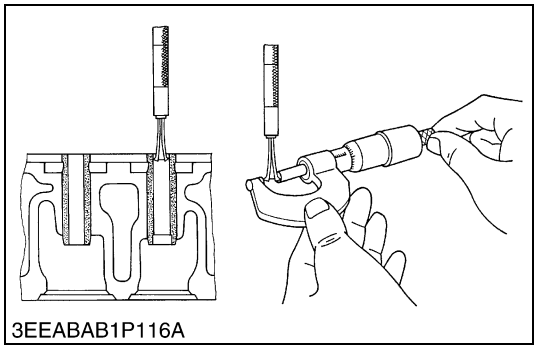
Clearance between Valve Stem and Valve Guide

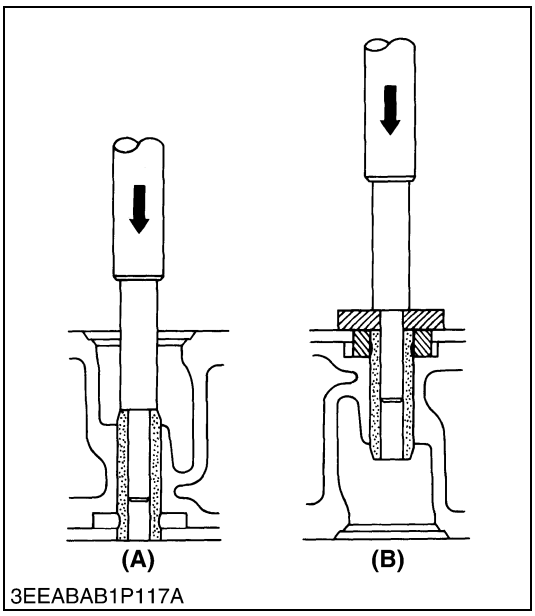
1. Remove carbon from the valve guide section.
2. Measure the valve stem O.D. with an outside micrometer.
3. Measure the valve guide I.D. with a small hole gauge, and calculate the clearance.
4. If the clearance exceeds the allowable limit, replace the valves. If it still exceeds the allowable limit,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

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

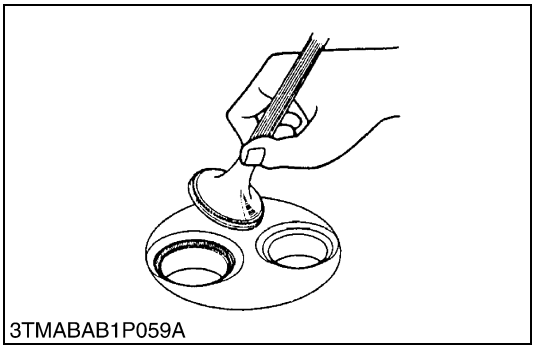
Valve stem O.D.	Factory spec.	6.960 to 6.975 mm 0.2741 to 0.2746 in.
Valve guide I.D.	Factory spec.	7.010 to 7.025 mm 0.2760 to 0.2765 in.

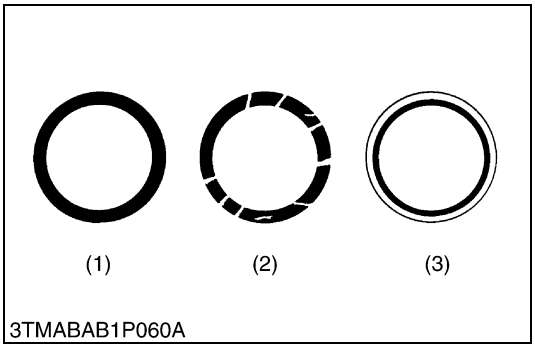
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3EEABAB1P117A


3TMABAB1P059A



3TMABAB1P060A

Replacing Valve Guide

(When removing)

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

(When installing)

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

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

■ **IMPORTANT**

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

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

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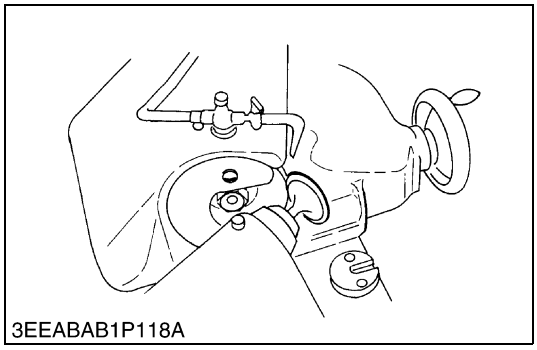
Valve Seating

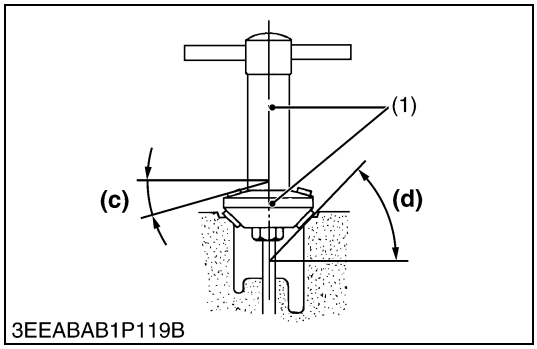
1. Coat the valve face lightly with prussian blue and put the valve on its seat to check the contact.
2. If the valve does not seat all the way around the valve seat or the valve contact is less than 70 %, correct the valve seating as follows.
3. If the valve contact does not comply with the reference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

Valve seat width	Factory spec.	2.12 mm 0.0835 in.

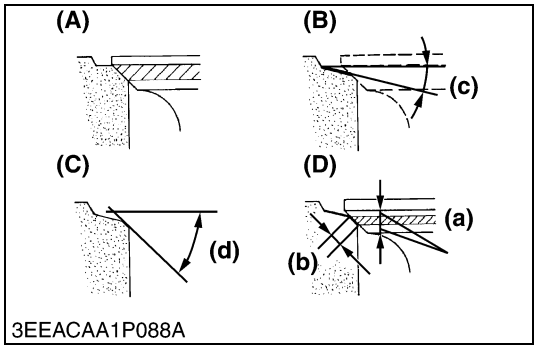
(1) Correct
(2) Incorrect
(3) Incorrect

W10282190


3EEABAB1P118A



3EEABAB1P119B



3EEACAA1P088A

Correcting Valve and Valve Seat

■ **NOTE**
- **Before correcting the valve and the 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.

Valve face angle	Factory spec.	IN.	1.047 rad 60 °
		EX.	0.785 rad 45 °

2) Correcting Valve Seat

1. Slightly correct the seat surface with a 0.785 rad (45 °) / 1.047 rad (60 °) valve seat cutter.
2. Fitting the valve, check the contact position of the valve face and seat surface with prussian blue. (Visual check) [If the valve has been used for a long period, the seat tends to come in contact with the upper side of the valve face.]
3. Grind the upper surface of the seat with a 0.523 rad (30 °) valve seat cutter until the valve seat touches to the center of the valve face (so that **(a)** equals **(b)** as shown in the figure).
4. Grind the seat with a 0.262 rad (15 °) valve seat cutter again, and visually recheck the contact between the valve and the seat.
5. Repeat steps 3 and 4 until the correct contact is achieved.
6. Continue lapping until the seated rate becomes more than 70 % of the total contact area.

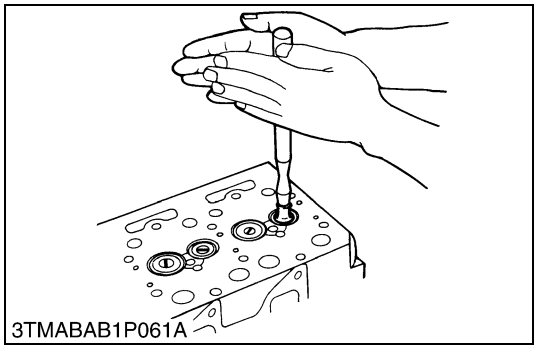
Valve seat angle	Factory spec.	IN.	1.047 rad 60 °
		EX.	0.785 rad 45 °

(1) Valve Seat Width

(A) Check Contact
(B) Correct Seat Width
(C) Correct Seat Surface
(D) Check Contact

(a) Identical Dimensions
(b) Valve Seat Width
(c) 0.262 rad (15 °)
(d) 0.785 rad (45 °)

W10283500

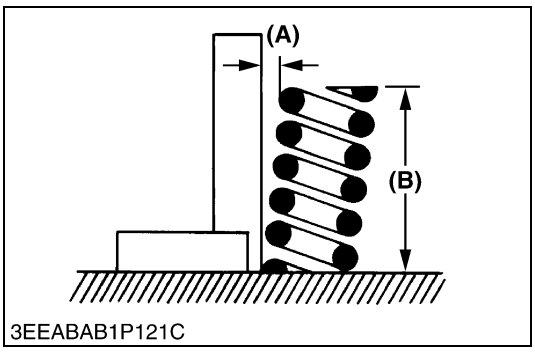

3TMABAB1P061A

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.**

W10288140



3EEABAB1P121C

Free Length and Tilt of Valve Spring

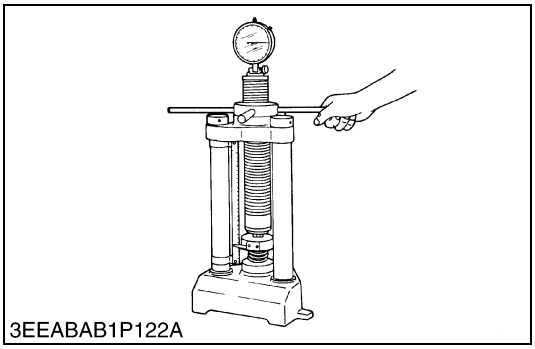
1. Measure the free length **(B)** of valve spring with vernier calipers. If the measurement is less than the allowable limit, replace it.
2. Put the valve spring on a surface plate, place a square on the side of the valve spring.
3. Check to see if the entire side is in contact with the square. Rotate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

Tilt **(A)**	Allowable limit	1.0 mm 0.039 in.

Free length **(B)**	Factory spec.	37.0 to 37.5 mm 1.457 to 1.476 in.
	Allowable limit	36.5 mm 1.437 in.

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

W10289350


3EEABAB1P122A

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.	117.4 N / 31.0 mm 11.97 kgf / 31.0 mm 26.4 lbf / 1.22 in.
	Allowable limit	100.0 N / 31.0 mm 10.2 kgf / 31.0 mm 22.5 lbf / 1.22 in.

W10784360


3TAAAAD1P060A

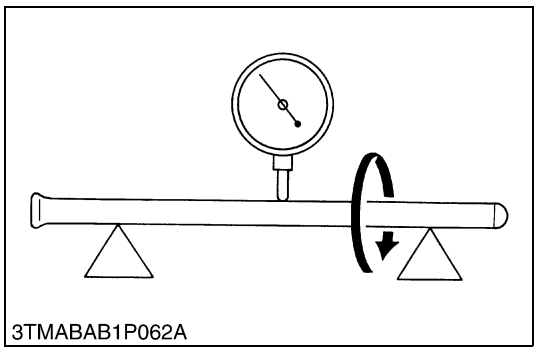
Oil Clearance between Rocker Arm and Rocker Arm Shaft

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	0.10 mm 0.0039 in.

Rocker arm shaft O.D.	Factory spec.	11.973 to 11.984 mm 0.4714 to 0.4718 in.
Rocker arm I.D.	Factory spec.	12.000 to 12.018 mm 0.4724 to 0.4731 in.

W10291500


3TMABAB1P062A

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.

W10292900


3TAAAAD1P061A

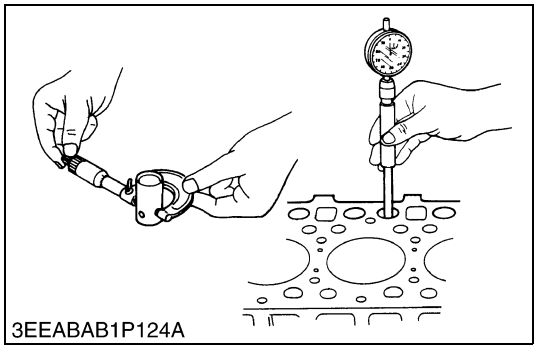
Oil Clearance between Tappet and Tappet Guide Bore

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.

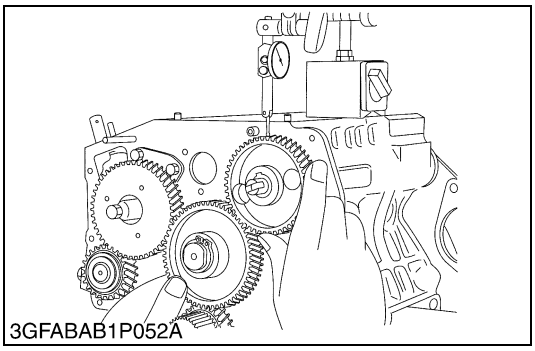
Oil Clearance between tappet and tappet guide bore	Factory spec.	0.020 to 0.062 mm 0.0008 to 0.0024 in.
	Allowable limit	0.07 mm 0.0028 in.

Tappet O.D.	Factory spec.	19.959 to 19.980 mm 0.7858 to 0.7866 in.
Tappet guide bore I.D.	Factory spec.	20.000 to 20.021 mm 0.7874 to 0.7882 in.

W10293660


3EEABAB1P124A

(2) Idle Gear and Camshaft

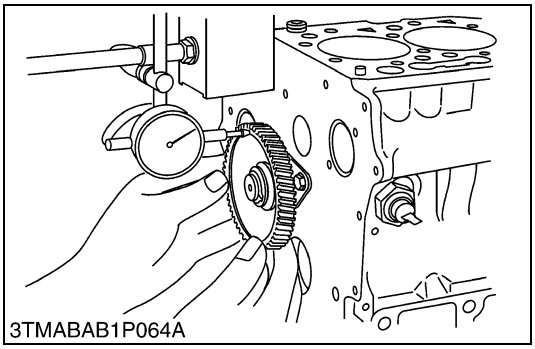

3GFABAB1P052A

Timing Gear Backlash

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

Backlash between idle gear 1 and crank gear	Factory spec.	0.032 to 0.115 mm 0.0013 to 0.0045 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear 1 and cam gear	Factory spec.	0.036 to 0.114 mm 0.0014 to 0.0045 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear 1 and injection pump gear	Factory spec.	0.034 to 0.116 mm 0.0013 to 0.0046 in.
	Allowable limit	0.15 mm 0.0059 in.
idle gear 1 and idle gear 2	Factory spec.	0.033 to 0.117 mm 0.0013 to 0.0046 in.
	Allowable limit	0.15 mm 0.0059 in.

W10280630

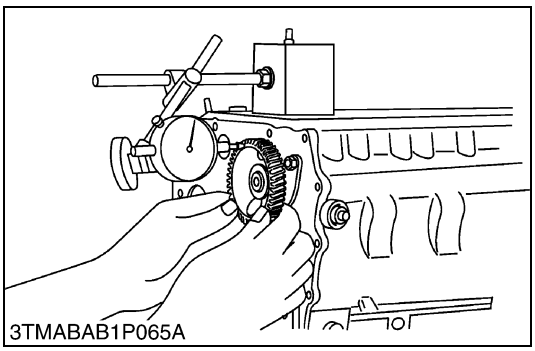

3TMABAB1P064A

Idle Gear 1 and 2 Side Clearance

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

Idle gear 1 and 2 side clearance	Factory spec.	0.20 to 0.51 mm 0.0079 to 0.0201 in.
	Allowable limit	0.8 mm 0.0315 in.

W10285590

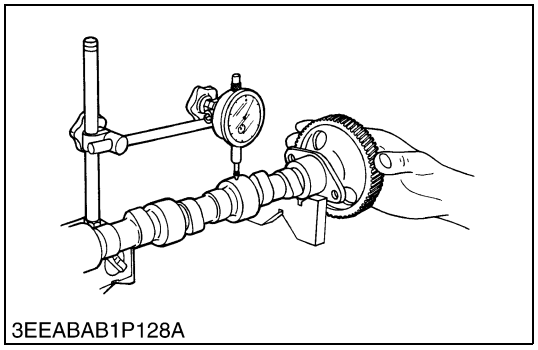

3TMABAB1P065A

Camshaft Side Clearance

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

Camshaft side clearance	Factory spec.	0.07 to 0.22 mm 0.0028 to 0.0087 in.
	Allowable limit	0.30 mm 0.0118 in.

W10295630

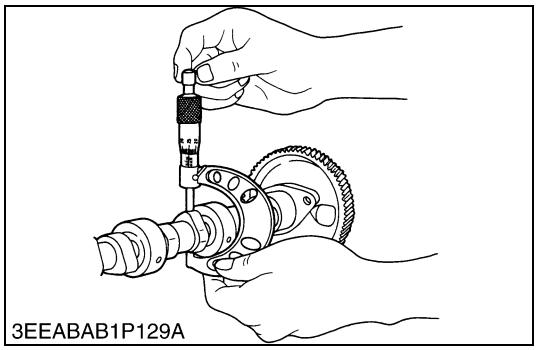

3EEABAB1P128A

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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3EEABAB1P129A

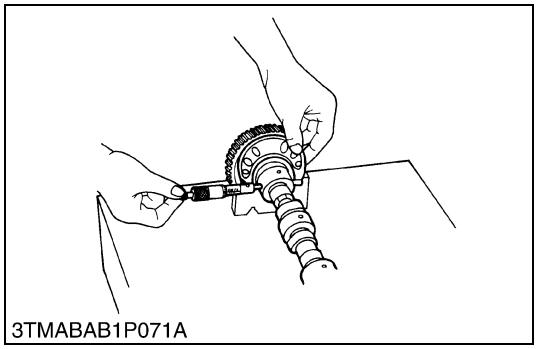
Cam Height

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	Factory spec.	28.80 mm 1.1339 in.
	Allowable limit	28.75 mm 1.1319 in.

Cam height of exhaust	Factory spec.	29.00 mm 1.1417 in.
	Allowable limit	28.95 mm 1.1398 in.

W10297880


3TMABAB1P071A

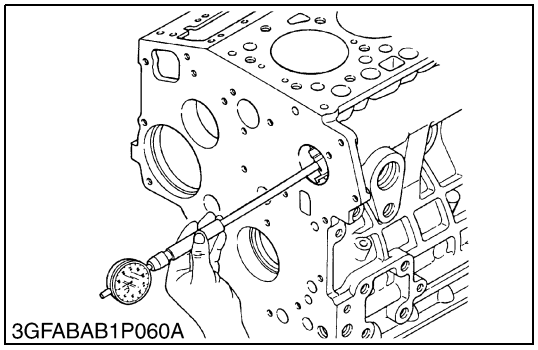
Oil Clearance of Camshaft Journal

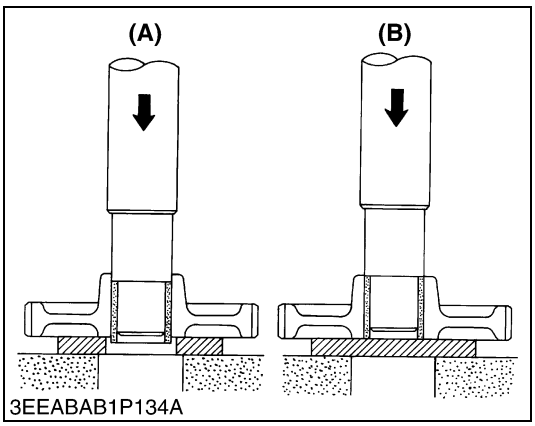
1. Measure the camshaft journal O.D. with an outside micrometer.
2. Measure the cylinder block bore I.D. for camshaft with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the camshaft.

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.	35.934 to 35.950 mm 1.4147 to 1.4153 in.
Camshaft bearing I.D. (Cylinder block bore I.D.)	Factory spec.	36.000 to 36.025 mm 1.4173 to 1.4183 in.

W10299330


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Replacing Idle Gear Bushing

(When removing)

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

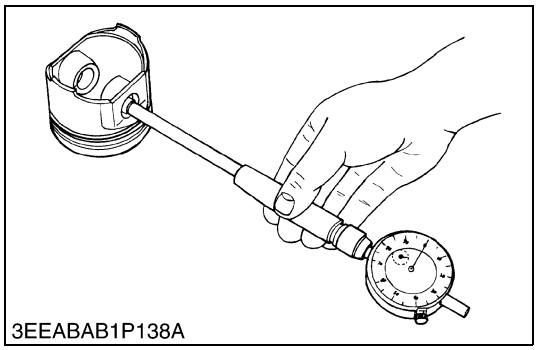
(When installing)

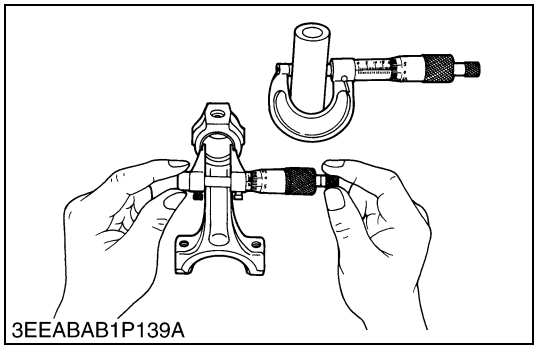
1. Clean a new idle gear bushing and idle gear bore, and apply engine oil to them.
2. Press in a new bushing using an idle gear bushing replacing tool, until it is flush with the end of the idle gear.

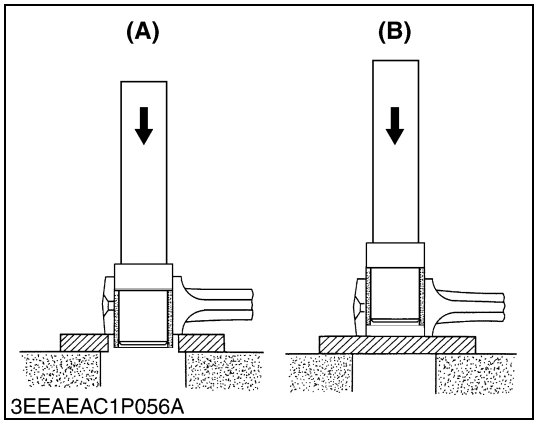
(A) When Removing **(B) When Installing**

W10302410

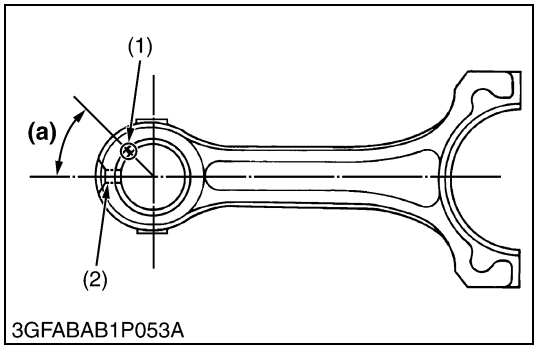
(3) Piston and Connecting Rod


3EEABAB1P138A


3EEABAB1P139A



3EEAEAC1P056A



3GFABAB1P053A

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.	22.000 to 22.013 mm 0.8661 to 0.8667 in.
	Allowable limit	22.03 mm 0.8673 in.

W10304770

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.	22.002 to 22.011 mm 0.8662 to 0.8666 in.
Small end bushing I.D.	Factory spec.	22.025 to 22.040 mm 0.8671 to 0.8677 in.

W10305740

Replacing Small End Bushing

(When removing)

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

(When installing)

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

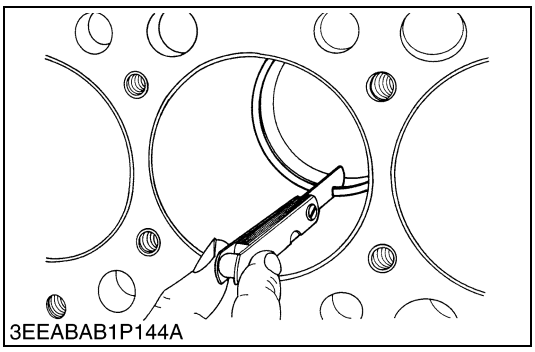
Oil clearance between piston pin and small end bushing (Spare parts)	Factory spec.	0.015 to 0.075 mm 0.00059 to 0.00295 in.
	Allowable limit	0.15 mm 0.0059 in.

Small end bushing I.D. (Spare parts)	Factory spec.	22.026 to 22.077 mm 0.7885 to 0.7904 in.

(1) Seam
(2) Oil Hole

(A) When Removing
(B) When Installing
(a) 0.785 rad (45 °)

W10307120


3EEABAB1P144A

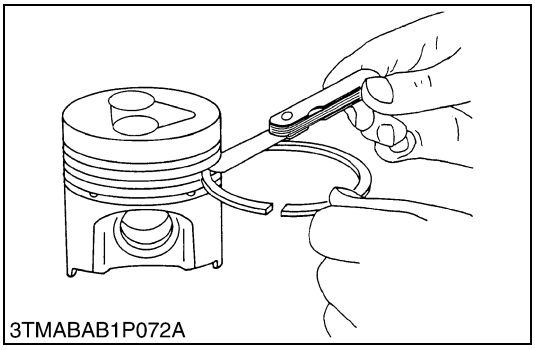
Piston Ring Gap

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

Piston ring gap **[D905-E2]**	Top ring	Factory spec.	0.25 to 0.40 mm 0.0098 to 0.0157 in.
		Allowable limit	1.25 mm 0.0492 in.
	Second ring	Factory spec.	0.25 to 0.40 mm 0.0098 to 0.0157 in.
		Allowable limit	1.25 mm 0.0492 in.
	Oil ring	Factory spec.	0.25 to 0.40 mm 0.0098 to 0.0157 in.
		Allowable limit	1.25 mm 0.0492 in.

Piston ring gap **[D1005-E2]** **[D1105-E2]** **[V1505-E2]**	Top ring	Factory spec.	0.30 to 0.45 mm 0.0118 to 0.0177 in.
		Allowable limit	1.25 mm 0.0492 in.
	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 0.40 mm 0.0098 to 0.0157 in.
		Allowable limit	1.25 mm 0.0492 in.

W10310120

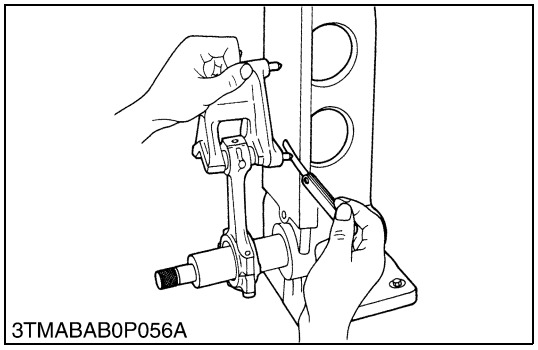

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Clearance between Piston ring and Piston Ring Groove

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.

Clearance between piston ring and piston ring groove	Second ring	Factory spec.	0.085 to 0.112 mm 0.0033 to 0.0044 in.
		Allowable limit	0.20 mm 0.0079 in.
	Oil ring	Factory spec.	0.020 to 0.055 mm 0.0008 to 0.0021 in.
		Allowable limit	0.15 mm 0.0059 in.

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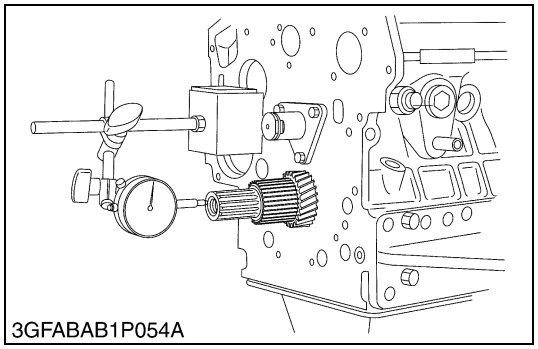
Connecting Rod Alignment

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.
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.

Space between gauge pin face plate	Allowable limit	0.05 mm 0.0020 in.

W10314620

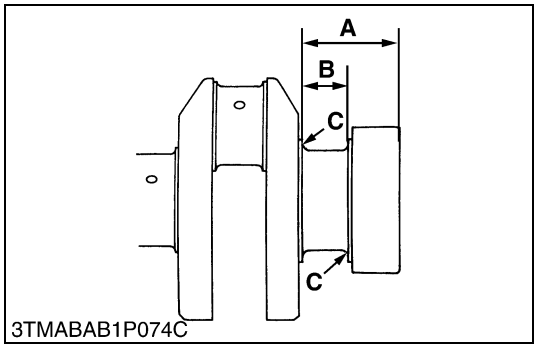
(4) Crankshaft


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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.



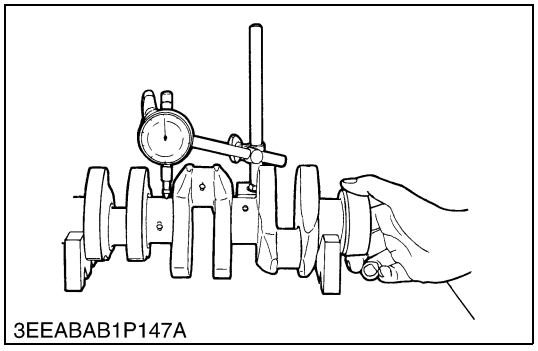
3TMABAB1P074C

(Reference)

- Oversize dimensions of crankshaft journal

Oversize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension **A**	51.5 to 51.7 mm 2.028 to 2.035 in.	51.6 to 51.8 mm 2.031 to 2.039 in.
Dimension **B**	28.20 to 28.25 mm 1.1102 to 1.1122 in.	28.40 to 28.45 mm 1.1181 to 1.1201 in.
Dimension **C**	2.3 to 2.7 mm radius 0.091 to 0.106 in. radius	2.3 to 3.7 mm radius 0.091 to 0.106 in. radius
The crankshaft journal must be fine-finished to higher than ∇∇∇.		(0.8-S)

W10317070

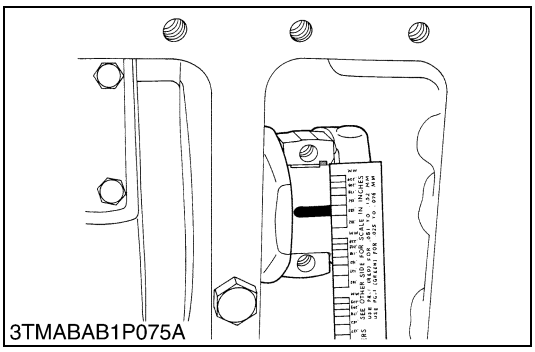

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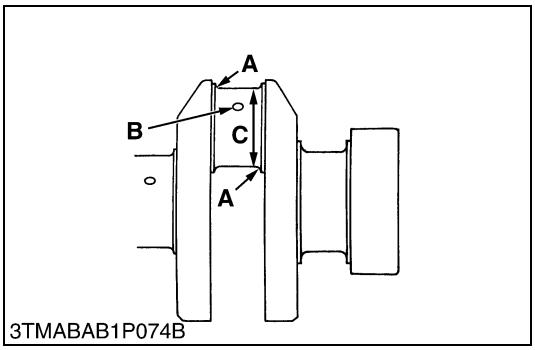
Crankshaft Alignment

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

Crankshaft alignment	Allowable limit	0.02 mm 0.0008 in.

W10330010


3TMABAB1P075A



3TMABAB1P074B

Oil Clearance between Crankpin and Crankpin Bearing

1. Clean the crankpin and crankpin bearing.
2. Put a strip of plastigage 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.**

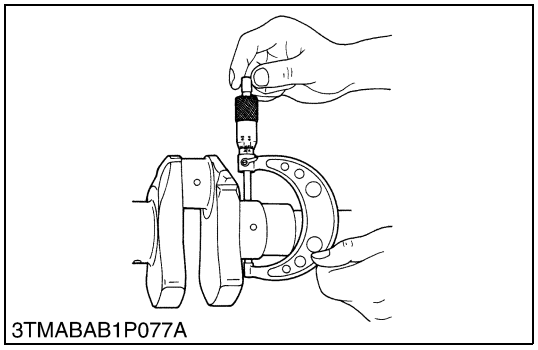
Oil clearance between crankpin and crankpin bearing	Factory spec.	0.029 to 0.091 mm 0.0011 to 0.0036 in.
	Allowable limit	0.20 mm 0.0079 in.

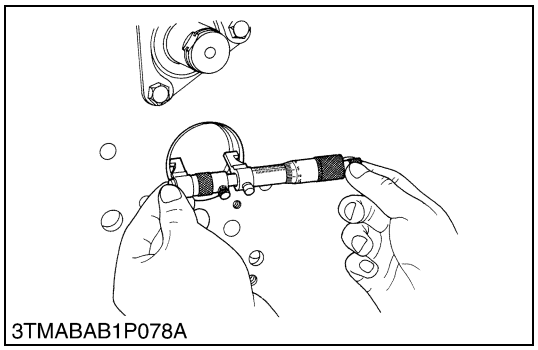
Crankpin O.D.	Factory spec.	39.959 to 39.975 mm 1.5732 to 1.5738 in.
Crankpin bearing I.D.	Factory spec.	40.004 to 40.050 mm 1.5750 to 1.5768 in.

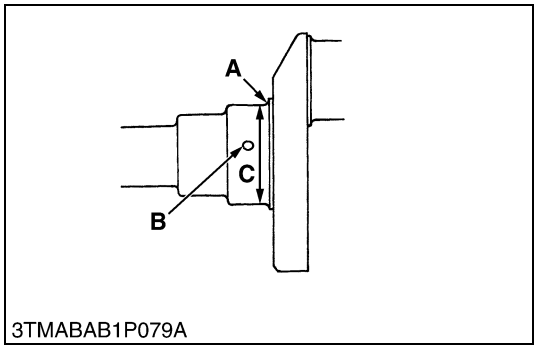
(Reference)
- Undersize dimensions of crankpin

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 relief 0.0394 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief
Dimension **C**	39.759 to 39.775 mm dia. 1.5653 to 1.5659 in. dia.	39.559 to 39.575 mm dia. 1.5574 to 1.5581 in. dia.
(0.8-S) The crankpin must be fine-finished to higher than ∇∇∇∇ *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.0394 to 0.0591 in.) relief.		

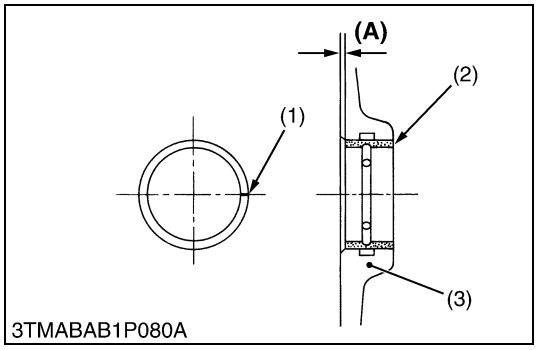
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3TMABAB1P079A



3TMABAB1P080A

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.	0.034 to 0.114 mm 0.0013 to 0.0045 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D.	Factory spec.	47.934 to 47.950 mm 1.8872 to 1.8878 in.
Crankshaft bearing 1 I.D.	Factory spec.	47.984 to 48.048 mm 1.8891 to 1.8916 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension **A**	2.3 to 2.7 mm radius 0.0906 to 0.1063 in. radius	2.3 to 2.7 mm radius 0.0906 to 0.1063 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief
Dimension **C**	47.734 to 47.750 mm dia. 1.8793 to 1.8799 in. dia.	47.534 to 47.550 mm dia. 1.8714 to 1.8720 in. dia.
(0.8-S) The crankshaft journal must be fine-finished to higher than ∇∇∇ *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.0394 to 0.0591 in.) relief.		

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Replacing Crankshaft Bearing 1

(When removing)

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

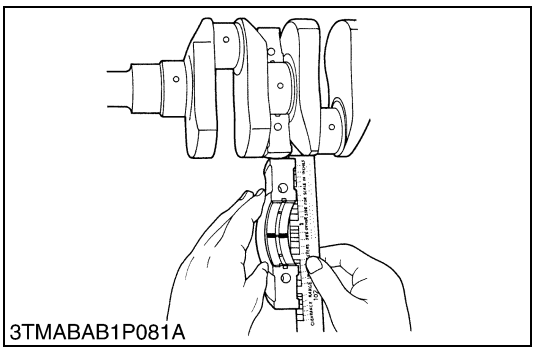
(When installing)

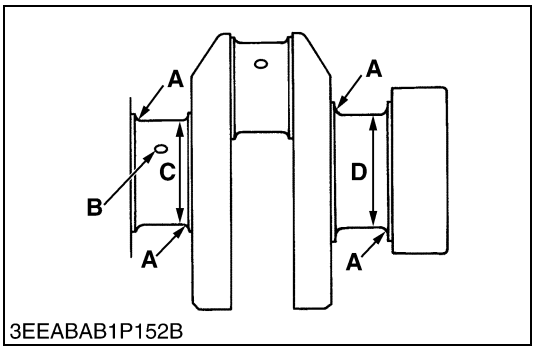
1. Clean a new crankshaft bearing 1 and crankshaft journal bore, and apply engine oil to them.
2. Using a crankshaft bearing 1 replacing tool, press in a new bearing 1 (2) so that its seam (1) directs toward the exhaust manifold side. (See figure.)

Dimension **(A)**	Factory spec.	0 to 0.3 mm 0 to 0.0118 in.

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

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

1. Put a strip of plastigage on the center of the journal.
2. Install the bearing case and tighten the baring case screws 1 to the specified torque, and remove the bearing case again.
3. Measure the 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 (1) and crankshaft bearing (3).
5. If the same size bearing is useless because of the crankshaft journal wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

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

Oil clearance between crankshaft journal and crankshaft bearing 2	Factory spec.	0.034 to 0.095 mm 0.0013 to 0.0037 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Intermediate)	Factory spec.	47.934 to 47.950 mm 1.8872 to 1.8878 in.
Crankshaft bearing 2 I.D.	Factory spec.	47.984 to 48.029 mm 1.8891 to 1.8909 in.

Oil clearance between crankshaft journal and crankshaft bearing 3	Factory spec.	0.034 to 0.098 mm 0.0013 to 0.0039 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Flywheel side)	Factory spec.	51.921 to 51.940 mm 2.0441 to 2.0449 in.
Crankshaft bearing 3 I.D.	Factory spec.	51.974 to 52.019 mm 2.0462 to 2.0480 in.

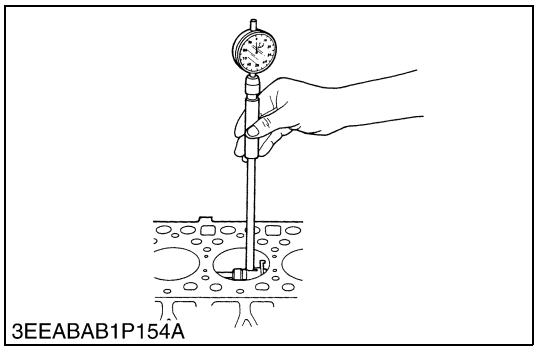
(Reference)

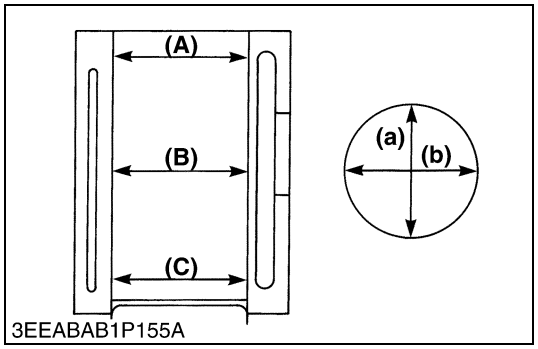
- Undersize dimensions of crankshaft journal

Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension **A**	2.3 to 2.7 mm radius 0.0906 to 0.1063 in. radius	2.3 to 2.7 mm radius 0.0906 to 0.1063 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief
Dimension **C**	47.734 to 47.750 mm dia. 1.8793 to 1.8799 in. dia.	47.534 to 47.550 mm dia. 1.8714 to 1.8720 in. dia.
Dimension **D**	51.721 to 51.740 mm dia. 2.0362 to 2.0370 in. dia.	51.521 to 51.540 mm dia. 2.0284 to 2.0291 in. dia.
(0.8-S) The crankshaft journal must be fine-finished to higher than ∇∇∇∇ *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.0394 to 0.0591 in.) relief.		

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(5) Cylinder


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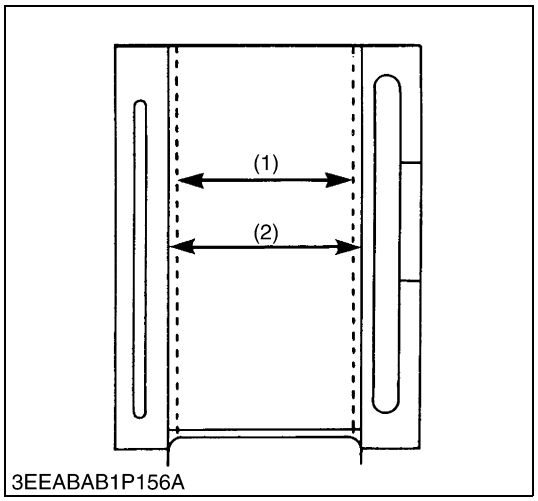
Cylinder Wear

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 I.D.	Factory spec.	D905-E2	72.000 to 72.019 mm 2.8346 to 2.8354 in.
		D1005-E2	76.000 to 76.019 mm 2.9921 to 2.9929 in.
		D1105-E2 V1505-E2	78.000 to 78.019 mm 3.0709 to 3.0716 in.
	Allowable limit	D905-E2	72.15 mm 2.8406 in.
		D1005-E2	76.15 mm 2.9980 in.
		D1105-E2 V1505-E2	78.15 mm 3.0768 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.

Oversized cylinder liner I.D.	Factory spec.	D905-E2	72.500 to 72.519 mm 2.85433 to 2.85507 in.
		D1005-E2	76.500 to 76.519 mm 3.0118 to 3.0126 in.
		D1105-E2 V1505-E2	78.500 to 78.519 mm 3.0906 to 3.0913 in.
	Allowable limit	D905-E2	72.65 mm 2.8602 in.
		D1005-E2	76.65 mm 3.0177 in.
		D1105-E2 V1505-E2	78.65 mm 3.0965 in.
Finishing	Finishing Hone to 1.2 to 2.0 mm μR max. ∇∇∇ (0.000047 to 0.000079 in. μR max.)		

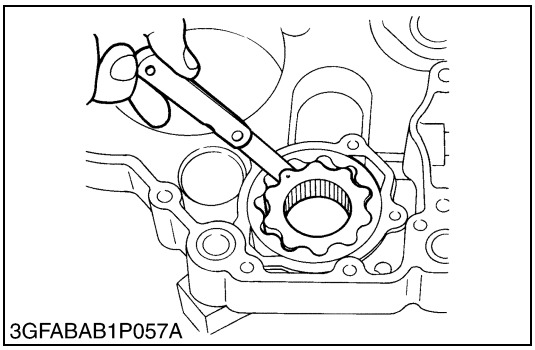
2. Replace the piston and piston rings with oversize ones.
   Oversize : 0.5 mm (0.0197 in.)

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

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

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(6) Oil Pump

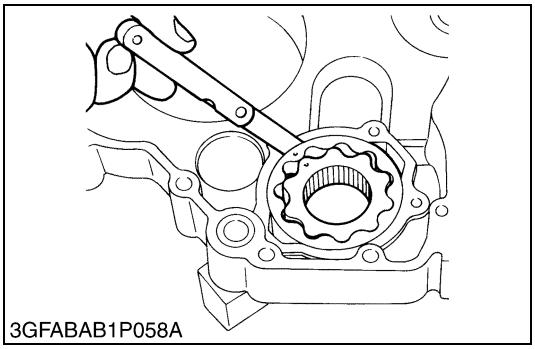

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Rotor Lobe Clearance

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

Rotor lobe clearance	Factory spec.	0.06 to 0.18 mm 0.0024 to 0.0071 in.

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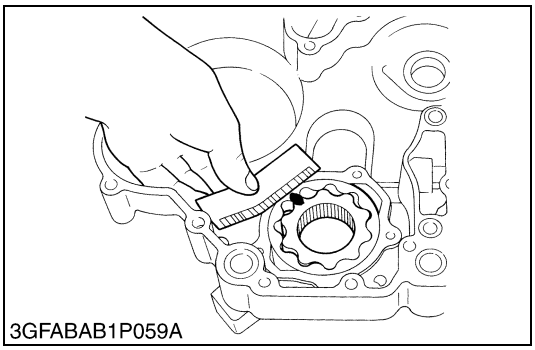

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Clearance between Outer Rotor and Pump Body

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

Clearance between outer rotor and pump body	Factory spec.	0.100 to 0.180 mm 0.0039 to 0.0071 in.

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Clearance between Rotor and Cover

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

Clearance between rotor and cover	Factory spec.	0.025 to 0.075 mm 0.0010 to 0.0030 in.

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2 CLUTCH

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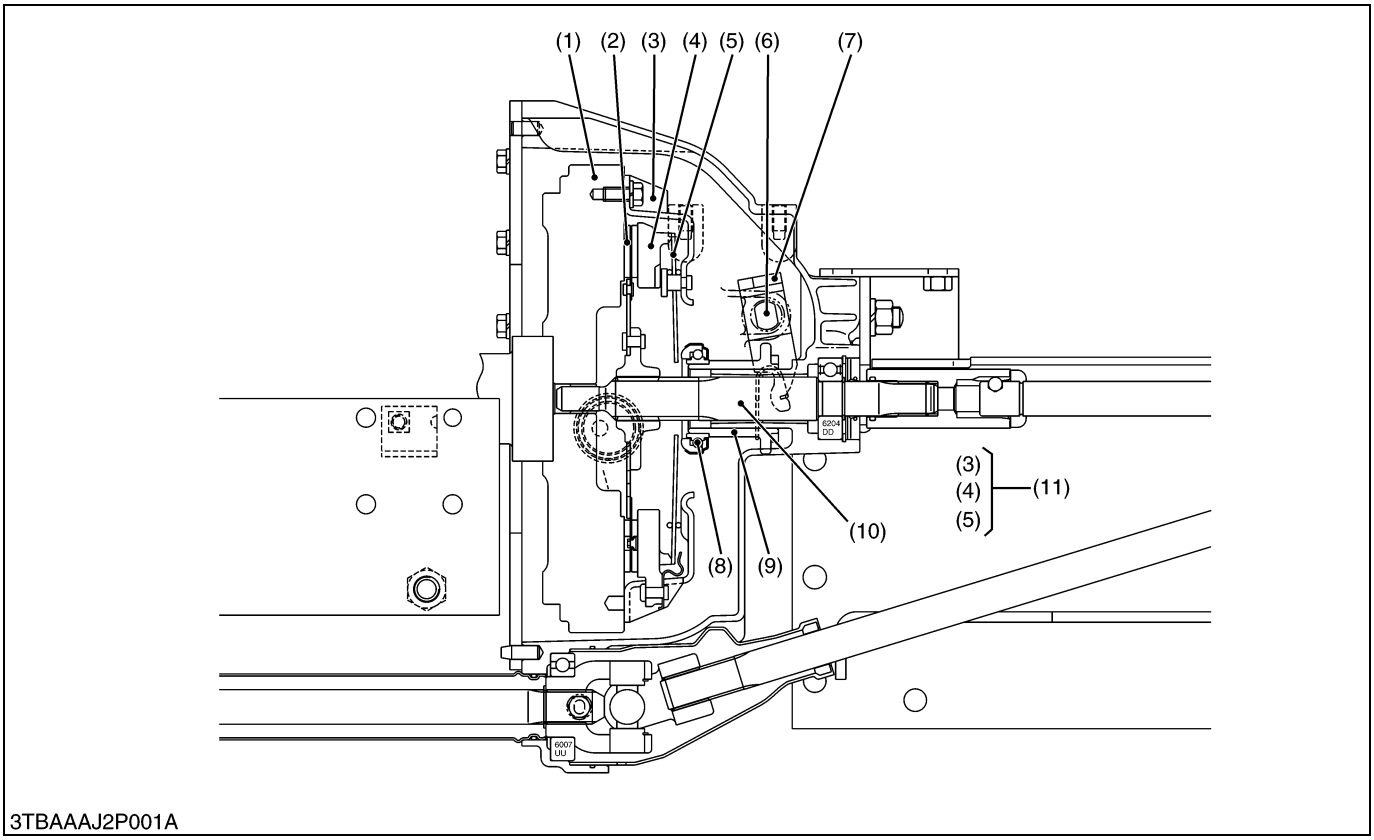
MECHANISM

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1. STRUCTURE 2-M1
[1] MANUAL TRANSMISSION MODEL 2-M1
[2] CLUTCH OPERATION 2-M2
(1) Clutch “Engaged” 2-M2
(2) Clutch “Disengaged” 2-M2

1. STRUCTURE

[1] MANUAL TRANSMISSION MODEL



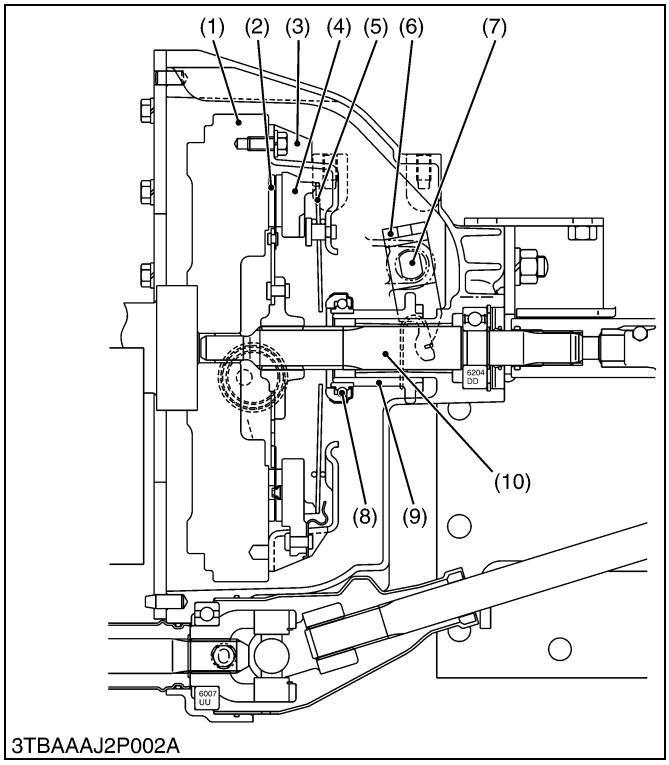
(1) Engine Flywheel
(2) Clutch Disc
(3) Clutch Cover
(4) Pressure Plate
(5) Diaphragm Spring
(6) Clutch Rod
(7) Clutch Release Fork
(8) Clutch Release Bearing
(9) Clutch Release Hub
(10) Clutch Shaft
(11) Pressure Plate Assembly

Engine torque is transmitted to the pressure plate assembly (11) via the flywheel (1) which is connected to the engine crankshaft. Therefore, the clutch cover constantly runs with engine. The clutch disc (2) is located between the flywheel (1) and the pressure plate (4) of pressure plate assembly (11). Torque is transmitted to the clutch disc (2) by the pressure created by the diaphragm spring (5) installed in the pressure plate assembly (11). Then, the torque is transmitted to the transmission via the clutch shaft (10).

When the clutch pedal is depressed, the clutch release hub (9) and the clutch release bearing (8) move towards the flywheel and push the fingers of the diaphragm spring (5). This movement pulls the pressure plate (4) up and disengages the clutch.

[2] CLUTCH OPERATION

(1) Clutch “Engaged”



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When the clutch pedal is not depressed, the clutch release bearing (8) and the fingers of the diaphragm spring (5) are not connected to each other.

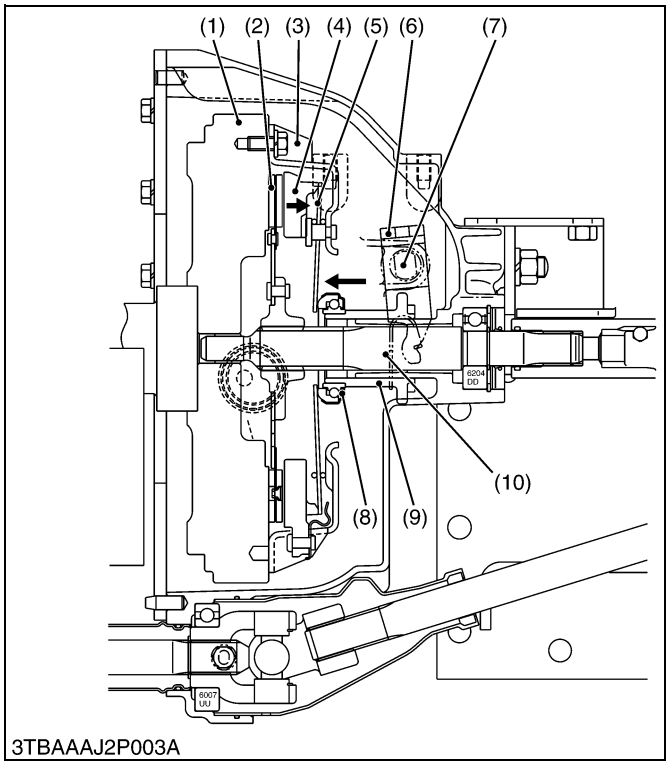
Accordingly, the pressure plate (4) is tightly passed against the flywheel (1) by the diaphragm spring (5).

As a result, rotation of the flywheel (1) is transmitted to the transmission through the clutch shaft (10) due to the frictional force among the flywheel (1), the clutch disc (2) and the pressure plate (4).

(1) Flywheel
(2) Clutch Disc
(3) Clutch Cover
(4) Pressure Plate
(5) Diaphragm Spring
(6) Release Fork
(7) Clutch Rod
(8) Release Bearing
(9) Release Hub
(10) Clutch Shaft

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(2) Clutch “Disengaged”



3TBAAAJ2P003A

When the clutch pedal is depressed, the clutch pedal rod is pulled to move the clutch rod (7). Then, the release fork (6) pushes the release hub (9) and release bearing (8) toward the flywheel. Simultaneously, the release bearing (6) pushes the diaphragm spring (5).

As the pressure plate (4) is pulled by the diaphragm spring (5), the frictional force among the flywheel (1), the clutch disc (2) and the pressure plate (4) disappears.

Therefore, rotation of the flywheel (1) is not transmitted to the clutch disc (2), and then the rotation of the clutch shaft (10) stops.

(1) Flywheel
(2) Clutch Disc
(3) Clutch Cover
(4) Pressure Plate
(5) Diaphragm Spring
(6) Release Fork
(7) Clutch Rod
(8) Release Bearing
(9) Release Hub
(10) Clutch Shaft

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SERVICING

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1. TROUBLESHOOTING 2-S1
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      (1) Separating Engine From Clutch housing 2-S5
      (2) Separating Clutch Assembly.....2-S12
   [3] SERVICING 2-S13

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Clutch Drags	Clutch pedal free travel excessive	Adjust	2-S4
	Dust on clutch disc generated from clutch disc facing	Remove rust	2-S12
	Release fork broken	Replace	2-S12
	Clutch disc or pressure plate warped	Replace	2-S12
	Wire ring of the clutch cover worn or broken	Replace clutch cover assembly	2-S12
Clutch Slips	Clutch pedal free travel too small	Adjust	2-S4
	Clutch disc excessively worn	Replace	2-S12
	Grease or oil on clutch disc facing	Replace	2-S12
	Clutch disc or pressure plate warped	Replace	2-S12
	Diaphragm spring weaken or broken	Replace	2-S12
	Wire ring of the clutch cover worn or broken	Replace clutch cover assembly	2-S12
Chattering	Grease or oil on clutch disc facing	Replace	2-S12
	Clutch disc or pressure plate warped	Replace	2-S12
	Clutch disc boss spline worn or rusted	Replace or remove rust	2-S12
	Clutch shaft bent	Replace	2-S12, 3-S36
	Pressure plate or flywheel face cracked or scored	Replace	2-S12
	Clutch disc boss spline and clutch shaft spline worn	Replace	2-S12, 3-S36
	Diaphragm spring strength uneven or diaphragm spring broken	Replace	2-S12
Rattle During Running	Clutch disc boss spline worn	Replace	2-S12
	Release bearing worn or sticking	Replace	2-S12
Clutch Squeaks	Release bearing sticking or dry	Replace	2-S12
	Clutch disc excessively worn	Replace	2-S12
Vibration	Clutch Shaft bent	Replace	2-S12, 3-S36
	Clutch disc rivet worn or broken	Replace	2-S12
	Clutch parts broken	Replace	2-S12

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Clutch Pedal	Free Travel	20 to 30 mm 0.78 to 1.18 in.	–
Clearance between Bolt and Housing Case	Clearance “**B**”	Approx. 8.5 mm 0.33 in.	–
Clutch Disc and Clutch Shaft	Backlash (Displacement around Disc Edge)	–	2.0 mm 0.079 in.
Clutch Disc	Disc Surface to Rivet Top	–	0.3 mm 0.012 in.
Pressure Plate	Flatness	–	0.2 mm 0.008 in.

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3. TIGHTENING TORQUES

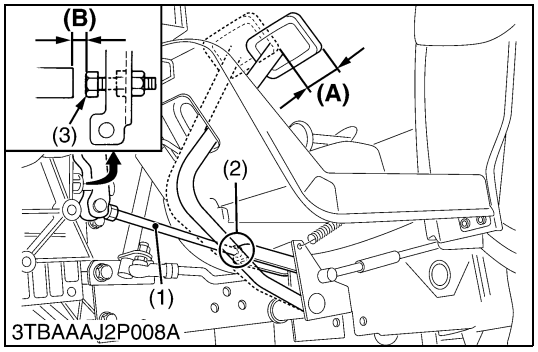
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-8.)

Item	N·m	kgf·m	lbf·ft
Steering wheel mounting nut	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Sub-frame mounting bolt (M10) for alminum	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2
Sub-frame mounting bolt (M12) for alminum	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5
Sub-frame mounting bolt for ordinary material (M12)	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Sub-frame mounting bolt for ordinary material (M14)	126 to 150	12.9 to 15.3	93 to 111
Engine and front case mounting bolt and nut (M8)	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2
Engine and front case mounting stud bolt (M10)	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Clutch mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.2

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4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



Checking Clutch Pedal Free Travel

CAUTION

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

1. Slightly depress the clutch pedal and measure stroke **(A)** at the top of pedal stroke.
2. If the measurement is not within the factory specifications, loosen the lock nut (2) and adjust the clutch pedal rod (1) length.
3. Retighten the lock nut (2).
4. After adjusting, release the clutch pedal and check the clearance **(B)**. If adjustment is needed, adjust the clearance with the bolt (3).

Clutch pedal free travel **(A)**	Factory spec.	20 to 30 mm 0.78 to 1.18 in.
Clearance **(B)**		Approximately 8.5 mm 0.33 in.

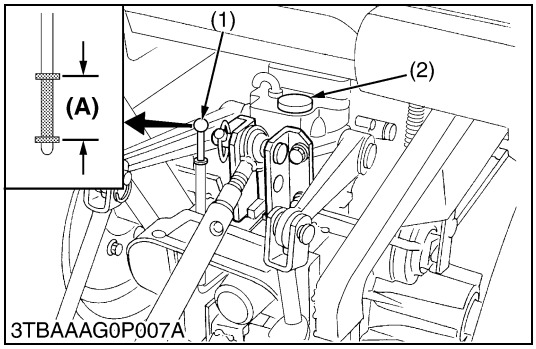
(1) Clutch Pedal Rod
(2) Lock Nut
(3) Bolt

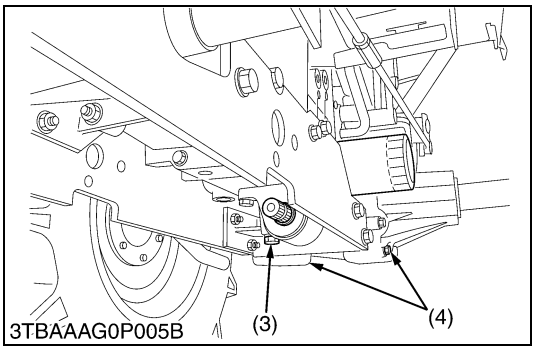
(A) Clutch pedal free travel
(B) Clearance between bolt and housing case

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[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Engine From Clutch housing





Draining Transmission Fluid

1. Place oil pan underniath the transmission case, and remove the drain plugs (3).
2. Drain the transmission fluid.
3. Reinstall the drain plug (3).

(When refilling)

- Fill new oil from port after remaining the filling plug (2) up to the upper notch on the dipstick (1).
- After running the engine for new minutes, stop it and check the oil level again, it low, add oil prescribed level.

■ **IMPORTANT**

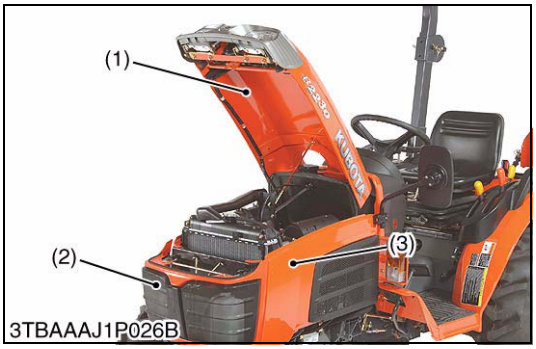
- **Use only KUBOTA SUPER UDT fluid-Use of the other oils may damage the transmission or hydraulic system. Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7.)**
- **Never work the tractor immediately after changing the transmission oil. Keeping the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

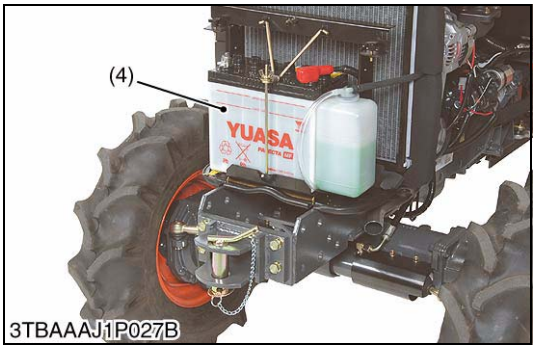
Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals

(1) Dipstick
(2) Filling Plug
(3) Drain Plug
(4) Drain Plug (Rear Axle Case)

(A) Oil level is acceptable within this range.

W1022219





Bonnet, Side Cover and Battery Cord

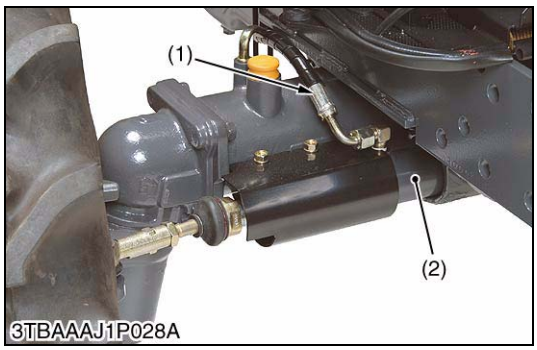
1. Open the bonnet (1) and remove the front grille (2).
2. Disconnect the battery negative cord.
3. Disconnect the head light connectors and remove the bonnet 1) side covers (3).

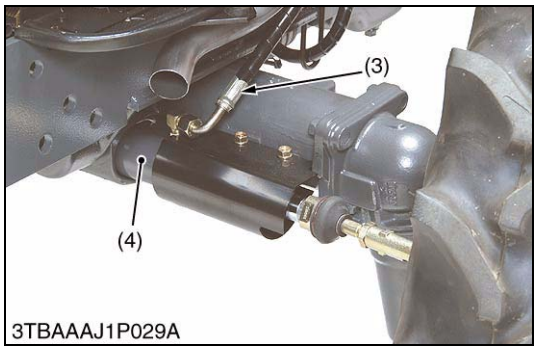
■ **NOTE**

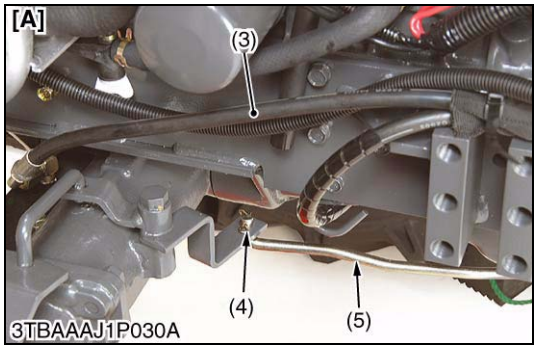
- **When disconnecting the battery cords, disconnect the grounding cord first. When connecting, positive cord first.**

(1) Bonnet
(2) Front Grille
(3) Side Cover
(4) battery

W1012741







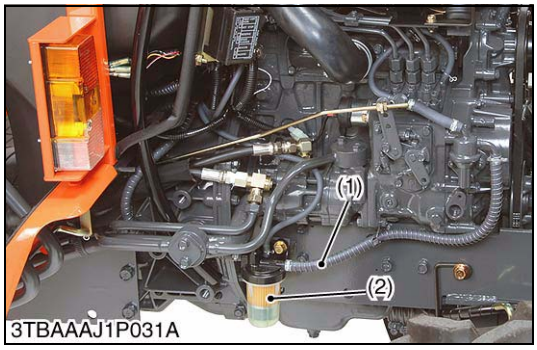
Hydraulic Hoses from Power Steering Cylinder

1. Disconnect the hydraulic hoses (1) (3) from the power steering cylinder (2).
2. Removing the snap pin (4) and disconnect the bi-speed rod (5).

(1) Hydraulic Hose (RH)
(2) Power Steering Cylinder
(3) Hydraulic Hose (LH)
(4) Snap Pin
(5) Bi-Speed Rod

[A] Bi-Speed Turn Model

W1015210



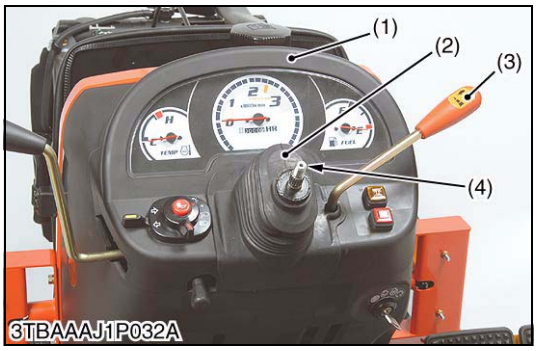
Fuel

1. Disconnect the fuel hose (1) from the fuel filter (2).
2. Drain the fuel to the fuel tank completely.

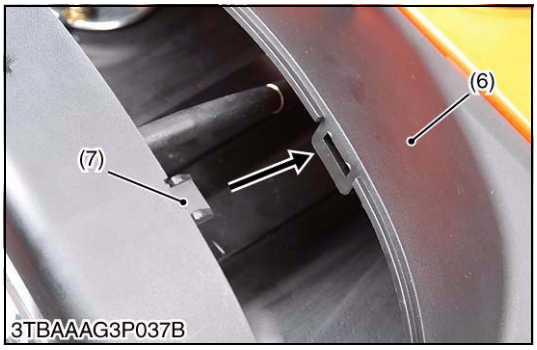
(1) Fuel Hose (from Fuel Tank)
(2) Fuel Filter

W1013088









Steering Wheel, Meter Panel, Shuttle Lever and Panel Lower Cover

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut.
3. Remove the steering wheel with a steering wheel puller (Code No. 07916-51090).
4. Remove the accelerator lever grip (3) and the steering boot (2).
5. Disconnect the hour meter cable and wiring harness connectors.
6. Remove the meter panel (1) not to damage with the steering shaft (4).
7. Remove the shuttle lever (5).
8. Remove the panel lower cover (6).

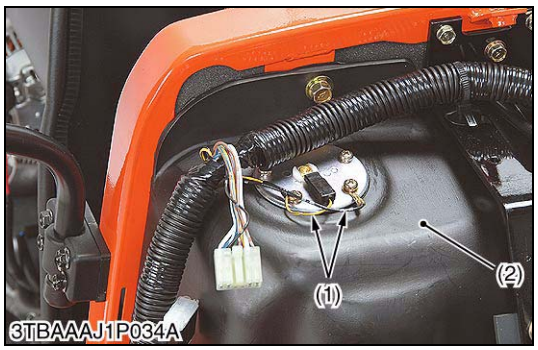
(When reassembling)

- Tighten the steering wheel mounting nut securely.

Tightening torque	Steering wheel mounting nut	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft

(1) Meter Panel
(2) Steering Boot
(3) Accelerator Lever Grip
(4) Steering Shaft
(5) Shuttle Lever
(6) Panel Lower Cover
(7) Meter Panel Hook

W1020252







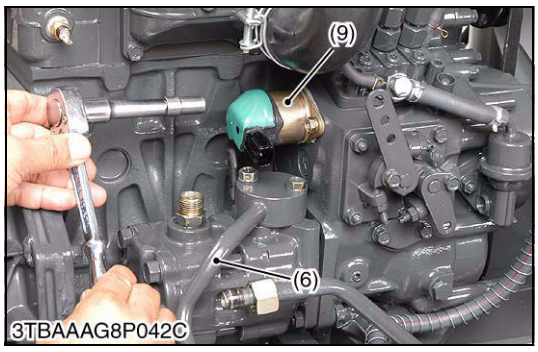


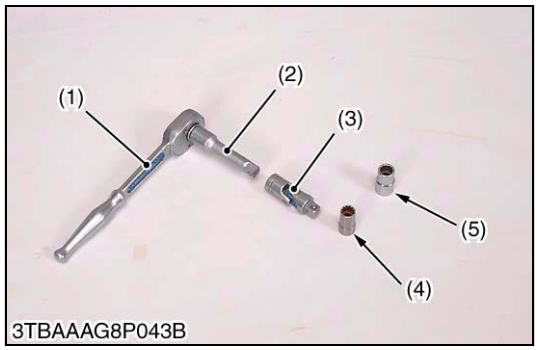
Fuel Tank

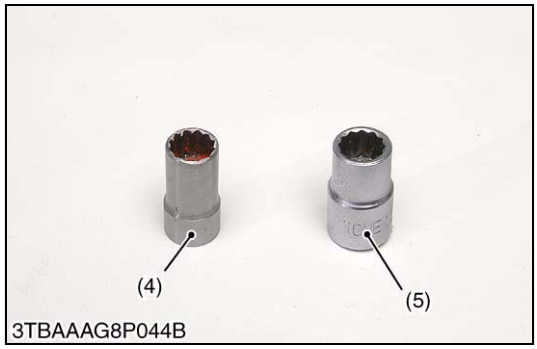
1. Disconnect the leads (1) from the fuel tank (2).
2. Disconnect the overflow hoses from the fuel tank (2).
3. Remove the shutter plate (6) and the fuel tank (2).

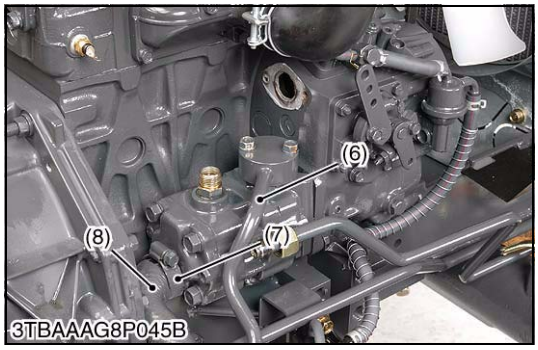
(1) Lead
(2) Fuel Tank
(3) Steering Post Stay
(4) Bolt
(5) Center Pillar
(6) Shuttle Plate

W1020593









Key Stop Solenoid and Hydraulic Delivery Pipe

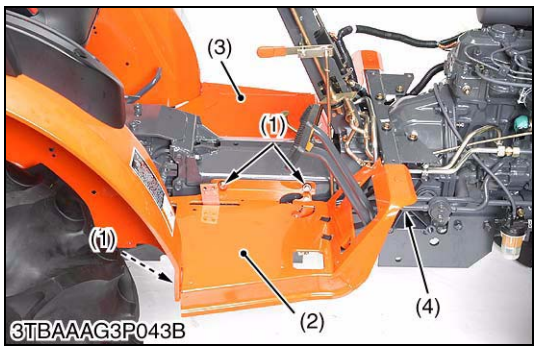
1. Remove the key stop solenoid connector.
2. Remove the engine stop solenoid (9) using a small size rachet handle (1), the extension joint (2), the universal joint (3) and the thinner socket (10 mm).
3. Remove the hydraulic delivery pipe mounting nuts.
4. Slide the hydraulic delivery pipe.
5. Loosen the hose band (7).
6. Disconnect the suction hose (8) from the hydraulic pump.

(When reassembling)

- Apply the liquid gasket (Three Bond 1206D or equivalent) to the joint face of the key stop solenoid and the engine.

(1) Rachet Handle
(2) Extension Joint
(3) Universal Joint
(4) Thinner Socket (10 mm, 0.39 in)
(5) Standard Socket (10 mm)
(6) Hydraulic Delivery Pipe
(7) Hose Band
(8) Suction Hose
(9) Engine Stop Solenoid

W1020835

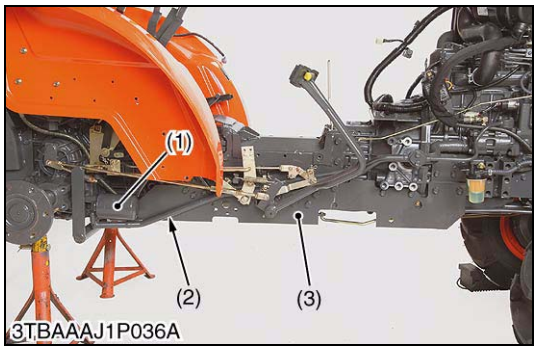


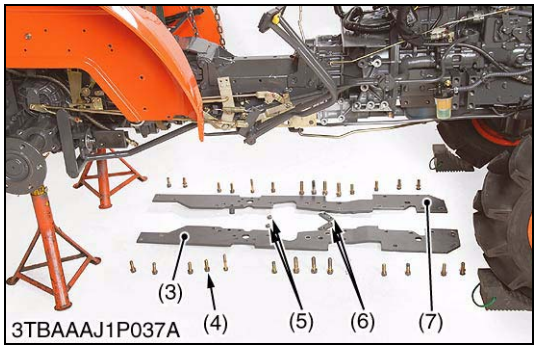
Steps (4-cylinder Engine, ROPS Model)

1. Remove the bolts (1) and the nut (4).
2. Remove the brake spring from the step (RH) (2). Remove the brake spring and the clutch spring from the step (LH) (3).
3. Remove the steps (2) (3).

(1) Bolt
(2) Step (RH)
(3) Step (LH)
(4) Nut

W1023721





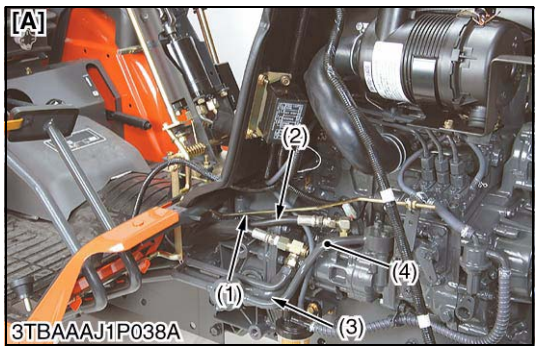
Sub-Frames (4-cylinder Engine Model)

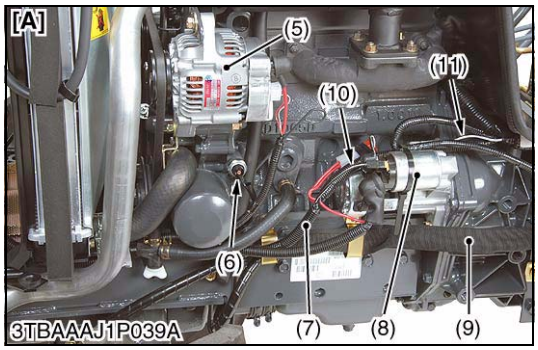
1. Place the rigid jack under the rear axle shaft.
2. Remove the transmission oil filter cartridge (1).
3. Loosen the sub-frame mounting bolts.
4. Remove the sub-frames (3) (7).

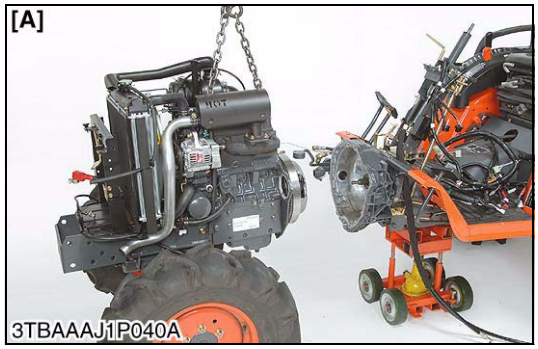
Tightening torque	Sub-frame mounting bolt for aluminum (M10)	39.3 to 45.1 N·m 4.0 to 4.6 kgf·m 29.0 to 33.2 lbf·ft
	Sub-frame mounting bolt for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft
	Sub-frame mounting bolt for ordinary material (M12)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 lbf·ft
	Sub-frame mounting bolt for ordinary material (M14)	126 to 150 N·m 12.9 to 15.3 kgf·m 93 to 111 lbf·ft

(1) Transmission Oil Filter Cartridge
(2) Suction Pipe
(3) Sub-frame (RH)
(4) Bolt
(5) Nut
(6) Steel Plate
(7) Sub-frame (LH)

W1023833







Separating Engine with Front Axle

1. Reinstall the rear tires.
2. Support the transmission with a disassembling stand.
3. Hook the engine with a hoist.
4. Place the disassembling stand under the main frame.
5. Disconnect the power steering hoses (2).
6. Loose the hydraulic inlet hose band. Disconnect the hydraulic inlet hose (3) from the hydraulic pump.
   Disconnect the hydraulic delivery pipe (4) from the hydraulic pump.
7. Disconnect the wiring leads from the alternator (5), the engine oil pressure switch (6) and the starter motor (8).
   Disconnect the wiring harness (7) and the power steering hoses (9) from the engine body.
8. Remove the docking bolts between the engine and the front case.

(When reassembling)

- Align the spline between the front wheel drive shaft and the universal joint securely.
- Tighten the docking bolts between the engine and the front case securely.

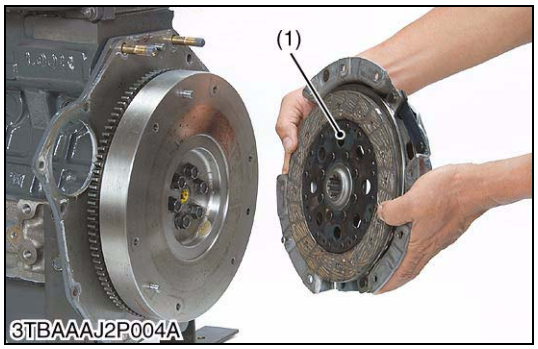
Tightening torque	Engine and front case mounting bolt and nut (M8)	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft
	Engine and front case mounting stud bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

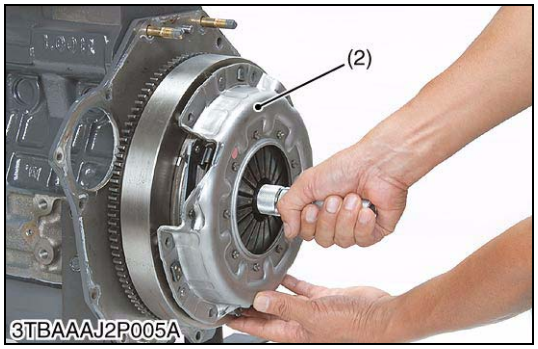
(1) Accelerator Rod
(2) Power Steering Hose
(3) Hydraulic Inlet Hose
(4) Hydraulic Delivery Pipe
(5) Alternator
(6) Engine Oil Pressure Switch
(7) Wiring Harness
(8) Starter Motor
(9) Power Steering Hoses

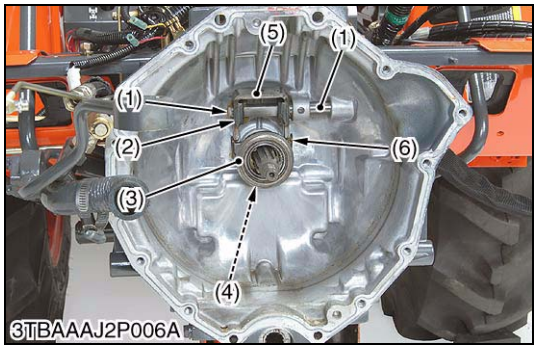
[A] ROPS, Manual Transmission Model

W1021585

(2) Separating Clutch Assembly







Separating the Clutch Assembly

1. Remove the clutch assembly (2) from the flywheel.

(When reassembling)

- Direct the shorter end of the clutch disc boss toward the flywheel.
- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Install the pressure plate, noting the position of straight pins.

■ **IMPORTANT**

- **Align the center of clutch disc and flywheel by inserting the clutch center tool.**

■ **NOTE**

- **Do not allow grease and oil on the clutch disc facing.**

Tightening torque	Clutch mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft

(1) Clutch Disc
(2) Clutch Assembly
(3) Clutch Cover

W1014376

Clutch and Clutch Release Fork

1. Remove the external snap ring (2) at the end of clutch rod shaft (1) and remove the clutch release fork (5) and the release bearing (3) with release bearing holder (4).

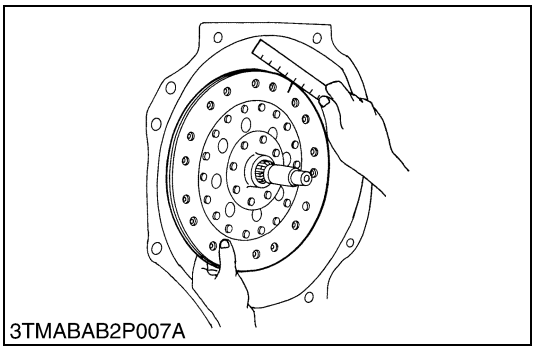
(When reassembling)

- Set the clutch release fork and the release bearing with the release folk spring (6) in the correct direction.

(1) Clutch Rod Shaft
(2) External Snap Ring
(3) Clutch Release Bearing
(4) Release Bearing Holder
(5) Clutch Release Folk
(6) Release Folk Spring

W1015039

[3] SERVICING

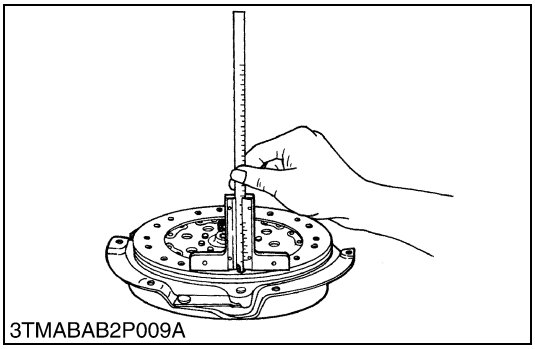

3TMABAB2P007A

Backlash between Clutch Disc and Clutch Shaft

1. Mount the clutch disc onto the propeller shaft.
2. Hold the propeller shaft so that it does not rotate.
3. Slightly move the disc and measure the displacement around the disc edge.
4. If the measurement exceeds the allowable limit, replace the clutch disc.

Displacement around disc edge	Allowable limit	2.0 mm 0.079 in.

W1016866

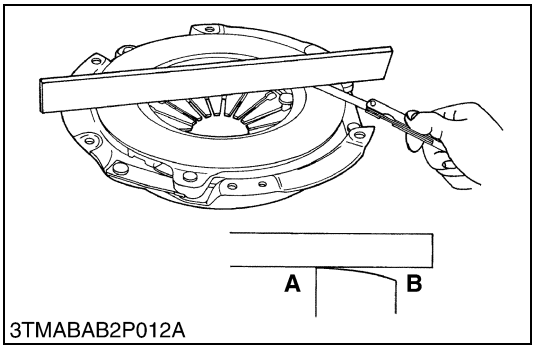

3TMABAB2P009A

Clutch Disc Wear

1. Measure the depth from clutch disc surface to the top of the rivet at least 10 points with a depth gauge.
2. If the depth is less than the allowable limit, replace the disc.
3. If oil is sticking to clutch disc, or disc surface is carbonized, replace the disc.

Disc surface to rivet top (Depth)	Allowable limit	0.3 mm 0.012 in.

W1017162



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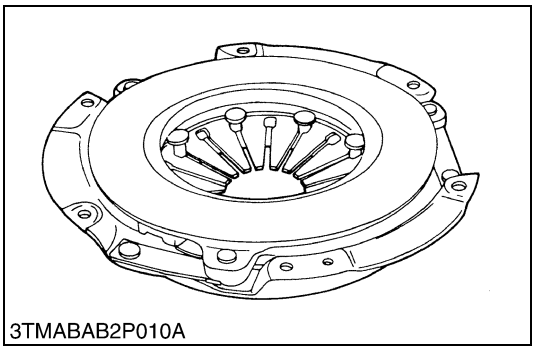
Pressure Plate Flatness

1. Place a straight edge on the pressure plate and measure clearance with a feeler gauge at several points.
2. If the clearance exceeds the allowable limit, replace it.
3. When the pressure plate is worn around its outside and its inside surface only is in contact with the straight edge, replace it even if the clearance is within the allowable limit.

Clearance between pressure plate and straight edge	Allowable limit	0.2 mm 0.008 in.

A : Inside **B : Outside**

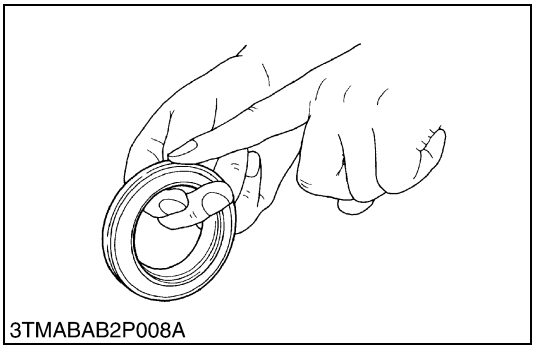
W1017439


3TMABAB2P010A

Checking Pressure Plate and Diaphragm

1. Check the pressure plate and if scratched on its surface, correct with sandpaper or replace.
2. Check the diaphragm for crack and scratches. If defects are found, replace it.

W1017284


3TMABAB2P008A

Checking Clutch Release Bearing

1. Check the clutch release bearing. IF surface is worn excessively, or abnormal sounds occur, replace it.

W1017028

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3 TRANSMISSION

https://truckmanualshub.com/

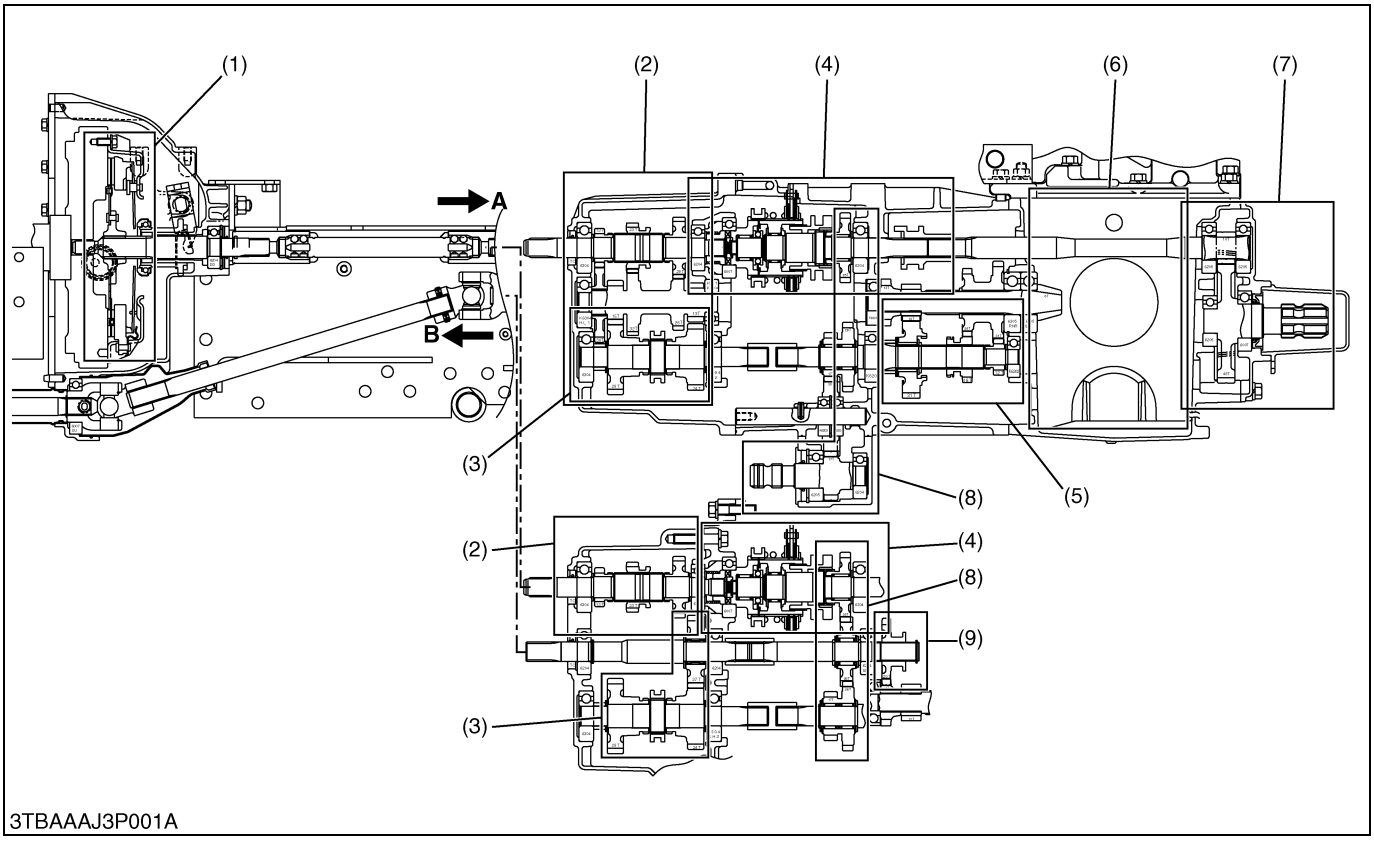
MECHANISM

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1. STRUCTURE

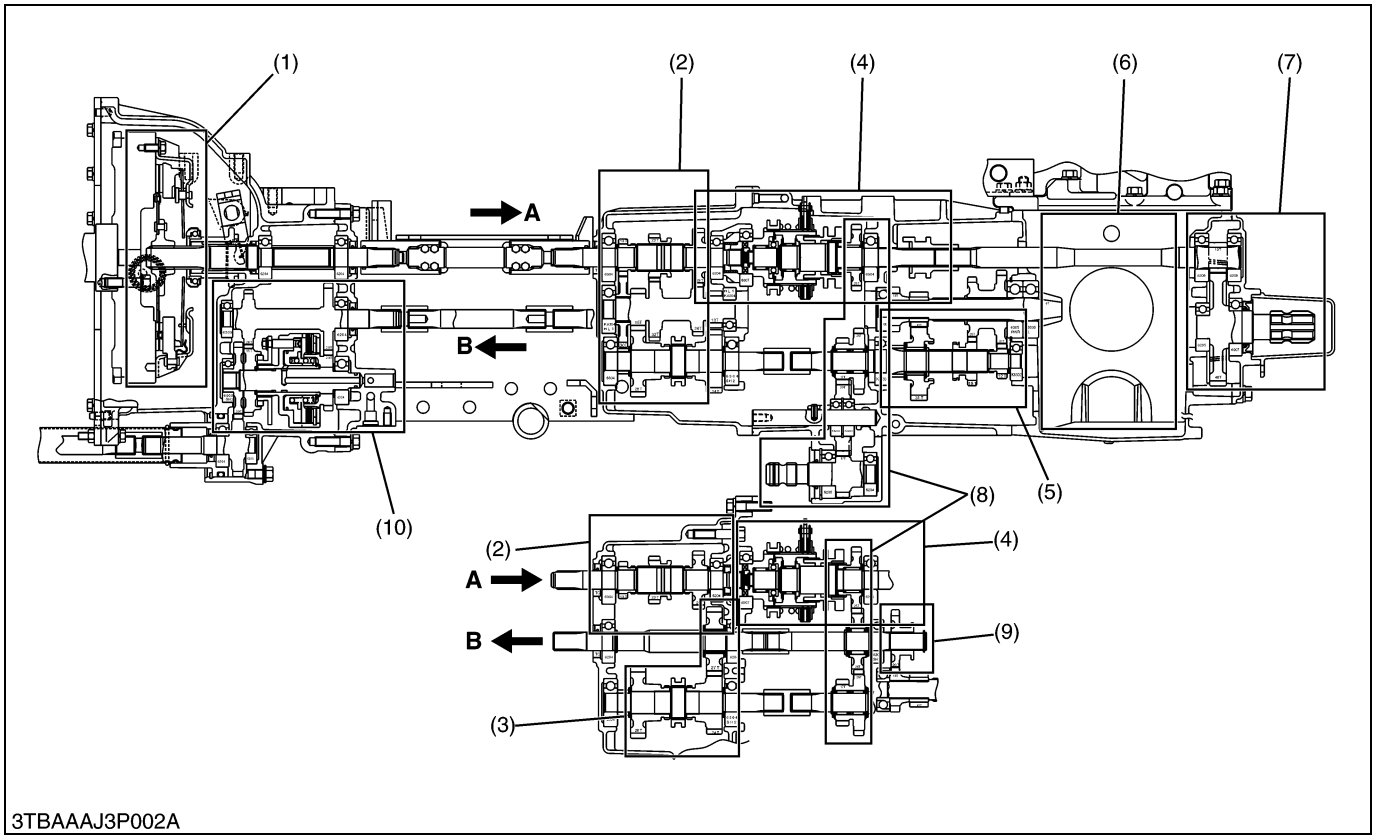
[1] MANUAL TRANSMISSION (WITHOUT BI-SPEED TURN MODEL)



(1) Main Clutch Section
(2) Main Gear Shift Section
(3) Shuttle Shift Section
(4) Mechanical PTO Clutch Section
(5) Range Gear Shift Section
(6) Differential Gear Section
(7) Rear PTO Gear Section
(8) Mid-PTO Gear Section
(9) Front Wheel Drive Gear Section

A : From Front Case
B : To Front Axle

[2] MANUAL TRANSMISSION (WITH BI-SPEED TURN MODEL)

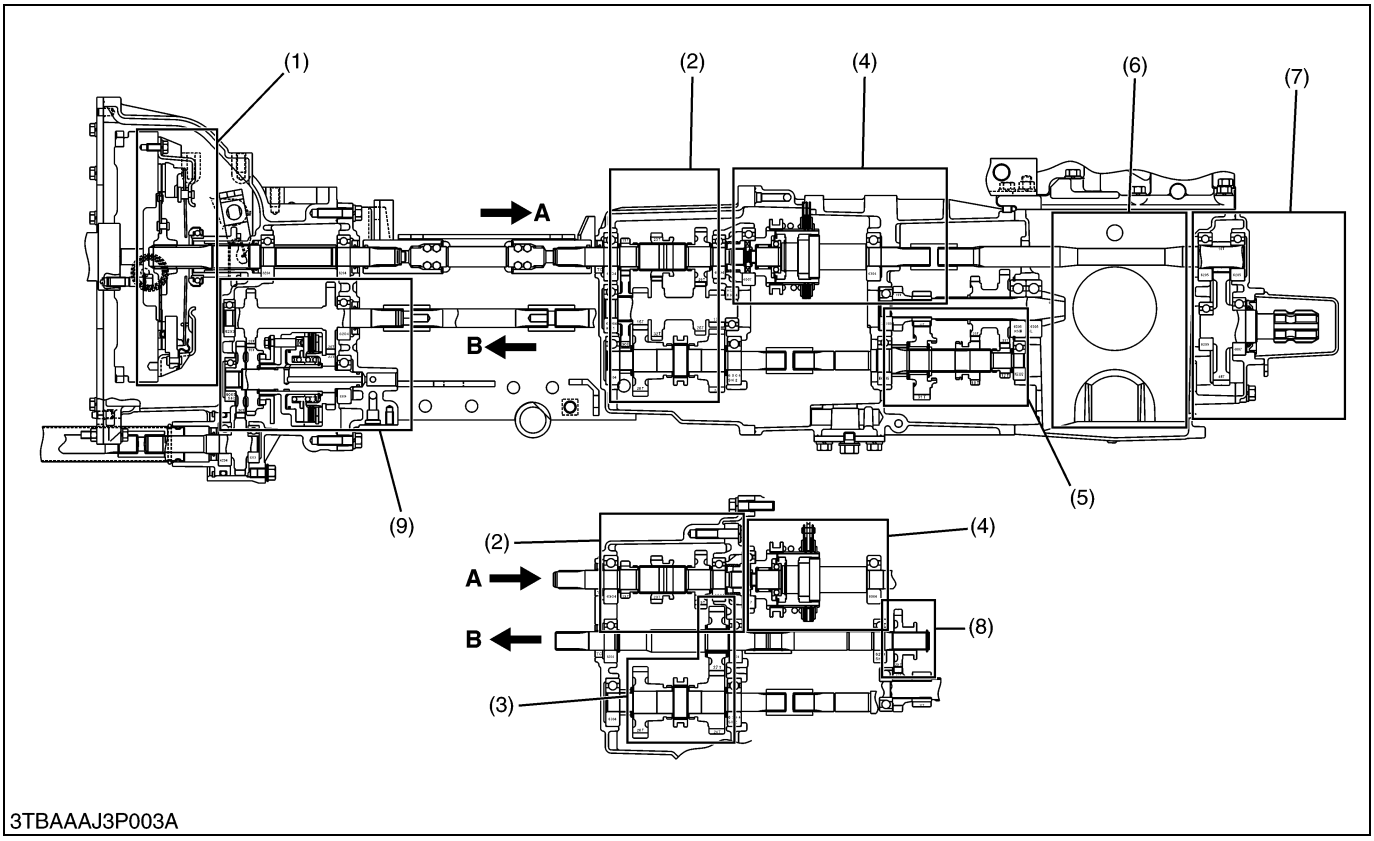


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(1) Main Clutch Section
(2) Main Gear Shift Section
(3) Shuttle Shift Section
(4) Mechanical PTO Clutch Section
(5) Range Gear Shift Section
(6) Differential Gear Section
(7) Rear PTO Gear Section
(8) Mid-PTO Gear Section
(9) Front Wheel Drive Gear Section
(10) Bi-Speed Turn Gear Section

A : From Front Case
B : To Bi-Speed Turn Gear Section

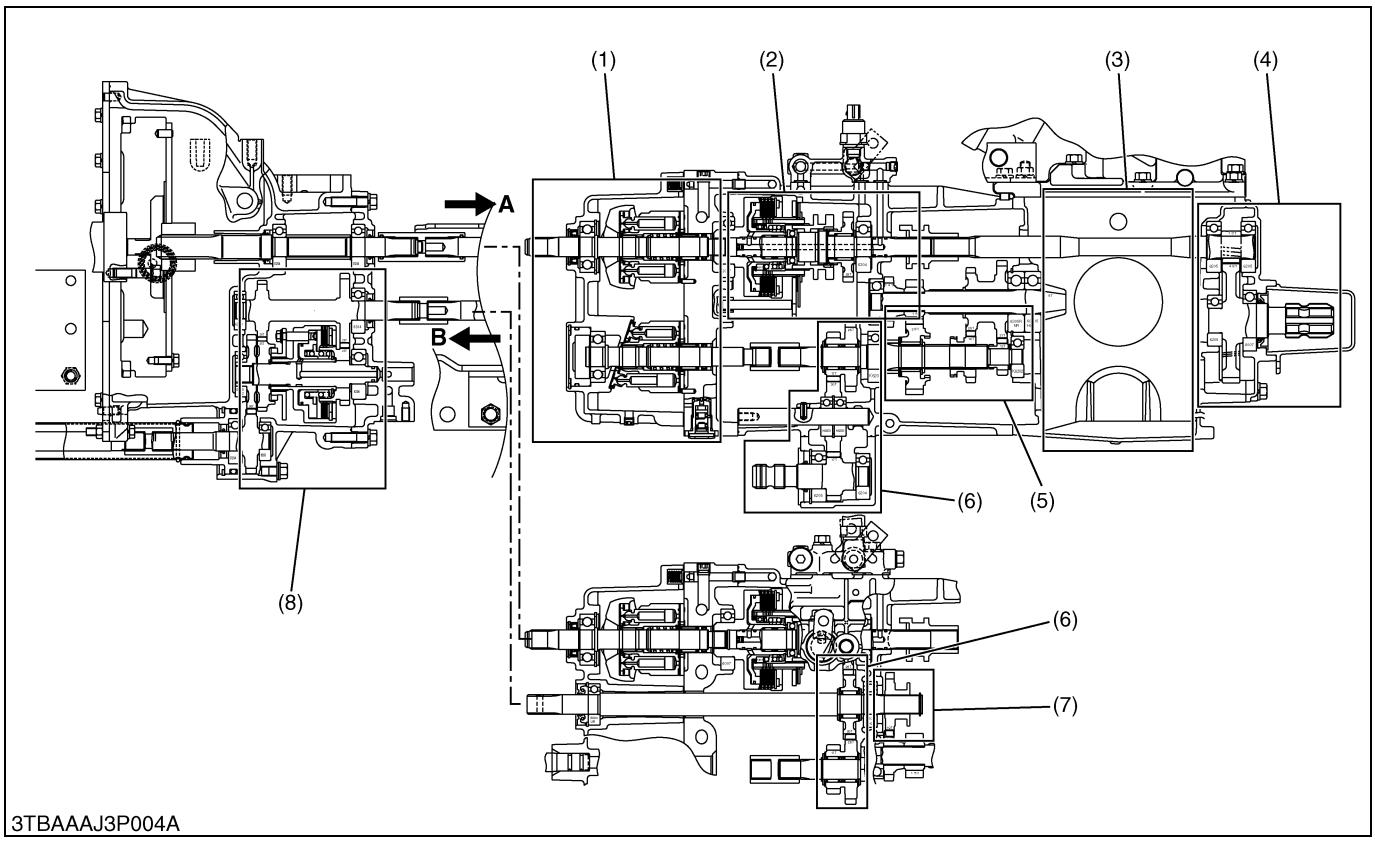
[3] MANUAL TRANSMISSION (WITH BI-SPEED TURN AND WITHOUT MID-PTO MODEL)



(1) Main Clutch Section
(2) Main Gear Shift Section
(3) Shuttle Shift Section
(4) Mechanical PTO Clutch Section
(5) Range Gear Shift Section
(6) Differential Gear Section
(7) Rear PTO Gear Section
(8) Front Wheel Drive Gear Section
(9) Bi-Speed Turn Gear Section

A : From Front Case
B : To Bi-Speed Turn Gear Section

[4] HST (WITH BI-SPEED TURN MODEL)

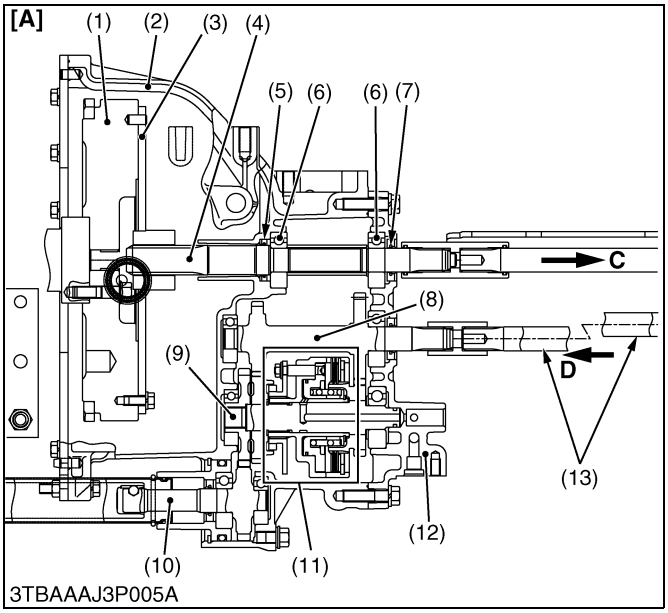


(1) Hydrostatic Transmission (HST) Section
(2) Hydrostatic PTO Section
(3) Differential Gear Section
(4) Rear PTO Gear Section
(5) Range Gear Section
(6) Mid-PTO Gear Section
(7) Front Wheel Drive Gear Section
(8) Bi-Speed Turn Gear Section

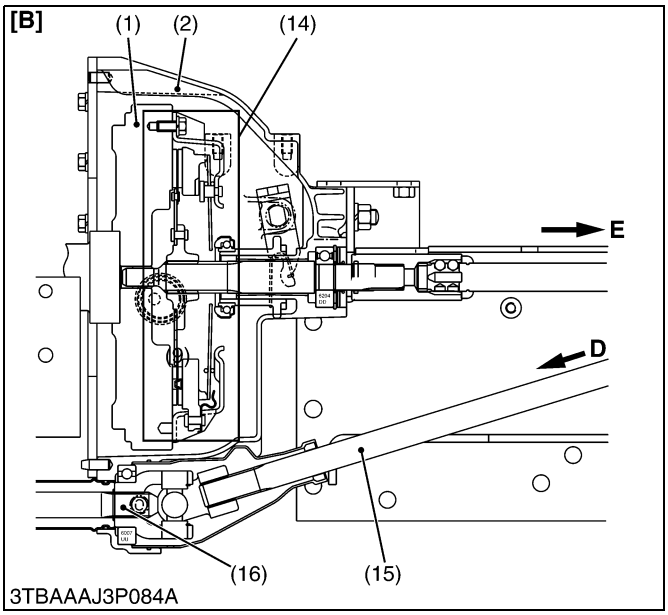
A : From Front Case
B : To Bi-Speed Turn Gear Section

2. FRONT CASE

[1] STRUCTURE (HST WITH BI-SPEED TURN MODEL)



3TBAAAJ3P005A



3TBAAAJ3P084A

In this tractor, clutch disk is not installed.

The steel plate (3) is installed on the clutch shaft (4).

Power from the engine is transmitted through the steel plate (3) to the clutch shaft (4) and HST pump shaft.

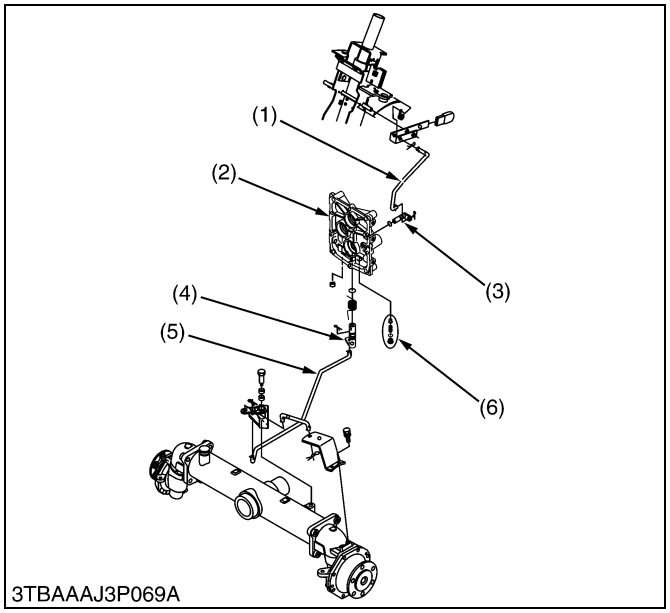
(1) Flywheel
(2) Clutch Housing
(3) Steel Plate
(4) Clutch Shaft
(5) Oil Seal
(6) Ball Bearing
(7) Oil Seal
(8) 28T-28T Front Wheel Drive Shaft 1
(9) Front Wheel Drive Shaft 2
(10) 24T Front Wheel Drive Shaft 3
(11) Bi-Speed Turn Clutch
(12) Front Mission Cover
(13) Propeller Shaft
(14) Main Clutch Section
(15) Propellar Shaft
(16) Propeller Shaft

[A] HST Model
[B] Manual Transmission Model (without Bi-Speed Turn)
C : To HST
D : From Front Wheel Drive Gear Section
E : To Transmission Case

W1014549

[2] BI-SPEED TURN LINKAGE

(1) Linkage



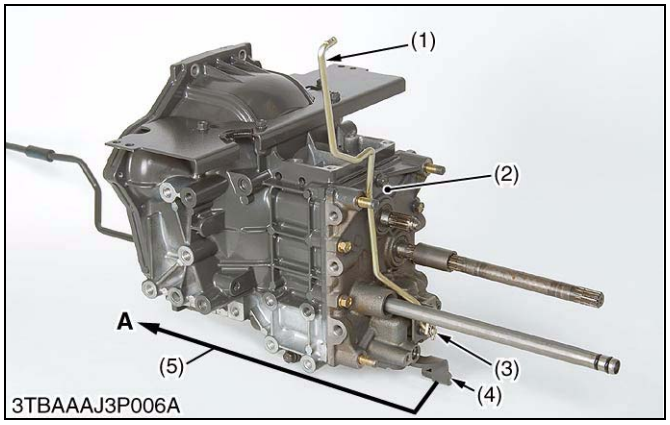
Bi-Speed Turn lever is connected to the Bi-Speed rod (1) and the Bi-Speed Turn ON/OFF shift shaft (3).

The left bevel gear case of the front axle is connected to the front Bi-Speed Turn shift shaft (4) with a Bi-Speed rod 2 (5).

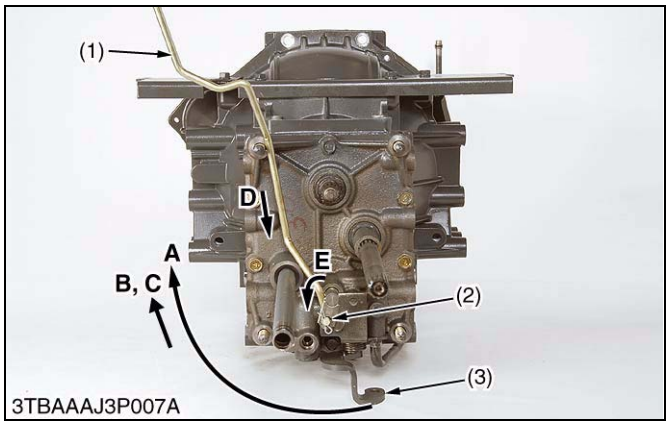
(1) Bi-Speed Rod 1
(2) Front Mission Cover
(3) Bi-Speed Turn ON/OFF Shift Shaft
(4) Bi-Speed Turn Shift Shaft
(5) Bi-Speed Rod 2

A : Connected to the Left Bevel Gear Case

W1016902



(2) Linkage : Bi-Speed Turn "Engaged"



When the Bi-Speed Turn lever is shifted to "**ON**" position, the Bi-Speed rod 1 (1) is pushed down and the Bi-Speed Turn ON/OFF shift shaft (2) is rotated counterclockwise. It is kept "**ON**".

When steering the steering wheel to "**Left**" or "**Right**", the Bi-Speed rod 2 connected to the left bevel gear case is pulled. The Bi-Speed Turn shift shaft (3) is rotated.

At this time, hydraulic oil from the pump port enter to the Bi-Speed clutch shaft through both the Bi-Speed Turn shift shaft (3) and the Bi-Speed ON/OFF shift shaft (2).

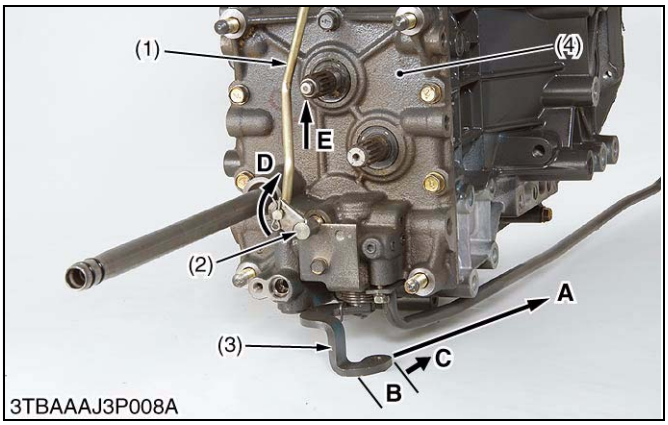
The Bi-Speed Turn is engaged.

(1) Bi-Speed Rod 1
(2) Bi-Speed Turn ON/OFF Shift Shaft
(3) Bi-Speed Turn Shift Shaft

A : Connected to the Left Bevel Gear Case
B : Left Turning
C : Right Turning
D : Bi-Speed Rod 1 "Engaged" Position
E : Bi-Speed Turn ON/OFF Shift Shaft "Engaged" Position

W1017733

(3) Linkage : Bi-Speed Turn “Disengaged”



When the Bi-Speed Turn lever is shifted to “**OFF**” position, the Bi-Speed rod 1 (1) is pushed up and the Bi-Speed Turn ON/OFF shift shaft (2) is rotated clockwise. It is kept ”**OFF**”.

When steering the steering wheel to “**Straight**”, the Bi-Speed rod 2 connected to the left bevel gear case is not pulled. The Bi-Speed Turn shift shaft (3) is kept to “**OFF**” position.

At this time, hydraulic oil from the pump port does not enter to the Bi-Speed Turn ON/OFF shift shaft.

The Bi-Speed Turn is disengaged.

(1) Bi-Speed Rod 1
(2) Bi-Speed Turn ON/OFF Shift Shaft
(3) Bi-Speed Turn Shift Shaft

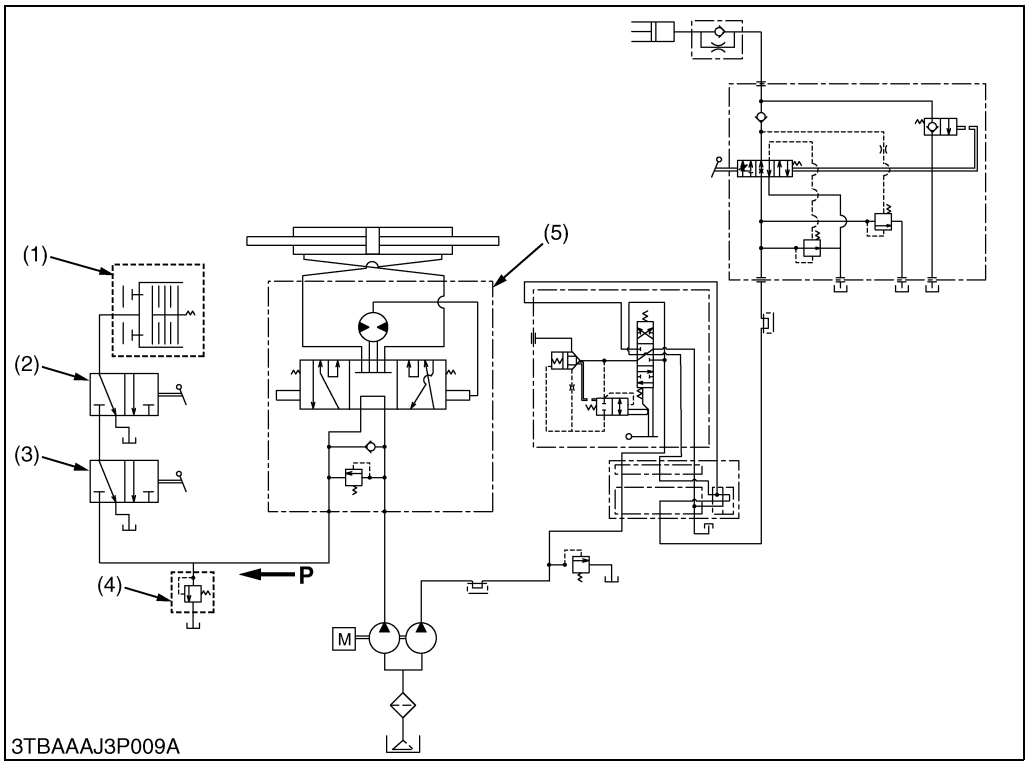
A : Connected to the Left Bevel Gear Case
B : “OFF” Position
C : “Engaged” Position
D : Bi-Speed Turn ON/OFF Shift Shaft “Disengaged” Position
E : Bi-Speed Rod 1 “Disengaged” Position

W1017498

[3] BI-SPEED TURN POWERTRAIN

(1) HYDRAULIC CIRCUIT

■ Manual Transmission Model

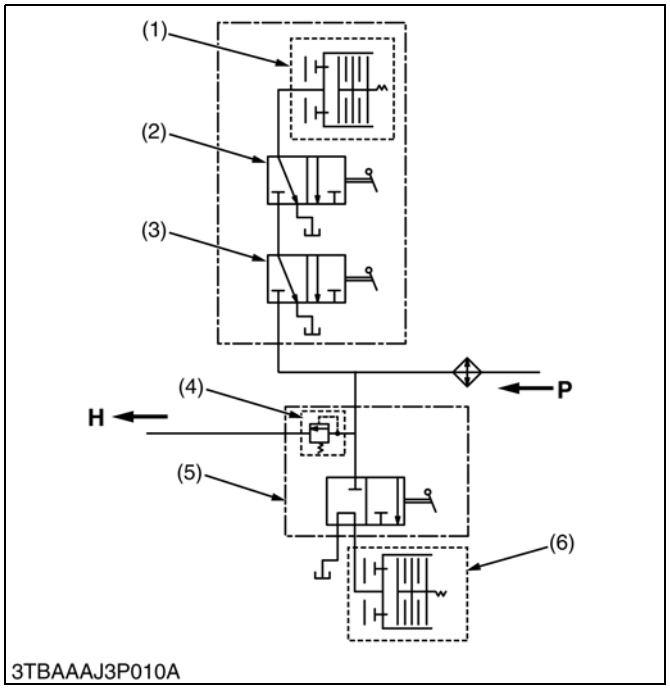


(1) Bi-Speed Turn Clutch
(2) Bi-Speed Turn Valve 2
(3) Bi-Speed Turn Valve 1
(4) Regulating Valve
(5) Power Steering Controller

P : From Pump Port

W1022896

■ HST Model

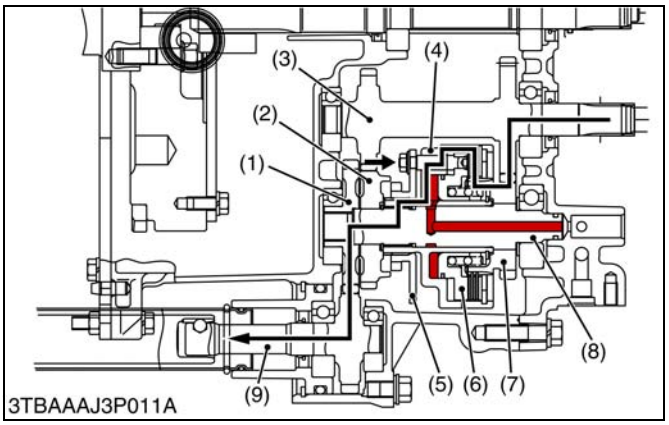


(1) Bi-Speed Turn Clutch
(2) Bi-Speed Turn Valve 2
(3) Bi-Speed Turn Valve 1
(4) Regulating Valve
(5) Independent PTO Valve
(6) Independent PTO Clutch

P : From Pump Port
H : To HST

W1018532

(2) Bi-Speed Turn "Engaged"



When a operator engage the Bi-Speed Turn lever to "**ON**" position and the front wheel steering angle is above approximately 0.714 rad (42°), the Bi-Speed Turn engages.

At the time, since both the Bi-Speed Turn valve 1 and the Bi-Speed Turn valve open, the pressured oil enter into the Bi-Speed Turn clutch shaft (8).

The pressured oil push the piston in the Bi-Speed Turn clutch, and the shifter (5) connected to the piston (6) slides into the Bi-Speed Turn clutch pack.

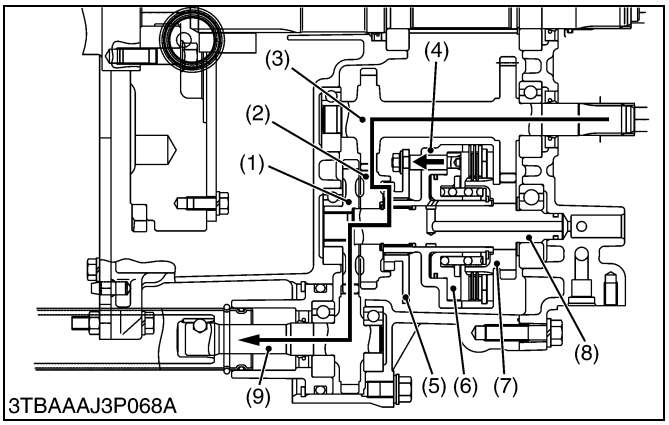
The shifter does not mesh to the 35T gear (2).

The power is transmitted from the front wheel drive shaft 1 (28T-28T) (3) through the 23T Bi-Speed Turn gear (7), the Bi-Speed Turn clutch pack, and the shifter (5) to the Bi-Speed Turn clutch shaft (8), and to the 30T gear (1) and to the front drive shaft 3 (24T) (9).

(1) 30T Gear
(2) 35T Gear
(3) 28T-28T Front Wheel Drive Shaft 1
(4) Bi-Speed Turn Clutch Case
(5) Shifter
(6) Piston
(7) 23T Bi-Speed Turn Gear
(8) Bi-Speed Turn Clutch Shaft (Front Wheel Drive Shaft 2)
(9) 24T Front Wheel Drive Shaft 3

W1018672

(3) Bi-Speed Turn "Disengaged"



When the front wheel steering angle is below 0.714 rad (42 °), the Bi-Speed Turn is disengaged.

Since the pressurized oil is not delivered into the Bi-Speed Turn clutch pack, the shifter is pushed out to the 35T gear (2).

The shifter meshes to the 35T gear (2).

The power is transmitted as follows.

Front wheel drive shaft (28T-28T) (3) → 35T gear (2) → shifter (5) → Bi-Speed Turn clutch shaft (8) → 30T gear (1) →front drive shaft (24T) (9).

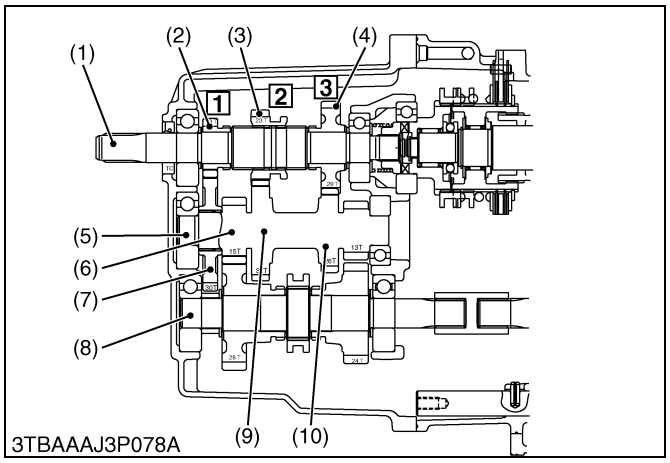
(1) 30T Gear
(2) 35T Gear
(3) 28T-28T Front Wheel Drive Shaft 1
(4) Bi-Speed Turn Clutch Case
(5) Shifter
(6) Piston
(7) 23T Bi-Speed Turn Gear
(8) Bi-Speed Turn Clutch Shaft (Front Wheel Drive Shaft 2)
(9) 24T Front Wheel Drive Shaft 3

W1019096

3. MANUAL TRANSMISSION

[1] STRUCTURE

(1) Main Gear Shift Section



Main shift section consists of three speeds.

■ **1st Speed Gear**

The 23T F2 gear (shifter) (3) slides to the engine side.

The 23T F2 gear (shifter) (3) meshes to the 13T F1 gear (2).

The power is transmitted as follows.

First shift shaft (1) → 23T F2 gear (shifter) (3) → 13T F1 gear (2) → 30T F1 gear (7) → 15T-32T-26T-13T shaft (5).

■ **2nd Speed Gear**

The 23T F2 gear (shifter) (3) meshes to the 32T gear (9) of the 15T-32T-26T-13T shaft (5).

The power is transmitted as follows.

First shift shaft (1) → 23T F2 gear (shifter) (3) → 32T gear (9) / 15T-32T-26T-13T shaft (5).

■ **3rd Speed Gear**

The 23T F2 gear (shifter) (3) slides to the mechanical PTO clutch side.

The 23T F2 gear (shifter) (3) meshes to the 29T F3 gear (4).

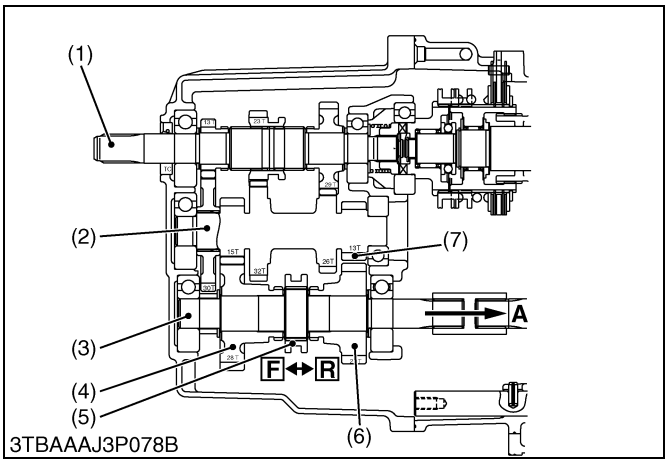
The power is transmitted as follows.

First shift shaft (1) → 23T F2 gear (shifter) (3) → 29T F3 gear (4) → 26T gear (10) / 15T-32T-26T-13T shaft (5).

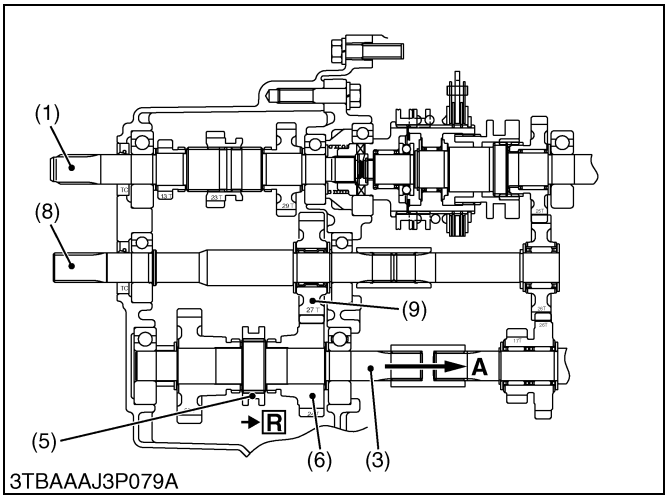
(1) First Shift Shaft
(2) 13T F1 Gear
(3) 23T F2 Gear (Shifter)
(4) 29T F3 Gear
(5) 15T-32T-26T-13T Shaft
(6) 15T Gear
(7) 30T F1 Gear
(8) Shuttle Shaft
(9) 32T Gear
(10) 26T Gear

W1019380

(2) Shuttle Gear Shift Section



3TBAAAJ3P078B



3TBAAAJ3P079A

The power shifted in the main gear shift section is transmitted from the 15T-32T-26T-13T shaft (2) to the shuttle shaft (3).

The shuttle shift gears are the sliding mesh gears.

The reverse shaft is the front wheel drive shaft (8).

The 27T gear (9) on the front wheel drive gear (8) is a reverse gear.

■ **Forward**

When shifting the shuttle lever to "**Forward**", the shifter (5) slides to the 28T gear side.

The shifter (5) meshes to the 28T gear (4).

The power is transmitted as follows.

15T-32T-26T-13T shaft (2) / 15T gear (2) → 28T gear (4) → shifter (5) → shuttle shaft → Hi-Low range gear section.

■ **Reverse**

When shifting the shuttle lever to "**Reverse**", the shifter (5) slides to the 24T gear side.

The shifter is transmitted as follows.

15T-32T-26T-13T shaft (2) / 13T gear (7) → 27T gear (9) on the front wheel drive shaft (8) → 24T gear (6) → shifter (5) → shuttle shaft (3) → High-low range gear section.

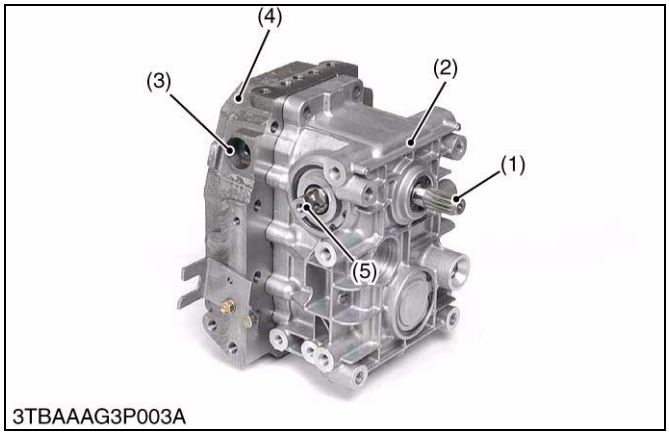
(1) First Shift Shaft
(2) 15T-32T-26T-13T Shaft
(3) Shuttle Shaft
(4) 28T Gear
(5) Shifter
(6) 24T Gear
(7) 13T Gear
(8) Front Wheel Drive Shaft
(9) 27T Gear

F : Forward
R : Reverse
A : To High-Low Range Gear Section

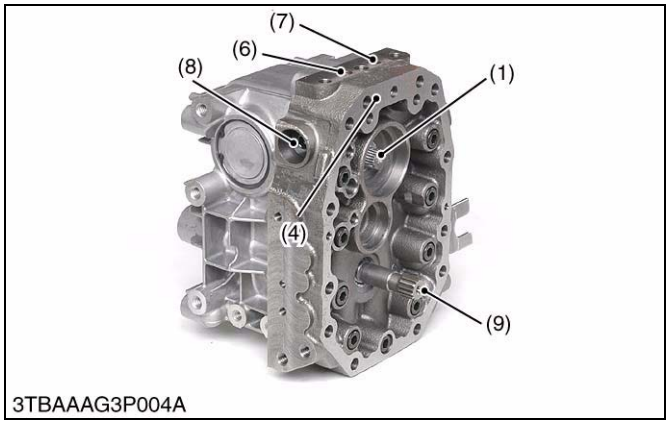
W1020488

4. HYDROSTATIC TRANSMISSION

[1] STRUCTURE



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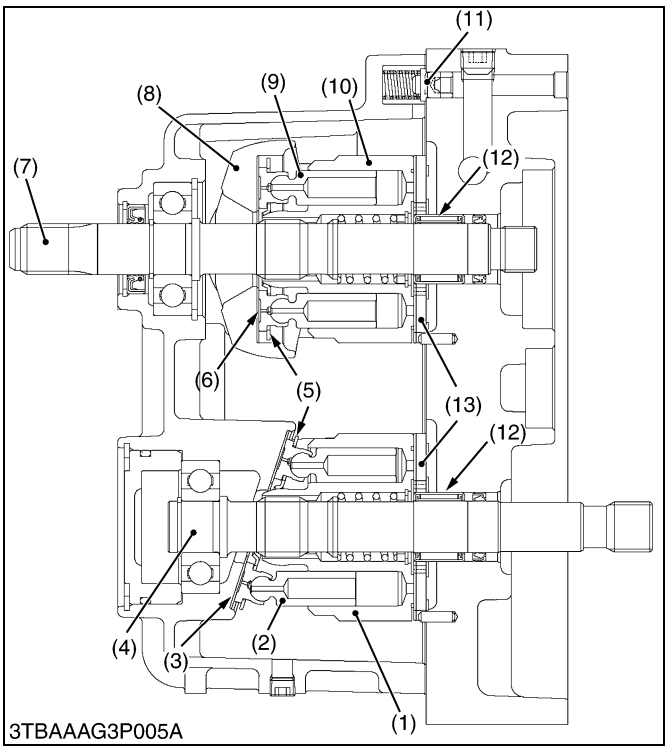


3TBAAAG3P004A

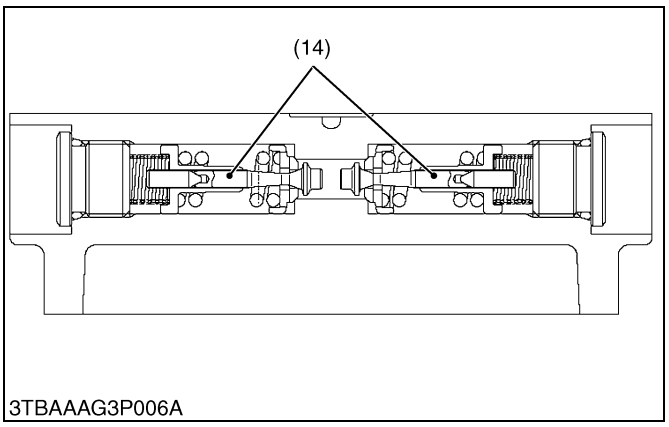
Hydrostatic transmission is composed of variable displacement piston pump, fixed displacement piston motor and valve system.

(1) Input Shaft (Pump Shaft)
(2) Housing
(3) Check and High Pressure Relief Valve (Reverse)
(4) Center Section
(5) Trunnion Shaft
(6) Check Port
(7) Check Port
(8) Check and High Pressure Relief Valve (Forward)
(9) Output Shaft (Motor Shaft)

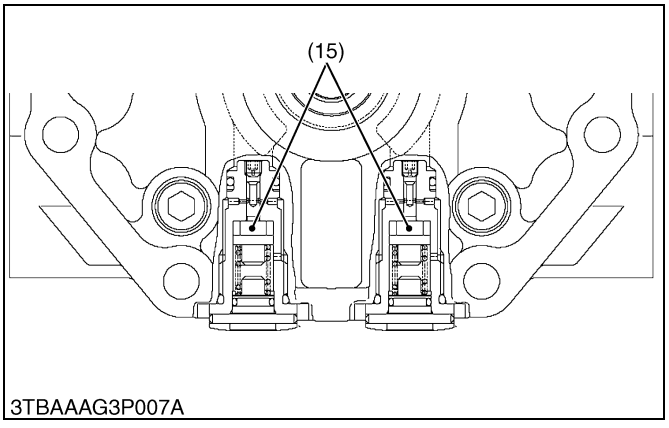
W1013136



3TBAAAG3P005A



3TBAAAG3P006A

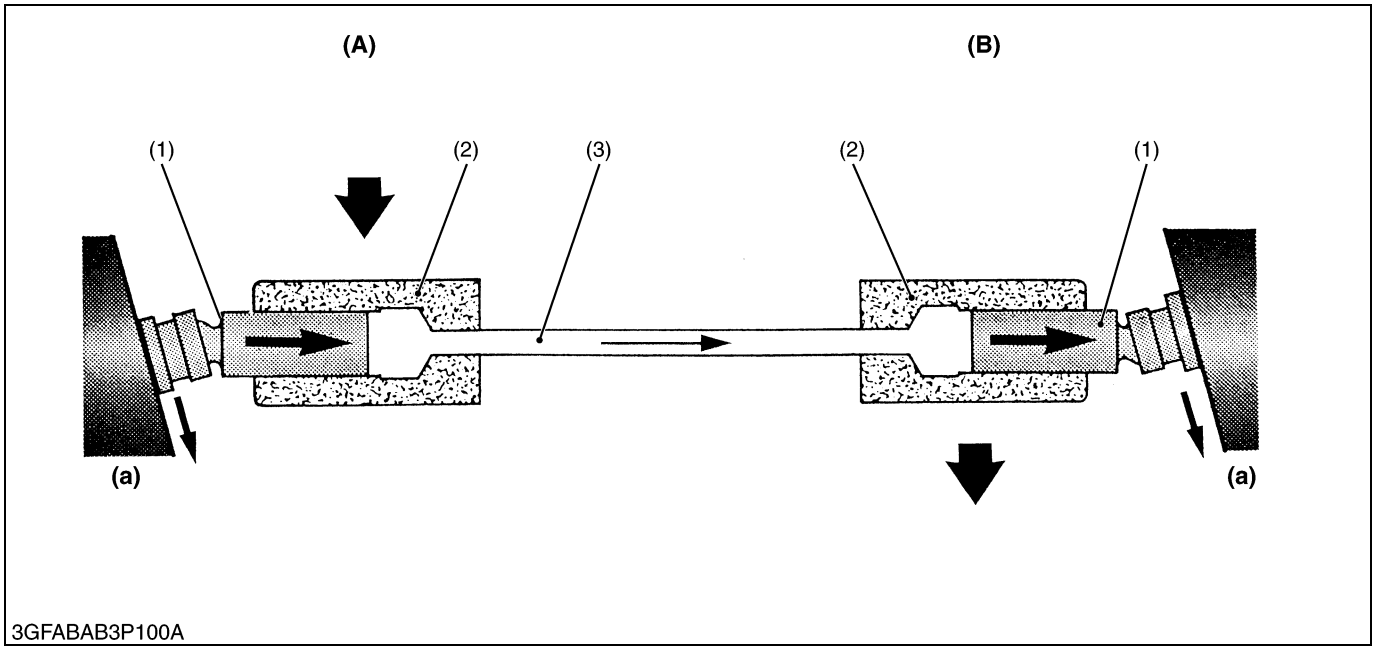


3TBAAAG3P007A

(1) Cylinder Block (Motor)
(2) Piston
(3) Thrust Collar
(4) Motor Shaft
(5) Retainer Plate
(6) Thrust Collar
(7) Pump Shaft
(8) Variable Swashplate
(9) Piston
(10) Cylinder Block (Pump)
(11) Charge Relief Valve
(12) Needle Bearing
(13) Valve Plate
(14) Check and High Pressure Relief Valve
(15) Neutral Valve

W1013416

[2] PUMP AND MOTOR



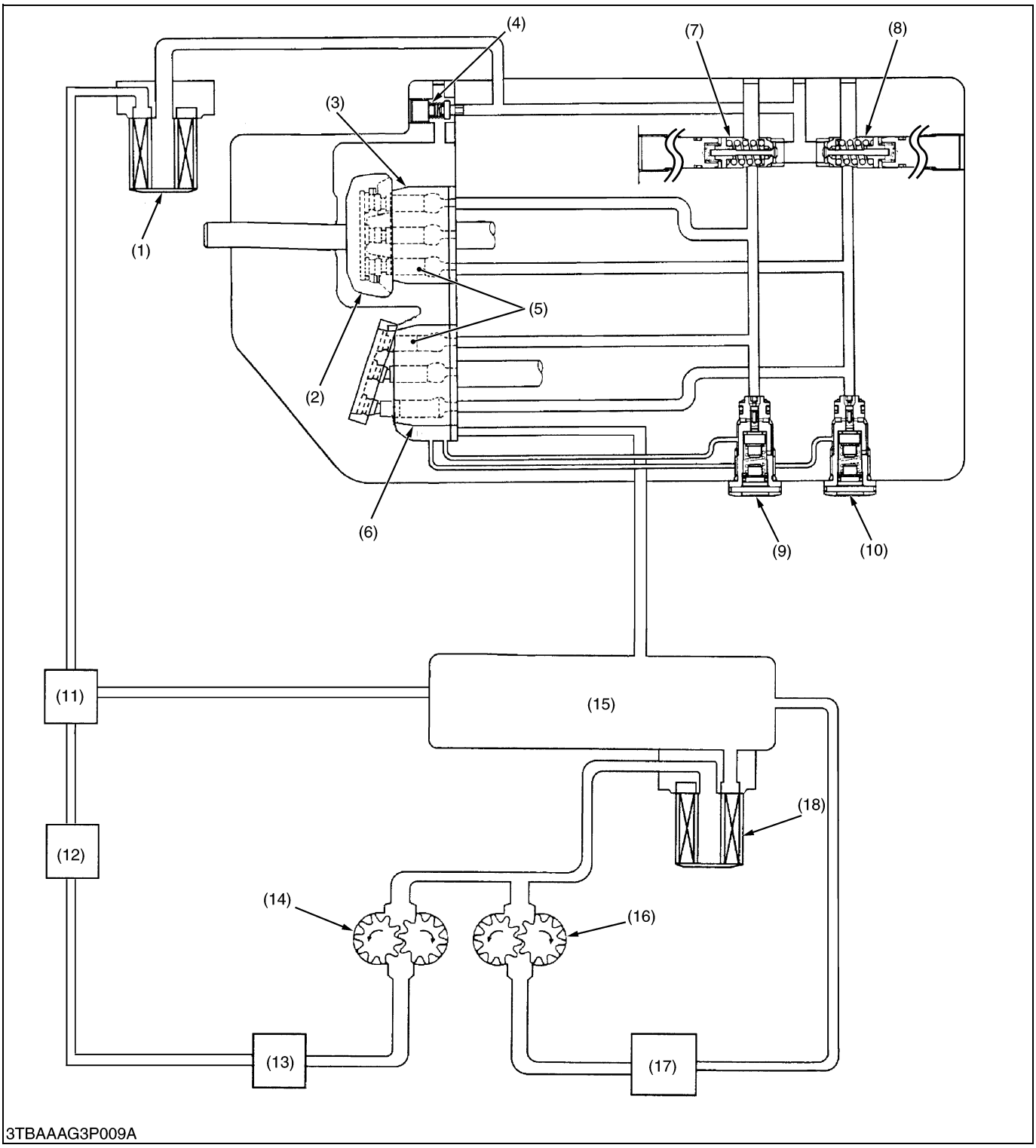
(1) Piston
(2) Cylinder
(3) Oil
(A) Pump
(B) Motor
(a) Swashplate

Pump and motor cylinder, each containing pistons, are connected by lines. Cylinders and lines are filled with oil piston ride against swashplates located in pump and motor.

In the pump, as the cylinder rotates, pistons move across the sloping face of swashplate and slide in or out of their cylinder bores. The oil forced out by the pump pistons, causes the motor pistons to slide out of their cylinder bores.

In the motor, sliding out of the cylinder and moving across the sloping face of swashplate, the pistons rotate the cylinder.

[3] OIL FLOW AND VALVES



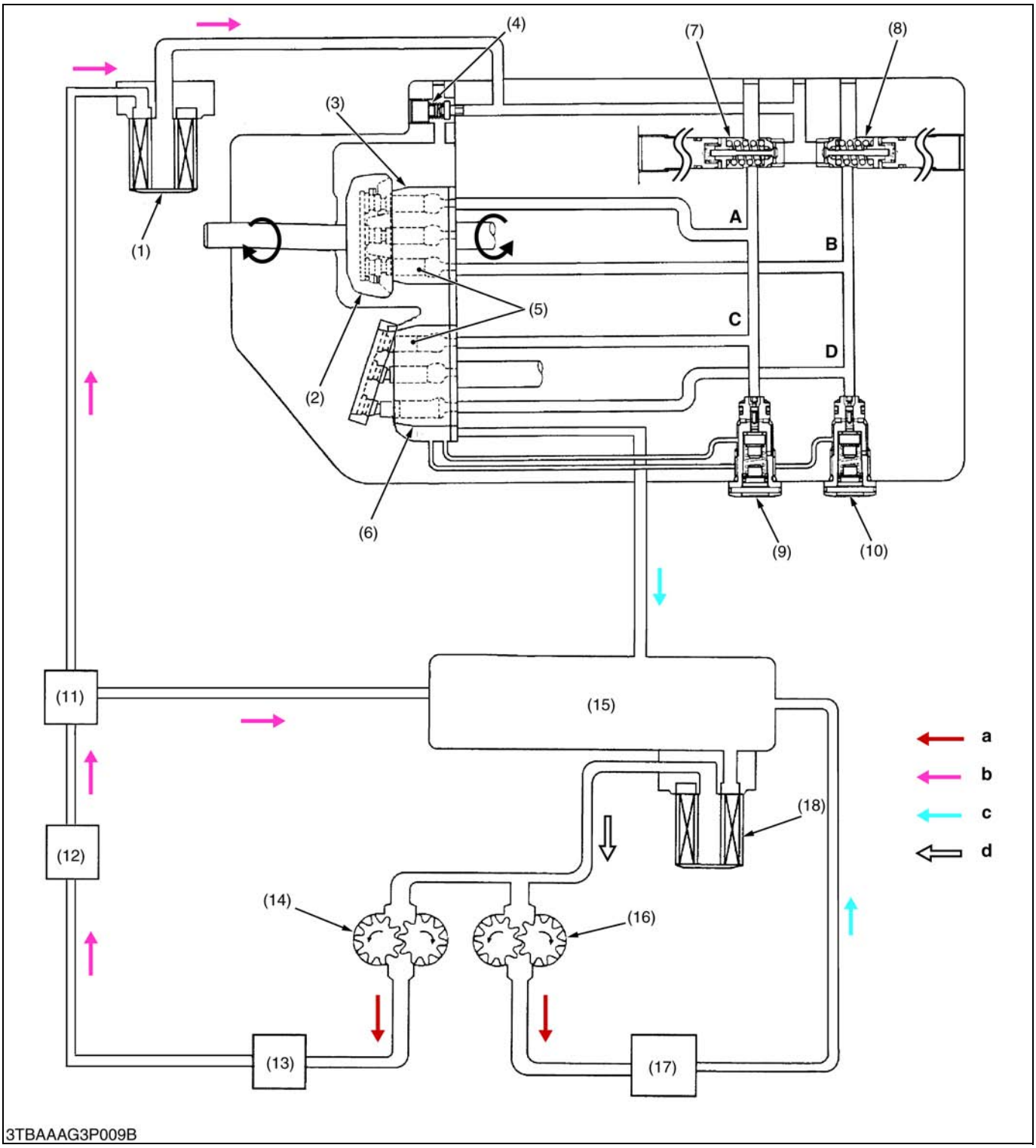
(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Hydraulic Control Valve (for 3-points Hitch)
(18) Oil Filter Cartridge

The pump and the motor are joined in a closed hydraulic circuit. Most of oil circulates with in the main oil circuit. A little oil lubricates and oozes out from the clearance between the moving parts in the case. Then oil in the main oil circuit of the HST needs to be supplied a want.

So all of oil fed from hydraulic pump flow to hydraulic transmission for charging and cooling.

The charge oil aids smooth operation of pistons for pump and motor. The charge oil passed to charge relief valve port. The rest of oil passed through the charge relief valve into the HST housing. And overflow oil from HST housing return to the transmission case.

■ Neutral



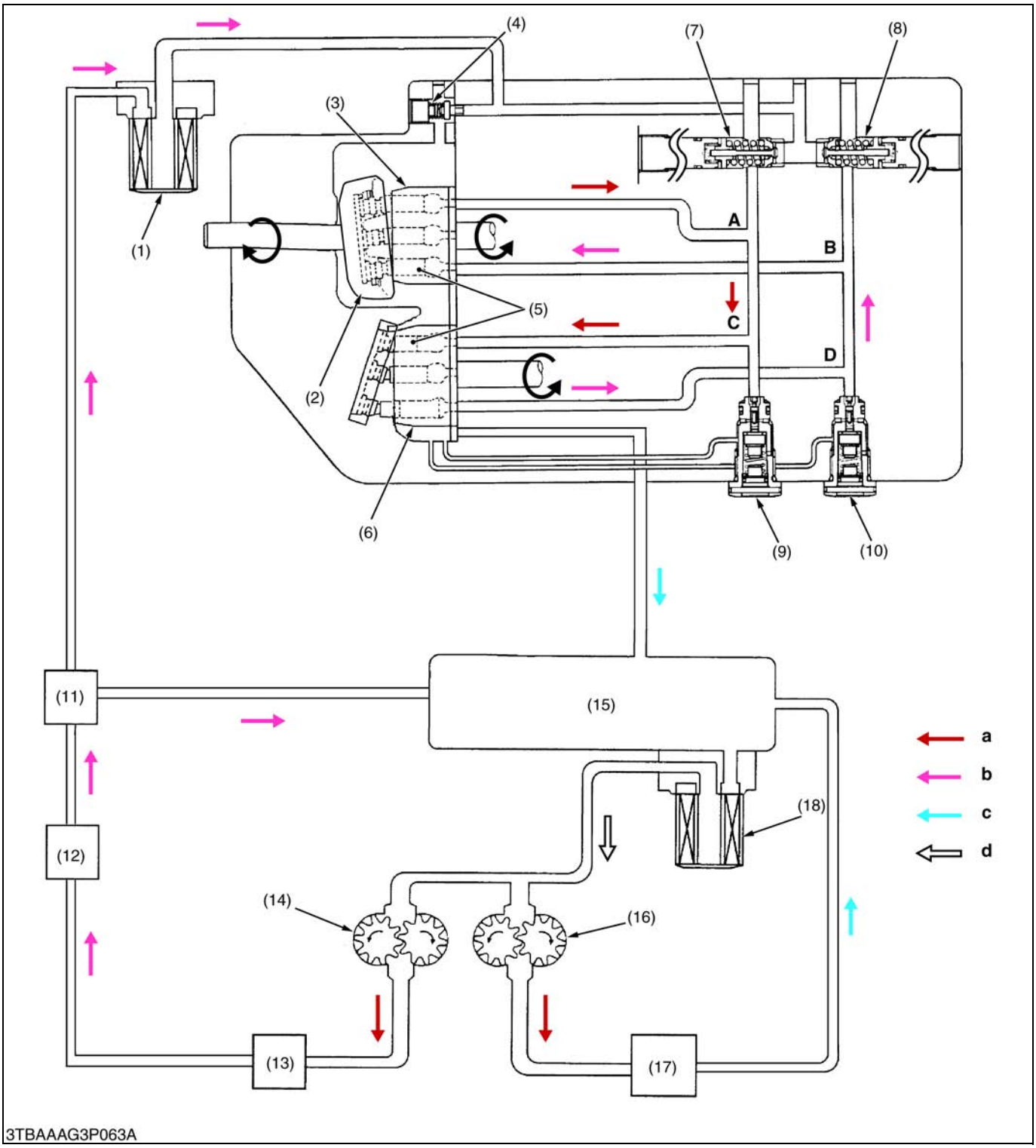
(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Hydraulic Control Valve (for 3-points Hitch)
(18) Oil Filter Cartridge

A : Pump A Port
B : Pump B Port
C : Pump C Port
D : Pump D Port
a : High Pressure Oil
b : Low Pressure Oil
c : Free Oil
d : Suction Oil

When the speed control pedal is in **"Neutral"**, the variable swashplate is right-angles to the pump pistons. And the pump pistons only rotate with cylinder block (pump) without reciprocating.

Since the oil is not being pumped to the motor, the cylinder block (motor) is stationary. And the output shaft does not rotate.

■ Forward



(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Hydraulic Control Valve (for 3-points Hitch)
(18) Oil Filter Cartridge

A : Pump A Port
B : Pump B Port
C : Pump C Port
D : Pump D Port
a : High Pressure Oil
b : Low Pressure Oil
c : Free Oil
d : Suction Oil

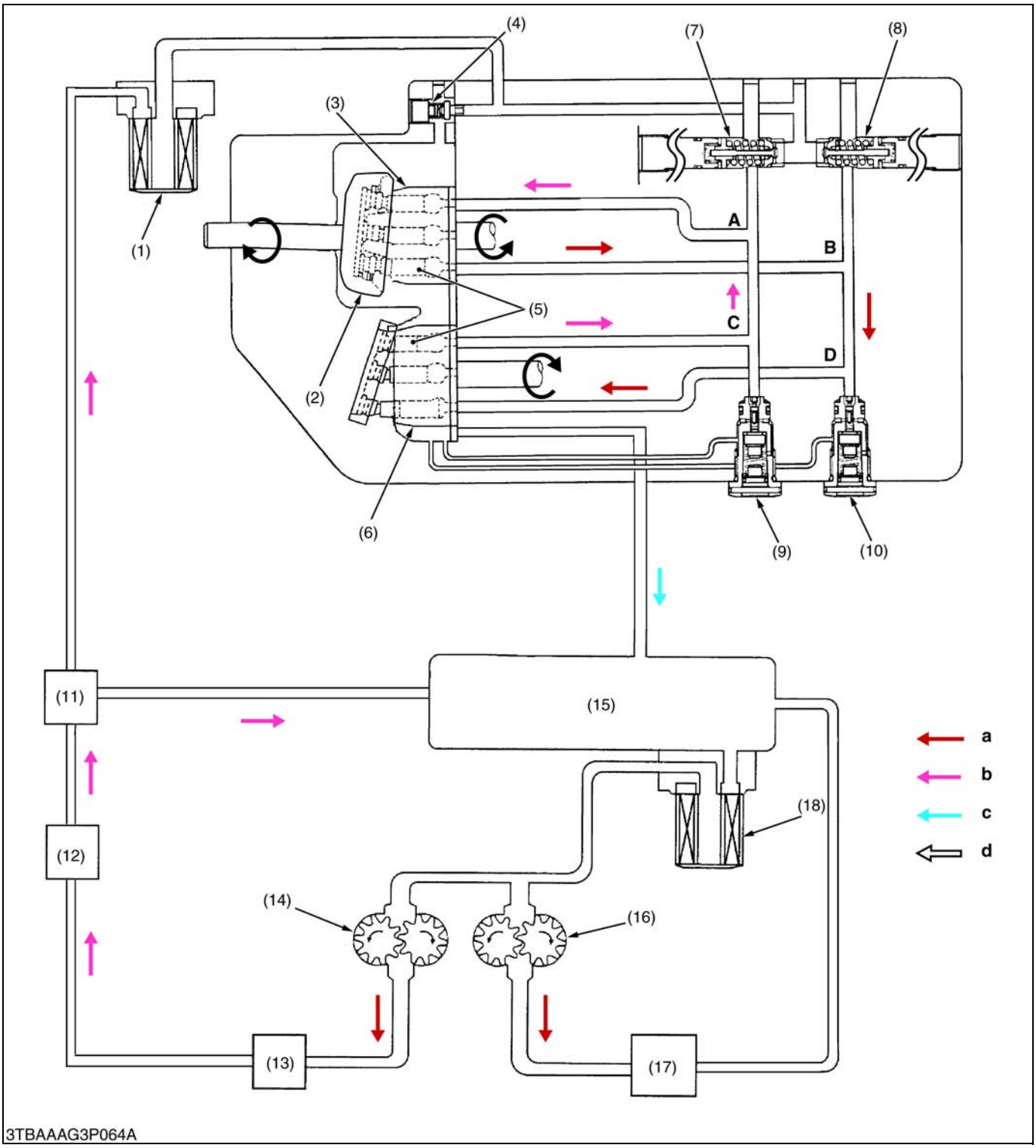
When the speed control pedal is stepped on and set to **"Forward"**, the variable swashplate is tilted as shown in figure above.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **A** at high pressure. As pressure oil from the pump cylinder block enters to motor port **C**, the pistons, which align with port **C**, are pushed against the swashplate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine forward and the angle of pump swashplate determines the output speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **D** at low pressure and retunes to the pump port **B**.

■ Reverse



(1) Oil Filter Cartridge (for HST)
(2) Swashplate
(3) Cylinder Block (for Pump)
(4) Charge Relief Valve
(5) Piston
(6) Cylinder Block (for Motor)
(7) Check and High Pressure Relief Valve (for Forward)
(8) Check and High Pressure Relief Valve (for Reverse)
(9) Neutral Valve (for Forward)
(10) Neutral Valve (for Reverse)
(11) Independent PTO Control Valve
(12) Oil Cooler
(13) Power Steering
(14) Hydraulic Pump (for Power Steering, Independent PTO, HST)
(15) Oil Tank
(16) Hydraulic Pump (for 3-points Hitch)
(17) Hydraulic Control Valve (for 3-points Hitch)
(18) Oil Filter Cartridge

A : Pump A Port
B : Pump B Port
C : Pump C Port
D : Pump D Port
a : High Pressure Oil
b : Low Pressure Oil
c : Free Oil
d : Suction Oil

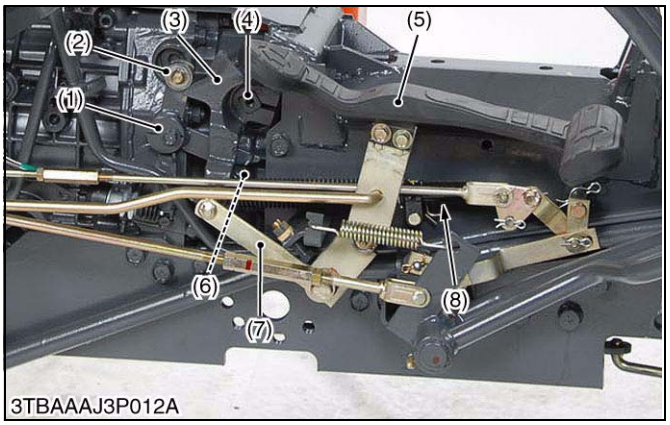
When the speed control pedal is stepped on and set to **"Reverse"**, the variable swashplate is tilted as shown in figure above.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **B** at high pressure. As pressure oil from the pump cylinder block enters to motor port **D**, the pistons, which align with port **D**, are pushed against the swashplate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine reward and the angle of pump swashplate determines the output speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **C** at low pressure and retunes to the pump port **A**.

[4] CONTROL LINKAGE



The HST pedal (5) and the trunnion shaft (4) of the variable swashplate are linked with the speed control rod (7) and the neutral holder (3). As the front footrest of the HST pedal (5) is depressed, the swashplate rotates and forward travelling speed increases. Depressing the rear footrest increases reverse travelling speed.

The roller (2) on the neutral holder arm (1) is held with spring seats and the detent of the neutral holder (3) so that the neutral holder (3) returns to neutral. When the pedal is released, the swashplate is returned to neutral with the neutral holder (3). The damper (8) connected to the HST pedal (5) restricts the movement of the linkage to prevent abrupt operation or reversing.

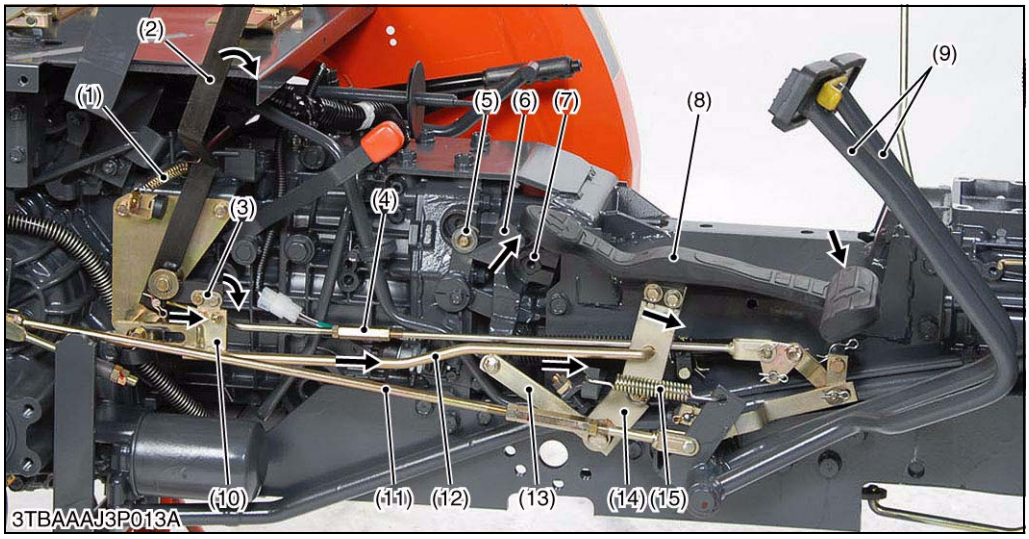
(1) Neutral Arm
(2) Roller
(3) Neutral Holder
(4) Trunnion Shaft
(5) HST Pedal
(6) Spring
(7) Speed Control Rod (HST)
(8) Damper

W1015444

5. CRUISE CONTROL

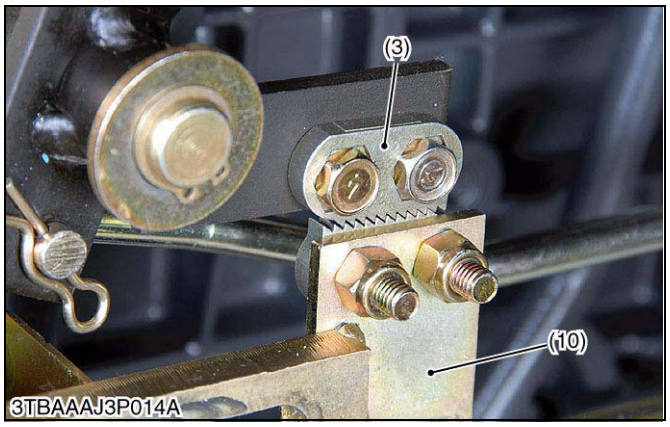
[1] CRUISE CONTROL LINKAGE

(1) Cruise Control "ON" Position



(1) Return Spring
(2) Cruise Control Lever
(3) Cruise Lock 1
(4) Release Rod
(5) Roller
(6) Neutral Holder
(7) Trunnion Shaft
(8) HST Pedal
(9) HST Lever
(10) Cruise Lock 2
(11) Brake Rod
(12) Cruise Rod
(13) HST Plate
(14) HST Lever
(15) Brake Spring

W1021534

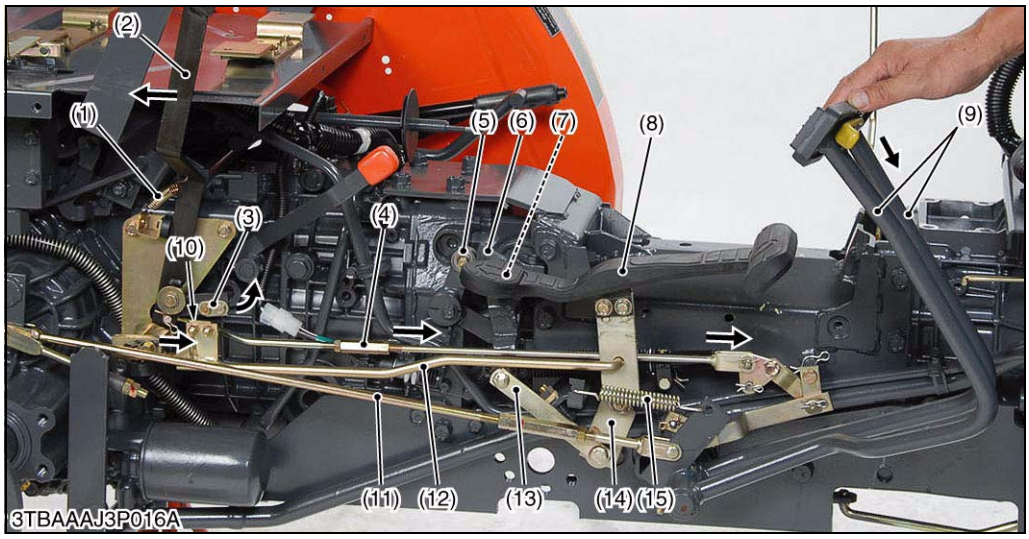


W1021859

When depressing the HST pedal (8) to "**Forward**", the HST lever (14), the cruise rod (12) and the cruise lock 2 (10) moves like the arrow shown in the pictures.

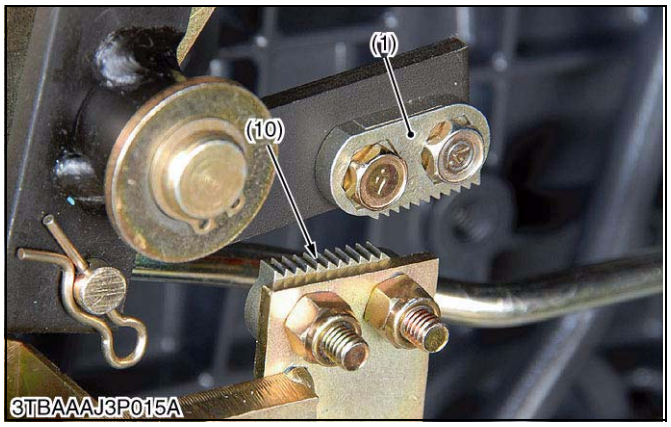
And when the cruise control lever (2) is set to the desired position, the cruise lock (1) is locked to the cruise lock 2 (10) and the travelling speed is held to the desired speed.

(2) Cruise Control “OFF” Position



(1) Return Spring
(2) Cruise Control Lever
(3) Cruise Lock 1
(4) Release Rod
(5) Roller
(6) Neutral Holder
(7) Trunnion Shaft
(8) HST Pedal
(9) HST Lever
(10) Cruise Lock 2
(11) Brake Rod
(12) Cruise Rod
(13) HST Plate
(14) HST Lever
(15) Brake Spring

W1022146



W1022303

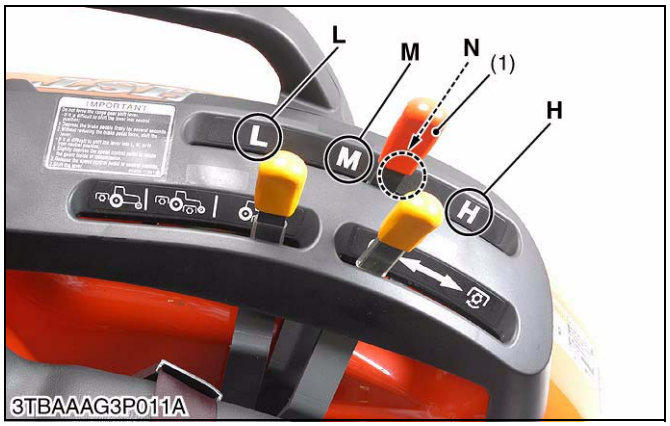
When depressing the brake pedals (9), the release rod (4), the cruise control lever (2) and the cruise lock 1 (3) moves like the arrows shown in the pictures.

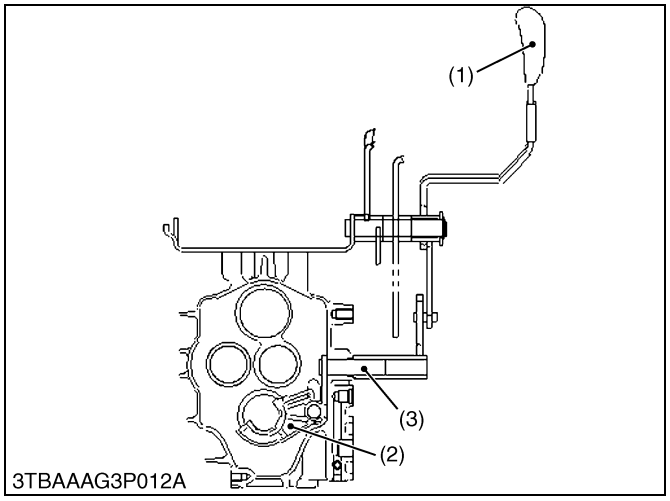
And the cruise lock 1 release from the cruise lock 2 (10).

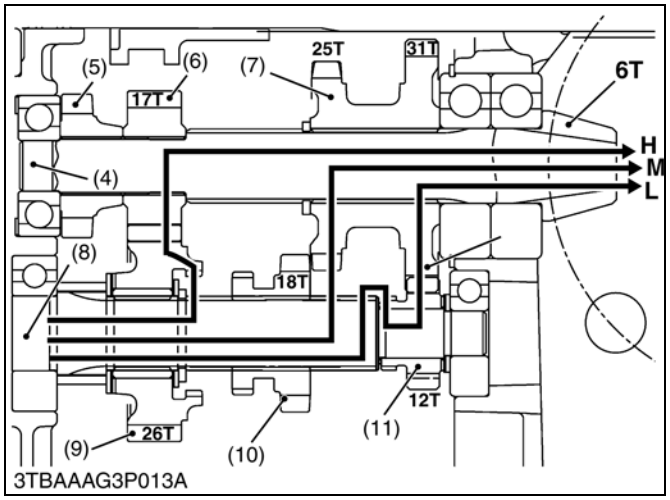
Cruise lock is changed from “**ON**” to “**OFF**” position.

Since the cruise lock is kept “**OFF**”, the neutral holder turns counterclockwise, and the roller is returned to “**Neutral**” position. The HST pedal (8) also returns to “**Neutral**“ position and the tractor stops.

6. RANGE GEAR SHIFT SECTION







Range gear shift lever (1) is located at left side fender.

Range gear shift lever (1) can select three speed range, low speed, mid speed and high speed.

Range gear shift lever (1) and 18T shifter gear (10) are linked with range shift arm (3) and range shift fork (2) etc..

Three range gear shifts are selected by shifting the 18T shifter gear (10) on the sub shaft (8) to 17T gear (6) and 25T - 31T gear (7) on 6T bevel pinion shaft (4)

■ **Low Speed Position**

Sub shaft (8) → 18T shifter gear (10) → 12T gear (11) → 31T of 25T - 31T gear (7) → 6T bevel pinion shaft (4).

■ **Middle Speed Position**

Sub shaft (8) → 18T shifter gear (10) → 25T of 25T - 31T gear (7) → 6T bevel pinion shaft (4).

■ **High Speed Position**

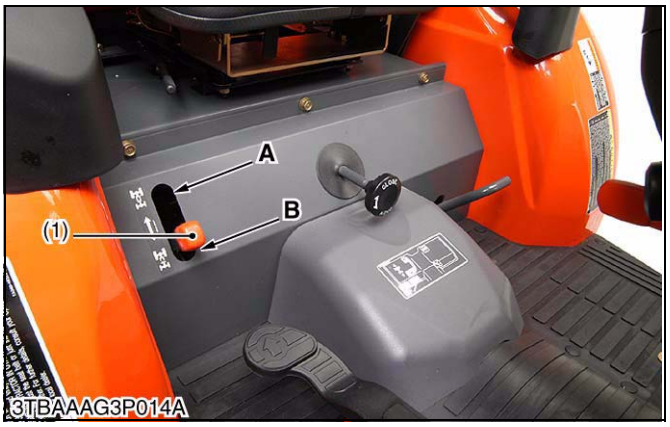
Sub shaft (8) → 18T shifter gear (10) → 26T gear (9) → 17T gear (6) → 6T bevel pinion shaft (4).

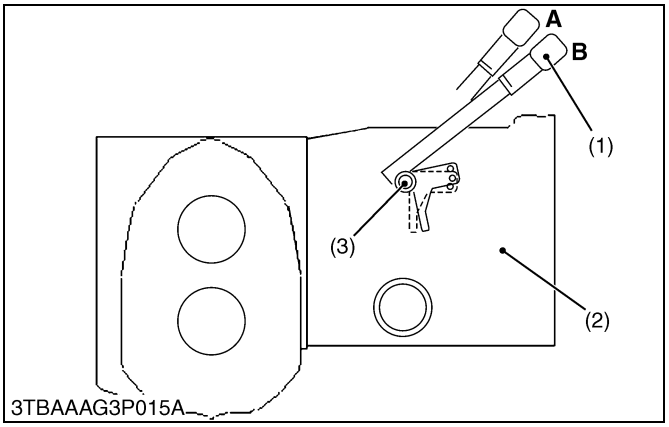
(1) Range Gear Shift Lever
(2) Range Shift Fork
(3) Range Shift Arm
(4) 6T Bevel Pinion Shaft
(5) 13T Gear (for Front Wheel Drive)
(6) 17T Gear
(7) 25T - 31T Gear
(8) Sub Shaft
(9) 26T Gear
(10) 18T Shifter Gear
(11) 12T Gear

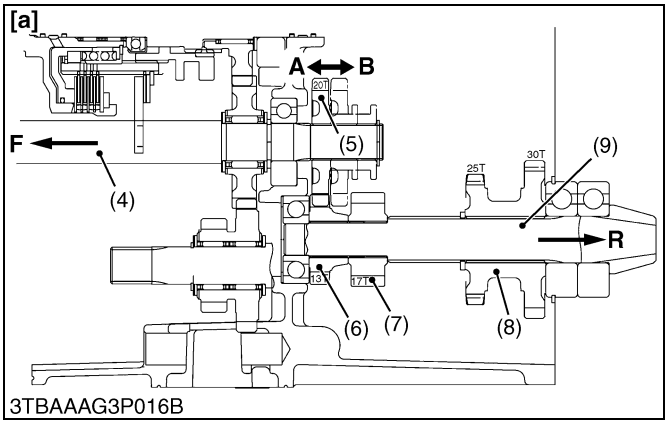
L : "LOW" Range
M : "MID" Range
N : "Neutral" Position
H : "HIGH" Range

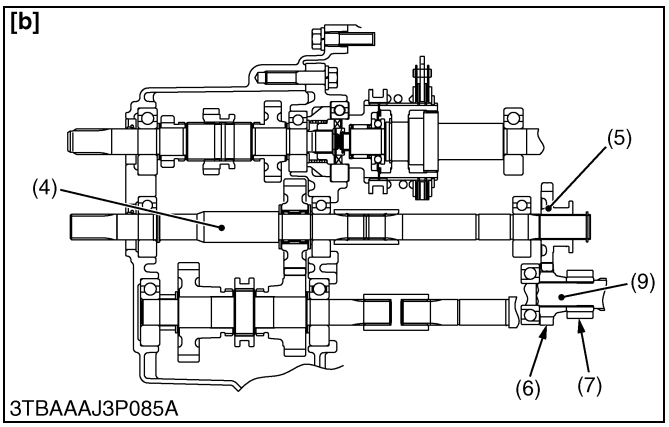
W1016380

7. FRONT WHEEL DRIVE SECTION









Front wheel drive lever (1) is located at the front floor cover.

Front wheel drive lever (1) and shifter (3) are linked.

20T shifter gear (5) is located on the front wheel drive shifter (4).

2-wheel drive or 4-wheel drive is selected by changing the position of 20T shifter gear (5) reverse or forward.

When the font wheel drive lever (1) is set to **"4 Wheel Drive Position",** 20T shifter gear (5) slides forward, meshes the13T gear (6) on the 6T bevel pinion shaft (9).

In this state, power from the 6T bevel pinion shaft (9) is transmitted through 20T shifter gear (5) to the front wheel drive shaft (4) and the front wheels.

(1) Front Wheel Drive Lever
(2) Transmission Case
(3) Shifter
(4) Front Wheel Drive Shaft
(5) 20T Shifter Gear (B1830, B2230, B2530)
19T Shifter Gear (B3030)
(6) 13T Gear (B1830, B2230, B2530)
14T Gear (B3030)
(7) 17T Gear
(8) 25T-31T Gear
(9) 6T Bevel Pinion Shaft

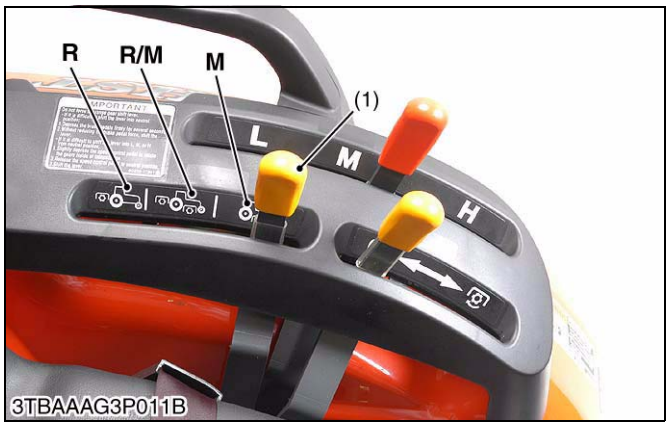
A : 4 Wheel Drive Position
B : 2 Wheel Drive Position
F : Power to Front Wheels
R : Power to Rear Wheels

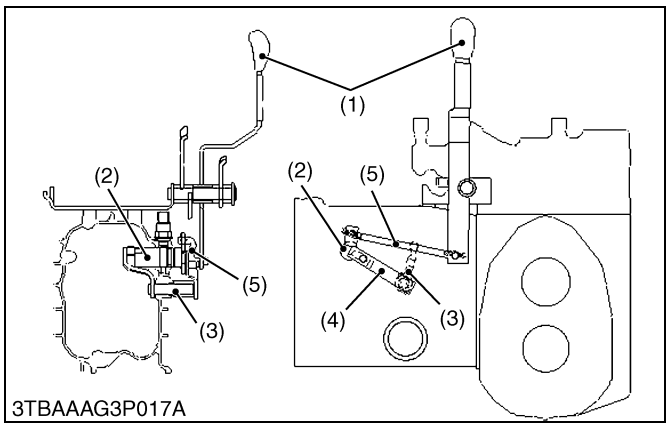
[a] HST Model
[b] Manual Transmission Model (without Mid-PTO)

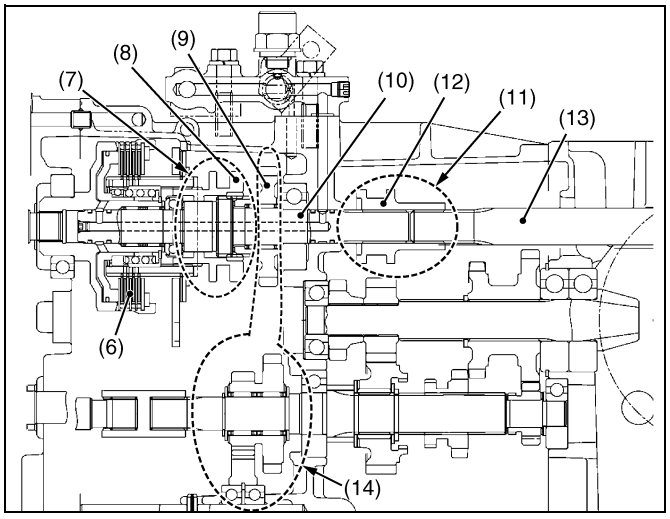
W1017020

8. PTO SYSTEM (HYDRAULIC PTO CLUTCH MODEL)

[1] STRUCTURE







The PTO shift lever (1) is located at left side fender.

The PTO shift lever (1) and the PTO shift arm (2) are linked with the control rod (5).The PTO shift arm (2) and the rear PTO arm (3) linked with the rear PTO control plate.

The PTO shift arm (2) shifts the PTO shifter (8).

The rear PTO arm (3) shifts the rear PTO shifter (12).

PTO gear section consists of four sections.

The first section is independent PTO section.

The second section is PTO position selection section.

The third section is mid-PTO selection section.

The fourth section is rear PTO rotation prevention section.

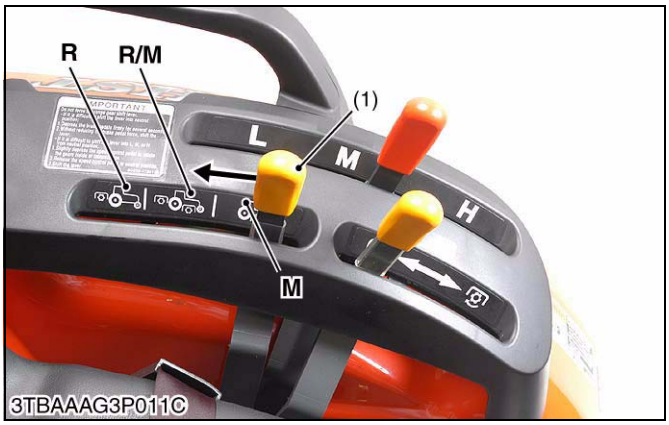
In this section, when the PTO shift lever is set to **"Mid-PTO"** shifter slides to the front side and shifter meshes to the housing.

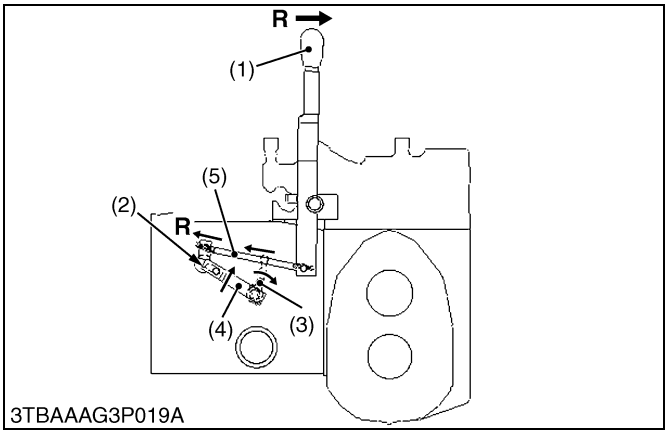
The rear PTO shift does not rotate at this **"Mid-PTO"** position.

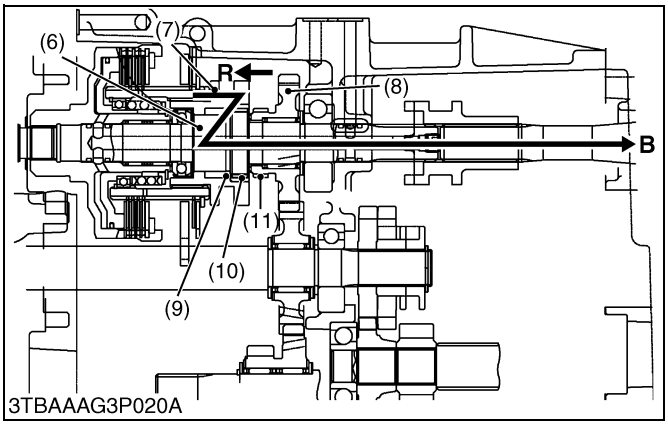
(1) PTO Shift Lever
(2) PTO Shift Arm
(3) Rear PTO Arm
(4) Rear PTO Control Plate
(5) Control Rod
(6) Independent PTO Clutch
(7) PTO Position Selection Section
(8) PTO shifter
(9) 25T Mid PTO Gear
(10) PTO Clutch Shaft
(11) Rear PTO Rotation Prevention Section
(12) Rear PTO shifter
(13) 8T Rear PTO Shaft (B1830, B2230, B2530)
10T Rear PTO Shaft (B3030)
(14) Mid PTO Selection Section

R : REAR PTO" position
R/M :REAR PTO / MID PTO position
M : MID PTO Position

[2] REAR PTO SECTION







When the PTO shift lever (1) is set to **"REAR PTO"** (**R**) position, the PTO shift lever (1) pushes the control rod (5).

The control rod (5) pushes the PTO shift arm (2).

In this state, the PTO shift arm (2) shifts the PTO shifter (7) forward. The inner spline (10) of the PTO shifter (7) meshes the independent PTO shaft spline (9).

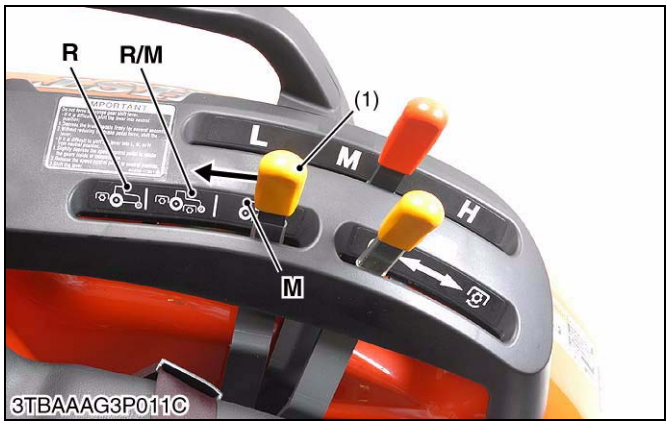
Power is transmitted from the independent PTO clutch to the rear PTO shaft as follows.

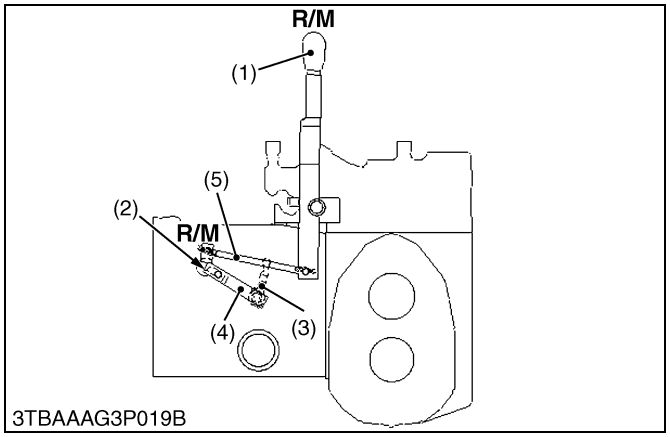
Independent PTO clutch → PTO shifter (7) → Independent PTO shaft (6) → Rear PTO shifter → Rear PTO shaft.

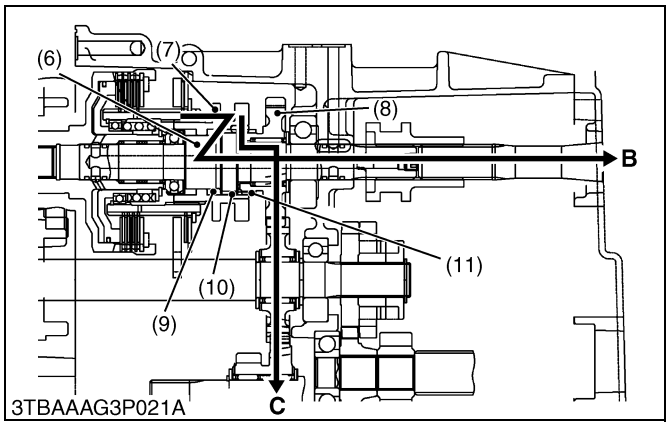
(1) PTO Shift Lever
(2) PTO Shift Arm
(3) Rear PTO Arm
(4) Rear PTO Control Plate
(5) Control Rod
(6) Independent PTO Shaft
(7) PTO Shifter
(8) PTO Shifter
(9) 25T Mid PTO Gear
(10) Inner Spline
(11) 25T Mid Gear Spline

R : REAR PTO position
R/M :REAR PTO / MID PTO position
M : MID PTO Position
B : To Rear PTO Shaft

[3] REAR PTO / MID-PTO SECTION







When the PTO shift lever (1) is set to **"REAR PTO / MID PTO"** (**R/M**) position, the PTO shift lever (1) pulls the control rod.

The control rod (5) pulls the PTO shift arm (2).

In this state, the PTO shifter (7) keeps its position between the independent PTO shaft spline (9) and the 25T mid gear spline (11).

In this position, the inner spline (10) of the PTO shifter (7) meshes both independent PTO shaft spline (9) and the 25T and gear spline (11).

Power is transmitted from the independent PTO clutch to both the rear PTO shaft and the mid PTO shaft as follows.

■ **Rear PTO Section**

Independent PTO Clutch → PTO shifter (7) → Independent PTO Shaft (6) → Rear PTO shifter → Rear PTO shaft.

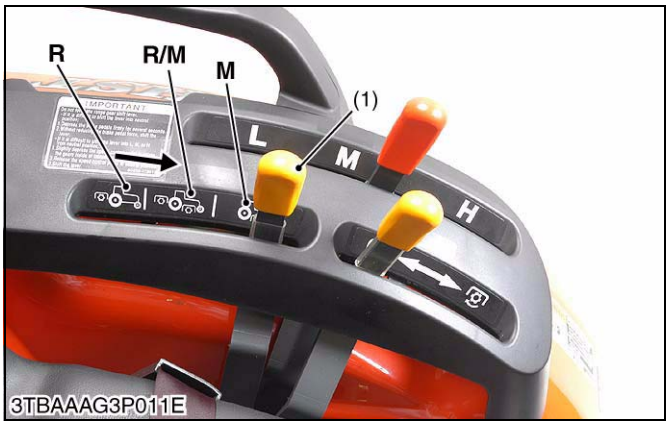
■ **Mid PTO Section**

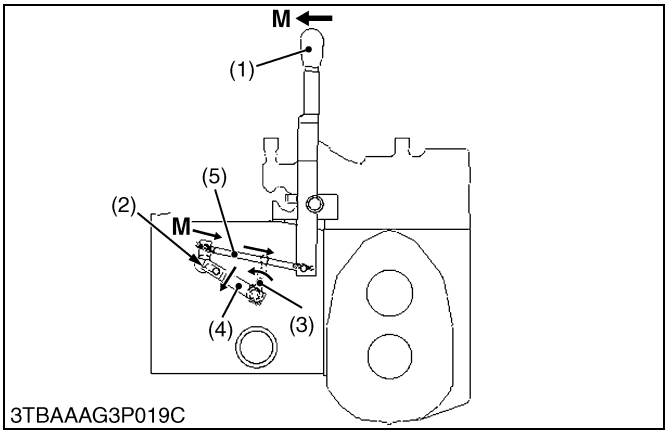
Independent PTO Clutch → PTO shifter (7) → 25T mid gear → 26T gear on front wheel drive shaft → 17T - 26T mid gear → 30T gear → Mid PTO shaft (B1830, B2230, B2530: 18T, B3030: 17T).

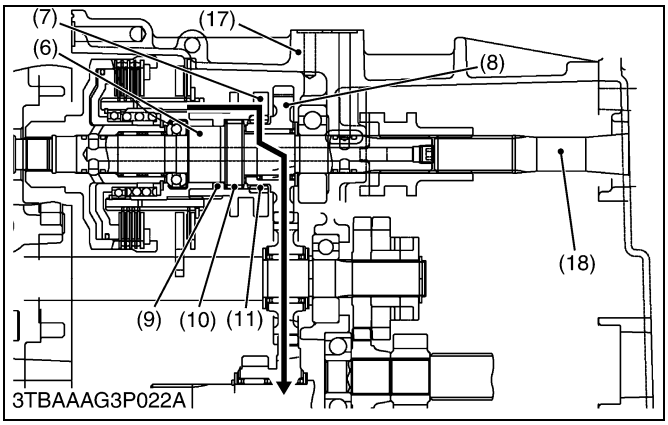
(1) PTO Shift Lever
(2) PTO Shift Arm
(3) Rear PTO Arm
(4) Rear PTO Control Plate
(5) Control Rod
(6) Independent PTO Clutch
(7) PTO Shifter
(8) 25T Mid PTO Gear
(9) Independent PTO Shaft Spline
(10) Inner Spline
(11) 25T Mid Gear Spline

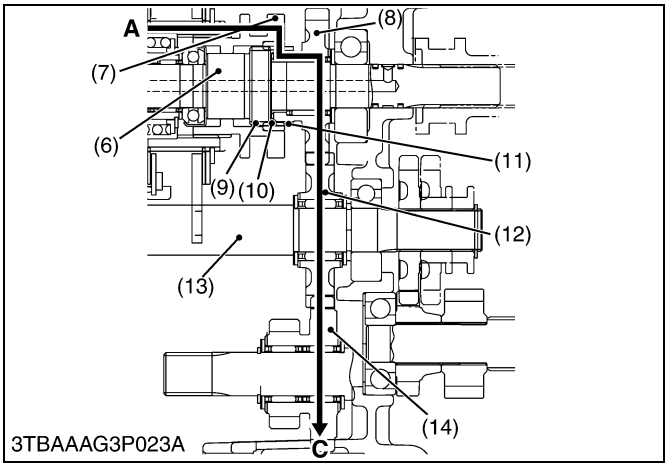
B : To Rear PTO Shaft
C : To Mid PTO Shaf
R : REAR PTO Position
R/M :REAR PTO / MID PTO Position
M : MID PTO Position

[4] MID-PTO SECTION









When the PTO shift lever (1) is set to **"MID-PTO"** (**M**) position, the PTO shift lever pulls the control rod (5). The control rod (5) pulls the PTO shift arm (2). In this state, the PTO shift arm (2) shifts the PTO shifter (7) reverse. The inner spline of the PTO shifter (7) meshes the 25T Mid PTO gear spline (11).

On the other hand, the range gear shifter arm (2) turns the rear PTO control plate counterclockwise and turns the rear PTO arm counterclockwise.

Since the rear PTO arm is turned counter clockwise, the rear PTO shifter is pushed forward.

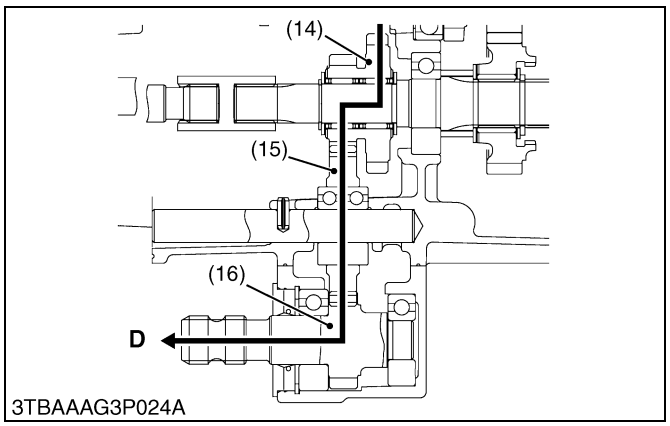
Then, the rear PTO shifter meshes the rib of the transmission case.

In this state, the rear PTO brake shifter prevents the independent PTO shaft from rotating itself.

(To be continued)

(1) PTO Shift Lever
(2) PTO Shift Arm
(3) Rear PTO Arm
(4) Rear PTO Control Plate
(5) Control Rod
(6) Independent PTO Clutch
(7) PTO Shifter
(8) 25T Mid PTO Gear
(9) Independent PTO Shaft Spline
(10) Inner Spline
(11) 25T Mid Gear Spline
(12) 26T Gear
(13) Front Wheel Drive Shaft
(14) 17T - 26T Mid Gear
(15) 30T Gear
(16) Mid PTO Shaft
B1830, B2230, B2530: 18T
B3030: 17T
(17) Transmission Case
(18) Rear PTO Shaft

A : From Independent PTO Clutch
C : To Mid PTO Shaft
R : REAR PTO Position
R/M :REAR PTO / MID PTO Position
M : MID PTO Position



(Continued)

Power is transmitted from the independent PTO clutch to the Mid PTO shaft as follows.

Independent PTO clutch → PTO shifter (7) → 25T mid gear (8) → 26T gear (12) → 17T - 26T mid gear (14) → 30T gear (15) → Mid PTO shaft (16)

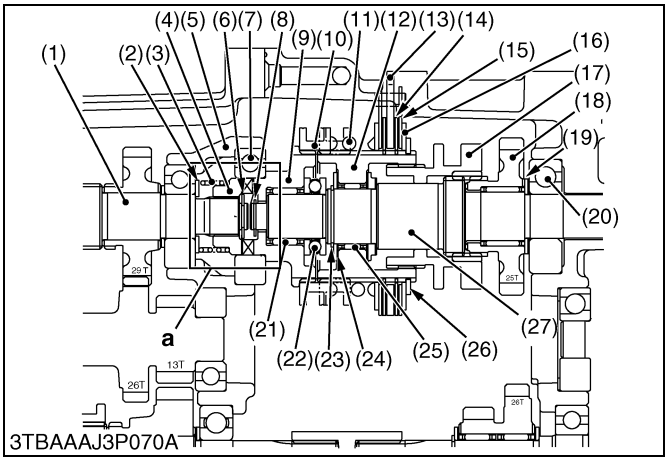
(14) 17T - 26T id Gear
(15) 30T Gear
(16) Mid PTO Shaft
B1830, B2230, B2530: 18T
B3030: 17T

D : To Mid Mount Mower or Front Implement

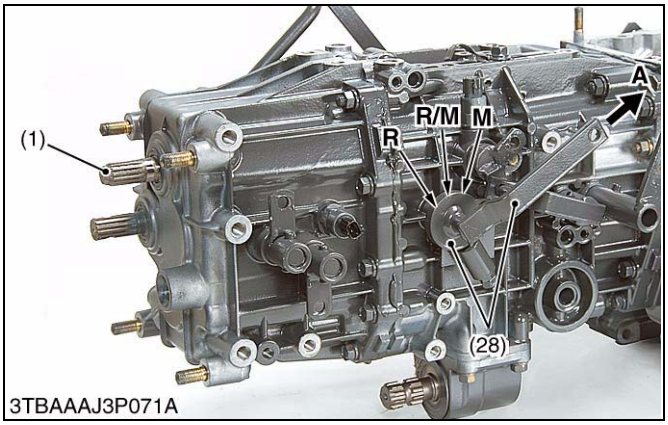
W1021627

9. PTO SYSTEM (MECHANICAL PTO CLUTCH MODEL)

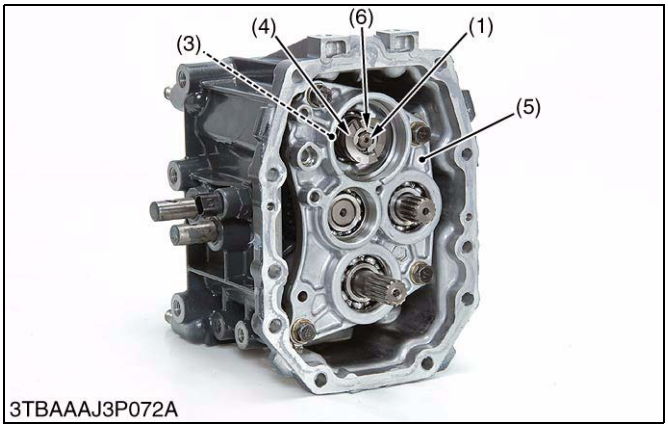
[1] STRUCTURE



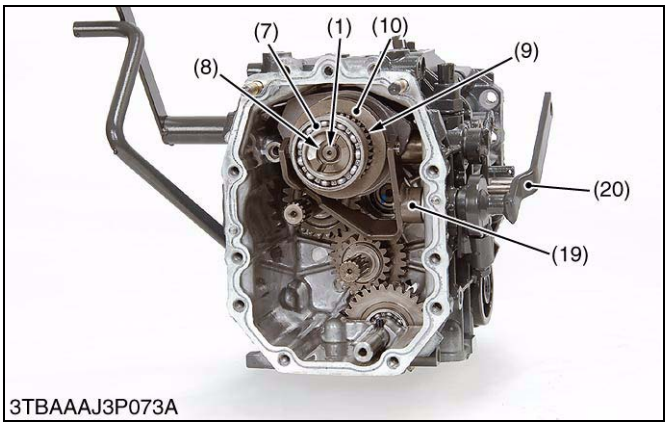
3TBAAAJ3P070A



3TBAAAJ3P071A



3TBAAAJ3P072A



3TBAAAJ3P073A

The PTO shift lever location is almost same as the hydraulic PTO clutch model.

The PTO positions are selected to three positions, the “Rear PTO” position (**R**), the “Rear PTO/ the mid-PTO” position (**R/M**) and the “Mid-PTO” position (**M**).

The PTO section is separated to two sections.

The front PTO section is located in the main speed shift case. The rear PTO is the mechanism PTO assembly and is located in the transmission case.

The shifter (17) is connected mechanicaly to the PTO select lever.

When the mechanical PTO clutch lever is shifted to “**ON (Engaged)**” position, the mechanical PTO clutch lever (?) sides front and meshes to the one-way clutch spline boss (21).

Since the PTO brake spline boss (12), the power is transmitted from the one-way clutch spline boss through the shifter (10) to the PTO brake spline boss (12).

[PTO Brakes]

When the mechanical PTO clutch lever is shifted to “**OFF (Disengaged)**” position, the shifter (10) slides to the PTO brake spring side.

The shifter (7) does not mesh to the one-way clutch spline boss (9), and the power is not transmitted from the one-way clutch spline boss (9) to the PTO brake spline boss (12).

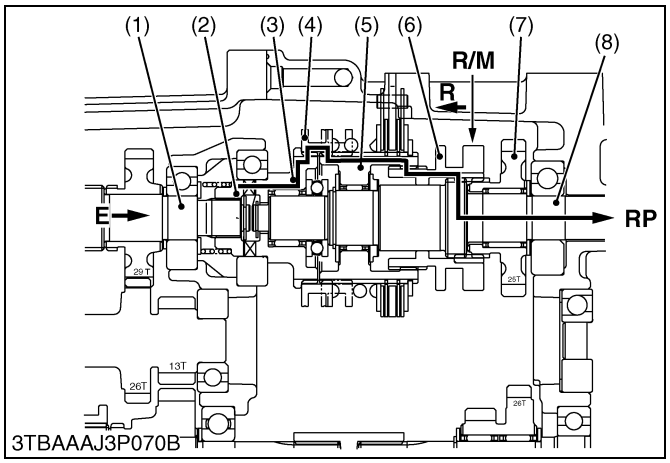
Since the PTO brake spring (11) pushed the brake prates (16) and the PTO brake disks (15), the PTO brake (13) is engaged at this moment.

(1) First Shift Shaft
(2) Collar (1.8)
(3) Overrunning Clutch Spring
(4) One-way Clutch Cam
(5) Bearing Holder
(6) Cir-clip
(7) Ball Bearing
(8) Cir-clip
(9) One-way Clutch Spline Boss
(10) Shifter (PTO ON/OFF)
(11) PTO Brake Spring
(12) PTO Brake Spline Boss
(13) Brake Plate 2
(14) Brake Disk
(15) Brake Plate 3
(16) Brake Plate 1
(17) PTO Shifter
(18) 25T Mid-gear
(19) Collar (20)
(20) Ball Bearing
(21) Needle Bearing
(22) Thrust Ball Bearing
(23) Cir-clip
(24) Thrust Collar
(25) Needle Bearing
(26) Cir-clip
(27) PTO Clutch
(28) PTO Shift Lever
(29) PTO ON/OFF Shift Folk

a : One-way Clutch Section
A : Connected to the PTO Select Lever
R : REAR PTO position
R/M :REAR PTO / MID PTO position
M : MID-PTO Position

W1026381

[2] REAR PTO SECTION



When the PTO shift lever is set to "**Rear PTO**" position (**R**), the PTO shifter (6) slides to "**Rear PTO**" position (**R**).

The PTO shifter (6) meshes to the spline of the PTO clutch shaft (8).

The power is transmitted from the first shift shaft (1) to the PTO clutch shaft (8) as follows.

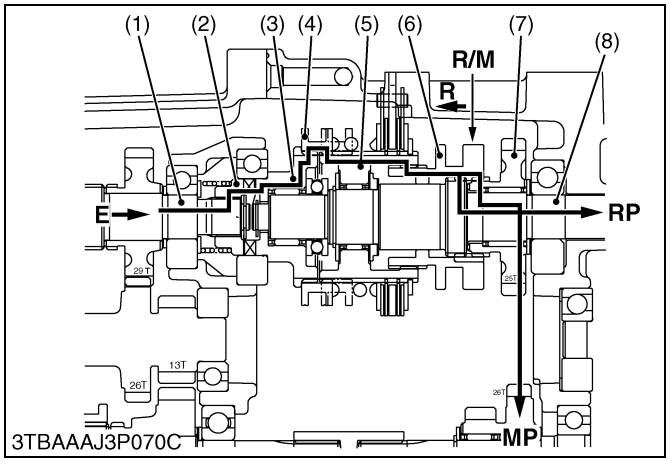
First shift shaft (1) → One-way clutch cam (2) → One-way clutch spline boss (3) → shifter (PTO ON/OFF) (4) → PTO brake spline boss (5) → PTO shifter (6) → PTO clutch shaft (8).

(1) First Shift Shaft
(2) One-way Clutch Cam
(3) One-way Clutch Spline Boss
(4) Shifter (PTO ON/OFF)
(5) PTO Brake Spline Boss
(6) PTO Shifter
(7) 25T Mid Gear
(8) PTO Clutch Shaft

E : Power from Engin
R : REAR PTO Position
R/M :REAR PTO / MID PTO Position
RP :Power to Rear PTO Shaft

W1030244

[3] REAR PTO / MID-PTO SECTION



When the PTO shift lever is set to "**Rear PTO/Mid-PTO**" position, the PTO shifter (6) slides to "**Rear PTO/ Mid-PTO**" position (**R/M**).

The PTO shifter (6) meshes to both the spline of the PTO clutch shaft (8) and the spline of the 25T mid-PTO gear (7).

The power is transmitted from the first shift shaft (1) to both the rear PTO and the mid-PTO as follows.

■ **To Rear PTO**

First shift shaft (1) → One-way clutch cam (2) → One-way clutch spline boss (3) → shifter (PTO ON/OFF) (4) → PTO brake spline boss (5) → PTO shifter (6) → PTO clutch shaft (8) → to rear PTO (**R**).

■ **To Mid PTO**

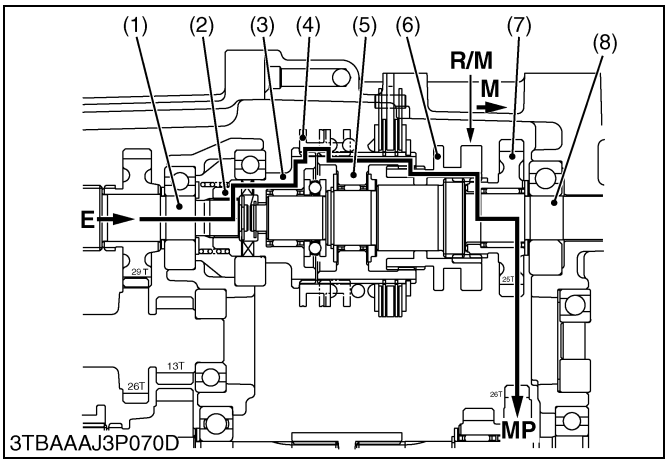
First shift shaft (1) → One-way clutch cam (2) → One-way clutch spline boss (3) → shifter (PTO ON/OFF) (4) → PTO brake spline boss (5) → PTO shifter (6) → 25T mid-gear (7) → 26T gear (10) → to mid-PTO (**MP**).

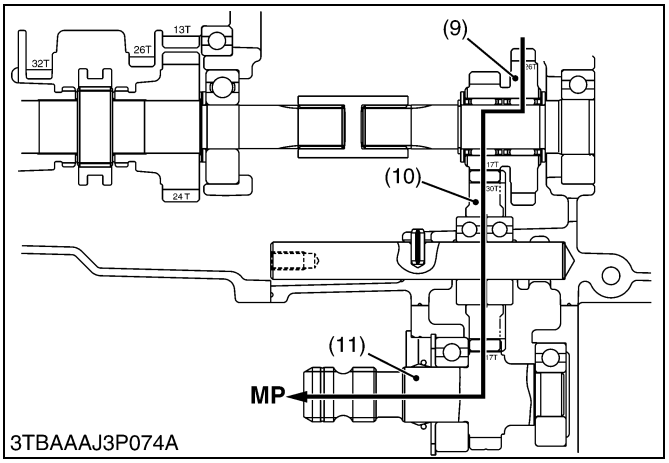
(1) First Shift Shaft
(2) One-way Clutch Cam
(3) One-way Clutch Spline Boss
(4) Shifter (PTO ON/OFF)
(5) PTO Brake Spline Boss
(6) PTO Shifter
(7) 25T Mid Gear
(8) PTO Clutch Shaft

R : REAR PTO Position
R/M :REAR PTO / MID PTO Position
E : Power from Engine
RP :Power to Rear PTO Shaft
MP :Power to Mid-PTO

W1032322

[4] MID-PTO SECTION





When the PTO shift lever is set to "**Mid-PTO**" position, the PTO shifter (6) slides to "**Mid-PTO**" position (**M**).

The PTO shifter meshes to the spline of the 25T mid-gear (7).

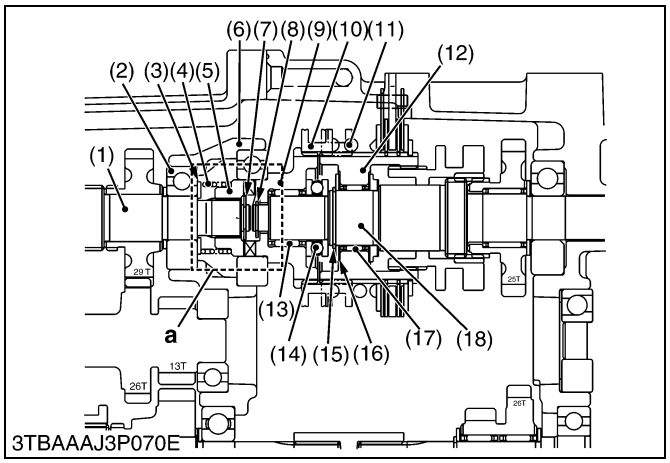
The power is transmitted from the first shift shaft (1) to the mid-PTO as shown in the figure.

(1) First Shift Shaft
(2) One-way Clutch Cam
(3) One-way Clutch Spline Boss
(4) Shifter (PTO ON/OFF)
(5) PTO Brake Spline Boss
(6) PTO Shifter
(7) 25T Mid Gear
(8) PTO Clutch Shaft
(9) 17T-26T Mid PTO Gear
(10) 30T Gear
(11) Mid Gear Shaft

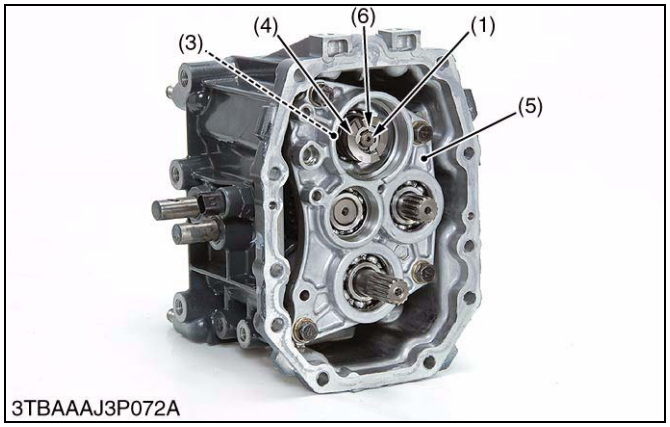
R/M :REAR PTO / MID PTO Position
M : MID-PTO Position
E : Power from Engine
MP :Power to Mid-PTO Implement

W1033664

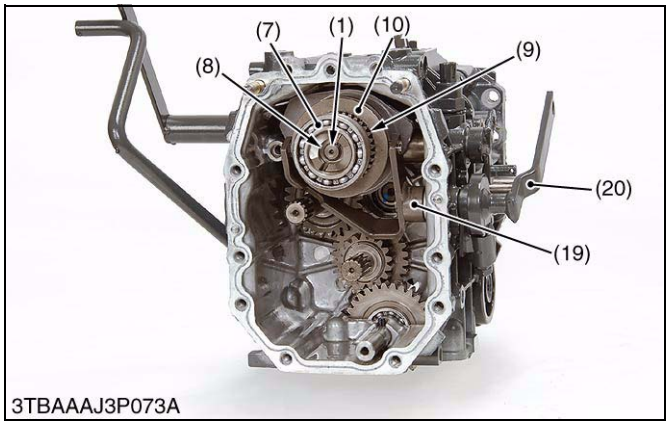
[5] ONE-WAY CLUTCH SYSTEM



3TBAAAJ3P070E



3TBAAAJ3P072A



3TBAAAJ3P073A

In manual transmission models, a mechanical PTO is adopted.

The one-way PTO clutch is located between the first shift shaft (1) and the PTO clutch shaft (18).

The one-way clutch is composed of the first shift shaft (1), the one-way clutch spring (4), the one-way clutch cam (5), the one-way clutch spline boss (9) and the one-way clutch shaft (18).

The one-way clutch cam (15) is splined to the first shift shaft (1, and the one-way clutch spline boss (9) is splined to the PTO clutch shaft (18).

Both the one-way clutch cam (5) and the one-way clutch spline boss (9) are engaged with each other by the force of the one-way clutch spring (4).

While the first shift shaft (1) is driving the PTO clutch shaft (18), both the one-way clutch cam and the one-way clutch spline boss (9) will remain engaged.

However, when the PTO shaft drives a rotary mower, for example, and if the engine speed is lowered, the one-way clutch spline boss (9) on the PTO clutch shaft (18) will overrun.

This overrunning is caused by the internal of the mower's blades.

Then, engagement will not take place until the first shift shaft (1) is running faster than the one-way clutch PTO clutch shaft (18).

In this way, the one-way clutch protects the transmission and the engine against damage, by allowing the PTO shaft, the first shift shaft (1) and the PTO clutch shaft (18) to overrun if the first shift shaft (1) over speeds.

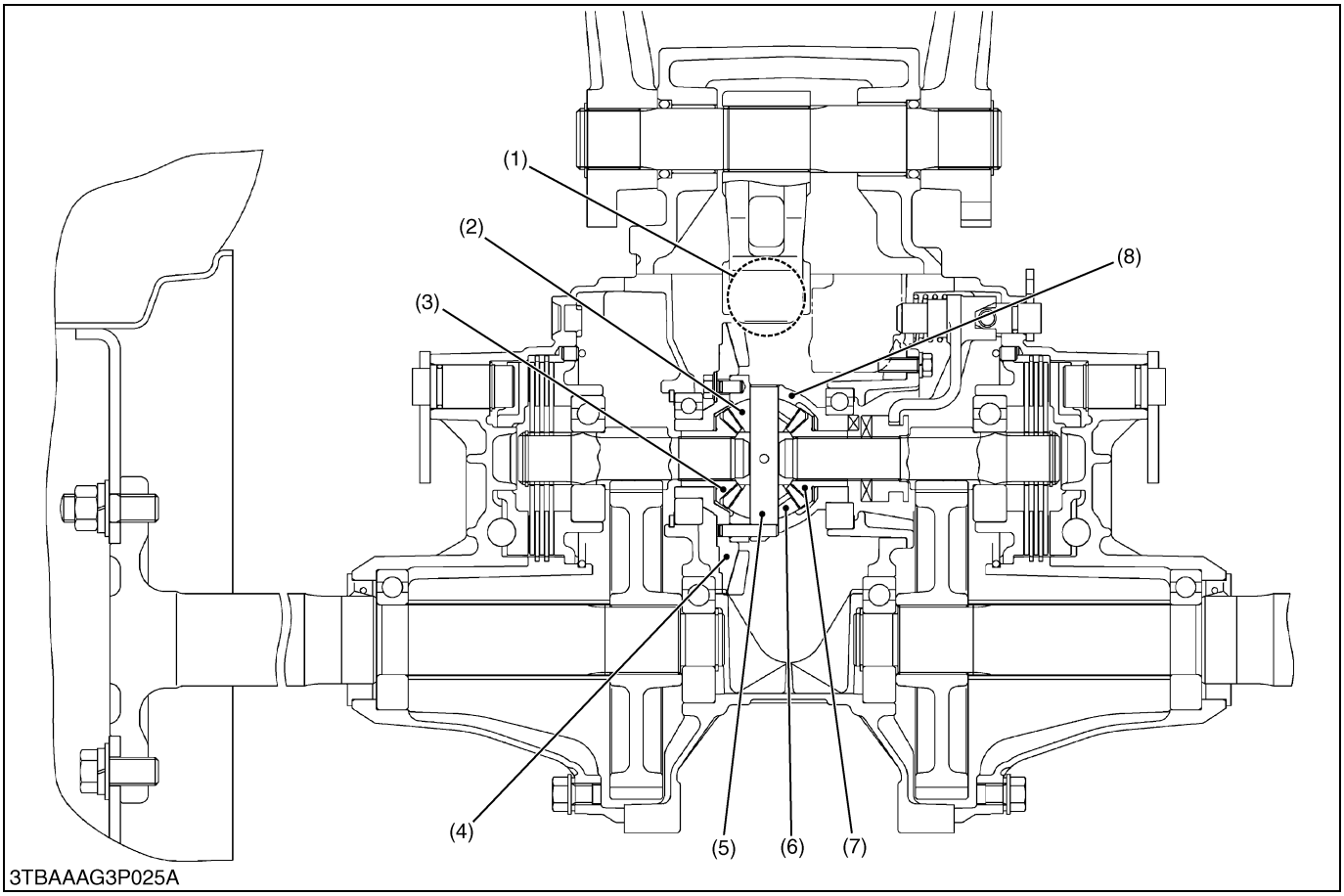
(1) First Shift Shaft
(2) Ball Bearing
(3) Collar (1.8)
(4) One-way Clutch Spring
(5) One-way Clutch Cam
(6) Bearing Holder
(7) Cir-clip
(8) Cir-clip
(9) One-way Clutch Spline Boss
(10) Shifter (PTO ON/OFF)
(11) Clutch Spring
(12) PTO Brake Spline Boss
(13) Needle Bearing
(14) Thrust Ball Baring
(15) Cir-clip
(16) Thrust Collar
(17) Needle Bearing
(18) PTO Clutch Shaft
(19) PTO ON/OFF Shift Lever
(20) PTO Shift Lever

a : One-way Clutch Section

W1034270

10. DIFFERENTIAL GEAR SYSTEM

[1] DIFFERENTIAL FUNCTION



(1) Spiral Bevel Pinion
(2) Differential Pinion
(3) Differential Side Gear
(4) Spiral Bevel Gear
(5) Differential Pinion Shaft
(6) Differential Pinion
(7) Differential Side Gear
(8) Differential Case

■ **During Straight Running**

Rotation of the spiral bevel pinion (1) is transmitted to the spiral bevel gear (4) and differential case (8). When road resistance to the right and left wheels are equal, differential pinions (2), (6) and differential side gears (3), (7) are all rotate as a unit. Both rear axles received equal input, and both wheels turn at the same speed, allowing the tractor to ho straight ahead. At this time, differential pinions (2), (6) does not rotate around the differential pinion shaft (5).

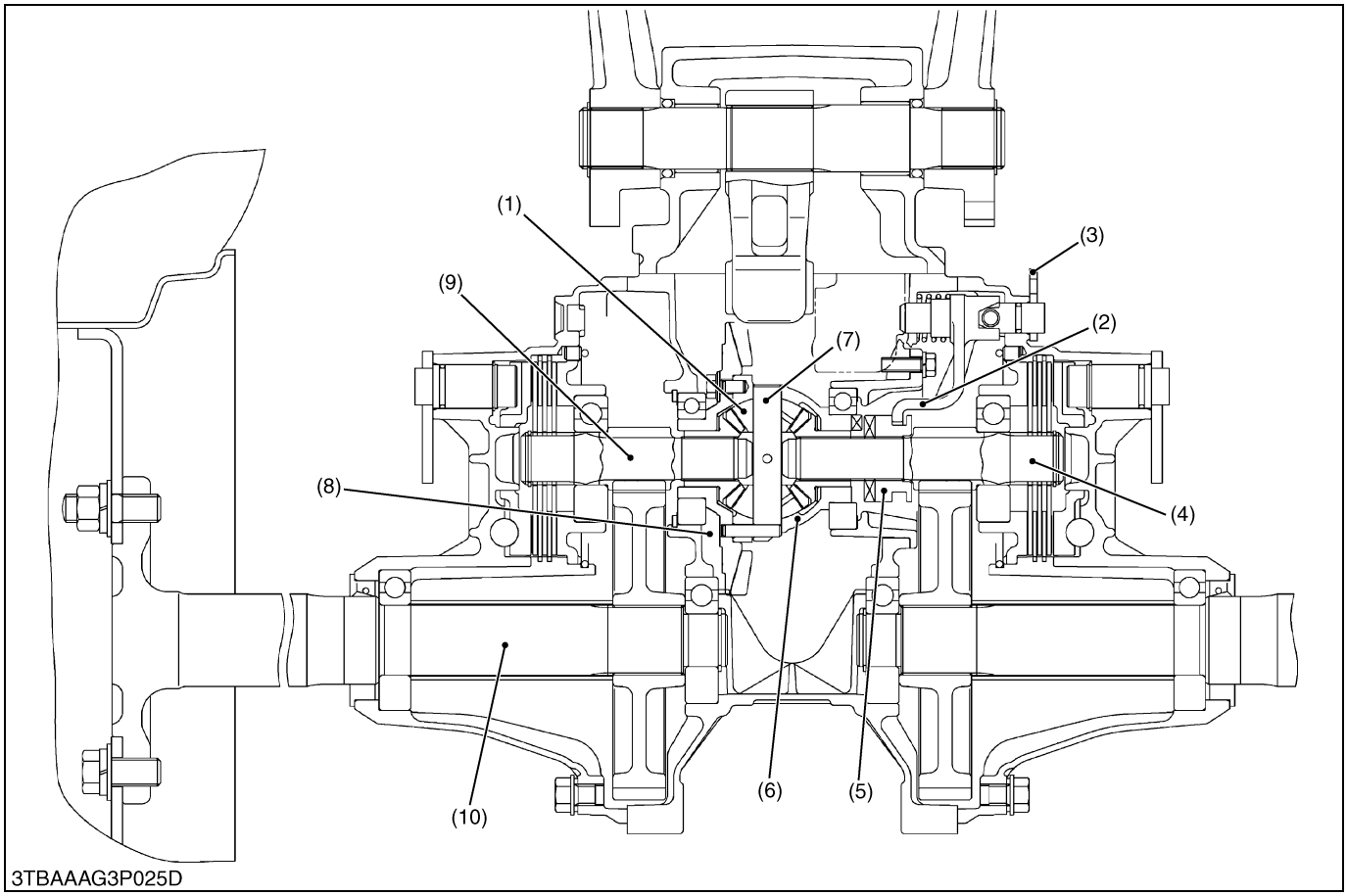
■ **During Turning**

When the tractor turns, the road resistance to the inside tire increases (as if braking is applied to that side only).

In other words, if one of tires slows down, revolution difference is generated in the differential side gears (3), (7). When rotation of one differential side gear becomes lower than the other, differential pinions (2), (6) begin rotating around differential pinion shaft (5). The other differential side gear is increased in speed by the speed increment of differential pinion shaft (5). This means that rotation of one rear axle is slowed down and that of the other rear axle is increased. Thus, the tractor turns smoothly without power loss.

The combined number of revolutions of the right and left differential side gears is always twice that of the spiral bevel gear (4). When spiral bevel gear revolution is 100 min^{-1} (rpm), and if one of the differential side gears stops moving, the revolution of the other differential side gear becomes 200 min^{-1} (rpm) and if one rotates at 50 min^{-1} (rpm), the other rotates at 150 min^{-1} (rpm).

[2] DIFFERENTIAL LOCK



(1) Differential Pinion
(2) Shift Fork
(3) Differential Lock Lever
(4) Differential Gear Shaft (Right)
(5) Differential Lock Clutch
(6) Differential Case
(7) Differential Pinion Shaft
(8) Spiral Bevel Pinion
(9) Differential Gear Shaft (Left)
(10) Rear Axle (B3030)

When resistance to the right and the left tires are greatly different due to ground conditions or type of work, the tire with less resistance slips and prevents the tractor from moving ahead. To compensate for this drawback, the differential lock restricts the differential action and causes both rear axles to rotate as a unit.

When the differential lock pedal is stepped on, it causes the differential lock lever (3) to rotate. The differential lock lever (3) will move the shift fork (2) and the differential lock clutch (5) toward the spiral bevel gear (8). The differential lock clutch (5) engages with the teeth of the differential case (6) to make the differential case (6) and the differential lock clutch (5) to rotate together as a unit.

Therefore, the differential pinions (1) are unable to rotate around the differential pinion shaft (7) and differential revolutions are transmitted to the right and the left differential gear shaft (4) (9).

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SERVICING

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1. TROUBLESHOOTING

HYDROSTATIC TRANSMISSION SECTION

Symptom	Probable Cause	Solution	Reference Page
System Will Not Operate in Either Direction	Oil level is low	Check oil level or fill oil to proper level	G-15, 3-S14
	Speed control pedal linkage defective	Repair linkage	3-S12
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-14, 3-S14
		2. Check charge pressure	3-S8
		3. Inspect or flush charge relief valve	3-S46
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S9, S10, S47
	Neutral valve defective	Inspect or replace neutral valve	3-S48
	Component parts defective	Replace hydrostatic transmission assembly	3-S44 to S53
Vibration and Noise	Oil level is too low	Check oil level or fill oil to proper level	G-15, 3-S14
	Speed control pedal linkage defective	Repair linkage	3-S12
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-14, 3-S14
		2. Check charge pressure	3-S8
		3. Inspect or flush charge relief valve	3-S46
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S9, S10, S47
	Neutral valve is defective	Inspect or replace neutral valve	3-S48
	Component parts defective	Replace hydrostatic transmission assembly	3-S44 to S53

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HYDROSTATIC TRANSMISSION SECTION (Continued)

Symptom	Probable Cause	Solution	Reference Page
Loss of Power	Oil level is too low	Check oil level or fill oil to proper level	G-15, 3-S14
	Speed control pedal linkage defective	Repair linkage	3-S12
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-14, 3-S14
		2. Check charge pressure	3-S8
		3. Inspect or flush charge relief valve	3-S46
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	3-S9, S10, S47
	Neutral valve is defective	Inspect or replace neutral valve	3-S48
	Component parts defective	Fill transmission oil level up to proper level	3-S44 to S53
Transmission Oil Over Heats	Low transmission oil level	Fill oil to proper level	G-15, 3-S14
	Radiator net clogged	Clean radiator net	–
	Excessive machine load	Reduce machine load	–
	Improper charge pressure	1. Check high relief pressure	3-S9
		2. Replace transmission oil filter cartridge	G-14, 3-S14
		3. Replace check and high pressure relief valve	3-S47
		4. Inspect and replace charge relief valve	3-S46
Machine Will not Stop in Neutral Position	Speed control linkage is out of adjustment or sticking	Repair or replace linkage	3-S12
		Adjust neutral adjuster	3-S12
	Neutral valve defective	Inspect or replace neutral valve	3-S48
System Operates in One Direction Only	Speed control linkage defective	Repair or replace linkage	3-S12
	Check and high pressure relief valve defective	Replace check and high pressure relief valve	3-S47

W1024729

FRONT CASE

Symptom	Probable Cause	Solution	Reference Page
Noise From Front Case	Clutch shaft spline worn	Replace	3-S32
	Bearing Worn	Replace	3-S32
	Gear worn or broken	Replace	3-S34
	Bi-Speed Turn clutch damaged	Replace	3-S34

W1021570

TRANSMISSION CASE SECTION

Symptom	Probable Cause	Solution	Reference Page
Noise From Front Transmission	Transmission oil insufficient	Refill	3-S14
	Gear worn or broken	Replace	3-S40, S67
	Improper backlash between spiral bevel pinon and bevel gear	Adjust	3-S75
	Improper backlash between differential pinion and differential side gear	Adjust	3-S74
	Bearings worn	Replace	–
	PTO clutch damaged	Repair or replace	3-S54

W1023839

DIFFERENTIAL CASE SECTION

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual Noise at All Times	Improper backlash between spiral bevel pinion and bevel gear	Adjust	3-S75
	Improper backlash between differential pinion and differential side gear	Adjust	3-S74
	Bearing worn	Replace	–
	Insufficient or improper type of transmission fluid used	Replenish or replace	G-15
Noise while Turning	Differential pinions or differential side gears worn or damaged	Replace	3-S75
	Differential lock binding (does not disengage)	Replace	4-S5
	Bearing worn	Replace	3-S75
Differential Lock Can Not Be Set	Differential lock shift fork damaged	Replace	4-S5
	Differential lock shifter mounting pin damaged	Replace	4-S5
	Differential lock clutch damaged	Replace	4-S5
Differential Lock Pedal Does Not Return	Differential lock pedal return spring weakened or damaged	Replace	4-S5
	Differential lock fork shaft rusted	Repair	4-S5

W1025803

2. SERVICING SPECIFICATIONS

BI-SPEED TURN SECTION

Item		Factory Specification	Allowable Limit
Charge Relief Valve	Setting Pressure	0.4 to 0.6 MPa 4.1 to 6.1 kgf/cm^2 58 to 87 psi	–
Clutch Disc	Thickness	1.70 to 1.90 mm 0.067 to 0.075 in.	1.55 mm 0.061 in.
Clutch Disc Plate	Thickness	1.95 to 2.05 mm 0.0768 to 0.0807 in.	1.8 mm 0.071 in.

W1108133

HYDROSTATIC TRANSMISSION (HST)

Check and High Pressure Relief Valve	Setting Pressure [Relief Valve]	33.9 to 34.8 MPa 345 to 355 kgf/cm^2 4910 to 5040 psi	–
Charge Relief Valve	Setting Pressure	0.4 to 0.6 MPa 4.1 to 6.1 kgf/cm^2 58 to 87 psi	–
Relief Valve	Readjusting Pressure	31.4 to 35.3 MPa 320 to 360 kgf/cm^2 4551 to 5120 psi	–
Spiral Bevel Pinion	Side Clearance	Less than 0.15 mm Less than 0.0059 in.	–
Spiral Bevel Pinion to Spiral Bevel Gear	Backlash	0.10 to 0.20 mm 0.0039 to 0.0079 in.	0.4 mm 0.016 in.
	Adjusting Shim Thickness	0.2 mm, 0.008in. 0.5 mm, 0.020 in.	–
Piston to Bore (HST)	Clearance	0.2 mm 0.0008 in.	0.04 mm 0.0016 in.
Piston Slipper	Thickness	3.00 mm 0.118 in.	2.90 mm 0.1142 in.

W1027349

INDEPENDENT PTO CLUTCH

Clutch Disc	Thickness	1.70 to 1.90 mm 0.067 to 0.075 in.	1.55 mm 0.061 in.
Clutch Plate	Thickness (With Hole)	1.15 to 1.25 mm 0.045 to 0.049 in.	1.10 mm 0.043 in.
Pressure Plate	Thickness	1.95 to 2.05 mm 0.0768 to 0.0807 in.	1.8 mm 0.071 in.
Piston Return Spring	Free Length	44.0 mm 1.73 in.	
	Load / Length	638.7 N / 26 mm 65.13 kgf / 26 mm 143.6 lbf / 1.02 in.	539.4 N / 26 mm 55 kgf / 26 mm 121.3 lbf / 1.02 in.

W1027629

MECHANICAL PTO CLUTCH

Item		Factory Specification	Allowable Limit
PTO Brake Disc	Thickness	1.70 to 1.90 mm 0.067 to 0.075 in.	1.55 mm 0.061 in.
PTO Brake Plate 1	Thickness	1.95 to 2.05 mm 0.0768 to 0.0807 in.	1.8 mm 0.071 in.

W1108286

TRANSMISSION CASE AND DIFFERENTIAL GEAR

Differential case to Differential Side Gear	Clearance	0.025 to 0.066 mm 0.0010 to 0.0026 in.	0.3 mm 0.0118 in.
Differential Case	I.D.	32.000 to 32.025 mm 1.2599 to 1.2608 in.	–
Spiral Bevel Gear	I.D.	32.000 to 32.025 mm 1.2599 to 1.2608 in.	–
Differential Side Gear	O.D.	31.959 to 31.975 mm 1.2582 to 1.2589 in.	–
Differential Pinion to Differential Pinion Shaft	Clearance	0.016 to 0.045 mm 0.0006 to 0.0018 in.	0.3 mm 0.0118 in.
Differential Pinion	I.D.	16.000 to 16.018 mm 0.6299 to 0.6306 in.	–
Differential Pinion Shaft	O.D.	15.973 to 15.984 mm 0.6289 to 0.6293 in.	–
Differential Pinion to Differential Side Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	0.4 mm 0.016 in.
Shift Fork to Shifter Groove	Clearance	0.10 to 0.35 mm 0.0039 to 0.014 in.	0.5 mm 0.02 in.
Spiral Bevel Pinion Shaft	Movements at shaft directions	Approx. 0 mm 0 in.	–
Spiral Bevel Pinion to Spiral Bevel Gear	Backlash	0.10 to 0.30 mm 0.0039 to 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-8.)

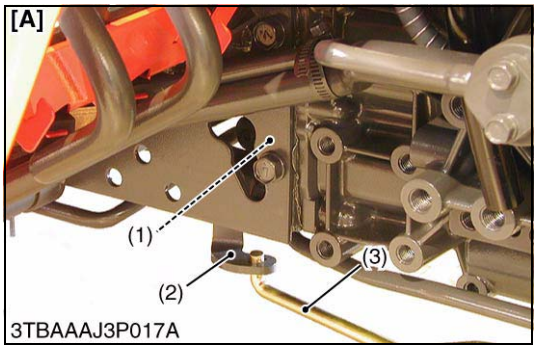
Item	N·m	kgf·m	lbf·ft
Checking port plug	30 to 44	3.0 to 4.5	22 to 33
Hex. socket head screw	24.5 to 29.5	2.5 to 3.0	18.1 to 21.7
Steering wheel mounting nut	24.9 to 49.0	3.0 to 5.0	21.7 to 36.2
Cabin mounting bolt and nut (M14)	100 to 120	10.2 to 12.2	73.8 to 88.5
Cabin support mounting bolt	100 to 110	10.2 to 11.2	73.8 to 81.1
ROPS mounting bolt (for middle and lower frame 9/16-18UNF)	124 to 147	12.6 to 15.0	91.2 to 108
ROPS mounting bolt (M12)	90 to 95	9.2 to 9.7	66.4 to 70.1
Sub-frame mounting bolt for aluminum (M10)	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2
Sub-frame mounting bolt for aluminum (M12)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5
Sub-frame mounting bolt for ordinary material (M12)	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Sub-frame mounting bolt for ordinary material (M14)	126 to 150	12.9 to 15.3	93 to 111
Engine and front case mounting bolt and nut (M8)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1
Engine and front axle frame mounting bolt (M10)	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Front case mounting bolt for aluminum (M10)	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
Steel plate mounting bolt (M8)	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2
Front case rear cover mounting bolt for aluminum (M10)	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
Front case rear cover mounting stud bolt for aluminum (M12)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5
Bi-Speed Turn clutch shifter mounting flange nut (M18)	9.8 to 11.8	1.0 to 1.2	7.2 to 8.7
Main frame mounting bolt and nut for aluminum (M12)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5
Main frame mounting bolt for ordinary material (M12)	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Main gear shift section mounting bolt and nut (M10)	39.3 to 45.1	4.0 to 4.6	29.0 to 32.5
Main gear shift bearing holder mounting bolt (M8)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1
Transmission case mounting bolt and nut (M10)	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
HST assembly mounting bolt for aluminum (M10)	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
Center section mounting hex. bolt for aluminum (M10)	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
Check and high pressure relief valve plug	118 to 147	12.0 to 15.0	86.8 to 108.5
HST Neutral valve body	58.5 to 68.6	6.0 to 7.0	43.4 to 50.6
Hydraulic cylinder mounting bolt (M10)	39.3 to 44.1	4.0 to 4.5	28.9 to 32.5
Transmission case mounting bolt and nut (M10)	39.3 to 44.1	4.0 to 4.5	28.9 to 32.5
Rear axle case (LH and RH) mounting bolt (M10)	39.3 to 44.1	4.0 to 4.5	28.9 to 32.5
Rear PTO cover mounting bolt for aluminum (M10)	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
Differential bearing holder mounting bolt for aluminum (M8)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1
Valve Plug	118 to 147	12.0 to 15.0	86.8 to 108.5
Neutral Valve Plug	58.5 to 68.6	6.0 to 7.0	43.4 to 50.6

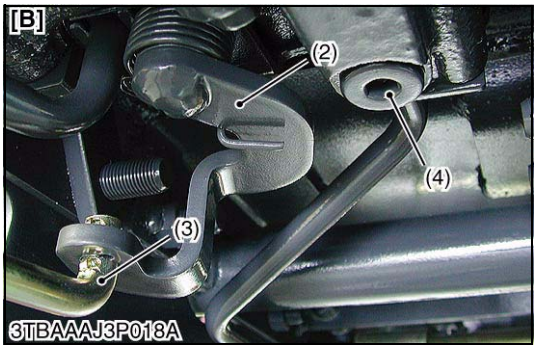
W1012736

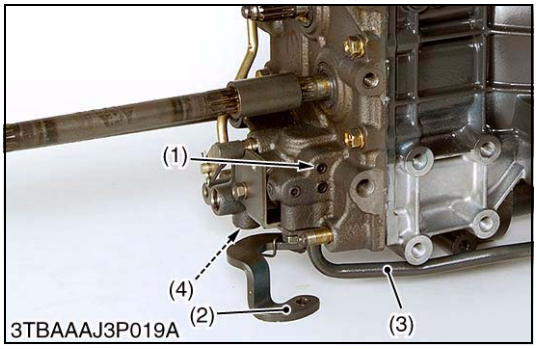
4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Bi-Speed Turn







Charge Pressure

CAUTION

- **When checking, park the tractor on flat ground and fully engage the parking brake.**

1. Remove the plug (R 1/8) (1) at the front case right side. (3 cylinder engine model)
2. Remove the plug (GPF 3/8) (4) at the front case bottom side. (4 cylinder engine model).
3. Install the adaptor to the front case.
4. Install the cable low pressure gauge to the adaptor.

Engine speed	Rated speed
Range gear shift position	Neutral
HST pedal	Neutral

5. Start the engine and warm the transmission fluid before testing.
6. Steer the steering wheel and turn the front wheel above 0.714 rad (42 °).
7. Read the low pressure gauge to measure the charge pressure.
8. If the measurement is not same as factory specification check the Bi-Speed Turn charge valve and the related hydraulic components.

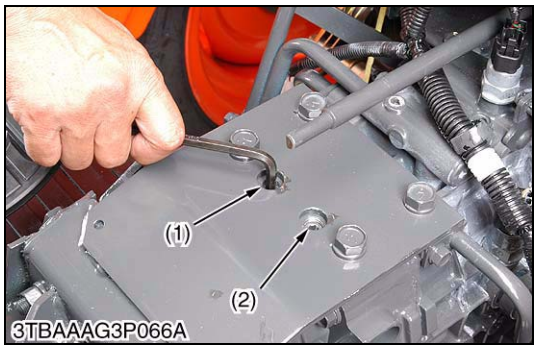
Bi-Speed Turn charge pressure	Factory spec.	0.4 to 0.6 MPa 4.1 to 6.1 kgf/cm^2 58 to 87 psi

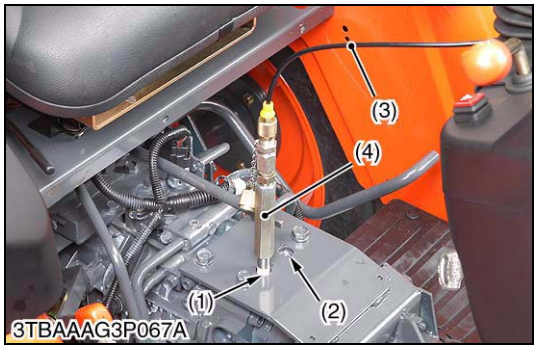
(1) Plug (R 1/8)
(2) Bi-Speed Turn Valve
(3) Bi-Speed Rod
(4) Plug (GPF 3/8)

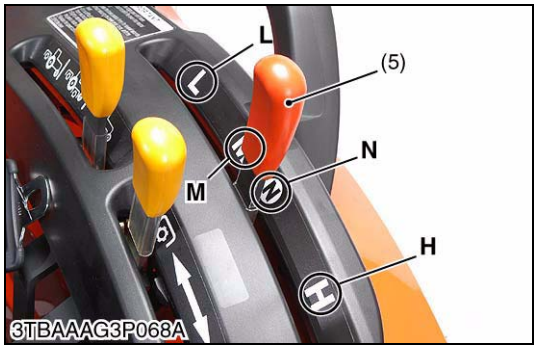
[A] 3 Cylinder Engine Model
[B] 4 Cylinder Engine Model

W1027846

(2) HST









Charge Pressure

CAUTION

- **When checking, park the tractor on flat ground and fully engage the parking brake.**

1. Remove the lowering speed adjusting knob and the seat under cover.
2. Remove the plug from **P1** port (reverse) or **P2** port (forward).

■ **NOTE**

- **If the plug is tight to remove, warm up the plug by a hair driver etc..**

3. Install the adaptor (4) to **P1** port (1) or **P2** port (2).
4. Install the cable (3) and low pressure gauge to the adaptor (4).

Engine speed	**Rated speed**
Range gear shift position	Neutral
HST pedal	Neutral

5. Start the engine and warm the oil before testing.
6. Change the range gear shift lever (5) to **"NEUTRAL"** position.
7. Run the engine at the rated speed.
8. Release the foot from the HST pedal (6).
9. Read the low pressure gauge to measure the charge relief pressure.
10. If the measurement is not same as factory specification, check the charge relief valve and the related hydraulic components.

Charge pressure	Factory spec.	0.4 to 0.6 MPa 4.1 to 6.1 kgf/cm^2 17.4 to 20.2 psi

■ **NOTE**

- **Low pressure gauge is 2.9 MPa (30 kgf/cm^2, 427 psi) full scale.**

(When reassembling)

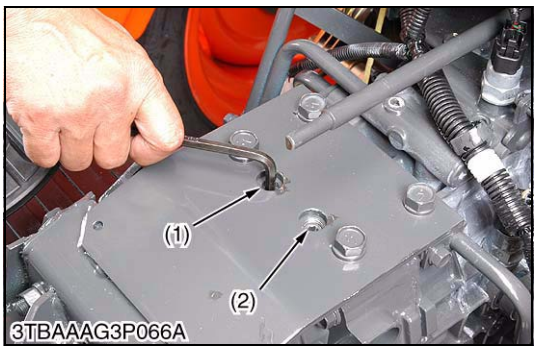
- Apply liquid lock (Three Bond 1375N or its equivalent) to the plug.

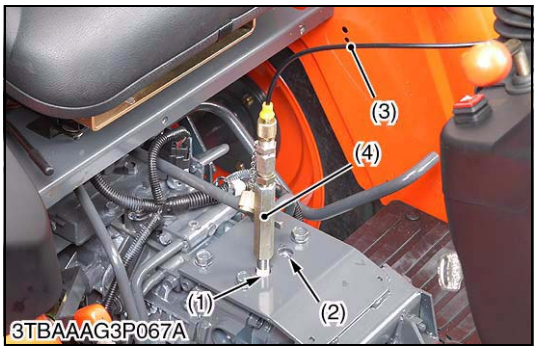
Tightening torque	Checking port plug	30 to 44 N·m 3.0 to 4.5 kgf·m 22 to 33 lbf·ft

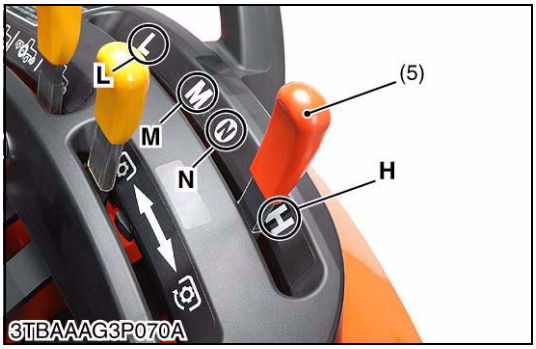
(1) **P1** Port (Reverse)
(2) **P2** Port (Forward)
(3) Cable
(4) Adaptor
(5) Range Gear Shift Lever
(6) HST Pedal

L : Low Speed Position
M : Medium Speed Position
N : Neutral Position
H : High Speed Position

W1011821









High Pressure Relief Valve Pressure (Reverse)

CAUTION

- **When checking, park the tractor on flat ground and fully engage the parking brake.**

1. Remove the lowering speed adjusting knob and the seat under cover.
2. Remove the plug from **P1** port (reverse).

NOTE

- **If the plug is tight to remove, warm up the plug by a hair drier etc..**

3. Install the adaptor (4) to **P1** port (1).
4. Install the cable (3) and high pressure gauge.

Engine speed	Rated speed
Range gear shift position	High
HST pedal	Reverse
Brake pedal	Depressed

5. Start the engine and warm the oil before testing. Check to see that parking brake is applied.
6. Place the range gear shift lever (5) to **"HIGH"** position.
7. Run the engine at the rated speed.
8. Depress the rear side pedal of the HST pedal (6).
9. Read the high pressure gauge to measure the high pressure relief valve pressure.
10. If the measurement is not the same as factory specification, check the check and high pressure relief valve assembly.

Check and high pressure relief valve (Oil temperature at 40 to 60 °C (104 to 140 °F)	Factory spec.	33.9 to 34.8 MPa 345 to 355 kgf/cm^2 4910 to 5040 psi

IMPORTANT

- **Measure quickly so than the relief valve may not be in operation more than 10 seconds.**

NOTE

- **High pressure gauge is 40 MPa (400 kgf/cm^2, 5800 psi) full scale.**
- **Engine speed : Rated speed**
- **Oil temperature : 45 to 55 °C**
  113 to 131 °C

(When reassembling)

- Apply liquid lock (Three Bond 1375N or its equivalent) to the plug.

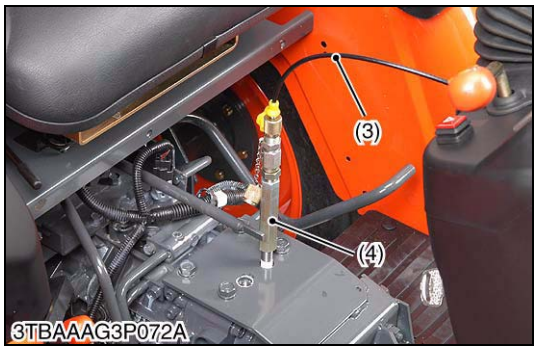
Tightening torque	Checking port plug	30 to 44 N·m 3.0 to 4.5 kgf·m 22 to 33 lbf·ft

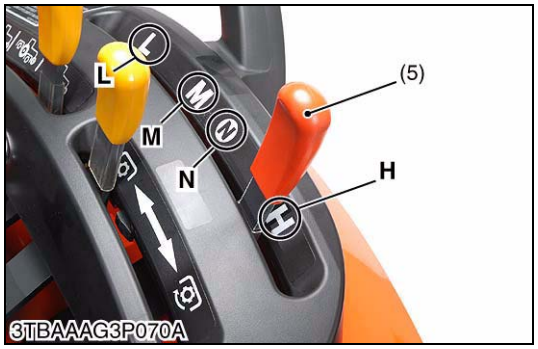
(1) **P1** Port (Reverse)
(2) **P2** Port (Forward)
(3) Cable
(4) Adaptor
(5) Range Gear Shift Lever
(6) HST Pedal

L : Low Speed Position
M : Medium Speed Position
N : Neutral Position
H : High Speed Position

W1031469









High Pressure Relief Valve Pressure (Forward)

CAUTION

- **When checking, park the tractor on flat ground and fully engage the parking brake.**

1. Remove the lowering speed adjusting knob and the seat under cover.
2. Remove the plug from **P2** port (forward).

NOTE

- **If the plug is tight to remove, warm up the plug by a hair drier etc..**

3. Install the adaptor (4) to **P2** port (1).
4. Install the cable (3) and high pressure gauge.

Engine speed	Rated speed
Range gear shift position	High
HST pedal	Forward
Brake pedal	Depressed

5. Start the engine and warm the oil before testing. Check to see that parking brake is applied.
6. Place the range gear shift lever (5) to **"HIGH"** position.
7. Run the engine at the rated speed.
8. Depress the front side pedal of the HST pedal (6).
9. Read the high pressure gauge to measure the high pressure relief valve pressure.
10. If the measurement is not same as factory specification, check the check and high pressure relief valve assembly.

Check and high pressure relief valve (Oil temperature at 40 to 60 °C (104 to 140 °F)	Factory spec.	33.9 to 34.8 MPa 345 to 355 kgf/cm^2 4910 to 5040 psi

IMPORTANT

- **Measure quickly so that the relief valve may not be in operation more than 10 seconds.**

NOTE

- **High pressure gauge is 40 MPa (400 kgf/cm^2, 5800 psi) full scale.**
- **Engine speed : Rated speed**
- **Oil temperature : 45 to 55 °C**
  113 to 131 °C

(When reassembling)

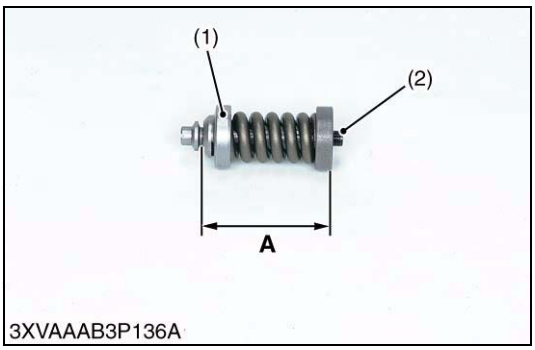
- Apply liquid lock (Three Bond 1375N or its equivalent) to the plug.

Tightening torque	Checking port plug (Forward)	30 to 44 N·m 3.0 to 4.5 kgf·m 22 to 33 lbf·ft

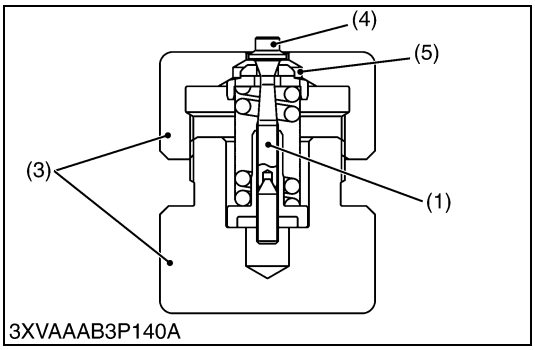
(1) **P1** Port (Reverse)
(2) **P2** Port (Forward)
(3) Cable
(4) Adaptor
(5) Range Gear Shift Lever
(6) HST Pedal

L : Low Speed Position
M : Medium Speed Position
N : Neutral Position
H : High Speed Position

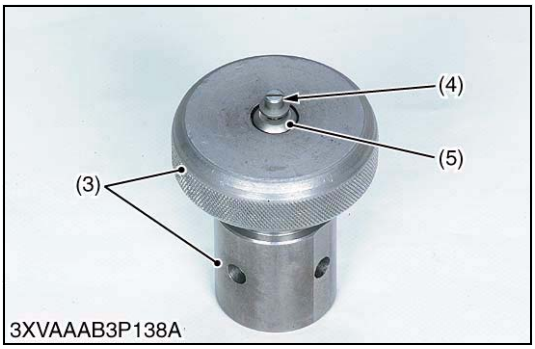
W1033174



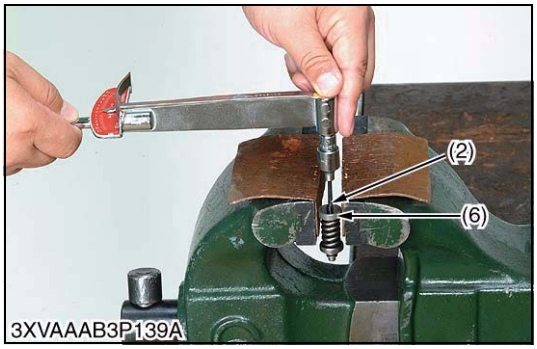
3XVAAAB3P136A



3XVAAAB3P140A



3XVAAAB3P138A



3XVAAAB3P139A

Readjustment of Relief Valve (When the HST does not work due to its loose hexagon socket head screw)

■ **IMPORTANT**

- **The KUBOTA does not recommend the readjustment of relief valve. And KUBOTA will recommend to replace with genuine parts.**
- **As the HST may be damaged if the pressure is set to higher by mistake, be careful when adjusting it.**

■ **NOTE**

- **The relief pressure is set in between 33.3 to 36.3 MPa (340 to 370 kgf/cm^2, 4836 to 5262 psi) when shipped from the factory. But, for the purpose of after-sales services, as it is impossible to reset the pressure precisely as set in the factory, its setting range is defined as a slightly wider range between 31.4 to 35.3 MPa (320 to 360 kgf/cm^2, 4551 to 5120 psi)**

1. Measure the pre-adjustment distance **A**.
2. Compress the spring of the relief valve with a relief valve assembling tool (3).
3. Then, find the distance **A** by turning the poppet (4) with a screwdriver.
   Reference: The distance **A** changes by about 0.5 mm (0.0197 in.) per one turn of the poppet (4).
4. Repeat the same operation a few times to find the distance **A** as it is difficult to acquire at the first time.
5. After finding the distance **A**, hold the setscrew (6) to a vice and fasten the hexagon socket head screw (2) with specified torque. On this occasion, use a copper plate, etc. for the vice jaws not to damage the setscrew (6).
6. Install the relief valve in the HST.
7. Check the relief pressure as indicated in page 3-S7 and 3-S8. The distance **A** is for refresh only. Make sure to check the relief pressure after readjutment.
8. If the relief pressure does not fall within the readjustment pressure range, repeat the processes of the above item 1 onward.
   Reference: The pressure changes by 1.47 MPa (15 kgf/cm^2, 213.3 psi) per 0.1 mm (0.0039 in.) in distance **A**.

Tightening torque	Hex. socket head screw	24.5 to 29.5 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 lbf·ft

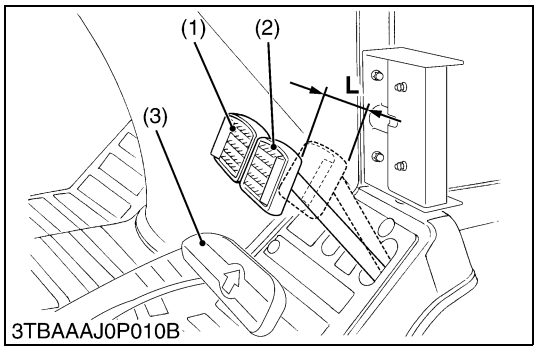
Relief valve readjusting pressure	Factory spec.	31.4 to 35.3 MPa 320 to 360 kgf/cm^2 4551 to 5120 psi

Distance **A**	Reference value	37.9 to 38.0 mm 1.4921 to 1.4960 in.

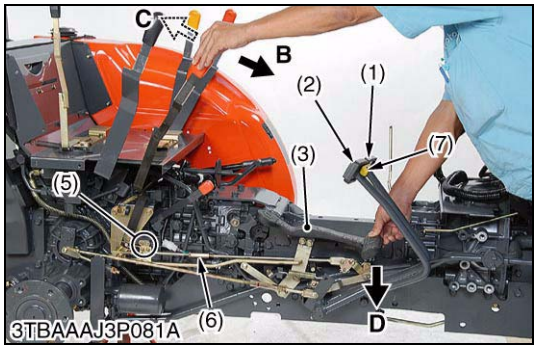
(1) Relief Valve Assembly
(2) Hexagon Socket Head Screw
(3) Relief Valve Assembling Tool
(4) Poppet
(5) Valve Seat
(6) Setscrew

W1034685

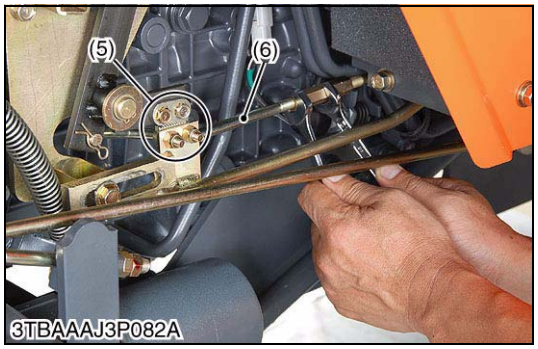
(3) Cruise Control



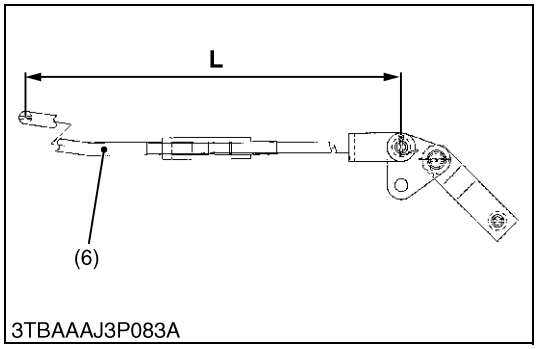
3TBAAAJ0P010B



3TBAAAJ3P081A



3TBAAAJ3P082A



3TBAAAJ3P083A

Cruise Control Adjustment

1. Before adjusting the cruise control adjustment, adjust the brake pedal free travel (2) securely.

Brake pedal free travel (**A**)	30 to 40 mm (1.18 to 1.57 in.) on the pedal
	Keep the free travel in the right and the left brake pedals equal.

Check the cruise control is operated properly as follows.

- The cruise control lever is returned to "**OFF**" position (**C**) when depressing two brake pedals simultaneously.
- The cruise control lever is still kept at "**ON**" position (**B**) when depressing one side brake pedal.

If the cruise control is not operated properly as two conditions mentioned above, adjust the cruise control as follows.

2. Depress the speed control pedal fully, and set the cruise control lever to "**ON**" position (**B**).
3. Remove the rear wheel (RH).

■ **Case 1 : When the cruise control lever is not returned to "OFF" position (C) properly by depressing both brake pedals, after connecting both the left and the right brake pedals.**

- Shorten the release rod (6) until the cruise control is returned to "**OFF**" position (**C**).

■ **Case 2 : When the cruise control lever is not kept at "ON" position (B) by depressing the one side brake pedal after disconnecting the brake pedal lock (7) from the right brake pedal.**

- Lengthen the release rod (6) until the cruise control is kept at "**ON**" position (**C**).

(Remarks)

- Since the cruise control adjustment range is very narrow, the release rod length is shown as a reference below.

Release rod length (**L**) (Reference valve)	B1830 B2230 B2530	534 mm 21.0 in.
	B3030	594 mm 23.4 in.

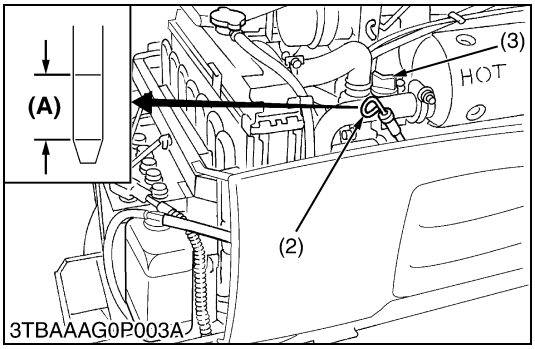
(1) Brake Pedal, LH
(2) Brake Pedal, RH
(3) Speed Control Pedal
(4) Cruise Control Lever
(5) Lock Plate
(6) Release Rod
(7) Brake Pedal Lock

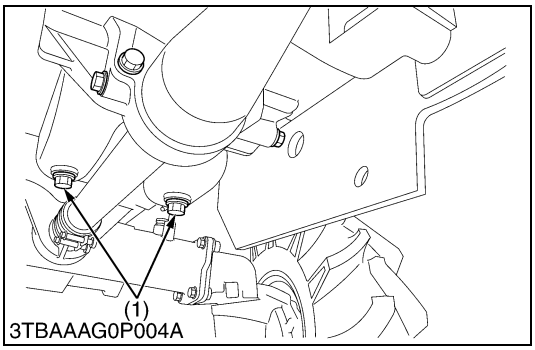
A : Brake Pedal Free Travel
B : Cruise Control Lever "ON" Position
C : Cruise Control Lever "OFF" Position
D : Speed Control Lever "Forward" Position
L : Release Rod Length

W1039450

[2] PREPARATION

(1) Draining Lubricants and Coolant





Draining Engine Oil

CAUTION

- **Before changing oil, be sure to stop the engine.**

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw in the drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

■ **IMPORTANT**

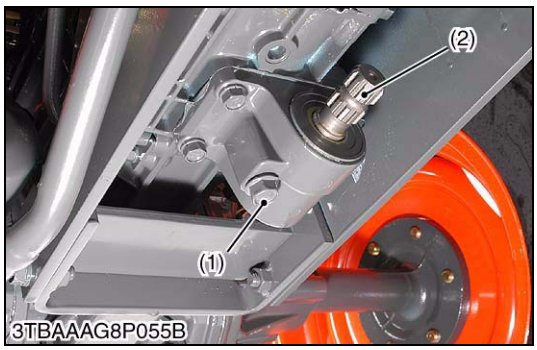
- **When using an oil of different manufacture or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Use the proper SAE Engine Oil according to ambient temperatures.**
- **Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)**

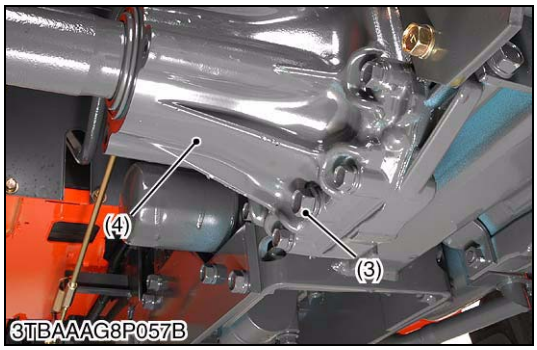
Engine oil capacity	B1830, B2230, B2530	3.0 L 3.2 U.S.qts 2.6 lmp.qts
	B3030	4.1 L 4.3 U.S.qts 3.6 lmp.qts

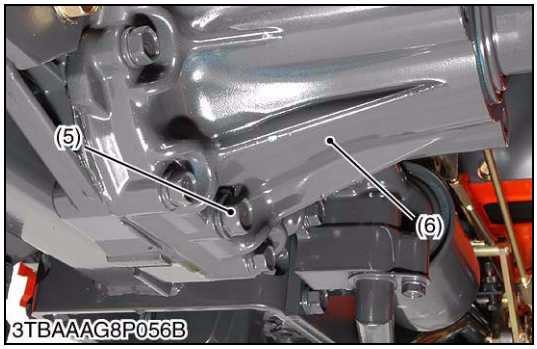
(1) Drain Plug
(2) Dipstick
(3) Oil Inlet Plug

(A) Oil level is acceptable within this range.

W1014065







Draining Transmission Fluid

CAUTION

- **Stop the engine before checking and changing the transmission fluid.**

1. Place the oil pan under the tractor.
2. Remove the drain plugs (1) (3) (5) at the mid-PTO shaft and at the bottom of the rear axle cases (4) (6).
3. Drain the transmission fluid.
4. After draining the transmission fluid, reinstall the drain plugs (1), (3), (5).

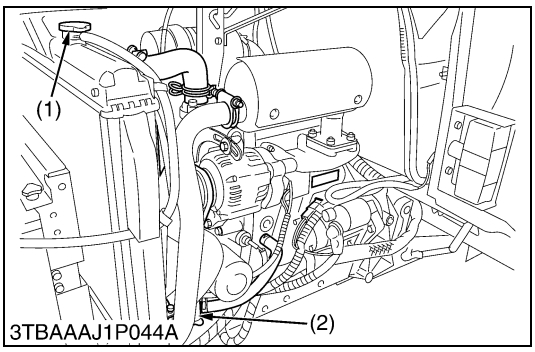
IMPORTANT

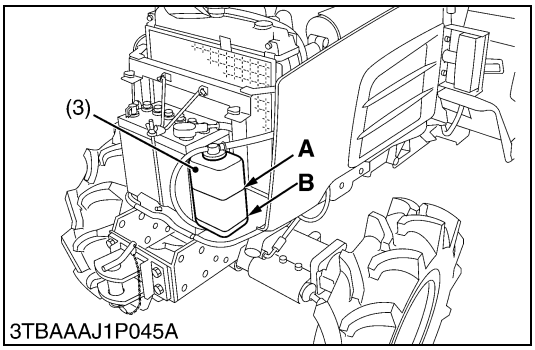
- **Use only KUBOTA UDT oil. Use of other oils may damage the transmission or hydraulic system.**
  Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7).
- **Never work the tractor immediately after changing the transmission oil. Keep the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030HST	17 L 4.5 U.S.gals 3.7 Imp.gals

(1) Drain Plug
(2) Mid-PTO Shaft
(3) Drain Plug
(4) Rear Axle Case (LH)
(5) Drain Plug
(6) Rear Axle Case (RH)

W1096260





Draining Coolant

CAUTION

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

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

IMPORTANT

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

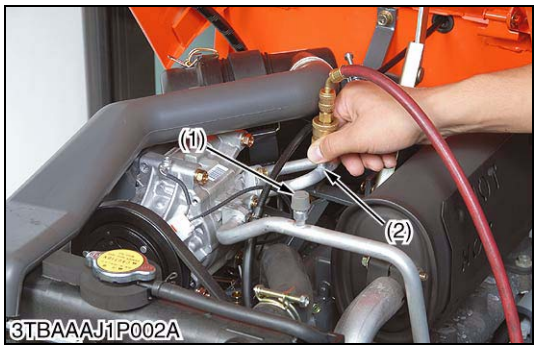
Coolant capacity (with recovery tank)	B1830, B2230, B2530, B3030	4.5 L 4.7 U.S.qts 4.0 Imp.qts
	CABIN model	5.2 L 6.3 U.S.qts 4.8 Imp.qts

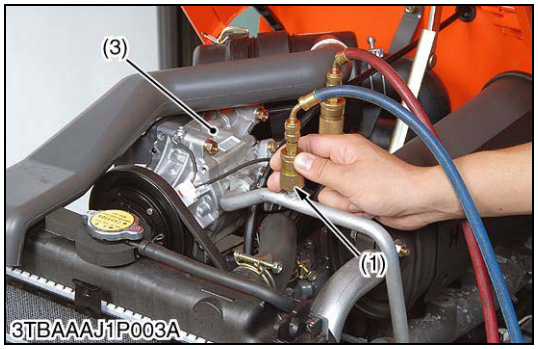
(1) Radiator Cap
(2) Drain Cock
(3) Recovery Tank

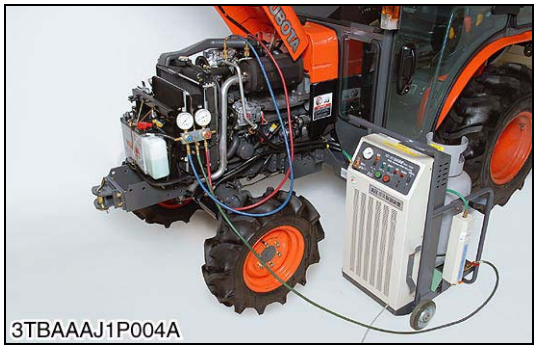
A : FULL
B : LOW

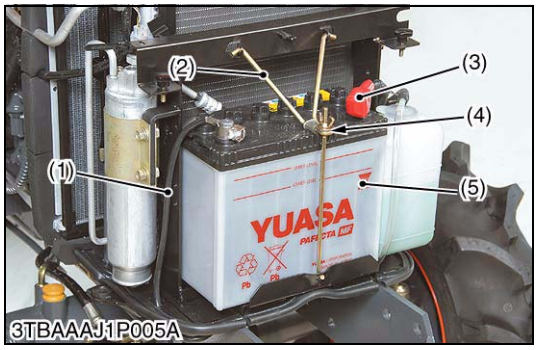
W1021307

(2) Separating Cabin from Tractor Body (CABIN)









Discharging R134a Refrigerant

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
(2) **HI** Pressure Side Charging Valve
(3) Compressor

W1077370

Removing Battery

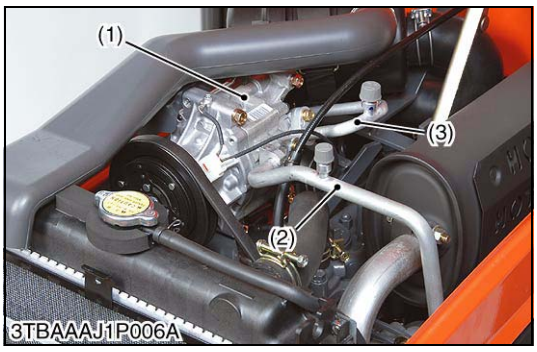
1. Removing the wing nut (4).
2. Remove the battery retainer (2).
3. Disconnect the battery negative cable (1) from the battery (5).
4. Disconnect the battery positive cable (3) from the battery (5).
5. Remove the battery (5).

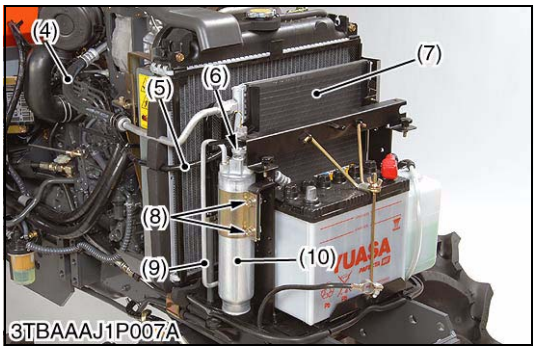
(When reassembling)

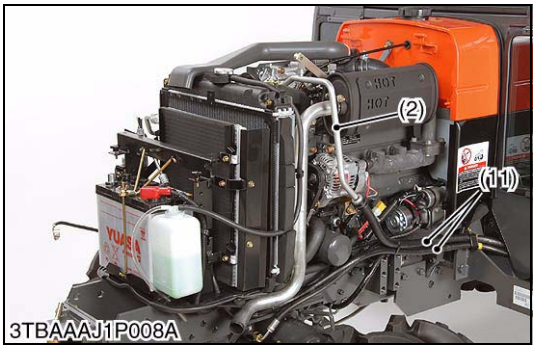
- Connect the battery positive cable first.
- Connect the battery negative cable second.

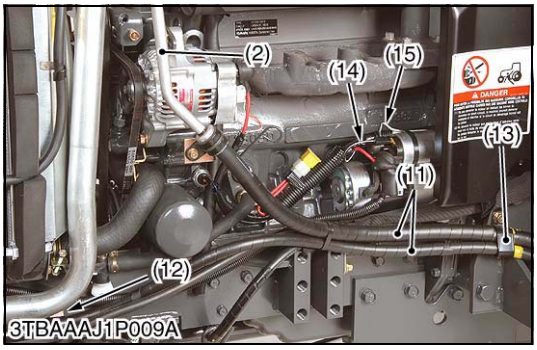
(1) Battery Negative Cable
(2) Battery Retainer
(3) Battery Positive Cable
(4) Wing Nut
(5) Battery

W1077632









Removing Receiver, Condenser and Refrigerant Hoses

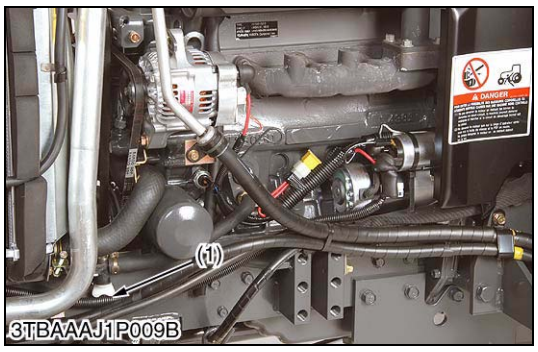
1. Disconnect the high pressure pipe (3) and the low pressure pipe (2) from the compressor.
2. After removing the battery, disconnect the connector from the receiver pressure switch. Remove the bolts (8) and the receiver (10).
3. Remove the condenser (7).
4. Remove the refrigerant clamps (12) (13).
5. Dismount the receiver, the condenser with the refrigerant hose (1) not to bend or not to damage the refrigerant pipes connected to the receiver.

(When reassembling)

- Connect the battery positive cable first.
- Connect the battery negative cable second.

(1) Compressor
(2) Low Pressure Pipe
(3) High Pressure Pipe
(4) Refrigerant Hose
(5) Wiring Harness
(6) Pressure Switch
(7) Condenser
(8) Bolt
(9) Refrigerant Pipe
(10) Receiver
(11) Refrigerant Hose
(12) Clamp
(13) Clamp

W1039311



Disconnecting Water Hoses

1. Loosen the water drain cock (1).
2. Drain the coolant.
3. Remove the hose clamps (3). Disconnect the water hoses (2) from the engine.

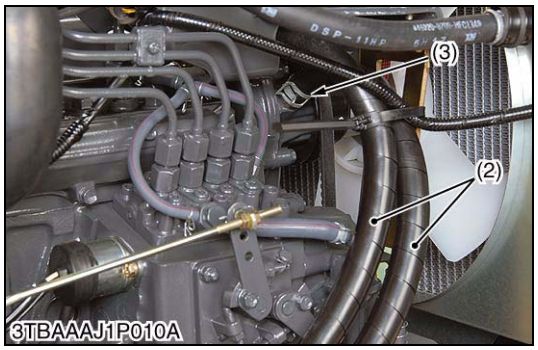
(When reassembling)

- Fill the coolant to the specified capacity.

Coolant capacity (with recovery tank)	CABIN model	5.2 L 6.3 U.S.qts 4.8 Imp.qts

(1) Water Drain Cock
(2) Water Hose
(3) Hose Clamp

W1043014

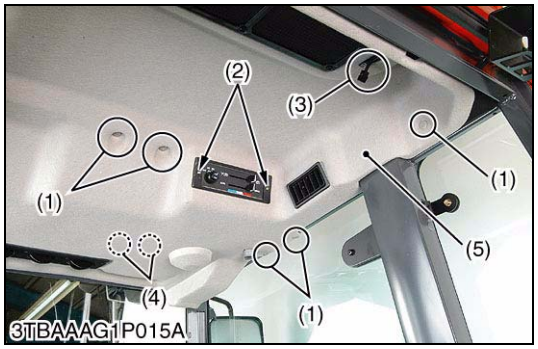


Removing Inner Roof

1. Remove the screws (2) from the control panel.
2. Remove the knob (3).
3. Remove the rivets (1) and the screws (4) from the inner roof (5).

(1) Rivet
(2) Screw
(3) Knob
(4) Screw
(5) Inner Roof

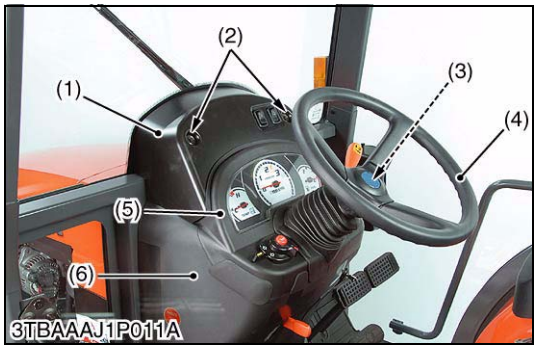
W1078469



Removing Steering Wheel and Meter Panel

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut (3).
3. Remove the steering wheel with a steering wheel puller (Code No. 07916-51090).
4. Remove the bolts (2) and the front wiper cover (1).
5. Disconnect the coupler.
6. Remove the meter panel (5).
7. Disconnect the hour-meter cable (8) from the meter panel.
8. Remove the panel lower cover (6).
9. Remove the spring (10) and the steering post stay (9).
10. Remove the bolts (7) from the cabin frame.

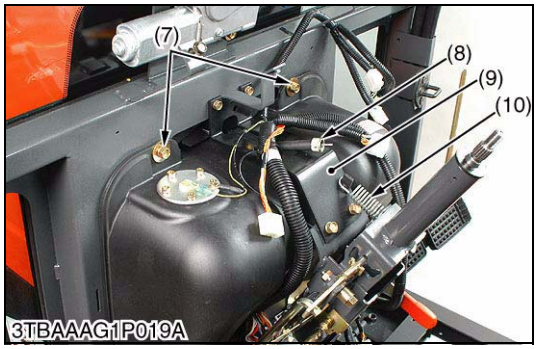
(When reassembling)



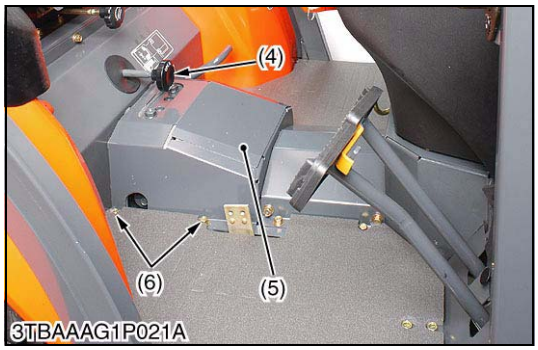
Tightening torque	Steering wheel mounting nut	24.9 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft

(1) Front Wiper Cover
(2) Bolt
(3) Nut
(4) Steering Wheel
(5) Meter Panel
(6) Panel Lower Cover
(7) Bolt
(8) Hour-meter cable
(9) Steering Post Stay
(10) Spring

W1079311







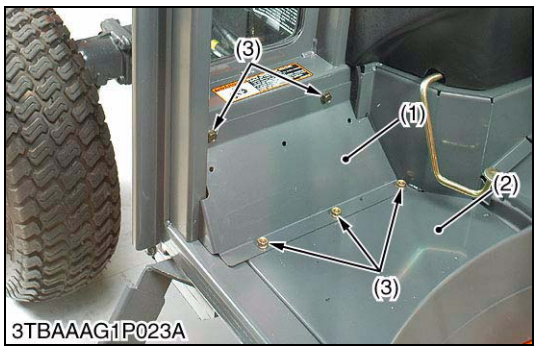


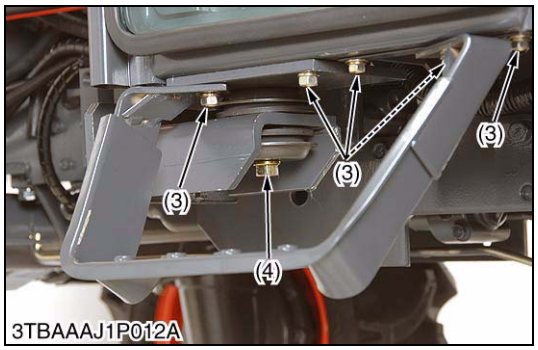
Removing HST Pedal, Floor Mat and Seat Front Cover

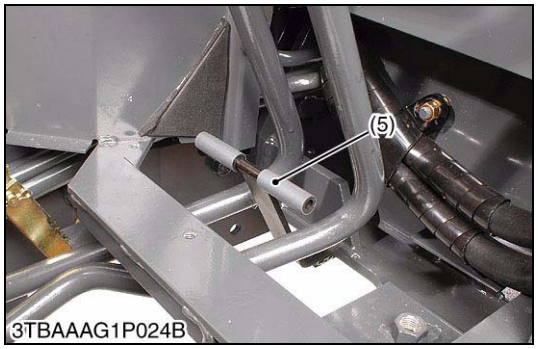
1. Remove the bolts (2) and the HST pedal (1).
2. Remove the grip (4). Remove the differential lock pin at the right side rear axle shaft.
3. Remove the bolts (6) and the seat front cover (5) from the fenders and the steps.

(1) HST Pedal
(2) Bolt
(3) Floor Mat
(4) Grip
(5) Seat Front Cover
(6) Bolt

W1080336







Removing Cover, Step and Stopper

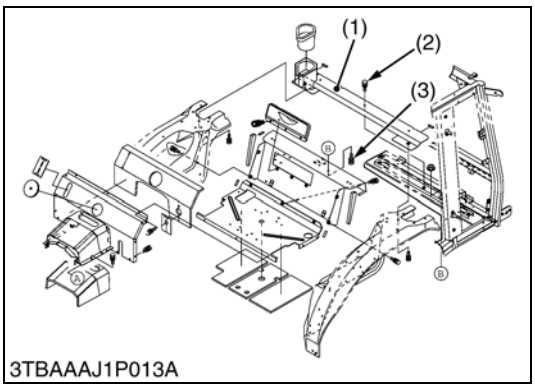
1. Remove the bolts (3).
2. Remove the cover (1).
3. Remove the bolts and the step (2).
4. Remove the bolt and the stopper (5).
5. Remove the cabin mounting bolts and the nuts.

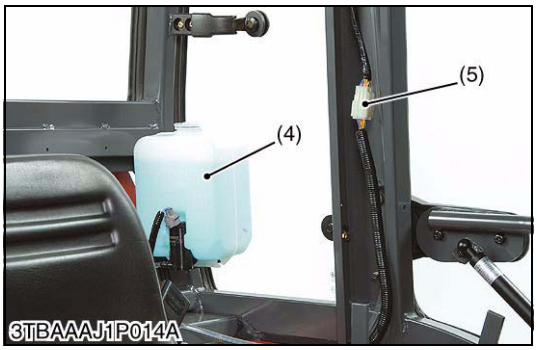
(When reassembling)

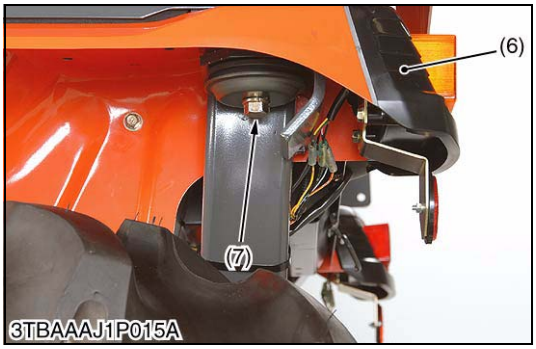
Tightening torque	Cabin mounting bolts and nuts (M14)	100 to 120 N·m 10.2 to 12.2 kgf·m 73.8 to 88.5 lbf·ft

(1) Cover
(2) Step
(3) Bolt
(4) Bolt and Nut
(5) Stopper

W1080434







Disconnecting Wiring Harness and Removing Cabin Mounting Bolt

1. After removing the seat, remove the bolts (2) and the rear fender cover (1).
2. Remove the bolts (3) from the cabin frame.
3. Disconnect the connector from the window washer tank (4).
4. Disconnect the cabin connector (5).
5. After disconnecting the leads from tail light body (6), remove the tail light body (6) from the fenders.
6. Remove the cabin mounting bolts and nuts (7)

(When reassembling)

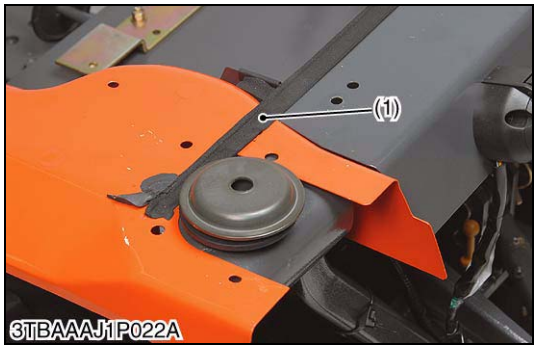
Tightening torque	Cabin mounting bolts and nuts (M14)	100 to 120 N·m 10.2 to 12.2 kgf·m 73.8 to 88.5 lbf·ft

(1) Rear Fender Cover
(2) Bolt
(3) Bolt
(4) Window Washer Tank
(5) cabin Connector
(6) Tail Light Body
(7) Cabin Mounting Bolt and Nut

W1061018







Dismounting Cabin

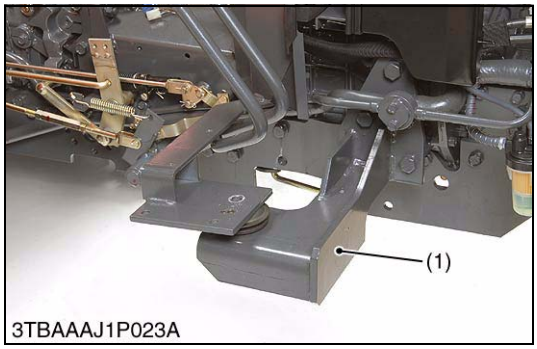
1. Hook the cabin with the nylon slings not to damage the other roof.
2. Dismount the cabin from the tractor body.
3. Support the cabin with the rigid jacks.

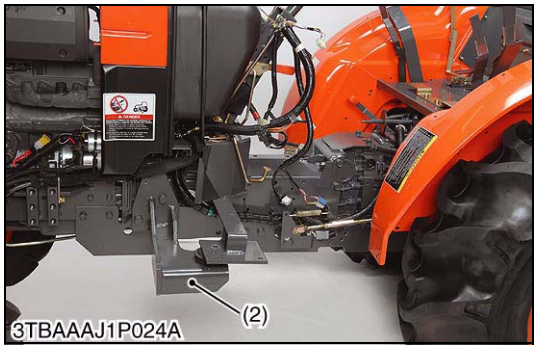
(When reassembling)

- If the beam shield (1) is damaged, replace it with a new one.

(1) Beam Shield
(2) Bolt and Nut
(3) Bolt and Nut
(4) Bolt

W1081774





Removing Cabin Support

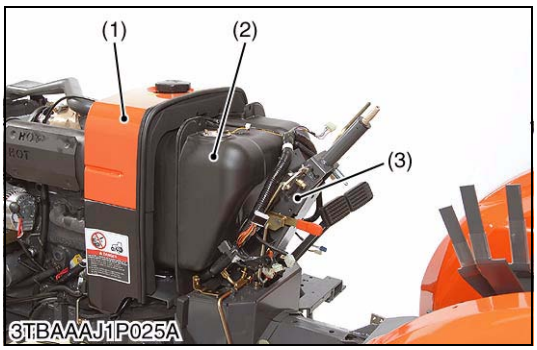
1. Remove the cabin support (RH) (1) and the cabin support (LH) (2).

(When reassembling)

Tightening torque	Cabin support mounting bolt	100 to 110 N·m 10.2 to 11.2 kgf·m 73.8 to 81.1 lbf·ft

(1) Cabin Support (RH)
(2) Cabin Support (LH)

W1084673



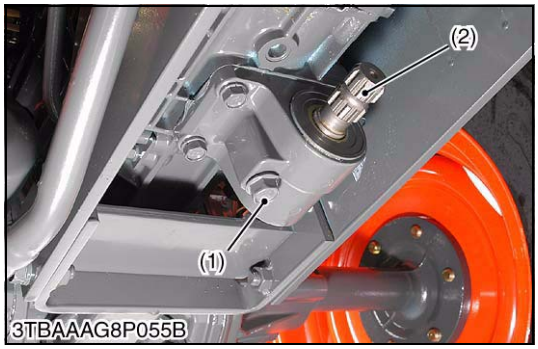
Removing Center Pillar, Fuel Tank and Steering Post Assembly

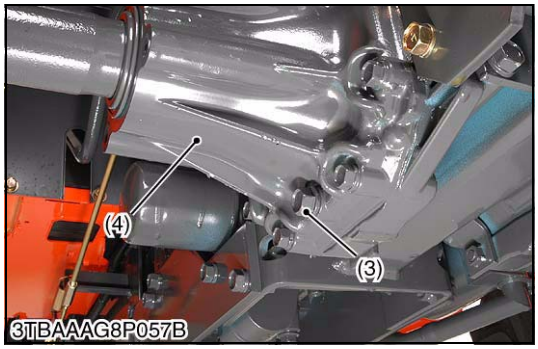
1. Remove the center pillar (1).
2. Remove the fuel tank (2) and shutter plate.
3. Disconnect the power steering hoses and pipes.
4. Remove the steering post assembly (3).

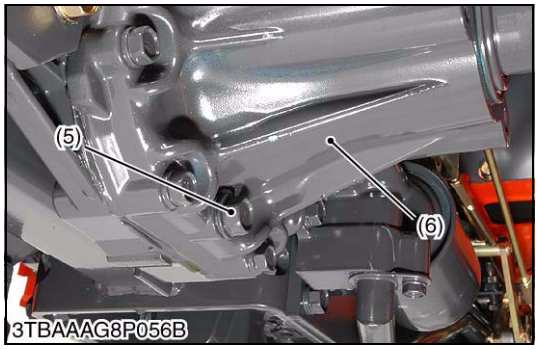
(1) Center Pillar
(2) Fuel Tank
(3) Steering Post Assembly

W1084824

(3) Separating Engine and Front Case from Tractor







Draining Transmission Fluid

CAUTION

- **Stop the engine before checking and changing the transmission fluid.**

1. Place the oil pan under the tractor.
2. Remove the drain plugs (1) (3) (5) at the mid-PTO shaft and at the bottom of the rear axle cases (4) (6).
3. Drain the transmission fluid.
4. After draining the transmission fluid, reinstall the drain plugs (1), (3), (5).

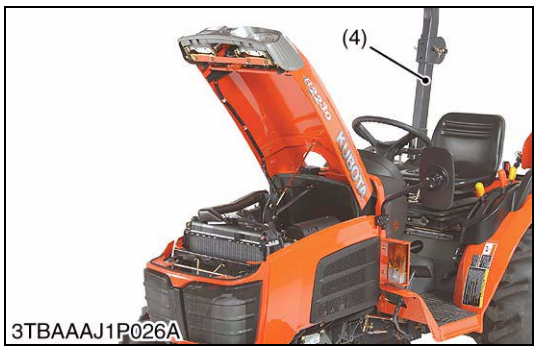
IMPORTANT

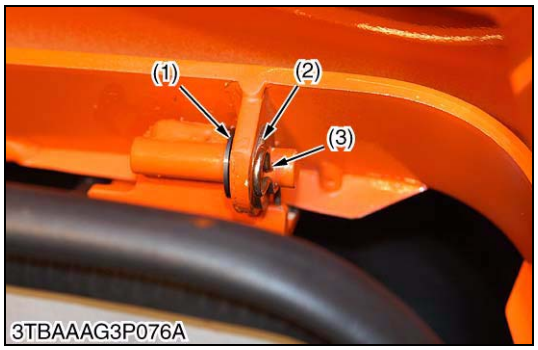
- **Use only KUBOTA UDT oil. Use of other oils may damage the transmission or hydraulic system. Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7).**
- **Never work the tractor immediately after changing the transmission oil. Keep the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030 HST	17 L 4.5 U.S.gals 3.7 Imp.gals

(1) Drain Plug
(2) Mid-PTO Shaft
(3) Drain Plug
(4) Rear Axle Case (LH)
(5) Drain Plug
(6) Rear Axle Case (RH)

W1094959







Bonnet, Front Grille, Side Covers and ROPS

1. Open the bonnet.
2. Remove the pin (3) and the plain washer (2).
3. Remove the wiring harness from the bonnet.
4. Remove the hood.
5. Remove the front grille and the side covers.
6. Remove the ROPS (4).

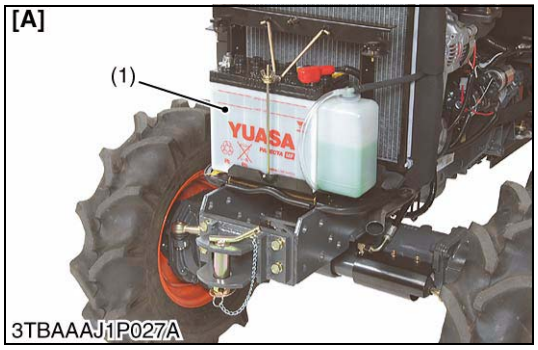
(When reassembling)

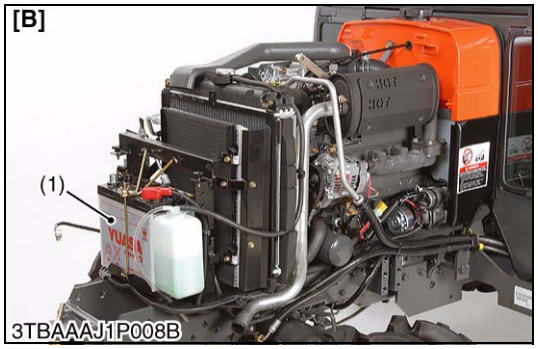
1. Install the bush (1) to the bonnet securely.
2. Install the hood.
3. Don't damage the bonnet when installing it.

Tightening torque	ROPS mounting bolt (for middle and lower frames, 9/16-18 UNF)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
	ROPS mounting bolt (M12)	90 to 95 N·m 9.2 to 9.7 kgf·m 66.4 to 70.1 lbf·ft

(1) Bush
(2) Plain Washer
(3) Pin
(4) ROPS

W1099886





Battery

1. Disconnect the battery negative cable first.
2. Disconnect the battery positive cable second.
3. Remove the battery (1).
4. Remove the front hitch.

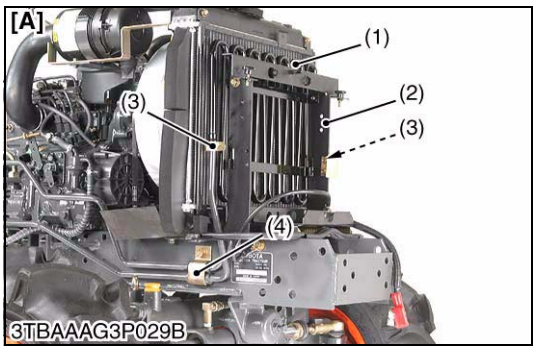
(When reassembling)

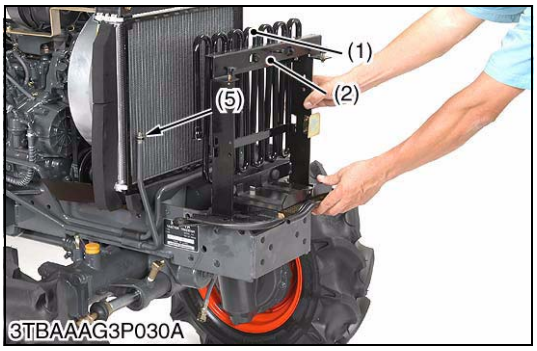
- Connect the battery positive cable first.
- Connect the battery negative cable second.

(1) Battery

[A] Manual Transmission Model
[B] HST Model

W1014971





Oil Cooler and Battery Stay (HST)

1. Remove the oil cooler pipe plate spring (3).
2. Remove the clamp(4).
3. Remove the battery stay (2).

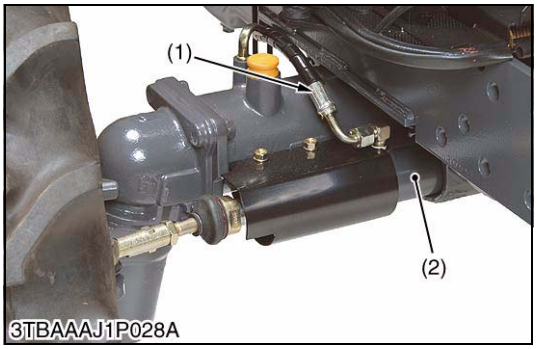
■ **NOTE**

- **Don't damage the O-ring (5).**
- **Don't damage the oil cooler pipe and delivery pipes.**

(1) Oil Cooler
(2) Battery Stay
(3) Plate Spring
(4) Clamp
(5) O-ring

[A] HST Model

W1040071



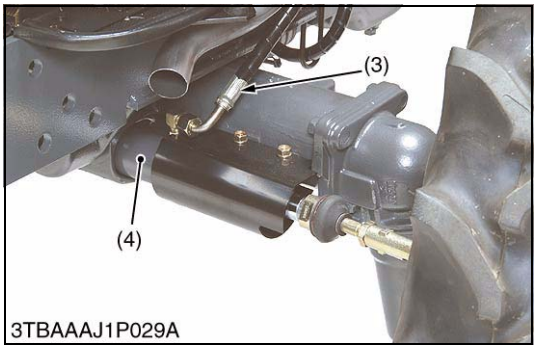
Hydraulic Hoses from Power Steering Cylinder

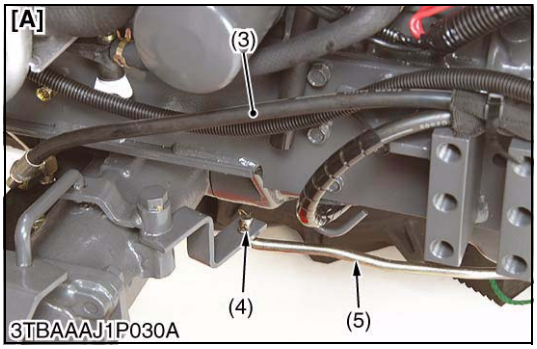
1. Disconnect the hydraulic hoses (1) (3) from the power steering cylinder (2).
2. Removing the snap pin (4) and disconnect the Bi-Speed rod (5).

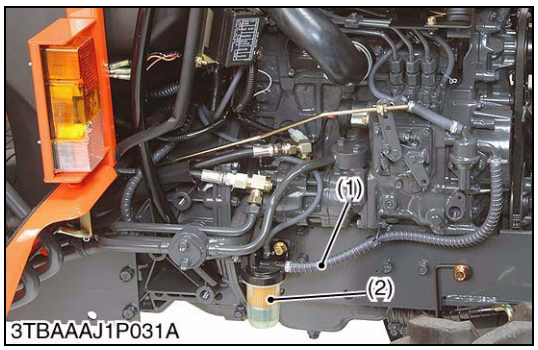
(1) Hydraulic Hose (RH)
(2) Power Steering Cylinder
(3) Hydraulic Hose (LH)
(4) Snap Pin
(5) Bi-Speed Rod

[A] Bi-Speed Turn Model

W1015210





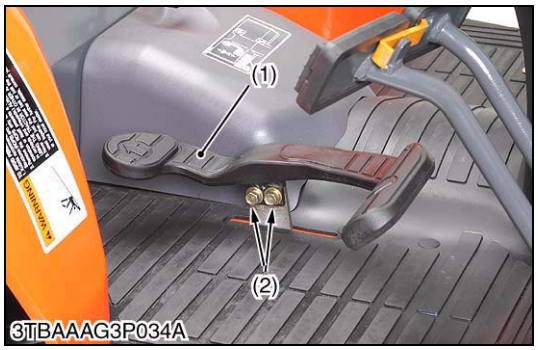


Fuel

1. Disconnect the fuel hose (1) from the fuel filter (2).
2. Drain the fuel from the fuel tank completely.

(1) Fuel Hose (from Fuel Tank) (2) Fuel Filter

W1015336

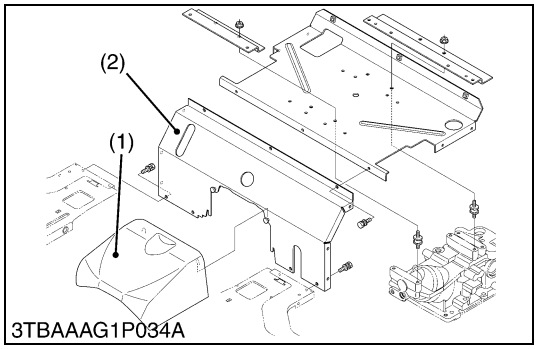


HST Pedal and Floor Mat

1. Remove the HST pedal mounting bolts (2).
2. Remove the HST pedal (1).
3. Remove the floor mat.

(1) HST Pedal (2) Bolt

W1015419



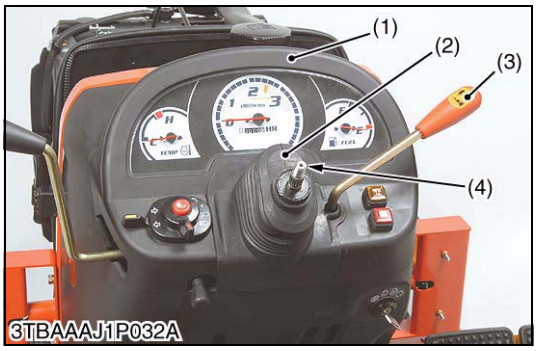
Front Cover

1. Remove the front cover (1) (2).

(1) Front Cover (2) Front Cover

W1015531









Steering Wheel, Meter Panel, Shuttle Lever and Panel Lower Cover

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut.
3. Remove the steering wheel with a steering wheel puller (Code No. 07916-51090).
4. Remove the accelerator lever grip (3) and the steering boot (2).
5. Disconnect the hour meter cable and wiring harness connectors.
6. Remove the meter panel (1) not to damage with the steering shaft (4).
7. Remove the shuttle lever (5).
8. Remove the panel lower cover (6).

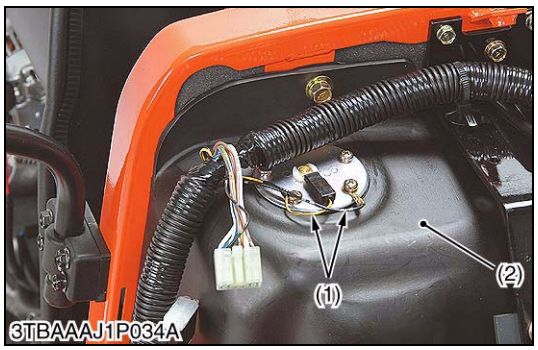
(When reassembling)

- Tighten the steering wheel mounting nut securely.

Tightening torque	Steering wheel mounting nut	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft

(1) Meter Panel
(2) Steering Boot
(3) Accelerator Lever Grip
(4) Steering Shaft
(5) Shuttle Lever
(6) Panel Lower Cover
(7) Meter Panel Hook

W1015674









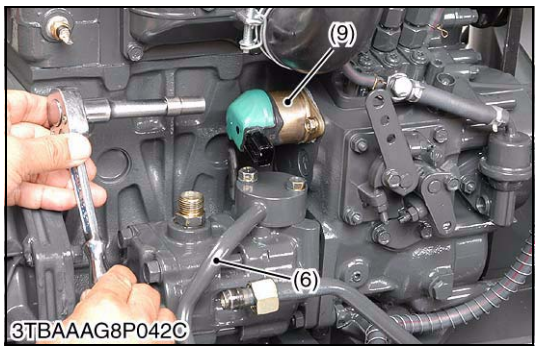


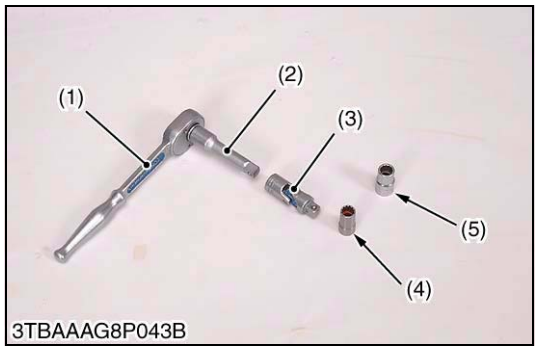
Fuel Tank

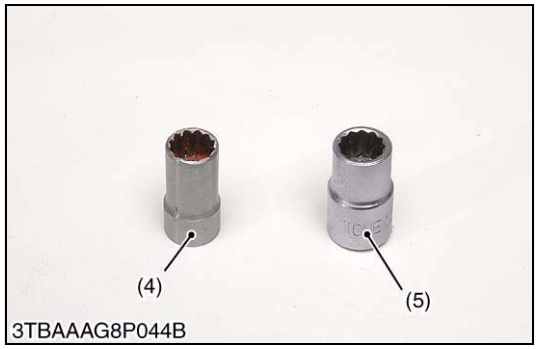
1. Disconnect the leads (1) from the fuel tank (2).
2. Remove the steering post stay (1).
3. Disconnect the overflow hoses from the fuel tank (2).
4. Remove the fuel tank (2).

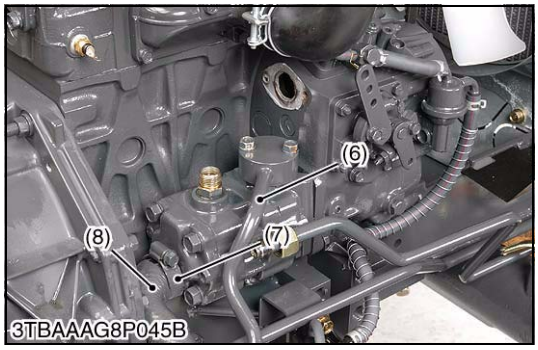
(1) Lead
(2) Fuel Tank
(3) Steering Post Stay
(4) Center Pillar
(5) Shuttle Plate

W1040319









Key Stop Solenoid and Hydraulic Delivery Pipe

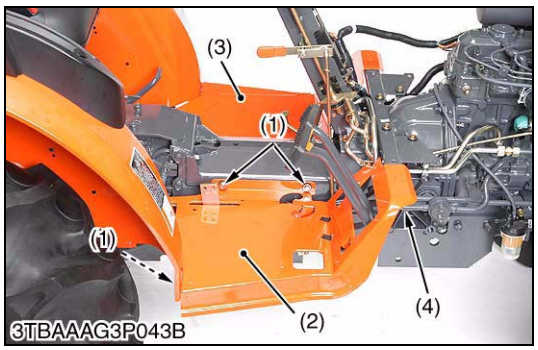
1. Remove the key stop solenoid connector.
2. Remove the engine stop solenoid (9) using a small size rachet handle (1), the extension joint (2), the universal joint (3) and the thinner socket (10 mm).
3. Remove the hydraulic delivery pipe mounting nuts.
4. Slide the hydraulic delivery pipe.
5. Loosen the hose band (7).
6. Disconnect the suction hose (8) from the hydraulic pump.

(When reassembling)

- Apply the liquid gasket (Three Bond 1206D or equivalent) to the joint face of the key stop solenoid and the engine.

(1) Rachet Handle
(2) Extension Joint
(3) Universal Joint
(4) Thinner Socket (10 mm, 0.39 in)
(5) Standard Socket (10 mm)
(6) Hydraulic Delivery Pipe
(7) Hose Band
(8) Suction Hose
(9) Engine Stop Solenoid

W1088429

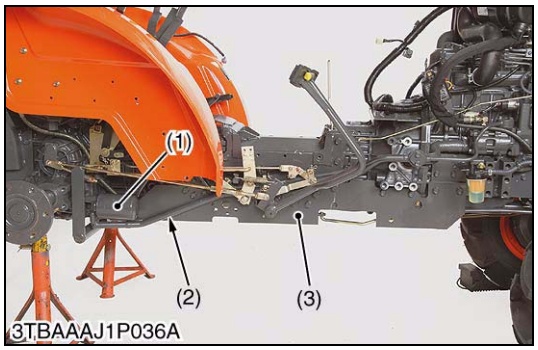


Steps (4-cylinder Engine, ROPS Model)

1. Remove the bolts (1) and the nut (4).
2. Remove the brake spring from the step (RH) (2). Remove the brake spring and the clutch spring from the step (LH) (3).
3. Remove the steps (2) (3).

(1) Bolt
(2) Step (RH)
(3) Step (LH)
(4) Nut

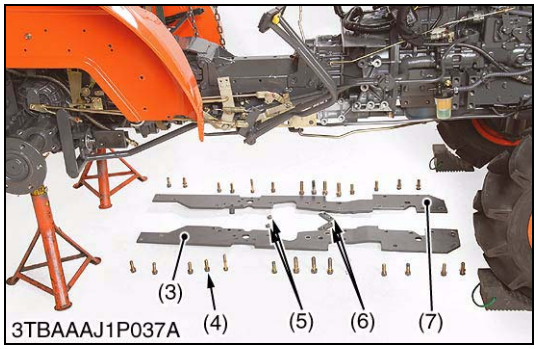
W1112590



Sub-Frames (4-cylinder Engine Model)

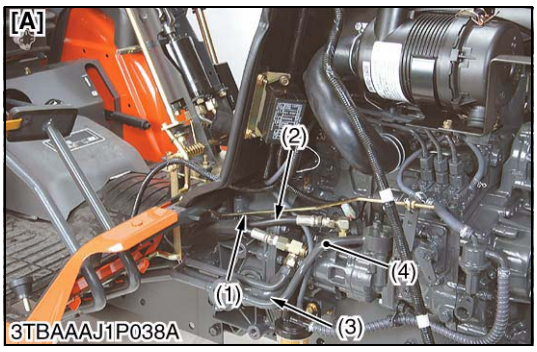
1. Place the rigid jack under the rear axle shaft.
2. Remove the transmission oil filter cartridge (1).
3. Loosen the sub-frame mounting bolts.
4. Remove the sub-frames (3) (7).

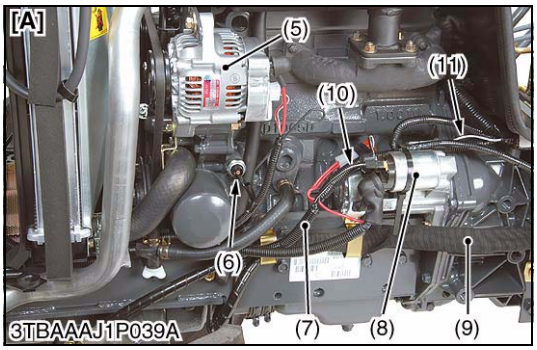
Tightening torque	Sub-frame mounting bolt for aluminum (M10)	39.3 to 45.1 N·m 4.0 to 4.6 kgf·m 29.0 to 33.2 lbf·ft
	Sub-frame mounting bolt for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft
	Sub-frame mounting bolt for ordinary material (M12)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 lbf·ft
	Sub-frame mounting bolt for ordinary material (M14)	126 to 150 N·m 12.9 to 15.3 kgf·m 93 to 111 lbf·ft

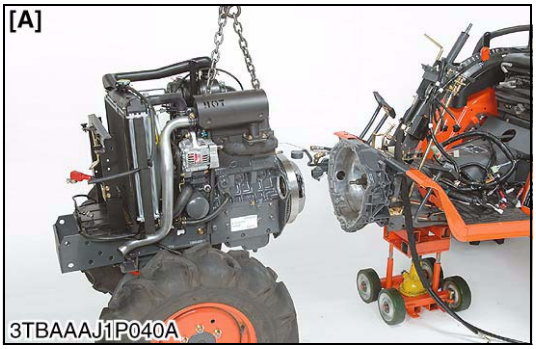


(1) Transmission Oil Filter Cartridge
(2) Suction Pipe
(3) Sub-frame (RH)
(4) Bolt
(5) Nut
(6) Steel Plate
(7) Sub-frame (LH)

W1016563









Separating Engine with Front Axle

1. Reinstall the rear tires.
2. Support the transmission with a disassembling stand.
3. Hook the engine with a hoist.
4. Place the disassembling stand under the main frame.
5. Disconnect the power steering hoses (2).
6. Loose the hydraulic inlet hose band. Disconnect the hydraulic inlet hose (3) from the hydraulic pump.
   Disconnect the hydraulic delivery pipe (4) from the hydraulic pump.
7. Disconnect the wiring leads from the alternator (5), the engine oil pressure switch (6) and the starter motor (8).
   Disconnect the wiring harness (7) and the power steering hoses (9) from the engine body.
8. Remove the docking bolts between the engine and the front case.

(When reassembling)

- Align the spline between the front wheel drive shaft and the universal joint securely.
- Tighten the docking bolts between the engine and the front case securely.

Tightening torque	Engine and front case mounting bolt and nut (M8)	17.7 to 20.5 N·m 1.8 to 2.1 kgf·m 13.1 to 15.1 lbf·ft
	Engine and front case mounting stud bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

(1) Accelerator Rod
(2) Power Steering Hose
(3) Hydraulic Inlet Hose
(4) Hydraulic Delivery Pipe
(5) Alternator
(6) Engine Oil Pressure Switch
(7) Wiring Harness
(8) Starter Motor
(9) Power Steering Hoses
(10) ST Terminal Lead
(11) Stop Solenoid Lead

[A] ROPS, Manual Transmission Model

W1093199

Separating Front Axle from Engine

1. Remove the exhaust pipe.
2. Disconnect the radiator hoses.
3. Remove the front axle frame mounting bolts.
4. Separate the front axle from the engine.
5. Remove the steering post assembly (1).

(When reassembling)

Tightening torque	Engine and front axle frame mounting bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

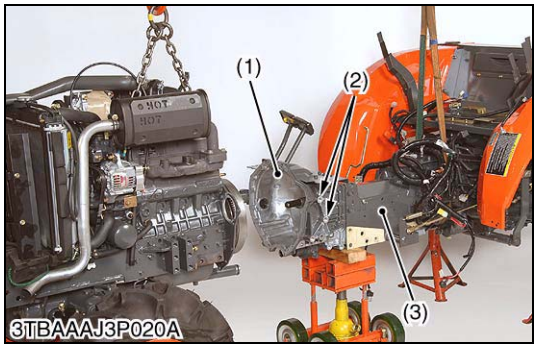
(1) Steering Post Assembly

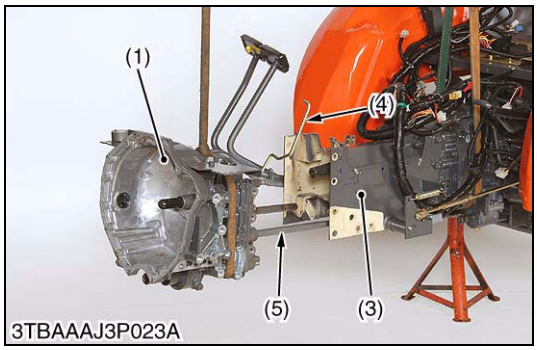
[A] ROPS, Manual Transmission Model

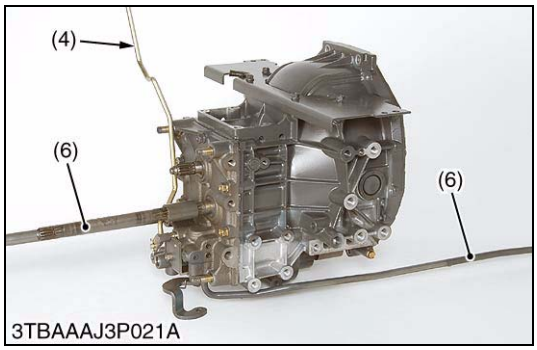
W1069085

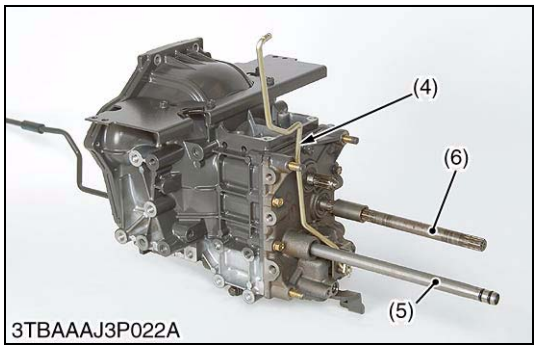
[3] DISASSEMBLING AND ASSEMBLING

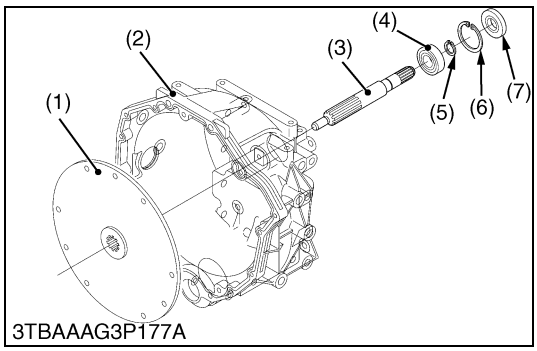
(1) Front Case











Front Case Assembly

1. Support the engine securely.
2. Remove the front case mounting bolts (1).
3. Remove the front case (3) from the frame (3).

(When reassembling)

- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint face of the engine and the front case.

Tightening torque	Front case mounting bolt for aluminum (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

(1) Front Case
(2) Bolt
(3) Frame
(4) Bi-Speed Rod 1
(5) Delivery Pipe
(6) Propeller Shaft

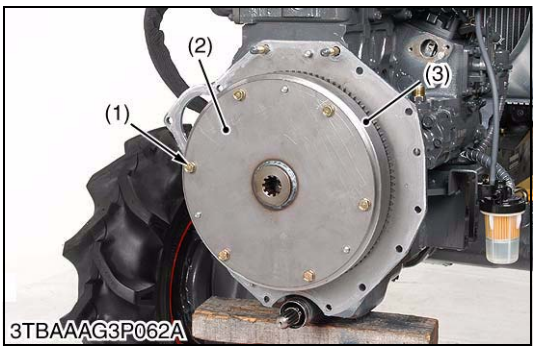
W1034463

Clutch Shaft and Ball Bearing

1. Remove the oil seal (7).
2. Remove the cir-clip (6).
3. Remove the clutch shaft (3) from the front case (2).

(1) Steal Plate
(2) Front Case
(3) Clutch Shaft
(4) Ball Bearing
(5) External Cir-clip
(6) Internal Cir-clip
(7) Oil Seal

W1034707



Steel Plate

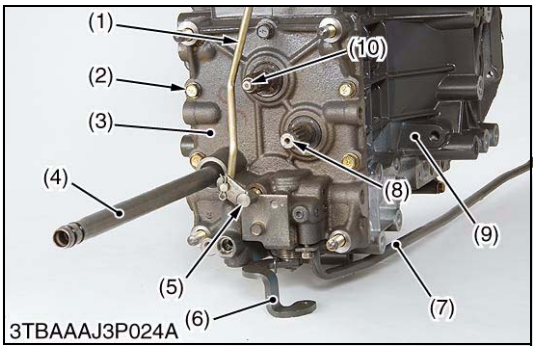
1. Remove the steel plate mounting bolts (1).
2. Remove the steel plate (2) from the flywheel.

- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint face of the engine and the front case.

Tightening torque	Steel plate mounting bolt (M8)	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft

(1) Steel Plate Mounting Bolt
(2) Steel Plate
(3) Flywheel

W1074681



Bi-Speed Turn ON-OFF Valve and Front Case Rear Cover

1. Remove the Bi-Speed Turn rod 1 (1), the Bi-Speed Turn ON-OFF valve (5) and the Bi-Speed Turn Valve (6).
2. Remove the connecting pipe (4).
3. Remove the front case rear cover mounting bolts 2) and the front case rear cover (3).

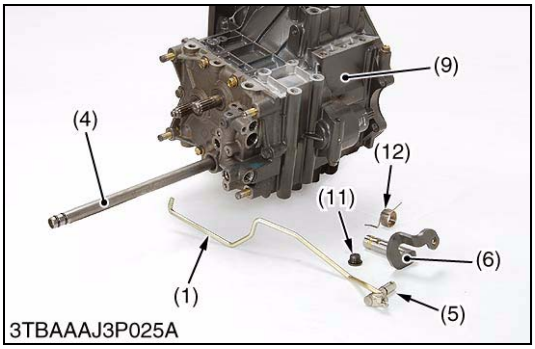
(When assembling)

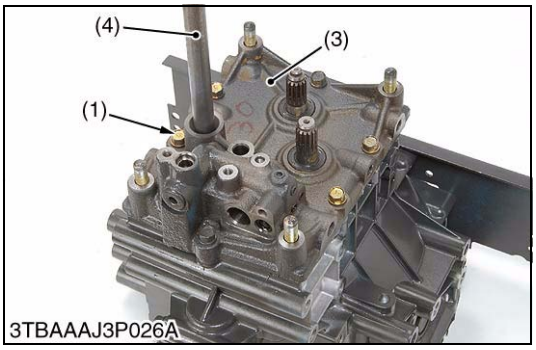
- Check the oil seals and the O-ring for damage.

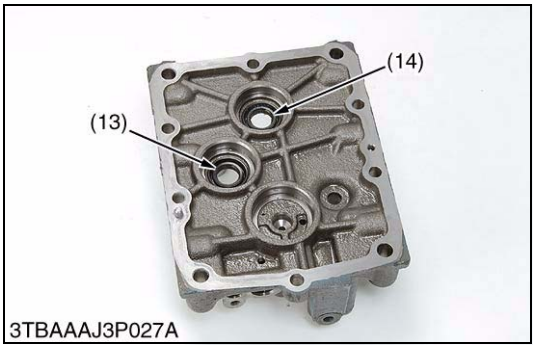
Tightening torque	Front case rear cover mounting bolt for aluminum (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft
	Front case rear cover mounting stud bolt for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft

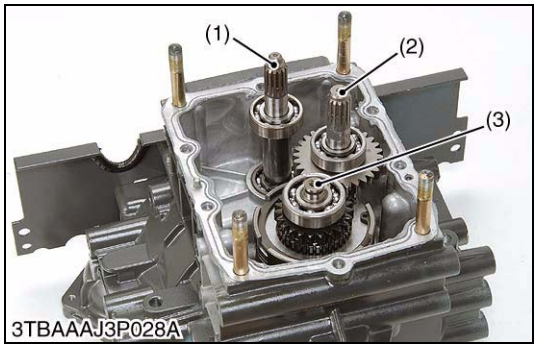
(1) Bi-Speed Turn Rod 1
(2) Bolt
(3) Front Case Rear Cover
(4) Connecting Pipe
(5) Bi-Speed Turn ON-OFF Valve
(6) Bi-Speed Turn Valve
(7) Delivery Pipe
(8) Front Wheel Drive Shaft 1
(9) Front Case
(10) Clutch Shaft
(11) Plug
(12) Spring
(13) Oil Seal
(14) Oil Seal

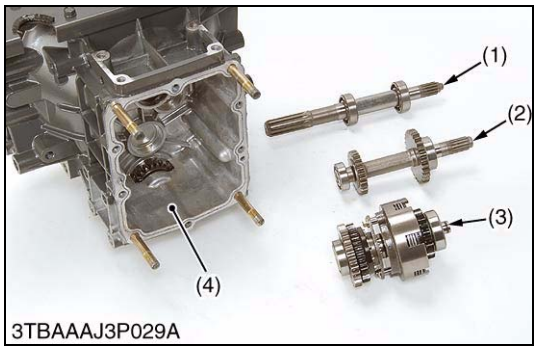
W1096212

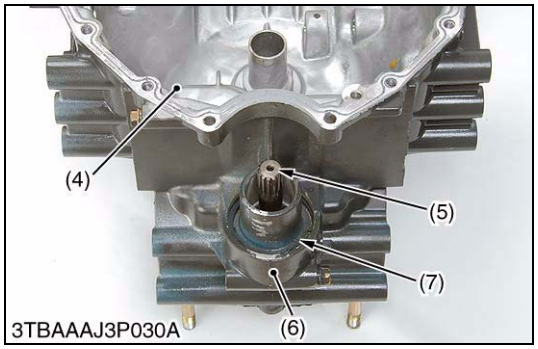


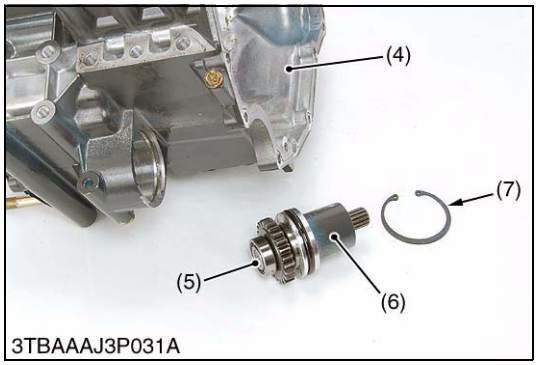










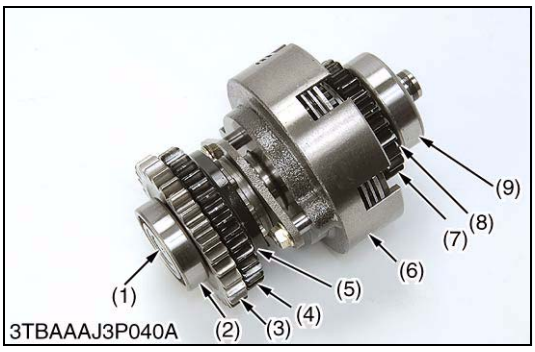


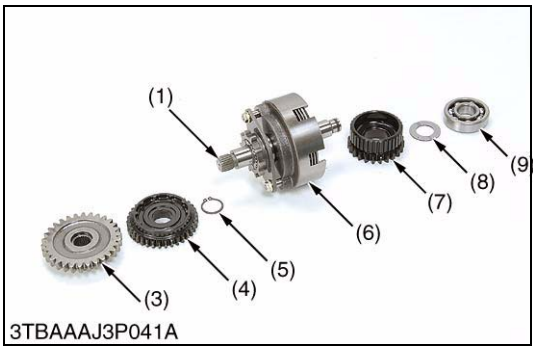
Bi-Speed Turn Clutch Assembly and Front Wheel Drive Shaft 1

1. Remove the clutch shaft 1), the front wheel drive shaft 1 (2) and Bi-Speed Turn clutch shaft (3) from the front case (4).
2. Remove the internal cir-clip (7).
3. Remove the front wheel drive shaft 3 (5) with the bearing holder (6).

(1) Clutch Shaft
(2) Front Wheel Drive Shaft 1
(3) Bi-Speed Turn Clutch Shaft
(4) Front Case
(5) Front Wheel Drive Shaft 3
(6) Bearing Holder
(7) Internal Cir-clip

W1097482





Disassembling Bi-Speed Turn Clutch Assembly 1

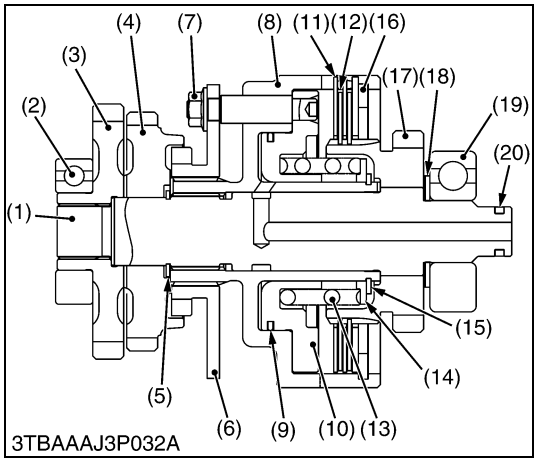
1. Remove the bearings (2).
2. Remove the 30T gear (3), the 35T gear (4) and the cir-clip (5).
3. Remove the bearing 9).
4. Remove the thrust collar (8) and the 23T gear (7).

(When assembling)

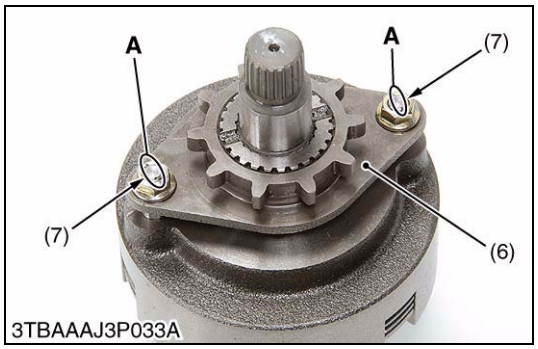
- Check the seal ring for damage.

(1) Bi-Speed Turn Clutch Shaft (Front Wheel Drive Shaft 2)
(2) Bearing
(3) 30T Gear
(4) 35T Gear
(5) Cir-clip
(6) Bi-Speed Turn Clutch Case
(7) 23T Gear
(8) Thrust Collar
(9) Bearing

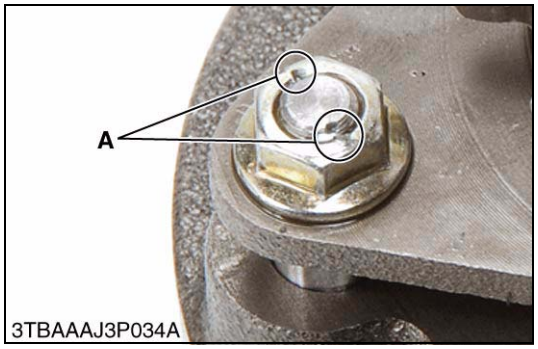
W1104348



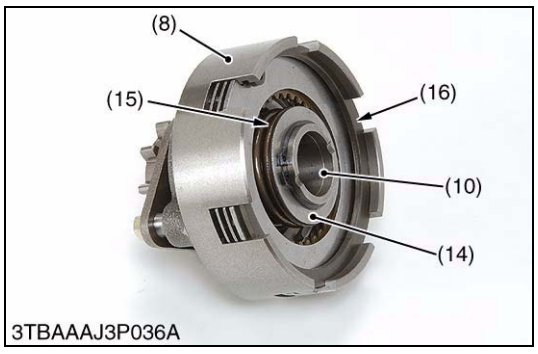
3TBAAAJ3P032A



3TBAAAJ3P033A



3TBAAAJ3P034A



3TBAAAJ3P036A

Disassembling Bi-Speed Turn Clutch Assembly 2

1. Remove the Bi-Speed Turn clutch shaft (1).
2. Loosen and remove the flange nuts (7).
3. Remove the shifter (6).
4. Remove the cir-clip with the special tools (21) (22).
5. Remove the internal cir-clip (16).
6. Remove the clutch disks (12) and the plates (11).

(When assembling)

- Check the seal ring for damage.
- Tighten the flange nuts to the specified tightening torque.
- After tighten the flange nut, punch the nut at the two portions as shown in the picture.

Tightening torque	Bi-Speed Turn clutch shifter mounting flange nut (M18)	9.8 to 11.8 N·m 1.0 to 1.2 kgf·m 732 to 8.7 lbf·ft

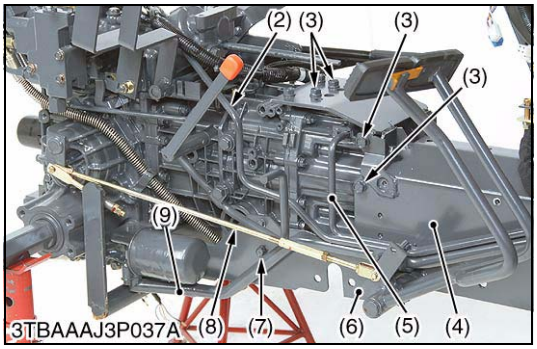
(1) Bi-Speed Turn Clutch Shaft (Front Wheel Drive Shaft 2)
(2) Bearing
(3) 30T Gear
(4) 35T Gear
(5) Cir-clip
(6) Shifter
(7) Flange Nut
(8) Bi-Speed Turn Clutch Case
(9) D-ring
(10) Clutch Piston
(11) Clutch Plate
(12) Clutch Disk
(13) Piston Return Spring
(14) Collar
(15) Cir-clip
(16) Internal Cir-clip
(17) 23T Gear
(18) Thrust Collar
(19) Bearing
(20) Seal Ring

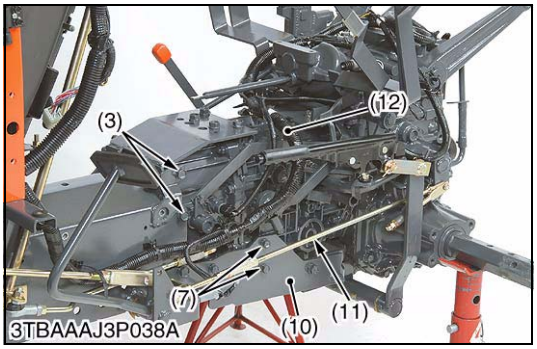
A : Punch

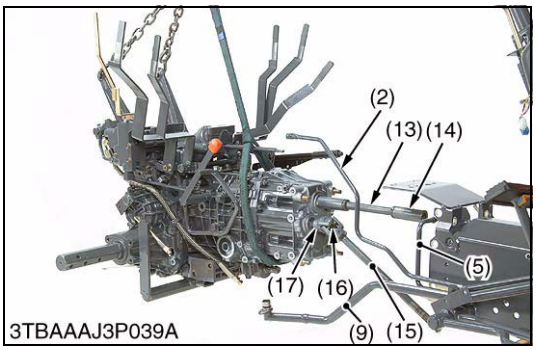
W1099006

(2) Main Gear Shift Section









Steps, Brake Rods, Hydraulic Pipes, Sub-Frames and Wiring Harness

1. Remove the steps (1) and the brake springs.
2. Disconnect the connectors from the HST neutral switch, the PTO switch and the PTO valve switch. Move the wiring harness to the engine side.
3. Disconnect the hydraulic suction pipe (9) and the hydraulic delivery pipes (2) (5). Loosen the pipe bands.
4. Remove the snap pins and disconnect the brake rods (8) (11).
5. Remove the sub-frame mounting bolts (7) and the sub-frames (6) (10).
6. Hook the transmission assembly.
7. Remove the main frame mounting bolts and the main frame (4).
8. Separate the transmission assembly from the tractor main frame (4).
9. Remove the spring pins from the propeller shaft (13).

(When assembling)

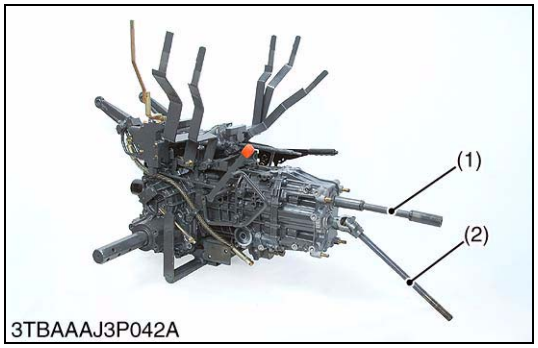
Connection of couplings

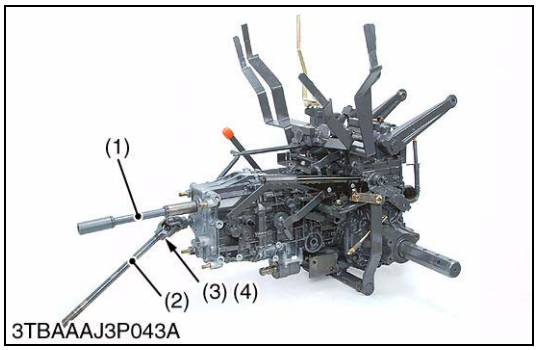
- Set the rear wheels to the tractor.
- Firstly install the coupling between the front axle pinion shaft and the front wheel drive shaft under the engine.
- Install the coupling and the propeller shaft to the clutch shaft.
- Secondly align the spline between the front wheel drive shaft and the universal joint.
- Thirdly, push the transmission assembly slowly to the main frame side, and align the spline between propeller shaft and the first shift shaft. Align the universal joint and the front wheel drive shaft (17).
- Fourthly, install the split pins (16) from the down side.

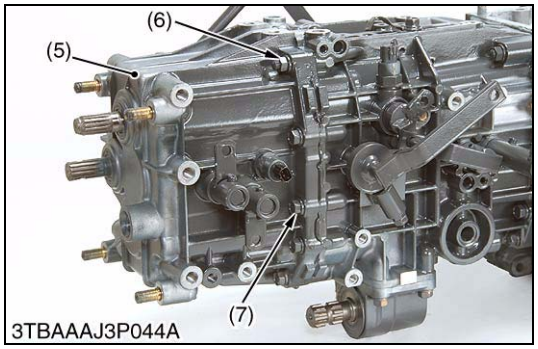
Tightening torque	Main frame mounting bolt for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft
	Main frame mounting nut for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft
	Main frame mounting bolt for ordinary material (M12)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 lbf·ft

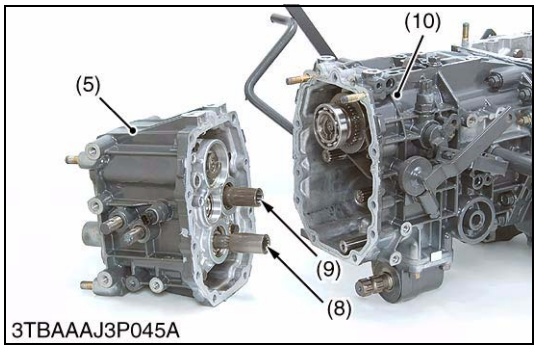
(1) Step
(2) Hydraulic Cylinder Delivery Pipe
(3) Bolt
(4) Main Frame
(5) PTO Valve Delivery Pipe
(6) Sub-frame, RH
(7) Bolt
(8) Brake Rod, RH
(9) Hydraulic Suction Pipe
(10) Sub-frame, LH
(11) Brake Rod, RH
(12) Wiring Harness
(13) Propeller Shaft
(14) Coupling
(15) Rear Drive Shaft
(16) Split Pin
(17) Front Wheel Drive Shaft

W1100299









Separating Main Gear Shift Section Assembly

1. Remove the propeller shaft (1).
2. Remove the spring pins (3) (4).
3. Remove the main gear shift section mounting bolts (7) and the nuts (6).
4. Separate the main gear shift section case assembly (5) from the transmission case.

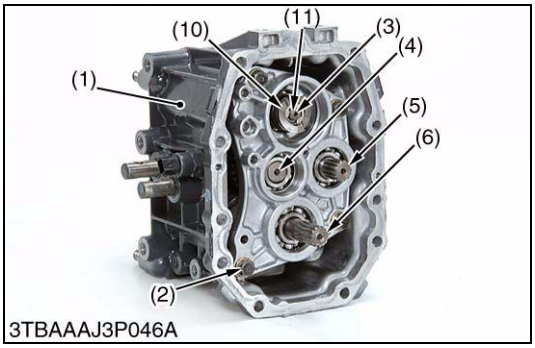
(When assembling)

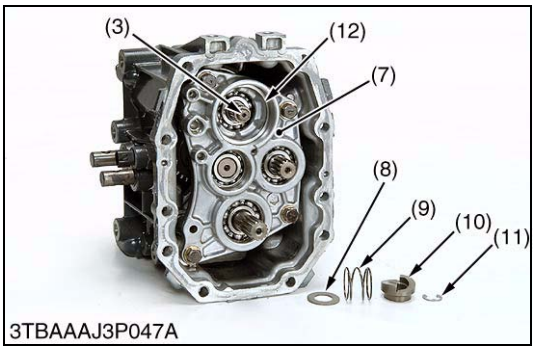
- Apply the liquid gasket (Three Bond 1206D or its equivalent).
- Align the coupling spline between the shuttle shaft and the Hi-Lo gear shaft. Align the coupling spline between the front wheel drive shafts.

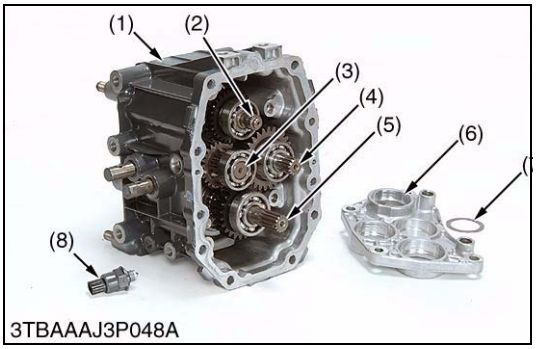
Tightening torque	Main gear shift section mounting bolt (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft
	Main gear shift section mounting nut (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

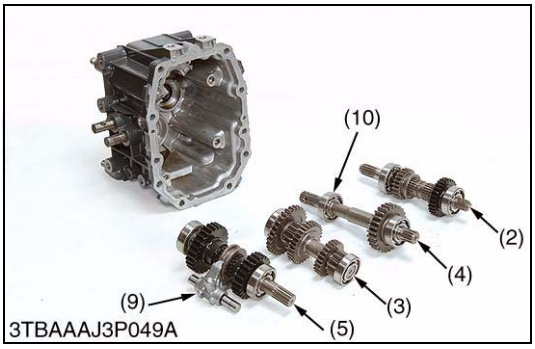
(1) Propeller Shaft
(2) Drive Shaft
(3) Spring Pin
(4) Spring Pin
(5) Main Gear Shift Section Case Assembly
(6) Nut
(7) Bolt
(8) Couple Ring (Connecting for 4WD Shaft)
(9) Couple Ring (Connecting for Hi-Lo Gear Shaft)
(10) Transmission Case

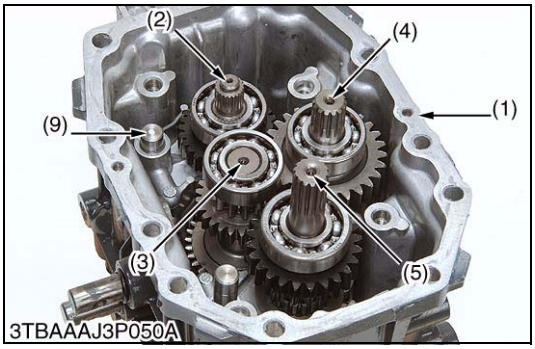
W1105412











Removing Mechanical PTO Clutch Cam and Bearing Holder

1. Remove the cir-clip (11).
2. Remove the one way clutch cam (10), the one way clutch spring (9) and the collar (8).
3. Remove the bearing holder mounting bolts (2).
4. Remove the bearing holder (7).

(When assembling)

- Install the spacer (12) to the bearing.

Tightening torque	Main gear shift bearing holder mounting bolt (M8)	17.7 to 20.5 N·m 1.8 to 2.1 kgf·m 13.1 to 15.1 lbf·ft

(1) Main Gear Shift (Section) Case
(2) Bolt
(3) Shift Shaft 1
(4) Shift Shaft 2
(5) Front Wheel Drive Shaft (Reverse Shaft)
(6) Shuttle Shaft
(7) Bearing Holder
(8) Collar (1.6 mm, 0.063 in.))
(9) One Way Clutch Spring
(10) One Way Clutch Cam
(11) Cir-clip
(12) Spacer

W1049620

Removing Main Gear Shift Shafts

1. Remove the shim (7) with the bearing holder (6).
2. Remove the shuttle switch (8).
3. Remove the shuttle shaft (5), the shift shaft 2 (3), the front wheel drive shaft (4) and the shift shaft 1 (1) temporally.

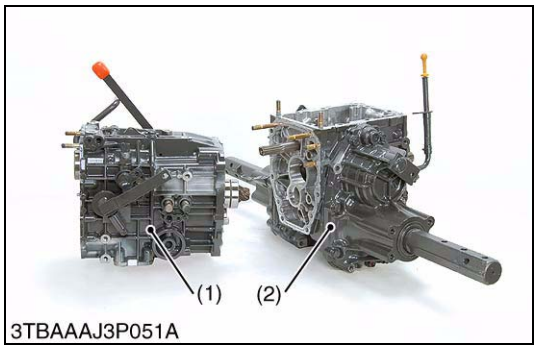
(When assembling)

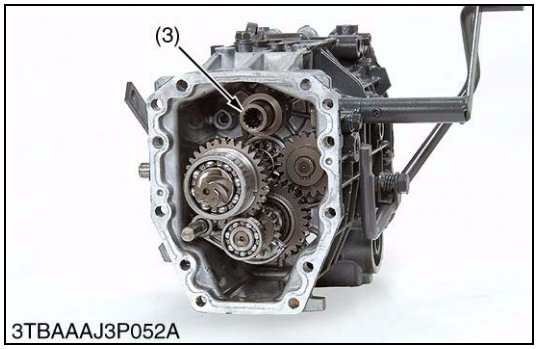
- Remove the bearing (10) from the front wheel drive shaft (4).
- Install the bearing (10) to the main gear shift (section) case (1).
- Install the shuttle shifter (9) and the shuttle shaft (5) to the main gear shift (section) case (1).
- Install the three shafts, the shift shaft 1 (2), the shift shaft 2 (3) and the shuttle shaft (5) to the main gear shift (section) case (1) and install the front wheel drive shaft to the bearing simultaneously shaking all shafts (2) (3) (4) (5) slowly.
- Check the four shafts (2) (3) (4) (5) to rotate smoothly.
- Install the shim (7) to the bearing hole for the shuttle shaft.

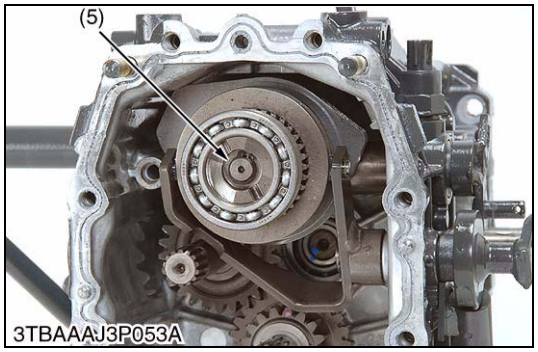
(1) Main Gear Shift (Section) Case
(2) Shift Shaft 1
(3) Shift Shaft 2
(4) Front Wheel Drive Shaft (Reverse Shaft)
(5) Shuttle Shaft
(6) Bearing Holder
(7) Shim
(8) Shuttle Switch
(9) Shuttle Shifter
(10) Bearing

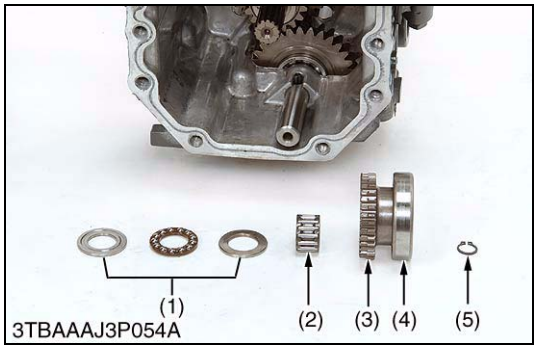
W1052176

(3) Mechanical PTO Clutch Assembly









Separating Transmission Case from Differential Case

1. Remove the transmission mounting bolts and nuts.
2. Separate the transmission case (1) from the differential case (2).

(When reassembling)

- Install the coupling to the mechanical PTO clutch shaft.
- Apply the liquid gasket (Three Bond 1206D or equivalent).
- Tighten the transmission mounting bolts and the nuts to the specified torque.

Tightening torque	Transmission case mounting bolt (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft
	Transmission mounting nut (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

(1) Transmission Case
(2) Differential Case
(3) Coupling

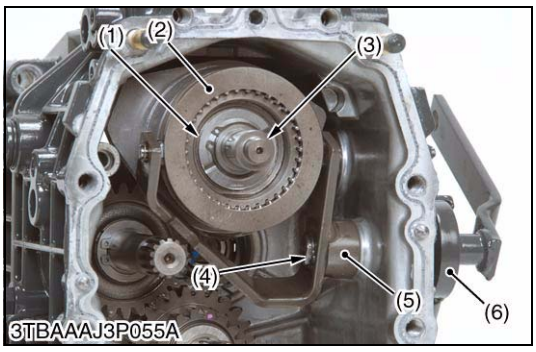
W1055422

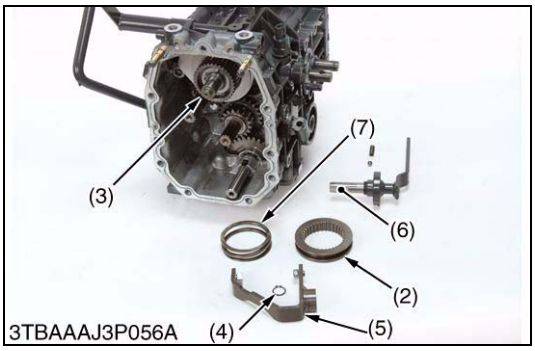
Removing One-Way Clutch Spline Boss

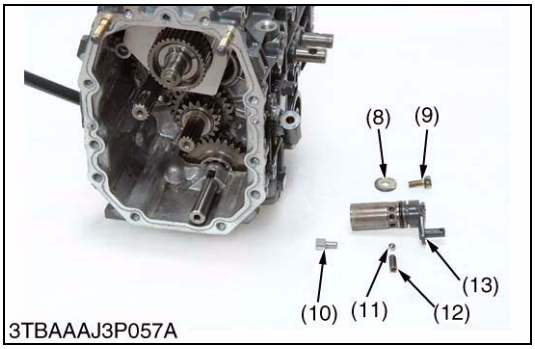
1. Remove the cir-clip (5) from the PTO clutch shaft.
2. Remove the one-way clutch spline boss (3) with the bearing (4).
3. remove the needle bearing (2) and the thrust ball bearing (1).

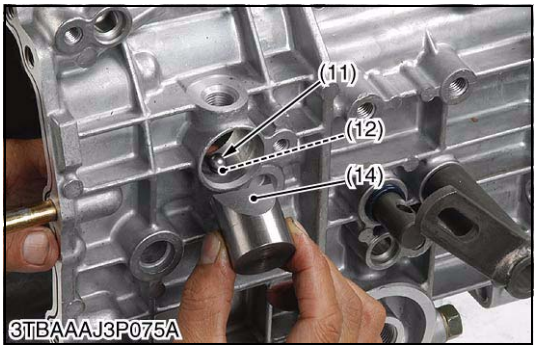
(1) Thrust Ball Bearing
(2) Needle Bearing
(3) One-way Clutch Spline Boss
(4) Ball Bearing
(5) Cir clip

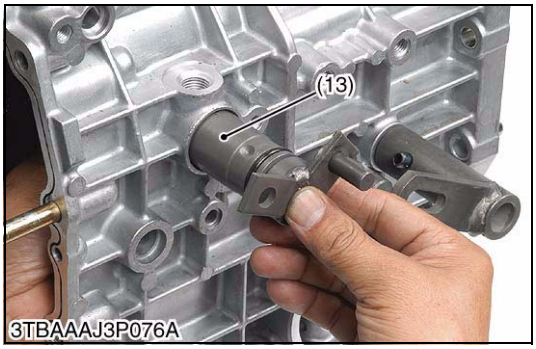
W1058564











Removing PTO ON-OFF Shift Fork and PTO Shift Arm

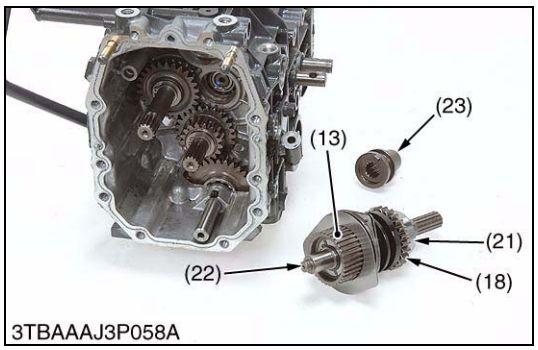
1. Remove the cir-clip (1) from the PTO clutch shaft (3).
2. Remove the cir-clip (4) the PTO ON-OFF arm shaft (6).
3. Remove the shifter (2) and the PTO clutch spring (7).
4. Remove the bolt (9) and the washer (8) from the transmission case.
5. Remove the PTO shift arm (13).

(When reassembling)

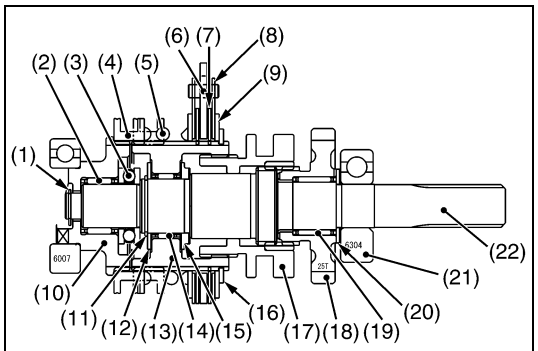
- Install the PTO cotter (10) to the groove of the PTO shifter securely.
- Install the ball (11) and the spring (12) to the transmission case using the special ball guide.

(1) Cir-clip
(2) Shifter
(3) PTO Clutch Shaft
(4) Cir-clip
(5) PTO ON-OFF Shift Fork
(6) PTO ON-OFF Arm Shaft
(7) Clutch Spring
(8) Washer
(9) Bolt
(10) PTO Cotter
(11) Ball
(12) Spring
(13) PTO Shift Arm
(14) Ball Guide

W1062227



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3TBAAAJ3P077A

Removing and Disassembling Mechanical PTO Clutch Assembly

1. Remove the rear PTO shifter (23) from the PTO clutch shaft (22).
2. Disassemble the mechanical PTO clutch assembly.

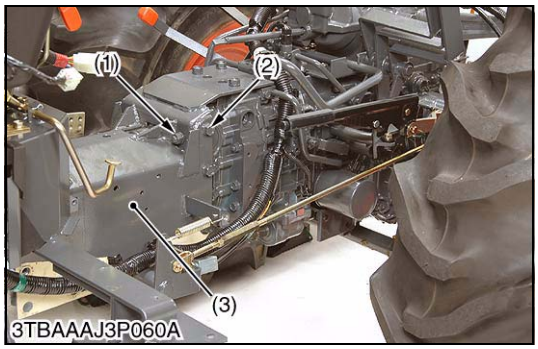
(When reassembling)

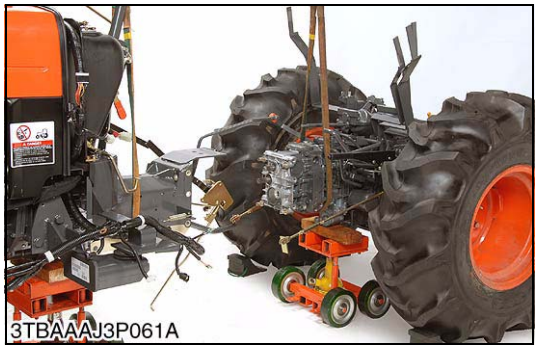
- Check the mechanical PTO clutch assembly parts the damage and wear, replace it.

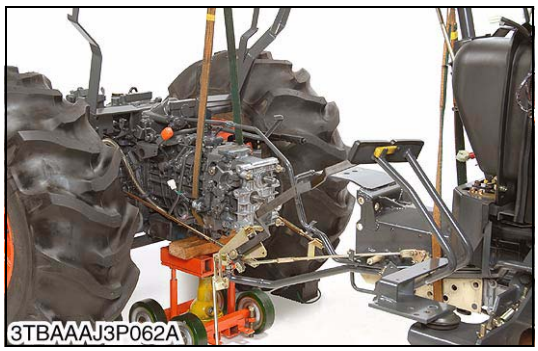
(1) Cir-clip
(2) Needle Bearing
(3) Thrust Ball Bearing
(4) Shifter (PTO ON/OFF)
(5) Clutch Spring
(6) Brake Plate
(7) Brake Plate 3
(8) Brake Disk
(9) Brake Plate 1
(10) One-way Clutch Spline Boss
(11) Cir-clip
(12) Thrust Collar
(13) PTO Brake Spline Boss
(14) Needle Bearing
(15) Thrust Collar
(16) Cir-clip
(17) PTO Shifter
(18) 25T Mid PTO gear
(19) Needle Bearing
(20) Collar
(21) Ball Bearing
(22) PTO Clutch Shaft
(23) Rear PTO Shifter

W1065748

(4) Hydrostatic Transmission (HST)







Separating Transmission Case

1. Disconnect the brake rods.
2. Disconnect the code bands from the wiring harness. Disconnect the couplers from the HST neutral switch and the PTO neutral switch. Separate the wiring harness from the transmission case.
3. Loosen the pipe bands.
4. Disconnect the hydraulic inlet pipe.
   Disconnect the independent PTO valve delivery pipe.
   Disconnect the hydraulic cylinder delivery pipe.
5. Hoist the transmission case and the main frame.
   Support the transmission with a jack.
6. Remove the main frame mounting bolts.
7. Separate the transmission assembly from the main frame.
8. After separating the transmission, remove the rear wheels and the transmission outer parts installed to the transmission.

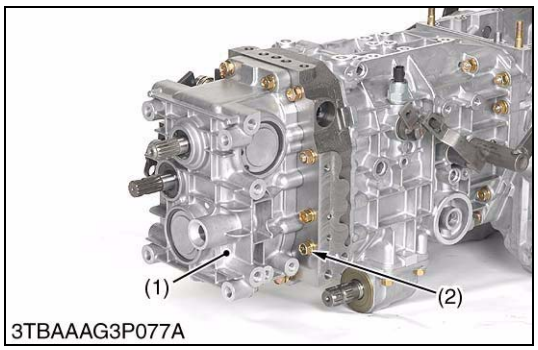
(When reassembling)

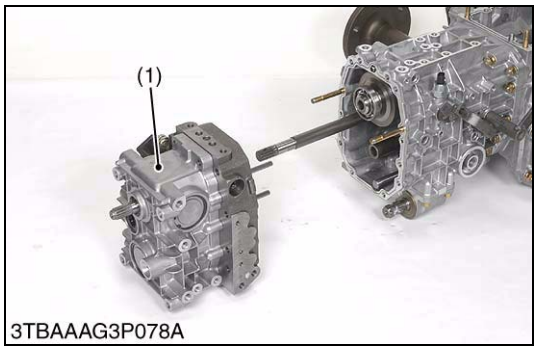
- Tighten the transmission mounting bolts and nuts to the specified torque.

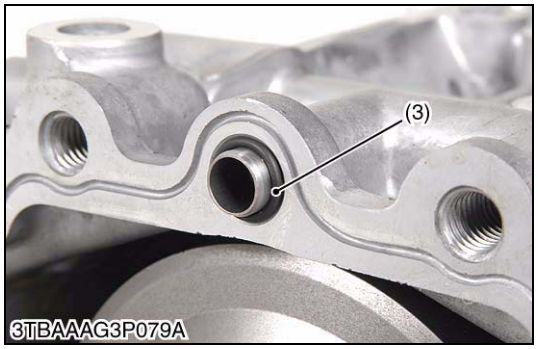
Tightening torque	Main frame mounting bolt for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft
	Main frame mounting nut for aluminum (M12)	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft
	Main frame mounting bolt for ordinary material (M12)	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 lbf·ft

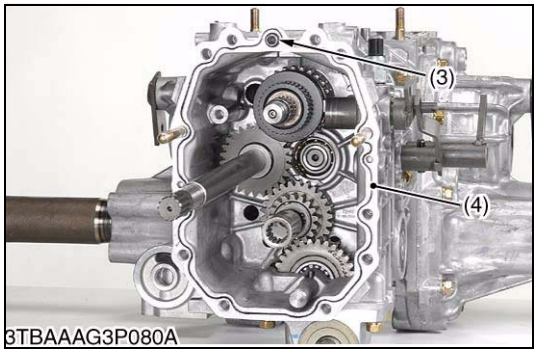
(1) Nut
(2) Bolt
(3) Main Frame

W1067763









HST Assembly

1. Remove the HST mounting bolts (2).
2. Separate the HST assembly (1) from the transmission.

(When reassembling)

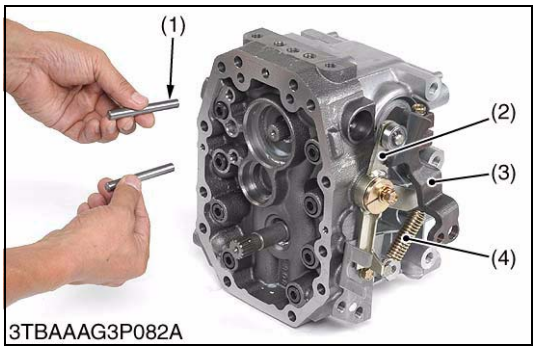
- Install the O-ring (3) to the transmission case.
- Apply liquid gasket (Three Bond 1206D or equivalent) to the groove (4) of the transmission case.

Tightening torque	HST assembly mounting bolt for aluminum (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

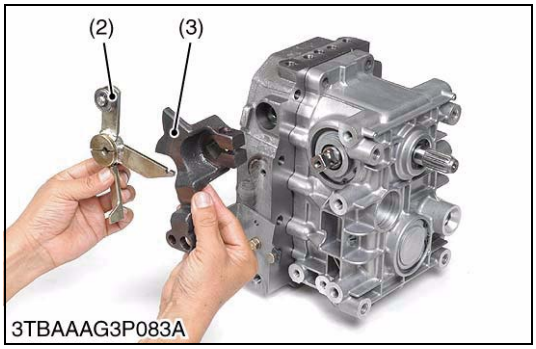
(1) HST Assembly
(2) HST Assembly Mounting Bolt
(3) O-ring
(4) Groove (for Liquid Gasket)

W1024639


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3TBAAAG3P082A



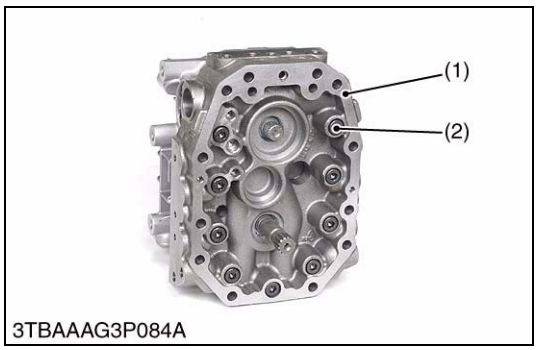
3TBAAAG3P083A

Plate Push Rod, Neutral Arm and Neutral Holder

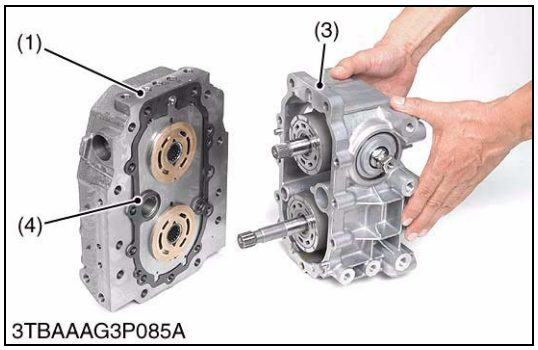
1. Remove the plate push rod (1).
2. Remove the spring (4).
3. Remove the neutral arm mounting bolt.
4. Loosen the bolt of the neutral holder (3).
5. Remove the neutral holder (3).

(1) Plate Push Rod
(2) Neutral Arm
(3) Neutral Holder
(4) Spring

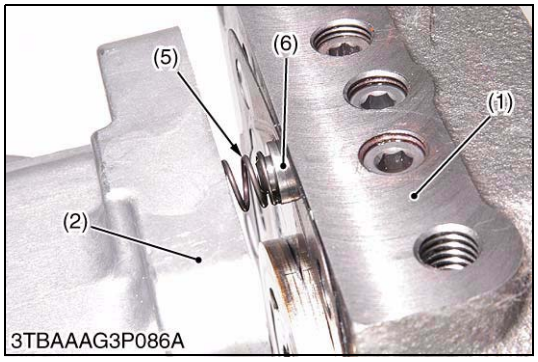
W1024976



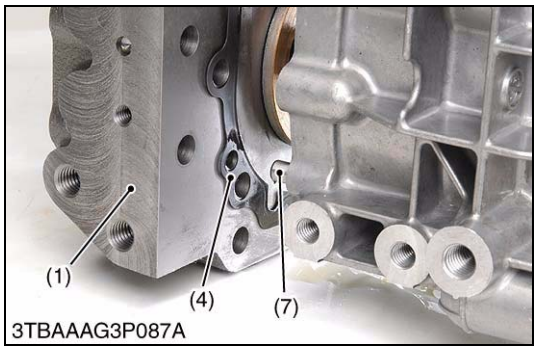
3TBAAAG3P084A



3TBAAAG3P085A



3TBAAAG3P086A



3TBAAAG3P087A

Center Section 1

1. Remove the center section mounting hex. bolts (2).
2. Separate the HST housing (3) from the center section (1).

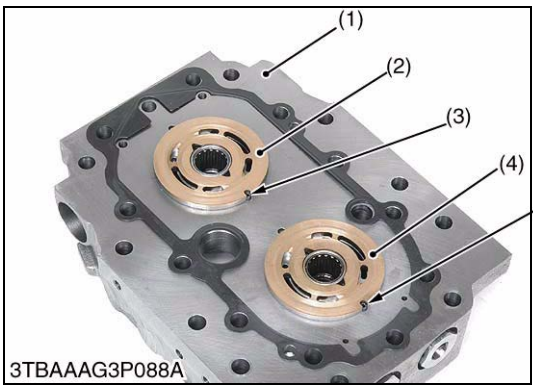
(When reassembling)

- Use a new gasket.
- Install the poppet to the center section (1). Don't drop the spring (5).
- Check the knock pin.
- Hold the gasket with the hex. bolts (2) not to drop the gasket (4).

Tightening torque	Center section mounting hex. bolt for aluminum (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

(1) Center Section
(2) Hex. Bolt
(3) HST Housing
(4) Gasket
(5) Spring
(6) Poppet
(7) Knock Pin

W1077570



Valve Plates

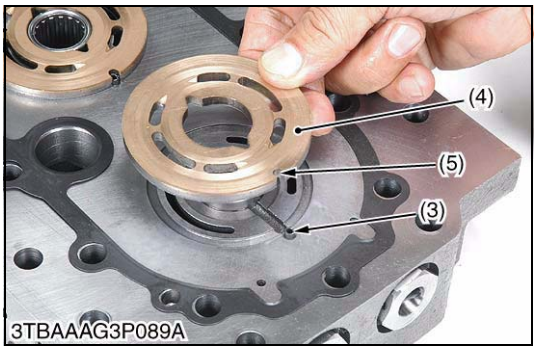
1. Pushing the valve plate (2) against the anchor pin (3), lift the valve plate (2) to remove.
2. Remove the valve plate (2).
3. Remove the valve plate (4).

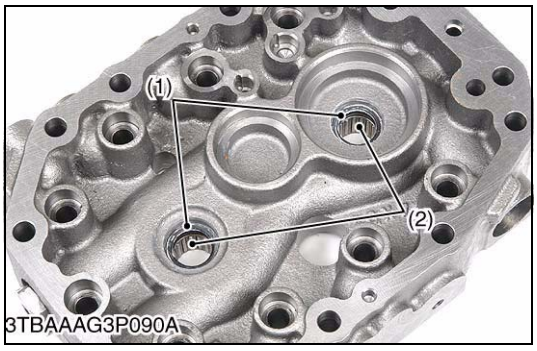
(When reassembling)

- Install the groove (5) the valve plates (2), (4) to the anchor pins (3) securely.

(1) Center Section
(2) Valve Plate (Pump Shaft)
(3) Anchor Pin
(4) Valve Plate (Motor Shaft)
(5) Groove

W1078965





Oil Seals and Needle Bearings

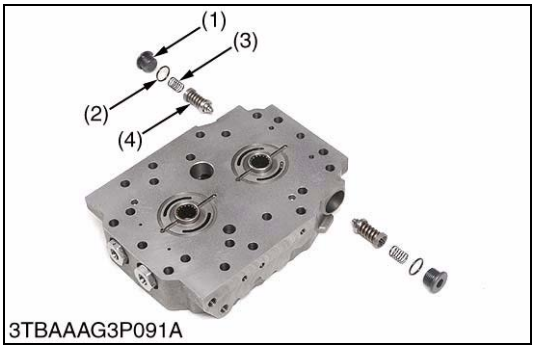
1. Remove the needle bearing (2).
2. Remove the oil seals (1).

(When reassembling)

- After checking or changing the oil seals, apply the bearing with hydrostatic transmission oil and the oil seal with grease.

(1) Oil Seal
(2) Needle Bearing

W1079889



Check and High Pressure Relief Valve

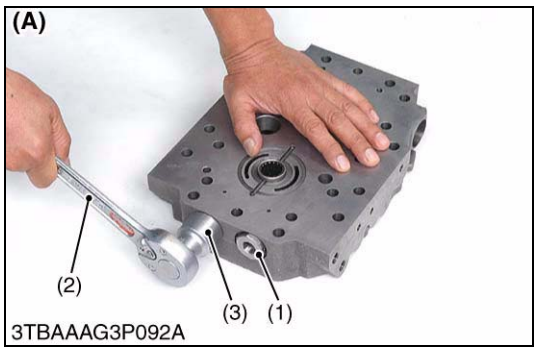
1. Remove the valve plug (1) with a hex. wrench.
2. Remove the spring (3) and the valve (4).

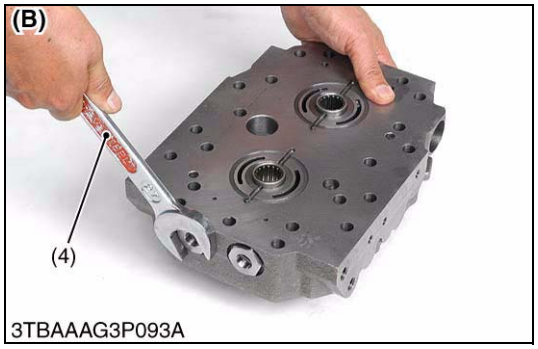
(When reassembling)

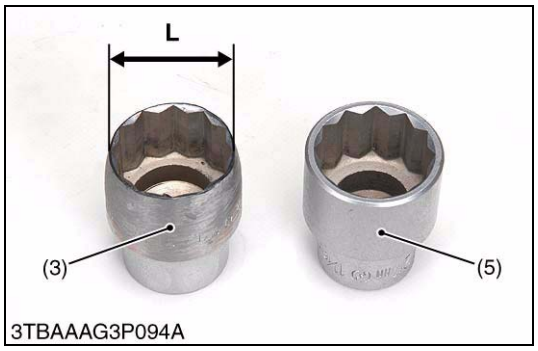
Tightening torque	Check and high pressure relief valve plug	118 to 147 N·m 12.0 to 15.0 kgf·m 86.8 to 108.5 lbf·ft

(1) Valve Plug
(2) O-ring
(3) Spring
(4) Valve

W1080348







Removing Neutral Valve

1. Remove the neutral valve (1) with the rachet handle and the thin socket (27 mm (1.06 in.)).

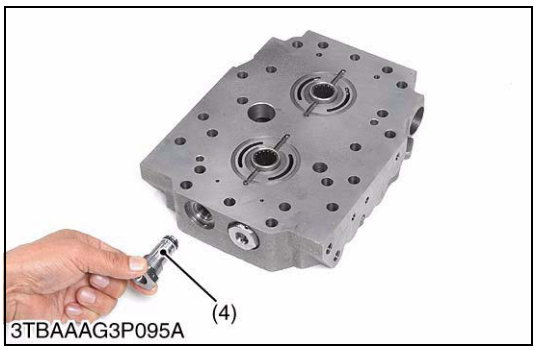
(When reassembling)

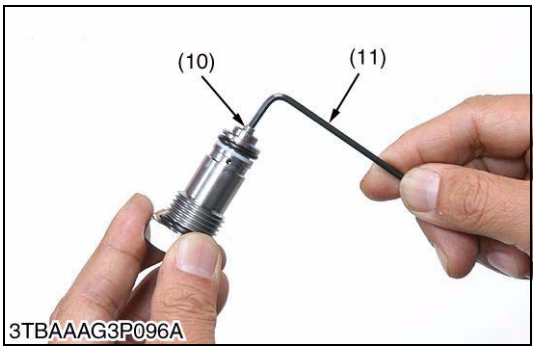
Tightening torque	Neutral valve body	58.5 to 68.6 N·m 6.0 to 7.0 kgf·m 43.4 to 50.6 lbf·ft

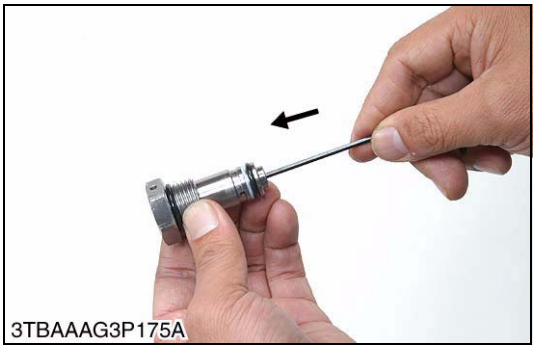
(1) Neutral Valve
(2) Rachet Handle
(3) Thin Socket (27 mm (1.06 in.))
(4) Spanner (27 mm (1.06 in.))
(5) Common Socket (27 mm (1.06 in.))

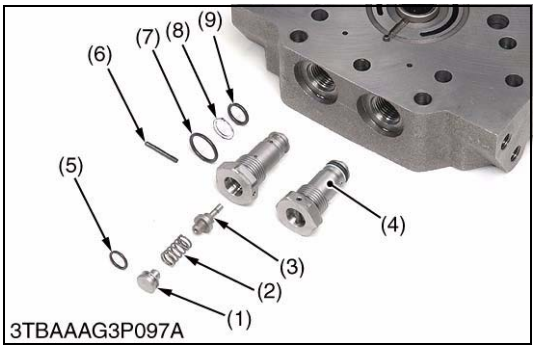
(A) Using Correct Tools
(B) Using Wrong Tools
L : Outside Diameter (Approx. 27mm (1.06 in.))

W1081157









Neutral Valve

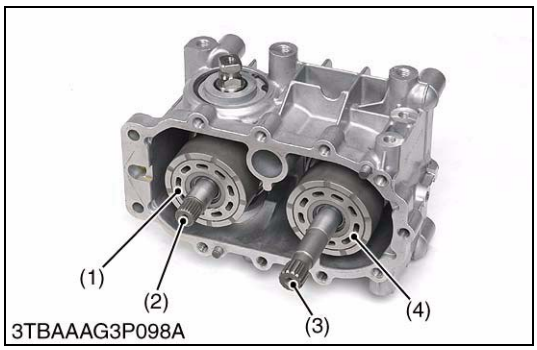
1. Remove the neutral valve body (4).
2. Remove the pin (6) from the neutral valve body (4).
3. Remove the plug (10) with 2.5 mm hex. wrench (11).
4. Push the neutral valve (3) with 2.5 mm hex. wrench (11) not to damage it.
5. Take out the inner parts from the neutral valve body (4).

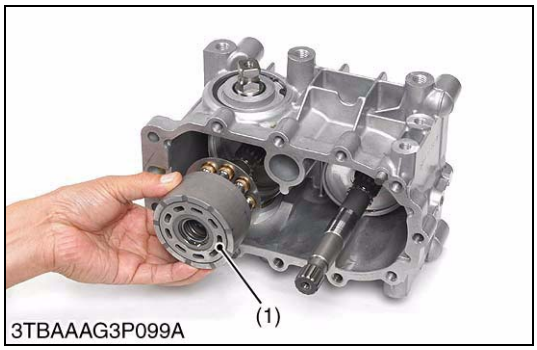
(When reassembling)

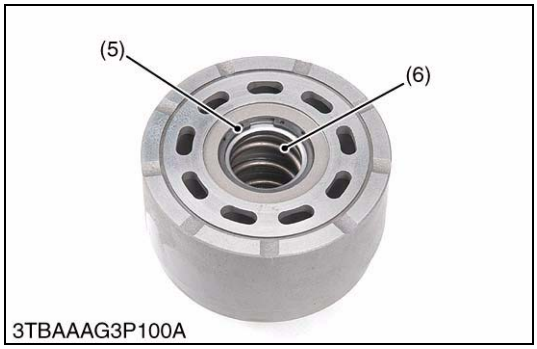
Tightening torque	Neutral valve body	58.5 to 68.6 N·m 6.0 to 7.0 kgf·m 43.4 to 50.6 lbf·ft

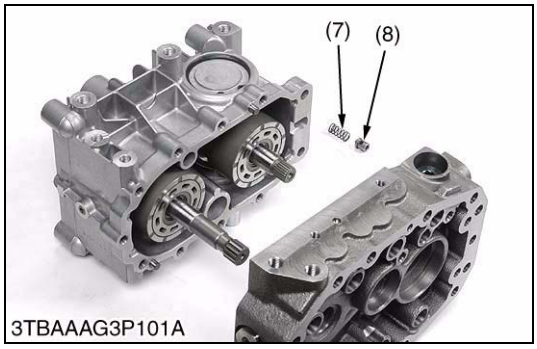
(1) Plug
(2) Spring
(3) Neutral Valve
(4) Neutral Valve Body
(5) O-ring
(6) Pin
(7) Pin
(8) Back-up Ring
(9) O-ring
(10) Plug
(11) 2.5 mm Hex. Wrench

W1082003









HST Housing Case Cylinder Blocks

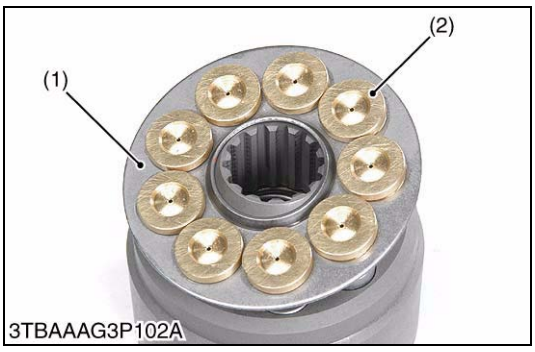
1. Remove the cylinder blocks (2) (4) from the pump shaft (2) and the motor shaft (3).
2. Remove the cir-clip (5) and spring (6) from the cylinder block.

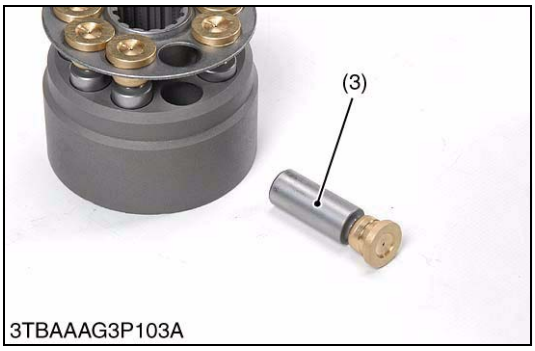
(When reassembling)

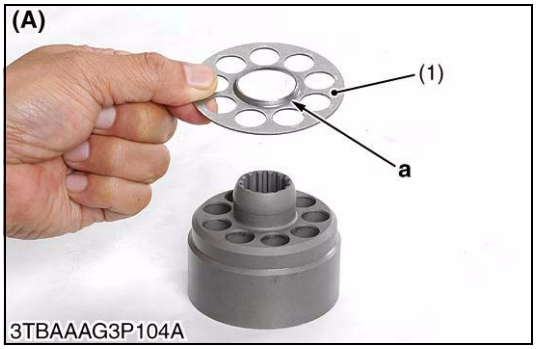
- Install the poppet (8) to the center section, not to drop it.
- Install the spring (7) to the HST housing side.

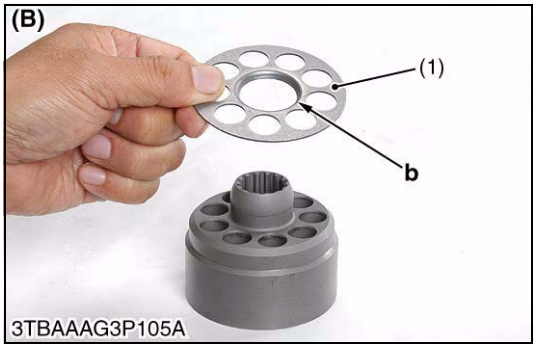
(1) Cylinder Block (Pump)
(2) Pump Shaft
(3) Motor Shaft
(4) Cylinder Block (Motor)
(5) Cir-clip
(6) Spring
(7) Spring
(8) Poppet

W1083346









Piston and Retainer Plate

1. Remove the pistons (2) with the retainer plates (1).

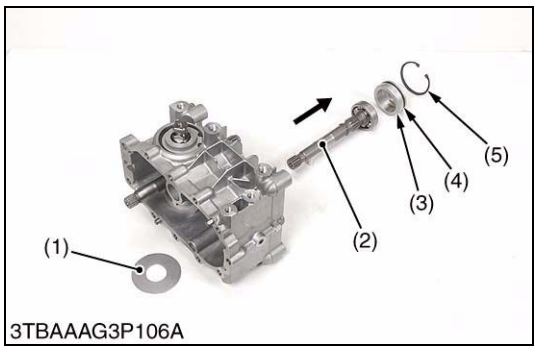
(When reassembling)

- Install the piston to its original position of the cylinder block.
- Check the direction of the thrust collar (1) as shown in the picture.
- If the direction of the thrust collar is wrong, HST will not be operated properly.

(1) Retainer Plate
(2) Piston Slipper
(3) Piston

(A) Retainer Plate Correct Direction
(B) Retainer Plate Wrong Direction
a : Correct Direction
b : Wrong Direction

W1084635



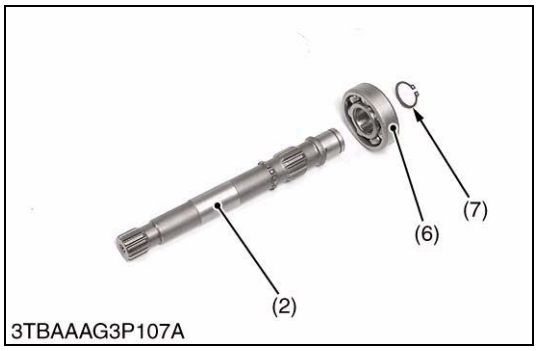
3TBAAAG3P106A

Motor Shaft

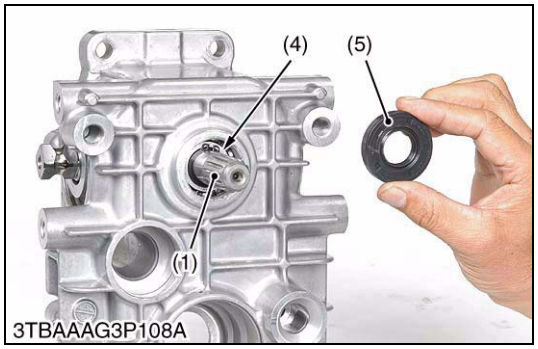
1. Remove the internal cir-clip (5) from the HST housing.
2. Remove the cover with an O-ring.
3. Remove the motor shaft (2) with the ball bearing (6) from the HST housing.
4. Remove the external cir-clip from the motor shaft (2).
5. Remove the ball bearing (6) from the motor shaft (2).

(1) Thrust Collar
(2) Motor Shaft
(3) Cover
(4) O-ring
(5) Internal Cir-clip
(6) Ball Bearing
(7) External Cir-clip

W1086022



3TBAAAG3P107A



3TBAAAG3P108A

Pump Shaft

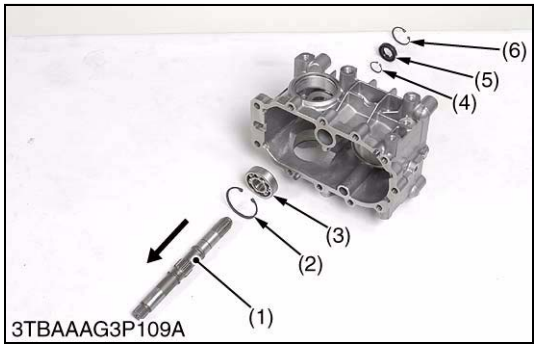
1. Remove the internal cir-clip (6) from the HST housing.
2. Remove the oil seal (5) from the HST housing.
3. Remove the external cir-clip (4) from the pump shaft (1).
4. Remove the internal cir-clip (2) from the HST housing.
5. Remove the pump shaft (1) to the cylinder block side.

(When reassembling)

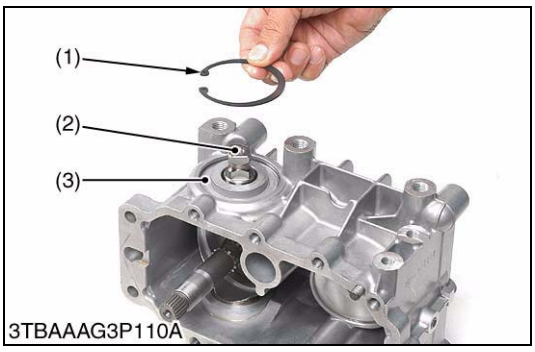
- Replace the used oil seal with a new one.

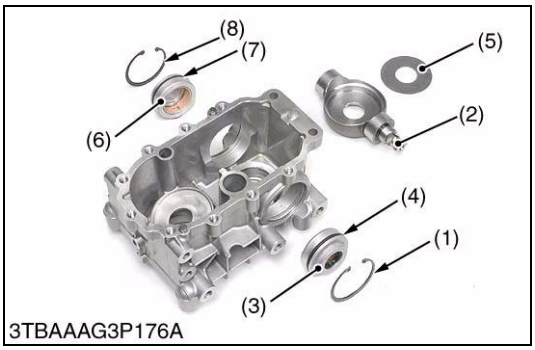
(1) Pump Shaft
(2) Internal Cir-clip
(3) Ball Bearing
(4) External Cir-clip
(5) Oil Seal
(6) Internal Cir-clip

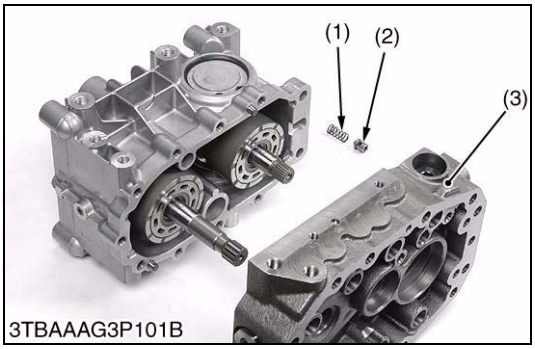
W1087141



3TBAAAG3P109A







Trunnion Shaft

1. Remove the internal cir-clip (1) from the HST housing.
2. Remove the internal cir-clip (8) from the HST housing.
3. Strike out the trunnion shaft (2) slightly with a plastic hammer to the left side not to damage the o-rings (7) (4).
4. Take out the cover (3) with o-ring.
5. Take out the thrust collar using air blower.

(When reassembling)

- Check the O-rings for damage.

(1) Internal Cir-clip
(2) Trunnion Shaft
(3) Cover (RH)
(4) O-ring
(5) Thrust Collar
(6) Cover (LH)
(7) O-ring
(8) Internal Cir-clip

W1087755

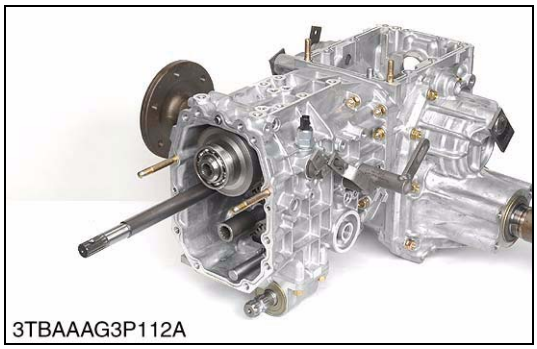
Charge Relief Valve

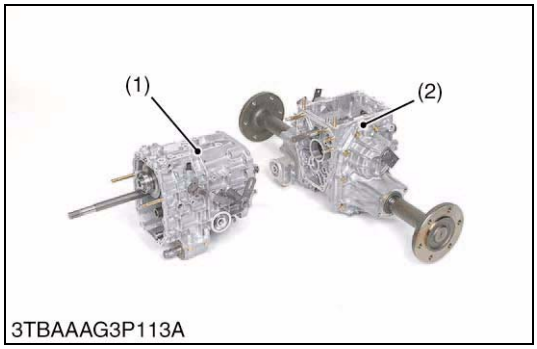
1. Check the spring (1) for breakage and wear.
2. If it is unusual, replace it.

(1) Spring
(2) Poppet
(3) Center Section

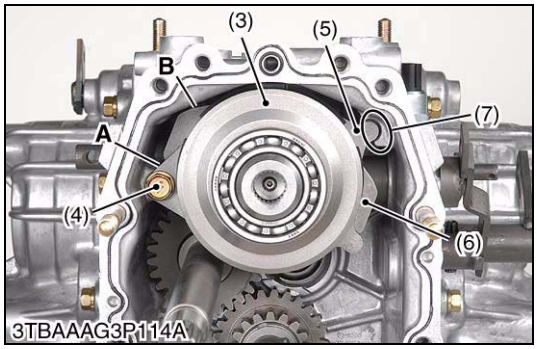
W1088697

(5) PTO Clutch Case (HST Model)

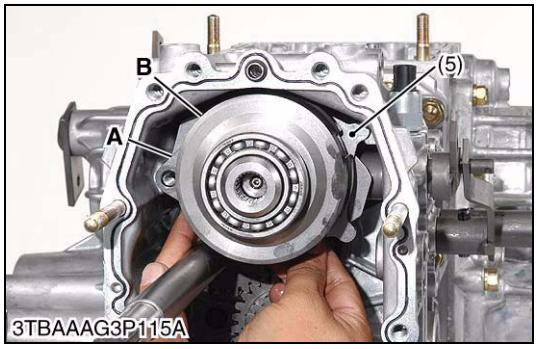

3TBAAAG3P112A



3TBAAAG3P113A



3TBAAAG3P114A



3TBAAAG3P115A

Separating Differential case and PTO Clutch Case

1. Remove the transmission case mounting bolts.
2. Separate the transmission case (1) from the differential case (2).
3. Remove the PTO brake plate 4 mounting bolt (4).

(When reassembling)

- Install the PTO brake plate 4 (5) to the transmission case groove (7) securely as shown in the picture.
- Place the PTO brake plate 2 (6) between **A** and **B**.

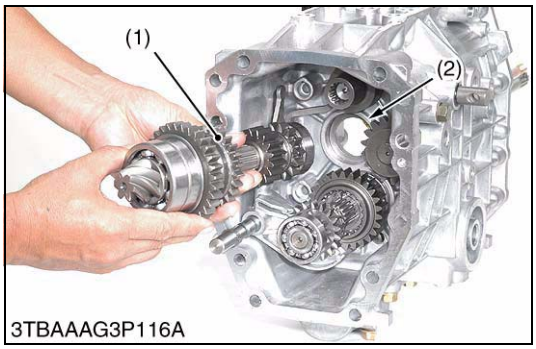
Tightening torque	Transmission case mounting bolt (M10) and nut	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft
	Hydraulic cylinder mounting bolt (M10) and nut	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

(1) Transmission Case
(2) Differential Case
(3) PTO Clutch Case
(4) PTO Brake Plate 4 Mounting Bolt
(5) PTO Brake Plate 4
(6) PTO Brake Plate 2
(7) Transmission Case Groove

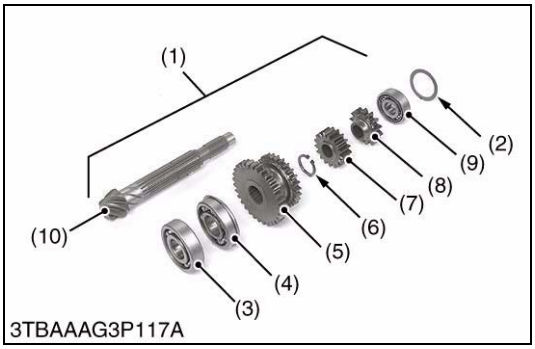
A : Position
B : Position

W1089293

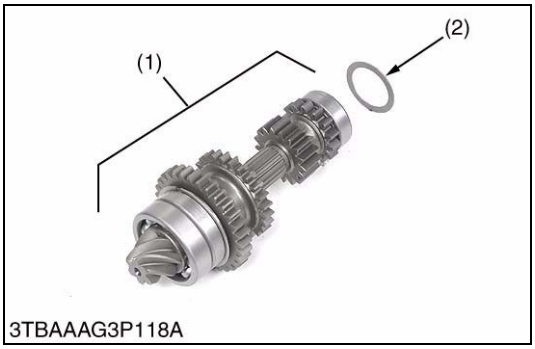
(6) Bevel Pinion Shaft



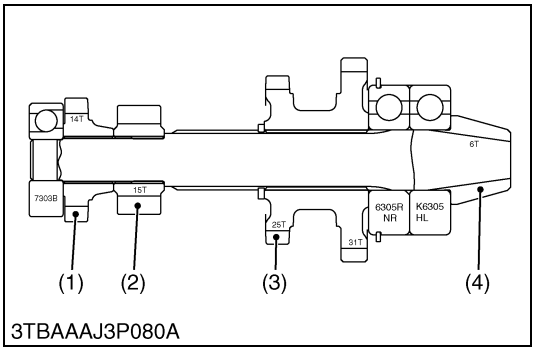
3TBAAAG3P116A



3TBAAAG3P117A



3TBAAAG3P118A



3TBAAAJ3P080A

Bevel Pinion Shaft 1

1. Remove the bevel pinion shaft assembly (1) from the transmission case.
2. Remove the spacer (2).

(When reassembling)

- Install the spacer (2) to the transmission case.
- Install the bevel pinion shaft assembly (1).

(1) Bevel Pinion Shaft Assembly
(2) Spacer
(3) Ball Bearing
(4) Ball Bearing
(5) Gear (25T-31T)
(6) Cir-clip
(7) Gear
(8) Gear
(9) Ball Bearing
(10) Bevel Pinion Shaft (6T)

W1091169

Bevel Pinion Shaft 2

Gear teeth number are changed by the tractor models.

(When reassembling)

- Check the gear teeth number and assemble the bevel pinion shaft assembly.

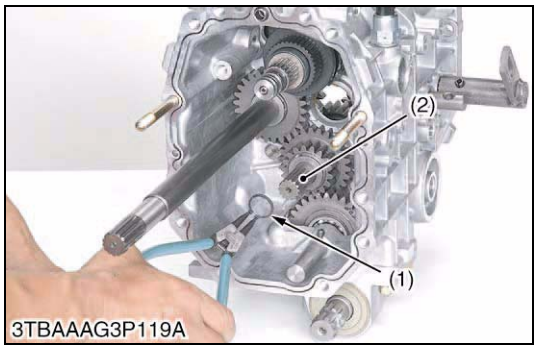
Model	4WD gear (1)	Gear (2)
B1830 M/T, B2230 M/T, B2530 M/T	13T	12T
B2230 HST, B2530 HST	13T	15T
B3030 HST	14T	15T

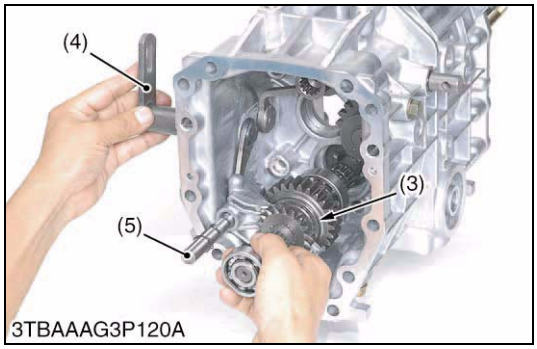
M/T : Manual Transmission

(1) 4WD Gear
(2) Gear
(3) 25T-31T Gear
(4) 6T Bevel Pinion Shaft

W1089819

(7) Range Gear Shaft



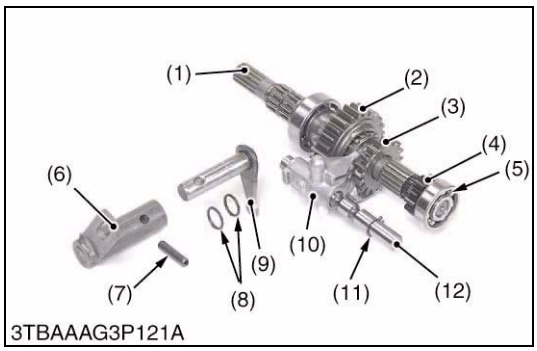


Range Gear Shaft Assembly

1. Remove the cir-clip (1) from the range gear shaft (2).
2. Remove the spring pin from the shift arm lever (4).
3. Remove the range gear shaft assy.(3) and the fork rod (5) from the transmission case.

(1) Cir-clip
(2) Range Gear Shaft
(3) Range Gear Shaft Assembly
(4) Shift Arm Lever
(5) Fork Rod

W1051118



Range Gear Shaft and Gears

1. Remove the ball bearing (5) from the rang gear shaft (1).
2. Remove the 12T gear (4), the 18T gear(3) and the 26T gear (2)

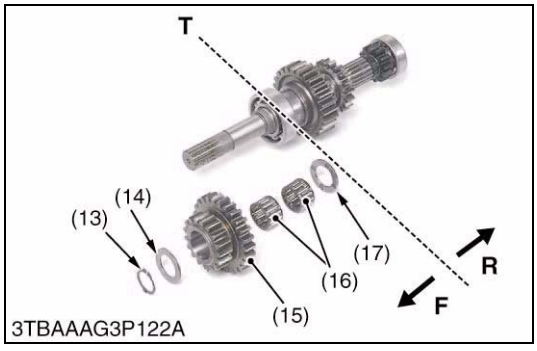
(When reassembling)

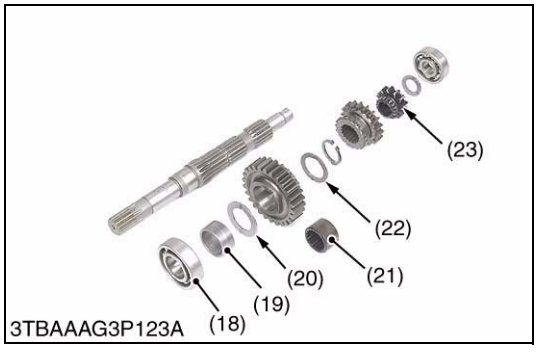
- Install the range shift arm (9) to the range shift fork (10) securely.
- Install the O-rings (8) to the range shift arm (9).

(1) Range Gear Shaft
(2) Gear (26T)
(3) Gear (18T)
(4) Gear (12T)
(5) Ball Bearing
(6) Shift Arm Lever
(7) Spring Pin
(8) O-ring
(9) Range Shift Arm
(10) Range Shift Fork
(11) Cir-clip
(12) Fork Rod
(13) Cir-clip
(14) Collar
(15) Gear
(16) Needle Bearing
(17) Collar
(18) Ball Bearing
(19) Collar
(20) Collar
(21) Inner Ring
(22) Collar
(23) Gear

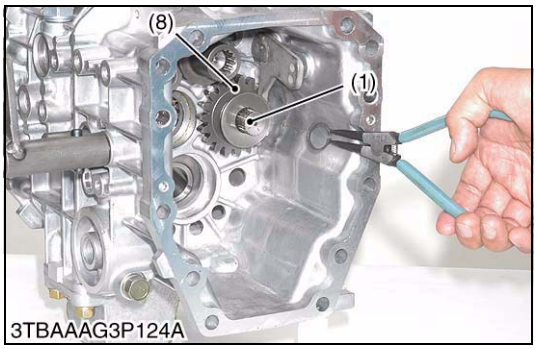
T : Transmission Case
F : Front Side
R : Rear Side

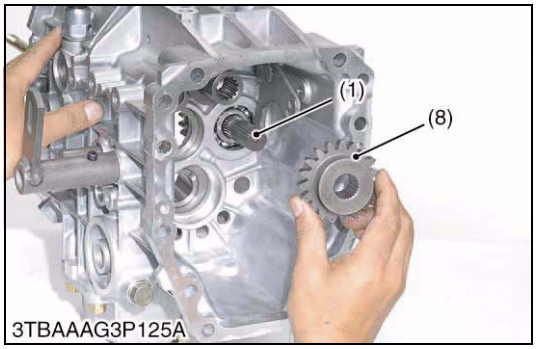
W1092651

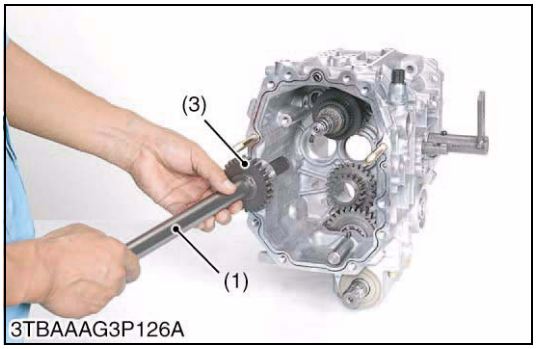


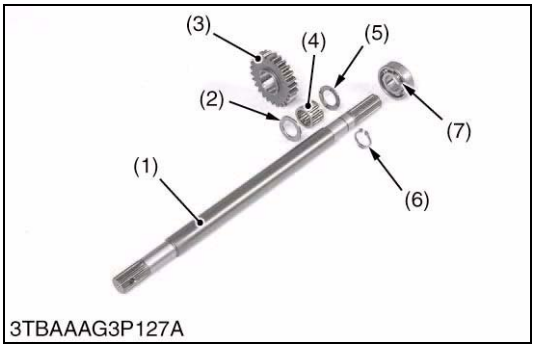


(8) Front Wheel Drive Shaft







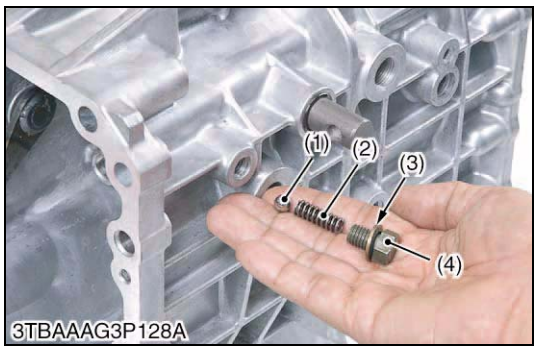


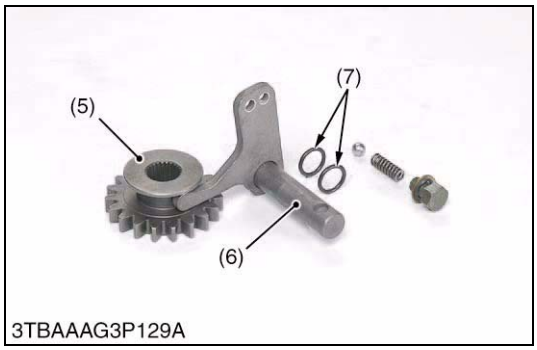
4WD Shaft

1. Remove the cir-clip from the 4WD shaft (1).
2. Remove the 4WD gear (8) from the 4WD shaft (1).
3. Remove the 4WD shaft (1) with the 26T gear (3).
4. Remove the 26T gear (3) and the ball bearing (7).

(1) 4WD Shaft
(2) Collar
(3) 26T Gear
(4) Needle Bearing
(5) Collar
(6) Cir-clip
(7) Ball Bearing
(8) 4WD Gear
B1830, B2230, B2530 : 20T
B3030 : 19T

W1093246





4WD Shaft Lever

1. Remove the bolt (4) and the washer with rubber (3).

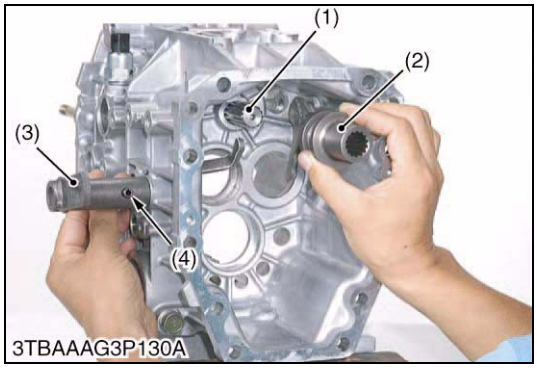
(When reassembling)

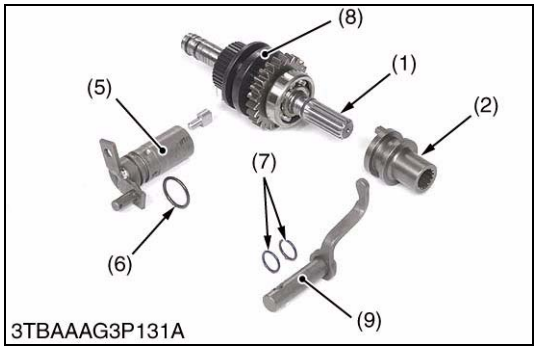
- Install the 4WD gear (5) to the 4WD shaft.
- Install the 4WD shaft arm (6) to the 4WD gear (5).
- Install the O-rings to the 4WD shift arm (6).

(1) Ball
(2) Spring
(3) Washer with Rubber
(4) Bolt
(5) 4WD Gear
(6) 4WD Shift Arm
(7) O-ring

W1093892

(9) Independent PTO Clutch Shifter





Rear PTO Shifter and Rear PTO Arm

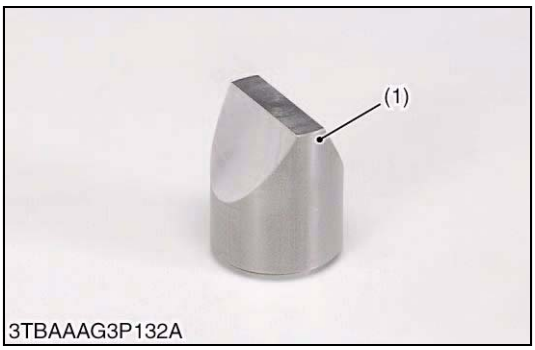
1. Remove the rear PTO shifter (2) from the PTO clutch shaft(1).
2. Remove the spring pin (4) from the rear PTO arm (9).
3. Remove the PTO clutch shaft (1) and the PTO shifter as an assembly.

(When reassembling)

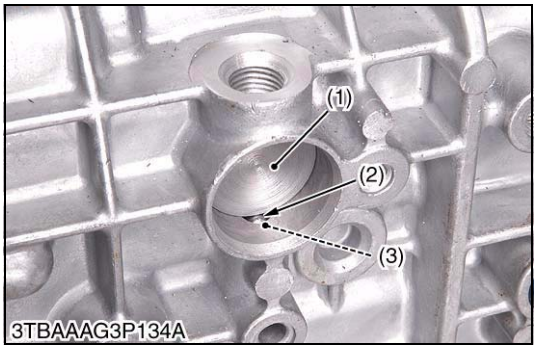
- Install the rear PTO arm (9) to the transmission case.
- After installing the PTO shifter (8) to the PTO clutch shaft (1), install the rear PTO arm (9) to the rear PTO shifter (2).
- Install the O-rings (7) to the rear PTO arm (9).
- Install the PTO lever (3) to the rear PTO arm (9).
- Install the spring pin (4) to the rear PTO arm (9).

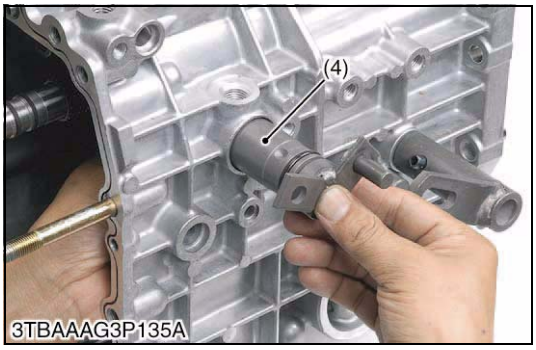
(1) PTO Clutch Shaft
(2) Rear PTO Shifter
(3) PTO Lever
(4) Spring Pin
(5) PTO Shift Arm
(6) O-ring
(7) O-ring
(8) PTO Shifter
(9) Rear PTO Arm

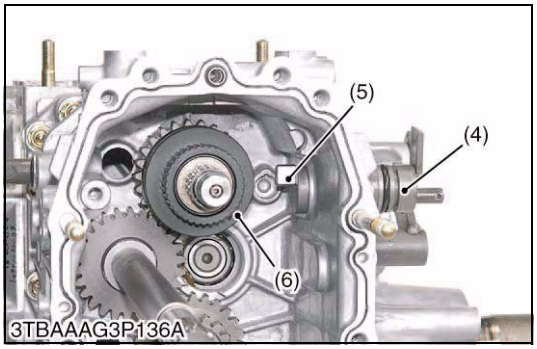
W1094577











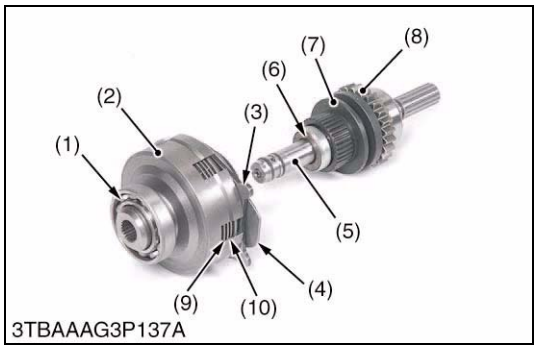
Installing PTO Shifter

1. Install the spring (3) and the ball (2) to the transmission.
2. Push the ball (2) by finger from the inside of the transmission case.
3. Push the PTO shift arm ball guide (1) into the transmission case as shown in the picture.
4. Push the PTO shift arm ball guide (1) with the PTO shift arm (4).
5. Install the PTO cotter (5) to the PTO shift arm (4).
6. Align the PTO cotter to the groove of the PTO shifter (6).

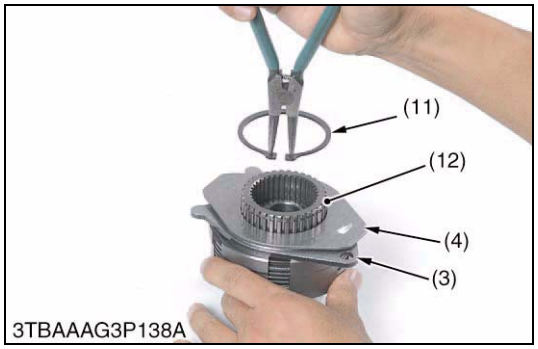
(1) PTO Shift Arm Ball Guide
(2) Ball
(3) Spring
(4) PTO Shift Arm
(5) PTO Cotter
(6) PTO Shifter

W1094924

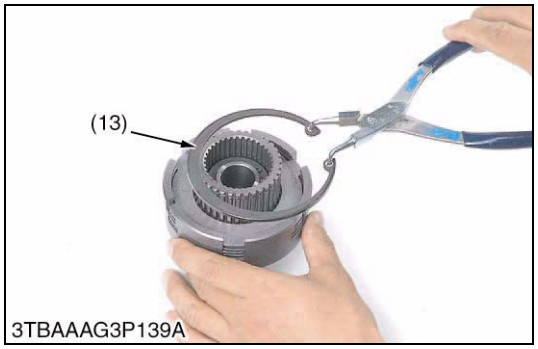
(10) Independent PTO Clutch



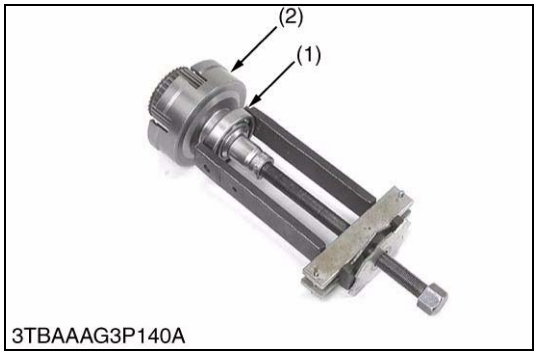
3TBAAAG3P137A



3TBAAAG3P138A



3TBAAAG3P139A



3TBAAAG3P140A

PTO Clutch Case

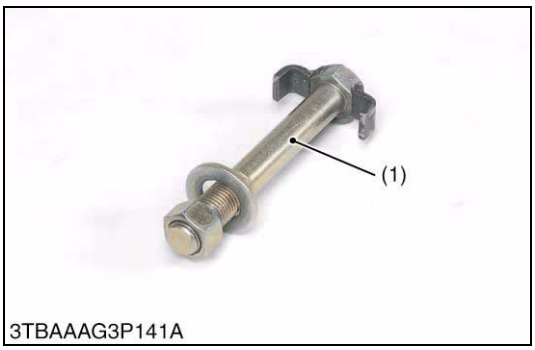
1. Remove the external cir-clip (11) from the spline boss (12).
2. Remove the internal cir-clip (13) from the PTO clutch case (2).
3. Remove the clutch disks (9) and the clutch plates (10) from the PTO clutch case (2).
4. Remove the ball bearing (1) from the PTO clutch case (2) with a puller.

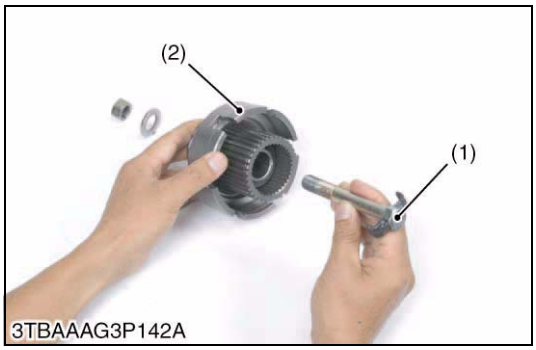
■ **NOTE**

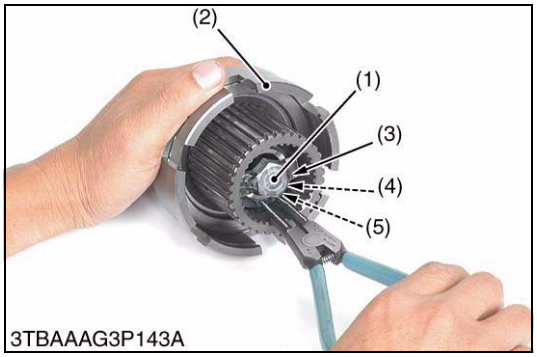
- **When removing the cir-clip, use an adequate size snap ring pliers.**

(1) Ball Bearing
(2) PTO Clutch Case
(3) Brake Plate 4
(4) Brake Plate 2
(5) PTO Clutch Shaft
(6) Thrust Bearing
(7) PTO Shifter
(8) 25T Mid PTO gear
(9) Clutch Disk
(10) Clutch Plate
(11) External Cir-clip
(12) Spline Boss
(13) Internal Cir-clip

W1095622





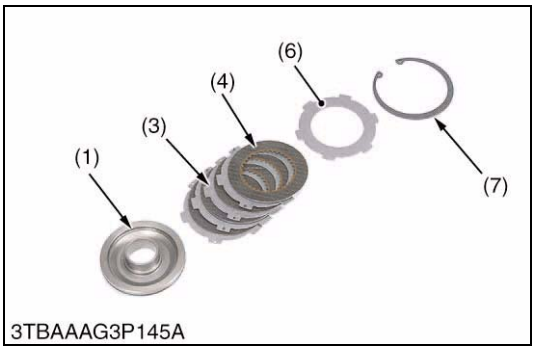


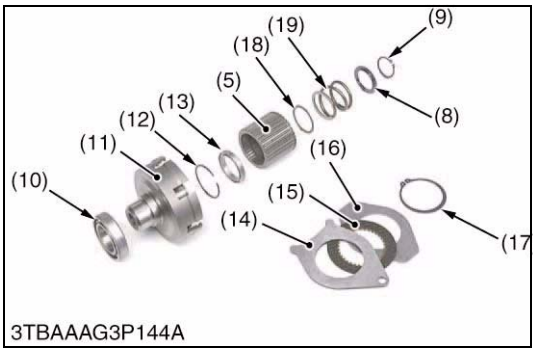
PTO Clutch Spring

1. Set the PTO clutch spring compressor (1) to the PTO clutch case (2). (Refer to G-54.)
2. Tighten the nut and remove the external cir-clip (3).
3. Remove the spring collar (4) and the PTO clutch spring (5).

(1) PTO Clutch Spring Compressor
(2) PTO Clutch Case
(3) External Cir-clip
(4) Spring Collar
(5) PTO Clutch Spring

W1096441





PTO Clutch Disks and Brake

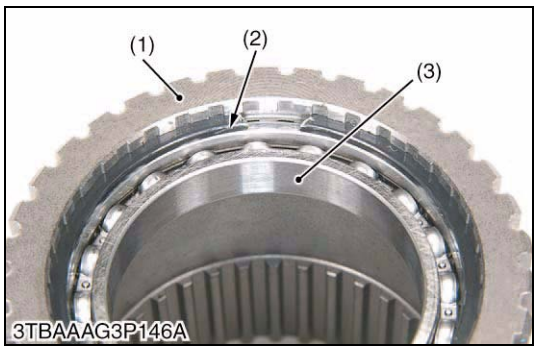
1. After removing the inner cir-clip (7) from the PTO clutch case (11), remove the pressure plate (6).
2. Remove the clutch disks (4) and clutch plates (3).
3. Remove the external cir-clip (17) from the spline boss (5).
4. Remove the brake plate (16), the brake disks (15) and the brake plate (14).
5. After removing the external cir-clip (9) and the spring (19).

(When reassembling)

- Install the parts to the original positions.

(1) Clutch Piston
(2) O-ring
(3) Clutch Plate
(4) Clutch Disk
(5) Spline Boss
(6) Pressure Plate
(7) Internal Cir-clip
(8) Spring Collar
(9) External Cir-clip
(10) Ball Bearing
(11) PTO Clutch Case
(12) Cir-clip
(13) Ball Bearing
(14) Brake Plate
(15) PTO Brake Disk
(16) Brake Plate
(17) External Cir-clip
(18) Bearing Collar
(19) Spring

W1096998







Spline Boss Cir-clip

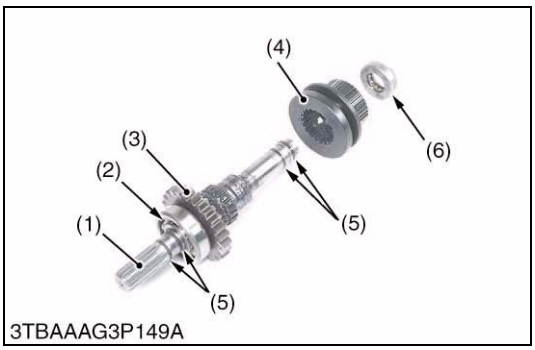
1. Push the cir-clip with a small screw driver through the small hole of the spline boss (1).
2. Lift the cir-clip (2) with a screw driver not to damage it.

(When reassembling)

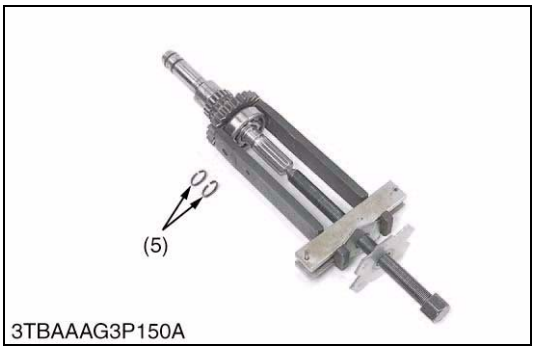
- Install the cir-clip (2) holding it by hands.

(1) Spline Boss
(2) Cir-clip
(3) Ball Bearing

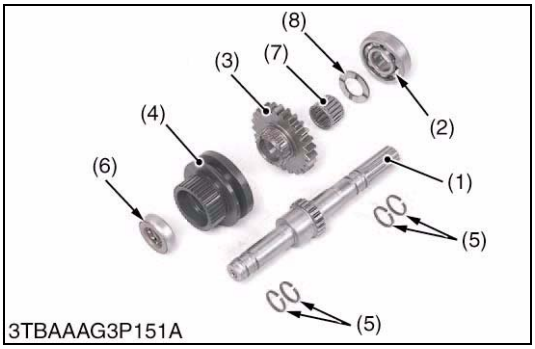
W1098228



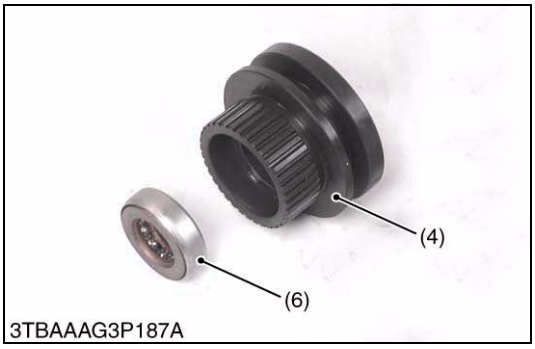
3TBAAAG3P149A



3TBAAAG3P150A



3TBAAAG3P151A



3TBAAAG3P187A

PTO Shaft

1. Remove the thrust bearing (6) and the PTO shifter (4) not to damage the seal rings (5) located at the PTO shaft front side.
2. Remove the seal rings (5) located at the PTO shaft rear side.
3. Remove the ball bearing (2) with a puller.

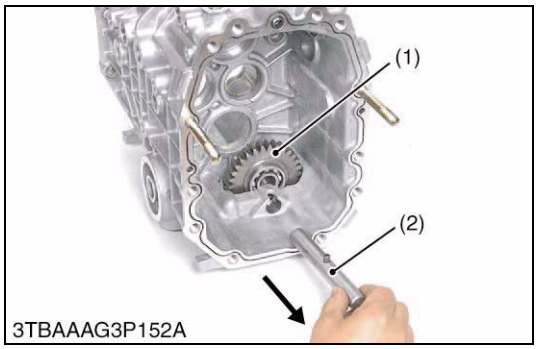
(When reassembling)

- Check all seal rings (5).
- If the seal ring (5) is damaged, replace it.
- Check the direction of the thrust bearing (6) and install the thrust bearing (6) as shown in the picture.

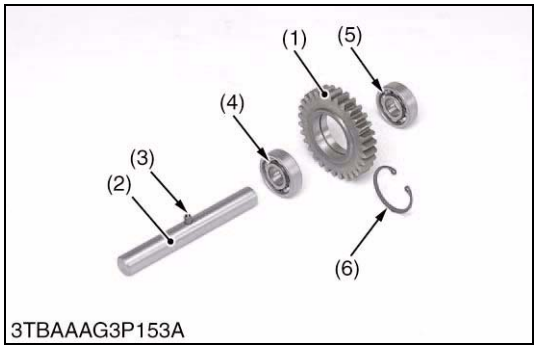
(1) PTO Clutch Shaft
(2) Ball Bearing
(3) 25T Mid-gear
(4) PTO Shifter
(5) Seal Ring
(6) Thrust Bearing
(7) Needle Bearing
(8) Collar

W1098663

(11) Mid-PTO Section



3TBAAAG3P152A



3TBAAAG3P153A

Mid-gear and Idle Shaft (Mid-PTO Model)

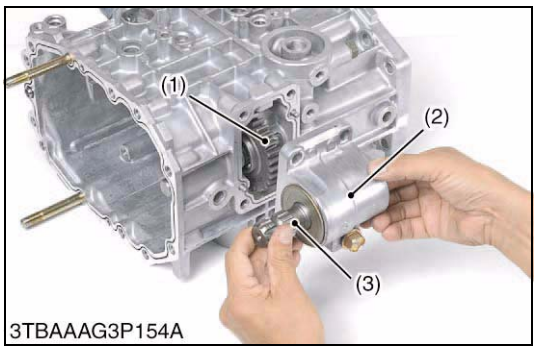
1. Remove the idle shaft (2) from the transmission case using a screw driver.
2. Remove the mid-gear (1) from the transmission case.
3. Remove the ball bearings (4) (5) and the internal cir-clip (6) from the mid-gear (1).

(When reassembling)

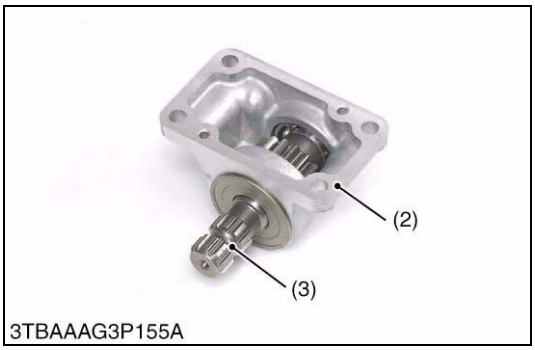
- Install the internal cir-clip (6) to the inner groove of the mid-gear (1) securely.

(1) 30T Mid-gear
(2) Idle Shaft
(3) Spring Pin
(4) Ball Bearing
(5) Ball Bearing
(6) Internal Cir-clip

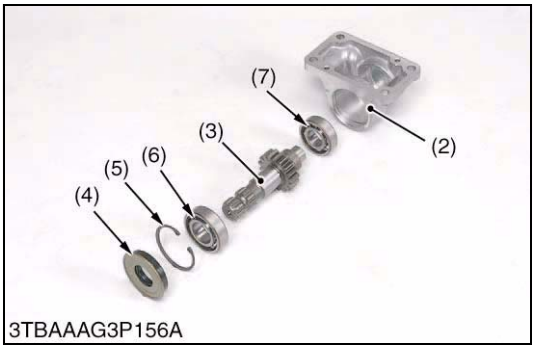
W1099561



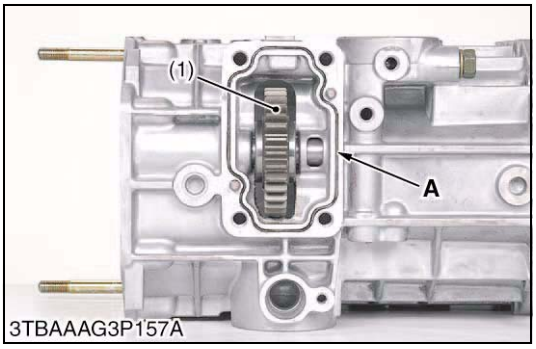
3TBAAAG3P154A



3TBAAAG3P155A



3TBAAAG3P156A



3TBAAAG3P157A

Mid-PTO Case and Mid-gear Shaft (Mid-PTO Model)

1. Remove the mid-PTO case mounting bolts.
2. Remove the mid-PTO case from the transmission case.
3. Remove the mid-PTO oil seal (4) from the mid-PTO case (2) using a screw driver not to damage it.
4. Remove the internal cir-clip (5).
5. Remove the mid-gear shaft (3) with the ball bearings (6) (7).
6. Remove the bearing (6) (7) from the mid-gear shaft (3).

(When reassembling)

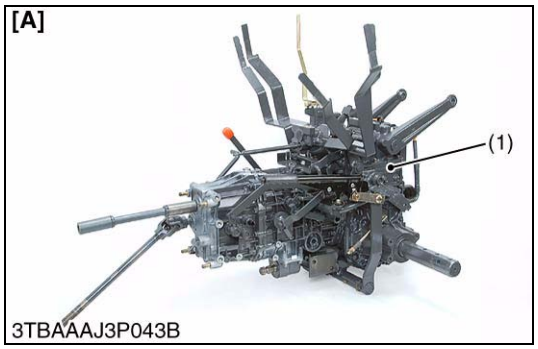
- If the mid-PTO oil seal (4) is defective, worn or scratched, replace it.
- Apply grease to the lip and the outer of the mid-PTO oil seal (4).
- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint surface A of the transmission case and the mid-PTO case (2).

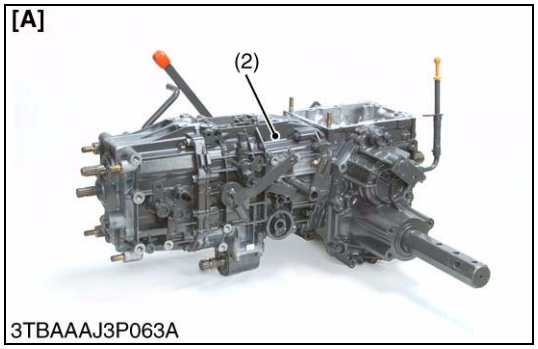
(1) 30T Mid-gear
(2) Mid-PTO Case
(3) Mid-gear Shaft
B1830, B2230, B2530 : 18T
B3030 : 17T
(4) Mid-PTO Oil Seal
(5) Internal Cir-clip
(6) Ball Bearing
(7) Ball Bearing

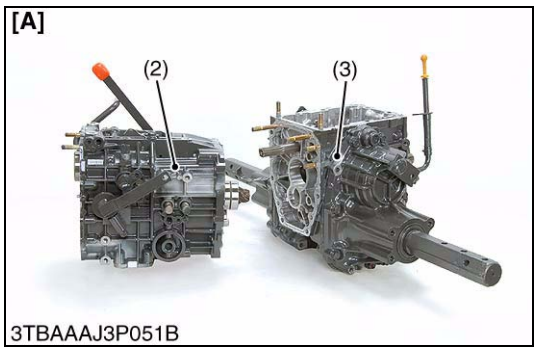
A : Joint Surface

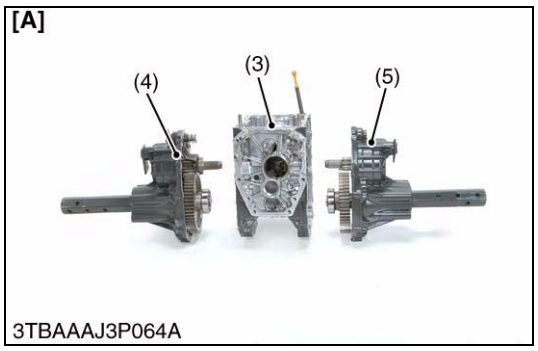
W1100165

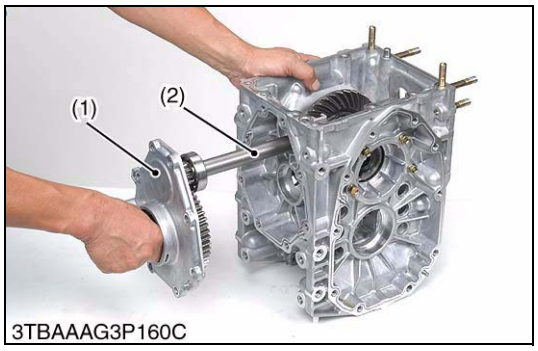
(12) Differential Gear Section











Separating Hydraulic Cylinder, Transmission Case and Rear Axles

1. Remove the hydraulic cylinder as an assembly.
2. Separate the transmission case.
3. Separate the rear axles.

(When reassembling)

Tightening torque	Hydraulic cylinder mounting bolt (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 lbf·ft
	Transmission case mounting bolt and nut (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft
	Rear axle case mounting bolt (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

(1) Hydraulic Cylinder Assembly
(2) Transmission Case
(3) Differential Case
(4) Rear Axle Case, RH
(5) Rear Axle Case, LH

[A] Manual Transmission Model

W1072637

Rear-PTO Case and Rear PTO Shaft

1. Remove the rear PTO cover mounting bolts and the rear PTO cover (1).

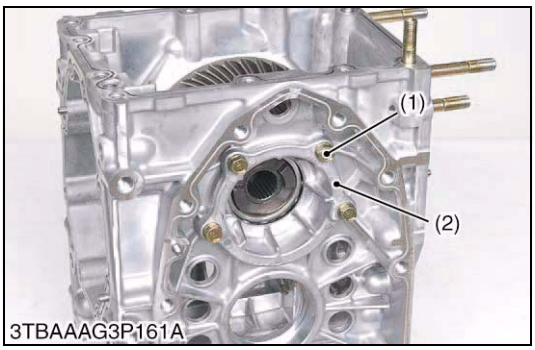
(When reassembling)

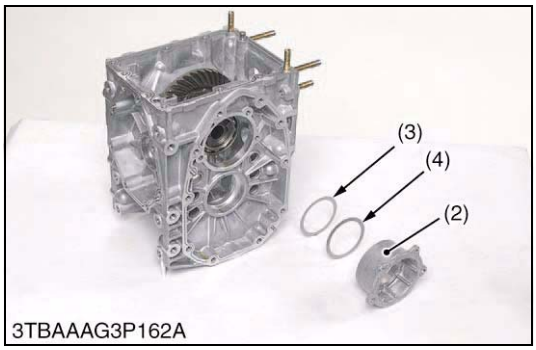
- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint surface of the rear axles cases and the rear PTO cover.

Tightening torque	Rear PTO cover mounting bolt for aluminum (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

(1) Rear PTO Cover
(2) PTO Drive Shaft

W1100724





Differential Bearing Holder (RH)

1. Remove the differential holder mounting bolts (1).
2. Remove the differential holder (2) and shims (3) (4).

(When reassembling)

- 0.5 mm (0.020 in.) shim Parts No. 66591-1498-0
- 0.2 mm (0.008 in.) shim Parts No. 66591-1499-0

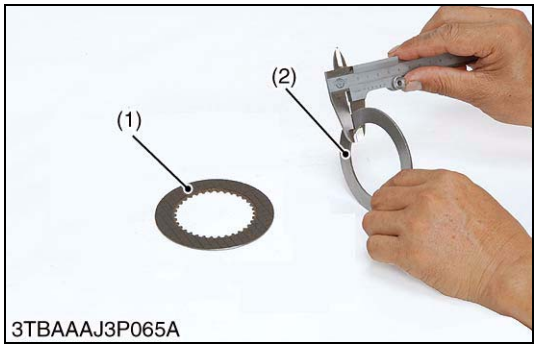
Tightening torque	Differential bearing holder mounting bolt for aluminum (M8)	17.7 to 20.5 N·m 1.8 to 2.1 kgf·m 13.1 to 15.1 lbf·ft

(1) Differential Bearing Holder Mounting Bolt
(2) Differential Bearing Holder
(3) Shim
(4) Shim

W1101519

[4] SERVICING

(1) Bi-Speed Turn Clutch



Clutch Disk and Clutch Plate

1. Measure the clutch disk thickness with a vernier calipers.
2. Measure the clutch plate thickness with a vernier calipers.
3. If the thickness is less than the allowable limit, replace it.
4. If the bearing is worn, replace it.

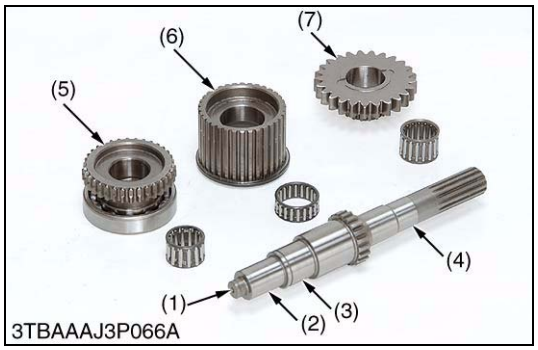
Bi-Speed Turn clutch disk thickness	Factory spec.	1.70 to 1.90 mm 0.067 to 0.075 in.
	Allowable limit	1.55 mm 0.061 in.

Bi-Speed Turn clutch disk plate thickness	Factory spec.	1.95 to 2.05 mm 0.0768 to 0.0807 in.
	Allowable limit	1.8 mm 0.071 in.

(1) Clutch Disk
(2) Clutch Disk Plate

W1074531

(2) Mechanical PTO Clutch

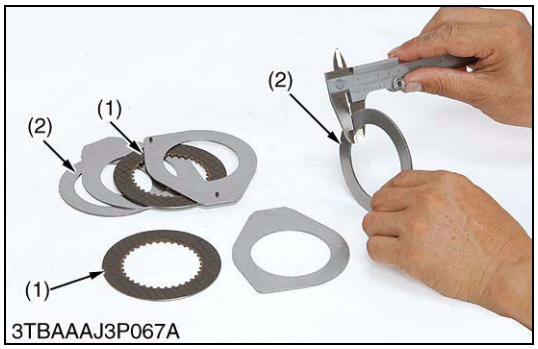


PTO Clutch Shaft

1. Check the needle bearings.
2. Check the needle bearing surfaces (2) (3) (4) of the PTO clutch shaft (1).
3. Check the needle bearing surfaces of the one-way clutch spline boss (5), the PTO brake spline boss (6) and the 25T mid-PTO gear (7).
4. If the PTO clutch shaft is rough or grooved, replace it.
5. If the needle bearing is wore, replace it.
6. The one-way clutch spline boss (5), the PTO brake spline boss (6) or the 25T mid-PTO gear (7) is worn, replace it.

(1) PTO Clutch Shaft
(2) Needle Bearing Surface
(3) Needle Bearing Surface
(4) Needle Bearing Surface
(5) One-way Clutch Spline Boss
(6) PTO Brake Spline Boss
(7) 25T Mid-PTO Gear

W1075301



PTO Brake Disk and Brake Plate 1

1. Measure the PTO brake disk thickness with a vernier calipers.
2. Measure the brake plate thickness with a vernier calipers.
3. If the thickness is less than the allowable limit, replace it.

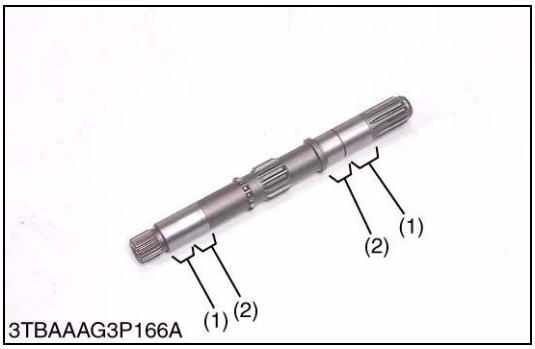
PTO brake disk thickness	Factory spec.	1.70 to 1.90 mm 0.067 to 0.075 in.
	Allowable limit	1.55 mm 0.061 in.

Mechanical PTO brake plate 1 thickness	Factory spec.	1.95 to 2.05 mm 0.0768 to 0.0807 in.
	Allowable limit	1.8 mm 0.071 in.

(1) PTO Brake Disk
(2) Brake Plate 1

W1076112

(3) HST

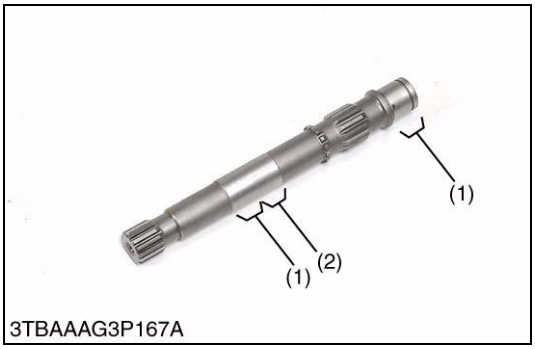


Pump Shaft

1. Pull out the pump shaft from the HST housing case.
2. Check the oil seal surface (1) the bearing surface (2) and the bearing.
3. If the shaft is rough or grooved, replace it.
4. If the bearing is worn, replace it.

(1) Oil Seal Surface (2) Bearing Surface

W1024186

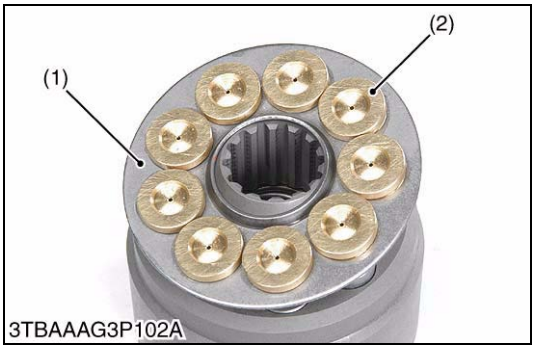


Motor Shaft

1. Pull out the motor shaft from the HST housing case.
2. Check the oil seal surface (1) the bearing surface (2) and the bearing.
3. If the shaft is rough or grooved, replace it.
4. If the bearing is worn, replace it.

(1) Oil Seal Surface (2) Bearing Surface

W1103300



Cylinder Block Bore and Pistons

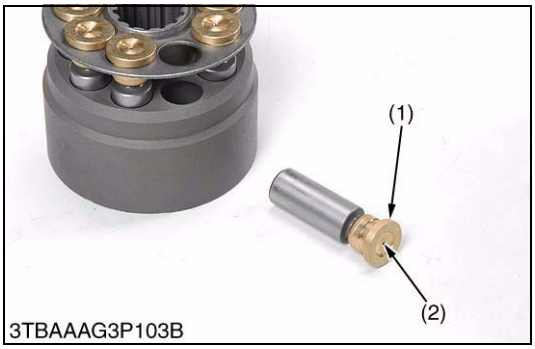
1. Lift all the pistons gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace cylinder block assembly.

■ **IMPORTANT**

- **Do not interchange pistons between pump and motor cylinder block. Pistons and cylinder blocks are matched.**

(1) Retainer Plate (2) Piston Slipper

W1035703



Piston Slipper and Retainer Plate

1. Check the slipper (1) for flatness.
2. If rounded, replace piston.
3. Measure the thickness of piston slipper.
4. If the measurement is less than the allowable limit, replace the piston.
5. Check the lubricant hole (2) for clogging.

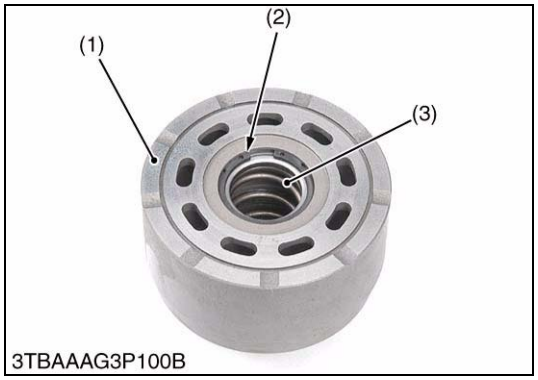
■ **IMPORTANT**

- **Do not interchange pistons between pump and motor cylinder block. Pistons and cylinder blocks are matched.**

Thickness of slipper	Factory spec.	3.00 mm 0.118 in.
	Allowable limit	2.90 mm 0.114 in.

(1) Piston Slipper (2) Lubricant Hole

W1035895

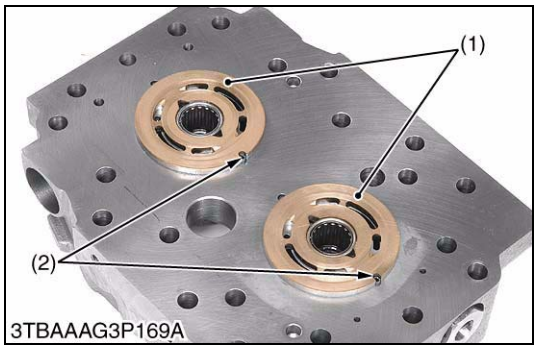


Cylinder Block Face

1. Check the polished face (1) of cylinder block for scoring.
2. If scored, replace cylinder block assembly.
3. Check the spring (3) for breakage.
4. If broken, replace cylinder block assembly.

(1) Polished Face
(2) Cir-clip
(3) Spring

W1036188



Valve Plate and Center Section Face

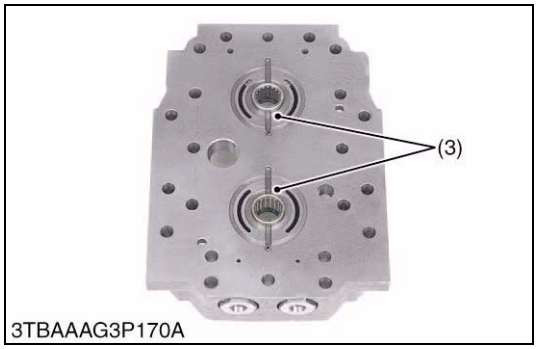
1. Check the engagement of the valve plate (1) and the anchor pin (2).
2. Pushing the valve plate (1) against the anchor pin (2), lift it to remove.
3. Check the valve plate (1) for foreign particles.
4. Clean the valve plate (1) and dry with compressed air.
5. Check the valve plate (1) for scratches, wear and erosion. (Run a finger nail across the valve plate surface. If worn, it will be felt.)
6. If worn or scored, replace it.

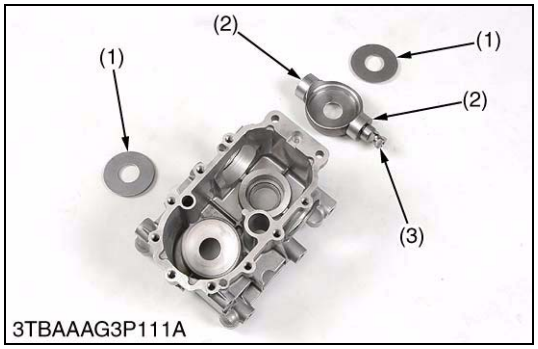
■ **NOTE**

- **After checking, coat them with hydrostatic transmission oil.**

(1) Valve Plates
(2) Anchor Pin
(3) Center Section Face

W1036339



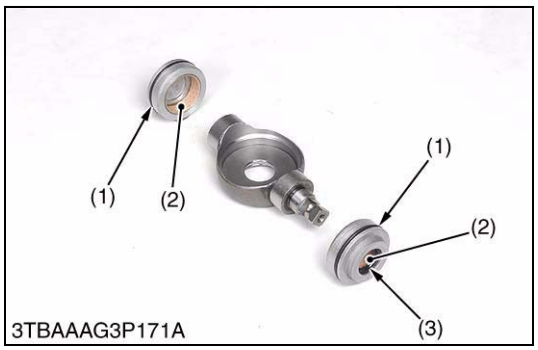


Thrust Plates and Bearing Surface

1. Check the thrust plate (1) for scratches and excessive wear.
2. If worn or scored, replace it.
3. Check the bearing surface (2) of trunnion shaft (swashplate)(3) for scratches and excessive wear.
4. If worn or scored, replace it.

(1) Thrust Plate
(2) Bearing Surface
(3) Trunnion Shaft

W1036630



Trunnion Shaft Cover

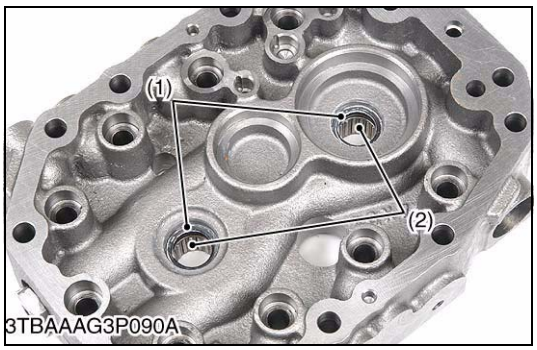
1. Check the bearing (2) for scratches and excessive wear.
2. If worn or scored, replace it.
3. Check the oil seal (3) and the O-rings (1) for damage.

■ **NOTE**

- **After checking, coat the bearings with hydrostatic transmission oil, and the oil seal lip and the O-rings (1) with grease.**

(1) O-ring
(2) Bearing
(3) Oil Seal

W1036765



Center Section Oil Seals and Bearings

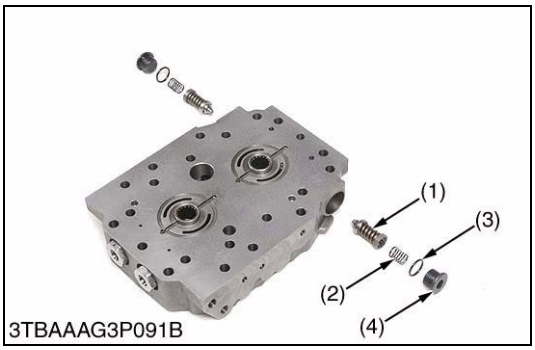
1. Check the oil seals (1) for damage.
2. Check the needle bearings (2) for wear.
3. If the needle bearings (2) and oil seals (1) are worn, replace all seals and needle bearings.

■ **NOTE**

- **After checking, coat the bearing with hydrostatic transmission oil and the oil seal lip with grease.**

(1) Oil Seal
(2) Needle Bearing

W1036910



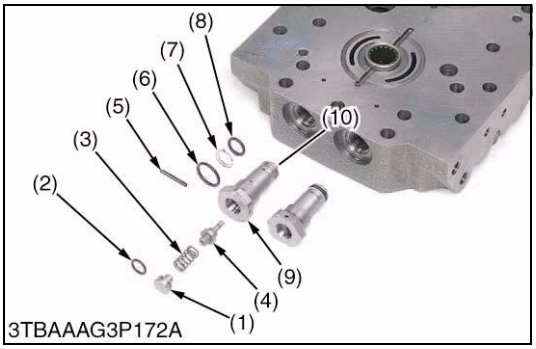
Check and High Pressure Relief Valve

1. Check the valve plug (4) and valve (1) for scratches and damage.
2. Check the valve seat in the port block for damage.
3. Check the spring (2) for breakage and wear.
4. If anything unusual, replace the check and high pressure relief valve assembly.

Tightening torque	Valve plug	118 to 147 N·m 12.0 to 15.0 kgf·m 86.8 to 108.5 lbf·ft

(1) Valve
(2) Spring
(3) O-ring
(4) Valve Plug

W1037053



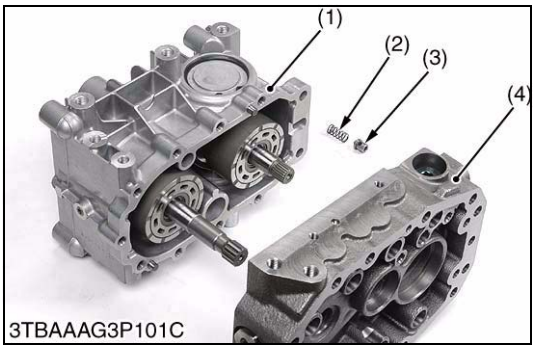
Neutral Valve

1. Check the holes of the valve body (9) and the neutral valve (4) for clogging.
2. If clogged, open hole with compressed air.
3. Replace the O-rings (2), (6), (8) and the backup ring (7) for scratches and damage.
4. Check the springs for breakage and wear.
5. If the valve surface is scored, replace it.
6. If anything is unusual, replace it.

Tightening torque	Neutral valve plug	58.5 to 68.6 N·m 6.0 to 7.0 kgf·m 43.4 to 50.6 lbf·ft

(1) Plug
(2) O-ring
(3) Spring
(4) Neutral Valve
(5) Pin
(6) O-ring
(7) Backup Ring
(8) O-ring
(9) Valve Body
(10) Plug

W1107714

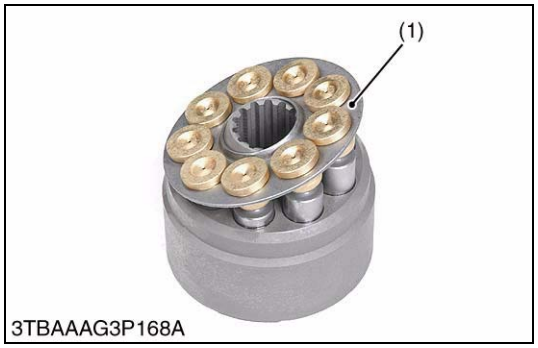


Charge Relief Valve

1. Check the spring (2) for breakage and wear.
2. If it is unusual, replace it.

(1) HST Housing
(2) Spring
(3) Poppet
(4) Center Section

W1037317



Cylinder Block Bore and Pistons

1. Lift all the pistons gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace cylinder block assembly.

■ **IMPORTANT**

- **Do not interchange pistons between pump and motor cylinder block. Pistons and cylinder blocks are matched.**

Clearance between piston and bore	Factory spec.	0.02 mm 0.0008 in.
	Allowable limit	0.04 mm 0.0016 in.

(1) Retainer Plate

W1108478

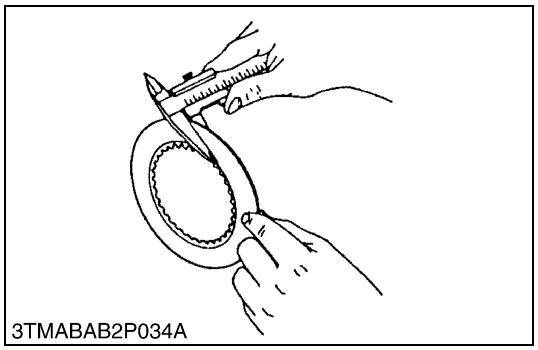
(4) Independent PTO Clutch



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.

W1017239

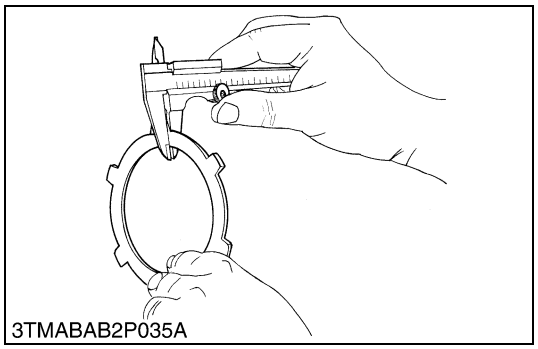


Clutch Disc Wear

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

Clutch disc wear	Factory spec.	1.70 to 1.90 mm 0.067 to 0.075 in.
	Allowable limit	1.55 mm 0.061 in.

W1017366



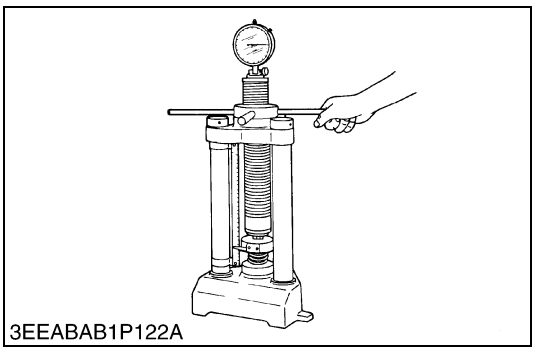
Steel Plate and Pressure Plate Wear

1. Measure the steel plate thickness with vernier calipers.
2. Measure the pressure plate thickness with vernier calipers.
3. If the thickness is less than the allowable limit, replace.

Steel plate wear (without hole)	Factory spec.	0.95 to 1.05 mm 0.0374 to 0.0413 in.
	Allowable limit	0.8 mm 0.031 in.
Steel plate wear (with holes, with holes and rubber plugs)	Factory spec.	1.15 to 1.25 mm 0.045 to 0.049 in.
	Allowable limit	1.10 mm 0.043 in.

Pressure plate wear	Factory spec.	1.95 to 2.05 mm 0.0768 to 0.0807 in.
	Allowable limit	1.8 mm 0.071 in.

W1026873


3EEABAB1P122A

Piston Return Spring Free Length and Tension

1. Measure the free length of the piston return spring with vernier calipers.
2. Place the piston return spring on a spring compression tester and compress to the specified length, and read the gauge.
3. If the measurement is less than the allowable limit, replace.

Piston / return spring free length	Factory spec.	34.5 mm 1.36 in.

Piston return spring tension	Factory spec.	614.2 N / 17.8 mm 62.7 kgf / 17.8 mm 138.1 lbf / 0.70 in.
	Allowable limit	518.7 N / 17.8 mm 53.0 kgf / 17.8 mm 438.0 lbf / 0.70 in.

W1110066

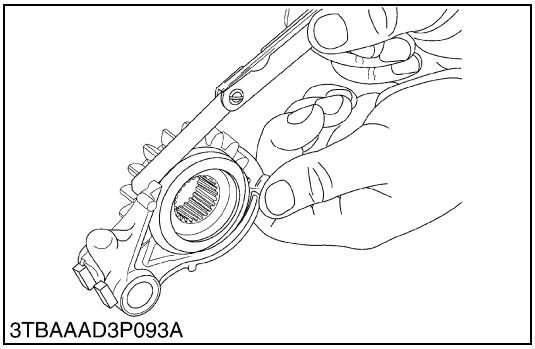
(5) Transmission Case


3TBAAAG3P174A

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.

W1024506


3TBAAAD3P093A

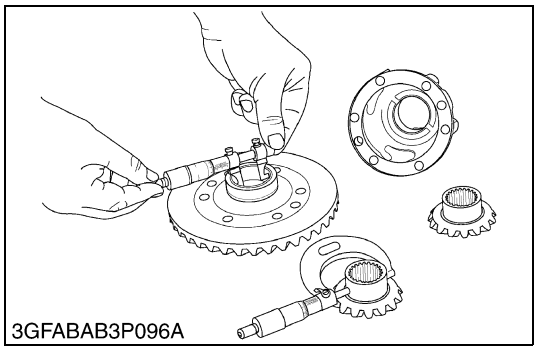
Clearance between Shift Fork and Shift Gear Groove

1. Insert the fork into the shift gear groove and measure the clearance with a feeler gauge.
2. If the clearance exceeds the allowable limit, replace it.

Clearance between shift fork and shift gear groove	Factory spec.	0.10 to 0.35 mm 0.004 to 0.014 in.
	Allowable limit	0.5 mm 0.020 in.

W1026751

(6) Differential Gear


3GFABAB3P096A

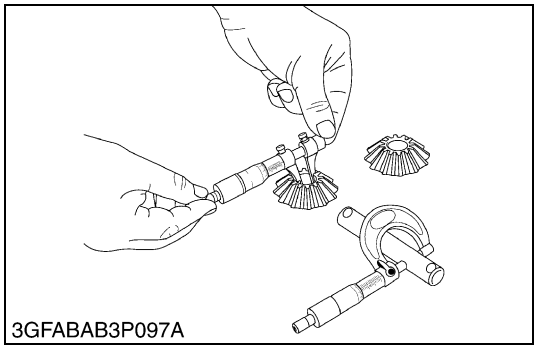
Clearance between Differential Case (Spiral Bevel Gear) and Differential Side Gear

1. Measure the differential side gear boss O.D. with an outside micrometer.
2. Measure the differential case I.D. and the spiral bevel gear I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between differential case (spiral bevel gear) and differential side gear	Factory spec.	0.025 to 0.066 mm 0.0010 to 0.0025 in.
	Allowable limit	0.30 mm 0.0118 in.

Differential case I.D.	Factory spec.	32.000 to 32.025 mm 1.2599 to 1.2608 in.
Spiral bevel gear I.D.	Factory spec.	32.000 to 32.025 mm 1.2599 to 1.2608 in.
Differential side gear O.D.	Factory spec.	31.959 to 31.975 mm 1.2582 to 1.2589 in.

W1028123


3GFABAB3P097A

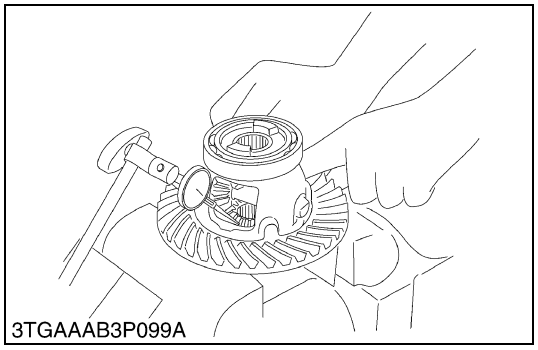
Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D. with an outside micrometer.
2. Measure the differential pinion I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between differential pinion shaft and differential pinion	Factory spec.	0.016 to 0.045 mm 0.0007 to 0.0018 in.
	Allowable limit	0.30 mm 0.0118 in.

Differential pinion I.D.	Factory spec.	16.000 to 16.018 mm 0.6300 to 0.6306 in.
Differential pinion shaft O.D.	Factory spec.	15.973 to 15.984 mm 0.6289 to 0.6292 in.

W1028504


3TGAAAB3P099A

Backlash between Differential Pinion and Differential Side Gear

1. Secure the differential case with a vise.
2. Set the dial indicator (lever type) with its finger on the tooth of the differential side gear.
3. Press differential pinion and side gear against the differential case.
4. Hold the differential pinion and move the differential side gear to measure the backlash.
5. If the backlash exceeds the allowable limit, adjust with differential side gear shims.

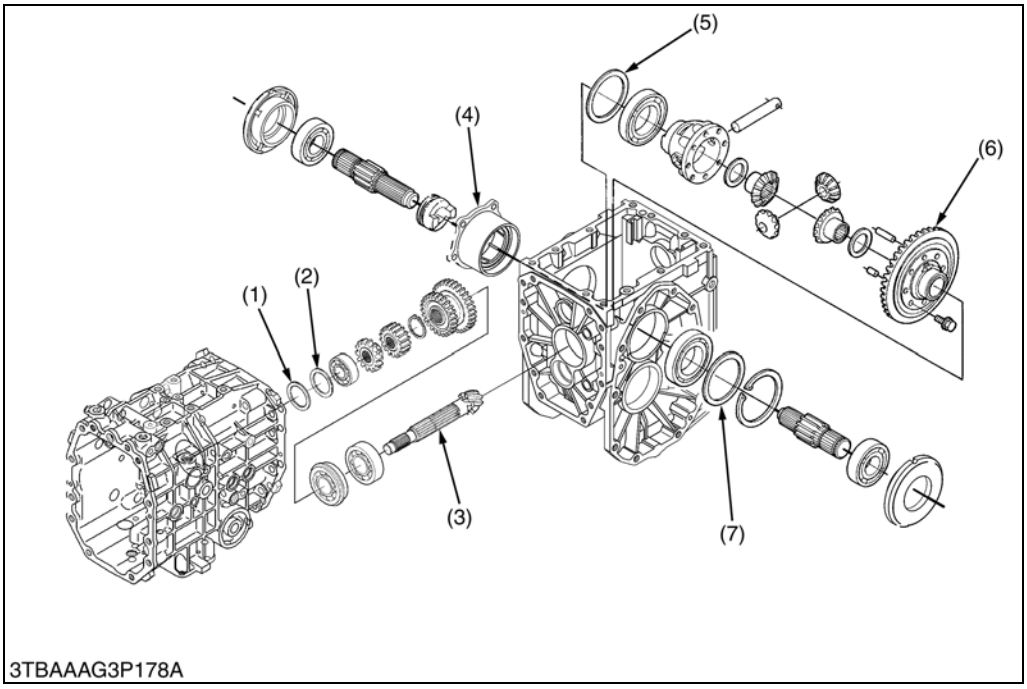
Backlash between differential pinion and differential side gear	Factory spec.	0.1 to 0.3 mm 0.004 to 0.011 in.
	Allowable limit	0.4 mm 0.016 in.

■ **NOTE**

- **Thickness of shims :**
  0.80 mm (0.0315 in.) [Parts No. 67211-15170]
  1.00 mm (0.0394 in.) [Parts No. 67211-15160]
  1.20 mm (0.0472 in.) [Parts No. 67211-15180]

W1028708

Backlash between Spiral Bevel Pinion and Spiral Bevel Gear



(1) Shim
(2) Shim
(3) Spiral Bevel Pinion
(4) Bearing Holder
(5) Shim
(6) Spiral Bevel Gear
(7) Shim

W1029105

1. Set the dial indicator (lever type) with its finger on the end of spiral bevel pinion (3).
2. Move the spiral bevel pinion back and forth to each end and measure the side clearance.
3. If the side clearance exceeds the factory specifications, adjust with the shims (2) at front end of spiral bevel pinion.
4. Set the dial indicator (lever type) with its finger on the tooth surface of bevel gear.
5. Measure the backlash by fixing the spiral bevel pinion (2) and moving bevel gear (5) by hand.
6. If the backlash exceeds the factory specifications, adjust with the shims (2), (7) at bearing holder (4) and differential case.
7. Adjust the backlash properly by repeating the above procedure.

(When adjusting)

Movement of spiral bevel pinion shaft at shaft directions	Factory spec.	Approx. 0 mm 0 in.
Backlash between spiral bevel pinion and spiral bevel gear	Factory spec.	0.10 to 0.30 mm 0.0039 to 0.0012 in.

W1029368

(Reference)

- Thickness of shims (1) :
  0.2 mm (0.008 in.) 1.4 mm (0.055 in.)
- Thickness of shims (5), (7) :
  0.2 mm (0.008 in.) 0.5 mm (0.020 in.)

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4 REAR AXLE

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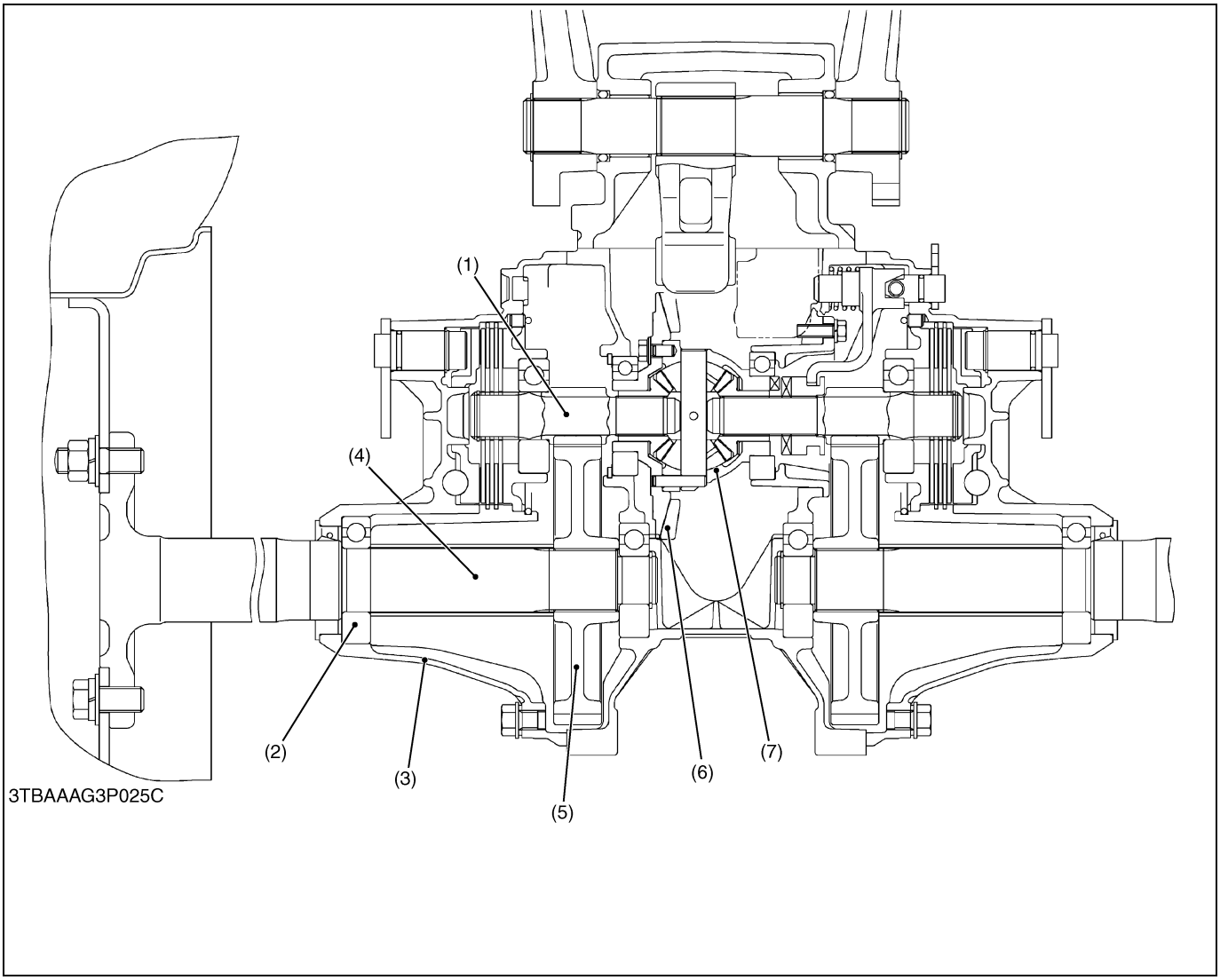
MECHANISM

CONTENTS

1. STRUCTURE 4-M1

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1. STRUCTURE



(1) Differential Gear Shaft
(2) Ball Bearing
(3) Rear Axle Case
(4) Rear Axle
(5) Spur Gear
(6) Spiral Bevel Gear
(7) Differential Gear

The rear axles are the semi floating type with ball bearing (2) between the rear axle (4) and the rear axle case (3), which supports the rear wheel load as well as transmitting power to the rear wheels.

The differential gears (7) automatically control the revolution of right and left wheels when the rear wheels encounter unequal resistance during turning.

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SERVICING

CONTENTS

1. TROUBLESHOOTING 4-S1
2. TIGHTENING TORQUES 4-S2
3. DISASSEMBLING AND SERVICING 4-S3
   [1] DISASSEMBLING AND ASSEMBLING 4-S3
   [2] SERVICING 4-S7

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual Noise at All Time	Improper backlash between differential gear shaft and final reduction gear	Replace	3-S78, S79
	Bearing worn	Replace	4-S4, S5
	Insufficient or improper type of transmission fluid used	Replenish or change	G-15
Noise while Turning	Brake shaft and spur gear and internal gear worn or damaged	Replace	4-S4, S5

W1014322

2. TIGHTENING TORQUES

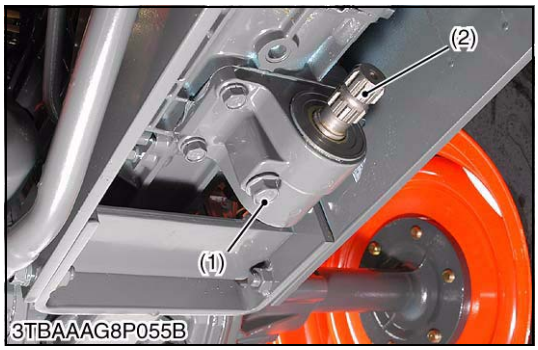
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-8.)

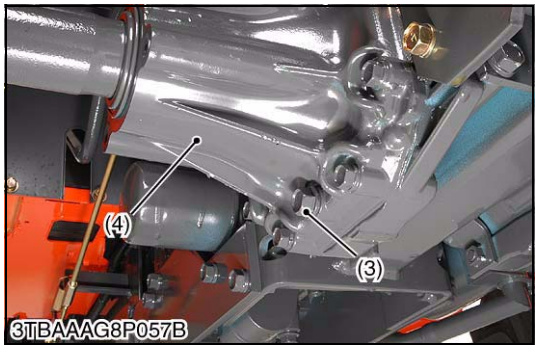
Item	N·m	kgf·m	lbf·ft
Rear wheel cotter setting bolt and nut [B1830, B2230, B2530]	123 to 147	12.6 to 15.0	91 to 108
Rear wheel hub mounting nut [B1830, B2230, B2530]	108 to 125	11.0 to 12.8	80 to 93
Rear axle case mounting bolt (M10) [B1830, B2230, B2530]	39.3 to 44.1	4.0 to 4.5	28.9 to 32.5
Rear wheel mounting bolt (M14) [B3030]	196 to 225	20 to 23	144.6 to 166.3
Rear axle case mounting bolt (M10) [B3030]	39.3 to 44.1	4.0 to 4.5	28.9 to 32.5

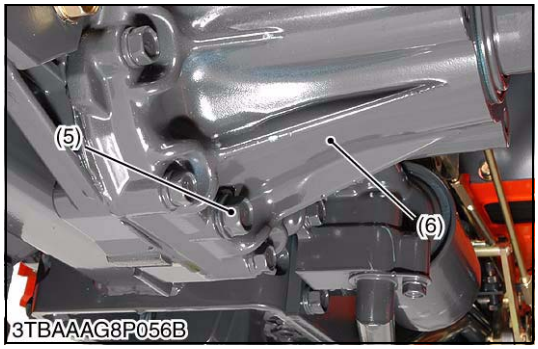
W1016410

3. DISASSEMBLING AND SERVICING

[1] DISASSEMBLING AND ASSEMBLING







Draining Transmission Fluid

CAUTION

- **Stop the engine before checking and changing the transmission fluid.**

1. Place the oil pan under the tractor.
2. Remove the drain plugs (1) (3) (5) at the mid-PTO shaft and at the bottom of the rear axle cases (4) (6).
3. Drain the transmission fluid.
4. After draining the transmission fluid, reinstall the drain plugs (1), (3), (5).

IMPORTANT

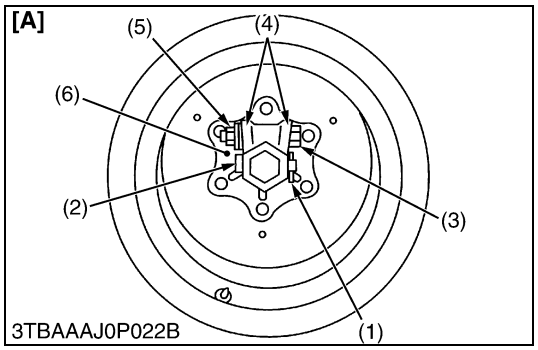
- **Use only KUBOTA UDT oil. Use of other oils may damage the transmission or hydraulic system. Refer to "LUBRICANTS, FUEL AND COOLANT" (See page G-7).**
- **Never work the tractor immediately after changing the transmission oil. Keep the engine at medium speed for a few minutes to prevents damage to the transmission.**
- **Do not mix different brands oil together.**

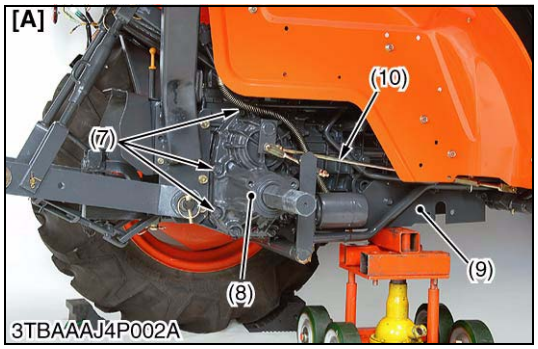
Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030HST	17 L 4.5 U.S.gals 3.7 Imp.gals

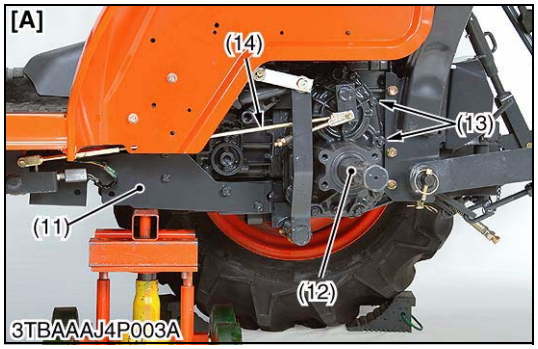
(1) Drain Plug
(2) Mid-PTO Shaft
(3) Drain Plug
(4) Rear Axle Case (LH)
(5) Drain Plug
(6) Rear Axle Case (RH)

W1013407











Removing Rear Wheels and Rear Axle

[Hexagon rear axle : B1830, B2230, B2530]

1. Support the tractor sub-frame with a jack.
2. Remove the snap pin (1) and the pin (2).
3. Loosen and remove the nut (5).
   Remove the spring washer (4) and the bolt (3).
4. Remove the rear wheel from the rear axle (12).

[Hub rear axle : B3030] (Refer to hexagon rear axle.)

1. Support the tractor sub-frame with a jack.
2. Remove the rear wheel mounting bolts and the nuts.
3. Remove the rear wheel.
4. Disconnect the brake rods.
5. Remove the rear axle case mounting bolts.
6. Remove the rear axle.

(When reassembling)

- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint face of the rear axle case and the differential gear case.

[Hexagon rear axle : B1830, B2230, B2530]

Tightening torque	Rear wheel cotter setting bolt and nut	123 to 147 N·m 12.6 to 15.0 kgf·m 91 to 108 lbf·ft
	Rear wheel hub mounting nut	108 to 125 N·m 11.0 to 12.8 kgf·m 80 to 93 lbf·ft
	Rear axle case mounting bolt (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 lbf·ft

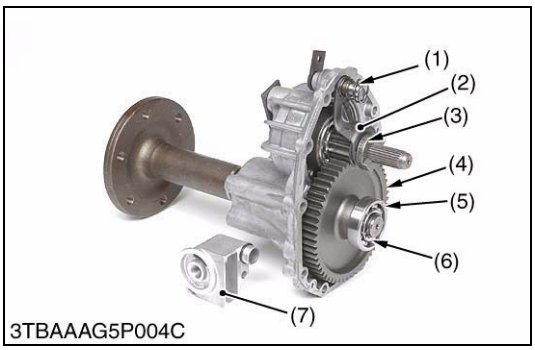
[Hub rear axle : B3030]

Tightening torque	Rear wheel mounting bolt (M14)	196 to 225 N·m 20 to 23 kgf·m 144.6 to 166.3 lbf·ft
	Rear axle case mounting bolt (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 lbf·ft

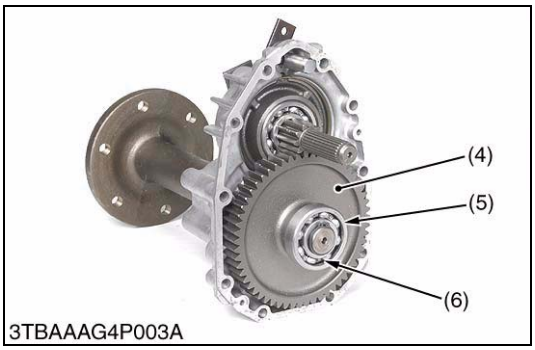
(1) Snap Pin
(2) Pin
(3) Bolt
(4) Cotter
(5) Nut and Spring Washer
(6) Hub
(7) Bolt
(8) Rear Axle, RH
(9) Sub-frame, RH
(10) Brake Rod
(11) Sub Frame, LH
(12) Rear Axle, LH
(13) Bolt
(14) Brake Rod

[A] Hexagon Rear Axle

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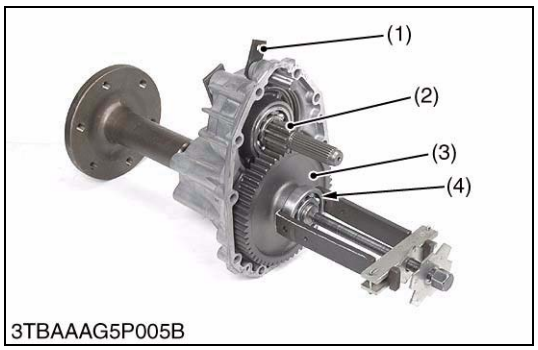
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Differential Lock Shift Fork

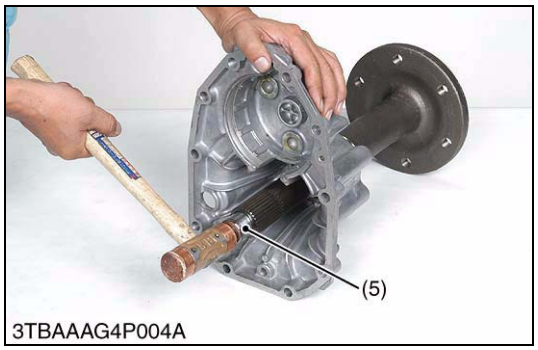
1. Remove the spring (1).
2. Draw out the differential lock shift lock clutch (3) and the differential lock shift fork (2).
3. Remove the external cir-clip (6).
4. Remove the transmission oil filter bracket (7).

(1) Spring
(2) Differential Lock Shift Fork
(3) Differential Lock Clutch
(4) 58T Gear (B1830, B2230, B2530)
57T Gear (B3030)
(5) Ball Bearing
(6) External Cir-clip
(7) Transmission Oil Filter Bracket

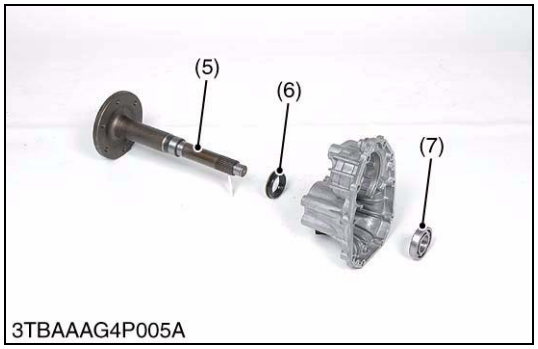
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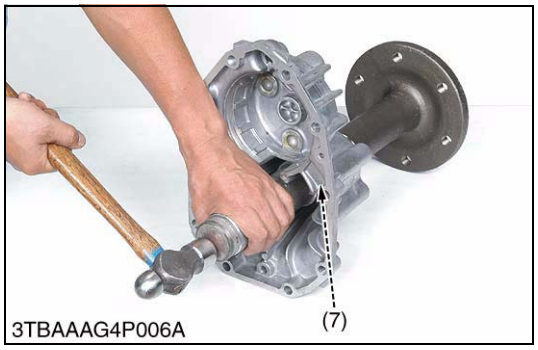
3TBAAAG5P005B



3TBAAAG4P004A



3TBAAAG4P005A



3TBAAAG4P006A

Rear Axle Shaft

1. Remove the fork rod (1).
2. Remove the ball bearing (4) with a puller.
3. Remove the gear (3).
4. Remove the brake shaft assembly (2).
5. Tap out the rear axle shaft (5) with a rubber hammer to the outside.

(When reassembling)

- Tap in the ball bearing to the rear axle case.

(1) Fork Rod
(2) Brake Shaft Assembly
(3) 58T Gear (B1830, B2230, B2530)
57T Gear (B3030)
(4) Ball Bearing
(5) Rear Axle Shaft
(6) Oil Seal
(7) Ball Bearing

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[2] SERVICING



Checking Ball 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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5 BRAKES

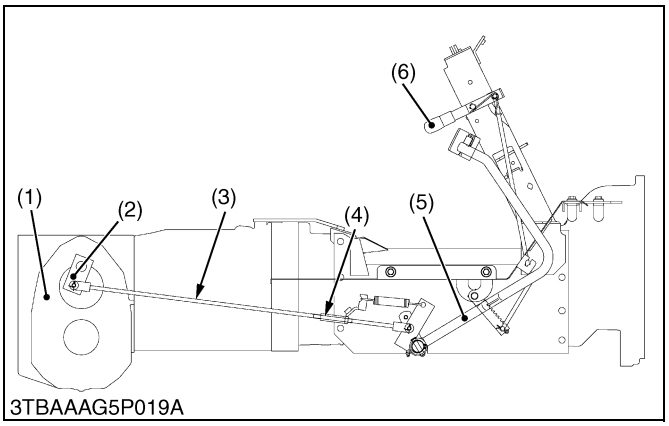
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MECHANISM

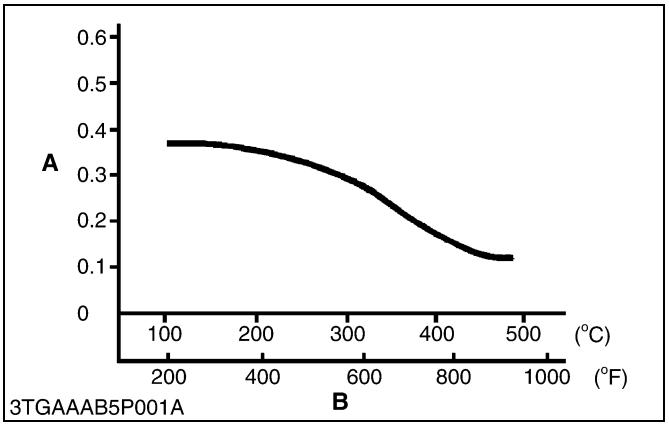
CONTENTS

1. FEATURE 5-M1
2. OPERATION 5-M2

1. FEATURE



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3TGAAAB5P001A

Independent mechanical wet disc brakes are used for the right and left travelling brakes. They are operated by the brake pedals through the mechanical linkages and provide stable braking and require little adjustment.The parking brake is mechanical type which is designed to actuate the travelling brakes through the parking brake linkages. When pulling the parking brake lever (6), parking brake mechanism is the same mechanism of travelling brake operated.

■ **Features of Wet Disc Brakes**

1. **Reduced disc wear**
   Although wet discs are worn by approx. several tens of microns depending on the accuracy of parts during the initial contact in initial period of 50 hours or so, almost no wear occurs afterward. This means that very little brake adjustments are required.
2. **Stable braking**
   Since the brake discs are immersed in transmission oil, ***Fade** is rarely caused even after repeated braking and a stable braking force is obtained.
3. **Pedal stroke does not change under influence of heat**
   Unlike internal expanding type brakes, the drum-to-shoe clearance of the wet disc brake does not increase due to thermal expansion and the increased pedal stroke does not result. Thus, the wet disc brake provides a constant pedal stroke.

***Fade**

Fade is a phenomenon of braking force loss caused by the heat generated in repeated braking. Generally, the friction coefficient of brake disc tends to lower and the braking force reduces with the rise of the temperature of the brake disc.

(Reference)

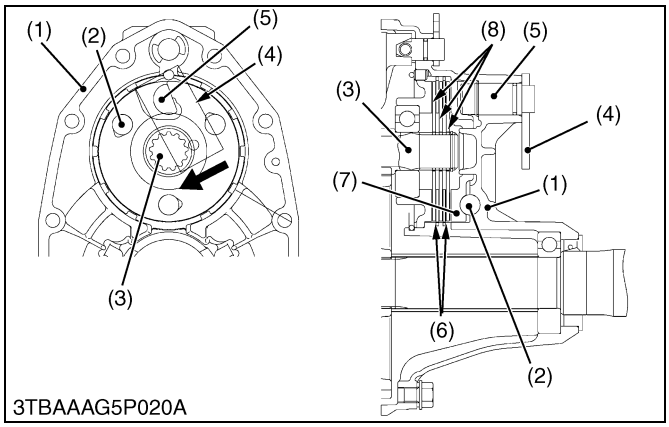
- Relationship between temperature and friction coefficient of brake disc is shown in the graph.

(1) Rear Axle Case
(2) Brake Cam Lever
(3) Brake Rod
(4) Turnbuckle
(5) Brake Pedal
(6) Parking Brake Lever

A : Friction Coefficient
B : Temperature

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2. OPERATION



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The brake body incorporated in the rear axle case (1) filled with transmission oil and is designed to brake when the brake disc (8) splined with the differential gear shaft (3) is pressed against the cam plate (7) by means of the cam mechanism incorporating steel balls (2).

For greater braking force, three brake discs are provided at the right and left sides respectively, and two friction plates (6) fixed to the rear axle case are arranged between the brake discs.

■ **During Braking**

When the brake pedal is pressed, the linkage causes the brake cam lever (4) and brake cam (5) to turn into the direction of arrow shown in the above figure.

Therefore, the cam plate (7) also moves to the direction of arrow. At this time, since the cam plate (7) rides on the steel balls (2) set in the grooves of the rear axle case to press the brake disc (8), the differential gear shaft (3) is braked by the frictional force generated by the cam plates (7) and brake discs (8).

(1) Rear Axle Case
(2) Steel Ball
(3) Brake Shaft (Differential Gear Shaft)
(4) Brake Cam Lever
(5) Brake Cam
(6) Friction Plate
(7) Cam Plate
(8) Brake Disc

W1013253

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SERVICING

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2. SERVICING SPECIFICATIONS 5-S2
3. TIGHTENING TORQUES 5-S3
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   [1] CHECKING AND ADJUSTING 5-S4
   [2] DISASSEMBLING AND ASSEMBLING.....5-S6
   [3] SERVICING 5-S10

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Uneven Braking Force	Brake pedal free travel unevenly adjusted	Adjust	5-S4
	Brake disc worn	Replace	5-S8
	Cam plate warped	Replace	5-S9
Brake Drags	Brake pedal free travel too small	Adjust	5-S4
	Parking brake lever free travel too small	Replace	5-S5
	Brake pedal return spring weaken or broken	Replace	–
	Brake cam rusted	Repair	5-S9
Poor Braking Force	Brake pedal free travel excessive	Adjust	5-S4
	Brake disc worn	Replace	5-S8
	Cam plate warped	Replace	5-S9
	Brake cam or lever damaged	Replace	5-S9
	Transmission fluid improper	Change	G-15

W1014322

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Brake Pedal	Free Travel	30 to 40 mm 1.18 to 1.57 in.	–
	Difference of Stroke (RH and LH)	0 mm 0 in.	–
Parking Brake	Free Travel	4 to 5 notchs	–
Cam Plate and Ball	Height	22.89 to 22.99 mm 0.9012 to 0.9051 in.	22.40 mm 0.8819 in.
Brake Disc	Thickness	3.3 to 3.5 mm 0.130 to 0.138 in.	3.0 mm 0.118 in.
Friction Plate	Thickness	1.92 to 2.08 mm 0.0756 to 0.0819 in.	1.52 mm 0.0598 in.

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3. TIGHTENING TORQUES

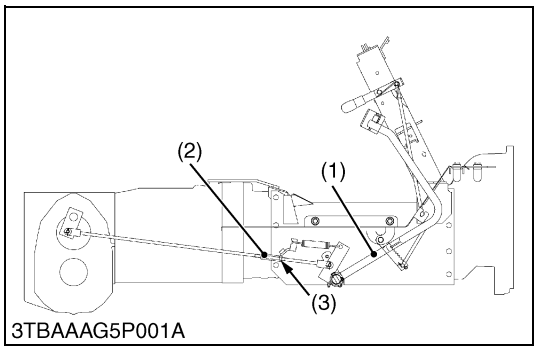
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-8.)

Item	N·m	kgf·m	lbf·ft
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Rear axle case mounting bolt (M10) [B1830, B2230, B2530]	39.3 to 44.1	4.0 to 4.5	28.9 to 32.5
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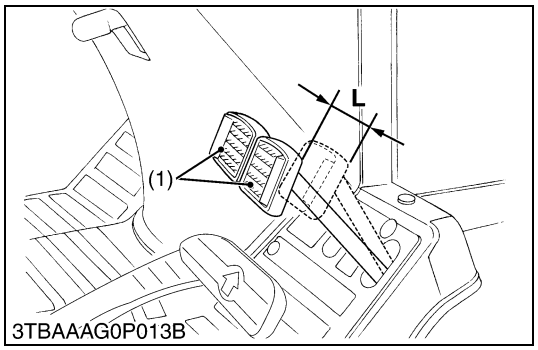
W1014036

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



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3TBAAAG0P013B

Adjusting Brake Pedal Free Travel

CAUTION

- **Stop the engine and chock the wheels before checking brake pedal.**
- **The difference between the right and left pedal plays must be equal.**

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

Brake pedal free travel	Factory spec.	30 to 40 mm 1.18 to 1.57 in.
		Keep the free travel in the right and left brake pedals equal.

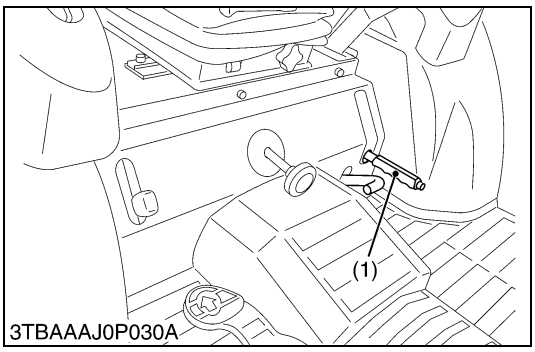
■ **NOTE**

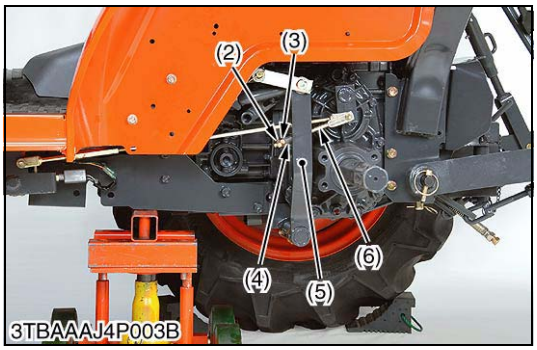
- **After checking brake pedal free play, be sure to engage the parking brake lever fully and check to see that the brake pedals are securely locked.**

(1) Brake Pedal
(2) Turnbuckle
(3) Lock Nut

L : Brake Pedal Free Travel

W1011243





Checking Parking Brake Lever Travel

1. Pull the parking brake lever (1) to the parking position while counting the ratchet sound made by the parking brake lever (1).
2. If the counted ratchet sound is not within the factory specification, adjust the parking brake lever travel.

CAUTION

- **Stop the engine and remove the key, and the chock wheels before checking parking brake.**

Parking brake lever travel	Factory spec.	4 to 5 notches

(When adjusting)

1. Release the parking brake lever.
2. Be sure to adjust the free travel of the right and left brake pedals.
3. Place the jack under the transmission case, then remove the rear tires and set the rigid rack under the rear axles.
4. Loosen the lock nuts (2) of the right and left rods (6).
5. Tighten the adjusting nut (3) of the right rod (6) by hand until the collar (4) comes into contact with the arm (5). Make half and one more turn of the nut.
6. Tighten the adjusting nut (3) of the left rod (6) by hand until the collar (4) comes into contact with the arm (5).
7. Tighten up the lock nuts (2) of right and left rods.
8. Make sure the parking brake lever gets locked at the its 4th or 5th notch.
9. Install the right and left tires.

NOTE

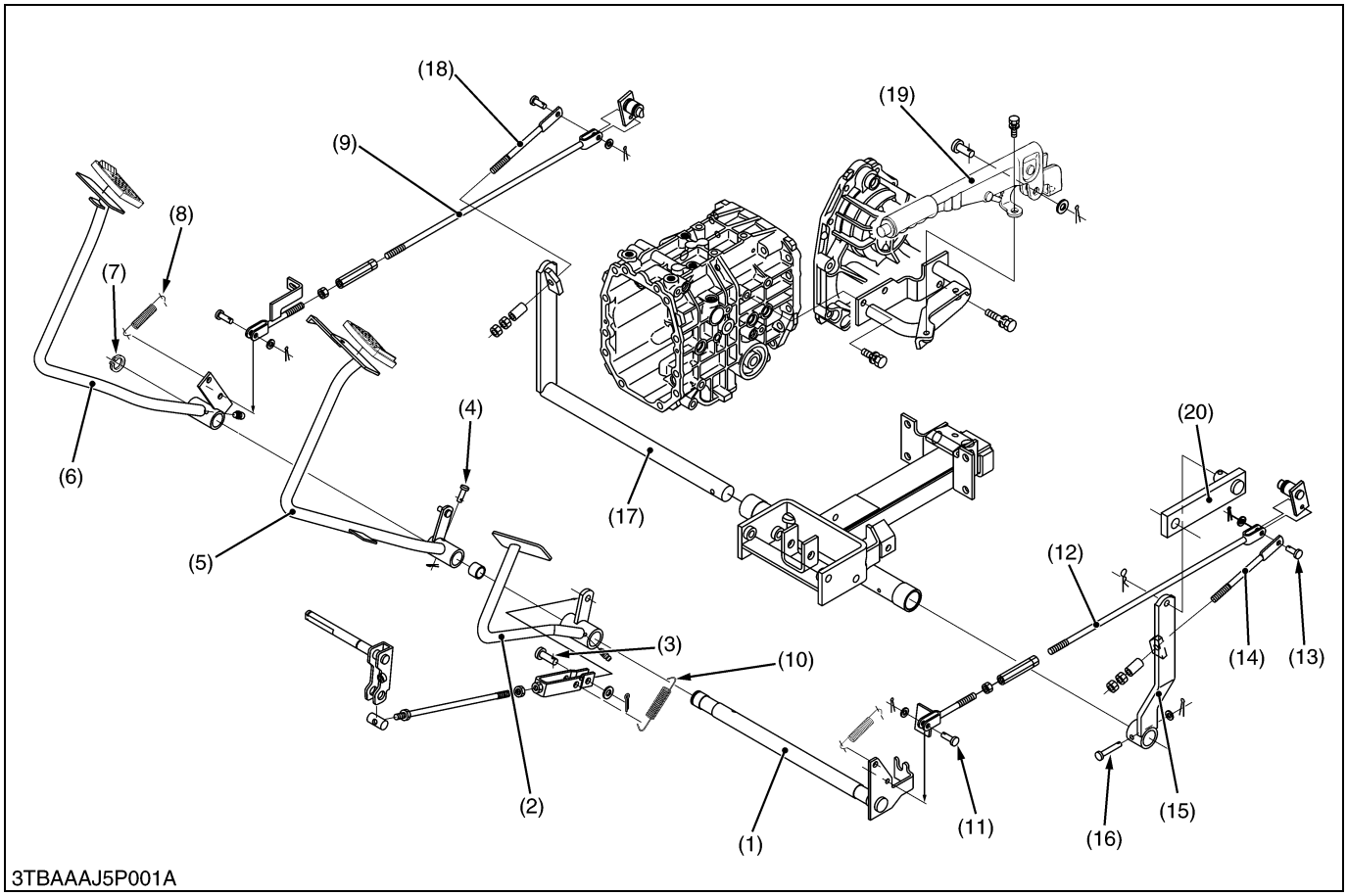
- **After adjusting the parking brake lever free travel :**
  - **Right and left parking brake for even braking.**
  - **With the parking brake released, make sure that the right and left tires do not drag on.**

(1) Parking Brake Lever
(2) Lock Nut
(3) Adjusting Nut
(4) Collar
(5) Parking Brake Arm
(6) Parking Brake Rod

W10128690

[2] DISASSEMBLING AND ASSEMBLING

Separating Brake Pedal



(1) Brake Pedal Shaft
(2) Clutch Pedal
(3) Clevis Pin
(4) Clevis Pin
(5) Brake Pedal LH
(6) Brake Pedal RH
(7) External Snap Ring
(8) Return Spring (Brake Pedal)
(9) Brake Rod RH
(10) Return Spring (Clutch Pedal)
(11) Pin
(12) Brake Rod LH
(13) Pin
(14) Parking Brake Rod LH
(15) Parking Brake Arm
(16) Clevis Pin
(17) Parking Brake Arm Shaft
(18) Parking Brake Rod RH
(19) Parking Brake Lever
(20) Parking Brake Lever Plate

(Brake Pedal)

1. Remove the right hand side step.
2. Remove the HST pedal. (HST Model)
3. Remove the pins (11) and disconnect the brake rods (9), (12).
4. Remove the return spring (8).
5. Remove the external snap ring (7) at the end of the brake pedal shaft (1).
6. Remove the clevis pin (4) of the brake pedal LH (5) and remove the clevis pin (3) of the clutch pedal (2).
7. Pull the right and left brake pedals from the brake pedal shaft (1).
8. Tap out the brake pedal shaft (1) to the left, and remove it with the clutch pedal (2).

(Parking Brake)

1. Remove the lock nuts and remove the parking brake rods (14), (18).
2. Remove the pin (13) and disconnect the brake rods (9), (12).
3. Disconnect the parking brake arm (15) from parking brake lever plate (20).
4. Remove the clevis pin (16) and remove the parking brake arm (15) and arm shaft (17).
5. Remove the parking brake lever (19) and parking brake lever plate (20) as a unit.

(When reassembling)

- Apply grease to the brake pedal shaft.
- Be sure to adjust the brake pedal free travel and parking brake lever travel.

Draining Transmission Oil

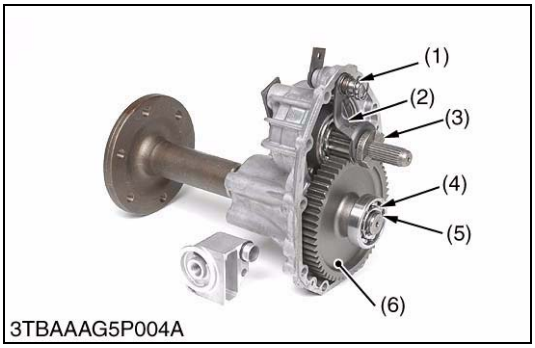
1. Refer to "**TRANSMISSION**" section.

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Rear Axle Case

1. Refer to "**REAR AXLE**" section.

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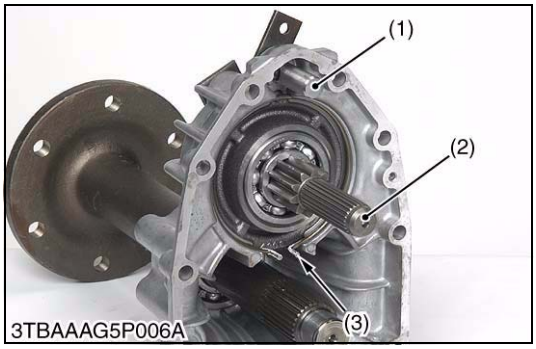
Differential Lock Clutch and Final Gear

1. Remove the spring (1).
2. Remove the differential lock clutch (3) and the differential shift fork (2).
3. Remove the external cir-clip (5).
4. Remove the ball bearing with a puller.
5. Remove the final gear (6).

(1) Spring
(2) Differential Lock Shift Fork
(3) Differential Lock Clutch
(4) Ball Bearing
(5) External Cir-clip
(6) Final Gear

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3TBAAAG5P006A

Brake Assembly

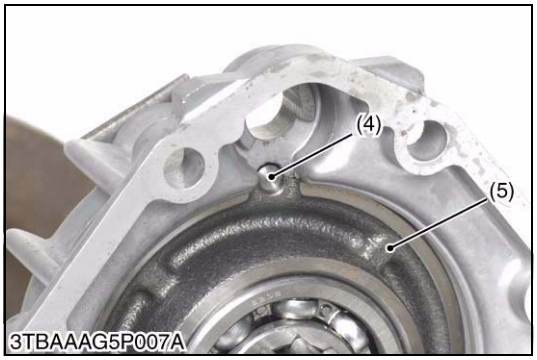
1. Remove the differential fork lever (1).
2. Remove the internal snap ring (3).
3. Remove the brake shaft (2) with the brake disks and the brake places as an assembly.

(When reassembling)

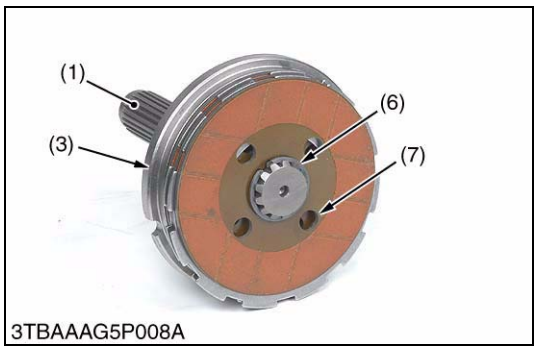
- When installing the internal snap ring (3) to the rear axle case as shown in the picture.
- When installing the bearing holder to the rear axle case, do not forget to install the straight pin (4).

(1) Differential Fork Lever
(2) Brake Shaft
(3) Internal Snap Ring
(4) Straight Pin
(5) Bearing Holder

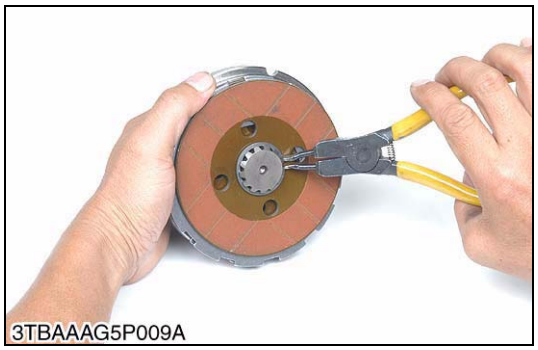
W1014492

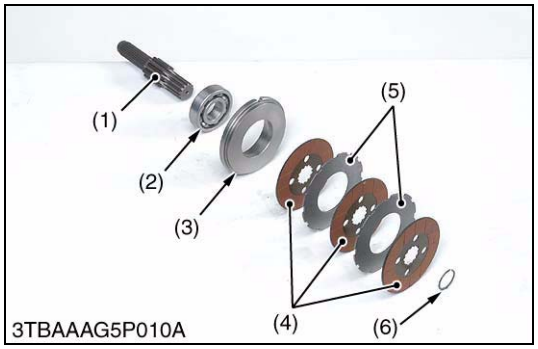


3TBAAAG5P007A

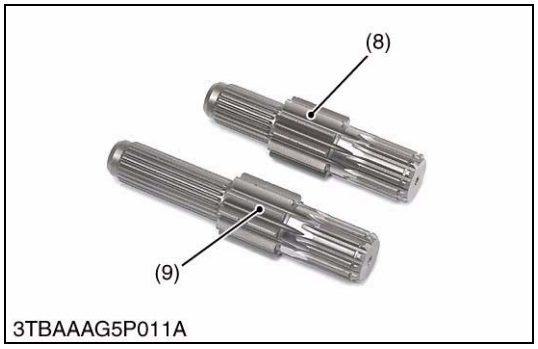


3TBAAAG5P008A


3TBAAAG5P009A



3TBAAAG5P010A



3TBAAAG5P011A

Brake Disks, Brake Plates and Brake Shaft

1. Remove the external cir-clip (6), and remove the brake disks (4) and the brake plates (5).
2. Remove the bearing holder (3) and the ball bearing (2).

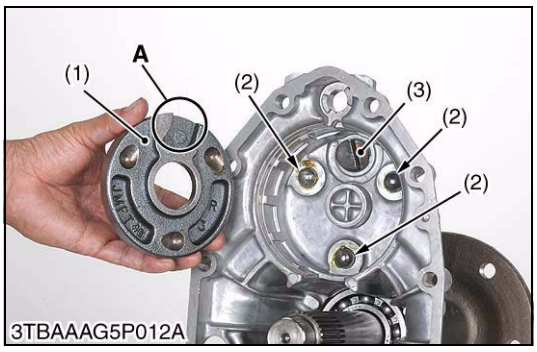
(When reassembling)

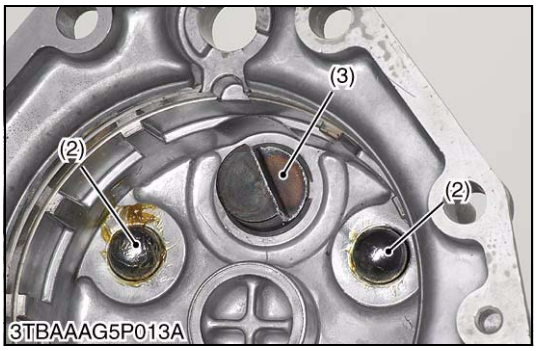
■ **NOTE**

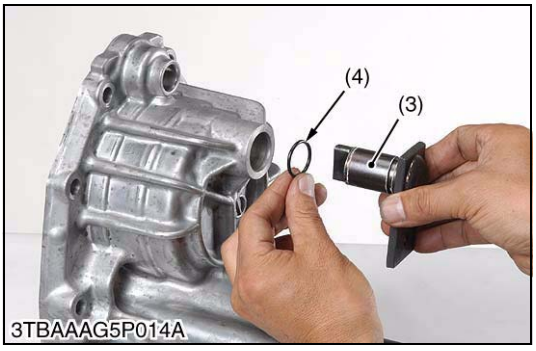
- **Since the length of the brake shaft (LH) and the brake shaft (RH) are different, don't exchange them.**
- **Install the brake disks with their holes (7) deviation at less than 1/3 of the total hole area.**

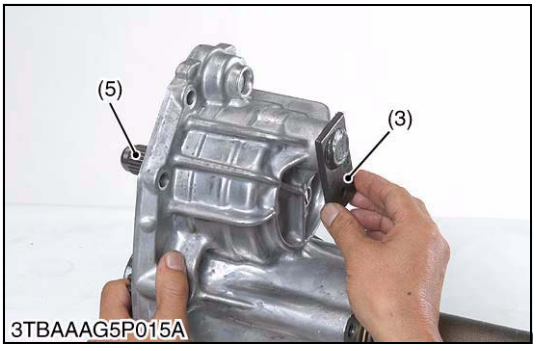
(1) Brake Shaft
(2) Ball Bearing
(3) Bearing Holder
(4) Brake Disk
(5) Brake Plate
(6) External Cir-clip
(7) Hole
(8) Brake Shaft (LH)
(9) Brake Shaft (RH)

W1014923









Brake Cam Plate and Brake Cam Lever

1. Remove the brake cam plate (1) and the balls (3).

(When reassembling)

- Apply grease to the balls (3).
- If O-ring (4) is defective, change it.
- Install the brake cam lever (3) to the brake cam plate (1) securely.
- Move the brake cam lever (3) by hand to check the movement. If the movement is heavy, refine the brake cam plate (1) with emery paper.

(1) Brake Cam Plate
(2) Ball
(3) Brake Cam Lever
(4) O-ring
(5) Brake Shaft

A : Portion to the Brake Cam Lever

W1015481

[3] SERVICING



Brake Cam Lever Movement

1. Move the brake cam lever by hand to check the movement.
2. If the movement is heavy, refine the brake cam with emery paper.

W1016116



Cam Plate Flatness and Bearing Holder Wear

1. Place a straightedge of 150 mm (5.91 in.) or more in length on the contacting surface of the cam plate and the bearing holder.
2. Inspect the friction surface of the cam plate and the bearing holder with the straightedge, and determine if a 0.30 mm (0.0118 in.) feeler gauge will fit on the part of wear.
3. If it will fit, resurface the cam plate.

W1016242

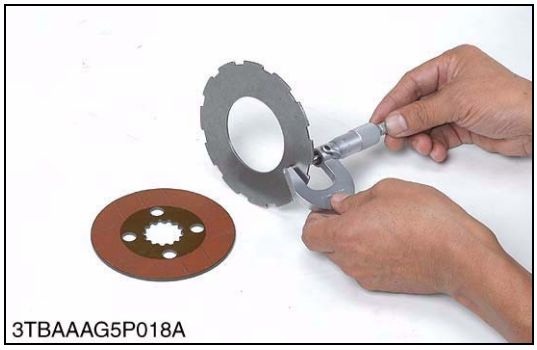


Height of Cam Plate and Ball

1. Measure the height 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.
4. If the uneven wear is found, replace it.

Height of cam plate and ball	Factory spec.	22.89 to 22.99 mm 0.9012 to 0.9051 in.
	Allowable limit	22.40 mm 0.8819 in.

W1016380



Brake Disc and Friction Plate Wear

1. Measure the brake disc thickness and the friction plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Brake disc thickness	Factory spec.	3.3 to 3.5 mm 0.130 to 0.137 in.
	Allowable limit	3.0 mm 0.118 in.

Friction plate thickness	Factory spec.	1.92 to 2.08 mm 0.0756 to 0.0818 in.
	Allowable limit	1.52 mm 0.0598 in.

W1015877

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6 FRONT AXLE

https://truckmanualshub.com/

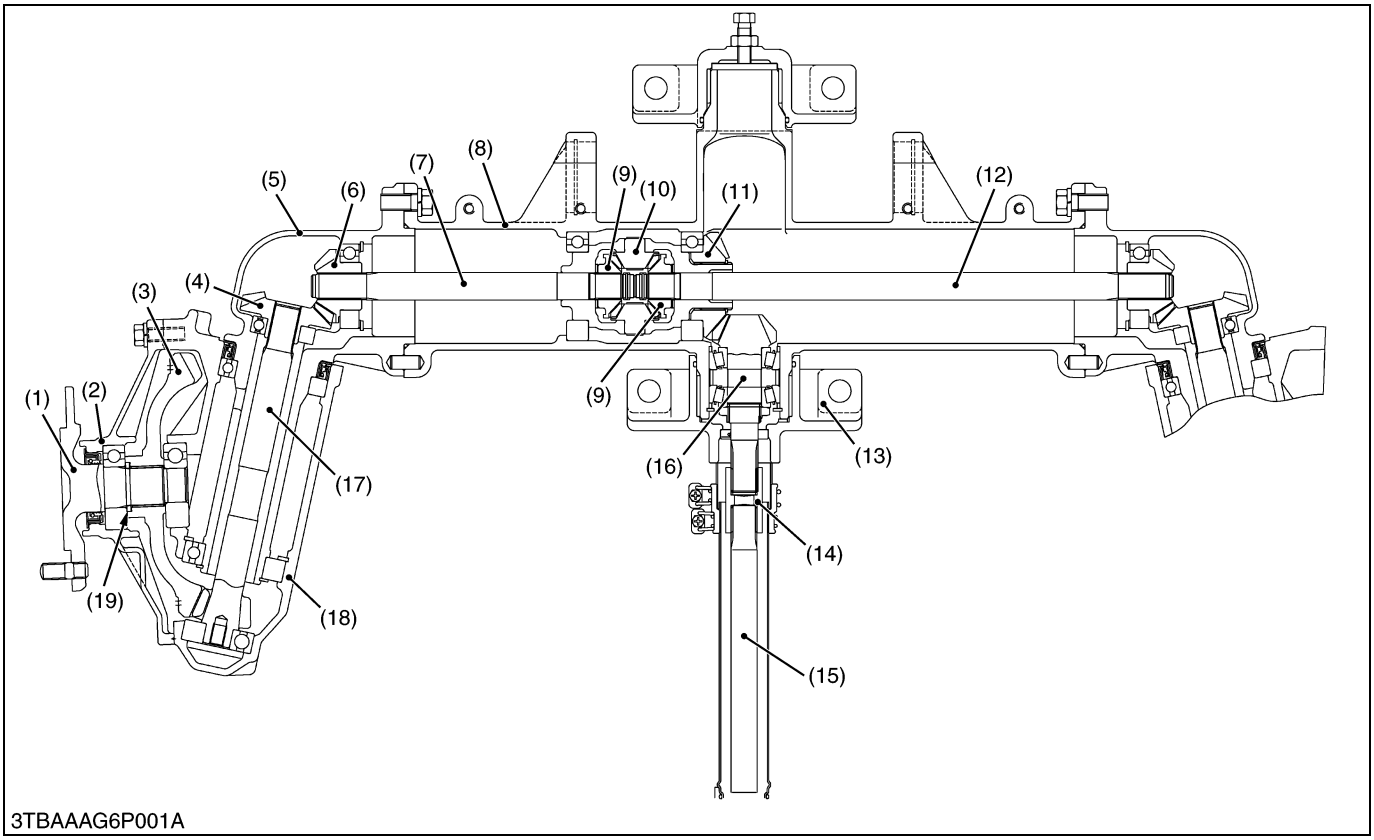
MECHANISM

CONTENTS

1. STRUCTURE 6-M1
[1] 4 WHEEL DRIVE MODEL 6-M1

1. STRUCTURE

[1] 4 WHEEL DRIVE MODEL



(1) Axle
(2) Axle Flange
(3) Bevel Gear (41T)
(4) Bevel Gear (16T)
(5) Bevel Gear Case
(6) Bevel Gear (11T)
(7) Differential Yoke Shaft, LH
(8) Front Axle Case
(9) Differential Side Gear (14T)
(10) Differential Pinion Gear (10T)
(11) Differential Side Gear (20T)
(12) Differential Yoke Shaft, RH
(13) Front Axle Bracket, Rear
(14) Coupling
(15) Propeller Shaft
(16) Spiral Bevel Pinion Shaft (11T)
(17) Bevel Gear Shaft (7T)
(18) Front Gear Case
(19) Collar

The front axle of the 4WD is constructed as shown above. Power is transmitted from the transmission through the propeller shaft (15) to the spiral bevel pinion shaft (16), then to the spiral bevel gear (11) and to the differential side gear (9).

The power through the differential side gear (9) is transmitted to the differential yoke shaft (7) (12), and to the bevel gear shaft (17) through the bevel gears (4) (6) in the bevel gear case (5).

The revolution is greatly reduced by the bevel gears (17) (3), then the power is transmitted to the axle (1).

The differential system allows each wheel to rotate at a different speed to make turning easier.

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SERVICING

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1. TROUBLESHOOTING 6-S1
2. SERVICING SPECIFICATIONS 6-S2
3. TIGHTENING TORQUES 6-S3
4. CEHCKING, DISASSEMBLING AND SERVICING.....6-S4
   [1] CHECKING AND ADJUSTING 6-S4
   [2] DISASSEMBLING AND ASSEMBLING.....6-S6
      (1) Separating Front Axle Assembly.....6-S6
      (2) Disassembling Front Axle Assembly.....6-S7
   [3] SERVICING 6-S13

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Wander to Right or Left	Tire pressure uneven	Adjust	G-57
	Improper toe-in adjustment (improper alignment)	Adjust	G-26, 6-S4
	Clearance between front axle case boss and front axle bracket bushing (front, rear) excessive	Replace	6-S15
	Front axle locking force too small	Adjust	6-S5
	Tie-rod end loose	Tighten	6-S7
	Air sucked in power steering circuit	Bleed	6-S6
Front Wheels Can Not Be Driven	Front wheel driving gears in front axle gear case broken	Replace	6-S8
	Universal joint broken	Replace	–
	Front wheel drive gears in transmission broken	Replace	3-S35, S61
	Front differential gear broken	Replace	6-S12
	Coupling displaced	Reassembling	–
Noise	Gear backlash excessive	Adjust or replace	6-S14, S15
	Oil insufficient	Replenish	6-S6
	Bearings damaged or broken	Replace	–
	Gears damaged or broken	Replace	–
	Spiral bevel pinion shaft turning force improper	Adjust	6-S13

W1011382

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Front Wheel Alignment	Toe-in	0 to 10 mm 0 to 0.39 in.	–
Front Axle	Locking Force	50.0 to 100.0 N 5.1 to 10.2 kgf 12.8 to 25.5 lbf	–
Differential Case, (Differential Case Cover) to Differential Side Gear	Clearance	0.040 to 0.082 mm 0.00157 to 0.00323 in.	0.17 mm 0.0067 in.
Differential Case	I.D.	26.000 to 26.021 mm 1.02362 to 1.2445 in.	–
Differential Case Cover	I.D.	26.000 to 26.021 mm 1.02362 to 1.02445 in.	–
Differential Side Gear	O.D.	25.939 to 25.960 mm 1.02122 to 1.02205 in.	–
Pinion Shaft to Differential Pinion	Clearance	0.038 to 0.068 mm 0.00150 to 0.00268 in.	0.17 mm 0.0067 in.
Pinion Shaft	O.D.	9.972 to 9.987 mm 0.39260 to 0.39312 in.	–
Differential Pinion	I.D.	10.025 to 10.040 mm 0.39469 to 0.39528 in.	–
Differential Pinion to Differential Side Gear	Backlash	0.10 to 0.30 mm 0.0039 to 0.0118 in.	–
Spiral Bevel Pinion Shaft	Turning Torque	0.8 to 1.0 N·m 0.08 to 0.10 Kgf·m 0.59 to 0.73 lbf·ft	–
Spiral Bevel Pinion Shaft to Spiral Bevel Gear	Backlash	0.10 to 0.30 mm 0.0039 to 0.0118 in.	–
Bevel Gear to 16T Bevel Gear	Backlash	0.10 to 0.30 mm 0.0039 to 0.0118 in.	–
Front Axle Case Boss to Bracket Bushing (Front)	Clearance	0.125 to 0.280 mm 0.0049 to 0.0110 in.	0.45 mm 0.018 in.
Front Axle Case Boss	O.D.	49.950 to 49.975 mm 1.9665 to 1.9675 in.	–
Bracket Bushing	I.D.	50.10 to 50.23 mm 1.9722 to 1.9774 in.	–
Front Axle Case Boss to Bracket Bushing (Rear)	Clearance	0.090 to 0.250 mm 0.0035 to 0.0098 in.	0.45 mm 0.018 in.
Front Axle Case Boss	O.D.	64.94 to 64.97 mm 2.5567 to 2.5579 in.	–
Bracket Bushing	I.D.	65.06 to 65.19 mm 2.5614 to 2.5665 in.	–

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3. TIGHTENING TORQUES

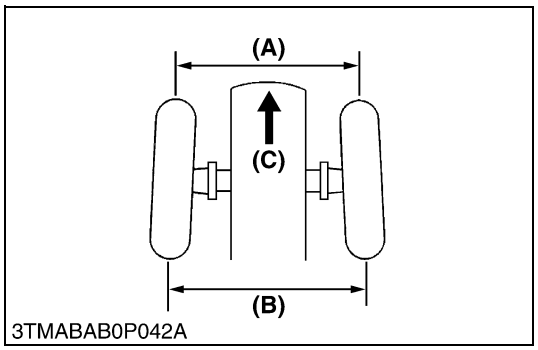
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-8.)

Item	N·m	kgf·m	lbf·ft
Front wheel mounting bolt and nut	77.0 to 90.0	7.9 to 9.2	57.0 to 67.0
Delivery hose retaining nut	24 to 28	2.5 to 2.9	17.7 to 20.7
Front axle holder mounting bolt	200 to 230	20.4 to 23.5	147.5 to 169.6
Tie-rod slotted nut	17.7 to 34.3	1.8 to 3.5	13.0 to 25.3
Tie-rod joint	74 to 84	7.5 to 8.6	54.4 to 61.9
Bevel gear case mounting screw	77.5 to 90.1	7.9 to 9.2	57.1 to 66.5
Axle flange mounting bolt	48.1 to 55.9	4.9 to 5.7	35.5 to 41.2

W1012736

4. CEHCKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



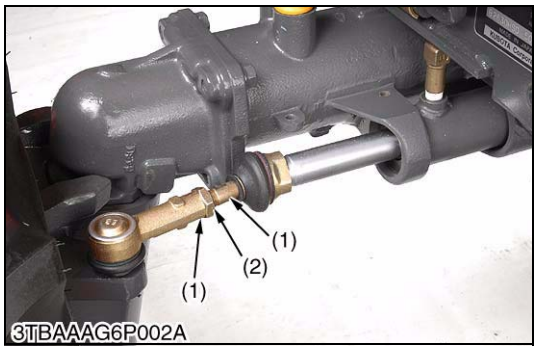
Toe-in

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.	0 to 10 mm 0 to 0.39 in.

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

W1011852



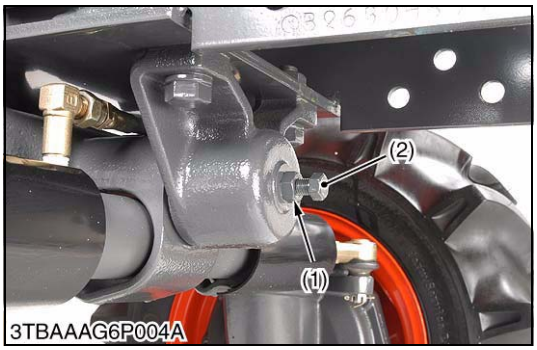
Toe-in Adjusting

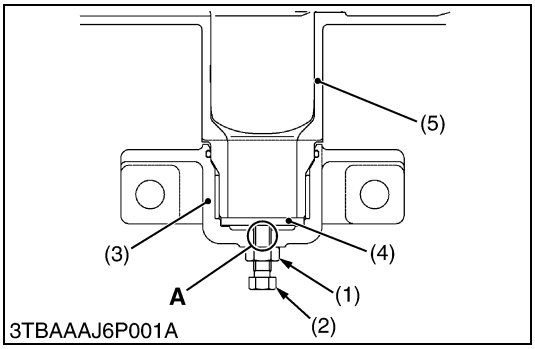
1. Loosen the lock nut (2).
2. Turn the tie-rod joint (1) to adjust the rod length until the proper toe-in measurement is obtained.
3. Retighten the lock nut (2).

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

W1010993







Front Axle Locking Force

1. Jack up the front side of tractor.
2. Set a spring balance to the front axle flange.
3. Measure the front axle locking force.
4. If the measurement is not within the factory specifications, adjust with the adjusting screw (1). After applying liquid gasket (Three Bond 1206D or equivalent) to the thread portion of the adjusting screw (2) to prevent front axle oil from leaking out of the front axle holder (3).
5. Tighten the lock nut (2) firmly.

Front axle locking force	Factory spec.	50.0 to 100.0 N 5.1 to 10.2 kgf 12.8 to 22.4 lbf

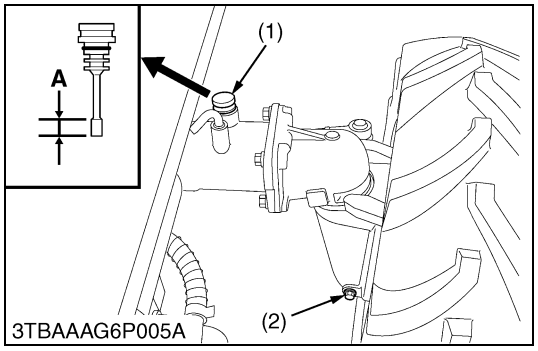
(1) Lock Nut
(2) Adjusting Screw
(3) Holder
(4) Thrust Collar
(5) Front Axle Case

A : Thread Portion

W1013044

[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Front Axle Assembly



Draining Front Axle Case Oil

1. Place the oil pans underneath the front axle case.
2. Remove the both right and left hand side drain plugs (1) and filling plug (2) to drain the front axle case oil.
3. After draining, reinstall the drain plugs (1).
4. Fill with new oil up to the upper notch on the dipstick.

■ **NOTE**

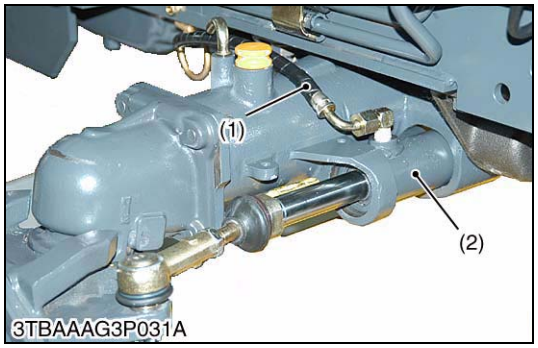
- **After ten minutes, check the oil level again, add oil to prescribed level.**
- **Use KUBOTA SUPER UDT fluid or SAE 80, 90 gear oil. Refer to "LUBRICNATS, FUEL AND COOLANT".**

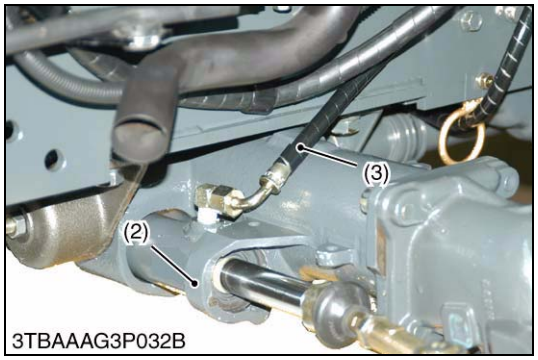
Front axle case oil	Capacity	4.7 L 5.0 U.S.qts 4.14 Imp.qts

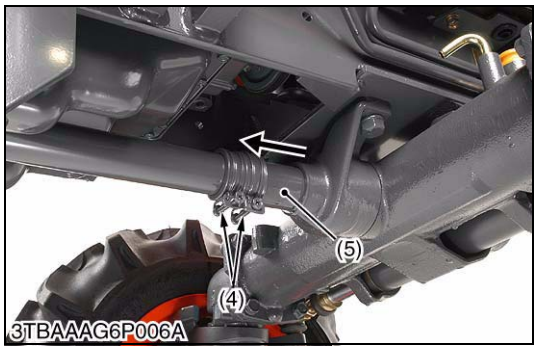
(1) Filling Plug with Dipstick
(2) Drain Plug

A : Oil level is acceptable within this range

W1011413







Front Wheels and Steering Cylinder Hoses

1. Disconnect the delivery hoses (1), (3).
2. Lift up the tractor front side.
3. Loosen the hose clamps (4) and slide the front cover (5).
4. Remove the front wheels.

■ **NOTE**

- **After disconnecting the delivery hoses, do not steer the front axle so that the steering oil may come out from the delivery hoses.**

■ **IMPORTANT**

- **Connect the delivery hoses to the original position.**

(When reassembling)

- Be sure to assemble the delivery hose RH and LH as shown in figure.

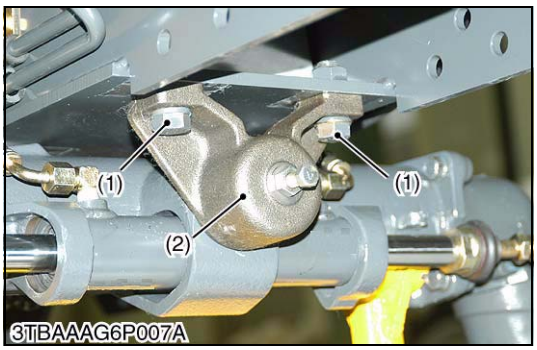
(Bleeding air in power steering circuit)

- Start the engine.
- Turn the steering wheel slowly in bolt directions all the way alternately several times, and stop the engine.

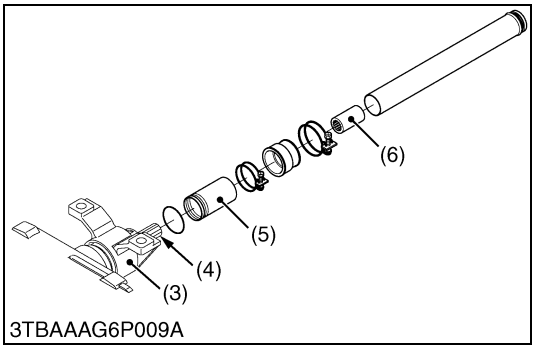
Tightening torque	Front wheel mounting bolt and nut	77.0 to 90.0 N·m 7.9 to 9.2 kgf·m 57.0 to 67.0 lbf·ft
	Delivery hose retaining nut	24 to 28 N·m 2.5 to 2.9 kgf·m 17.7 to 20.7 lbf·ft

(1) Delivery Hose (RH)
(2) Steering Cylinder
(3) Delivery Hose (LH)
(4) Hose Clamp
(5) Front Cover

W1013983







Front Axle Holder and Front Axle

1. Place the disassembling stand under the front axle.
2. Remove the front axle holder mounting bolts (1).
3. Separate the front axle holders (2), (3).
4. Separate the front axle from the front axle frame.

(When reassembling)

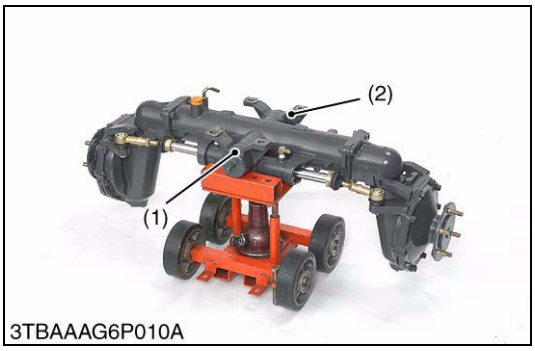
- Slide the coupling and the front cover to the front drive shaft.
- Align the front axle holders to the front axle frame, and align the coupling to the bevel pinion shaft spline.

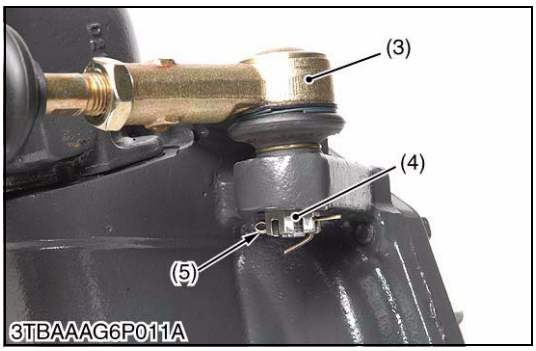
Tightening torque	Front axle holder mounting bolt	200 to 230 N·m 20.4 to 23.5 kgf·m 147.5 to 169.6 lbf·ft

(1) Front Axle Holder Mounting Bolt
(2) Front Axle Holder (Front)
(3) Front Axle Holder (Rear)
(4) Bevel Pinion Shaft
(5) Front Cover
(6) Coupling

W1014459

(2) Disassembling Front Axle Assembly





Front Axle Brackets and Tie-rod Joints

1. Remove the slotted nut (4) and remove the tie-rod joint (3).
2. Remove the front axle brackets (1), (2).

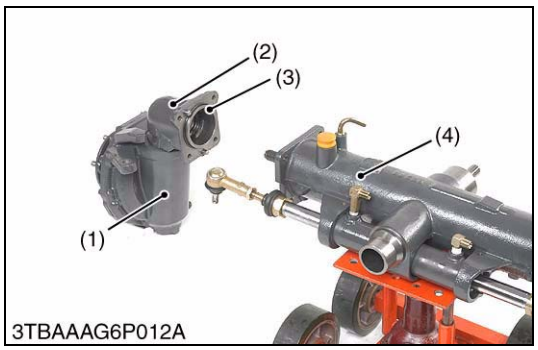
(When reassembling)

- Apply grease to the thrust collar of front axle bracket.
- Apply grease to the O-ring and take care not to damage it.
- After tightening the slotted nut, install cotter pin as shown in the figure.

Tightening torque	Tie-rod slotted nut	17.7 to 34.3 N·m 1.8 to 3.5 kgf·m 13.0 to 25.3 lbf·ft
	Tie-rod joint	74 to 84 N·m 7.5 to 8.6 kgf·m 54.4 to 61.9 lbf·ft

(1) Front Axle Bracket (Front)
(2) Front Axle Bracket (Rear)
(3) Tie-rod End
(4) Slotted Nut
(5) Cotter Pin

W1015040



Bevel Gear Case

1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (2) and front gear case (1) as a unit from the front axle case (4).

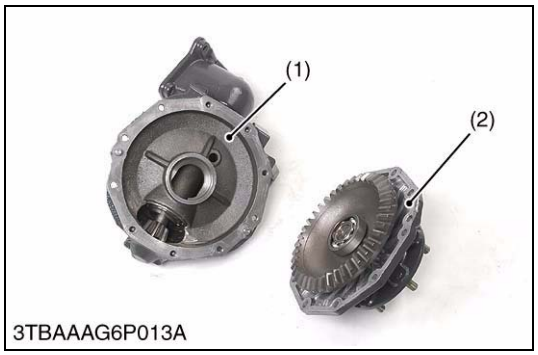
(When reassembling)

- Apply grease to the O-ring (3) and take care not to damage it.
- Do not interchange right and left bevel gear case assemblies and right and left gear case assemblies.

Tightening torque	Bevel gear case mounting screw	77.5 to 90.1 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 lbf·ft

(1) Front Gear Case
(2) Bevel Gear Case
(3) O-ring
(4) Front Axle Case

W1015491



Front Gear Case and Axle Flange

1. Remove the axle flange mounting bolts.
2. Remove the axle flange (2).

(When reassembling)

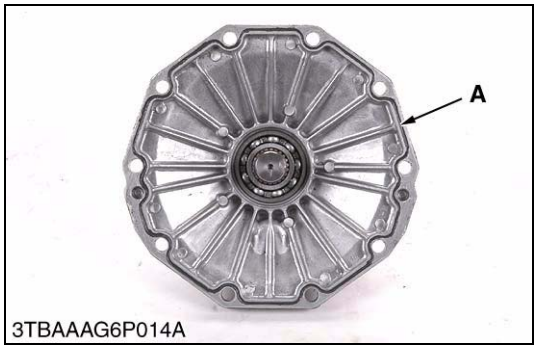
- Apply liquid gasket (Three Bond 1206D or equivalent) to joint face of the axle flange (2) and the front gear case (1) after eliminating the water, oil and stuck liquid gasket.
- Tighten the axle flange bolts and nuts diagonally in several steps.

Tightening torque	Axle flange mounting bolt	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

(1) Front Gear Case
(2) Axle Flange

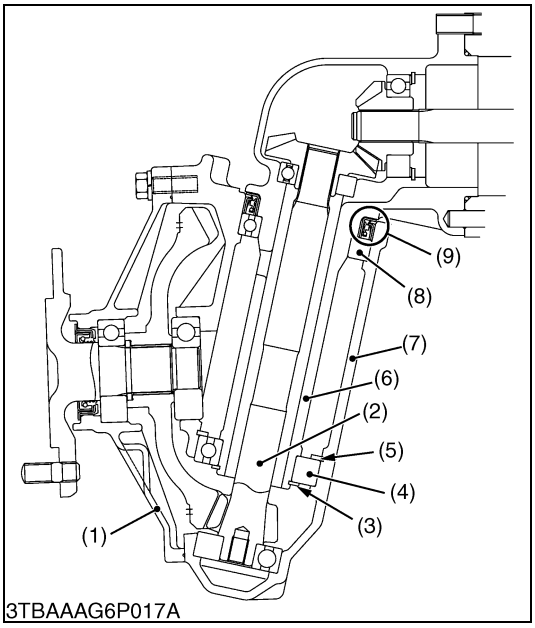
A : Portion to apply liquid gasket

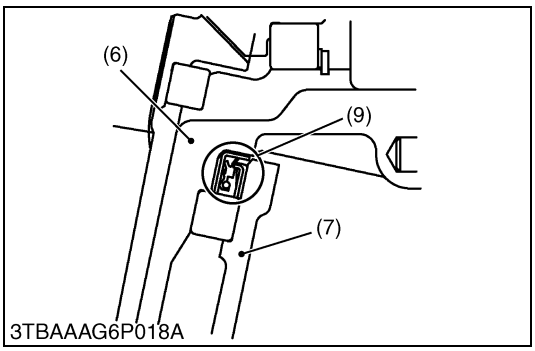
W1015873











Bevel Gear Shaft and Bevel Gear Case Oil Seal

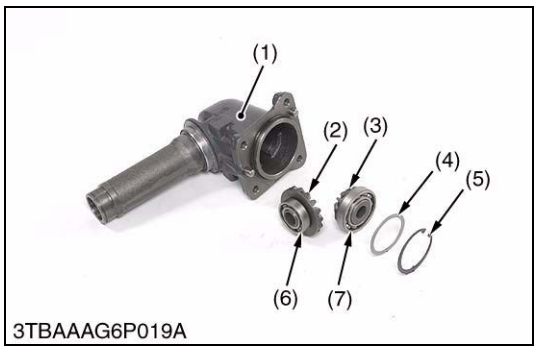
1. Remove the external cir-clip (3).
2. Remove the bevel gear case (6) from the front gear case (7).
3. Remove the oil seal (9).
4. Remove the ball bearing (8).
5. Remove the internal cir-clip (5) and remove the ball bearing (4).
6. Remove the bevel gear shaft (2) with the bearing.

(When reassembling)

- Install the oil seal (9) of the bevel gear case, noting its direction as shown in the figure.

(1) Axle Flange
(2) Bevel Gear Shaft
B1830, B2230, B2530: 9T
B3030: 7T
(3) External Cir-clip
(4) Ball Bearing
(5) Internal Cir-clip
(6) Bevel Gear Case
(7) Front Gear Case
(8) Ball Bearing
(9) Bevel Gear Case Oil Seal

W1016110



Bevel Gear Case Gears

1. Remove the internal snap ring (5).
2. Take out the bevel gears (3) (2) with ball bearings (7) (6) and shims (4).

(When reassembling)

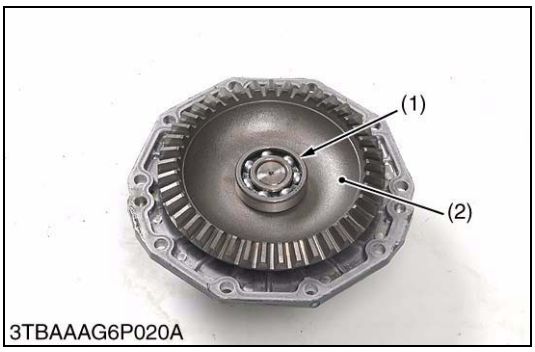
- Install the shim (4) to their original position.

(Reference)

- Thickness of adjusting shims :
  0.8 mm (0.031 in.) 1.2 mm (0.047 in.)
  1.0 mm (0.039 in.) 1.4 mm (0.055 in.)

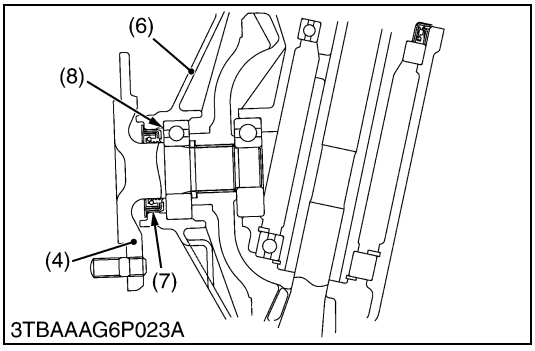
(1) Bevel Gear Case
(2) Bevel Gear (16T)
(3) Bevel Gear Shaft
B1830, B2230, B2530: 10T
B3030: 11T
(4) Shim
(5) Internal Cir-clip
(6) Ball Bearing
(7) Ball Bearing

W1016623









Axle

1. Remove the bearing (1).
2. Take out the bevel gear (2).
3. Take out the collar (3).
4. Tap out the axle (4).

(When reassembling)

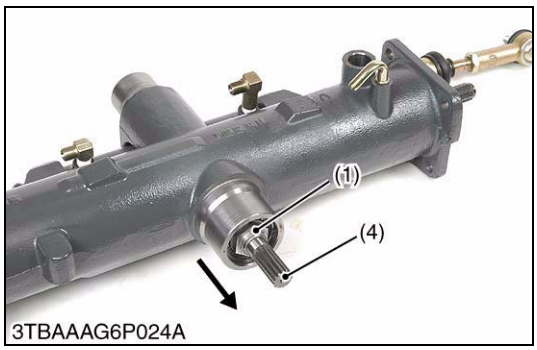
- Install the oil seal (7) of axle flange (6), noting its direction as shown in the figure.
- Install the shims (8) to their original position.

(Reference)

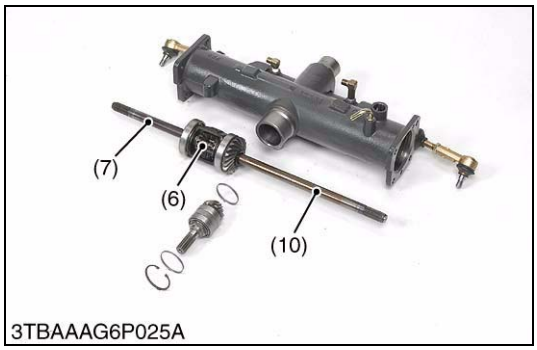
- Thickness of adjusting shims :
  B1830, B2230, B2530 :
  0.8 mm (0.03 in.) : Parts No. 6C040-5714-0
  1.0 mm (0.04 in.) : Parts No. 6C040-5713-0
  1.2 mm (0.05 in.) : Parts No. 6C040-5715-0
  1.4 mm (0.06 in.) : Parts No. 6C040-5716-0
  B3030 :
  0.2 mm (0.008 in.) : Parts No. 66621-1524-0
  0.3 mm (0.01 in.) : Parts No. 67211-1499-0

(1) Ball Bearing
(2) Bevel Gear
B1830, B2230, B2530 : 38T
B3030 : 41T
(3) Collar
(4) Axle
(5) Ball Bearing
(6) Axle Flange
(7) Oil Seal
(8) Shim

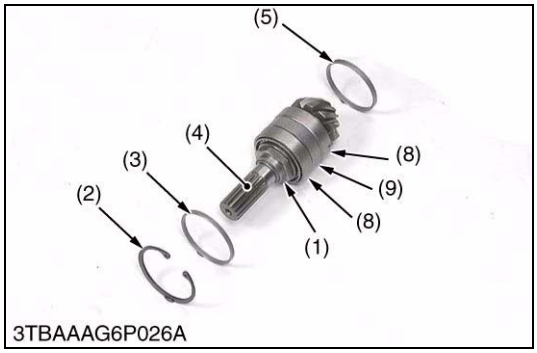
W1017051



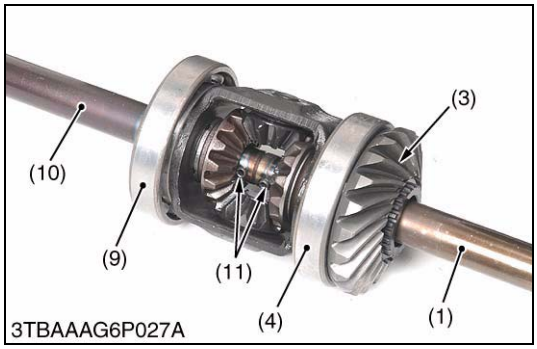
3TBAAAG6P024A



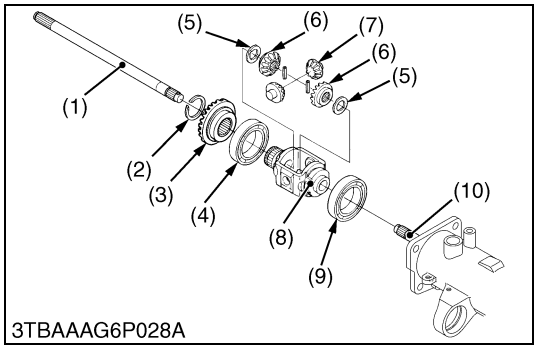
3TBAAAG6P025A



3TBAAAG6P026A



3TBAAAG6P027A



3TBAAAG6P028A

Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Remove the oil seal from the front axle case.
2. Remove the internal cir-clip (2) and the collar (3).
3. Tap out the spiral bevel pinion shaft (4) to the rear side.
4. Take out the differential gear assembly (6) from the right side of the front axle case.
5. Remove the nut (1) from the spiral bevel pinion shaft (4).
6. Remove the taper roller bearings (8).

(When reassembling)

- Replace the oil seal and the nut (1) with new one.
- Apply grease to the oil seal.
- Tighten up the nut (1) until the turning torque of the spiral bevel pinion shaft reaches the factory specifications. (See page 5-S15).
- Install the same shims and collars before they are removed.
- Install the taper roller bearing correctly, noting their direction, and apply gear oil to them.
- Stake the lock nut firmly.

(1) Nut
(2) Internal Cir-clip
(3) Spiral Bevel Pinion Shaft
(4) Axle
(5) Collar
(6) Differential Gear Assembly
(7) Differential Yoke Shaft (LH)
(8) Taper Roller Bearing
(9) Collar
(10) Differential Yoke Shaft (RH)

W1017425

Differential Gear

1. Remove the external cir-clip (2) from the differential case (8).
2. Tap out the spring pins (11) from the differential yoke shafts (1) (10).
3. Remove the differential yoke shafts (1) (10) from the differential case (8).
4. Remove the bevel gears (6) and the collars (5) from the differential case (8).
5. Remove the spiral bevel gear (3) and the ball bearings (4) from the differential case (8).

■ **NOTE**

- **Arrange the parts to know their original position.**

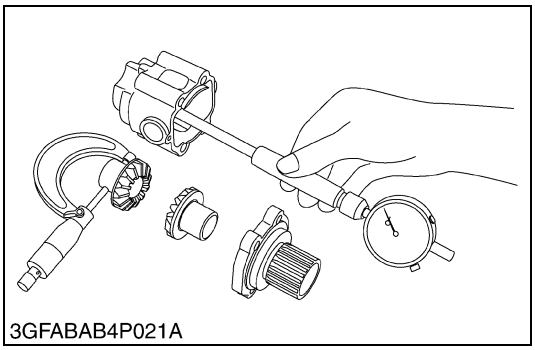
(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential bevel gears (6) and differential pinion (7).

(1) Differential Yoke Shaft (RH)
(2) External Cir-clip
(3) Spiral Bevel Gear
(4) Ball Bearing
(5) Collar
(6) Bevel Gear (14T)
(7) Differential Pinion (10T)
(8) Differential Case
(9) Ball Bearing
(10) Differential Yoke Shaft (LH)
(11) Spring Pin

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[3] SERVICING


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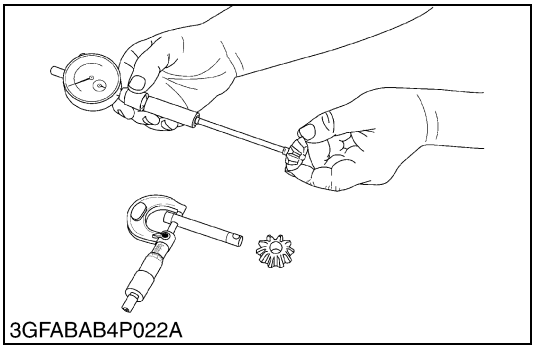
Clearance between Differential Case (Differential Case Cover) and Differential Side Gear

1. Measure the differential side gear boss 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 0.082 mm 0.00157 to 0.00323 in.
	Allowable limit	0.17 mm 0.0067 in.

Differential case I.D.	Factory spec.	26.000 to 26.021 mm 1.02362 to 1.02445 in.
Differential case cover I.D.	Factory spec.	26.000 to 26.021 mm 1.02362 to 1.02445 in.
Differential side gear O.D.	Factory spec.	25.939 to 25.960 mm 1.02122 to 1.02205 in.

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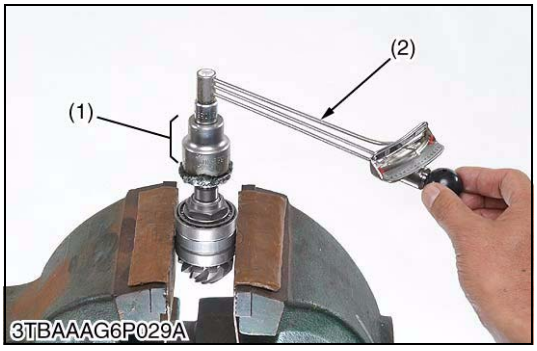
Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinon 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 differential pinion shaft and differential pinion	Factory spec.	0.038 to 0.068 mm 0.00150 to 0.00268 in.
	Allowable limit	0.17 mm 0.0067 in.

Differential pinion shaft O.D.	Factory spec.	9.972 to 9.987 mm 0.39260 to 0.39312 in.
Differential side gear I.D.	Factory spec.	10.025 to 10.040 mm 0.39469 to 0.39528 in.

W1019016



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Turning Torque of Spiral Bevel Pinion Shaft

1. Cramp the spiral bevel pinion shaft assembly to the vise and tighten the staking nut.
2. Measure the turning torque of bevel pinion shaft.
3. If the turning torque is not within the factory specifications, adjust with the lock nut.

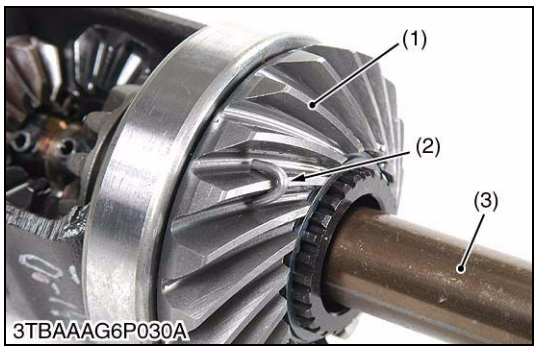
Turning torque	Factory spec.	0.8 to 1.0 N·m 0.08 to 0.10 kgf·m 0.59 to 0.73 lbf·ft

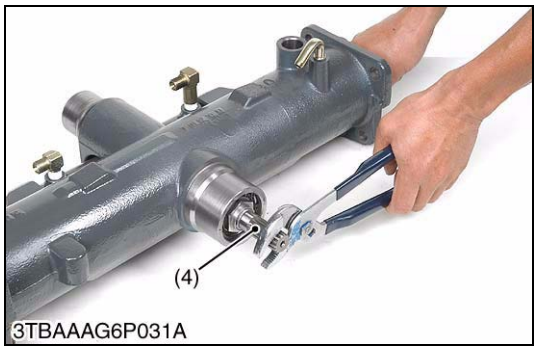
■ **NOTE**

- **After turning force adjustment, be sure to stake the lock nut.**

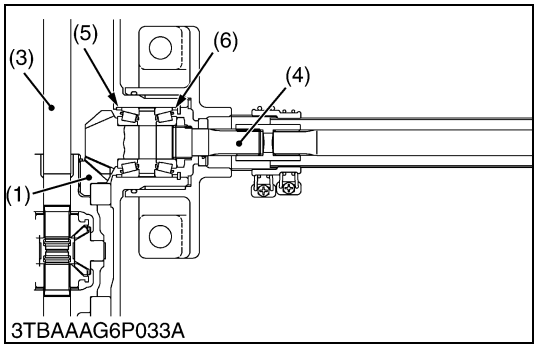
(1) Adaptor (2) Torque Wrench

W1019246









Backlash between Spiral Bevel Pinion Shaft and Spiral Bevel Gear

1. Place the fuse (2) on the gear tooth of the spiral bevel gear (1).
2. Install the spiral bevel gear (1) and the differential yoke shaft (3) into the front axle case.
3. Install the spiral bevel pinion shaft (4) to the front axle case. Install the internal cir-clip to the front axle case.
4. Turn the spiral bevel pinion shaft (4) holding the differential yoke shaft (3) by hand lightly.
5. Take out the fuse (2). And measure the fuse (2)
6. If the backlash is not within the factory specifications, change the adjusting collars (5) (6). For example change the adjusting collar (6) to 0.1 mm (0.004 in.) smaller size, and change the adjusting collar (5) to 0.1 mm (0.004 in.) larger size.
7. Adjust the backlash properly by repeating the above procedures.

Backlash between spiral bevel pinion shaft and spiral bevel gear	Factory spec.	0.10 to 0.30 mm 0.0039 to 0.0118 in.

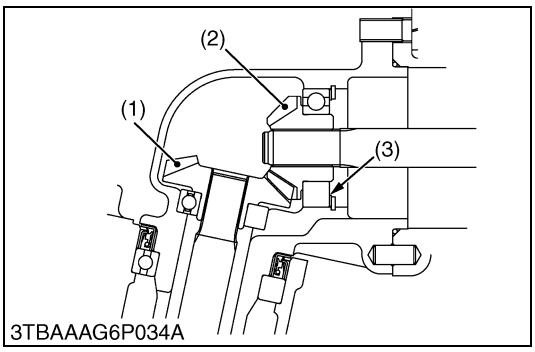
(Reference)

- Above factory specification should be measured on the tooth of spiral bevel pinion. When measuring the backlash on the spline of its shaft, factory specification will be 0.0571 to 0.1714 mm (0.00225 to 0.00675 in.).
- Thickness of adjusting collars (3) (4) :

3.4 mm (0.134 in.)	4.1 mm (0.161 in.)
3.6 mm (0.142 in.)	4.2 mm (0.165 in.)
3.8 mm (0.150 in.)	4.4 mm (0.173 in.)
4.0 mm (0.157 in.)	4.6 mm (0.181 in.)

(1) Spiral Bevel Gear
B1830, B2230, B2530 : 23T
B3030 : 20T
(2) Fuse
(3) Differential Yoke Shaft (RH)
(4) Spiral Bevel Pinion Shaft
B1830, B2230, B2530 : 10T
B3030 : 11T
(5) Adjusting Collar
(6) Adjusting Collar

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Backlash between 11T Bevel Gear and 16T Bevel Gear

1. Stick a strip of fuse to three spots on the 16T bevel gear (1) with grease.
2. Fix the front axle case, bevel gear case and front gear case.
3. Turn the axle.
4. Remove the bevel gear case from front axle case and measure the thickness of the fuses with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between bevel gear and bevel gear (16T)	Factory spec.	0.10 to 0.30 mm 0.0039 to 0.0118 in.

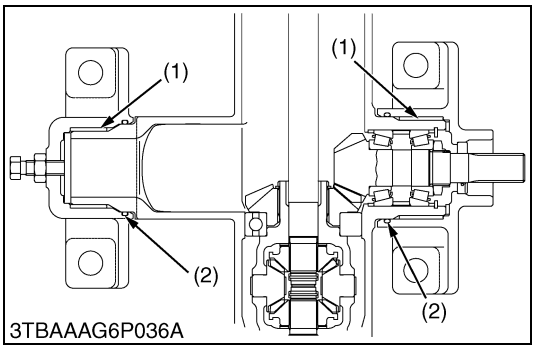
(Reference)

- Thickness of adjusting shims (3) :
  0.8 mm (0.031 in.) 1.2 mm (0.047 in.)
  1.0 mm (0.039 in.) 1.4 mm (0.055 in.)
- Tooth contact : More than 35%

(1) Bevel Gear (16T)
(2) Bevel Gear
B1830, B2230, B2530 : 10T
B3030 : 11T
(3) Shim

W1020336





Clearance between Front Axle Case Bosses and Bracket Bushing

1. Measure the front axle case bosses O.D. with an outside micrometer.
2. Measure the bracket Bushing I.D. with a cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bracket bushing.
4. If the clearance still exceeds the allowable limit, replace the front axle case.

Clearance between front axle case boss (front) and bracket bushing (front)	Factory spec.	0.125 to 0.280 mm 0.0049 to 0.0110 in.
	Allowable limit	0.45 mm 0.018 in.

Front axle case boss (front) O.D.	Factory spec.	49.950 to 49.975 mm 1.9665 to 1.9675 in.
Bracket bushing (front) I.D.	Factory spec.	50.10 to 50.23 mm 1.9722 to 1.9774 in.

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory spec.	0.090 to 0.250 mm 0.0035 to 0.0098 in.
	Allowable limit	0.45 mm 0.018 in.

Front axle case boss (rear) O.D.	Factory spec.	64.94 to 64.97 mm 2.5567 to 2.5579 in.
Bracket bushing (rear) I.D.	Factory spec.	65.06 to 65.19 mm 2.5614 to 2.5665 in.

■ Press-fitting Bushing

- When replacing the bushings (1), press-fit it until bushing contact to inside of the front axle bracket holder.
- Apply grease to the O-rings (2) and take care not to damage it.

■ NOTE

- **After replacing the bushing, be sure to adjust the front axle locking force. (See page 6S-5).**

(1) Bushing
(2) O-ring

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7 STEERING

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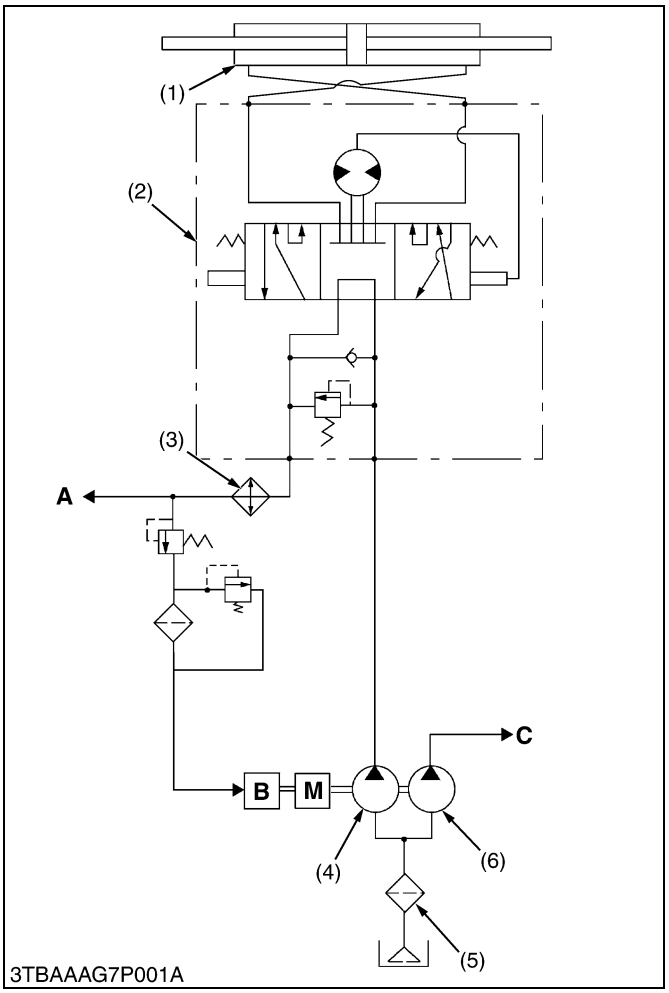
MECHANISM

CONTENTS

1. HYDRAULIC CIRCUIT 7-M1
2. STEERING CONTROLLER 7-M2
3. STEERING CYLINDER 7-M3

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1. HYDRAULIC CIRCUIT



The model is provided with a full hydrostatic power steering.

In the hydrostatic power steering, the steering control is connected to the steering cylinder with only the hydraulic piping. Accordingly, it does not have mechanical transmitting parts such as steering gear, pitman arm, drag link, etc.. Therefore, it is simple in construction. This steering system consists of oil filter cartridge (5), hydraulic pump (4), steering controller (2), steering cylinder (1), etc..

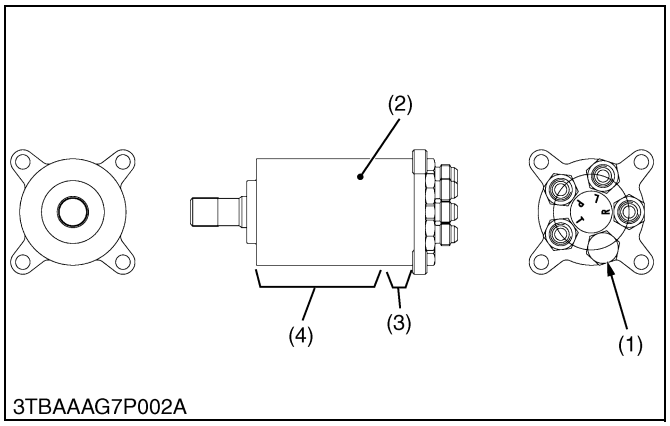
By operating the power steering body, the required amount of oil is fed to the steering cylinder (1).

(1) Power Steering Cylinder
(2) Power Steering Controller
(3) Oil Cooler
(4) Hydraulic Pump (for Power Steering, Independent PTO and HST)
(5) Oil Filter Cartridge
(6) Hydraulic Pump (for 3-Points Hitch)

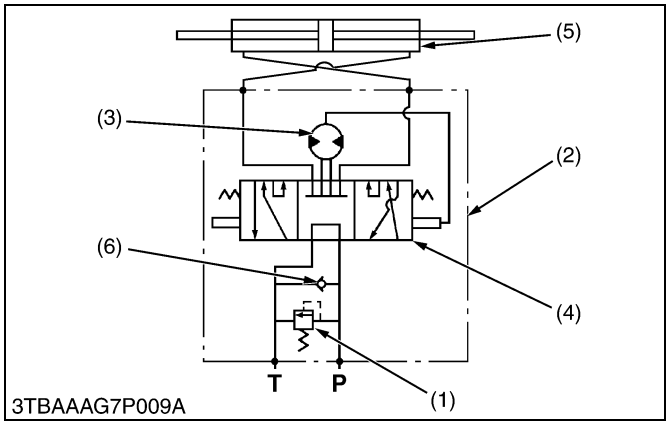
A : Independent PTO Control Valve
B : HST
C : To 3-Points Hitch

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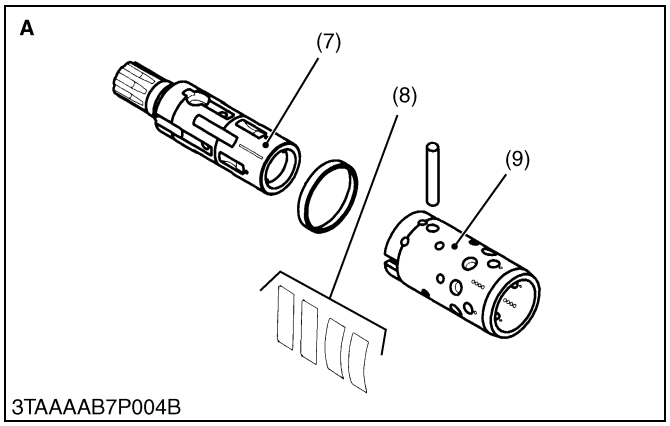
2. STEERING CONTROLLER



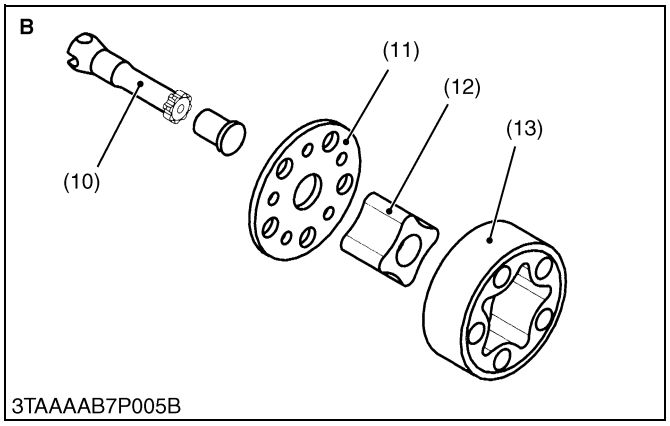
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3TBAAAG7P009A



3TAAAAB7P004B



3TAAAAB7P005B

The steering controller consists of a control valve (4) and a metering device (3).

■ **Control Valve**

The control valve is a rotating spool type. When the steering wheel is not turned, the position of the spool (7) and sleeve (9) is kept neutral by the centering spring (8). This causes the forming of a "Neutral" oil circuit. When the steering wheel is turned either clockwise or counterclockwise, the position of the spool and sleeve changes in relation to the centering spring. This allows the forming of a "Right Turning" or "Left Turning" oil circuit. At the same time, the gear pump (Metering device) rotates with the spool and sends the oil to the cylinder corresponding to the rotation of the steering wheel.

■ **Metering Device**

An oil, sent from the hydraulic pump to the steering cylinder, passes through the metering device (3). Namely, when the rotor is driven, two chambers suck in oil due to volumetric change in the pump chambers formed between the rotor (12) and the stator (13), while oil is discharged from other two chambers. On the other hand, rotation of the steering wheel is directly transmitted to the rotor through the spool (7), drive shaft (10), etc. Accordingly, the metering device serves to supply the steering cylinder with oil, amount of which corresponds to the rotation of the steering wheel. The wheels are thus turned by the angle corresponding to the rotation of the steering wheel. When the engine stops or the hydraulic pump malfunctions, the metering device functions as a manual trochoid pump, which makes manual steering possible.

■ **Relief Valve**

The relief valve (1) is located in the steering controller. It controls the maximum pressure of the power steering system.

Its setting pressure is as follows.

11.9 to 12.8 MPa

121 to 131 kgf/cm^2

1726 to 1856 psi

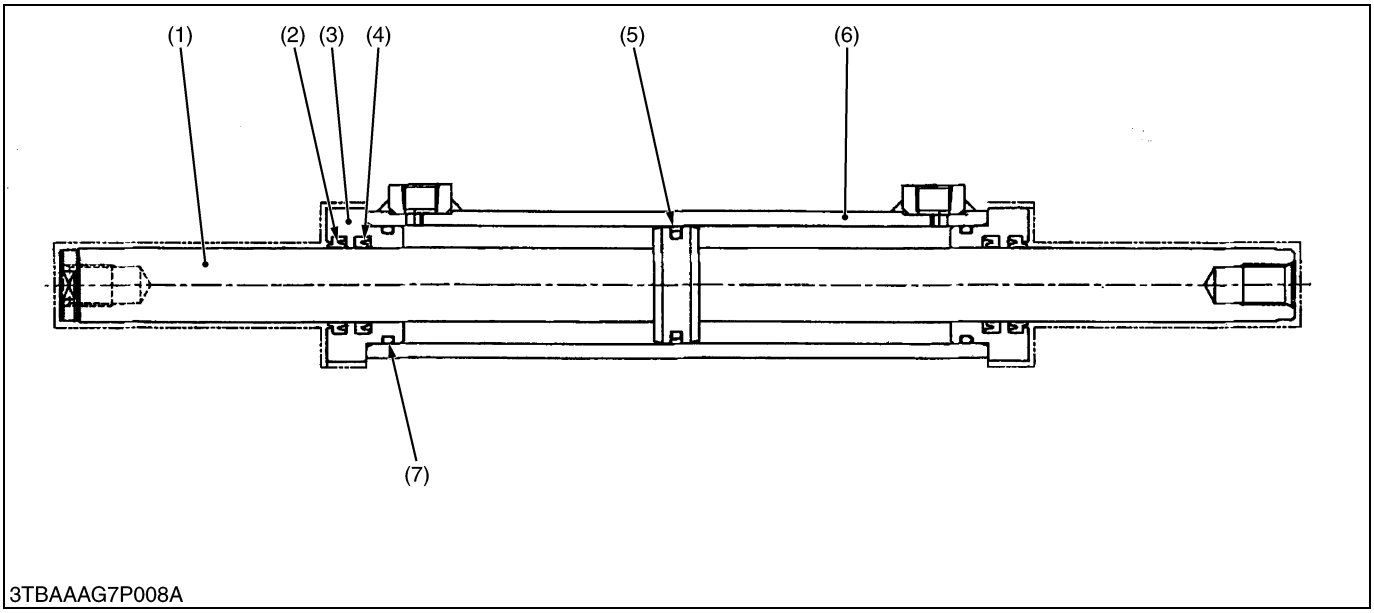
(1) Relief Valve
(2) Steering Controller
(3) Metering Device
(4) Control Valve
(5) Steering Cylinder
(6) Check Valve
(7) Spool
(8) Centering Spring
(9) Sleeve
(10) Drive Shaft
(11) Distributor Plate
(12) Rotor
(13) Stator

A : Control Valve
B : Metering Device
P : P Port (from Hydraulic Pump)
T : T Port (to Independent PTO Clutch Valve and HST Circuit)

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3. STEERING CYLINDER



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(1) Rod
(2) Dust Seal
(3) Rod Cover
(4) U gasket
(5) Piston Seal
(6) Cylinder Tube
(7) O-ring

The steering cylinder is single piston both rod double-acting type. This steering cylinder is installed parallel to the front axle and connected to tie-rods.

The tie-rods connected to both knuckle arm guarantees equal steering movement to both front wheels.

The steering cylinder provide force in both directions. Depending upon direction the steering wheel is turned pressure oil enters at one end of the cylinder to extend, or the other end to retract it, thereby turning front wheel of the tractor.

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SERVICING

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1. TROUBLESHOOTING 7-S1
2. SERVICING SPECIFICATIONS 7-S2
3. TIGHTENING TORQUES 7-S3
4. CHECKING, DISASSEMBLING AND SERVICING 7-S4
   [1] CHECKING 7-S4
      (1) Relief Valve 7-S4
   [2] DISASSEMBLING 7-S5
      (1) Separating Power Steering Controller 7-S5
      (2) Power Steering Controller 7-S6
      (3) Power Steering Cylinder 7-S7
   [3] SERVICING 7-S9
      (1) Power Steering Cylinder 7-S9

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Cannot Be Steered	Steering controller malfunctioning	Replace	7-S6
	Pipe broken	Replace	7-S5
Hard Steering	Power steering oil improper	Change with specified oil	G-7
	Hydraulic pump malfunctioning	Replace	8-S11
	Steering controller malfunctioning	Replace	7-S6
	Oil leak from pipe joint	Retighten pipe joint	7-S5
	Improper relief valve pressure	Check and replace	7-S4, S6
	Relief valve malfunctioning	Replace power steering controller	7-S6
	Air in the hydraulic pipes	Bleed air	7-S4
Steering Force Fluctuates	Steering controller malfunctioning	Replace	7-S6
	Air sucked in pump due to lack of oil	Replenish	G-15
	Air sucked in pump from suction circuit	Repair	–
Steering Wheel Turns Spontaneously When Released	Steering controller malfunctioning	Replace	7-S6
Rear Wheels Wander to Right and Left	Steering controller malfunctioning	Replace	7-S6
	Air sucked in pump due to lack of oil	Replenish	G-15
	Air sucked in pump from suction circuit	Repair	–
	Insufficient bleeding	Bleed air	7-S4
	Cylinder malfunctioning	Repair or replace	7-S8
	Improper toe-in adjustment	Adjust	6-S4
	Tire pressure uneven	Inflate	G-57
Wheels Are Turned to a Direction Opposite to Steering Direction	Power steering hoses connected in reverse	Repair	7-S4
Steering Wheel Turns Idle in Manual Steering	Insufficient bleeding	Bleed air	7-S4
	Air sucked in due to lack of oil	Replenish	G-15
Noise	Air sucked in pump due to lack of oil	Replenish	G-15
	Air sucked in pump from suction circuit	Repair	–
	Pipe deformed	Replace	7-S5
Oil Temperature Increases Rapidly	Steering controller (relief valve) malfunctioning	Replace	7-S6

W1014322

2. SERVICING SPECIFICATIONS

POWER STEERING BODY

Item		Factory Specification	Allowable Limit
Relief Valve	Setting Pressure	11.9 to 12.8 MPa 121 to 131 kgf/cm^2 1726 to 1856 psi	–

W1013874

POWER STEERING CYLINDER

Steering Cylinder	I.D.	40.000 to 40.062 mm 1.57480 to 1.57724 in.	40.100 mm 1.57874 in.
Piston Rod to Guide	Clearance	0.020 to 0.070 mm 0.00079 to 0.00276 in.	0.200 mm 0.00787 in.

W1013973

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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-8)

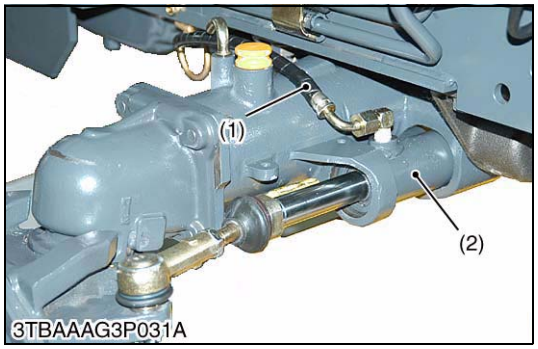
Item	N·m	kgf·m	lbf·ft
Power steering hose for power steering cylinder	24.0 to 28.0	2.5 to 2.9	17.7 to 20.7
Power steering controller for pipes and hoses	24.0 to 28.0	2.5 to 2.9	17.7 to 20.7
Tie-rod slotted nut	17.7 to 34.3	1.8 to 3.5	13.0 to 25.3
Tie-rod joint	74 to 84	7.5 to 8.6	54.6 to 61.9

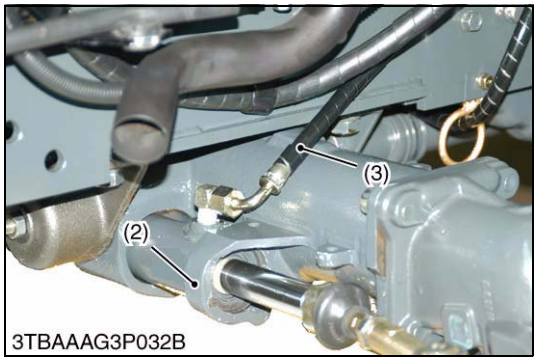
W1012736

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING

(1) Relief Valve





Relief Valve Operating Pressure

1. Disconnect the power steering hose LH (or RH) from steering the power steering cylinder, and set a pressure gauge and cable.

(Reference)

- Hose and adaptor size : 9/16-18UNF, 37 ° flare.

2. Start the engine and set at maximum speed (2600 min^{-1} (rpm)).
3. Fully turn the steering wheel to the left (or right) to check the feeling which the steering wheel lightly locks. Read the relief valve operating pressure when the steering wheel to the above-mentioned lock position by operation force at approximately 9.8 N (1 kgf, 2.2 lbf) of outer.

■ **NOTE**

- **After set a pressure gauge, be sure to bleed air.**
- **Note that the pressure value changes by the pump action of the power steering controller when the steering operation is continued after the steering wheel is lightly locked and accurate relief valve pressure cannot be measured.**

(Bleeding air in power steering circuit)

- Start the engine.
- Turn the steering wheel slowly in both directions all the way alternately several times, and stop the engine.

Relief valve operating pressure	Factory spec.	11.9 to 12.8 MPa 121 to 131 kgf/cm^2 1726 to 1856 psi

Tightening torque	Power steering hose for power steering cylinder	24 to 28 N·m 2.5 to 2.9 kgf·m 17.7 to 20.7 lbf·ft

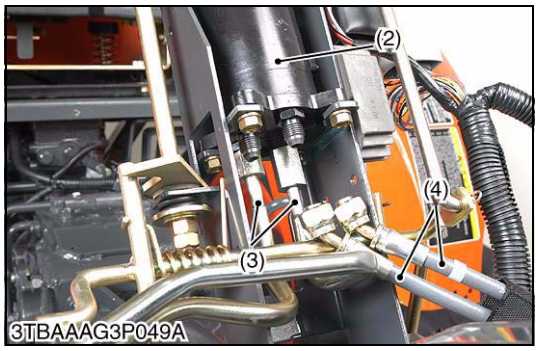
(1) Power Steering Hose (RH)
(2) Power Steering cylinder
(3) Power Steering Hose (LH)

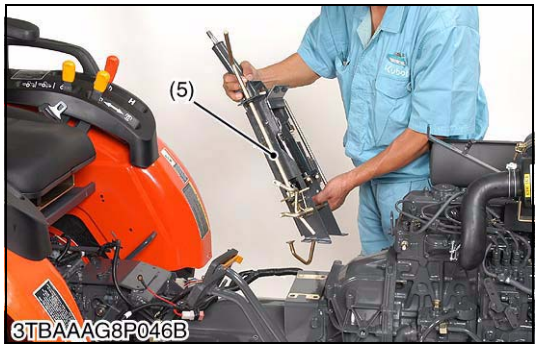
W1011368

[2] DISASSEMBLING

(1) Separating Power Steering Controller







Steering Wheel, Meter Panel Bonnet and Fuel Tank

Refer to "**TRANSMISSION**" section.

W1013840

Steering Post Assembly

1. Remove the center beam (1).
2. Disconnect the power steering hoses (4) from the power steering controller (2).
3. Disconnect the power steering hoses from the power steering controller (2).
4. Remove the steering post mounting bolts.
5. Remove the steering post assembly. (5) from the main frame.

(When reassembling)

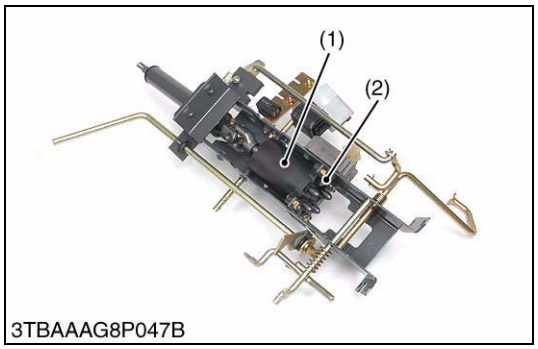
- Connect the power steering hoses (3) and the power steering hoses (4) to the power steering controller (2) securely.

Tightening torque	Power steering controller for pipes and hoses	24 to 28 N·m 2.5 to 2.9 kgf·m 17.7 to 20.7 lbf·ft

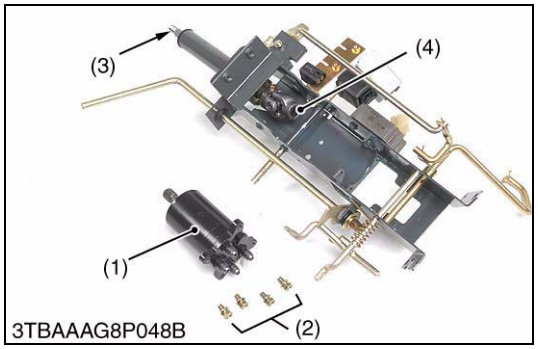
(1) Center Beam
(2) Power Steering Controller
(3) Power Steering Hose
(4) Power Steering Hose
(5) Steering Post Assembly

W1012541

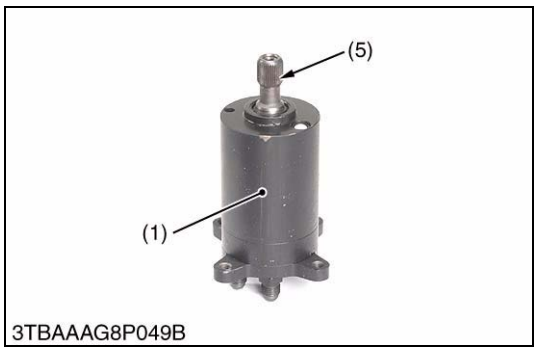
(2) Power Steering Controller



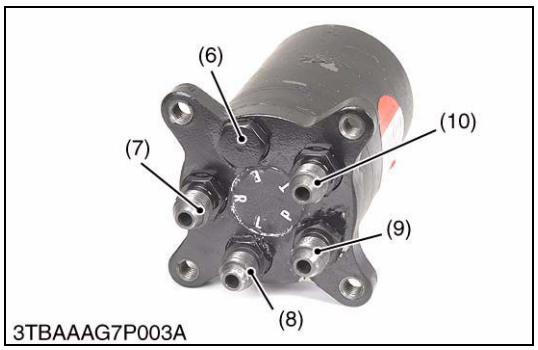
3TBAAAG8P047B



3TBAAAG8P048B



3TBAAAG8P049B



3TBAAAG7P003A

Power Steering Controller

1. Remove the steering controller mounting bolts (2) from the steering post.
2. Remove the bolt from the universal joint (4).
3. Remove the power steering controller (1) from the steering post.

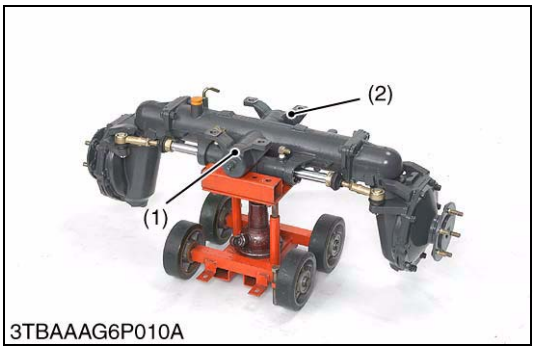
(When reassembling)

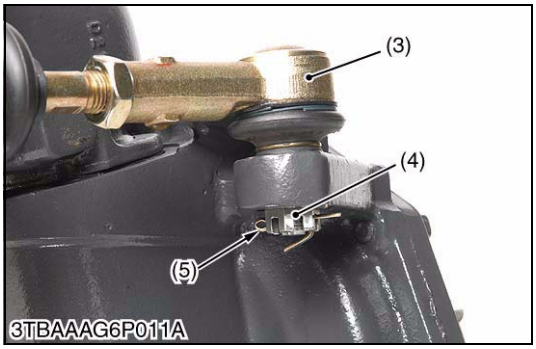
- If oil leaking from the power steering controller (1) is found, replace the power steering controller (1). O-ring in the power steering controller (1) is not supplied as a spare part.
- Align the power steering controller shaft (5) to the universal joint (4) securely.

(1) Power Steering Controller
(2) Power Steering Mounting Bolt
(3) Steering Shaft
(4) Universal Joint
(5) Power steering Shaft
(6) Relief Valve
(7) Adaptor (to Right Cylinder)
(8) Adaptor (to Left Cylinder)
(9) Adaptor (to Hydraulic Pump)
(10) Adaptor (to Oil Cooler)

W1014193

(3) Power Steering Cylinder





Steering Wheel, Meter Panel Bonnet and Fuel Tank

Refer to "**TRANSMISSION**" section.

W1015058

Tie-rod Joint

1. Remove the slotted nut (4) and remove the tie-rod joint (3).
2. Remove the front axle brackets (1) (2).

(When reassembling)

- Apply grease to the thrust collar of front axle bracket.
- Apply grease to the O-ring and take care not to damage it.
- After tightening the slotted nut, install cotter pin as shown in the figure.

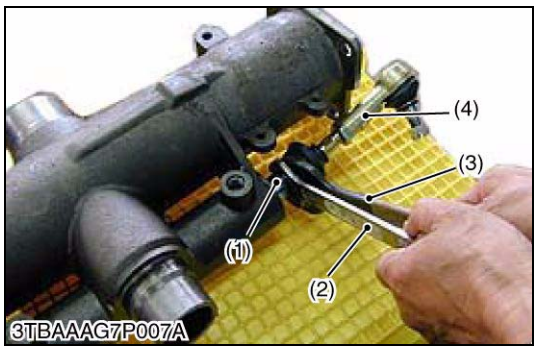
(Bleeding air in power steering circuit)

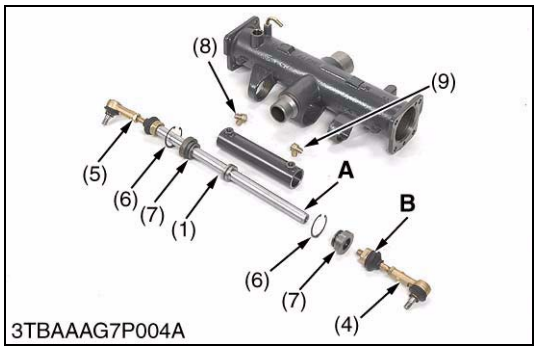
- Start the engine.
- Turn the steering wheel slowly in both directions all the way alternately several times, and stop the engine.

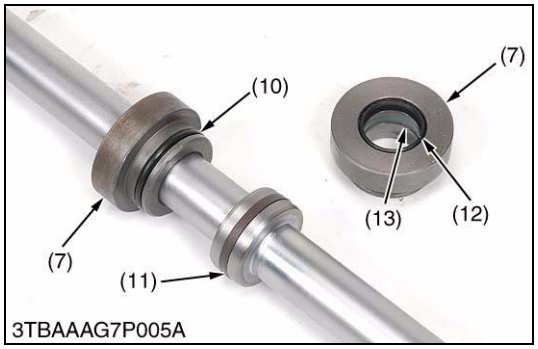
Tightening torque	Tie-rod slotted nut	17.7 to 34.3 N·m 1.8 to 3.5 kgf·m 13.0 to 25.3 lbf·ft
	Tie-rod joint	74 to 84 N·m 7.5 to 8.6 kgf·m 54.4 to 61.9 lbf·ft

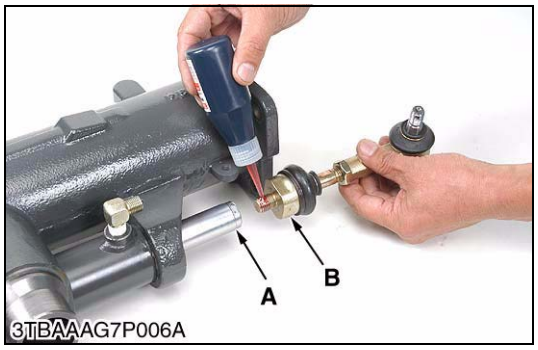
(1) Front Axle Bracket (Front)
(2) Front Axle Bracket (Rear)
(3) Tie-rod Joint
(4) Slotted Nut
(5) Cotter Pin

W1015113









Power Steering Cylinder

CAUTION

- **Since power steering cylinder is full of high-pressured steering oil, high-pressured oil is injected out from hose adopters by pushing piston rods.**
- **This injected oil can penetrate the skin or eyes causing serious injury.**
- **Use appropriate protective wear to prevent serious injury.**
- **Use waste to cover the adopters.**
- **Before disassembling drain steering oil from power steering cylinder.**

1. Remove the tie-rod join(4) from the rod (1) using spanners (2) (3).
2. Remove the adaptors (8) (9).
3. Remove the rod cover (7).
4. Tap out the rod (1) to the right front wheel side.

(When reassembling)

- Apply the liquid lock (Three Bond 1375N or equivalent) to the tie-rod joint (4).

Tightening torque	Tie-rod joint	74 to 84 N·m 7.5 to 8.6 kgf·m 55 to 62 lbf·ft

(1) Rod
(2) Thin Spanner
(3) Standard Spanner
(4) Tie-rod Joint (LH)
(5) Tie-rod Joint (RH)
(6) Internal Cir-clip
(7) Rod Cover
(8) Adaptor (RH)
(9) Adaptor (LH)
(10) O-ring
(11) Gasket
(12) Dust Seal
(13) U Gasket

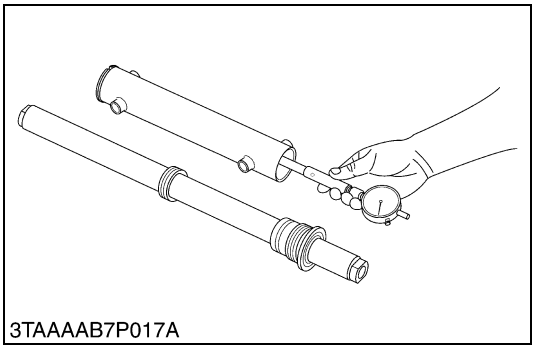
A : Position for thin thickness spanner
B : Position for standard thickness spanner

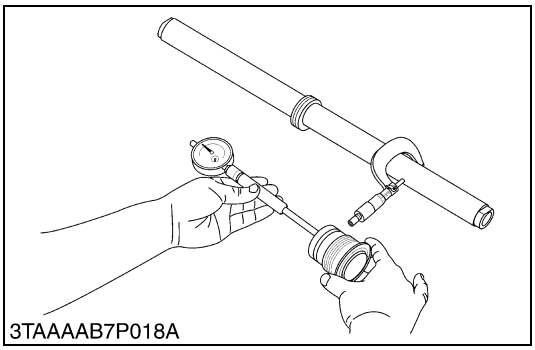
W1015562

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[3] SERVICING

(1) Power Steering Cylinder


3TAAAAB7P017A


3TAAAAB7P018A

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.	40.000 to 40.062 mm 1.57480 to 1.57724 in.
	Allowable limit	40.100 mm 1.57874 in.

W1011546

Clearance between Rod and Guide

1. Measure the rod guide 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 guide	Factory spec.	0.020 to 0.070 mm 0.00079 to 0.00276 in.
	Allowable limit	0.200 mm 0.00787 in.

W1016514

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8 HYDRAULIC SYSTEM

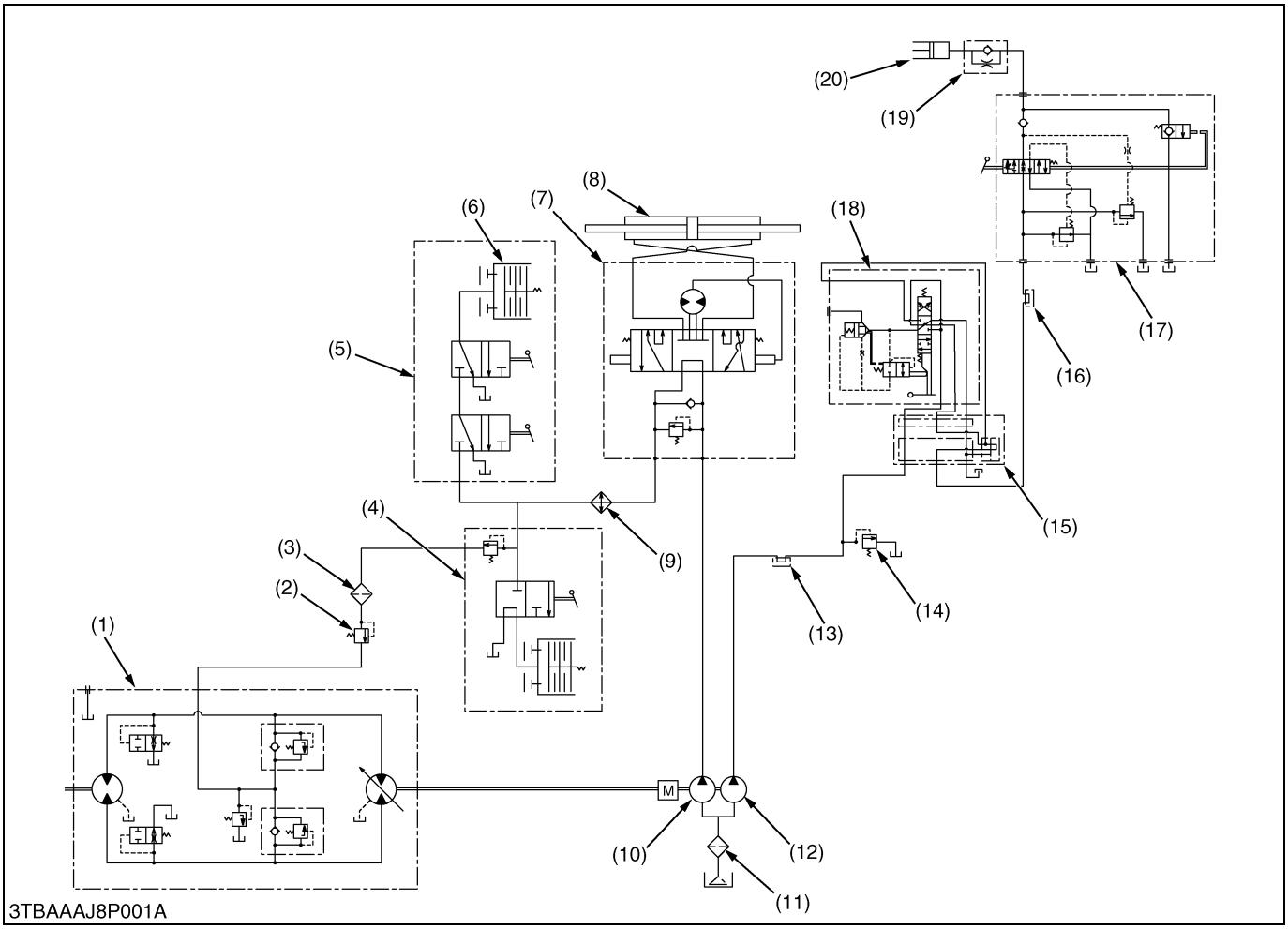
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MECHANISM

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1. HYDRAULIC CIRCUIT 8-M1
2. HYDRAULIC PUMP 8-M2
3. HYDRAULIC BLOCK 8-M3
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   [2] POWER STEERING CONTROLLER 8-M5
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6. THREE POINTS HYDRAULIC SYSTEM 8-M11
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8. REAR HYDRAULIC OUTLET 8-M19

1. HYDRAULIC CIRCUIT

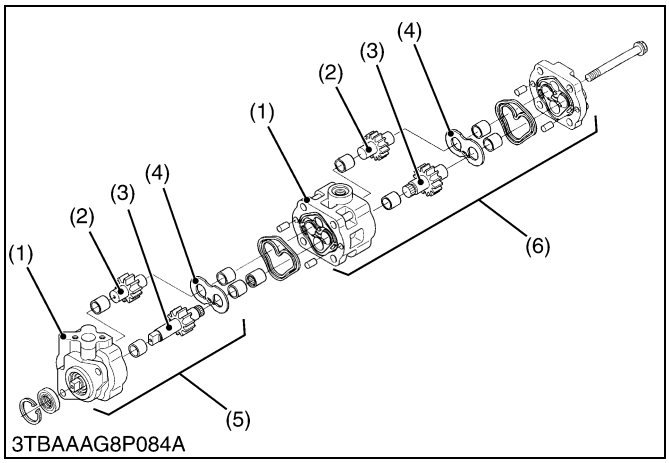


(1) Hydrostatic Transmission (HST)
(2) Relief Valve
(3) Oil Filter Cartridge
(4) Independent PTO Control Valve
(5) Bi-Speed Turn Valve and Clutch
(6) Bi-Speed Turn Clutch
(7) Power Steering Controller
(8) Power Steering Cylinder
(9) Oil Cooler
(10) Hydraulic Pump (for Power Steering, Bi-Speed Turn, Independent PTO and HST)
(11) Oil Filter
(12) Hydraulic Pump
(13) Hydraulic Block
(14) Relief Valve
(15) Rear Outlet
(16) Hydraulic Block
(17) Control Valve
(18) Remote Control Valve
(19) Lowering Speed Adjusting Valve
(20) Hydraulic Cylinder

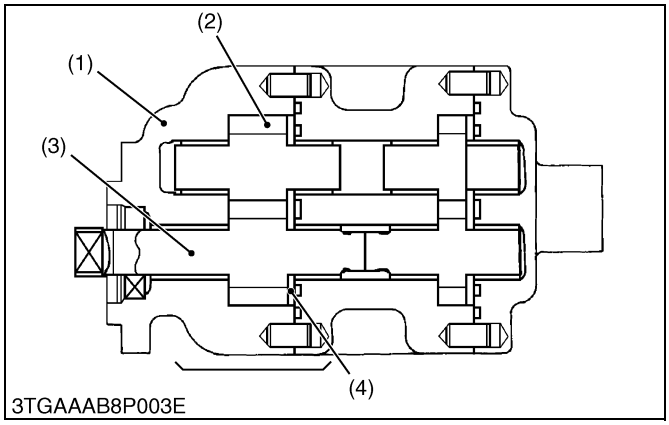
The hydraulic system are composed of hydraulic pumps (10) (12), power steering, independent PTO, HST (1), and 3-points hitch and other components.

1. Hydraulic power take off from the hydraulic block type outlet to operate the implements such as a front loader, front blade, rear blade and etc..
2. Hydraulic oil operates power steering, independent PTO clutch, HST and 3-point hitch.

2. HYDRAULIC PUMP



3TBAAAG8P084A



3TGAAAB8P003E

The hydraulic pump is composed of the casing (1), side plate (4), and two spur gears (drive gear (3) and driven gear (2)) that are in mesh.

Hydraulic pump is driven by the fuel camshaft.

Maximum displacement is as follows.

Hydraulic Pump (for 3-points Hitch)

	Displacement	Engine speed	Condition
B1830 B2230 B2530	20.5 L/min. 5.4 U.S.gals/min. 4.5 Imp.gals/min.	At 2700 min^{-1} (rpm)	at no load
B3030	19.7 L/min. 5.2 U.S.gals/min. 4.3 Imp.gals/min.	At 2600 min^{-1} (rpm)	at no load

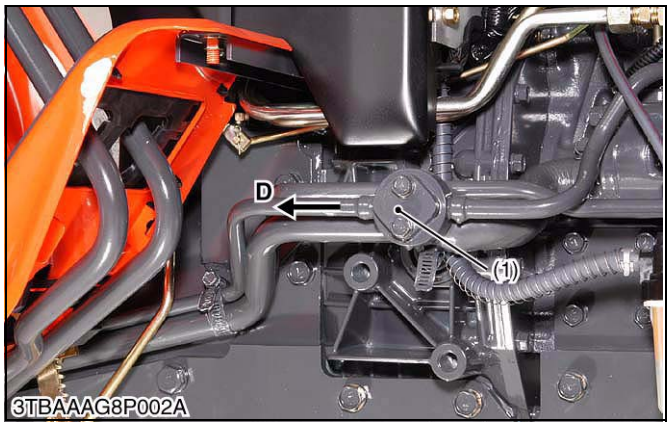
Hydraulic Pump (for Power Steering)

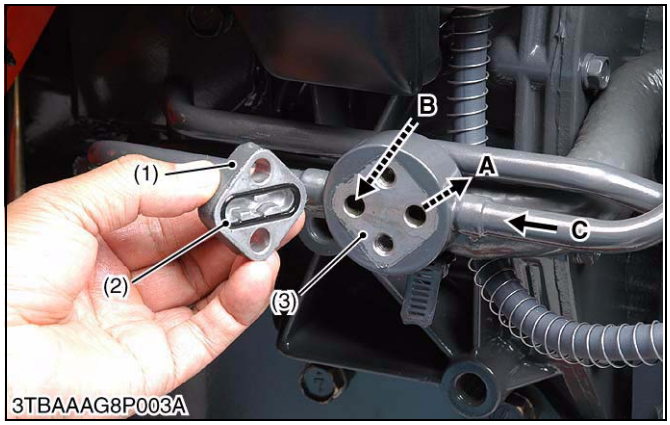
	Displacement	Engine speed	Condition
B1830 B2230 B2530	15.4 L/min. 4.1 U.S.gals/min. 3.4 Imp.gals/min.	At 2700 min^{-1} (rpm)	at no load
B3030	14.8 L/min. 3.9 U.S.gals/min. 3.3 Imp.gals/min.	At 2600 min^{-1} (rpm)	at no load

(1) Casing
(2) Driven Gear
(3) Drive Gear
(4) Side Plate
(5) Hydraulic Pump (for 3-Points Hitch)
(6) Hydraulic Pump (for Power Steering)

W1013860

3. HYDRAULIC BLOCK





The hydraulic block type outlet is located at the right hand side of the engine.

This hydraulic block type outlet is provided to take power out from the tractor to operate the hydraulic cylinders on the implement, such as front end loader, front blade and so on.

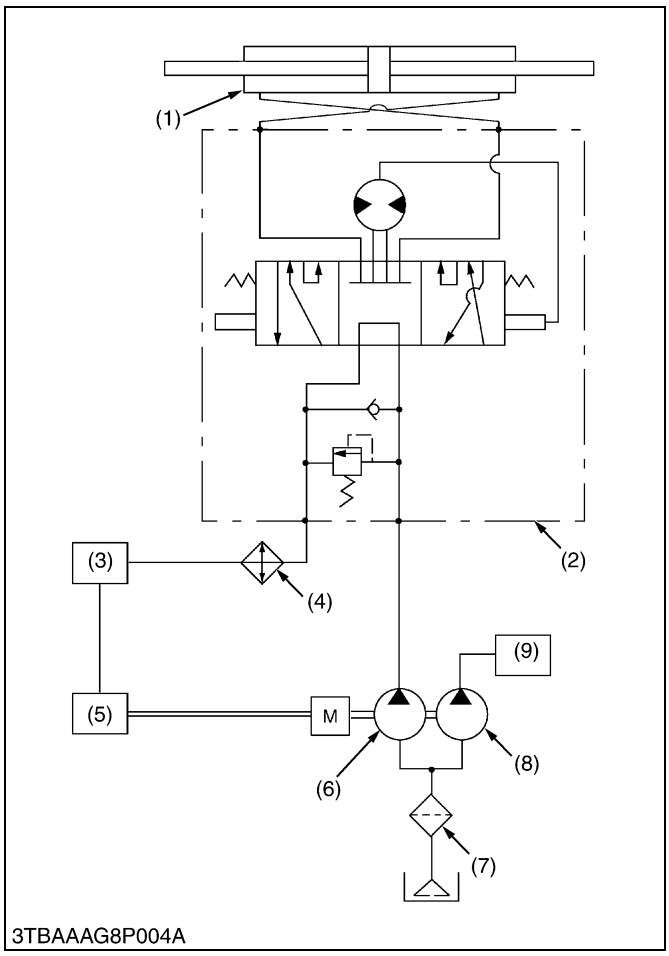
(1) Hydraulic Block Cover
(2) O-Ring
(3) Delivery Pipe

A : To Implement
B : From Implement
C : From Hydraulic Pump
D : To Control Valve

W1016112

4. POWER STEERING

[1] HYDRAULIC CIRCUIT



3TBAAAG8P004A

Hydraulic oil for power steering is forced by the hydraulic pump (6).

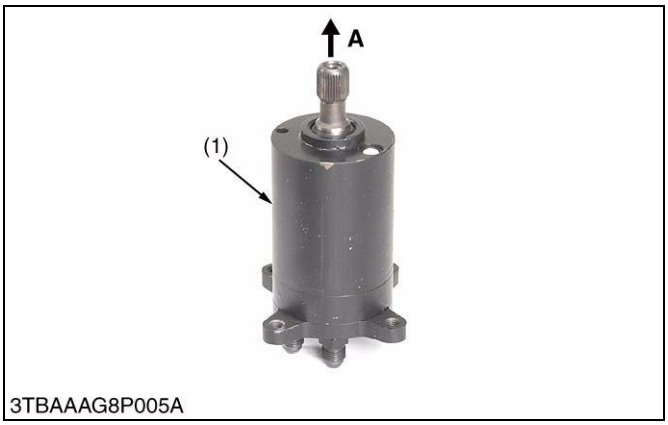
Hydraulic oil in the power steering controller is controlled by the steering wheel.

The controlled oil is forced to the power steering cylinder. The oil to the controller is forced return through oil cooler (4) to independent PTO (3) and HST (5).

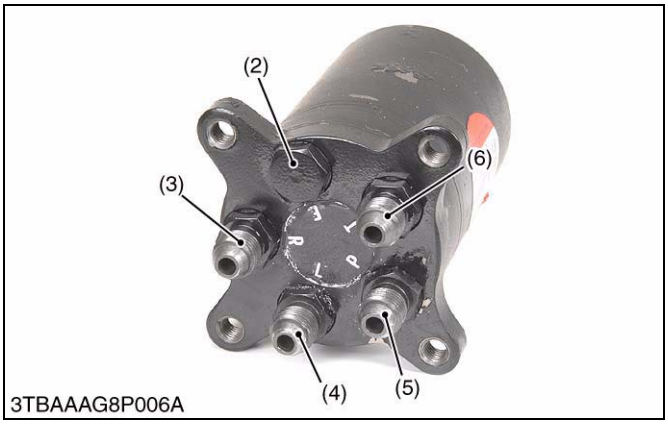
(1) Power Steering Cylinder
(2) Power Steering Controller
(3) Independent PTO
(4) Oil Cooler
(5) HST
(6) Hydraulic Pump (for Power Steering, Independent PTO and HST)
(7) Oil Filter Cartridge
(8) Hydraulic Pump (for 3-Points Hitch)
(9) 3-Points Hitch

W1015050

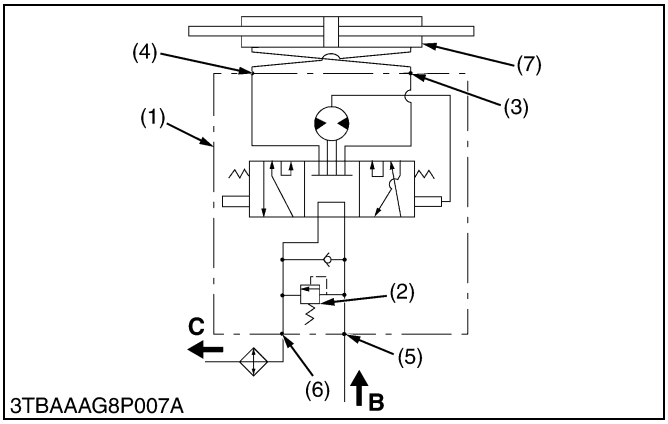
[2] POWER STEERING CONTROLLER



3TBAAAG8P005A



3TBAAAG8P006A



3TBAAAG8P007A

Power Steering controller (1) controls hydraulic oil from hydraulic pump.

Power steering controller is connected to hydraulic pump, power steering cylinder, and oil cooler.

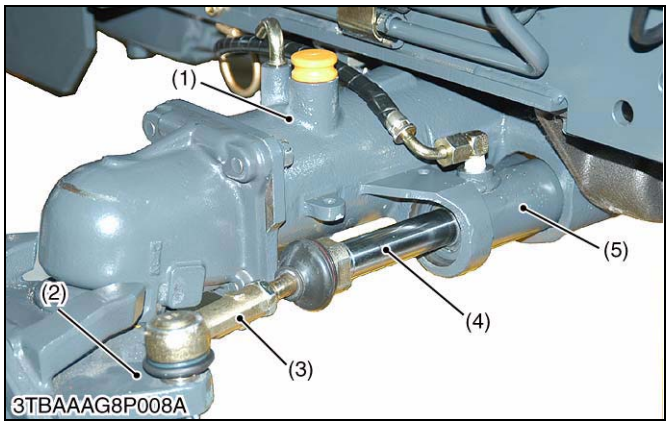
Since this power steering controller is a complete part and can not be disassembled, component parts in this power steering controller are not provided by KUBOTA.

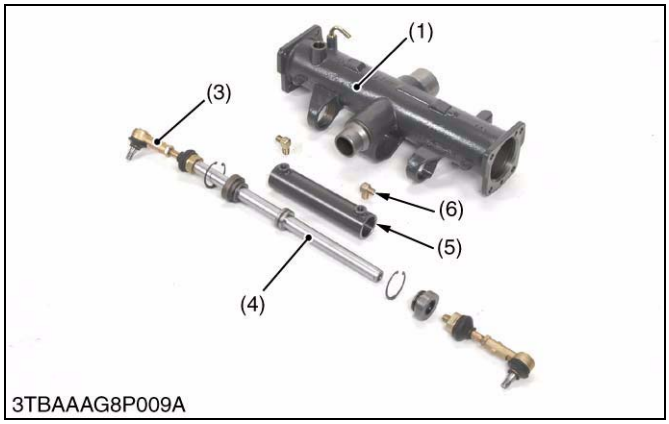
(1) Power Steering Controller
(2) Relief Valve
(3) Power Steering Cylinder Right Side Port
(4) Power Steering Cylinder Left Side Port
(5) Pump Port
(6) Tank Port (for Oil Cooler, Independent PTO and HST)
(7) Power Steering Cylinder

A : To Steering Wheel
B : Oil from Hydraulic Pump
C : To Independent PTO and HST

W1015544

[3] STEERING CYLINDER





Steering cylinder is located at the front side of the front axle case (1).

Steering cylinder is connected to the front gear cases.

Power steering hoses from power steering controller are connected to the adaptors of the steering cylinder.

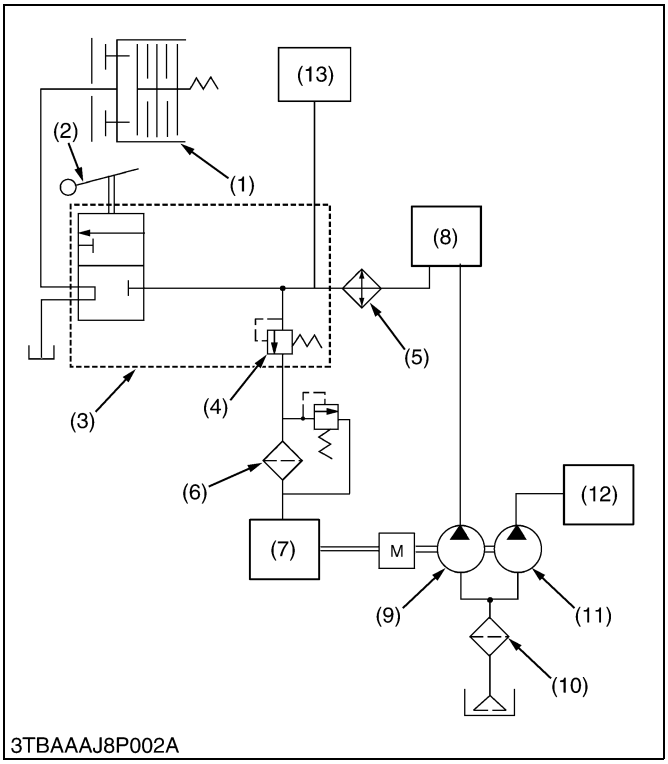
Steering cylinder is composed of tie rod joints (3), piston (4), cylinder (5), adaptors (6) and etc..

(1) Front Axle Case
(2) Front Gear Case
(3) Tie Rod End
(4) Piston
(5) Cylinder
(6) Adaptor

W1016209

5. INDEPENDENT PTO

[1] HYDRAULIC CIRCUIT

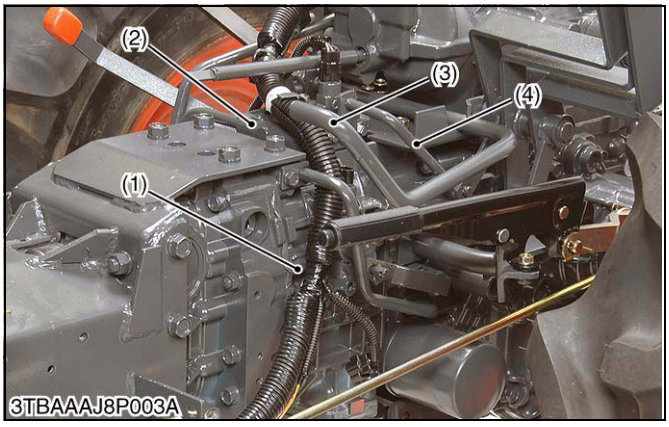


3TBAAAJ8P002A

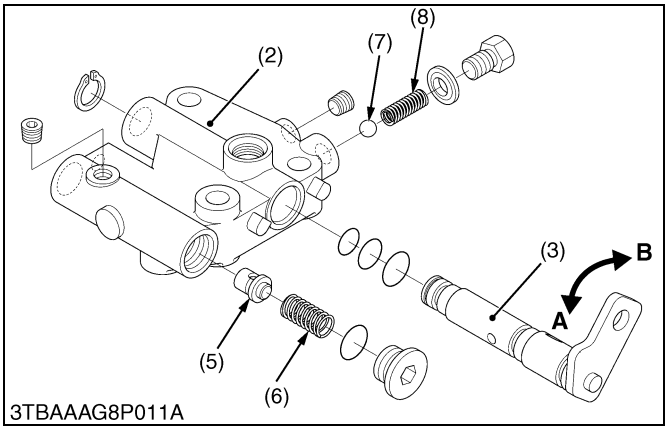
(1) PTO Clutch
(2) Independent PTO Lever
(3) Independent PTO Control Valve
(4) Relief Valve
(5) Oil Cooler
(6) Oil Filter Cartridge (for HST)
(7) HST
(8) Power Steering
(9) Hydraulic Pump (for HST, Power Steering and Independent PTO)
(10) Oil Filter Cartridge
(11) Hydraulic Pump (3-Points Hitch)
(12) 3-Points Hitch
(13) Bi-Speed Turn

W1016863

[2] INDEPENDENT PTO CONTROL VALVE



3TBAAAJ8P003A



3TBAAAG8P011A

Independent PTO control valve (2) is located at transmission case (1).

The independent PTO control valve (2) is composed of PTO arm (3), poppet (5), ball (7) and etc..

The PTO arm (3) is connected to control rod (4) and the independent PTO lever.

The PTO arm (3) is moved to **"OFF"** or **"ON"** position by the independent PTO lever.

Oil passage in the PTO arm (3) is turned by the independent PTO lever.

When the PTO arm (3) is moved to **"OFF"** position, oil in the independent PTO control valve does not flow to the oil passage.

When the PTO arm (3) is moved to **"ON"** position, oil in the independent PTO control valve flow to the oil passage.

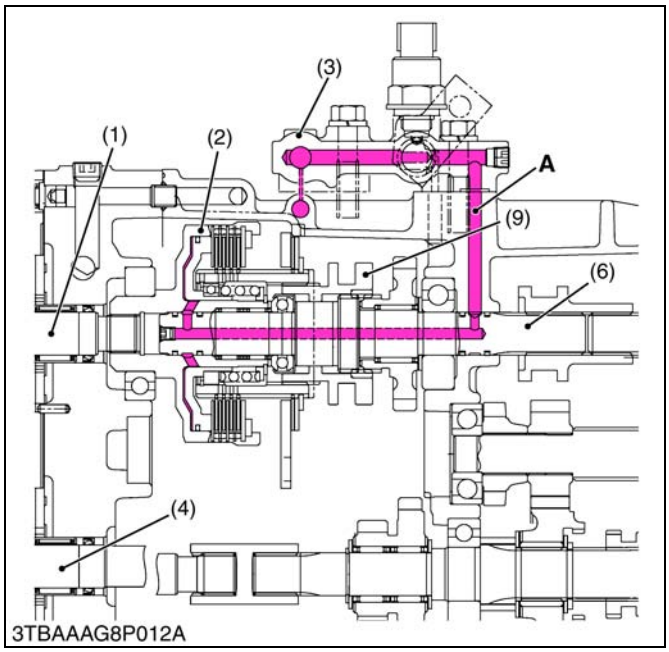
Poppet (5) and spring (6) operate as a relief valve.

(1) Transmission Case
(2) Independent PTO Control Valve
(3) PTO Arm
(4) Control Rod
(5) Poppet
(6) Spring
(7) Ball
(8) Spring

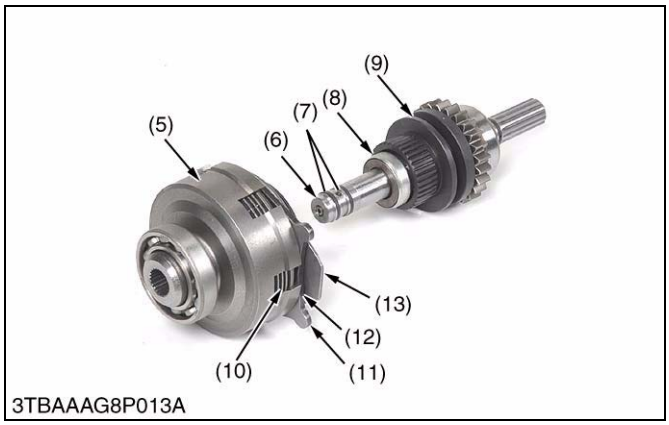
A : PTO Arm "OFF" Position
B : PTO Arm "ON" Position

W1017325

[3] INDEPENDENT PTO CLUTCH



3TBAAAG8P012A



3TBAAAG8P013A

Independent PTO clutch (2) is located behind the HST pump shaft (1) in the transmission case.

Independent PTO clutch (2) is operated with pressured hydraulic oil forced from the independent PTO control valve (3).

When independent PTO lever is shifted to **"ENGAGED"** position, hydraulic oil is forced through the transmission case inner passage **A** and PTO clutch shaft (6) to PTO clutch. In this state, power from HST pump shaft is transmitted through independent PTO clutch (2) to independent PTO clutch shaft (6).

When independent PTO lever is shifted to **"DISENGAGED"** position, hydraulic oil is not forced to the PTO clutch. In this state, power from HST pump shaft (1) is not transmitted to independent PTO clutch shaft (6).

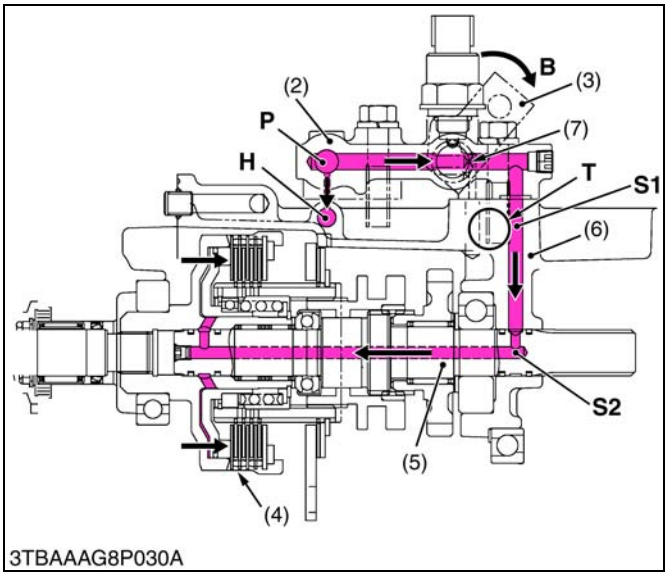
(1) HST Pump Shaft
(2) Independent PTO Clutch
(3) Independent PTO Control Valve
(4) HST Motor Shaft
(5) Case
(6) PTO Clutch Shaft
(7) Seal
(8) Bearing
(9) Shifter
(10) Clutch Disks and Plates
(11) Brake Plate 4
(12) Brake Disk
(13) Brake Plate 2

A : Passage

W1017867

[4] INDEPENDENT PTO LEVER "ENGAGED"





When the independent PTO lever (1) is shifted to the **"ENGAGED"** position, the PTO arm (3) is turned to **"ON"** position.

Hydraulic oil from **P** port flows through oil passage (7) of the PTO arm (3), oil passage **S1** in the transmission case (6) and oil passage **S2** in the PTO clutch shaft (5) to the PTO clutch (4).

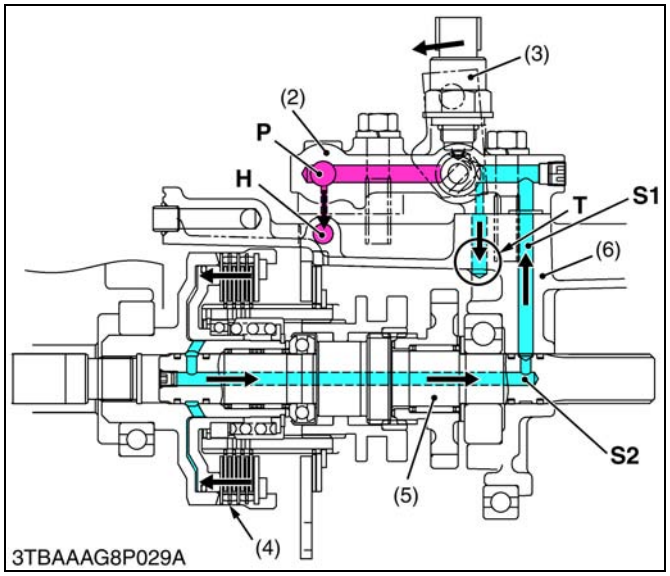
Since the piston of the PTO clutch (4) is pushed by pressurized oil, clutch disks and clutch plates are pushed, and the PTO clutch (4) is engaged.

(1) Independent PTO Lever	**A : "DISENGAGED" Position**
(2) Independent PTO Control Valve	**B : "ENGAGED" Position**
	P : Pump Port
(3) PTO Arm	**H : HST Port**
(4) PTO Clutch	**T : Tank Port**
(5) PTO Clutch Shaft	**S1 :Oil Passage (in the Transmission Case)**
(6) Transmission Case	
(7) Oil Passage (in the PTO arm)	**S2 :Oil Passage (in the PTO Clutch Shaft)**

W1018718

[5] INDEPENDENT PTO LEVER “DISENGAGED”





When the independent PTO lever (1) is shifted to the **"DISENGAGED"** position, the PTO arm(3) is turned to **"OFF"** position.

Hydraulic oil is stopped at the PTO arm (3).

This oil flows to the HST port.

Oil in the PTO clutch (4) and the PTO clutch shaft (5) drains through oil passage **S2**, **S1** and **T** port to the transmission case.

(1) Independent PTO Lever
(2) Independent PTO Control Valve
(3) PTO Arm
(4) PTO Clutch
(5) PTO Clutch Shaft
(6) Transmission Case

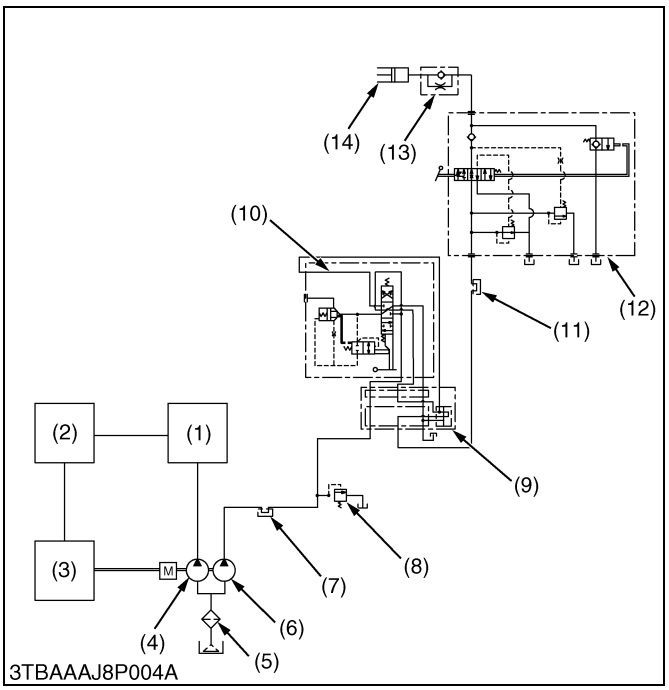
A : “DISENGAGED” Position
B : “ENGAGED” Position
P : Pump Port
H : HST Port
T : Tank Port
S1 :Oil Passage (in the Transmission Case)
S2 :Oil Passage (in the PTO Clutch Shaft)

W1019510

https://truckmanualshub.com/

6. THREE POINTS HYDRAULIC SYSTEM

[1] HYDRAULIC CIRCUIT



Two hydraulic pumps (4) (6) are installed in the B1830, B2230, B2530 and B3030.

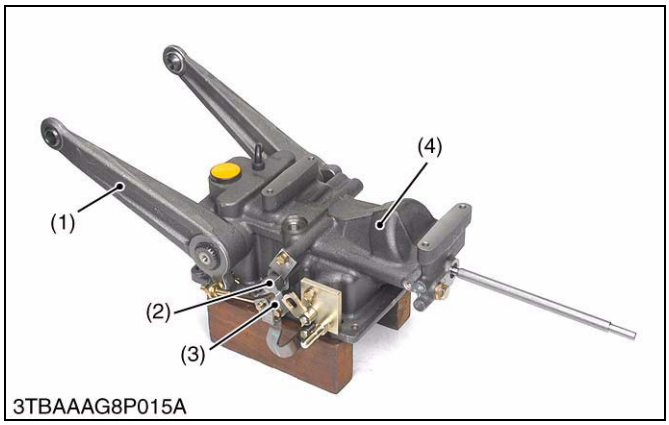
Hydraulic oil is forced from hydraulic pump (6) to the hydraulic block (7), relief valve (8), hydraulic block (9) and position control valve (10).

Three point hydraulic oil pressure is controlled by the relief valve (8).

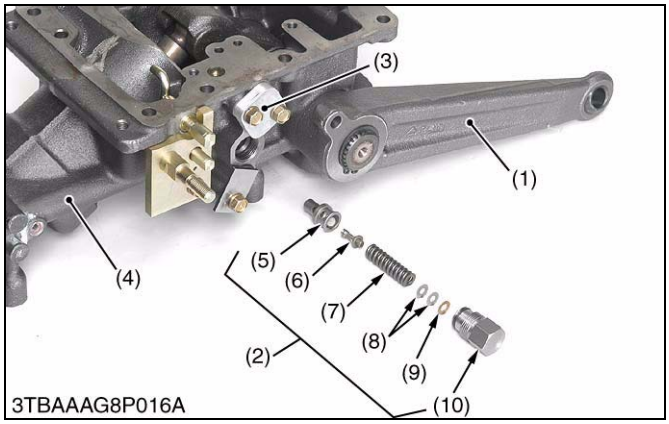
(1) Power Steering Controller
(2) Independent PTO
(3) HST
(4) Hydraulic Pump ((for Power Steering, HST, and Independent PTO)
(5) Oil Filter Cartridge
(6) Hydraulic Pump (for 3-Points Hitch)
(7) Hydraulic Block (for Front Loader and Front Blade)
(8) Relief Valve
(9) Rear Outlet
(10) Remote Control Valve
(11) Hydraulic Block
(12) Position Control Valve
(13) Lowering Speed Adjusting Valve
(14) Hydraulic Cylinder

W1019959

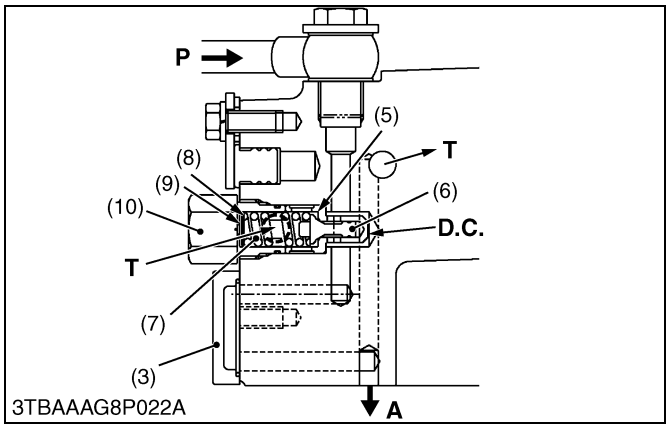
[2] RELIEF VALVE



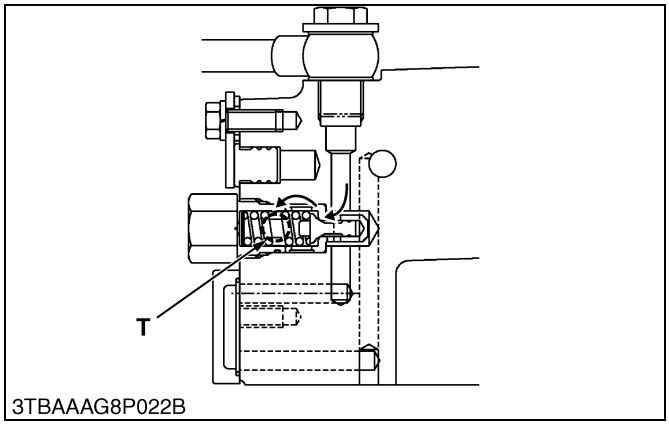
3TBAAAG8P015A



3TBAAAG8P016A



3TBAAAG8P022A



3TBAAAG8P022B

Relief valve is located at the hydraulic cylinder right hand side.

The implement control system circuit has a relief valve to restrict the maximum pressure in the circuit.

The relief valve is a guide piston type with damping effect.

Among direct acting relief valves, this type is suited to higher pressure and has larger capacity. Furthermore, this type is free from unstable operation, such as chattering, which occurs often in direct acting relief valves.

As shown in the figure, the guide is attached to the poppet (6) and a valve chamber **D.C.** (called the damping chamber) is formed at the bottom of the poppet (6). The inlet of the valve leads to the chamber via a clearance between the sliding portion of the poppet (6) and the valve seat (5), minimizing valve vibration with the damping effect of the chamber.

As the oil pressure in the circuit increases, so does the pressure in the damping chamber (**D.C.**). When the pressure rises above the valve setting and overcomes the spring force, the valve opens. Oil then flows out to the transmission case through **T** port, preventing any further rise in pressure. The valve closes again when enough oil is released to drop pressure below the valve setting pressure.

(Reference)

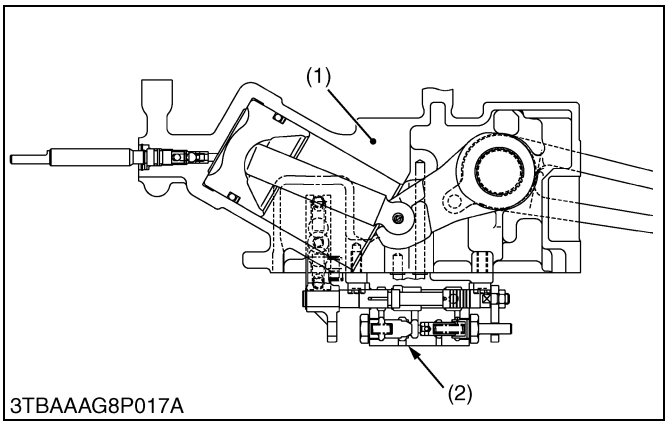
- Relief valve setting pressure :
  B1830, B2230, B2530 : 15.5 to 16.5 Mpa
  158 to 168 kgf/cm^2
  2248 to 2393 psi
  B3030 : 15.2 to 16.2 MPa
  155 to 165 kgf/cm^2
  1920 to 1991 psi
- Engine speed : Rated speed
- Oil temperature : 50 °C (122 °F)

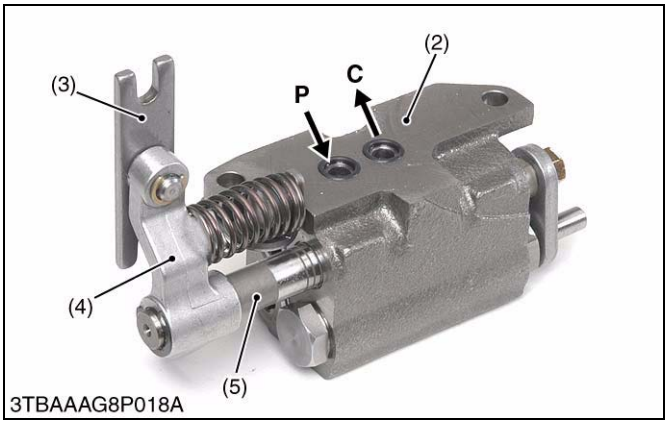
(1) Lift Arm
(2) Relief Valve
(3) Hydraulic Block
(4) Lift Cylinder
(5) Valve Seat
(6) Poppet
(7) Spring
(8) Shim
(9) Washer
(10) Plug

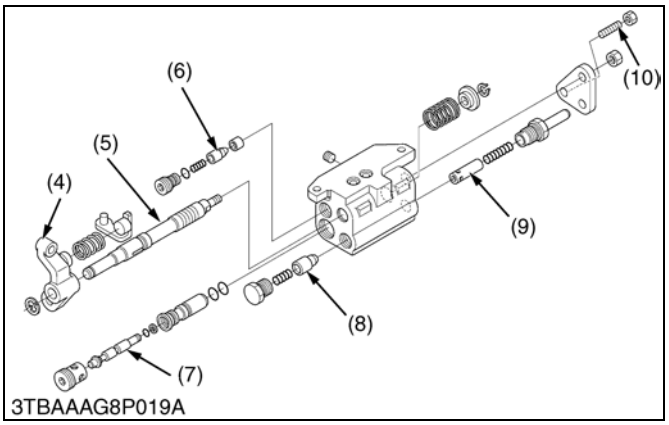
A : To Position Control Valve
P : Pump Port (from Hydraulic Pump)
T : Tank Port (to Transmission case)
D.C.:Damping Chamber

W1020478

[3] POSITION CONTROL VALVE







This position control valve (2) is located under the hydraulic cylinder block (1).

This control valve is mechanically connected to the position control lever with linkage.

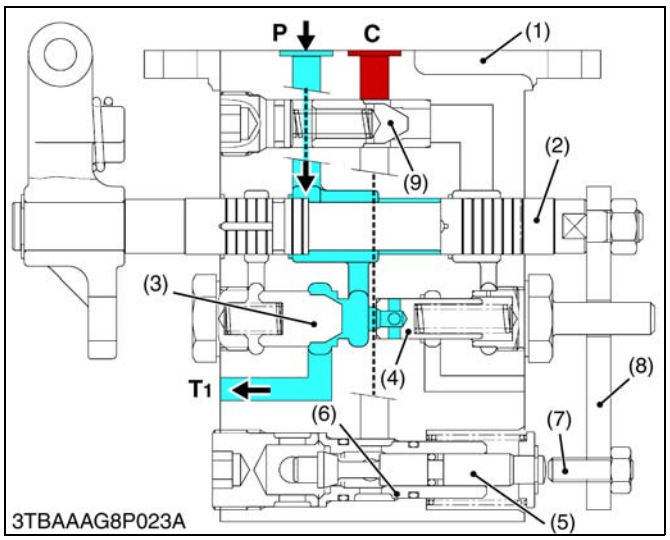
This control valve is also mechanically connected to the lift arm with a feed back rod.

This control valve controls the oil flow forced from hydraulic pump and the oil returned back from the hydraulic cylinder.

(1) Hydraulic Cylinder Block
(2) Position Control Valve
(3) Link
(4) Lever
(5) Spool
(6) Poppet
(7) Poppet
(8) Poppet
(9) Poppet
(10) Set Screw

P : Pump Port
C : Cylinder Port

W1021448



■ Neutral

Oil forced into the control valve through **P** port pushes and opens the unload valve (3), and opens the unload valve (3), and then returns to the transmission case through **T1** port.

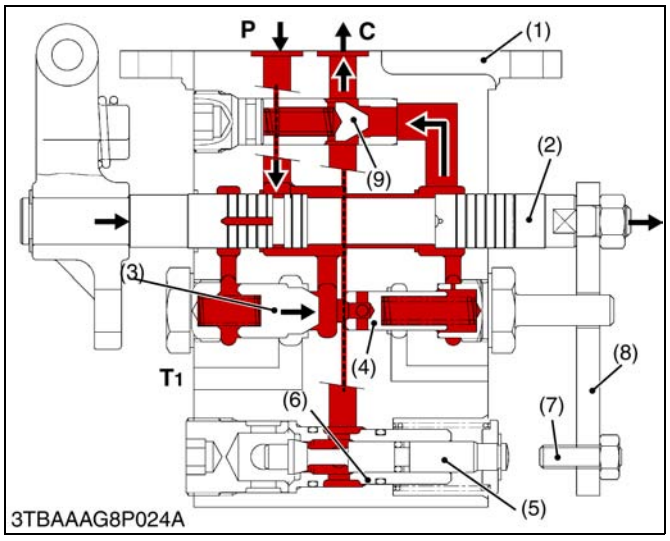
Oil behind the unload valve (3) returns to the transmission case through the groove of the spool (2).

Since the check valve (9) and the poppet 2 (5) are closed, oil in the hydraulic cylinder does not flow to the transmission case. Thus, the implement remains at its fixed position.

(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve

P : Pump Port
C : Cylinder Port
T1 :Tank Port

W1021891



■ Lift

When the position control lever is set to **"LIFT"** position, the spool (2) is pushed into the valve body (1).

The oil forced into the control valve body (1) through **P** port flows to two oil circuits.

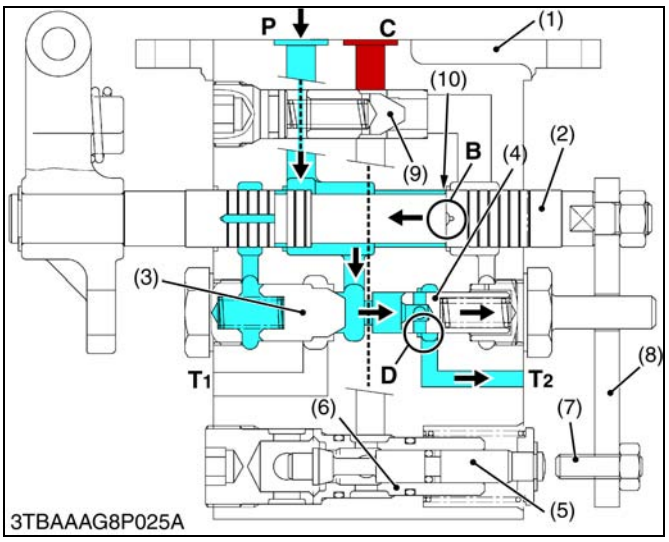
The first circuit is oil flowing to the back of the unload valve (3) to close it.

The second oil circuit is oil flowing to the check valve (9) and the hydraulic cylinder through **C** port to lift the implement.

(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve

P : Pump Port
C : Cylinder Port
T1 :Tank Port

W1022342



■ Shockless mechanism operating (Lift to Neutral)

When the implement begins to lift up, the feedback rod connected to the lift arm pushes back the spool (2) to near "**NEUTRAL**" position.

When the implement lifts up near the "**NEUTRAL**" position, quantity of oil passing through the orifice (10) is reduced.

It causes oil pressure difference between portion **B** and unload poppet (4).

Since oil pressure at unload poppet (4) is higher than oil pressure at portion **D**, oil forced from **P** port pushes and opens unload poppet (4), and oil drains through **T2** port to transmission case.

Quantity of oil flowing through portion **B** is less.

Quantity of oil flowing to unload poppet (4) is greater.

It causes oil pressure increase at portion **D** of the unload poppet (4).

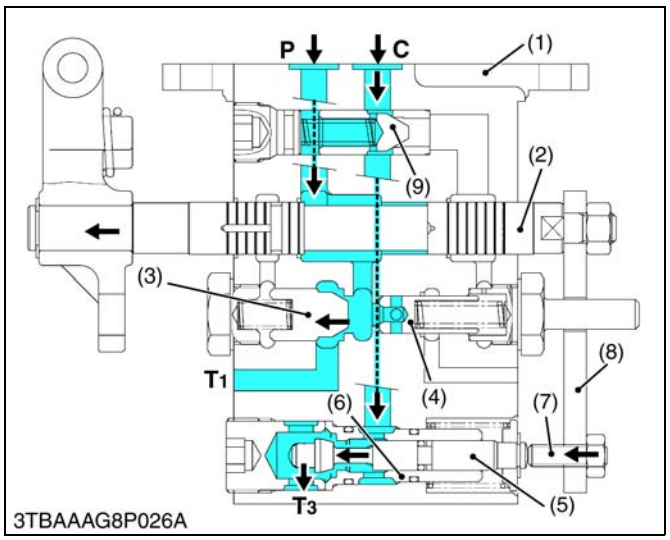
While the implement is coming to "**NEUTRAL**" position, quantity of oil flowing to spool (2) is reduced at portion **B**. And then, oil drains through unload poppet (4) to transmission case.

It causes implement's smooth stopping at "**NEUTRAL**" position without shock.

(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve
(10) Orifice

P : Pump Port
B : Portion B
C : Cylinder Port
D : Portion D
T1 :Tank Port

W1022580



■ Down

When the position control lever is set to **"DOWN"** position, the spool (2) is pulled out from the control valve body (1).

At the same time, the adjust bolt (7) connected to the connecting plate (8) pushes the poppet (5) into the control valve body (1). And then the poppet (5) is opened.

Oil in the hydraulic cylinder is forced out from C port through and goes valve body (1) to transmission case by the weight of the implement, causing the implement to lower.

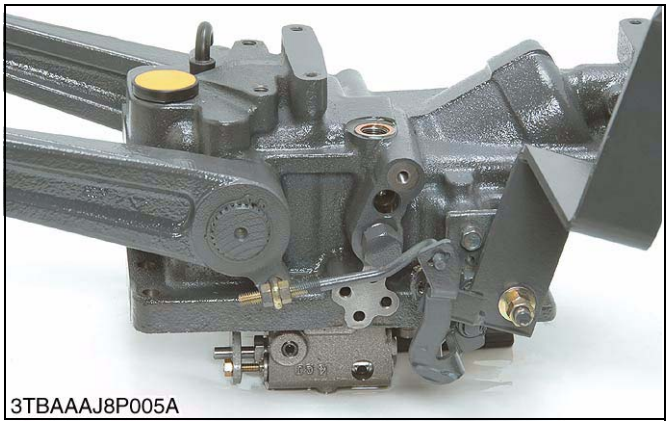
Oil forced into the control valve through **P** port pushes and opens the unload valve (3) and returns to the transmission case through **T1** port.

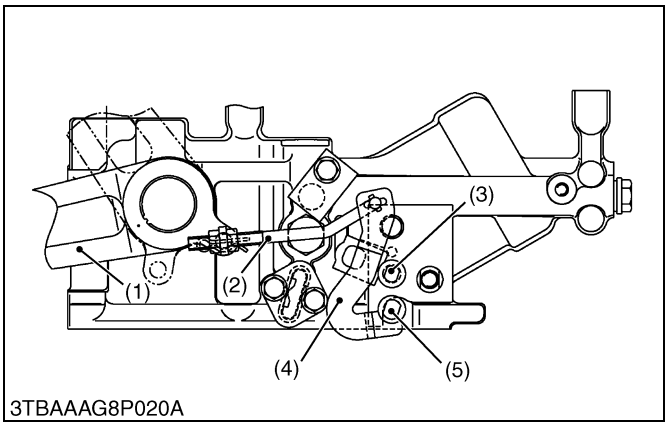
(1) Valve Body
(2) Spool
(3) Unload Valve
(4) Unload Poppet
(5) Poppet 2
(6) Sleeve
(7) Adjusting Bolt
(8) Connecting Plate
(9) Check Valve

P : Pump Port
C : Cylinder Port
T1 :Tank Port
T3 :Tank Port
T4 :Tank Port

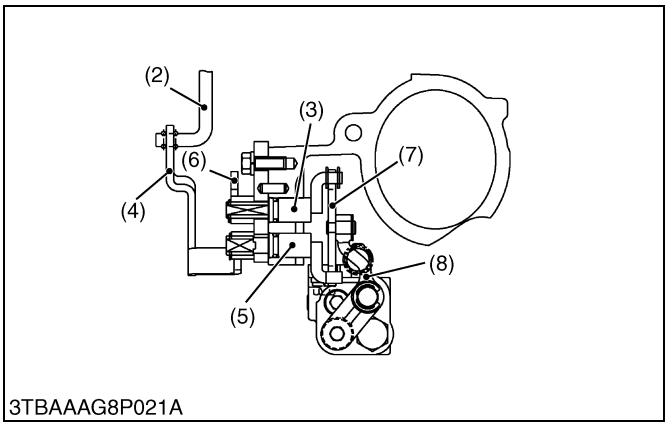
W1023023

[4] FEEDBACK LINKAGE FOR POSITION CONTROL


3TBAAAJ8P005A



3TBAAAG8P020A



3TBAAAG8P021A

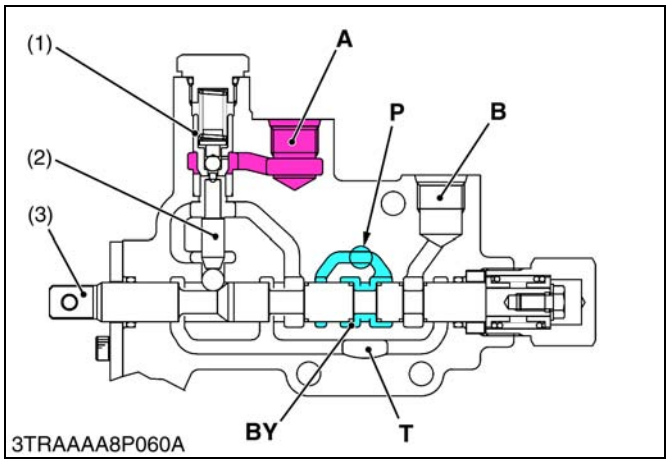
When the position control lever is moved to rearward to lift the implement, the spool of the position control valve is pushed in to form a lifting circuit by the motions of the control lever arm, the control lever shaft (3), the connecting arm (7) and the lever (8). After the lift arm (1) moves upward, the spool is pulled out and returns to form a neutral circuit by the motions of the feedback rod (2), the feedback arm (4), the feedback, the arm shaft (5), the connecting arm (7) and the lever (8).

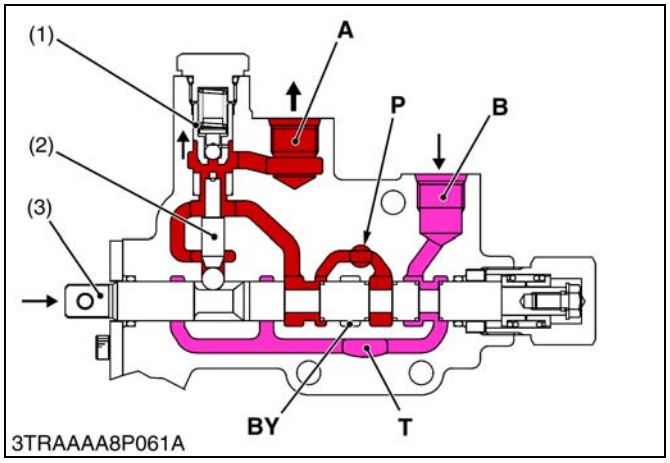
As a result, the implement height can be easily determined in proportion to the set position of the position control lever.

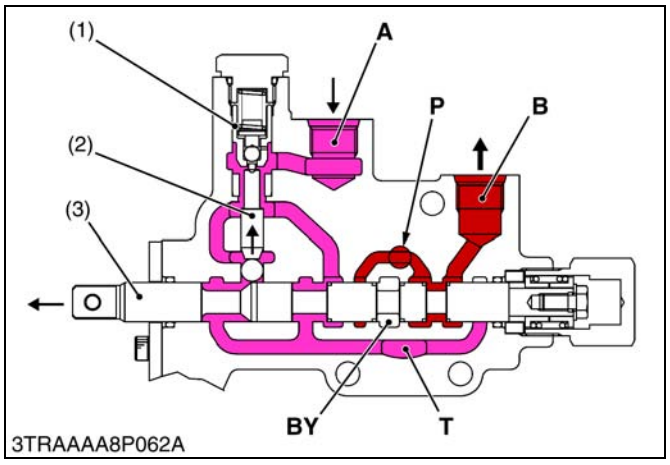
(1) Lift Arm
(2) Feedback Rod
(3) Control Lever Shaft
(4) Feedback Arm
(5) Feedback Arm Shaft
(6) Control Lever Arm
(7) Connecting Arm
(8) Lever

W1023464

7. REMOTE CONTROL VALVE







■ Neutral

Pressure-fed oil from the hydraulic pump is delivered into the **P** port, and flows to the rear hydraulic outlet through **BY** port.

At this time, oil from **A** port to the **T** port is blocked by the mechanical check valve (Poppet (1)). Therefore the position of implement is maintained at the set position.

(1) Poppet
(2) Piston
(3) Spool

P : Pump Port
T : Tank Port
BY : BY Port (To Position Control Valve)
A : A Port
B : B Port

W10147800

■ Lift

When the remote control valve operating lever is set to **LIFT** position, the spool (3) moves to the right and the passage from **P** port to the **BY** port is blocked by the spool (3).

Then the pressure-fed oil open the poppet (1) and flow through the **A** port to the hydraulic cylinder to lift the implement.

(1) Poppet
(2) Piston
(3) Spool

P : Pump Port
T : Tank Port (To Transmission Case)
BY : BY Port
A : A Port
B : B Port

W10148930

■ Down

When the remote control valve operating lever is set to **DOWN** position, the spool (3) moves to the left and the passage from **P** port to the **BY** port is blocked by the spool (3). At the same time, the piston (2) and poppet (1) moves upward, and open the passage from **A** port to **T** port.

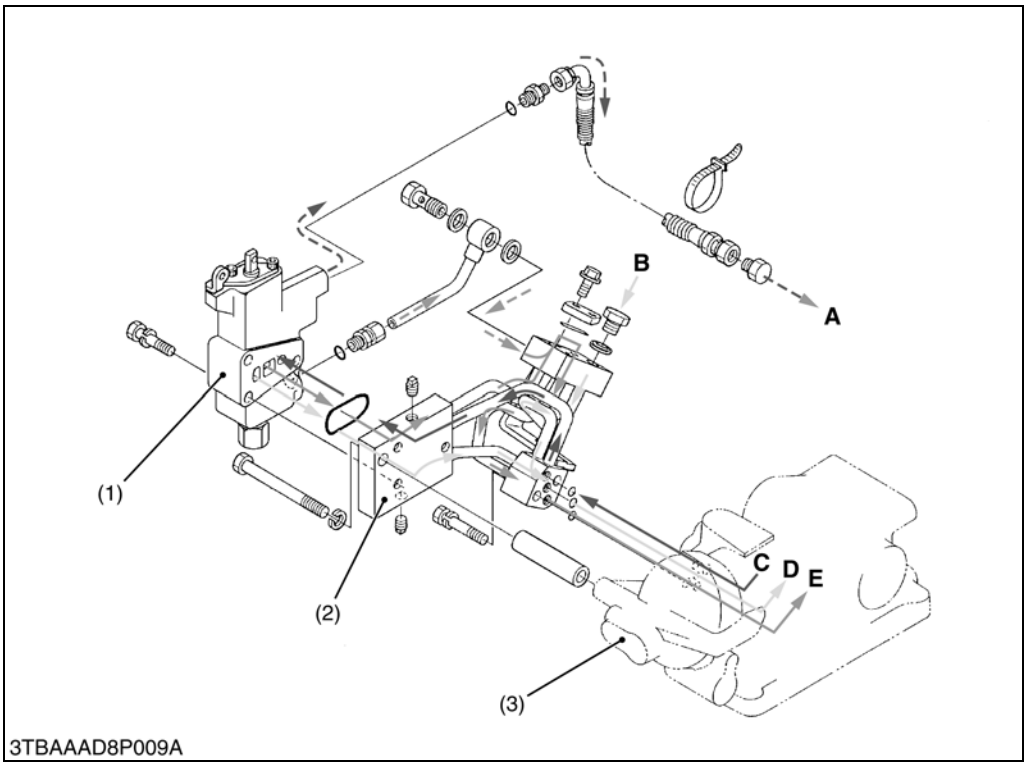
Then the pressure-fed oil flow through the **B** port to the hydraulic cylinder to lower the implement. Return oil from hydraulic cylinder flows from **A** port to the transmission case.

(1) Poppet
(2) Piston
(3) Spool

P : Pump Port
T : Tank Port (To Transmission Case)
BY : BY Port
A : A Port
B : B Port

W10149920

8. REAR HYDRAULIC OUTLET



3TBAAAD8P009A

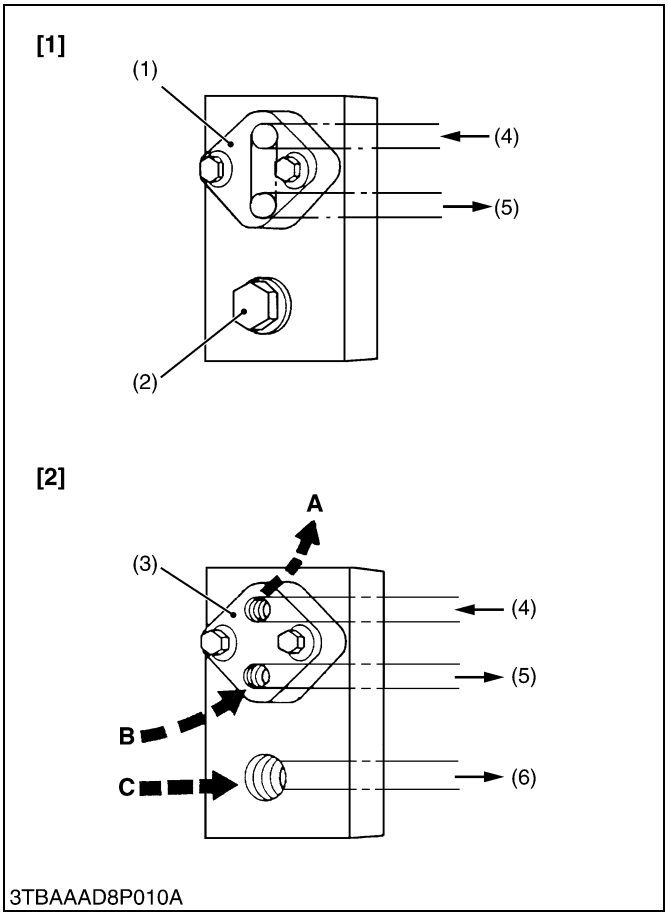
(1) Auxiliary Control Valve
(2) Rear Hydraulic Outlet
(3) Hydraulic Cylinder Body

A : To Implement
B : From Implement (Drain)
C : From Hydraulic Pump
D : To Transmission Case
E : To Position Control Valve

W10153280

The rear hydraulic outlet is located at the right hand side of the hydraulic cylinder body.

This rear hydraulic outlet is provided to take power out from the tractor to operate the hydraulic cylinders on the implement.



3TBAAAD8P010A

■ **NOTE**

- **If the control valve of implement has the relief valve, the tank port flow from implement should be connected to the port (C).**

[1] When implement is not attached
[2] When implement is attached
(1) Block Cover
(2) Plug
(3) Block Outlet Cover (Option)
(4) From Hydraulic Pump
(5) To Position Control Valve
(6) To Transmission Case
A : To implement (Inlet) Max. flow 17 L/min. (4.5 U.S.gal/min., 3.7 Imp.gal/min.) Max. pressure 13.2 to 13.7 MPa (135 to 140 kgf/cm^2, 1920 to 1992 psi)
B : From Implement (Outlet)
C : From Implement (Drain)

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SERVICING

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   [3] SERVICING 8-S23

1. TROUBLESHOOTING

POWER STEERING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Vibration	Air in power steering circuit	Bleed air	7-S4
Hard Steering	Transmission fluid improper or insufficient	Change	8-S14
	Oil leak from pipe or hose joint	Retighten	7-S5
	Hydraulic pump malfunctioning	Replace	8-S11
	Improper relief valve adjustment	Replace	8-S12
	Relief valve malfunctioning	Replace	8-S12
	Seals or O-rings in the steering controller damaged	Replace	8-S12
	Air in the hydraulic pipes	Air vent	7-S4
Low Operating Pressure	Hydraulic pump malfunctioning	Replace	8-S11
	Improper relief valve adjustment	Replace	8-S12
	Relief Valve malfunctioning	Replace	8-S12
	Seals or O-rings in the steering controller damaged	Replace	8-S12
	Oil leak from pipe or hose	Replace	7-S5
	Pipe or hose broken	Replace	7-S5
Steering Wheel Does Not Return to Neutral Position	Power steering controller damaged	Replace	8-S12
Steering Force Fluctuates	Insufficient oil	Replenish	8-S14
	Insufficient bleeding	Bleed	7-S4
	Steering controller malfunctioning	Replace	8-S12
Noise	Insufficient oil	Replenish	8-S14
	Air sucked in pump from suction circuit	Repair	7-S4
	Pipe deformed	Replace	7-S5

W1014322

INDEPENDENT PTO

Symptom	Probable Cause	Solution	Reference Page
PTO Clutch Slip	Operating pressure is low	Adjust	8-S8
	Independent PTO control valve malfunctioning	Repair or replace	8-S8
	Clutch disk or drive plate excessively worn	Replace	3-S61
	Deformation of piston or return plate	Replace	3-S61
PTO Shaft Does Not Rotate	PTO clutch malfunctioning	Repair or replace	3-S54, S60
	PTO propeller shaft coupling disengaged	Engage	–
PTO Clutch Operating Pressure is Low	Transmission oil improper or insufficient	Replenish or change	8-S14
	Relief valve poppet malfunctioning	Adjust or replace	8-S8
PTO Clutch Drags	Brake plate excessively worn	Replace	3-S61
	Return spring weaken or broken	Replace	3-S61
	Deformation or return plate or steel plate	Replace	3-S61

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3-POINTS HITCH

Symptom	Probable Cause	Solution	Reference Page
Implement Does Not Rise (No Noise)	Control valve broken	Replace	8-S17, S18
	Control valve improperly adjusted	Adjust	8-S17
	Control valve improperly assembled	Repair	8-S17, S18
	Relief valve spring damaged	Replace	8-S19
Implement Does Not Rise (Noise)	Oil filter cartridge clogged	Clean or replace	G-14
	Suction pipe loose or broken	Repair or replace	3-S29, S30
	Suction pipe connecting hose loose or broken	Repair or replace	3-S37
	Suction pipe O-ring broken	Replace	3-S37
	Insufficient transmission oil	Refill	8-S14
	Relief valve setting pressure too low	Adjust or replace	8-S9
	Hydraulic pump broken	Replace	8-S11
Implement Does Not Reach Maximum Height	Feedback rod improperly adjusted	Adjust	8-S10
Implement Does Not Lower	Control valve malfunctioning	Repair or replace	8-S17, S18
Implement Drops by its Weight	Hydraulic cylinder worn or damaged	Replace	8-S23
	Piston O-ring worn or damaged	Replace	8-S20
	Control valve malfunctioning	Replace	8-S17, S18
Implement Hunts	Control valve improperly adjusted	Adjust	8-S17

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Pump Delivery at Engine rated rpm, Oil Temperature 50 °C , 122 °F **[B1830, B2230, B2530]**	At no pressure	Above 20.5 L / min. 5.4 U.S.gals/ min. 4.5 Imp.gals/ min.	–
	At rated pressure	Above 19.4 L / min. 5.1 U.S.gals/ min. 4.3 Imp.gals/ min.	–
Pump Delivery at Engine 2600 min^{-1} (rpm), Oil Temperature 50 °C , 122 °F **[B3030]**	At no pressure	Above 19.7 L / min. 5.2 U.S.gals/ min. 4.3 Imp.gals/ min.	–
	At rated pressure	Above 18.7 L / min. 4.9 U.S.gals/ min. 4.1 Imp.gals/ min.	–
Gears to Casing	Clearance	–	0.15 mm 0.0059 in.
Gear Shaft to Bushing	Clearance	0.020 to 0.091 mm 0.0008 to 0.0036 in.	0.12 mm 0.0047 in.
Gear Shaft	O.D.	14.970 to 14.980 mm 0.5894 to 0.5898 in.	–
Bushing	I.D.	15.000 to 15.061 mm 0.5906 to 0.5930 in.	–
Side Plate	Thickness	2.48 to 2.50 mm 0.0976 to 0.0984 in.	2.40 mm 0.0945 in.
Lift Arm	Free Play	5 to 10 mm 0.20 in. 0.40 in.	–
Relief Valve for 3-Points Hitch **[B1830, B2230, B2530]** **Condition:** Engine Speed : Approx. 2700 min^{-1} (rpm) Oil Temperature : 50 °C (122 °F)	Setting Pressure	15.5 to 16.5 MPa 158 to 168 kgf/cm^2 2248 to 2393 psi	–
Relief Valve for 3-Points Hitch **[B3030]** **Condition:** Engine Speed : Approx. 2600 min^{-1} (rpm) Oil Temperature : 50 °C (122 °F)	Setting Pressure	15.0 to 16.0 MPa 153 to 163 kgf/cm^2 2175 to 2320 psi	–
Relief Valve for Independent PTO Valve **[B1830, B2230, B2530]** Engine Speed : Approx. 2700 min^{-1} (rpm)	Setting Pressure	1.1 to 1.5 MPa 11.2 to 15.3 kgf/cm^2 160 to 218 psi	–
Relief Valve for Independent PTO Valve [**B3030]** Engine Speed : Approx. 2600 min^{-1} (rpm)	Setting Pressure	1.1 to 1.5 MPa 11.2 to 15.3 kgf/cm^2 160 to 218 psi	–

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Item		Factory Specification	Allowable Limit
Hydraulic Cylinder	I.D.	70.05 to 70.10 mm 2.7579 to 2.7598 in.	70.15 mm 2.7618 in.
Hydraulic Arm Shaft to Bushing	Clearance	0.020 to 0.110 mm 0.0008 to 0.0043 in.	0.30 mm 0.0118 in.
Hydraulic Arm Shaft (RH)	O.D.	37.925 to 37.950 mm 1.4931 to 1.4941 in.	–
Hydraulic Arm Shaft (LH)	O.D.	33.925 to 33.950 mm 1.3356 to 1.3366 in.	–
Hydraulic Cylinder Bushing (RH)	I.D.	37.970 to 38.035 mm 1.4949 to 1.4974 in.	–
Hydraulic Cylinder Bushing (LH)	I.D.	33.970 to 34.035 mm 1.3374 to 1.3400 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-8.)

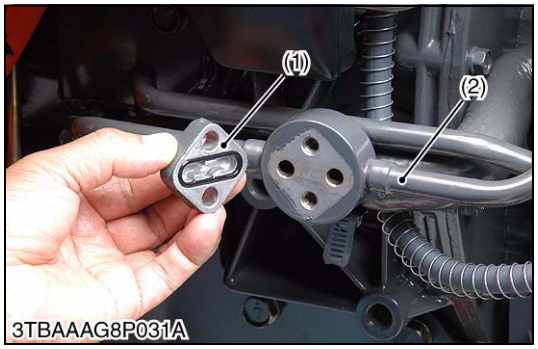
Item	N·m	kgf·m	lbf·ft
Delivery pipe nut for power steering	65 to 75	6.6 to 7.7	47.9 to 55.3
Steering post mounting bolt (M10)	48.1 to 55.8	4.9 to 5.7	36.5 to 41.2
Independent PTO control valve mounting bolt (M10)	39.3 to 44.	4.0 to 4.5	29.0 to 32.5
Hydraulic cylinder mounting bolt and nut (M10) [CABIN]	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
Hydraulic cylinder mounting bolt and nut (M10) [ROPS]	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5
Relief valve plug	49.1 to 68.6	5.0 to 7.0	36.2 to 50.6
Plug 1 (Remote control valve)	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Bracket mounting screw (Remote control valve)	4.9 to 7.8	0.5 to 0.8	3.6 to 5.8
Plug 2 (Remote control valve)	39.3 to 58.8	4.0 to 6.0	28.9 to 43.4

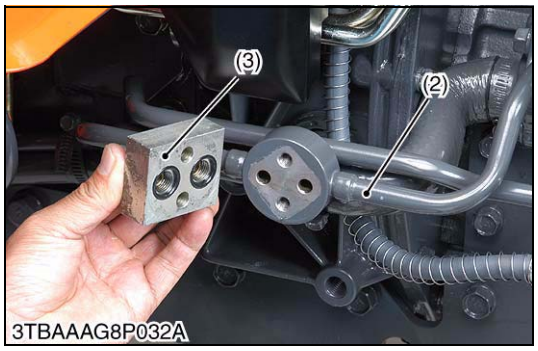
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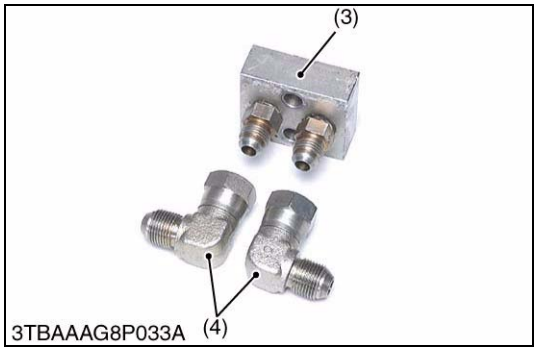
4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Hydraulic Pump









Flowmeter Connecting and Test Preparation

■ **IMPORTANT**

- **When using a flowmeter other than KUBOTA specified flowmeter (Code No : 07916-52792), be sure to use the instructions with that flowmeter.**
- **In this hook-up, there is no relief valve. Therefore while testing, do not close the flowmeter loading valve completely.**

1. Open the hood and the side cover (RH).
2. Remove the hydraulic block cover (1) from the delivery pipe.
3. Install the hydraulic block for the front loader to the delivery pipe (2).
4. Install the adaptors to the hydraulic block.
5. Connect the hydraulic test hose to the adaptor and the flowmeter inlet port.
6. Connect the another hydraulic test hose to the flowmeter outlet port.
7. Open the flowmeter loading valve completely. (Turn counterclockwise.).
8. Start the engine and set the engine speed at 2600 min^{-1} (rpm).
9. Slowly close the loading valve to generate the pressure approximately 13.7 MPa (140 kgf/cm^2, 1991 psi).
10. Hold this condition until the oil temperature reaches approximately 50 °C (122 °F).

(Reference)

- Adaptor is included in the adaptor set (Code No : 07916-54031).

(1) Hydraulic Block
(2) Delivery Pipe
(3) Hydraulic Block (for Front Loader)
(4) Adaptor

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Pump Test

■ **NOTE**

- **Before pump testing, perform the flowmeter connecting and test preparation.**

1. Open the loading valve completely.
2. Start the engine and set at rated speed.
3. Read and note the pump delivery at no pressure.
4. Slowly close the loading valve to increase pressure approx. 15.2 MPa (155 kgf/cm^2, 2204 psi) [B1830, B2230, B2530] or 15.9 MPa (162 kgf/cm^2, 2305 psi) [B3030].
5. Read and note the pump flow at rated pressure.
6. Open the loading valve and stop the engine.

(Reference)

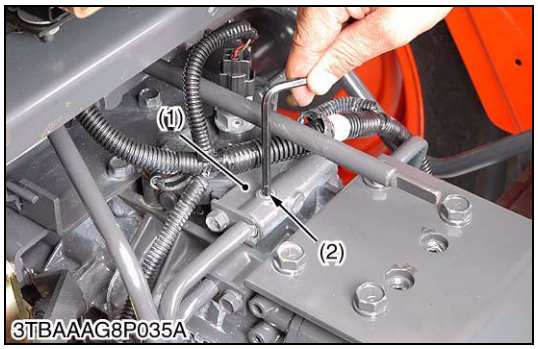
Hydraulic pump delivery at no pressure	Factory spec.	B1830 B2230 B2530	Above 20.5 L/min. 5.4 U.S.gals./min. 4.5 Imp.gals./min.
		B3030	Above 19.7 L/min. 5.2 U.S.gals./min. 4.3 Imp.gals./min.
Hydraulic pump delivery at rated pressure	Factory spec.	B1830 B2230 B2530	Above 19.4 L/min. 5.1 U.S.gals./min. 4.3 Imp.gals./min.
		B3030	Above 18.7 L/min. 4.9 U.S.gals./min. 4.1 Imp.gals./min.

Condition

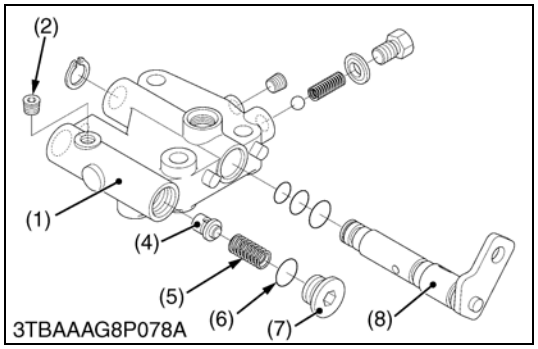
- Engine rated speed ..... **[B1830, B2230, B2530]**
  2700 min^{-1} (rpm)
  [B3030] 2600 min^{-1} (rpm)
- Rated pressure ..... **[B1830, B2230, B2530]**
  15.5 to 16.5 MPa
  158 to 168 kgf/cm^2
  2248 to 2393 psi
  [B3030]
  15.0 to 16.0 MPa
  153 to 163 kgf/cm^2
  2175 to 2320 psi
- Oil temperature ..... 50 °C
  122 °F

W1021448

(2) Independent PTO Control Valve









Independent PTO Control Valve Operating Pressure

1. Remove the plug (2) with a hexagon wrench.
2. Install the adapter (3) to the independent PTO control valve (1).
3. Connect the cable and the pressure gauge to the adapter (3).
4. Start the engine and set at the maximum speed.
   Pressure at "**ENGAGED**" position.
5. Move the independent PTO lever (9) to "**ENGAGED**" position **B**.
6. If the pressure is not the factory specifications, replace the spring with a new one.

Independent PTO valve setting pressure	Independent PTO lever "**ENGAGED**" position	1.1 to 1.5 MPa 11.2 to 15.3 kgf/cm^2 160 to 218 psi

Condition

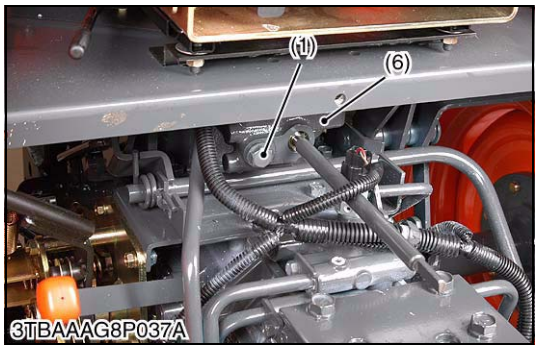
- Engine speed : Maximum
- Oil temperature : 50 °C
  122 °F

(1) Independent PTO Control Valve
(2) Plug
(3) Adapter
(4) Poppet
(5) Spring
(6) O-ring
(7) Plug
(8) PTO Arm
(9) Independent PTO Lever

A : "DESENGAGED" Position
B : "ENGAGED" Position

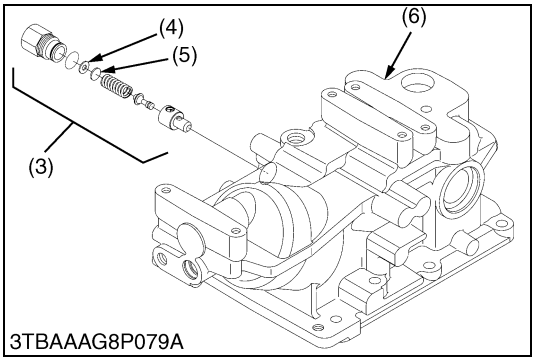
W1024425

(3) 3-Points Hitch Relief Valve









3-Points Hitch Relief Valve Setting Pressure

1. Remove the seat under cover.
2. Remove the plug (1) from the hydraulic cylinder block (6).
3. Install the adaptor (2). Then connect the cable and the pressure gauge to the adaptor (2).
4. Remove the feed back rod lock nut.
5. Start the engine and set the maximum speed.
6. Move the hydraulic control lever all way up to operate the relief valve and measure the pressure.
7. If the pressure is not factory specifications, adjust the relief valve setting pressure with the adjusting shims (4) (5).
8. After checking the pressure, reinstall the feedback rod lock nut and the plug (1).

Relief valve setting pressure	Factory spec.	B1830 B2230 B2530	15.5 to 16.5 MPa 158 to 168 kgf/cm^2 2248 to 2393 psi
		B3030	15.0 to 16.0 MPa 153 to 163 kgf/cm^2 2175 to 2320 psi

Condition

- Engine rated speed ..... **[B1830, B2230, B2530]** 2700 min^{-1} (rpm)
  [B3030] 2600 min^{-1} (rpm)
- Oil temperature ..... 50 °C
  122 °F

(Reference)

- Thickness of shims (4) (5) : 0.1 mm (0.0039 in.)
  0.2 mm (0.0079 in.)
  0.4 mm (0.0160 in.)

(1) Plug
(2) Adaptor
(3) Relief valve
(4) Shim
(5) Shim
(6) Hydraulic Cylinder Block

W1026366

(4) Lift Arm





Lift Arm Free Play

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and set at the idling speed.
3. Move the position control lever (1) to the uppermost position.
4. Move the lift arm (2) to the upper end by hand and measure the free play.
5. If the measurement is not within the factory specifications, adjust the free play by changing the position control feedback rod setting length.

Lift arm free play	Factory spec.	5 to 10 mm 0.20 to 0.40 in.

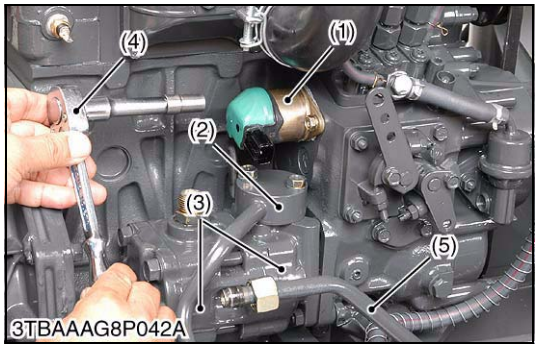
(1) Position Control Lever
(2) Lift Arm

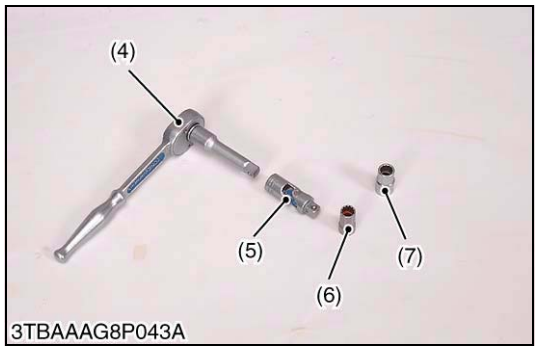
L : Lowest Position
H : Uppermost Position

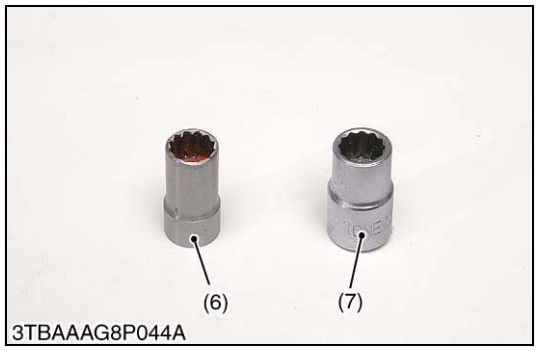
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[2] DISASSEMBLING AND ASSEMBLING

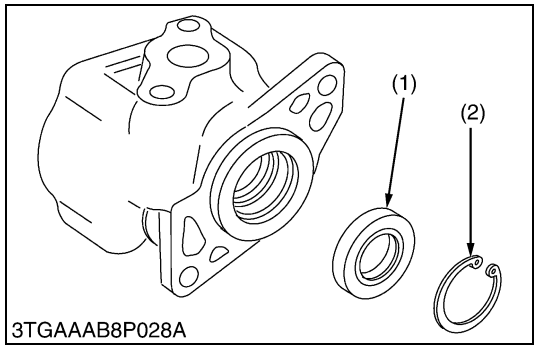
(1) Hydraulic Pump











Removing Hydraulic Pump

1. Open the bonnet then remove the front grille, side cover (RH) and disconnect the battery grounding cord.
2. Disconnect the connector of the engine stop solenoid and accelerator rod.
3. Disconnect the power steering delivery pipe and disconnect the delivery pipe (5) from the oil cooler. Relief to "**HYDRAULIC SYSTEM**" section.
4. Remove the engine stop solenoid using a small size ratchet handle and 10 mm thin socket.
5. Disconnect the suction hose.
6. Disconnect 3-points hitch delivery pipe and the hydraulic pump.

(When reassembling)

- Apply liquid gasket (Three Bond 1206D or equivalent) to engine stop solenoid.

■ **NOTE**

- **For fastening hydraulic pipe nut, use two wrenches. Hold the fitting with a wrench, turn the pipe nut with another wrench to avoid damage at fitting installed part,**

Tightening torque	Delivery pipe nut for power steering	65 to 75 N·m 6.6 to 7.7 kgf·m 47.9 to 55.3 lbf·ft

(1) Engine Stop Solenoid
(2) 3-Point Hitch Delivery Pipe
(3) Hydraulic Pump
(4) Racket Handle
(5) Delivery Pipe
(6) Thin Socket (10 mm)
(7) Standard Socket (10 mm)
(8) Suction Hose

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Oil Seal

1. Remove the internal snap ring (2), and remove the oil seal (1).

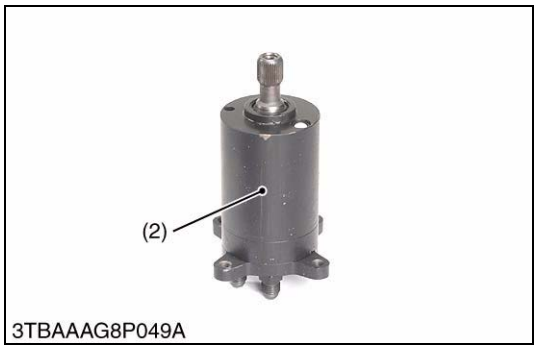
(When reassembling)

- If the oil seal is defective, worn or scratched, replace it.

(1) Oil Seal
(2) Internal Snap Ring

W1036139

(2) Power Steering Controller



Power Steering Controller

1. Remove the steering wheel.
2. Remove the bonnet, panel board, panel under cover.
3. Disconnect the power steering hoses and the hydraulic pipes.
4. Remove the steering post as an assembly.
5. Remove the bolts.

(When reassembling)

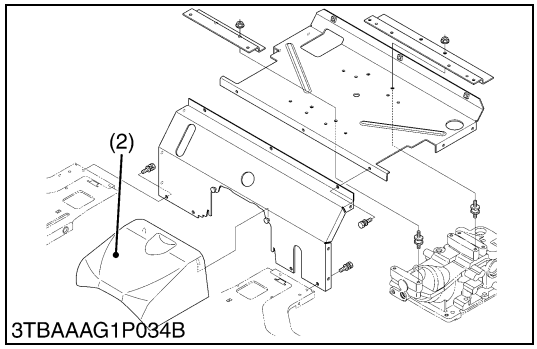
Tightening torque	Steering post mounting bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

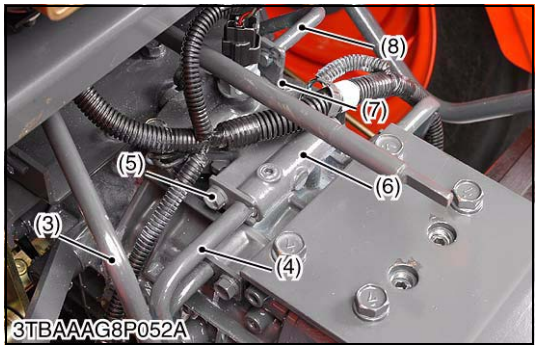
(1) Steering Post
(2) Power Steering Controller
(3) Bolt

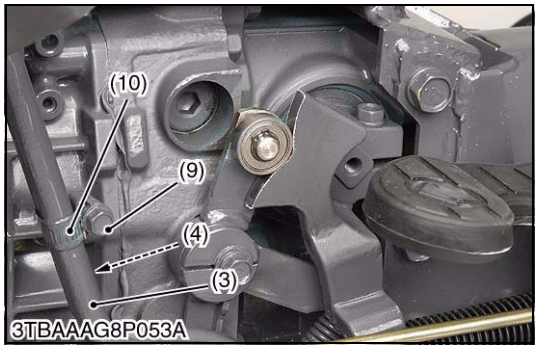
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(3) Independent PTO Clutch









Independent PTO Control Valve

1. Remove the grip (1).
2. Remove the under cover (2).
3. Loosen the bolt (9) tightening the pipe band (10).
4. Remove the bolt (5).
5. Slide the hydraulic cylinder delivery pipe (3) and the independent PTO delivery pipe (4).
6. Disconnect the independent PTO delivery pipe (4) from the independent PTO control valve (6).
7. Disconnect the control rod (7) from the PTO (7).
8. Remove the bolts from the independent PTO control valve (6).

(When reassembling)

- Check the O-rings.
- It the O-ring is damaged, replace it
- Install the o-rings to the groove securely.

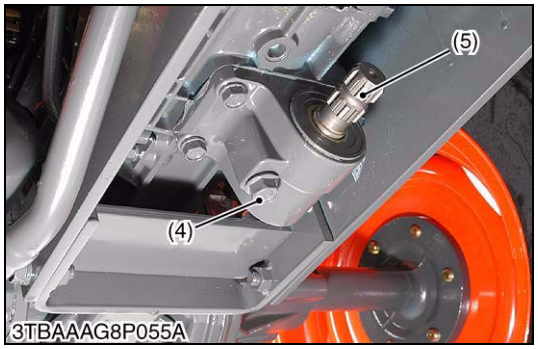
Tightening torque	Independent PTO control valve mounting bolt (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

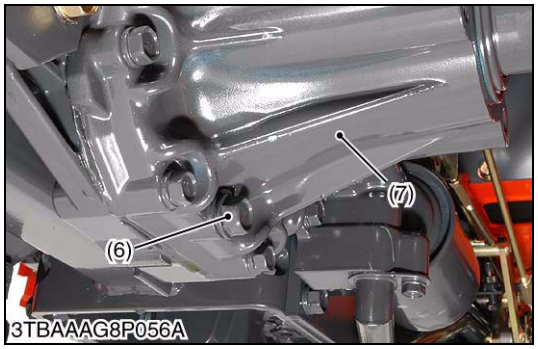
(1) Grip
(2) Front Cover
(3) Hydraulic Cylinder Delivery Pipe
(4) Independent PTO Control Valve Delivery Pipe
(5) Bolt
(6) Independent PTO Control Valve
(7) PTO Arm
(8) Control Rod
(9) Bolt
(10) Band (for Delivery Pipes)

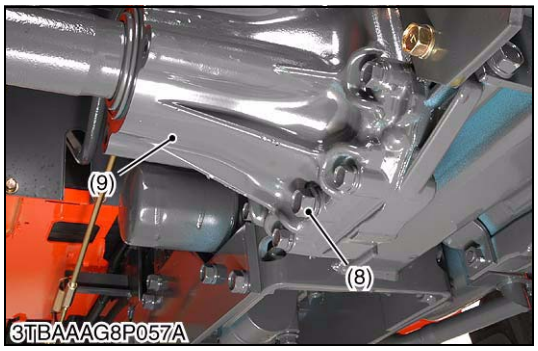
W1032507

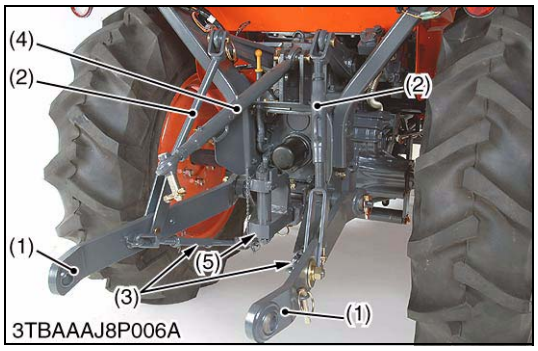
(4) 3-Points Hitch : Hydraulic Cylinder Separating











Battery Negative Cable and Transmission Oil

1. Disconnect the negative cable from the battery.
2. Remove the drain plug from the transmission case.

(When reassembling)

- Check the O-rings.
- It the O-ring is damaged, replace it
- Install the o-rings to the groove securely.

Transmission fluid capacity	B1830, B2230, B2530 Manual transmission (without Bi-Speed Turn)	15 L 4.0 U.S.gals 3.3 Imp.gals
	B1830, B2230, B2530 Manual transmission (with Bi-Speed Turn)	16.5 L 4.4 U.S.gals 3.6 Imp.gals
	B1830HST, B2230HST, B2530HST	17 L 4.5 U.S.gals 3.7 Imp.gals
	B3030HST	17 L 4.5 U.S.gals 3.7 Imp.gals

(1) Negative Cable
(2) Battery
(3) Positive Terminal
(4) Drain Plug
(5) Mid-PTO Shaft
(6) Drain Plug
(7) Rear Axle (Right)
(8) Drain Plug
(9) Rear Axle (Left)

W1033653

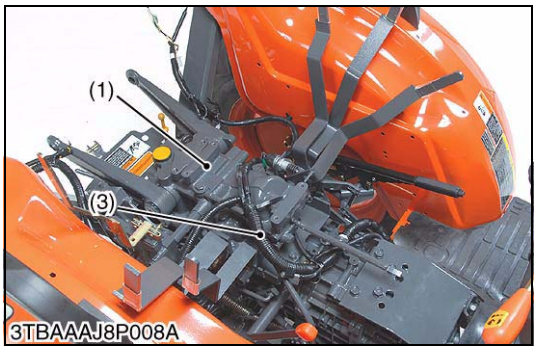
3-Point Hitch

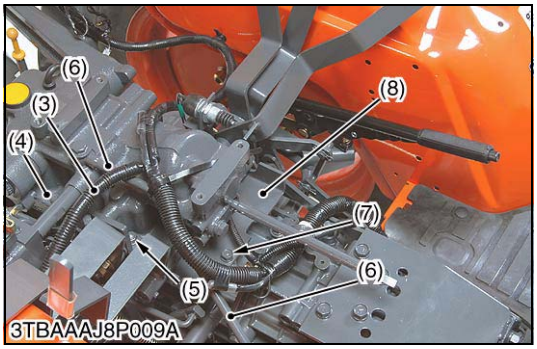
1. Remove the top link (4).
2. Remove the lift rods (2).
3. Remove the lower links (1).
4. Remove the stabilizers (3).
5. Remove the hitch (5)

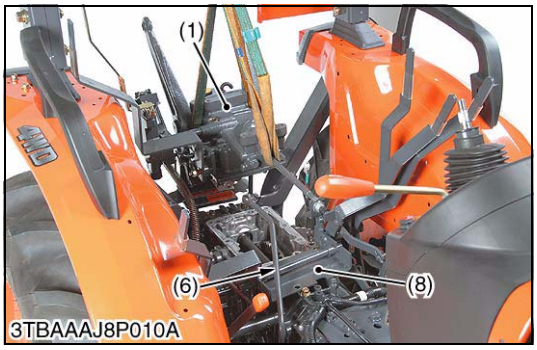
(1) Lower Link
(2) Lift Rod
(3) Stabilizer
(4) Top Link
(5) Hitch

W1034432









Removing Hydraulic Cylinder Assembly (ROPS, Manual Transmission Model)

1. After removing the fender rear cover, remove the top link brackets.
2. Remove the hydraulic cylinder mounting bolts (4) (7).
3. Disconnect the hydraulic delivery pipe.
4. Disconnect the wiring harness (3) from the hydraulic cylinder (1).
5. Remove the lever bracket (8).
6. Remove the hydraulic cylinder (1) from the tractor.

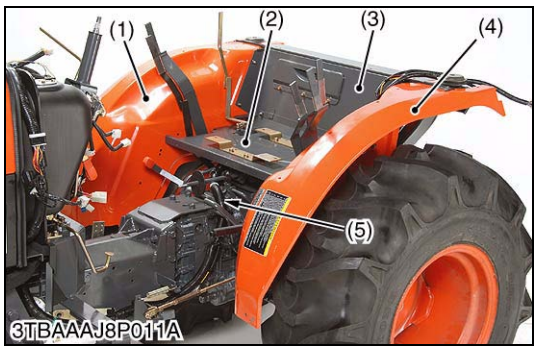
(When reassembling)

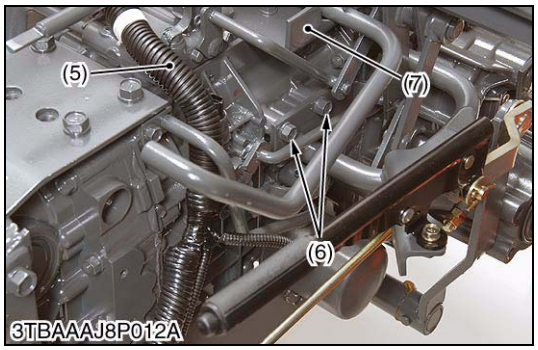
- Apply the liquid gasket (Three Bond 1206D or equivalent) tp the joint face of the differential case and the hydraulic cylinder.

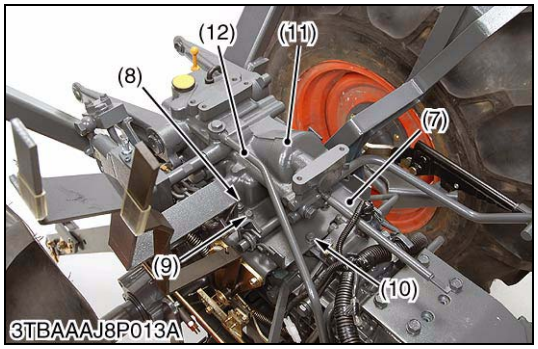
Tightening torque	Hydraulic cylinder mounting bolt and nut (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 lbf·ft

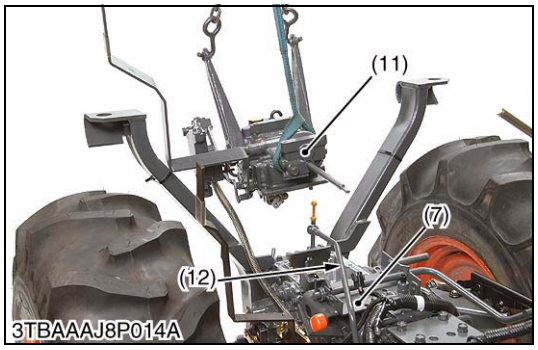
(1) Hydraulic Cylinder
(2) Bolt
(3) Wiring Harness
(4) Bolt
(5) Nut
(6) Delivery Pipe
(7) Bolt
(8) Lever Bracket

W1035184









Removing Hydraulic Cylinder Assembly (CABIN, HST Model)

1. Remove the fender rear cover (3), the fenders (1) (4) and the seat under cover (2).
2. Remove the top link bracket and the hydraulic cylinder mounting bolts.
3. Disconnect the wiring harness (5) from the hydrauli cylinder.
4. Disconnect the delivery pipe (12) from the hydraulic cylinder (11).
5. Remove the lever bracket mounting bolts (10) and the bolts (6).
6. Remove the hydraulic cylinder mounting bolts (9) and nuts (8).
7. Remove the hydraulic cylinder (11) from the tractor.

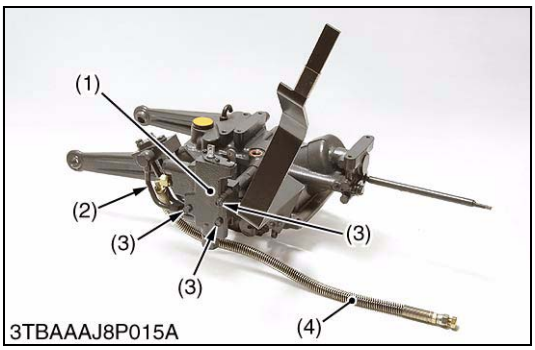
(When reassembling)

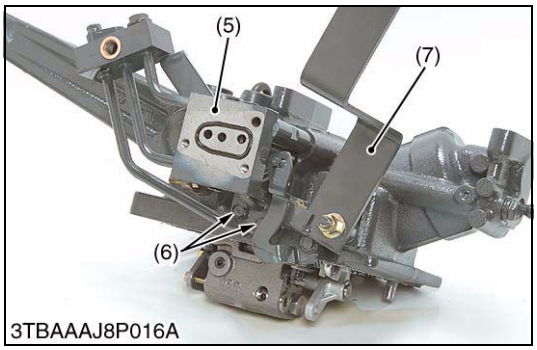
- Apply the liquid gasket (Three Bond 1206D or equivalent) tp the joint surface of the differential case and the hydraulic cylinder.

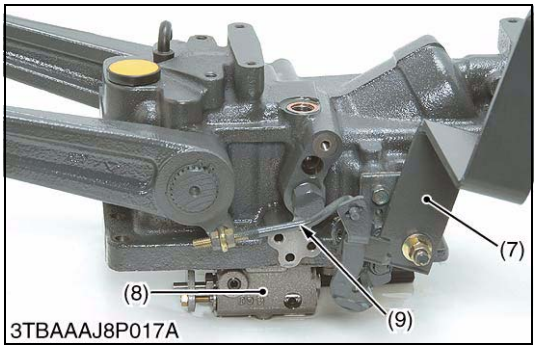
Tightening torque	Hydraulic cylinder mounting bolt and nut (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 lbf·ft

(1) Fender, RH
(2) Seat Under Cover
(3) Fender Rear Cover
(4) Fender, LH
(5) Wiring Harness
(6) Bolt (M18)
(7) Lever Bracket
(8) Nut (M10)
(9) Bolt (M10)
(10) Bolt (M10)
(11) Hydraulic Cylinder
(12) Delivery Pipe

W1020455







Removing Remote Control Valve and Rear Hydraulic Outlet

1. Disconnect the Pipe (2).
2. Remove the remote control valve mounting bolts (3).
3. Remove the remote control valve (1).
4. Remove the hose (4).
5. Remove the rear hydraulic outlet mounting bolts (6).
6. Remove the rear hydraulic outlet (5).
7. Remove the position control lever (7).

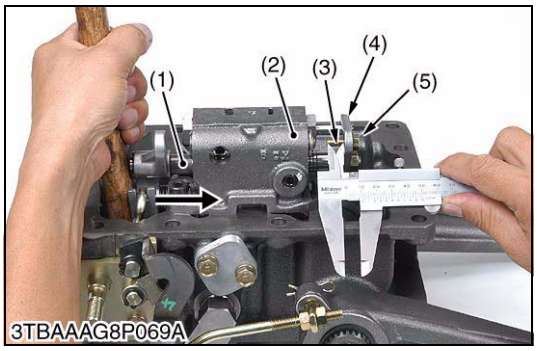
(When reassembling)

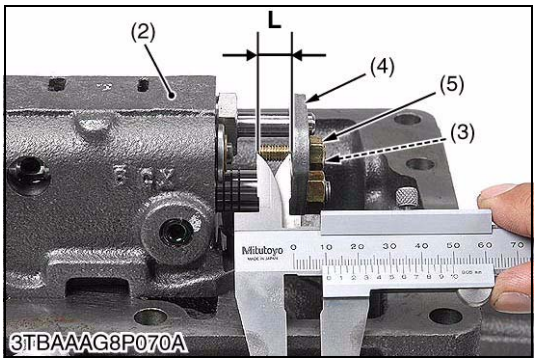
- Do not damage the O-rings.

(1) Remote Control Valve
(2) Pipe
(3) Bolt
(4) Hose
(5) Rear Hydraulic Outlet
(6) Bolt
(7) Position Control Lever
(8) Position Control Valve
(9) Feedback Rod

W1036897

(5) 3-Points Hitch : Hydraulic Cylinder





Checking the Length of the Adjusting Bolt

■ **NOTE**

- **Before disassembling the control valve, check the length of the adjusting bolt.**

1. Push the spool (1) into the control valve (2).
2. Check the length **L** of the adjusting bolt (3) as shown in the picture.

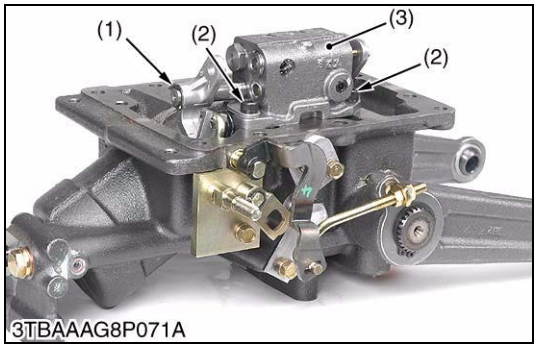
(Reference)

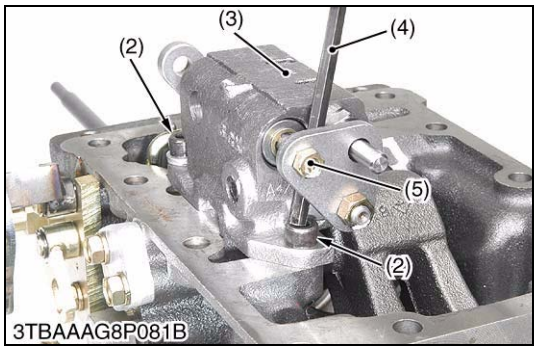
- Length **L** : Approx. 10.70 mm
  0.421 in.

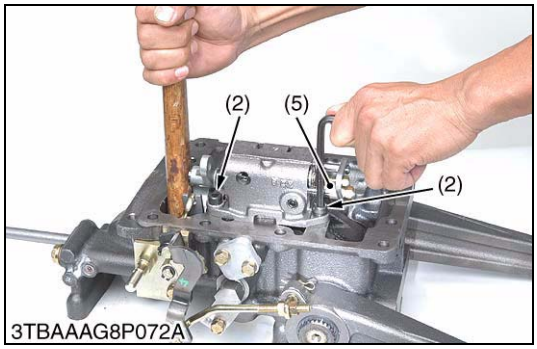
(1) Spool
(2) Control Valve
(3) Adjusting Bolt
(4) Connecting Plate
(5) Nut

L : Length of the adjusting bolt

W1037386









Control Valve

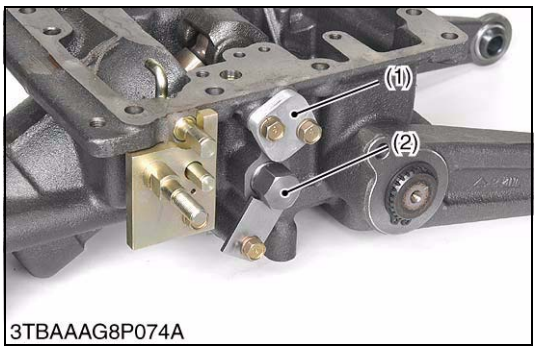
■ **NOTE**

- **When the control valve is installed in the hydraulic cylinder, the hexagon wrench is not aligned straight to the hexagon bolt without pushing the spool as shown in the picture.**

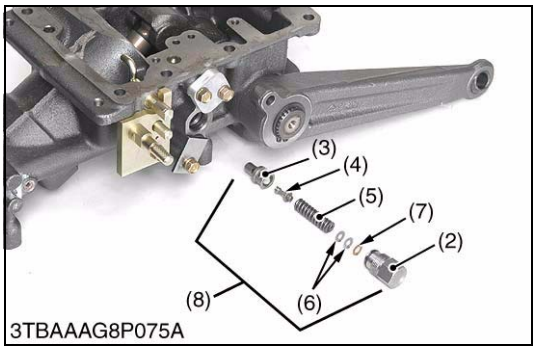
1. Push the spool (1) into the control valve (3).
2. Remove the hexagon bolts (2) with a hexagon wrench (4).

(1) Spool
(2) Hexagon Bolt
(3) Control Valve
(4) Hexagon Wrench
(5) Adjusting Bolt

W1037868



3TBAAAG8P074A



3TBAAAG8P075A

Relief Valve

1. Remove the plug (2), and draw out the washer (7), the shim (6), the poppet (4) and the valve seat (3).

(When reassembling)

- Take care not to damage the O-ring.

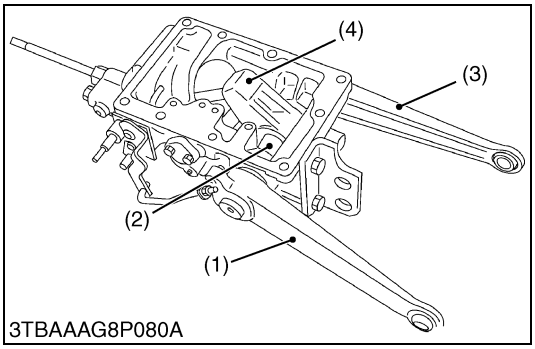
Tightening torque	Relief valve plug	49.1 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 lbf·ft

■ **IMPORTANT**

- **After disassembling and reassembling the relief valve, be sure to adjust the relief valve setting pressure.**

(1) Hydraulic Block Cap
(2) Plug
(3) Valve Seat
(4) Poppet
(5) Spring
(6) Shim
(7) Washer
(8) Relief Valve

W1038483



3TBAAAG8P080A

Lift Arm, Hydraulic Arm Shaft and Hydraulic Arm

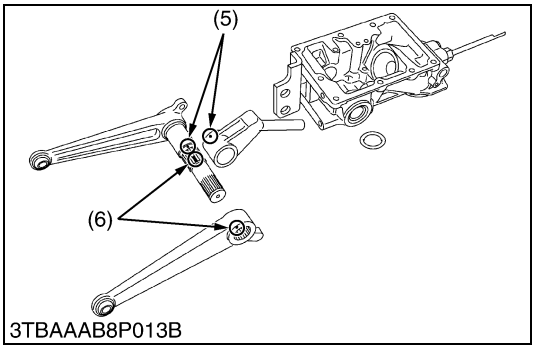
1. Remove the external snap ring, and remove the lift arm LH (2).
2. Draw out the hydraulic arm shaft (3) and lift arm RH (4) as a unit.

(When reassembling)

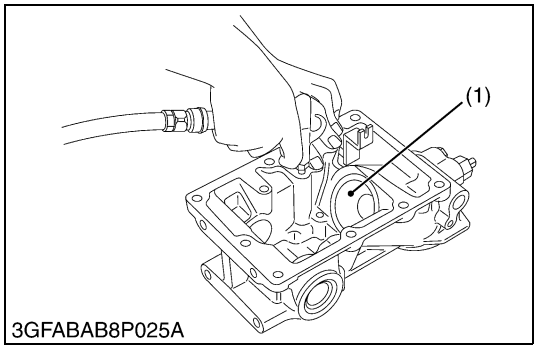
- Align the alignment marks (5) of the hydraulic arm and hydraulic arm shaft.
- Align the alignment marks (6) of the lift arm LH and hydraulic arm shaft.
- Apply grease to the right and left bushings and O-rings.
- Take care not to damage the O-rings.

(1) Lift Arm RH
(2) Hydraulic Arm Shaft
(3) Lift Arm LH
(4) Hydraulic Arm
(5) Alignment Marks
(6) Alignment Marks

W1039020



3TBAAAB8P013B



3GFABAB8P025A

Hydraulic Piston

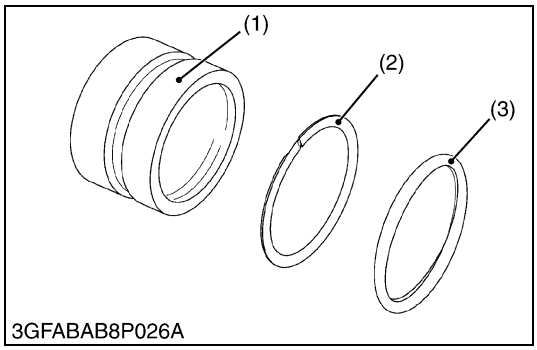
1. Inject the compressed air into the hydraulic cylinder, and take out the hydraulic piston (1).

(When reassembling)

- Take care not to damage the O-ring (3) and backup ring (2).
- Apply transmission fluid to the O-ring.
- Replace the O-ring if it is defective, worn or scratched, which may cause oil leakage.

(1) Hydraulic Piston
(2) Backup Ring
(3) O-ring

W1039338



3GFABAB8P026A

Hydraulic Adjust Shaft

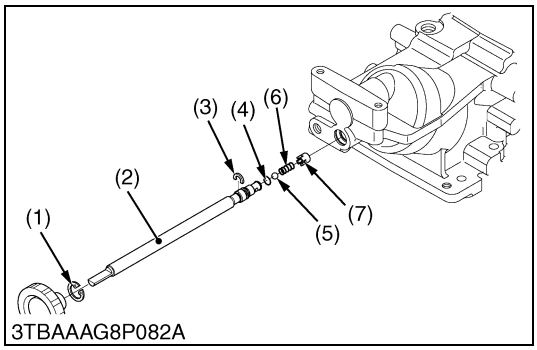
1. Remove the internal cir-clip (1) and the hydraulic adjusting shaft (2).
2. Draw out the ball (5), the spring (6) and the collar (7).

(When reassembling)

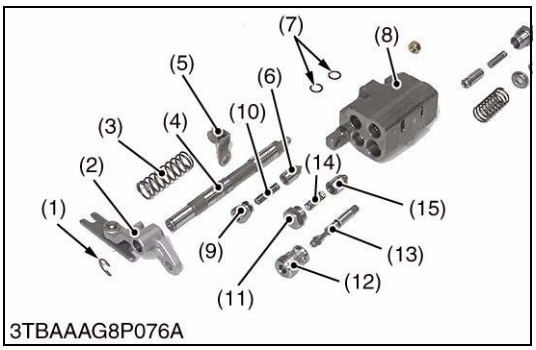
- Take care not to damage the O-rings.

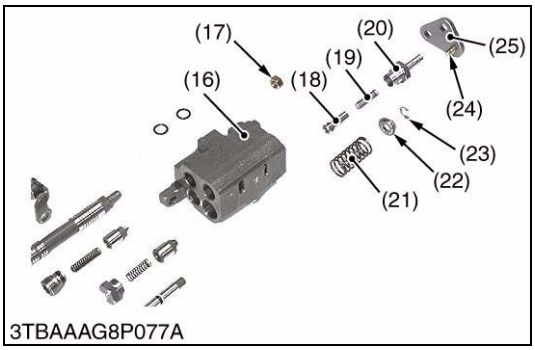
(1) Internal Cir-clip
(2) Hydraulic Adjust Shaft
(3) Stopper
(4) O-ring
(5) Ball
(6) Spring
(7) Collar

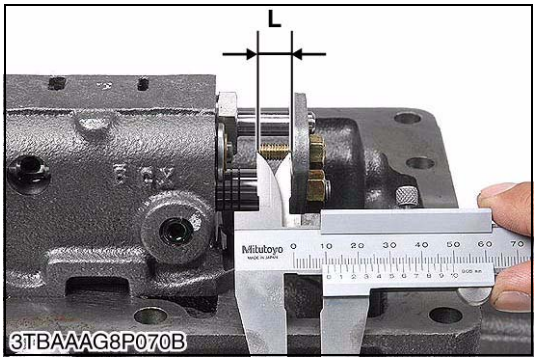
W1039814



3TBAAAG8P082A







Disassembling Position Control Valve

1. After removing the control valve, disassemble the component parts as shown in the picture.

(When reassembling)

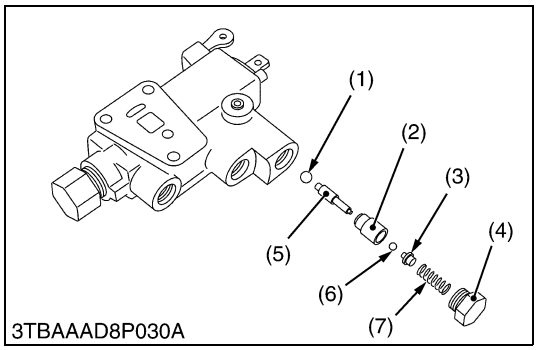
- Readjust the length **L** of the adjusting bolt.

(1) External Cir-clip
(2) Lever
(3) Spring
(4) Spool
(5) Spring Holder
(6) Poppet
(7) O-ring
(8) Control Valve Body
(9) Plug
(10) Spring
(11) Unload Plug
(12) Plug
(13) Poppet
(14) Spring
(15) Unload Poppet
(16) Control Valve Body
(17) Nut
(18) Poppet
(19) Spring
(20) Plug
(21) Spring
(22) Spring Holder
(23) External Cir-clip
(24) Adjusting Bolt
(25) Connecting Plate

L : Length of adjusting bolt

W1040071

(6) Remote Control Valve



Poppet and Piston (Mechanical Check Valve)

1. Remove the plug 1 (4) and draw out the spring (7), ball guide (3), balls (1), (6), poppet (2) and piston (5).

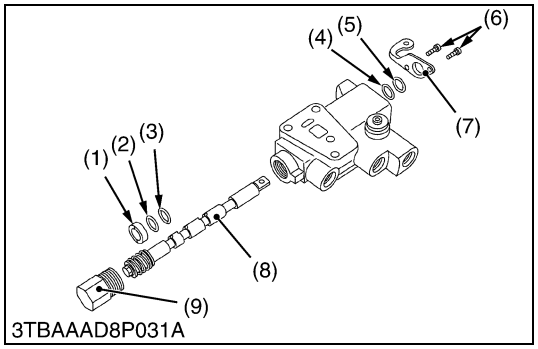
(When reassembling)

- Take care not to damage the O-ring.

Tightening torque	Plug 1	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft

(1) Ball
(2) Poppet
(3) Ball Guide
(4) Plug 1
(5) Piston
(6) Ball
(7) Spring

W10168010



Spool

1. Remove the screws (6), and remove the bracket (7).
2. Remove the plug 2 (9), and draw out the spool (8).

(When reassembling)

- Take care not to damage the O-rings and backup rings.

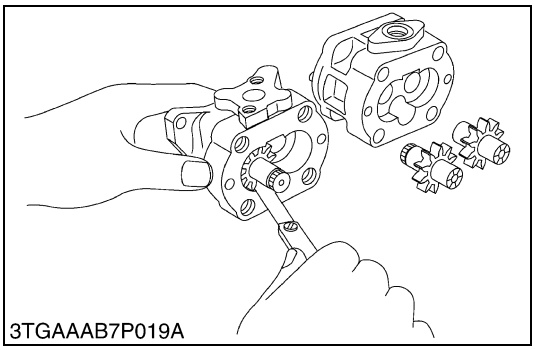
Tightening torque	Bracket mounting screw	4.9 to 7.8 N·m 0.5 to 0.8 kgf·m 3.6 to 5.8 lbf·ft
	Plug 2	39.3 to 58.8 N·m 4.0 to 6.0 kgf·m 28.9 to 43.4 lbf·ft

(1) Collar
(2) Backup Ring
(3) O-ring
(4) O-ring
(5) Backup Ring
(6) Screw
(7) Bracket
(8) Spool
(9) Plug 2

W10169620

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[3] SERVICING

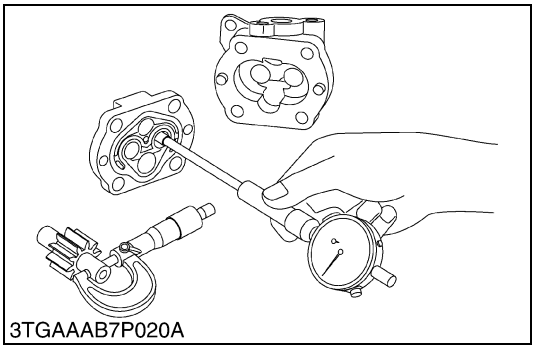

3TGAAAB7P019A

Clearance between Tip of Gear Tooth and Casing

1. Measure the clearance between gear and casing at several points with feeler gauge.
2. If the clearance exceeds the allowable limit, replace the assembly.

Clearance between tip of gear tooth and casing	Allowable limit	0.15 mm 0.0059 in.

W1015764


3TGAAAB7P020A

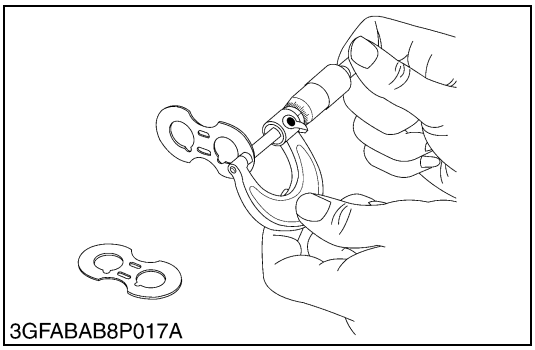
Clearance between Bushing and Shaft

1. Measure the shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with a cylinder gauge.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between bushing and shaft	Factory spec.	0.020 to 0.091 mm 0.0008 to 0.0036 in.
	Allowable limit	0.12 mm 0.0047 in.

Shaft O.D.	Factory spec.	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory spec.	15.000 to 15.061 mm 0.5906 to 0.5930 in.

W1015972

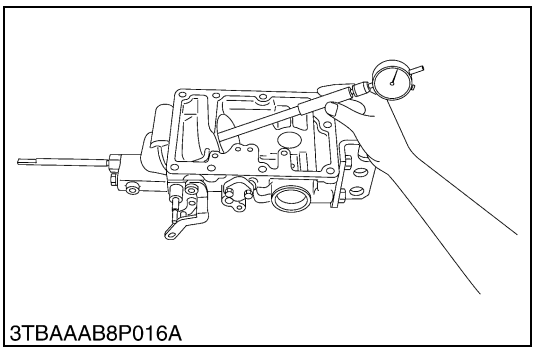

3GFABAB8P017A

Side Plate Thickness

1. Measure the side plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Side plate thickness	Factory spec.	2.48 to 2.50 mm 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

W1016194

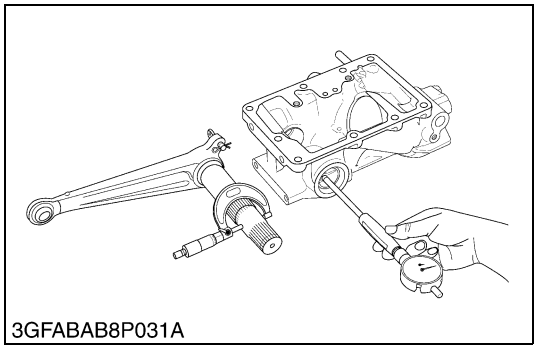

3TBAAAB8P016A

Hydraulic Cylinder Bore

1. Check the cylinder internal surface for scoring or damage.
2. Measure the cylinder I.D. with a cylinder gauge.
3. If the measurement exceeds the allowable limit, replace the hydraulic cylinder block.

Cylinder I.D.	Factory spec.	70.05 to 70.10 mm 2.7579 to 2.7598 in.
	Allowable limit	70.15 mm 2.7618 in.

W10171300


3GFABAB8P031A

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.

Clearance between hydraulic arm shaft and bushing	Factory spec.	0.020 to 0.110 mm 0.0008 to 0.0043 in.
	Allowable limit	0.30 mm 0.0118 in.

Hydraulic arm shaft O.D.	Factory spec.	Right	37.925 to 37.950 mm 1.4931 to 1.4941 in.
		Left	33.925 to 33.950 mm 1.3356 to 1.3366 in.

Bushing I.D. (after press filed)	Factory spec.	Right	37.970 to 38.035 mm 1.4949 to 1.4974 in.
		Left	33.970 to 34.035 mm 1.3374 to 1.3400 in.

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9 ELECTRICAL SYSTEM

https://truckmanualshub.com/

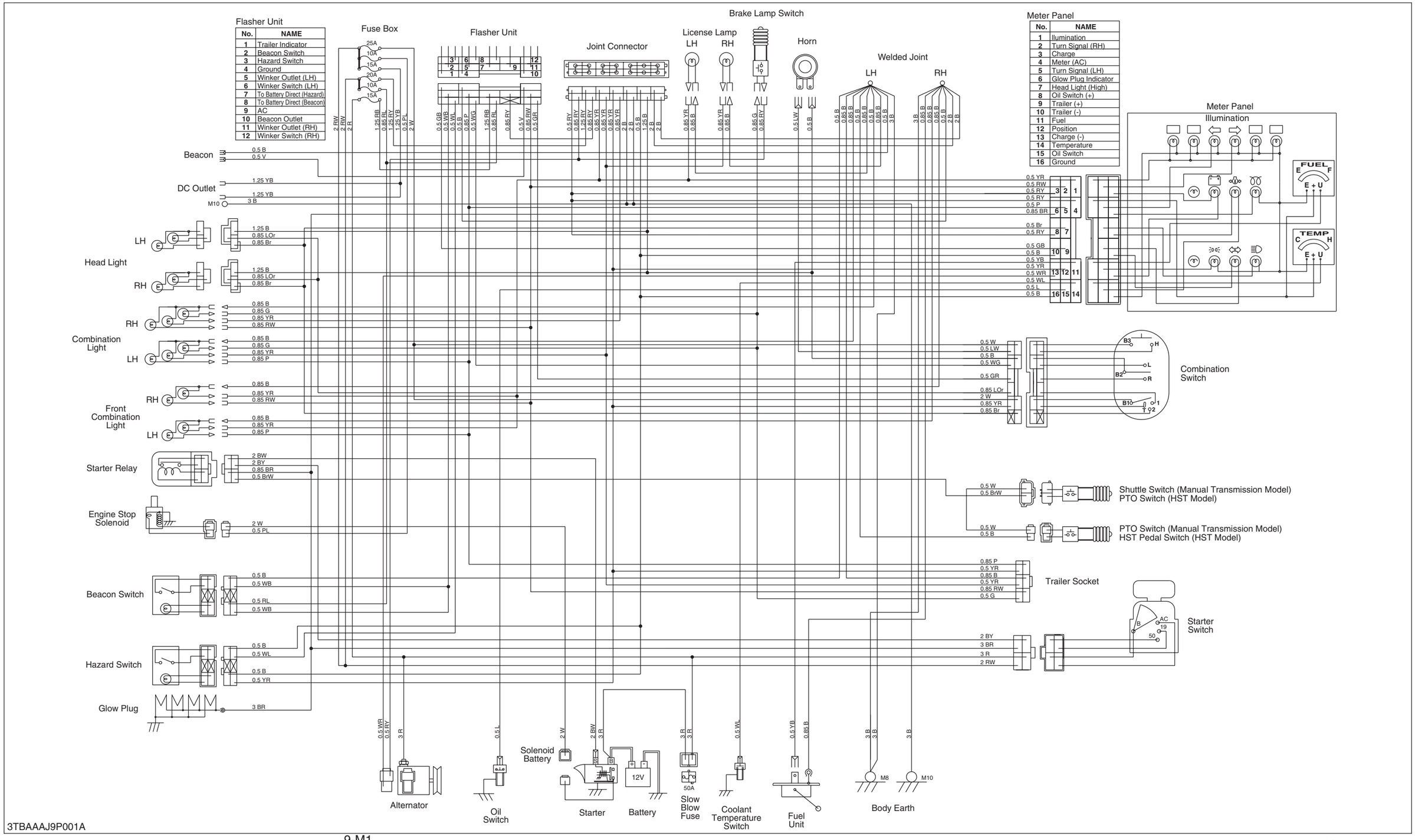
MECHANISM

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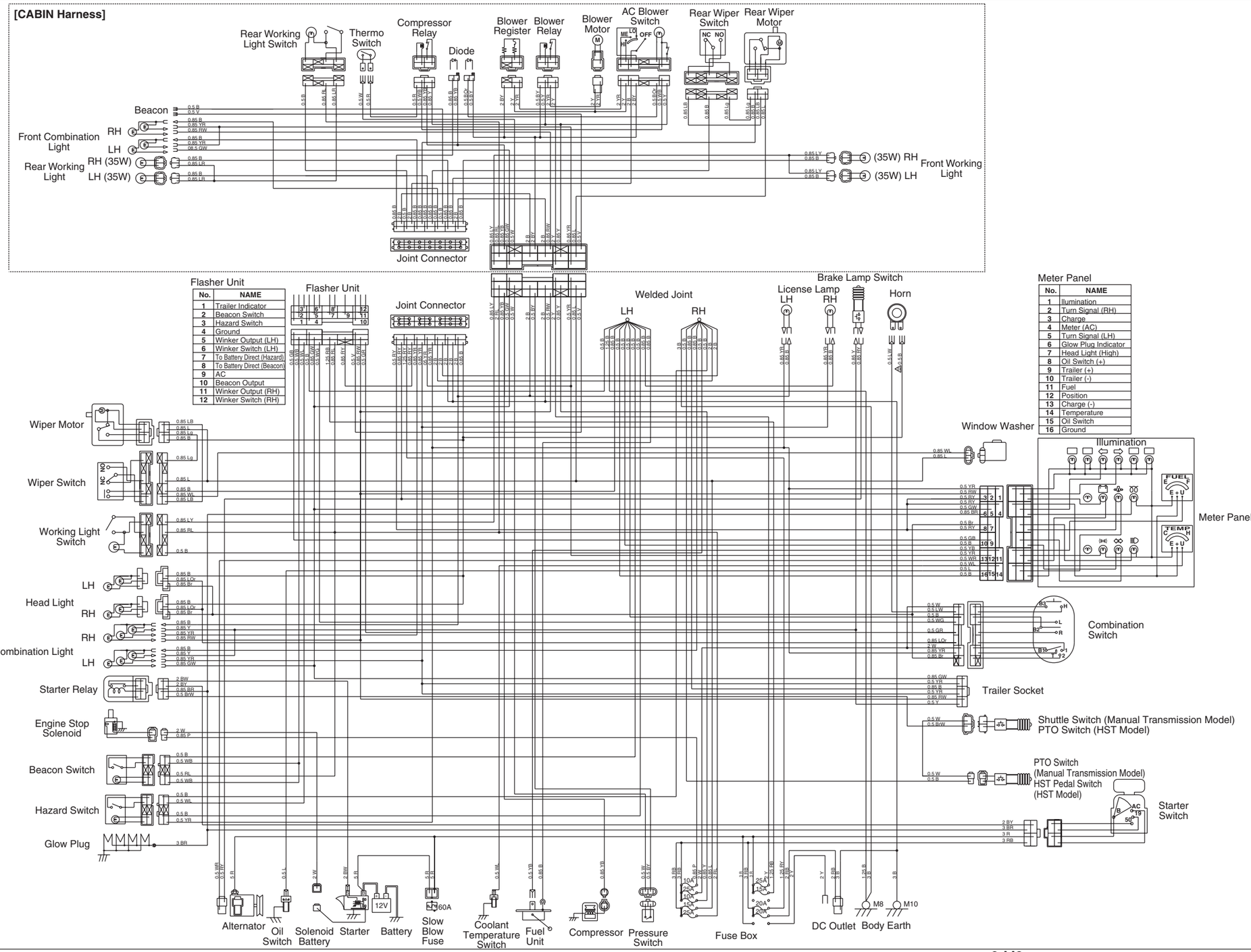
1. WIRING DIAGRAM

[1] ROPS



3TBAAAJ9P001A

[2] CABIN



No.	NAME
1	Trailer Indicator
2	Beacon Switch
3	Hazard Switch
4	Ground
5	Winker Output (LH)
6	Winker Switch (LH)
7	To Battery Direct (Hazard)
8	To Battery Direct (Beacon)
9	AC
10	Beacon Output
11	Winker Output (RH)
12	Winker Switch (RH)

No.	NAME
1	Illumination
2	Turn Signal (RH)
3	Charge
4	Meter (AC)
5	Turn Signal (LH)
6	Glow Plug Indicator
7	Head Light (High)
8	Oil Switch (+)
9	Trailer (+)
10	Trailer (-)
11	Fuel
12	Position
13	Charge (-)
14	Temperature
15	Oil Switch
16	Ground

3TBAAAJ9P002A

Color of Wiring

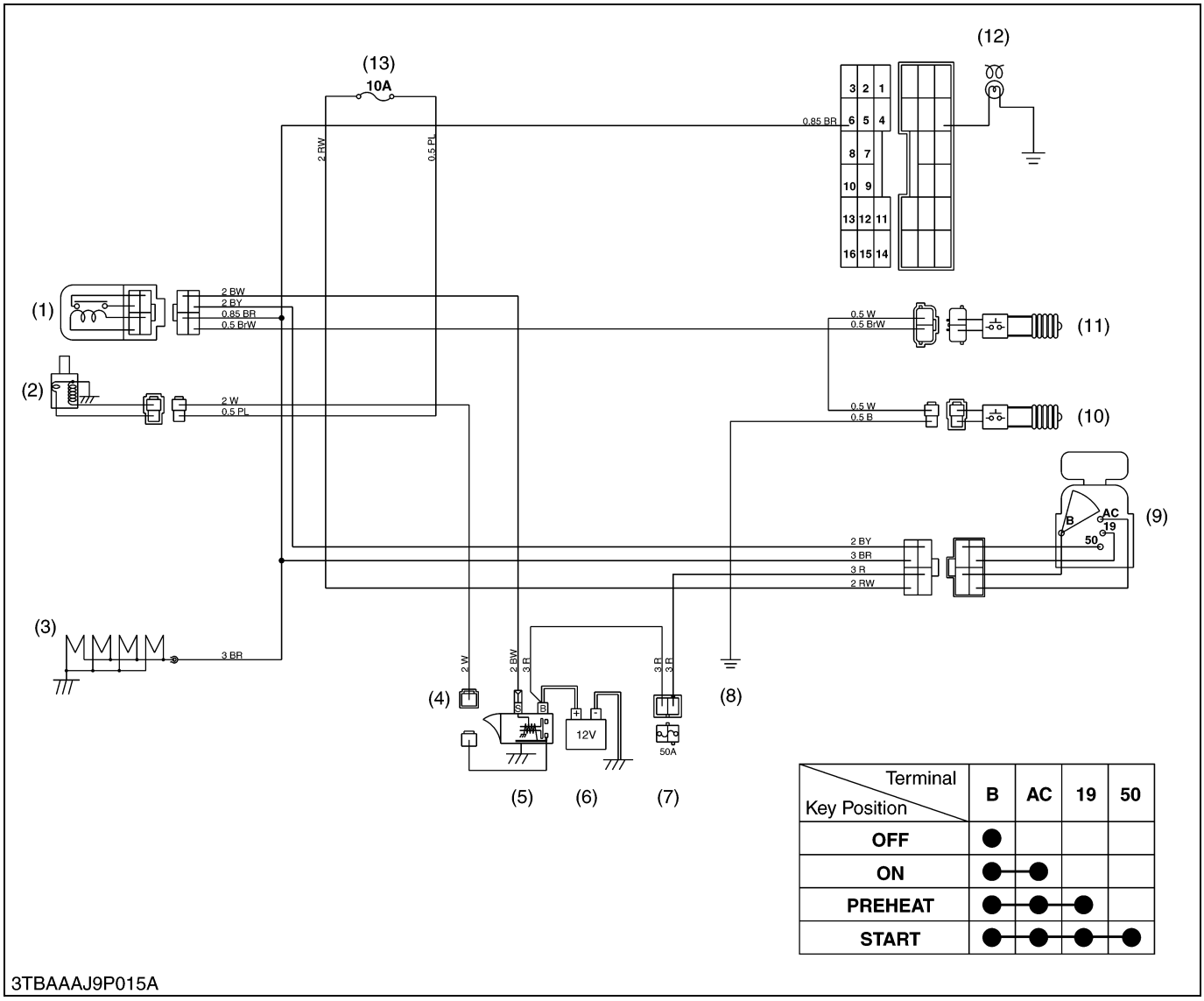
W ..... White	WR ..... White / Red	LW ..... Blue / White
R ..... Red	WY ..... White / Yellow	LG ..... Blue / Green
L ..... Blue	WL ..... White / Blue	LR ..... Blue / Red
Y ..... Yellow	RW ..... Red / White	LB ..... Blue / Black
B ..... Black	RL ..... Red / Blue	LOr ..... Blue / Orange
G ..... Green	RY ..... Red / Yellow	YG ..... Yellow / Green
P ..... Pink	RB ..... Red / Black	YR ..... Yellow / Red
Lg ..... Light Green	RG ..... Red / Green	YB ..... Yellow / Black
Br ..... Brown	BW ..... Black / White	YL ..... Yellow / Blue
Or ..... Orange	BL ..... Black / Blue	GR ..... Green / Red
Sb ..... Sky Blue	BR ..... Black / Red	GW ..... Green / White
WG ..... White / Green	BY ..... Black / Yellow	LgY ..... Light Green / Yellow
WB ..... White / Black	LY ..... Blue / Yellow	LgB ..... Light Green / Blue

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■ **NOTE**
- **Some colors shown in the above table are not used in B30 series tractor wirings.**

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2. STARTING SYSTEM



3TBAAAJ9P015A

(1) Starter Relay
(2) Engine Stop Solenoid
(3) Glow Plug
(4) Solenoid Battery
(5) Starter
(6) Battery
(7) Slow Blow Fuse
(8) Body Earth
(9) Starter Switch
(10) Safety Switch
(11) Safety Switch
(12) Glow Plug Indicator
(13) Fuse

When the starter switch is turned to the **PREHEAT** position, the terminal **B** is connected to the terminals **19** and **AC**. The glow plugs become red-hot, and at the same time, the glow plug indicator also lights on.

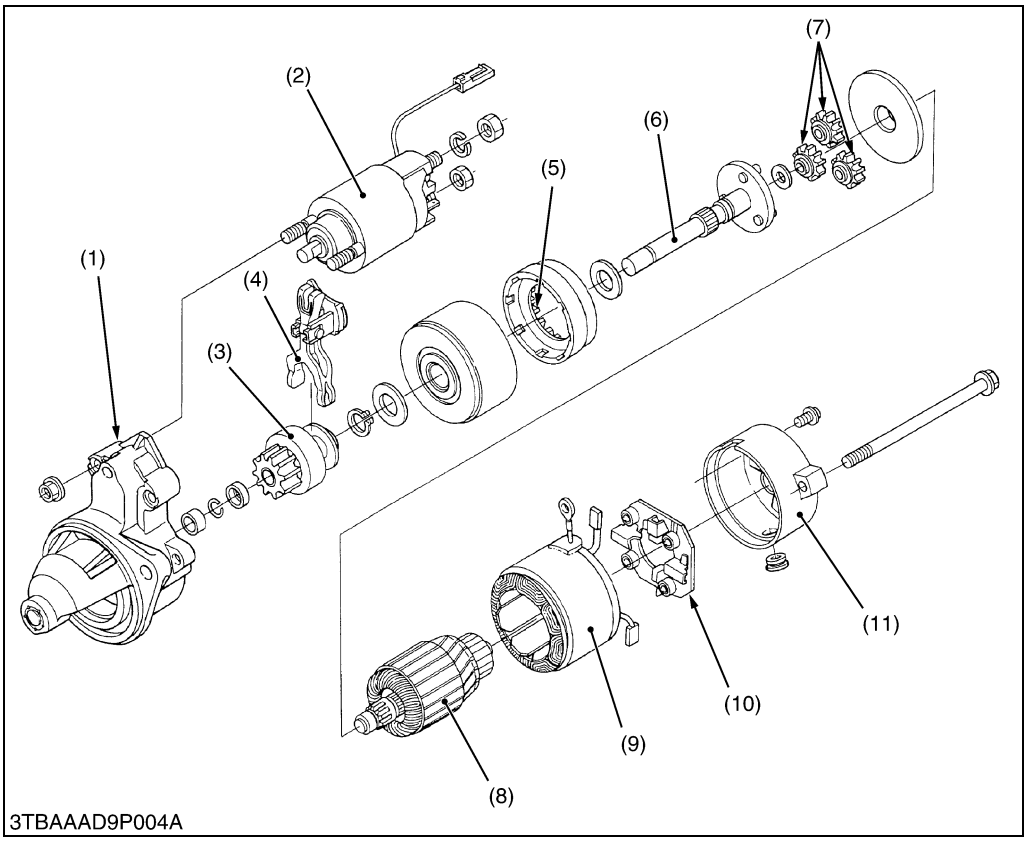
When the starter switch is then turned to the **START** position with the safety switches on, the terminal **B** is connected to the terminal **50** and **AC**. Consequently, battery current flows to the starter motor and start the engine.

The starter switch automatically returns to the **ON** position, the terminal **30** is connected only to the terminal **AC**, thereby causing the starting circuit to be opened, stopping the starter motor.

When the main switch turned from the **ON** position to the **OFF** position, the fuel cut-off solenoid moves the fuel injection pump control rack to the "**No Fuel Injection**" position and stop the engine.

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[1] STARTER



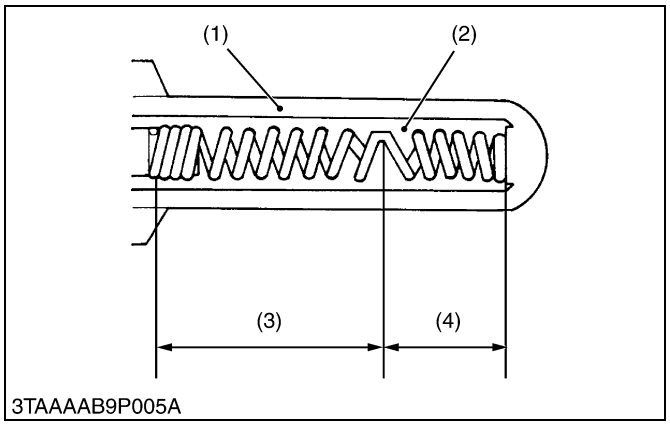
(1) Housing
(2) Magnetic Switch
(3) Overrunning Clutch
(4) Drive Lever
(5) Internal Gear
(6) Gear Shaft
(7) Planetary Gear
(8) Armature Shaft
(9) Yoke
(10) Brush Holder
(11) Rear End Frame

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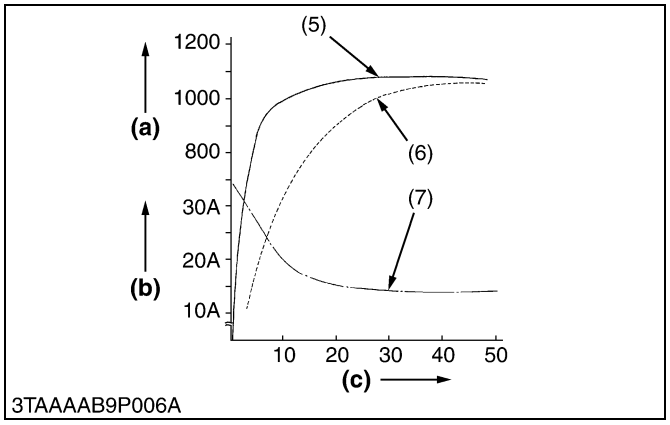
The starter is a reduction type.

The reduction system is used planetary gears, and the speed of gear shaft (6) is reduced to approximately one fifth of the armature shaft (8).

[2] GLOW PLUG



3TAAAAB9P005A



3TAAAAB9P006A

This plug is a two-material type QGS (Quick Glow System) for quick temperature rise, and has self-controlling function as well as excellent durability.

The heater (4) connected in series to the heater (3), which also functions as the resistor, is incorporated in the sheath tube (1) of the super glow plug.

The resistance of this heater (3) cum resistor is small when the temperature is low, while the resistance becomes large when the temperature rises.

Therefore, because sufficient current is flown to the heater (4) during the initial period of energization, the temperature rises quickly and the resistance grows with the rise in the temperature of the resistor, the flowing current is reduces to prevent the heater (4) from being heated.

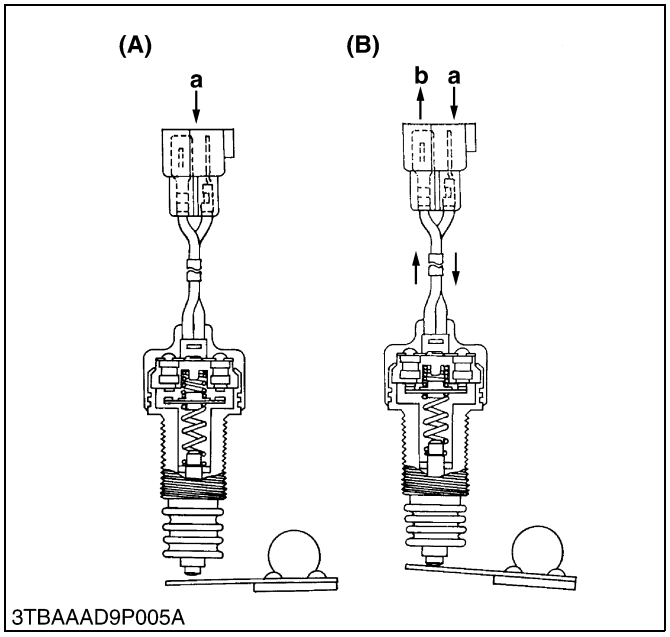
The ignition point is in the area of 2 to 3 mm (0.079 to 0.118 in.) from the tip of the plug in order to reduce its projection into the combustion chamber.

(1) Sheath Tube
(2) Insulation Powder
(3) Heater also functioning as a Resistor
(4) Heater
(5) Super Glow Plug
(6) Conventional Quick-heating type Glow Plug
(7) Glow Plug Current

(a) Glow Plug Temperature (°C)
(b) Current (A)
(c) Time (Sec.)

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[3] SAFETY SWITCH



3TBAAAD9P005A

■ **Manual Transmission Model : Shuttle Switch, PTO Switch**
HST Model : PTO Switch, HST Pedal Switch

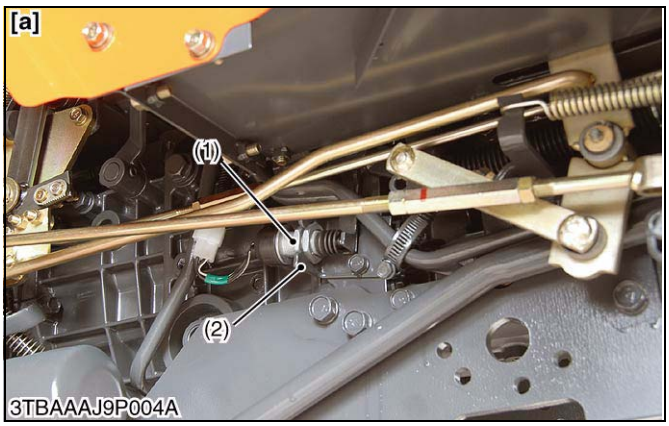
The safety switch prevents current from flowing to the starter when the safety switches are not depressed. This is to ensure safe starting.

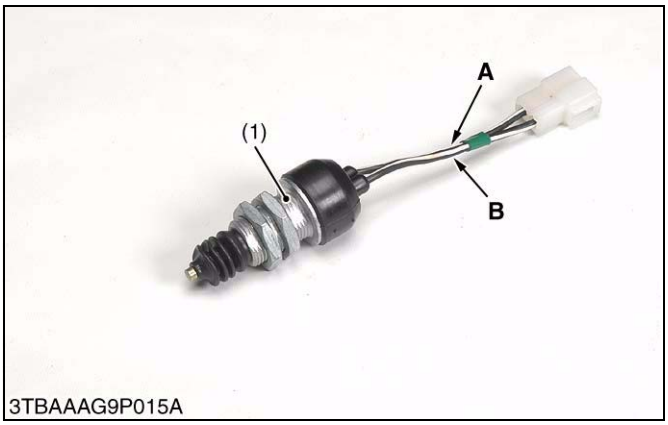
The safety switches are located at two (Manual Transmission Model : Shuttle Switch, PTO Switch

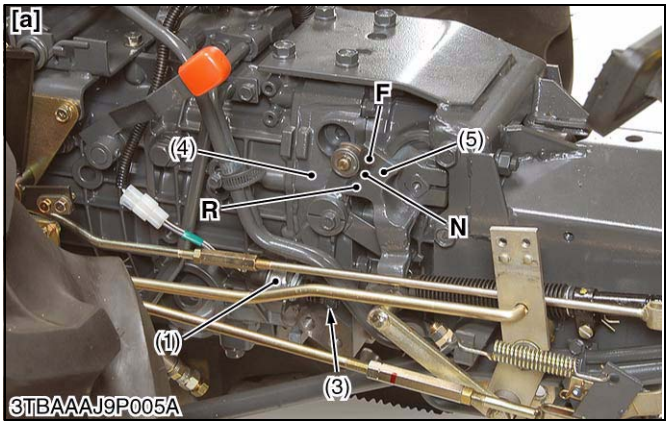
HST Model : PTO Switch, HST Pedal Switch) different positions.

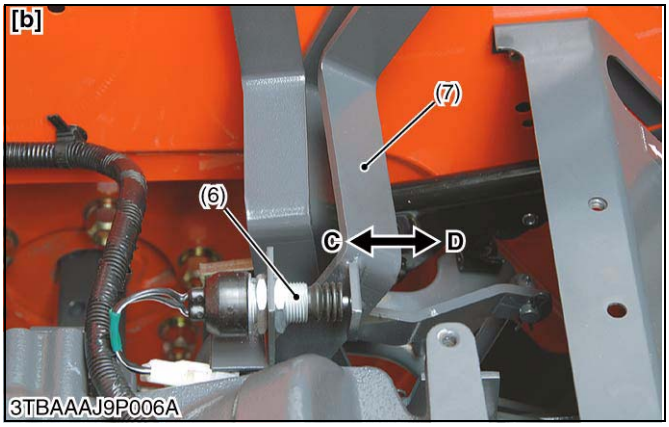
(A) Released (when shifted)
(B) Depressed (when neutral)
a : From Main Switch
b : To Starter

W10132920









■ HST Pedal Switch (HST Model) and PTO Switch (Manual Transmission Model)

[HST Model]

This switch locates at the neutral switch stay.

This switch is a push type.

This switch detects the position of the HST pedal.

When HST pedal is at "**NEUTRAL**" position, this switch is turned to "**ON**".

When HST pedal is at "**FORWARD**" or "**REVERSE**" position, this switch is turned to "**OFF**".

[Manual Transmission Model]

This switch locates at the bottom side of PTO clutch lever.

This switch detects the position at the PTO clutch lever (7).

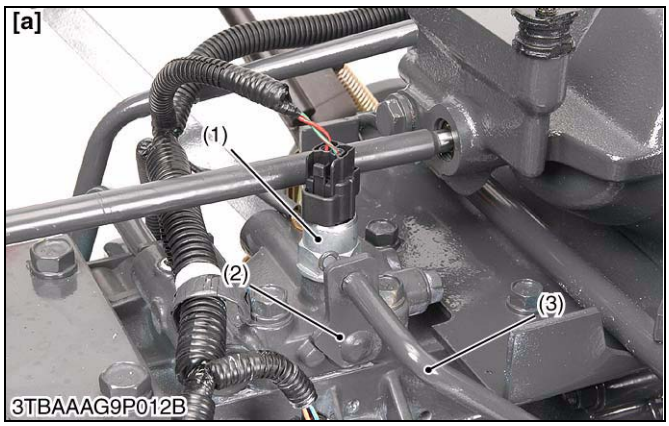
When the PTO clutch lever (7) is at "**OFF (DISENGAGED)**" position, this switch is turned to "**ON (ENGAGED)**" position, this switch is turned to "**OFF**".

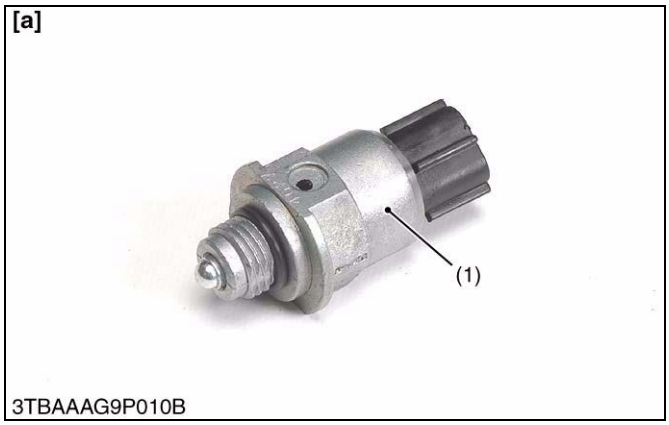
(1) HST Pedal Switch
(2) Neutral Switch Stay
(3) Neutral Arm
(4) Transmission Case
(5) Neutral Holder
(6) PTO Cover Switch
(7) PTO Clutch Lever

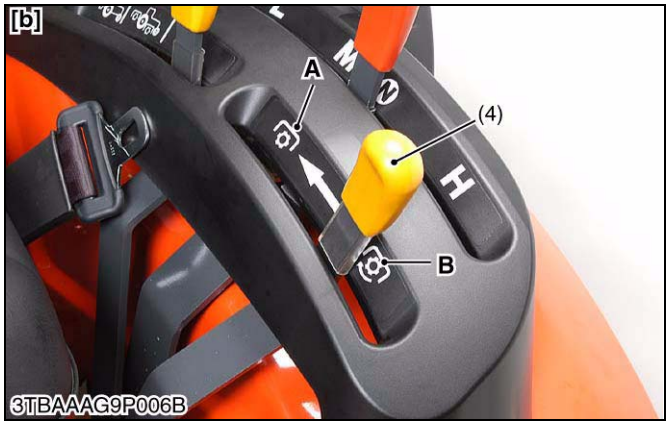
F : FORWARD
N : NEUTRAL
R : REVERSE
A : Current from Battery
B : Current to Controller
C : OFF (DISENGAGED) Position
D : ON (ENGAGED) Position

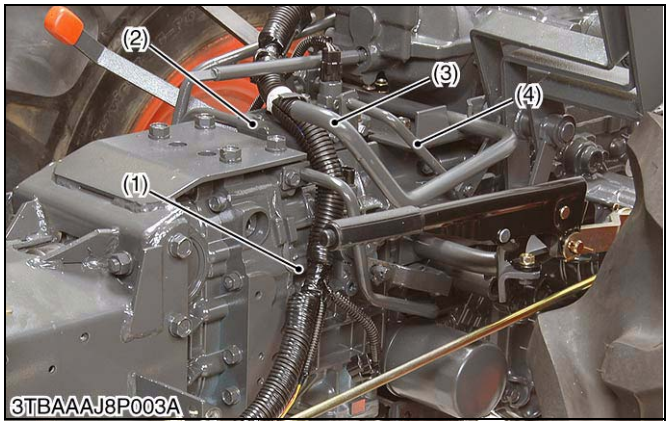
[a] HST Model
[b] Manual Transmission Model

W10214340









■ Independent PTO Lever Switch (HST Model) and Shuttle Lever Switch (Manual Transmission Model)

[HST Model]

This switch locates at the top pf the independent PTO control valve.

This switch is a push type.

This switch detects the independent PTO valve operating.

When the independent PTO lever is set to "**DISENGAGED**" position, this switch is turned to "**ON**".

When the independent PTO lever is set to "**ENGAGED**" position, this switch is turned "**OFF**".

[Manual Transmission Model]

This switch locates at the main gear section case.

This switch is a push type.

This switch detects the position of the shuttle shift lever.

When the shuttle shift lever is at "**NEUTRAL**" position, this switch is turned to "**ON**".

(1) Independent PTO Lever Switch
(2) Independent PTO Valve
(3) Control Rod
(4) Independent PTO Lever
(5) Shuttle Shift Lever Switch

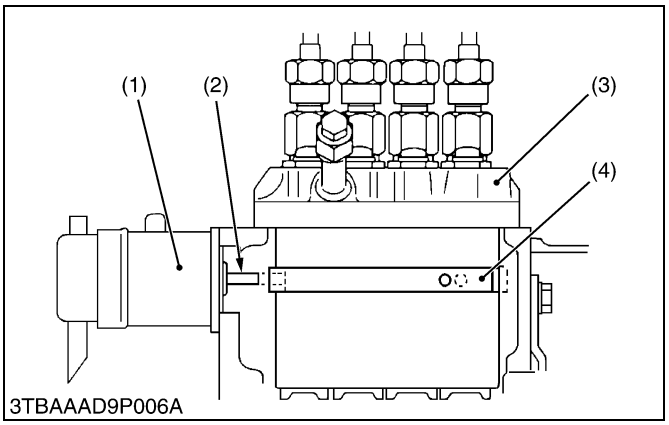
A : ENGAGED Position
B : DISENGAGED Position

[a] HST Model
[b] Manual Transmission Model

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[4] ENGINE STOP SOLENOID

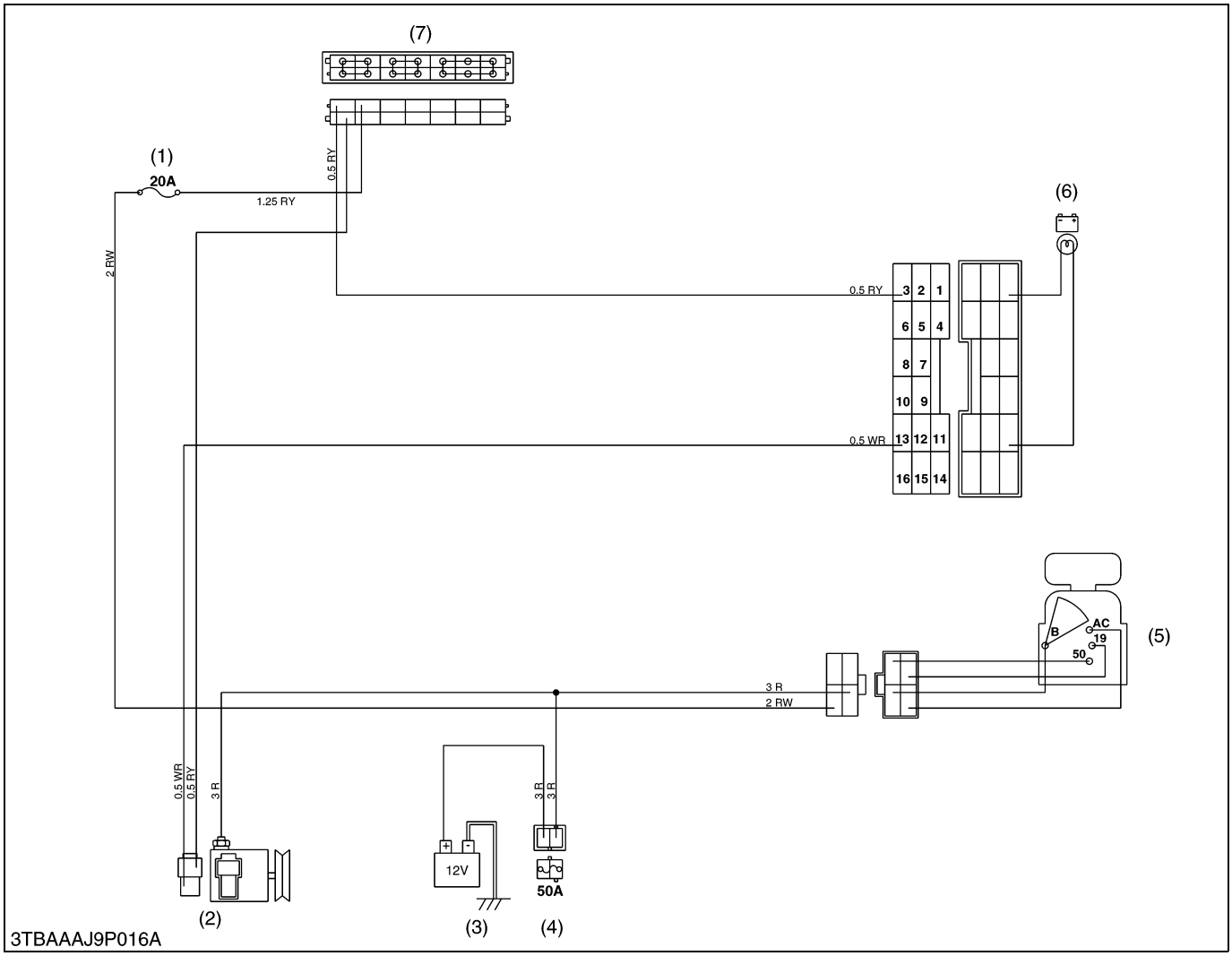


Flowing of the battery current into the fuel cut off solenoid, the plunger (2) move to left side so that the movement of control rack (4) becomes free. When the battery current stops, the plunger (2) is returned to the original position by the spring to keep the control rack (4) in **"No fuel injection"** position.

(1) Engine Stop Solenoid
(2) Plunger
(3) Injection Pump
(4) Control Rack

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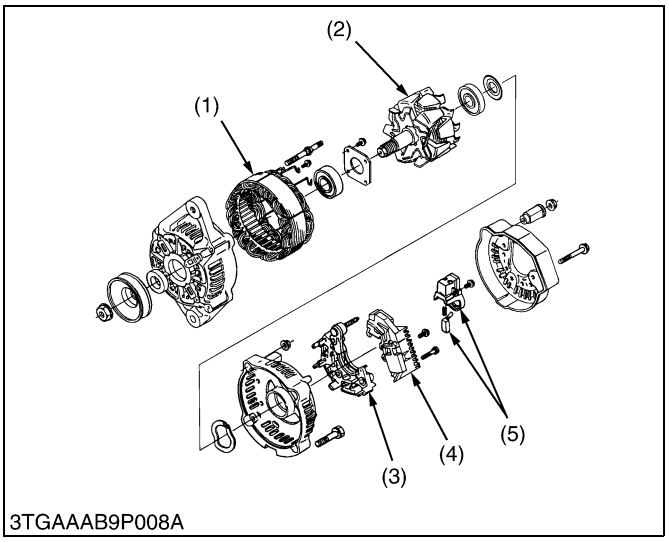
3. CHARGING SYSTEM



(1) Fuse
(2) Alternator
(3) Battery
(4) Slow Blow Fuse
(5) Starter Switch
(6) Charge Lamp
(7) Joint Connector

The charging system supplies electric power for various electrical devices and also charges the battery while the engine runs.

[1] ALTERNATOR



3TGAAAB9P008A

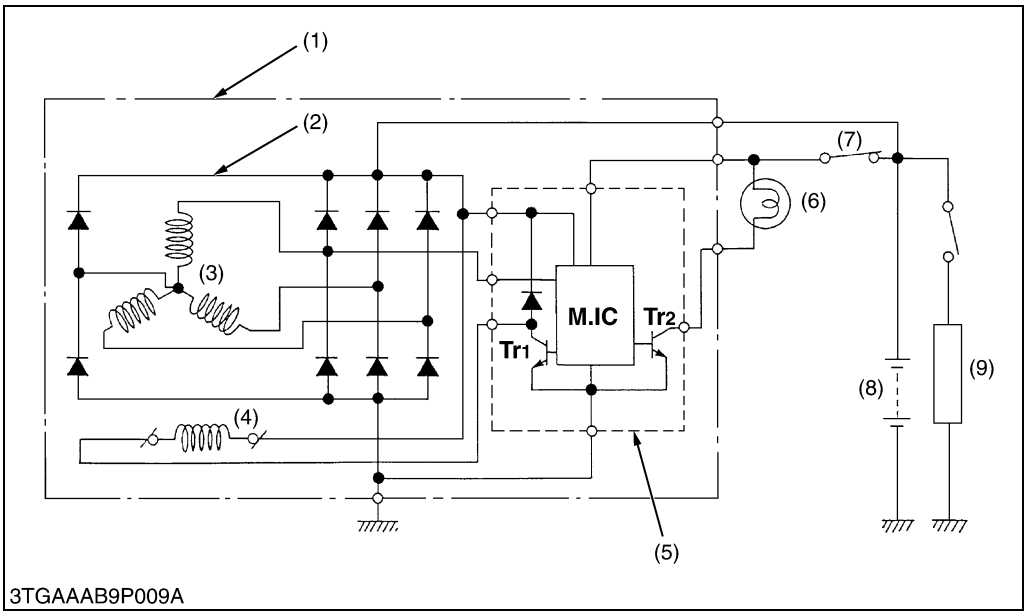
A compact alternator with an IC regulator is used, having the following characteristics :

- Approximately 26 % lighter and 17 % smaller than a standard alternator.
- Cooling performance and safety have been improved by combining the cooling fan with the rotor and incorporating the fan / rotor unit inside the alternator.
- IC regulator is fitted inside the alternator.
- The rectifier, IC regulator and similar components are easy to remove, making it easier to service the alternator.

(1) Stator
(2) Rotor
(3) Rectifier
(4) IC Regulator
(5) Brush Holder

W10136070

[2] IC REGULATOR



3TGAAAB9P009A

(1) Alternator
(2) Rectifier
(3) Stator Coil
(4) Rotor Coil
(5) IC Regulator
(6) Charge Lamp
(7) Main Switch
(8) Battery
(9) Load

W10137470

An IC regulator uses solid state transistors, chips or other semiconductor elements instead of the relays in a conventional regulator. Stable characteristics are achieved by cutting off the field current.

IC regulators have the following characteristics :

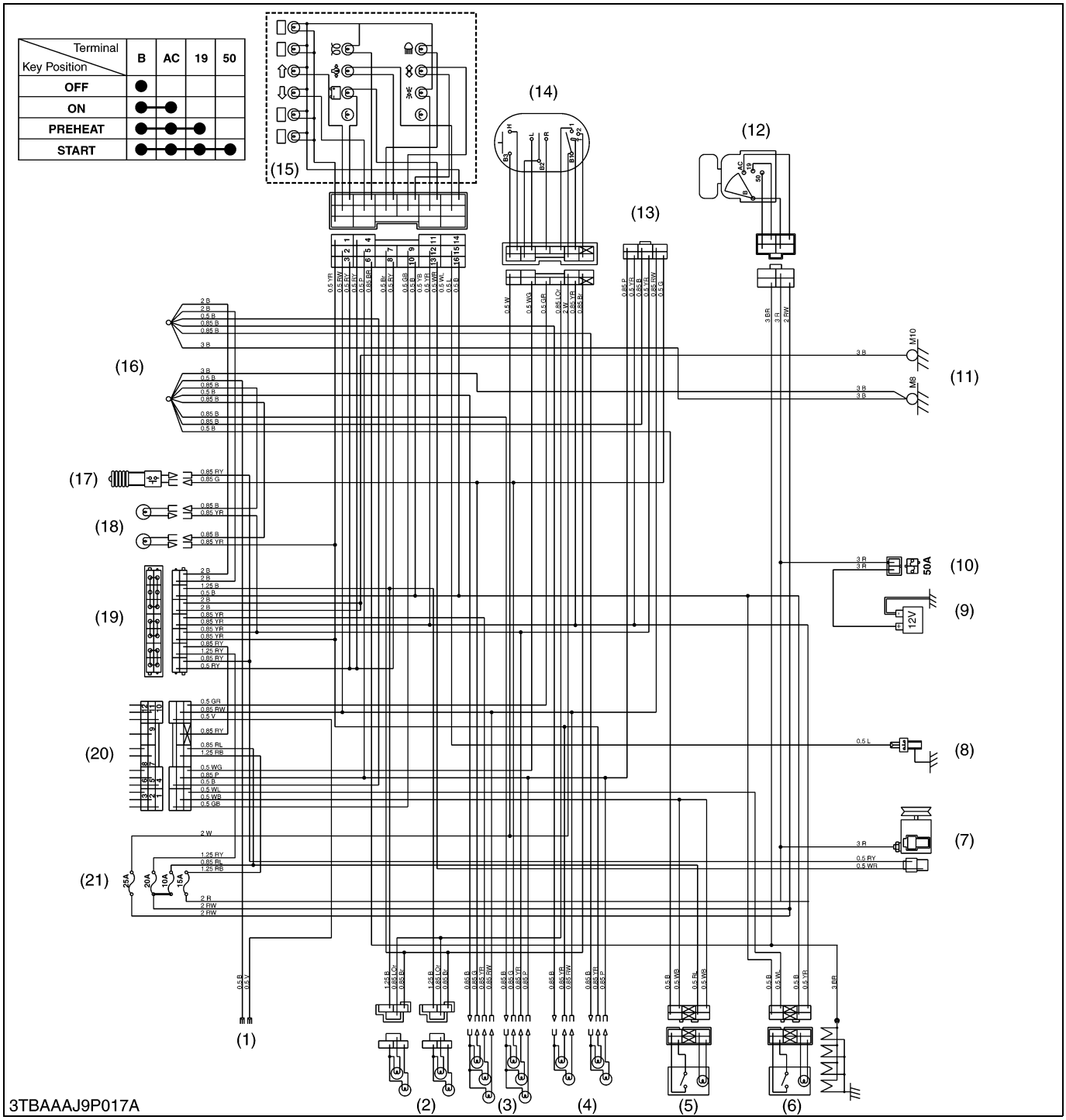
- The control voltage does not change over time, so the need for readjustment is eliminated. Since there are no moving parts, IC regulators are extremely durable and resistant to vibration.
- The overheat compensation characteristics ensure that the control voltage is reduced as the temperature rises, so the battery is charged at just the right level.

The internal circuitry of the IC regulator is shown in the diagram. It consists of a hybrid IC incorporating a monolithic IC. (The internal circuitry of the monolithic IC is extremely complex, so it is shown as simply **"M.IC circuit"**.)

Tr1 acts as the contacts controlling the field current, and **Tr2** acts as the charge lamp relay controlling the flashing of the charge lamp.

The **M.IC** circuit controls **Tr1** and **Tr2**, and monitors the alternator output voltage, and detects any drop in **L** terminal voltage or breaks in the rotor coil.

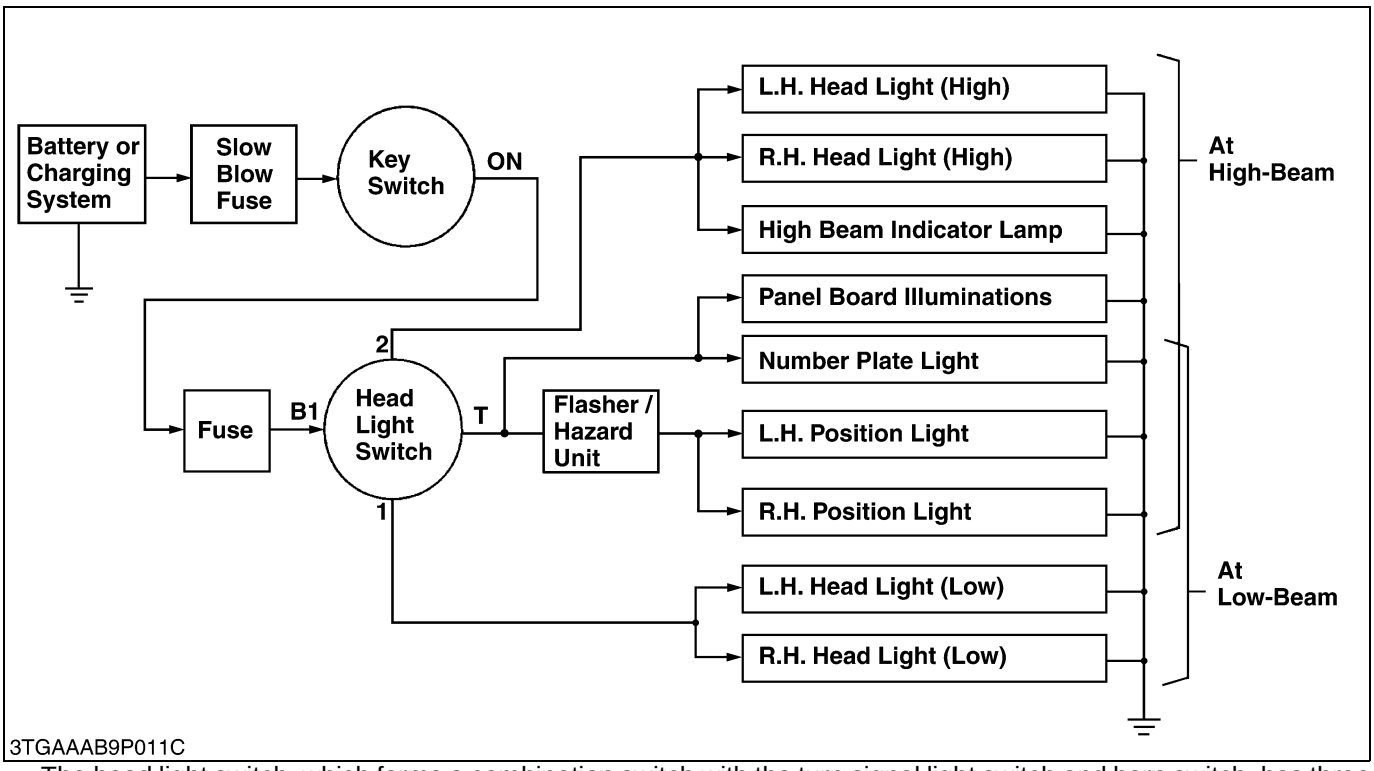
4. LIGHTING SYSTEM



(1) Beacon
(2) Head Light
(3) Combination Light
(4) Front Combination Light
(5) Beacon Switch
(6) Hazard Switch
(7) Alternator
(8) Oil Switch
(9) Battery
(10) Slow Blow Fuse
(11) Body Earth
(12) Starter Switch
(13) Trailer Socket
(14) Combination Switch
(15) Meter Panel
(16) Welded Joint
(17) Brake Lamp Switch
(18) License Lamp
(19) Joint Connector
(20) Flasher Unit
(21) Fuse Box

The lighting system consists of main switch, combination switch, hazard light switch, position light switch, brake light switch, head lights, combination lights, brake lights, etc..

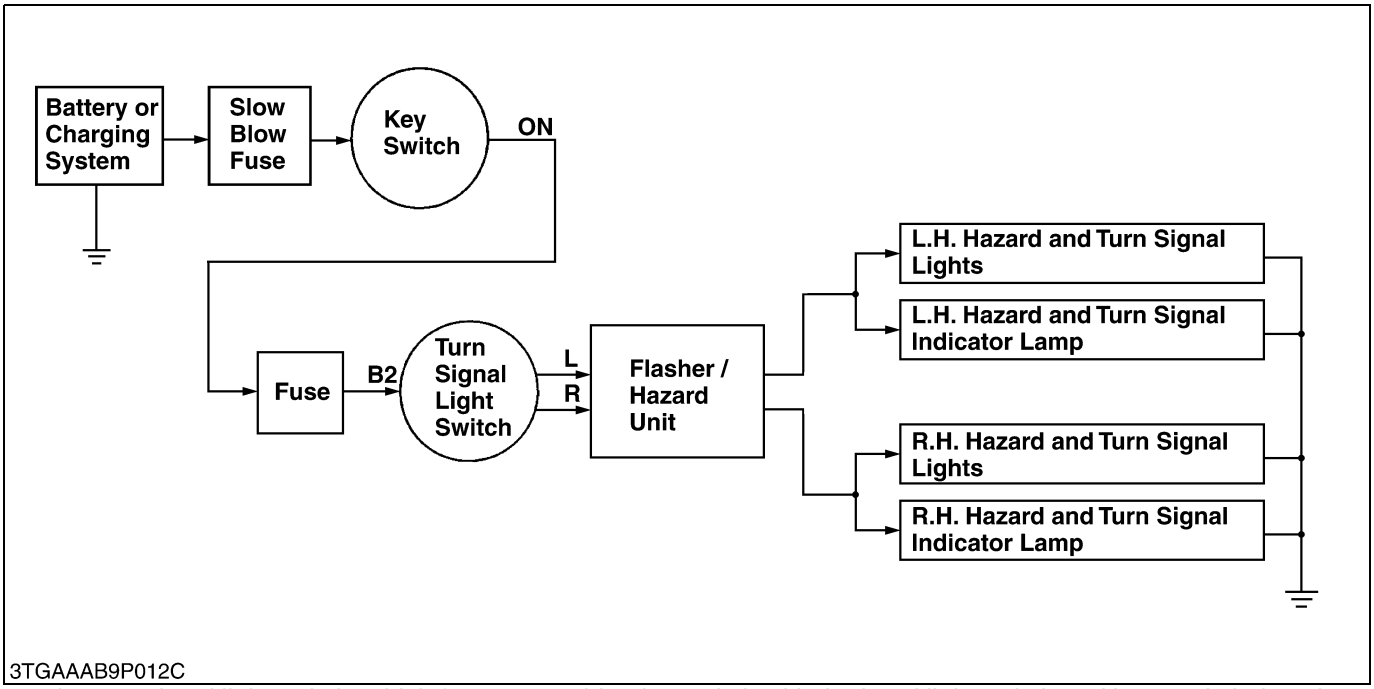
[1] HEAD LIGHT



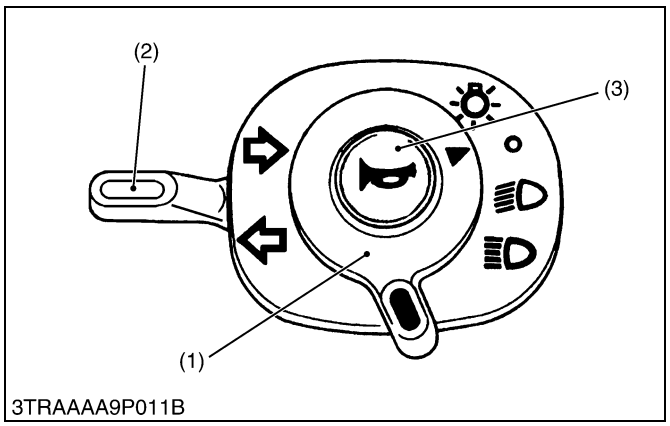
The head light switch, which forms a combination switch with the turn signal light switch and horn switch, has three positions; **OFF**, **LOW-BEAM** and **HIGH-BEAM**.

Current passes through the light circuit as shown in the figure above.

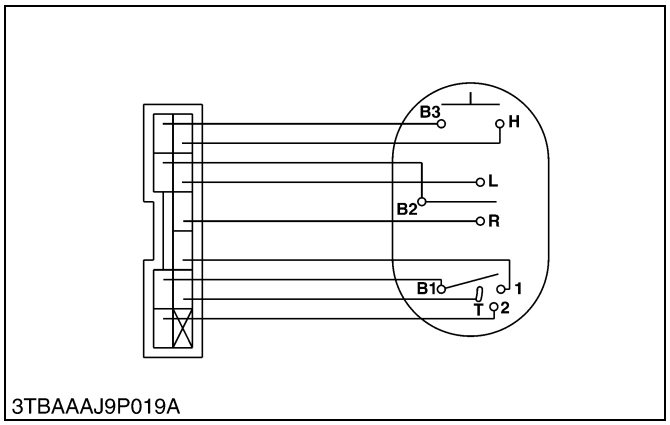
[2] TURN SIGNAL LIGHT



The turn signal light switch, which forms a combination switch with the head light switch and horn switch, has three position; **OFF**, **L** and **R**. When using turn signal light switch, blinks only one side light and other one stays off.



3TRAAAA9P011B



3TBAAAJ9P019A

■ Combination Switch

Combination switch consist of head light switch, turn signal light switch and horn switch.

Head Light Switch

	B1	T	1	2
OFF	●			
Low	●	●	●	
High	●	●		●

Turn Signal Light Switch

	B2	R	L
R	●	●	
OFF	●		
L	●		●

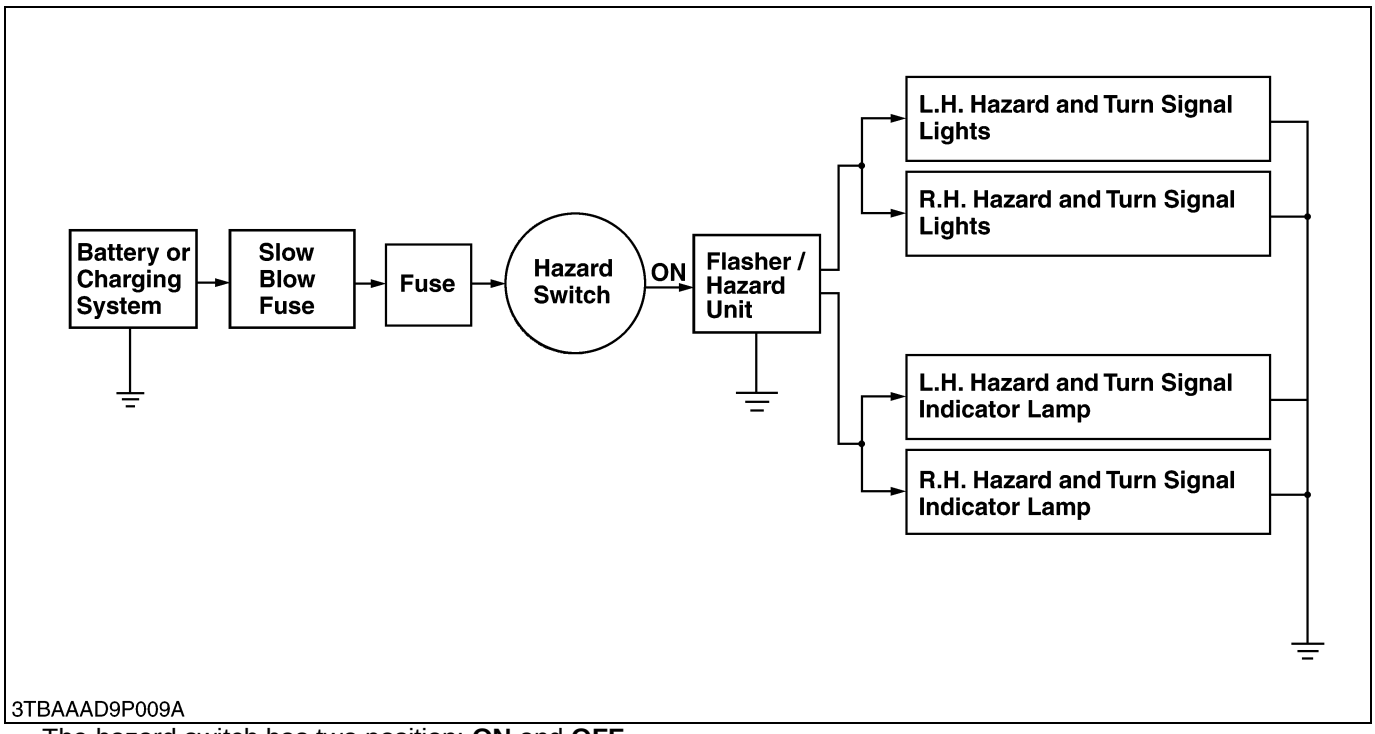
Horn Switch

	B3	H
OFF	●	
ON	●	●

(1) Head Light Switch
(2) Turn Signal Light Switch
(3) Horn Switch

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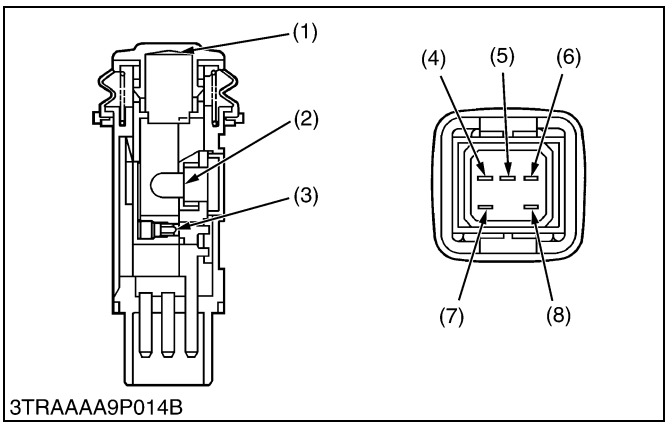
[3] HAZARD LIGHT



3TBAAAD9P009A

The hazard switch has two position; **ON** and **OFF**.

When the hazard switch is turned to **ON**, the hazard lights and indicator lamps are blinked as shown in the figure above.



3TRAAAA9P014B

■ Hazard Switch

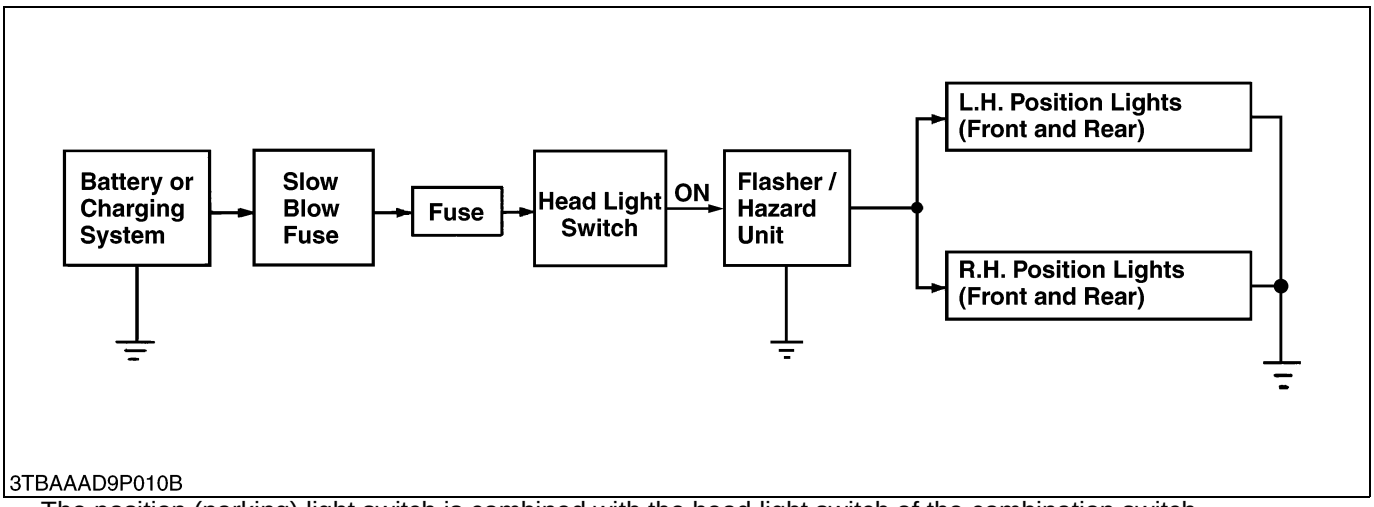
This is a pushing type switch to turn on the hazard lights. The lamp (2) in the switch is lighted up by the current from outside of the switch. The circuit in the switch is shown below.

Terminal	a	b	c	Lamp	
				d	e
OFF		●	●	●	●
ON	●		●	●	●

(1) Lens
(2) Lamp
(3) Contact Portion
(4) Terminal **a**
(5) Terminal **b**
(6) Terminal **d**
(7) Terminal **c**
(8) Terminal **e**

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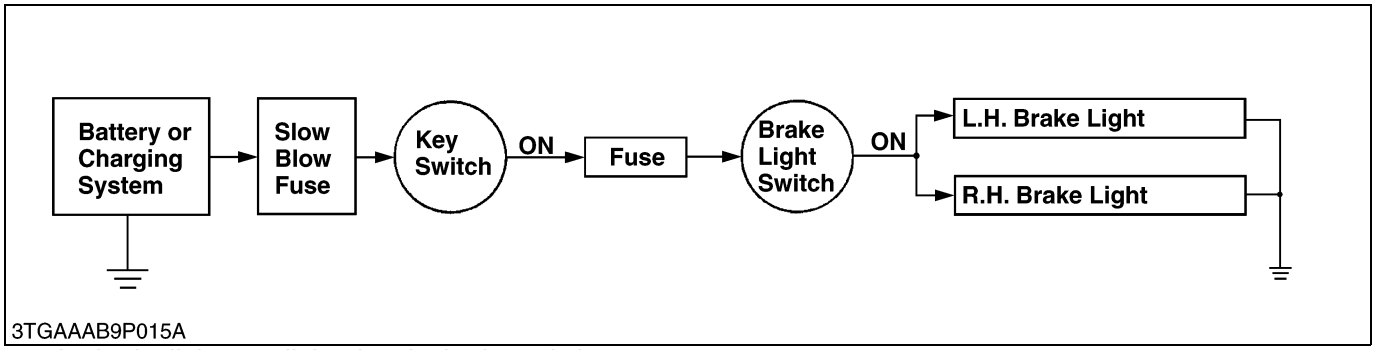
[4] POSITION (PARKING) LIGHT



3TBAAAD9P010B

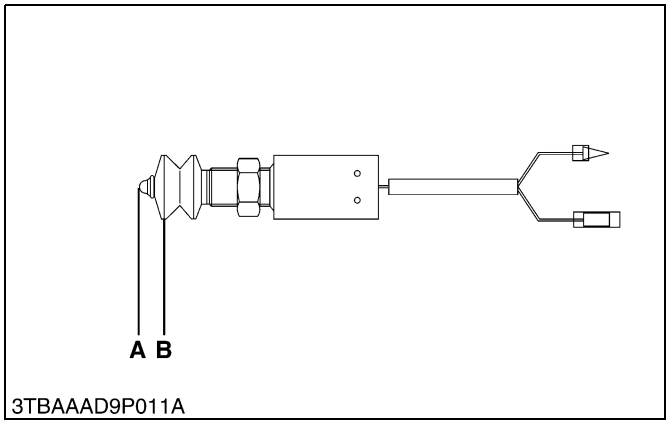
The position (parking) light switch is combined with the head light switch of the combination switch.
The position lights are lighted up by the head light switch.

[5] BRAKE LIGHT



3TGAAAB9P015A

The brake lights are lighted up by brake switch.
Current passes the circuit as shown in the figure above.



3TBAAAD9P011A

■ Brake Switch

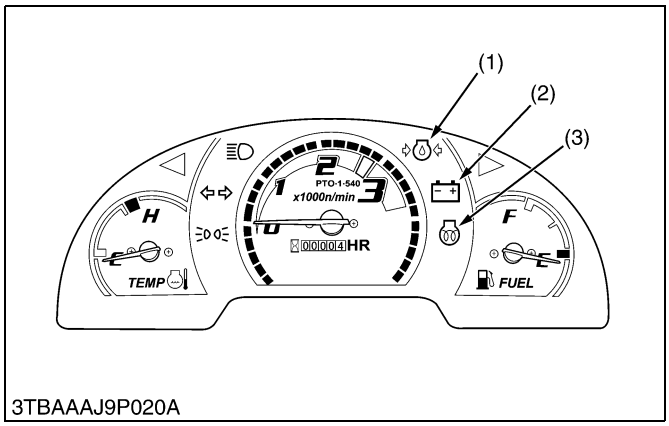
Brake switch is turned on by pushing a brake pedal and turned off by releasing it.

A : ON **B : OFF**

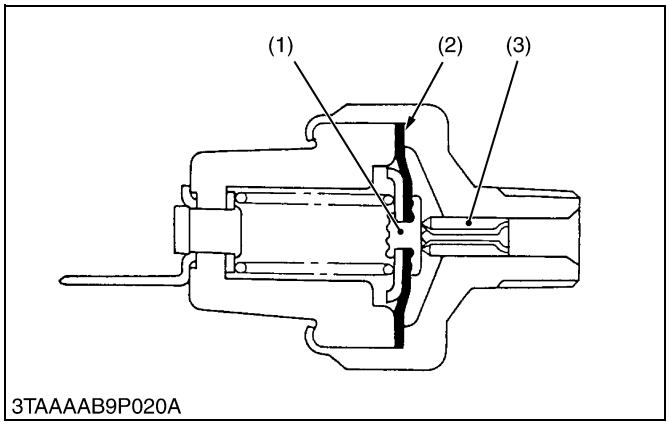
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[6] EASY CHECKER

To check the conditions of tractor easily before and during operation, easy checker combination of lamps on the easy checker board is provided.



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■ Indication Items

(1) Oil Pressure Lamp

When the engine oil pressure is low, this lamp illuminates.

(2) Charge Lamp

When the charging system is not functioning properly, this lamp illuminates.

(3) Pre-heat Indicator Lamp

When the key switch is in the **"Pre-heat"** position, the pre-heat indicator lamp illuminates.

(1) Oil Pressure Lamp (3) Pre-heat Indicator Lamp
(2) Charge Lamp

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■ Oil Pressure Switch

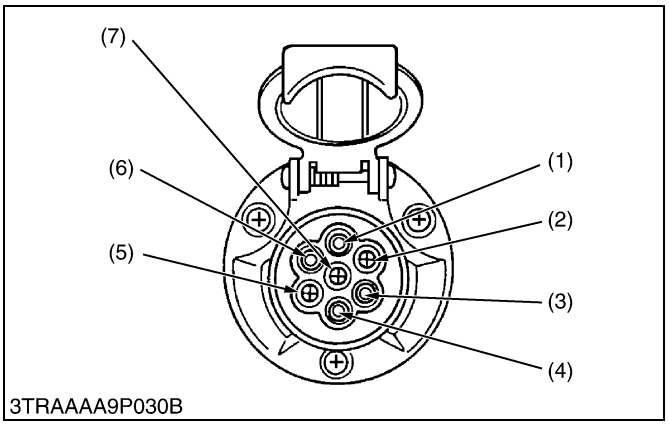
While oil pressure is high and the force applied to the diaphragm (2) is larger than the spring tension, the terminal contact (1) is open separated from the body contact (3). If the pressure drops below approx. 49 kPa (0.5 kgf/cm^2, 7.1 psi), the contact closes.

(1) Terminal Contact (3) Body Contact
(2) Diaphragm

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[7] TRAILER SOCKET



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The trailer socket is provided to take out the electrical power from tractor to trailer or implement.

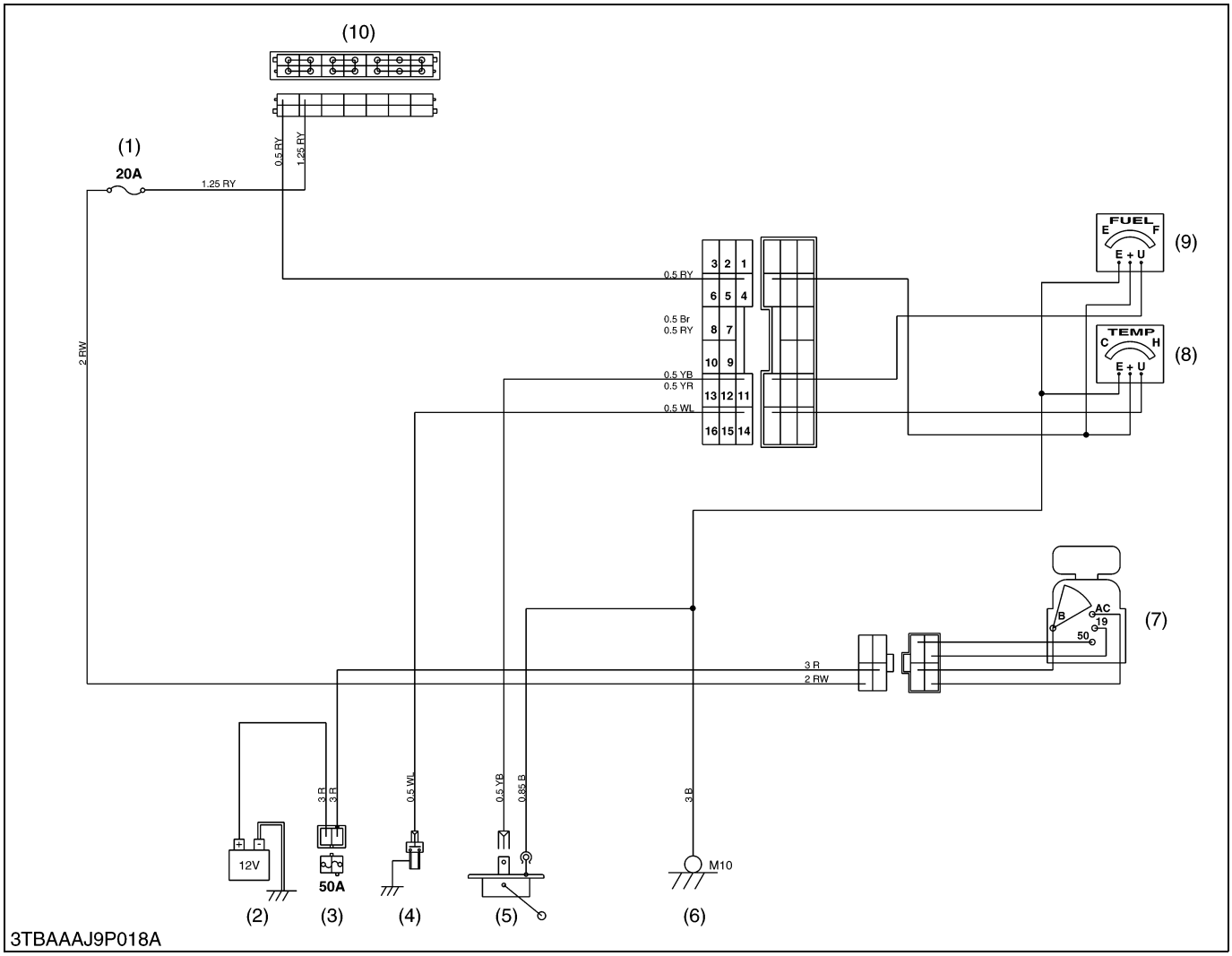
The function of each terminal is shown below.

Terminal	Function	Color of wire harness
(1)	Turn signal (**LH**)	Green / White
(2)	–	–
(3)	Ground	Black
(4)	Turn signal (**RH**)	Red / White
(5)	Tail (**RH**)	Yellow / Red
(6)	Brake	Yellow
(7)	Tail (**LH**)	Yellow / White

(1) Terminal **1**
(2) Terminal **2**
(3) Terminal **3**
(4) Terminal **4**
(5) Terminal **5**
(6) Terminal **6**
(7) Terminal **7**

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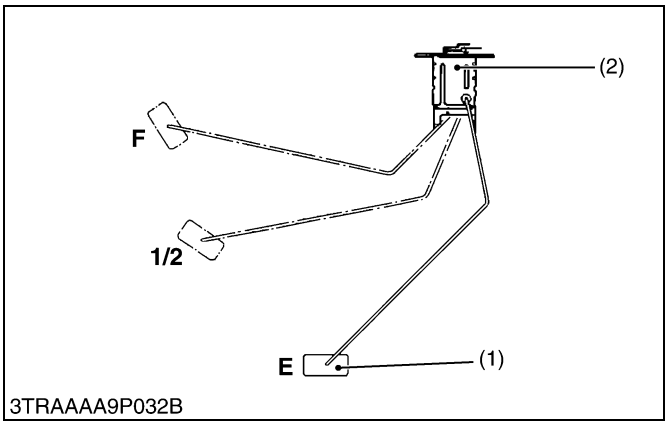
5. GAUGES



(1) Fuse
(2) Battery
(3) Slow Blow Fuse
(4) Coolant Temperature Switch (Coolant Temperature Sensor)
(5) Fuel Unit (Fuel Level Sensor)
(6) Body Earth
(7) Starter Switch
(8) Coolant Temperature Gauge
(9) Fuel Gauge
(10) Joint Connector

The fuel quantity and coolant temperature are indicated by the ammeters. The ammeters indicate each amperage flowing through the fuel level sensor for the fuel quantity detection and through the coolant temperature sensor for the coolant temperature detection.

[1] FUEL QUANTITY



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■ Fuel Level Sensor

The remaining fuel quantity is detected by the fuel level sensor installed in the fuel tank and indicated on the fuel gauge. For detection, a float and a resistor are used.

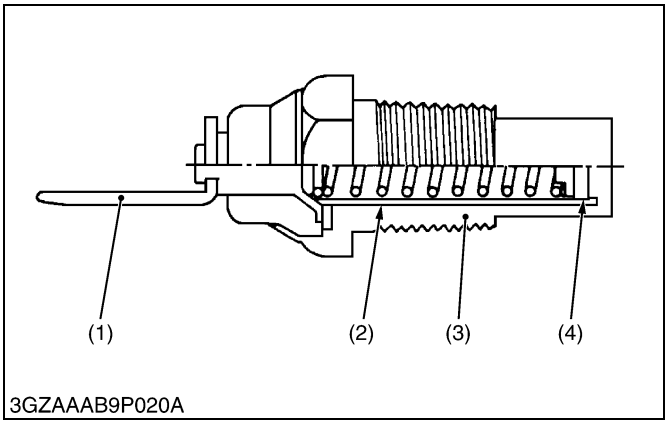
As the float (1) lowers, the resistance of the variable resistor (2) varies. The relation between the amount of fuel and the resistance is as follows.

F	1/2	E
1 to 5 Ω	27.5 to 37.5 Ω	103 to 117 Ω

(1) Float
(2) Variable Resistor

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[2] COOLANT TEMPERATURE



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■ Coolant Temperature Sensor

The coolant temperature sensor is installed to the cylinder head of engine, and its tip is in touch with the coolant. It contains a thermistor (4) whose electrical resistance decreases as the temperature increases.

Current varies with changes in the coolant temperature, and the increases or decreases in the current move the pointer of gauge.

Characteristics of Thermistor	
Temperature	Resistance
50 °C (122 °F)	148.8 Ω
80 °C (176 °F)	50.3 Ω
120 °C (248 °F)	16.0 Ω
170 °C (338 °F)	5.6 Ω

(1) Terminal
(2) Insulator
(3) Body
(4) Thermistor

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SERVICING

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      (1) Starter 9-S26
      (2) Alternator 9-S27

1. TROUBLESHOOTING

FUSE AND WIRING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipment Do Not Operate	Battery discharged or defective	Recharge or Replace	G-19
	Battery positive cable disconnected or improperly connected	Repair or Replace	–
	Battery negative cable disconnected or improperly connected	Repair or Replace	–
	Slow blow fuse blown	Replace	G-41
Fuse Blown Frequently	Short-circuited	Repair or Replace	–

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BATTERY

Battery Discharges Too Quickly	Battery defective	Recharge or Replace	9-S6
	Alternator defective	Repair or Replace	9-S23, S27
	Regulator defective	Replace	9-S28
	Wiring harness disconnected or improperly connected (between battery positive terminal and regulator **B** terminal)	Repair or Replace	–
	Cooling fan belt slipping	Adjust tension	G-22

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STARTING SYSTEM

Starter Motor Does Not Operate	Battery discharged or defective	Recharge or Replace	G-19
	Slow blow fuse blown	Replace	G-41
	Safety switch improperly adjusted or defective	Repair or replace	9-S12
	Wiring harness disconnected or improperly connected (between main switch **50** terminal and operator presence controller, between main switch **50** terminal and starter relay, between safety switches and operator presence controller, between safety switches and starter relay, between battery positive terminal and starter motor)	Repair or replace	–
	Starter relay defective	Replace	9-S11
	Starter motor defective	Repair or replace	9-S26
	Main switch defective	Replace	9-S8, S9
Pre-heat indicator Lamp Does Not Light When Main Switch Is in Pre-heat Position	Battery discharged or defective	Recharge or Replace	G-19
	Slow blow fuse blown	Replace	–
	Wiring harness disconnected or improperly connected (between main switch **19** terminal and pre-heat indicator, between pre-heat indicator and glow plugs)	Repair or Replace	9-S10
	Main switch defective	Replace	9-S8, S9
	Glow plug indicator defective	Replace	9-S20, S21

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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-41
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and panel board, between panel board and dynamo)	Repair or Replace	–
	Alternator defective	Repair or Replace	9-S23, S24
	Regulator defective	Replace	9-S24
Charging Lamp Does Not Go Off When Engine Is Running	Wiring harness disconnected or improperly connected (between main switch **30** terminal and alternator, between panel board and dynamo)	Repair or Replace	–
	Alternator defective	Repair or Replace	9-S23, S24
	Regulator defective	Replace	9-S24

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LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	Fuse blown (25A)	Replace	G-41
	Bulb blown	Replace	G-43
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and combination switch **B1** terminal, between combination switch **1** terminal and headlight	Repair or Replace	–
Tail Light Does Not Light	Fuse blown	Replace	G-41
	Bulb blown	Replace	G-43
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and combination switch **B1** terminal, between combination switch **T** terminal and tail light)	Repair or Replace	–
Illumination Light Does Not Light	Fuse blown	Replace	G-41
	Bulb blown	Replace	G-43
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and combination switch **B1** terminal, between combination switch **T** terminal and panel board)	Repair or Replace	–
Hazard Light (Tail Light) Does Not Light	Fuse blown	Replace	G-41
	Bulb blown	Replace	G-43
	Wiring harness disconnected or improperly connected	Repair or Replace	–
	Flasher unit defective	Replace	9-S19
	Hazard switch defective	Replace	9-S18
Hazard Indicator Lamp (Turn Signal Lamp) Does Not Light	Bulb blown	Replace	–
	Wiring harness disconnected or improperly connected	Replace	–
Hazard Light (Tail Light) Does Not Flicker	Flasher unit defective	Repair or Replace	9-S19
Turn Signal Light Does Not Light	Fuse blown	Replace	G-41
	Bulb blown	Replace	G-43
	Wiring harness disconnected or improperly connected	Repair or Replace	–
	Flasher unit defective	Replace	9-S19
	Combination switch defective	Replace	9-S15
Turn Signal Light Indicator Lamp Does Not Light	Bulb blown	Replace	G-43
	Wiring harness disconnected or improperly connected (between combination switch **R** or **L** terminal and panel board)	Repair or Replace	–
Turn Signal Light Does Not Flicker	Flasher unit defective	Replace	9-S19
	Blinker switch defective	Replace	9-S15

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EASY CHECKER

Symptom	Probable Cause	Solution	Reference Page
Oil Pressure Lamp Lights Up When Engine Is Running	Engine oil pressure too low	Repair engine	–
	Engine oil insufficient	Replenish	G-13
	Oil pressure switch defective	Replace	9-S20
	Short circuit between oil pressure switch lead and chassis	Repair	9-S20
	Circuit in panel board defective	Replace	–
Oil Pressure Lamp Does Not Light When Main Switch Is Turned On and Engine Is Not Running	Bulb blown	Replace	–
	Oil pressure switch defective	Replace	9-S20
	Wiring harness disconnected or improperly connected (between panel board and oil pressure switch)	Repair or Replace	–
	Circuit in panel board defective	Repair or Replace	–

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GAUGES

Fuel Gauge Does Not Function	Fuel gauge defective	Repair	–
	Fuel level sensor defective	Replace	9-S22
	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 defect	Replace	–
	Coolant temperature sensor defective	Replace	9-S22
	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

Item		Factory Specification	Allowable Limit
Commutator	O.D.	28.0 mm 1.102 in.	27.0 mm 1.063 in.
	Difference of O.D.'s	Less than 0.02 mm 0.0008 in.	0.05 mm 0.0020 in.
Mica	Undercut	0.60 mm 0.0236 in.	0.20 mm 0.0079 in.
Brush Holder to Holder Support	Resistance	Infinity	–

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ALTERNATOR

Non Load Output	Voltage	14.2 to 14.8 V (at 25 °C (77 °F)	–
Stator	Resistance	Less than 1.0 Ω	–
Rotor	Resistance	2.9 Ω	–
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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GLOW PLUG

Glow Plug	Resistance	Approx. 0.9 Ω	–

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SAFETY SWITCH

HST Pedal Switch	Resistance	0 Ω when placing the HST pedal to **"NEUTRAL"**.	–
Independent PTO Lever Switch	Resistance	0 Ω when placing the independent pedal to **"OFF (Disengaged)"** position.	–
PTO Shift Lever Switch	Resistance	0 Ω when placing the PTO lever to **"REAR PTO"** position.	–

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3. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

CAUTION

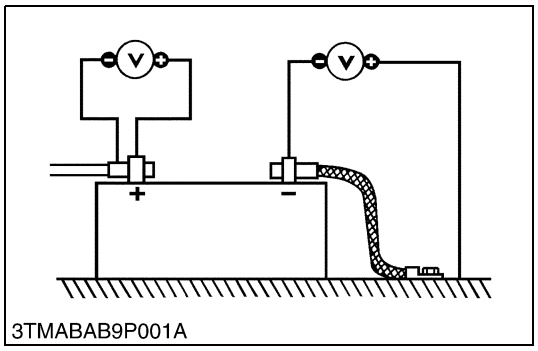
- **To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.**
- **Never remove the battery cap while the engine is running.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately.**
- **Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.**

■ IMPORTANT

- **If the machine is to be operated for a short time without battery (using a slave battery for starting), use additional current (lights) while engine is running and insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.**

(1) Battery





Battery Voltage

1. Stop the engine and turn the main switch **OFF**.
2. Connect the COM (-) lead of the voltmeter to the battery's negative terminal post and the (+) lead to the positive terminal post, and measure the battery voltage.
3. If the battery voltage is less than the factory specification, check the battery specific gravity and recharge the battery.

Battery voltage	Factory spec.	More than 12 V

(1) Battery

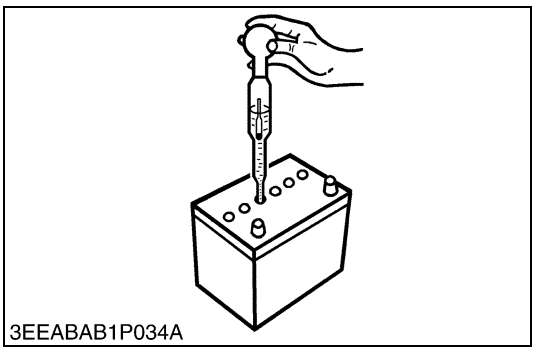
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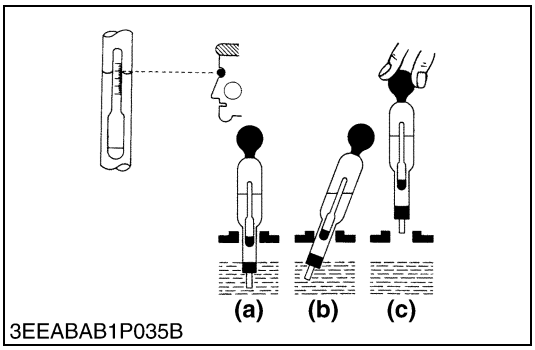
Battery Terminal Connection

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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3EEABAB1P035B

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 × (electrolyte temperature – 20 °C)
  - Specific gravity at 68 °F = Measured value + 0.0004 × (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

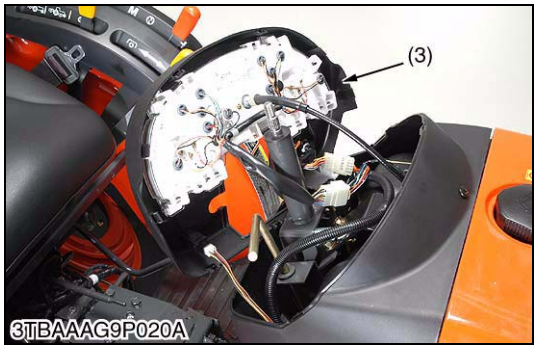
At an electrolyte temperature of 20 °C (68 °F)

(a) Good
(b) Bad
(c) Bad

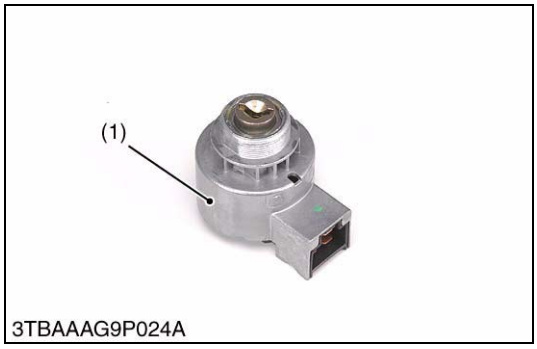
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(2) Main Switch







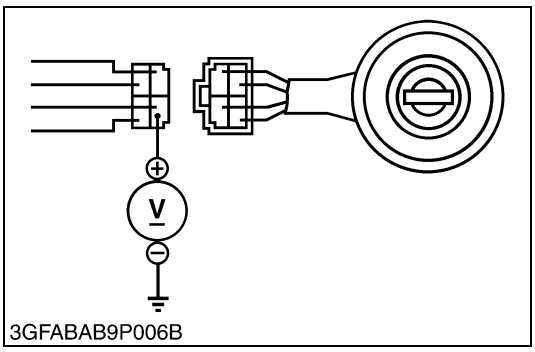


Main Switch

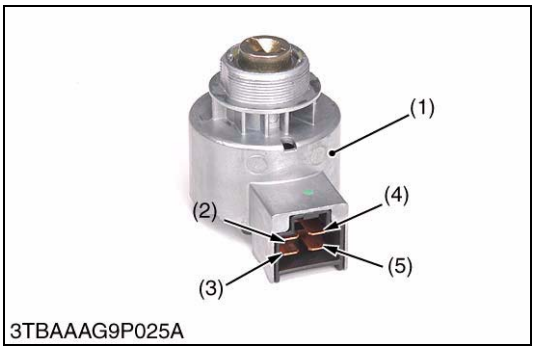
1. Remove the steering wheel and the panel board (3).
2. Disconnect the **4P** connector (2) and remove the main switch (1).
3. Perform the following checks.

(1) Main Switch
(2) Panel Board
(2) **4P** Connector

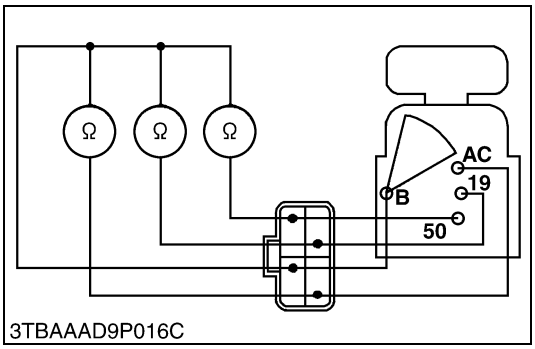
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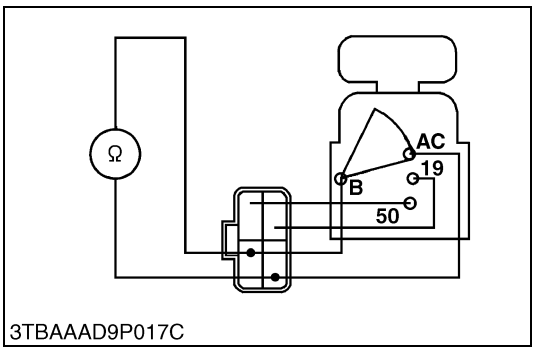
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3TBAAAG9P025A



3TBAAAD9P016C



3TBAAAD9P017C

Connector Voltage

1. Measure the voltage with a voltmeter across the connector **B** terminal (2) 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

(1) Main Switch
(2) **B** Terminal
(3) **AC** Terminal
(3) **50** Terminal
(4) **19** Terminal

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Main Switch Continuity

1) Main Switch Key at "OFF" Position

1. Set the main switch **OFF** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **AC** terminal, **B** terminal and **50** terminal, **B** terminal and **19** terminal.
3. If infinity is not indicated, the contacts of the main switch are faulty.

Resistance	**B** terminal - **AC** terminal	Infinity
	B terminal - **50** terminal	
	B terminal - **19** terminal	

B : Battery Terminal
AC :AC Terminal
19 :G Terminal
50 :ST Terminal

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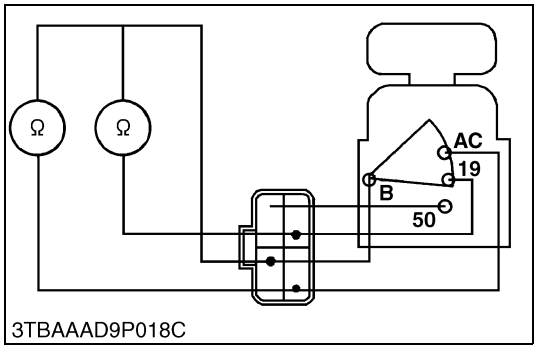
2) Main Switch Key at "ON" Position

1. Set the main switch **ON** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **AC** terminal.
3. If 0 Ω is not indicated, the **B** - **AC** contact of the main switch are faulty.

Resistance	**B** terminal - **AC** terminal	0 Ω

B : Battery Terminal
AC :AC Terminal
19 :G Terminal
50 :ST Terminal

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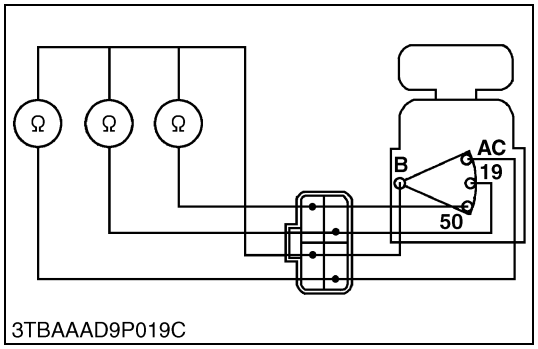
3) Main Switch Key at "PREHEAT" Position

1. Set and hold the main switch key at the **PREHEAT** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **19** terminal, and measure the resistance across the **B** terminal and the **AC** terminal.
3. If 0 Ω is not indicated, these contacts of the main switch are faulty.

Resistance	**B** terminal - **19** terminal	0 Ω
	B terminal - **AC** terminal	

B : Battery Terminal **19 :G Terminal**
AC :AC Terminal **50 :ST Terminal**

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3TBAAAD9P019C

4) Main Switch Key at "START" Position

1. Set and hold the main switch key at the **START** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **19** terminal, across the **B** terminal an the **50** terminal, and across the **B** terminal and the **AC** terminal.
3. If 0 Ω is not indicated, these contacts of the main switch are faulty.

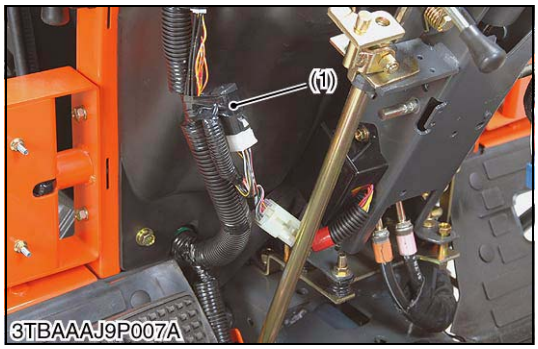
Resistance	**B** terminal - **19** terminal	0 Ω
	B terminal - **50** terminal	
	B terminal - **AC** terminal	

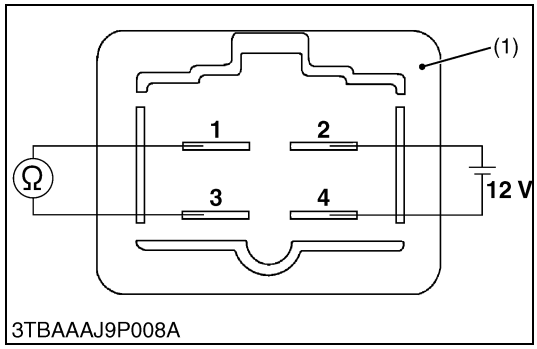
Terminal / Key Position	**B**	**AC**	**19**	**50**
OFF	●			
ON	●	●		
PREHEAT	●	●	●	
START	●	●	●	●

B : Battery Terminal **19 :G Terminal**
AC :AC Terminal **50 :ST Terminal**

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(3) Starter Relay





Starter Relay

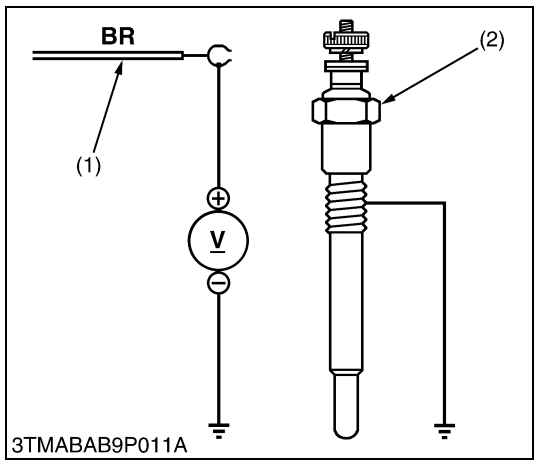
1. Open the panel board and remove the starter relay (1).
2. Apply battery voltage across **2** terminal and **4** terminal, and check for continuity across **1** terminal and **3** terminal.
3. If 0 Ω is not indicated, renew the key stop solenoid relay (6).

Resistance	**1** terminal - **3** terminal	Battery voltage is applied across **2** terminal and **4** terminal	0 Ω

(1) Starter Relay **1 to 4 :Terminals**

W10142670

(4) Glow Plug



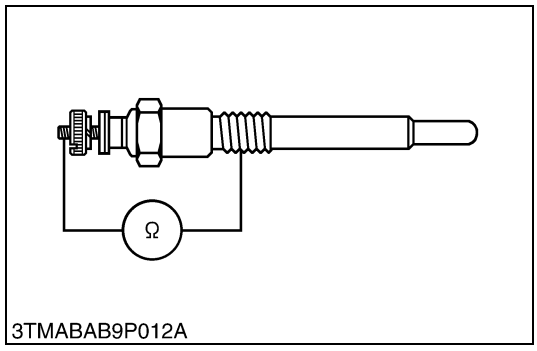
Lead Terminal Voltage

1. Disconnect the wiring lead (1) from the glow plug (2) after turning the main switch **OFF**.
2. Turn the main switch key to the **PREHEAT** position, and measure the voltage between the lead terminal and the chassis.
3. Turn the main switch key to the **START** position, and measure the voltage with a voltmeter between the lead terminal and the chassis.
4. If the voltage at either position differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage (Lead terminal - Chassis)	Main switch key at **PREHEAT**	Approx. battery voltage
	Main switch key at **START**	

(1) Wiring Lead (2) Glow Plug

W10564720



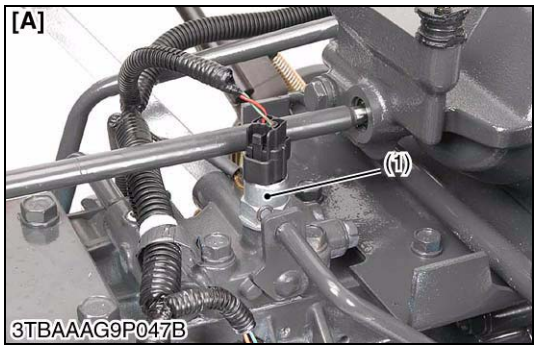
Glow Plug Continuity

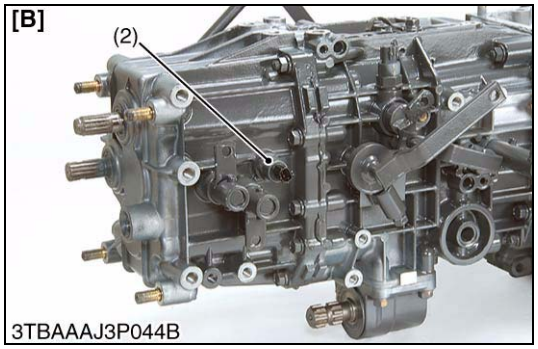
1. Disconnect the leads from the glow plugs.
2. Measure the resistance with an ohmmeter between the glow plug terminal and chassis.
3. If 0 Ω is indicated, the screw at the tip of the glow plug and the housing are short-circuited.
4. If the factory specification is not indicated, the glow plug is faulty.

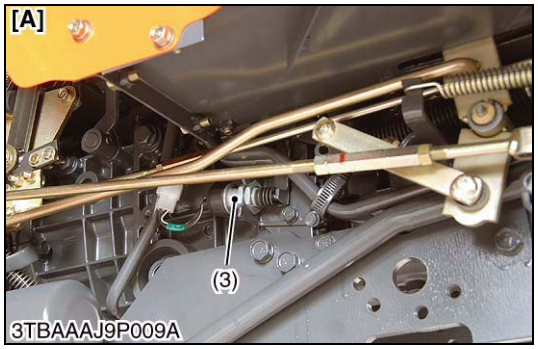
Glow plug resistance	Factory spec.	Approx. 0.9 Ω

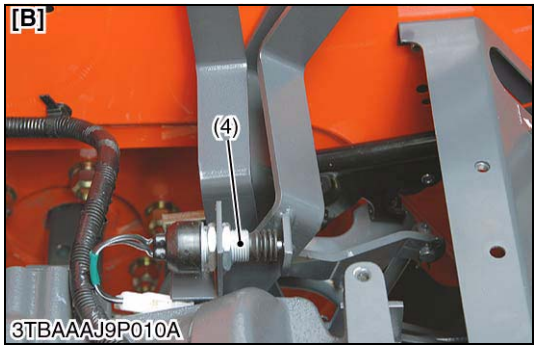
W10573670

(5) Safety Switch









PTO Switch Continuity

1. Disconnect the safety switch leads or couplers.
2. Connect the circuit tester to the safety switch leads.
3. Measure the resistance between leads.
4. If the safety switch is defective, replace it.

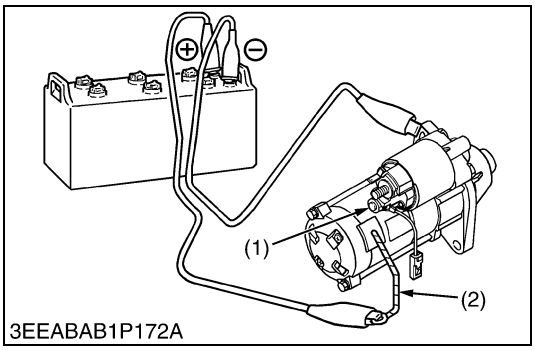
Safety Switch	State	Resistance
Independent PTO lever switch	Independent PTO lever in neutral	Infinity
	Independent PTO lever in engaged	0 Ω
Shuttle shift lever switch	Shuttle lever in neutral	0 Ω
	Shuttle lever in forward or reverse	Infinity
HST pedal switch	HST pedal in neutral (pushed in)	0 Ω
	HST pedal in forward or reverse	Infinity
PTO clutch lever switch	PTO clutch lever in disengage	Infinity
	PTO clutch lever in engage	0 Ω

(1) Independent PTO Lever Switch
(2) Shuttle Shift Lever Switch
(3) HST Pedal Switch
(4) PTO Clutch Lever Switch

[A] HST Model
[B] Manual Transmission Model

W10158610

(6) Starter



Motor Test

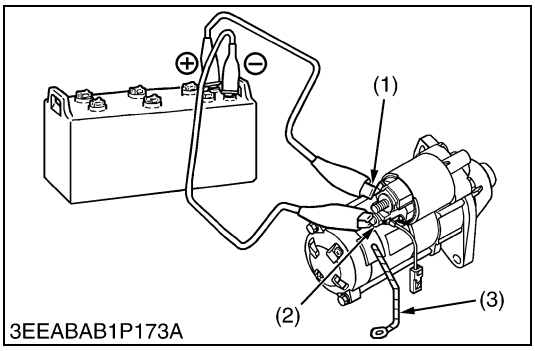
CAUTION

- **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 **M** terminal.
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

W10440960



Magnetic Switch Test

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter **M** terminal.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (3) from the starter **C** terminal (2).
5. Connect a jumper lead from the starter **S** terminal (1) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter **C** terminal (2) and the battery negative terminal post.
7. If the pinion gear does not pop out, check the magnetic switch.

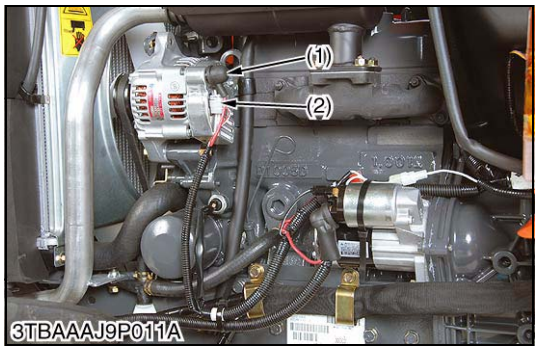
NOTE

- **This test should be carried out for a short time, about 3 to 5 seconds.**

(1) **S** Terminal
(2) **C** Terminal
(3) Connecting Lead

W11114310

(7) Alternator



Alternator No-load Voltage

1. Disconnect the **2P** connector (2) from the alternator.
2. Start the engine and keep the engine speed at approx. 2200 min^{-1} (rpm).
3. Disconnect the battery negative cord from the battery.
4. Measure the voltage across the **B** terminal (1) and the chassis.
5. If the measurement is less than the factory specification, disassemble the alternator and check the IC regulator.

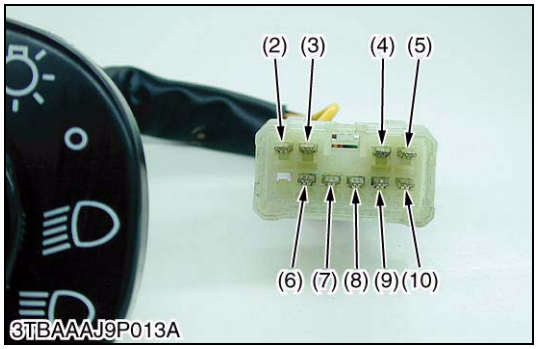
Alternator non-load voltage	Factory spec.	14.2 to 14.8 V (at 25 °C, 77 °F)

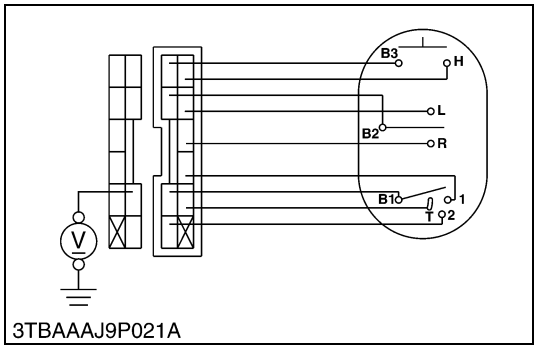
(1) **B** Terminal
(2) **2P** Connector

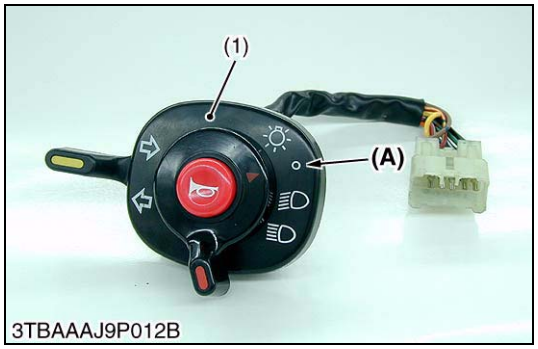
W1019658

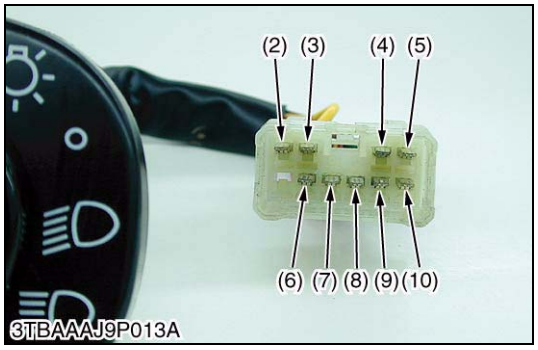
(8) Combination Switch











Combination Switch

1. Remove the meter panel, and disconnect the combination switch connector.
2. Remove the combination switch (1) and perform the following checks **1)** to **8)**.

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) B3 Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

W1048417

1) Connector Voltage

1. Connect the combination switch connector to the main wire harness.
2. Measure the voltage with a voltmeter across the connector **B1** terminal and chassis when the main switch is **ON** position.
3. If the voltage differs from the battery voltage, the wiring harness and main switch is faulty.

Voltage	Main switch at **ON** position	**B1** terminal - Chassis	Battery voltage

W11223670

2) Head Light Switch Continuity when Setting Switch at "OFF" Position

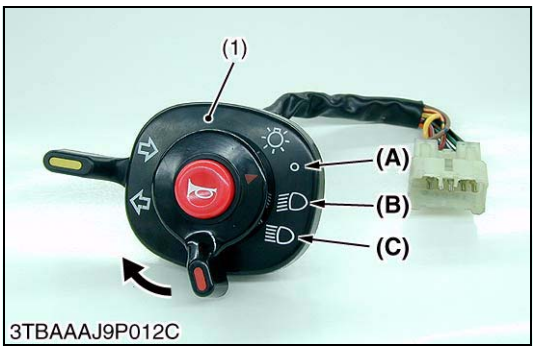
1. Set the light switch to the **OFF** position.
2. Measure the resistance with an ohmmeter across the **B1** terminal (3) to the **T** terminal (2), the **B1** terminal (3) to the **1 terminal** (1).
3. If infinity is not indicated, the head light switch is faulty.

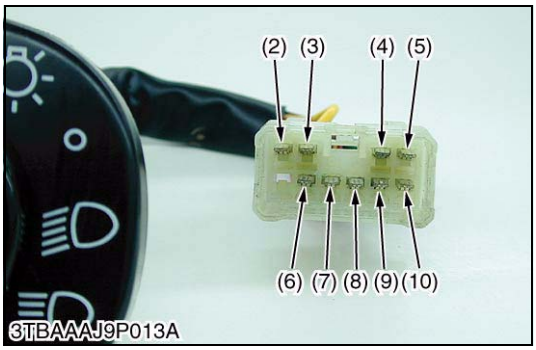
Resistance (Switch at **OFF** position)	**B1** terminal - **T** terminal	Infinity
	B1 terminal - **1** terminal	

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) B3 Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Head Light "OFF" Position

W11236540





3) Head Light Switch Continuity when Setting Switch at "LOW BEAM" and "HIGH BEAM" Position

1. Set the light switch to the **LOW BEAM** position.
2. Measure the resistance with an ohmmeter across the **B1** terminal (3) to the **T** terminal (6) and the **B1** terminal (3) to the **1** terminal (7).
3. If 0 Ω is not indicated, the head light switch is faulty.
4. Set the light switch to **HIGH BEAM** position.
5. Measure the resistance with an ohmmeter across the **B1** terminal (3) to the T terminal (6) and the B1 terminal (3) to the **2** terminal (2).
6. If 0 Ω is not indicated, the head light switch is faulty.

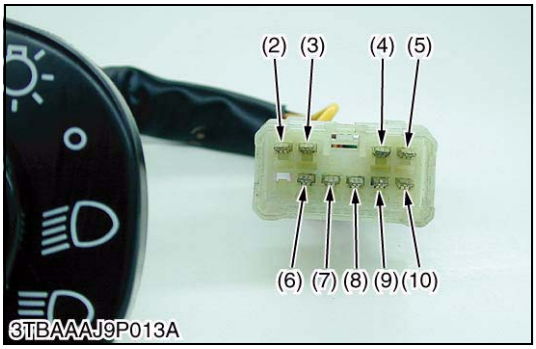
Resistance (Switch at **HIGH BEAM** position)	**B1** terminal - **T** terminal	0 Ω
	B1 terminal - **2** terminal	

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) **B3** Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Head Light "OFF" Position
(B) Head Light "LOW BEAM" Position
(C) Head Light "HIGH BEAM" Position

W11256200





4) Turn Signal Light Switch Continuity When Setting Switch Knob "OFF" Position

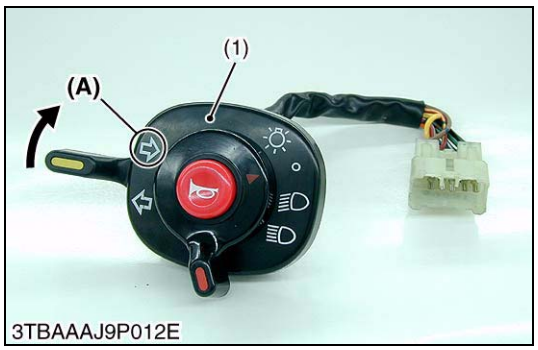
1. Set the hazard switch knob to the **OFF** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal (4) and **L** terminal (9), and across **B2** terminal (4) and **R** terminal (2).
3. If infinity is not indicated, the combination switch is faulty.

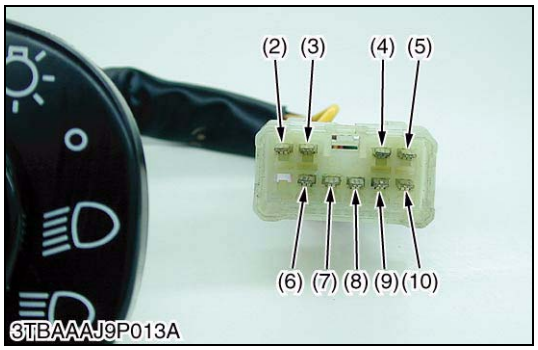
Resistance (Switch knob at **OFF** position)	**B2** terminal - **L** terminal	Infinity
	B2 terminal - **R** terminal	

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) B3 Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Turn Signal Light Switch "OFF" Position

W11272080





5) Turn Signal Light Switch Continuity When Setting Switch Knob at "RIGHT" Position

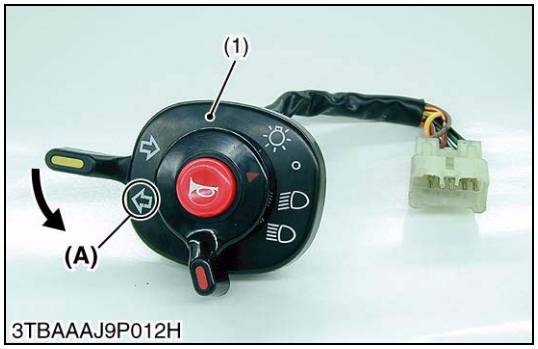
1. Set the hazard switch knob to the **RIGHT** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal (4) and **R** terminal (8) and across **B2** terminal (4) and **L** terminal (9).
3. If 0 Ω is not indicated at **RIGHT** position, the combination switch is faulty.

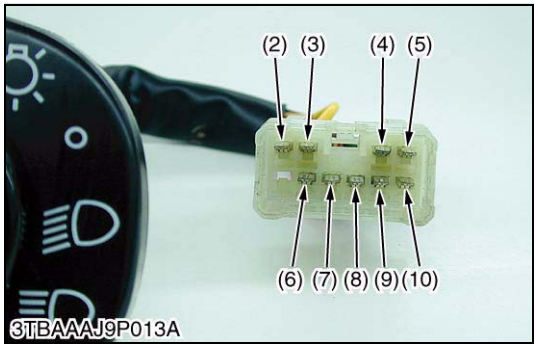
Resistance (Switch knob at **RIGHT** position)	**B2** terminal - **R** terminal	0 Ω
	B2 terminal - **L** terminal	Infinity

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) B3 Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Turn Signal Light Switch "RIGHT" Position

W11286780





6) Turn Signal Light Switch Continuity When Setting Switch Knob at "LEFT" Position

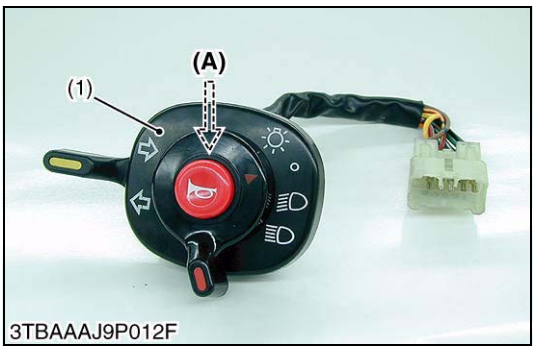
1. Set the hazard switch knob to the **LEFT** position.
2. Measure the resistance with an ohmmeter across the **B2** terminal (4) and **L** terminal (9) and across the **B2** terminal (4) and **R** terminal (8).
3. If 0 Ω is not indicated at **LEFT** position, the combination switch is faulty.

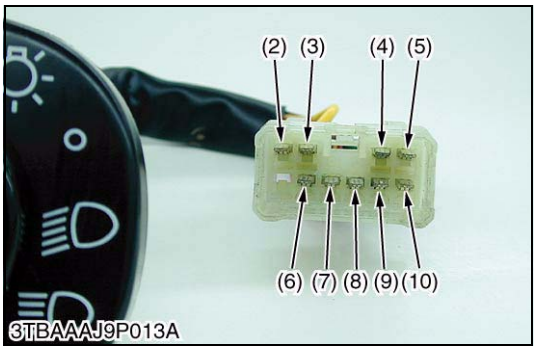
Resistance (Switch knob at **LEFT** position)	**B2** terminal - **L** terminal	0 Ω
	B2 terminal - **R** terminal	Infinity

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) B3 Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Turn Signal Light Switch "LEFT" Position

W11298990





7) Horn Button Continuity when Not Pushing Button

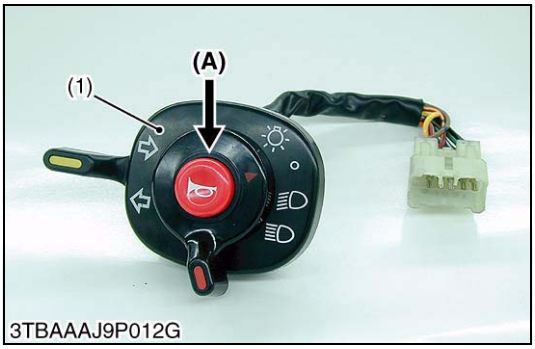
1. Set the horn button to the **OFF** position.
2. Measure the resistance with an ohmmeter across the **B3** terminal (5) and the **H** terminal (10).
3. If infinity is not indicated, the combination switch is faulty.

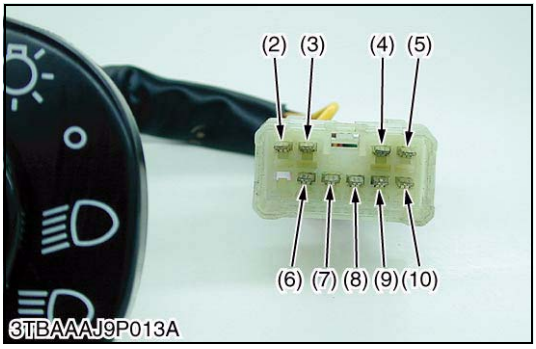
Resistance (Horn button at **OFF** position)	**B3** terminal - **H** terminal	Infinity

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) B3 Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Horn Button "OFF" Position

W1053841





8) Horn Button at "ON" Position

1. Set the horn button to the **ON** position.
2. Measure the resistance with an ohmmeter across the **B3** terminal (5) and the **H** terminal (10).
3. If 0 Ω is not indicated, the combination switch is faulty.

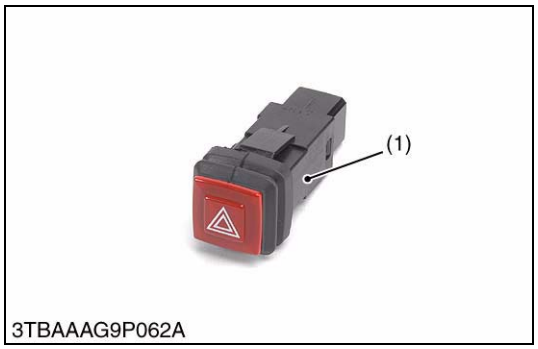
Resistance (Horn button at **ON** position)	**B3** terminal - **H** terminal	0 Ω

(1) Combination Switch
(2) **2** Terminal
(3) **B1** Terminal
(4) **B2** Terminal
(5) B3 Terminal
(6) **T** Terminal
(7) **1** Terminal
(8) **R** Terminal
(9) **L** Terminal
(10) **H** Terminal

(A) Horn Button "ON" Position

W1054637

(9) Hazard Switch



Hazard Switch

1. Remove the meter panel and disconnect the **4P** connector from hazard switch after disconnecting the battery negative code.
2. Remove the hazard switch.
3. Perform the following checking.

(1) Hazard Switch

W1131841



Connector Voltage

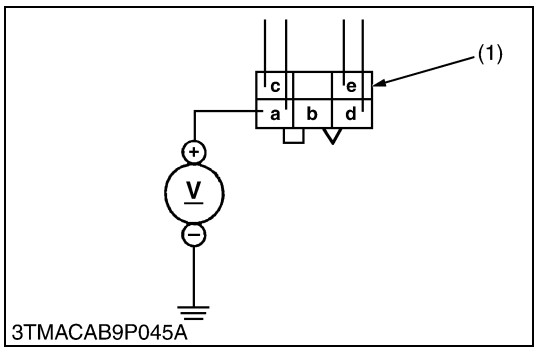
1. Connect the battery negative code, then measure the voltage with a voltmeter across the **a** terminal and chassis.
2. If the voltage differ from the battery voltage, the wiring harness is faulty.

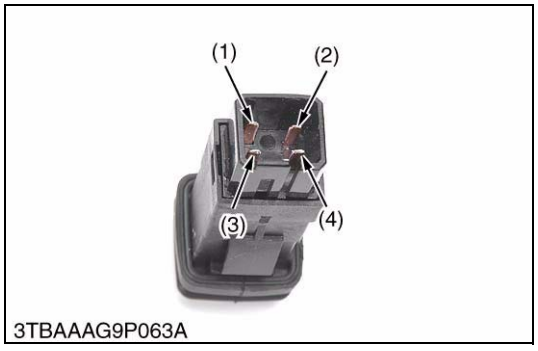
Voltage	**a** terminal - Chassis	Approx. battery voltage

(1) **4P** Connector (for Hazard Switch)
(2) **4P** Connector (for Main Switch)

a to e :Terminals

W11329880





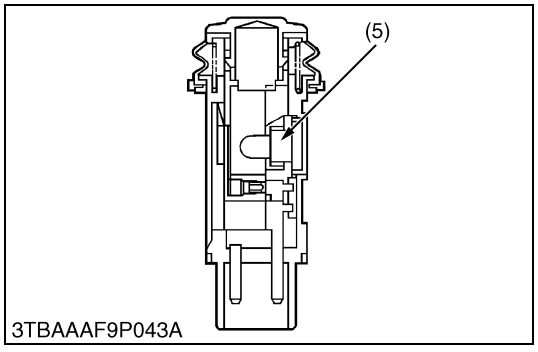
Hazard Switch Continuity

1. Measure the resistance with ohmmeter across the **a** terminal (1) and **c** terminal (3), and across the **d** terminal (2) and **e** terminal (4).
2. If the measurement is not following below, the hazard switch or the bulb are faulty.

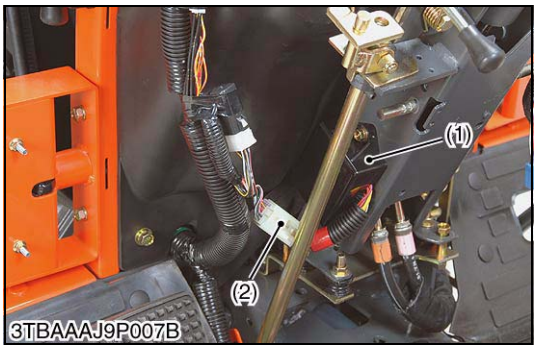
Resistance (Switch at **OFF**)	**a** terminal - **c** terminal	Infinity
Resistance (Switch at **ON**)	**a** terminal - **c** terminal	0 Ω
Resistance (Bulb)	**d** terminal - **e** terminal	Approx. 13 Ω

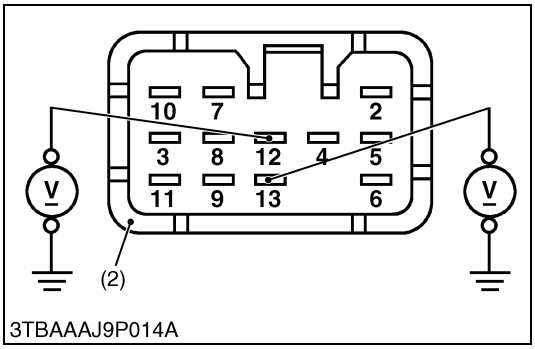
(1) **a** Terminal
(2) **d** Terminal
(3) **c** Terminal
(4) **e** Terminal
(5) Bulb

W11347910



(10) Flasher Unit





Supply Voltage to Flasher Unit

1. Disconnect the connector from the flasher unit.
2. Turn the main switch at **ON** position.
3. Measure the voltage between the terminal **12**, **13** and chassis.
4. If the voltage differ from the battery voltage, the wiring harness is faulty.

Voltage	Terminal 12 – Chassis	Approx. battery voltage
	Terminal 13 – Chassis	Approx. battery voltage

(Reference)

2	0.5V	Beacon light
3	0.5W/B	Beacon light switch
4	0.85R/Y	Main switch (AC)
5	0.85R/W	Turn signal light (R)
6	0.5G/R	Turn signal light switch (R)
7	0.5B	Ground
8	0.85P	Turn signal light (L)
9	0.5W/G	Turn signal light switch (L)
10	0.5G/B	Hazard indicator lamp
11	0.5W/L	Hazard switch
12	1.25R/B	Battery voltage (Hazard)
13	0.85R/L	Battery voltage (Beacon light)

1. Set the hazard switch to the **ON** position, and make sure the hazard light gives 60 to 120 flashers for a minute.
2. Set the main switch to the **ON** position and move the turn signal switch to the left. Make sure the left-hand light gives flashes. Then move the turn signal switch to the right and make sure the right-hand light gives flashes. Make sure the same actions as above result.
3. If both the hazard switch and the turn signal switch and the turn signal switch function but the above actions do not take place, replace the flasher unit with new one.

(1) Flasher Unit
(2) Flasher Unit 13P Coupler

2 to 3 :Terminals

W1036747

(11) Easy Checker



Easy Checker

1. Remove the panel board and disconnect the connector (1) from it.
2. Turn the main switch on.
3. Measure the voltage with a voltmeter across the terminal (Red / Yellow) and the earth terminal (Black).
4. If the voltage differs from the battery voltage, the wiring harness fuses and main switch should be checked.

(1) Connector

W1141077

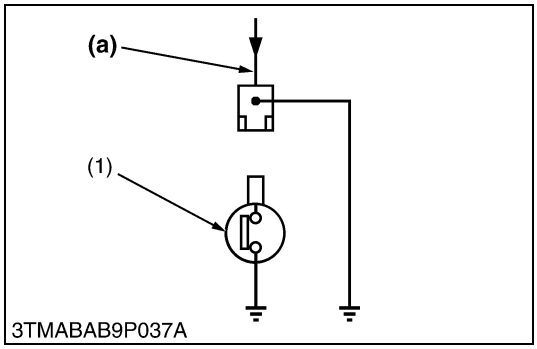


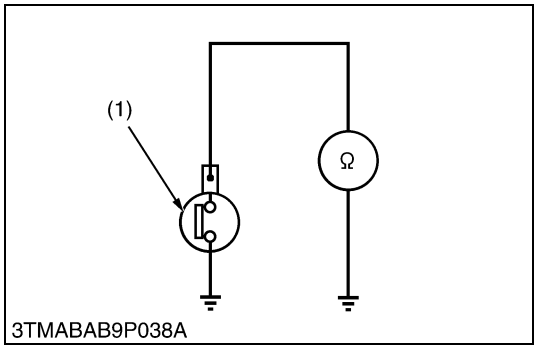
Engine Oil Pressure Switch, Panel Board and Wiring Harness

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**

W1142125





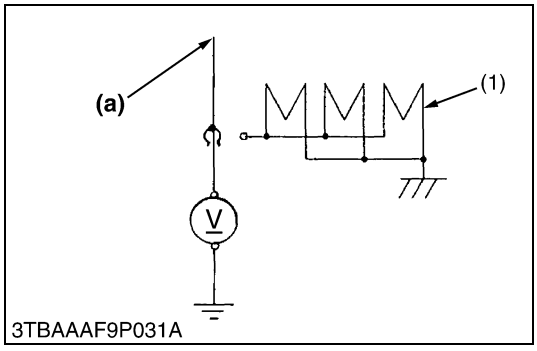
Engine Oil Pressure Switch Continuity

1. Measure the resistance with an ohmmeter across the switch terminal and the chassis.
2. If 0 Ω 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/cm^2, 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

W11429220

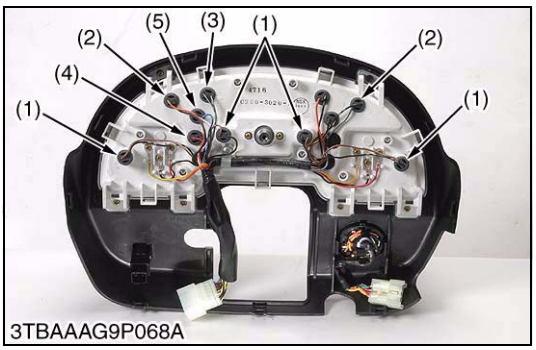


Glow Plug

1. Disconnect the lead from the glow plug.
2. Connect the tester positive cable to the glow plug lead and negative one to the chassis.
3. Measure its voltage with a voltmeter, after turning the main switch to the preheating or starting position.
4. If its voltage is not approximately the battery one, check the main switch or wiring harness.

(1) Glow Plugs **(a) From Main Switch 19 and Pre-heat Indicator Lamp**

W11439720



Monitor Lamp (for Charge, Engine Oil Pressure, Pre-heat, Illumination and Hazard)

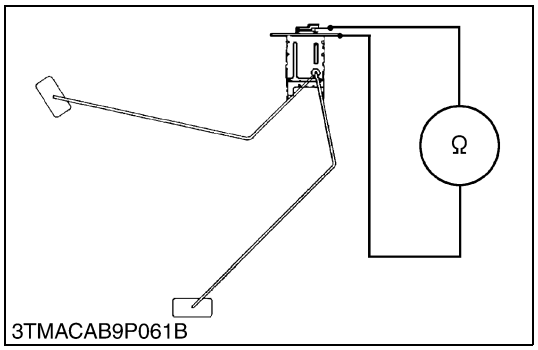
1. After removing the panel board from tractor, remove the plate behind the panel.
2. Remove the each lamp.
3. Measure the lamp resistance.
4. If it is infinity, replace the lamp with new.

Lamp spec.	All lamp	12 V, 1.7 W

(1) Illumination Lamp
(2) Hazard Lamp
(3) Engine Oil Pressure Lamp
(4) Pre-heat Lamp
(5) Charge Lamp

W11444990

(12) Gauge



3TMACAB9P061B

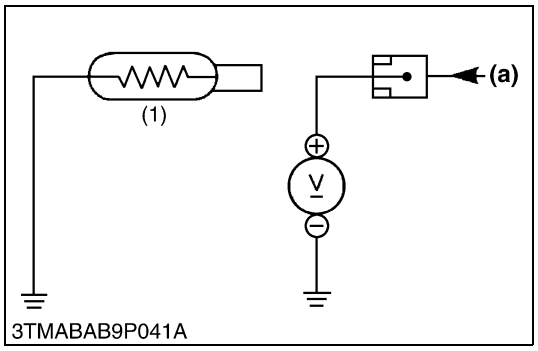
Fuel Level Sensor

1) 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 reference values are not indicated, the sensor is faulty.

Resistance (Sensor terminal - its body)	Reference value	Float at upper-most position	1 to 5 Ω
		Float at lower-most position	103 to 117 Ω

W56478923



3TMABAB9P041A

Coolant Temperature Sensor

1) Lead Terminal Voltage

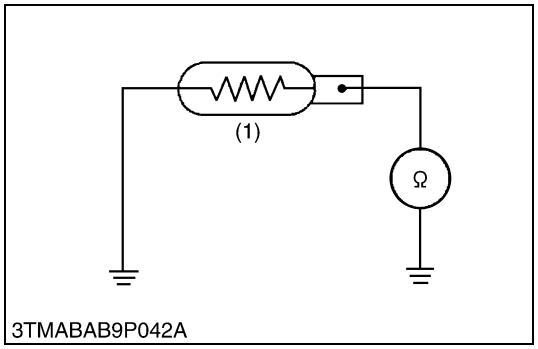
1. Disconnect the lead from the coolant temperature sensor after turning the main switch **OFF**.
2. Turn the main switch **ON** and measure the voltage with a voltmeter across the lead terminal and the chassis. If the voltage differs from the battery voltage, the wiring harness fuse or coolant temperature gauge is faulty.

Voltage	Lead terminal – Chassis	Approx. battery voltage

2) Sensor Continuity

1. Measure the resistances with an ohmmeter across the sensor terminal and the chassis.
2. If the reference value is not indicated, the sensor is faulty.

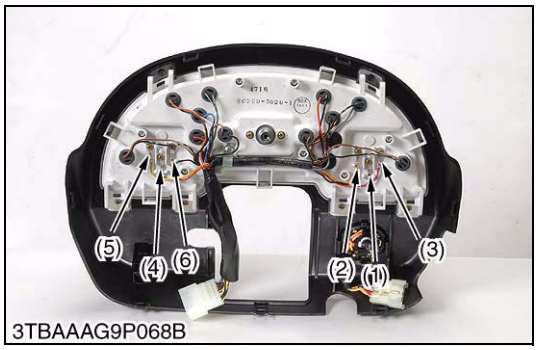
Resistance (Sensor terminal – Chassis)	Reference value	Approx. 12.2 Ω at 130 °C (266 °F) Approx. 23.6 Ω at 105 °C (221 °F) Approx. 51.9 Ω at 80 °C (176 °F) Approx. 153.9 Ω at 50 °C (122 °F)



3TMABAB9P042A

(1) Coolant Temperature Sensor **(a) From Temperature Gauge**

W56874921



3TBAAAG9P068B

Fuel Gauge and Coolant Temperature Gauge Continuity

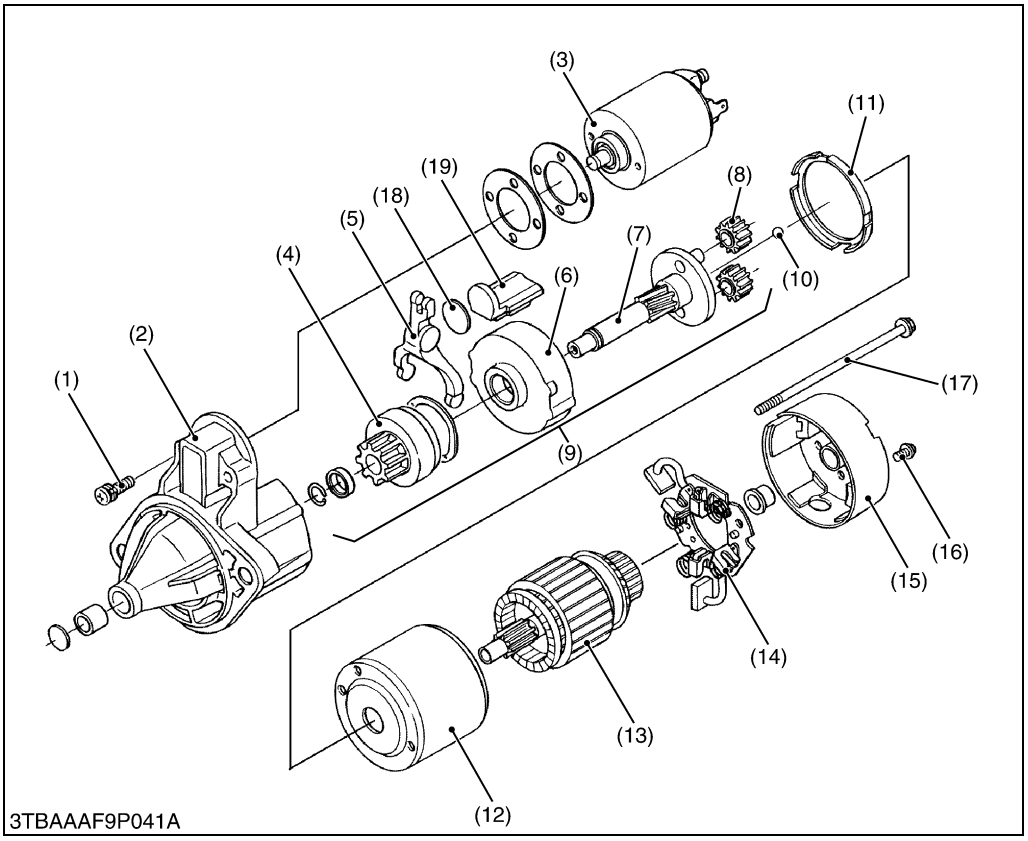
1. Remove the panel board from the tractor.
2. Check the continuity with an ohmmeter across the **U** terminal (2) and **IGN** terminal (3) and across the **U** terminal (2) and **GND** terminal (1).
3. If infinity is indicated, the coolant temperature is faulty.
4. Check the continuity with an ohmmeter across the **U** terminal (5) and **IGN** terminal (6) and across the **U** terminal (5) and **GND** terminal (4).
5. If infinity is indicated, the fuel gauge is faulty.

(1) **GND** Terminal (Temperature)
(2) **U** Terminal (Temperature)
(3) **IGN** Terminal (Temperature)
(4) **GND** Terminal (Fuel)
(5) **U** Terminal (Fuel)
(6) **IGN** Terminal (Fuel)

W1057349

[2] DISASSEMBLING AND ASSEMBLING

(1) Starter



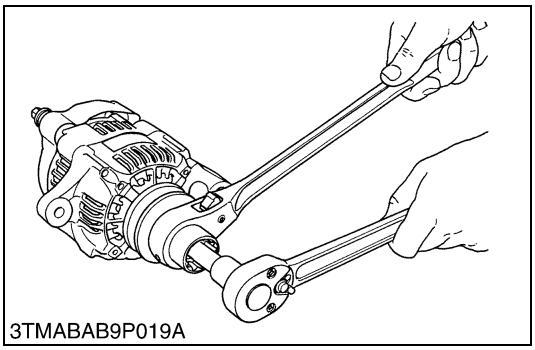
(1) Screw
(2) Front Bracket
(3) Magnetic Switch
(4) Overrunning Clutch
(5) Drive Lever
(6) Internal Gear
(7) Shaft
(8) Planetary Gear
(9) Shaft Assembly
(10) Ball
(11) Gasket
(12) Yoke
(13) Armature
(14) Brush Holder
(15) Rear End Frame
(16) Screw
(17) Through Bolt

W1016748

1. Disconnect the connecting lead from the magnetic switch (3).
2. Remove the screw (1) and remove the magnet switch (3).
3. Remove the screw (16) and through bolt (17), and separate the rear end frame (15).
4. Remove the brush holder (14).
5. Draw out the armature (13) and yoke (12).
6. Remove the gasket (11), gasket (19) and plate (18).
7. Draw out the shaft assembly (9) with the drive lever (5).

■ **NOTE**
- **Do not damage the brush and commutator.**
- **Do not miss the ball (10).**

(2) Alternator



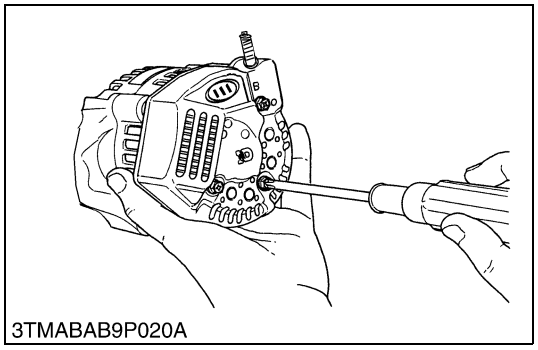
Pulley

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 lbf·ft

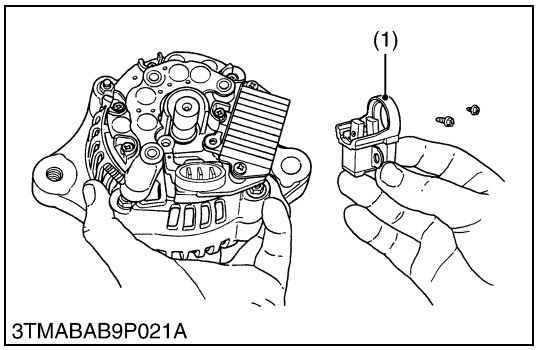
W10187280


3TMABAB9P020A

Rear End Cover

1. Unscrew the three rear end cover screws and the **B** terminal nut, and remove the rear end cover.

W10189820



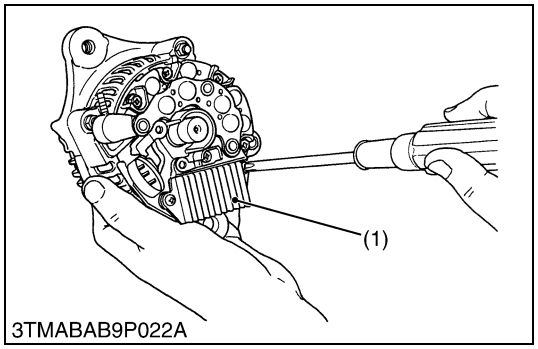
3TMABAB9P021A

Brush Holder

1. Unscrew the two screws holding the brush holder, and remove the brush holder (1).

(1) Brush Holder

W10190540



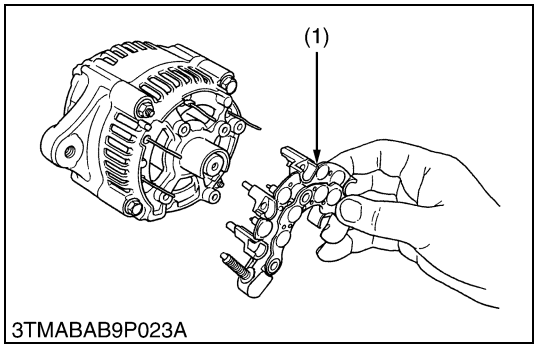
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IC Regulator

1. Unscrew the three screws holding the IC regulator, and remove the IC regulator (1).

(1) IC Regulator

W10191230



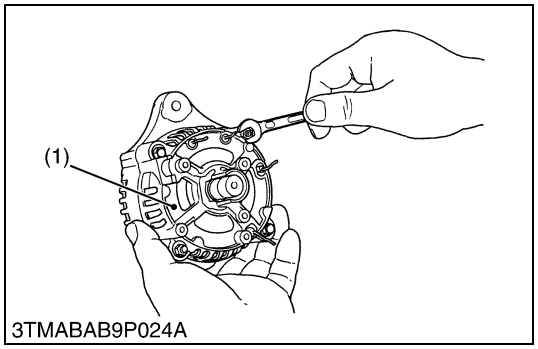
3TMABAB9P023A

Rectifier

1. Remove the four screws holding the rectifier and the stator lead wires.
2. Remove the rectifier (1).

(1) Rectifier

W10191920



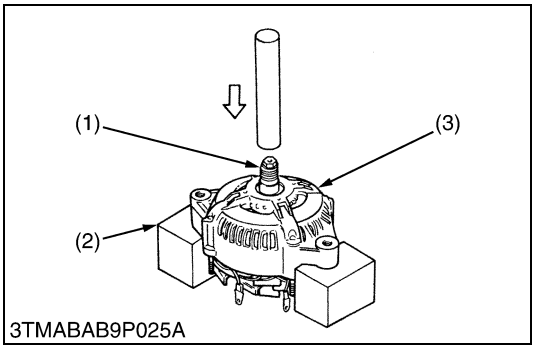
3TMABAB9P024A

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

W10192740



3TMABAB9P025A

Rotor

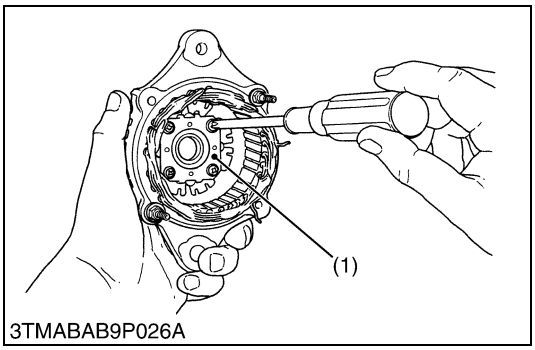
1. Press out the rotor (1) from drive end frame (3).

■ **IMPORTANT**

- **Take special care not to drop the rotor and damage the slip ring or fan, etc..**

(1) Rotor
(2) Block
(3) Drive End Frame

W10194380



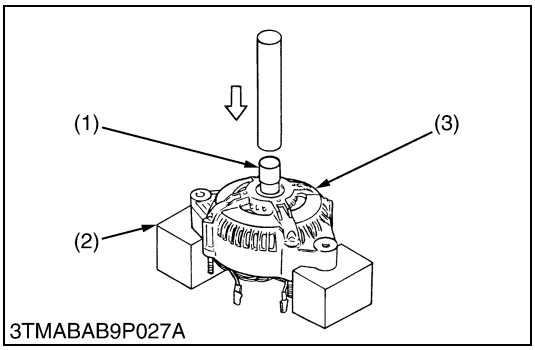
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Retainer Plate

1. Unscrew the four screws holding the retainer plate, and remove the retainer plate (1).

(1) Retainer Plate

W10195420



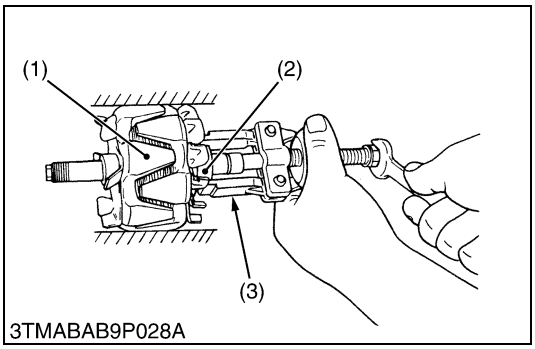
3TMABAB9P027A

Bearing on Drive End Side

1. Press out the bearing from drive end frame (3) with a press and jig (1).

(1) Jig
(2) Block
(3) Drive End Frame

W10196110



3TMABAB9P028A

Bearing at Slip Ring Side

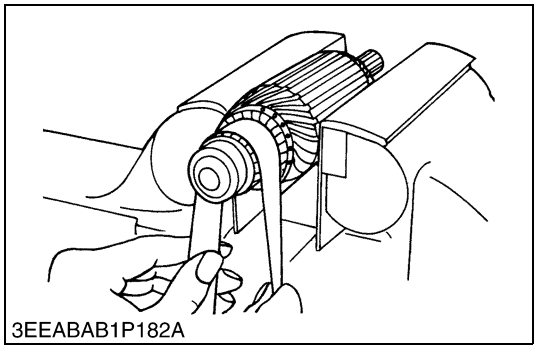
1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

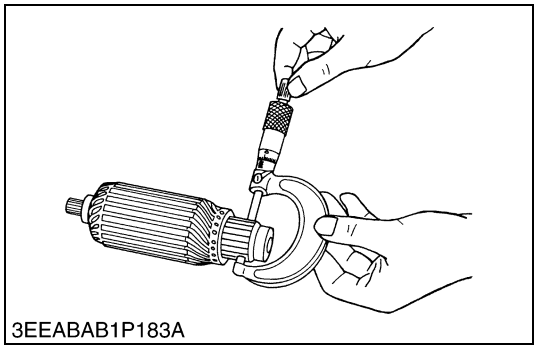
(1) Rotor
(2) Bearing
(3) Puller

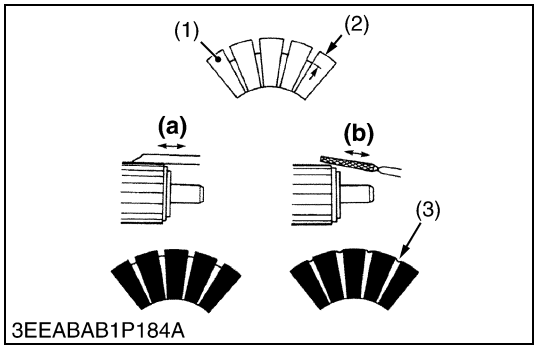
W10197010

[3] SERVICING

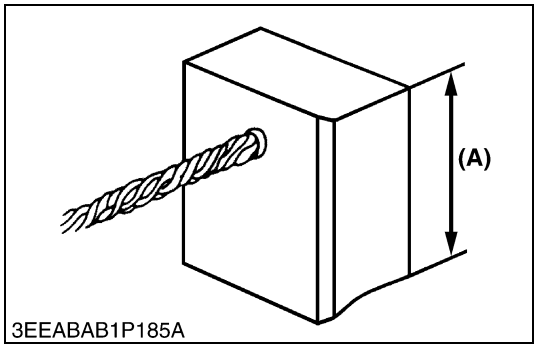
(1) Starter


3EEABAB1P182A

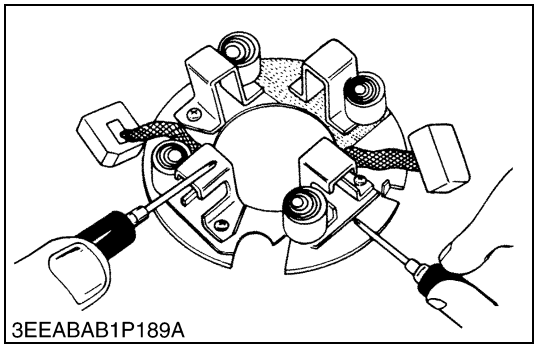

3EEABAB1P183A



3EEABAB1P184A



3EEABAB1P185A


3EEABAB1P189A

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, correct the commutator on a lathe to the factory specification.
4. Measure the mica undercut.
5. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.

Commutator O.D.	Factory spec.	28.0 mm 1.102 in.
	Allowable limit	27.0 mm 1.063 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.	0.60 mm 0.0236 in.
	Allowable limit	0.20 mm 0.0079 in.

(1) Segment
(2) Undercut
(3) Mica

(a) Correct
(b) Incorrect

W1017092

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.

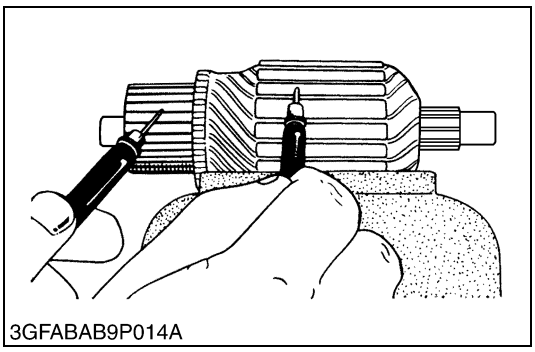
W1017544

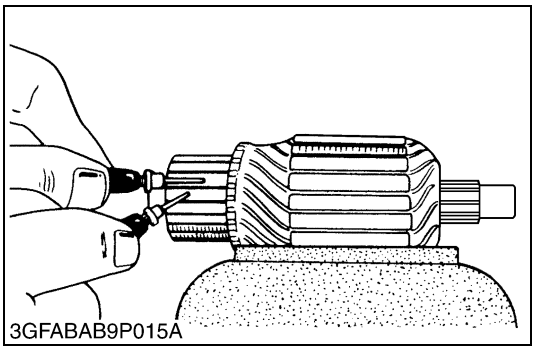
Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

Resistance	Brush holder - Holder support	Infinity

W1017672


3GFABAB9P014A

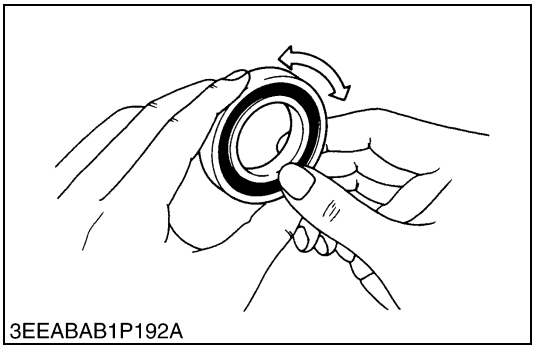

3GFABAB9P015A

Armature Coil

1. Check the continuity between the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity between the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

W1017767

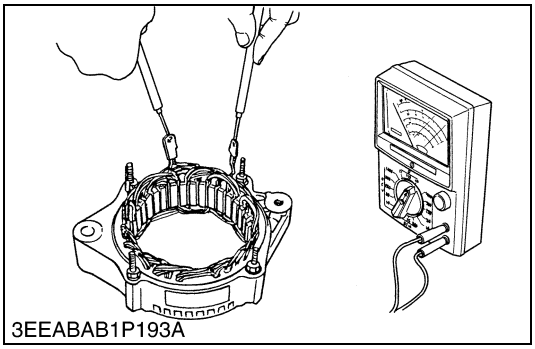
(2) Alternator


3EEABAB1P192A

Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

W10197900

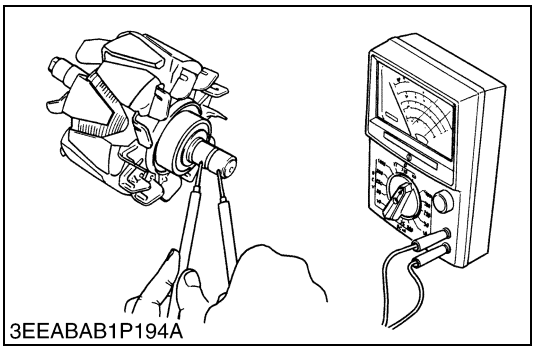

3EEABAB1P193A

Stator

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within the 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

W10199640

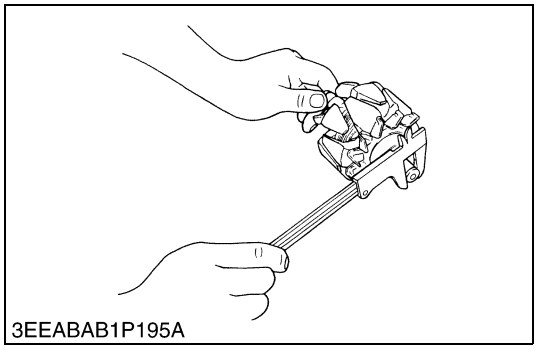

3EEABAB1P194A

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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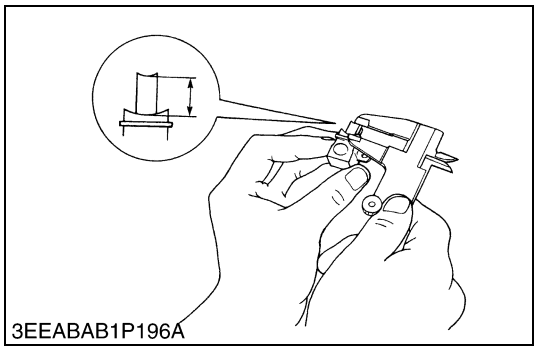

3EEABAB1P195A

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	12.8 mm 0.504 in.

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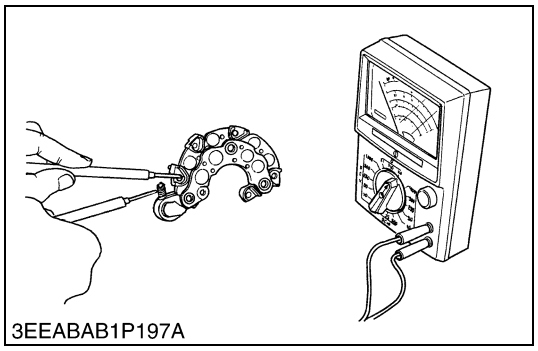

3EEABAB1P196A

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.

W10203290


3EEABAB1P197A

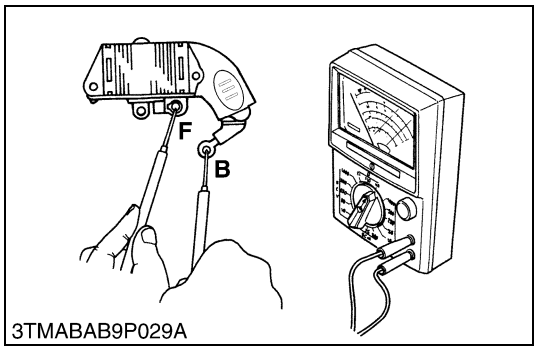
Rectifier

1. Check the continuity across each diode of rectifier with an analog ohmmeter. Conduct the test in the (R × 1) setting.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

■ **IMPORTANT**
- **Do not use a 500 V 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.**

W10204520



3TMABAB9P029A

IC Regulator

1. Check the continuity across the **B** terminal and the **F** terminal of IC regulator with an analog ohmmeter. Conduct the test in the (R × 1) setting.
2. The IC regulator is normal if the IC regulator conducts in one direction and does not conduct in the reverse direction.

■ **IMPORTANT**
- **Do not use a 500 V 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.**

W10206450

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10 CABIN

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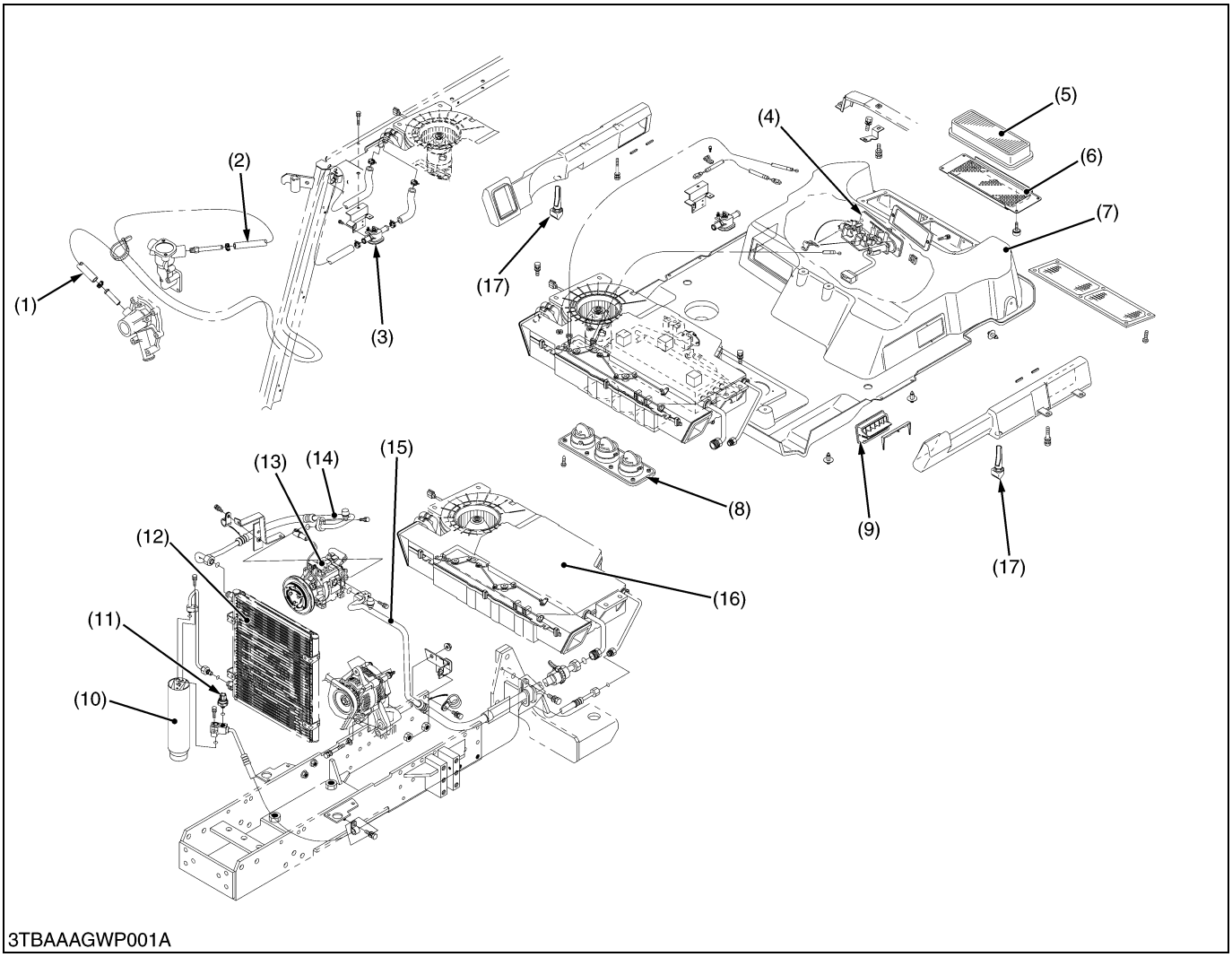
MECHANISM

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[1] COMPRESSOR 10-M11
(1) Scroll Type Compressor 10-M11
(2) Pressure Relief Valve 10-M12
(3) Magnetic Clutch 10-M13
[2] CONDENSER 10-M14
[3] RECEIVER 10-M15
[4] AIR CONDITIONER UNIT 10-M16
(1) Expansion Valve 10-M17
(2) Evaporator 10-M19
(3) Heater Core 10-M19
(4) Water Valve 10-M20
(5) Blower 10-M21
3. SYSTEM CONTROL 10-M22
4. ELECTRICAL SYSTEM 10-M23
[1] ELECTRICAL CIRCUIT 10-M23
[2] BLOWER RELAY, COMPRESSOR RELAY, THERMO SWITCH AND PRESSURE SWITCH 10-M24
(1) Compressor Relay 10-M25
(2) Blower Switch 10-M26
(3) Thermo Switch 10-M27
(4) Pressure Switch 10-M28

1. OUTLINE OF AIR CONDITIONING SYSTEM

[1] STRUCTURE



3TBAAAGWP001A

(1) Heater Hose (Outside)
(2) Heater (Inside)
(3) Water Valve
(4) Control Panel
(5) Outside Air Filter
(6) Inside Air Filter
(7) Roof
(8) Front Air Outlet
(9) Side Air Outlet
(10) Receiver
(11) Pressure Switch
(12) Condenser
(13) Compressor
(14) High Pressure Pipe
(15) Low Pressure Pipe
(16) Air Conditioner Unit
(17) Door Air Outlet

The machine is equipped with a thin large-capacity air conditioner with outside air intake. Air pulled from the inside air filter (6) as well as the outside air filter (5), passes through the roof (7) and reaches the air conditioner unit (16). The air is then cooled and dehumidified by this unit.

The processed air is then heated to a comfortable level. In this way, the air being blown via the blow port can be kept at comfortable temperature and humidity.

The front air outlet (8) can be opened and closed using the center knob of each port. The side air outlet (9) are opened and closed using the mode lever on the control panel (4). With these ports opened or closed, you can feel your head cool and your feet warm.

Capacity (Cooling)	Factory spec.	2.7 to 3.3 kW
Capacity (Warming)	Factory spec.	3.85 to 4.71 kW
Kinds of refrigerant (Charging amount)	Factory spec.	R134a 0.63 to 0.69 kg 1.39 to 1.52 lbs
Pressure sensor (Low)	Factory spec.	0.196 MPa 2.0 kgf/cm^2 28.4 psi
Pressure sensor (High)	Factory spec.	2.94 MPa 30.0 kgf/cm^2 426 psi

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■ **NOTE**

- **As for the mechanism and function of each component part, refer to Workshop Manual of "MECHANISM".**

■ **Compressor Oil**

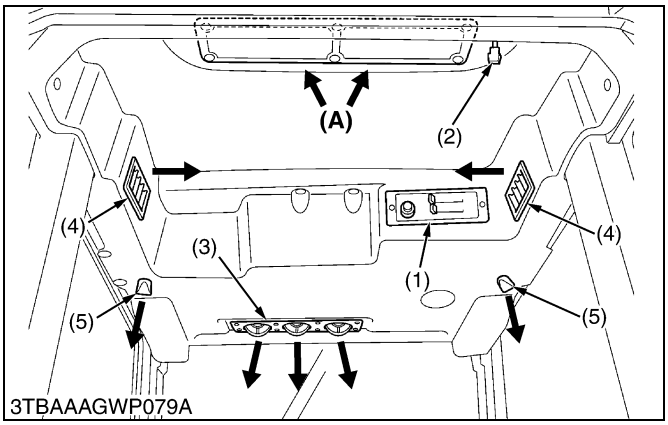
The compressor oil dissolves in the refrigerant, circulates through the air-conditioning cycle, and performs the function of lubricating the compressor. The conventional compressor oil for R12 does not dissolve in R134a, so it does not circulate through the system, and the lifespan of the compressor is considerably shortened.

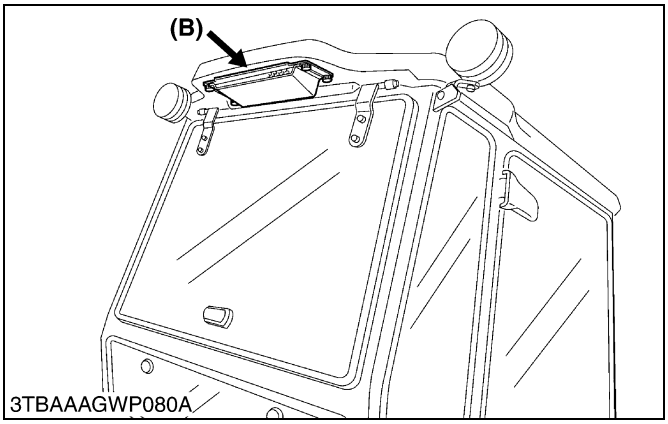
It is essential to ensure that the correct refrigerant oil is used. R12 systems were lubricated with mineral oil, which is totally unsuitable for R134a systems. The system requires PAG oil, which mixes very well with the refrigerant and provides ideal lubrication throughout the system.

Quantity (Total)	Brand Name
50 to 70 cm^3 3.1 to 4.3 cu.in.	ND-OIL 8 <PAG* oil>

*PAG : Polyalkyleneglycol (Synthetic oil)

[2] AIR FLOW





Air in the CAB and fresh air introduced into CAB flow as shown in the figure. Adjust the 7 air ports to obtain the desired condition.

■ **NOTE**

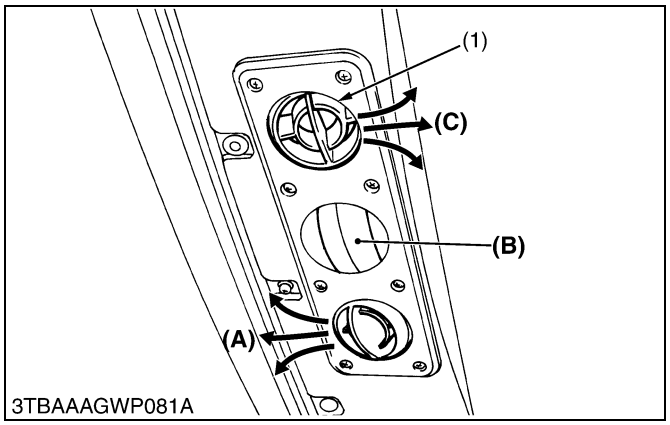
- **Do not pour water directly into the fresh air port while washing the vehicle.**

(1) Control Panel
(2) Recirculation / Fresh Air Selection Lever
(3) Front Air Outlet (Defrost, Windshield, Foot Area)
(4) Side Air Outlet (Face, Back Area)
(5) Door Air Outlet (Door Area)

(A) Inner Air Recirculation
(B) Fresh Air Inlet

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[3] AIR CONTROL VENT

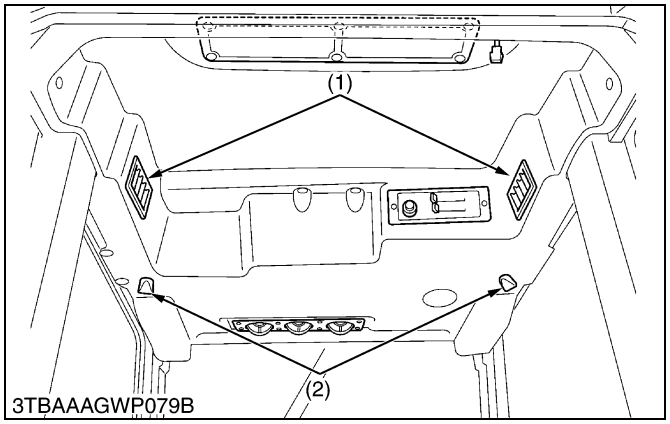


■ Front Air Outlet

The front air outlets can be independently adjusted as required. To defrost the windshield, rotate the outlets toward the windshield.

(1) Front Air Outlet
(A) Windshield
(B) Closed
(C) Chest Area

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■ Side Air Outlet and Door Air Outlet

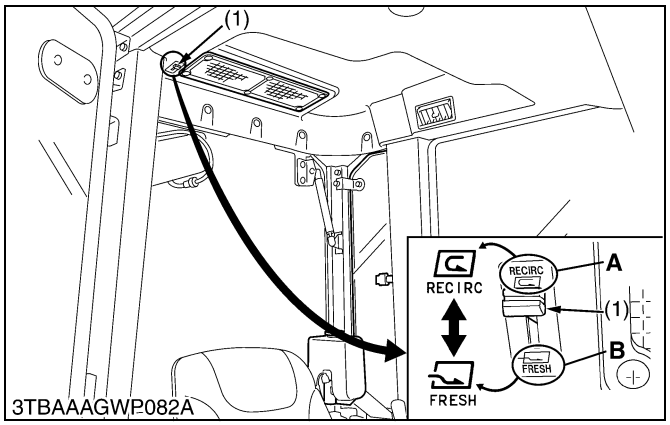
The side and door air outlets can be adjusted to direct air on to the operator, door window or the rear of the CAB.

■ NOTE

- **If the airflow rate at the face is too low, close the front air outlet.**

(1) Side Air Outlet
(2) Door Air Outlet

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■ Recirculation / Fresh Air Selection Lever

[FRESH AIR]

Set the lever to the **B** position (**FRESH AIR**), and fresh air will flow into the CAB.

This is helpful when you work in dusty conditions or if the glass windows get foggy.

[RECIRCULATION]

Set the lever to the **A** position (**RECIRCULATION**), and the in-CAB air will be recirculated. This is useful for cooling or heating the CAB quickly or keeping it extra cool or warm.

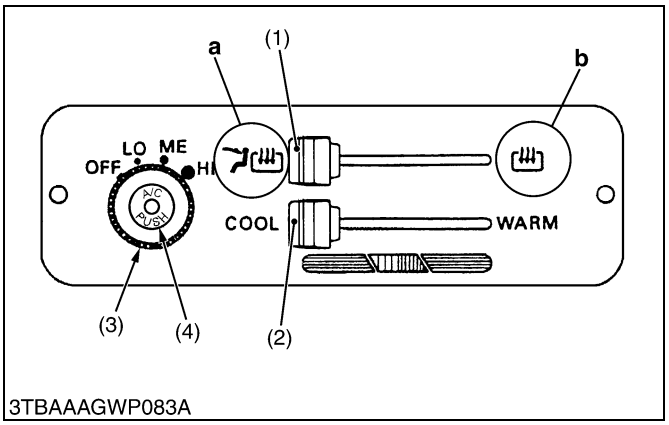
■ NOTE

- **When heating, do not keep the lever at the "RECIRCULATION" position for a long time. The windsheild easily gets foggy.**
- **While working in a dusty conditions, keep the lever at the "FRESH AIR" position. This increase the pressure in the CAB, which helps prevent dust from coming into the CAB.**

(1) Recirculation / Fresh Air Selection Lever
A : RECIRCULATION
B : AIR FRESH

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[4] CONTROL PANEL



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■ **Mode Lever**

Set the mode lever to the desired position.

a : Air is blown from the front and side air outlets.

b : Air is blown from only the front air outlets.

■ **Temperature Control Lever**

Set this lever at the desired position to obtain the optimum air temperature. Move the lever to the right to obtain warmer air. Move it to the left to obtain cooler air.

■ **Blower Switch**

Air volume can be changed in three steps. At the "**HI**" position, the largest air volume is obtained.

■ **Air Conditioner Switch**

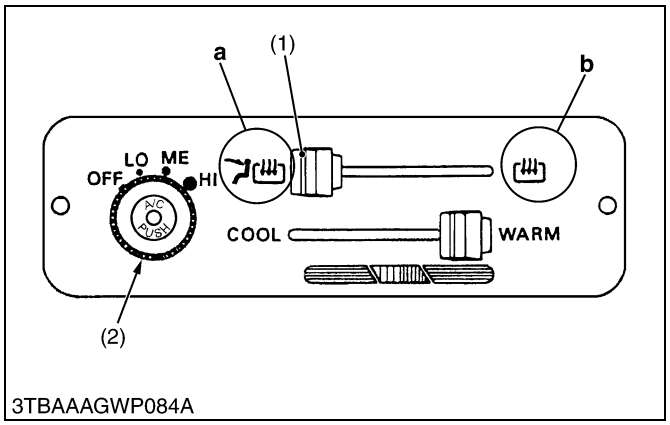
Push this switch to activate the air conditioner. An indicator light will light up when the switch is set to "**ON**". Push switch again to turn air conditioner off, in which case the indicator light will be off.

(1) Mode Lever
(2) Temperature Control Lever
(3) Blower Switch
(4) Air Conditioner Switch with Indicator Light

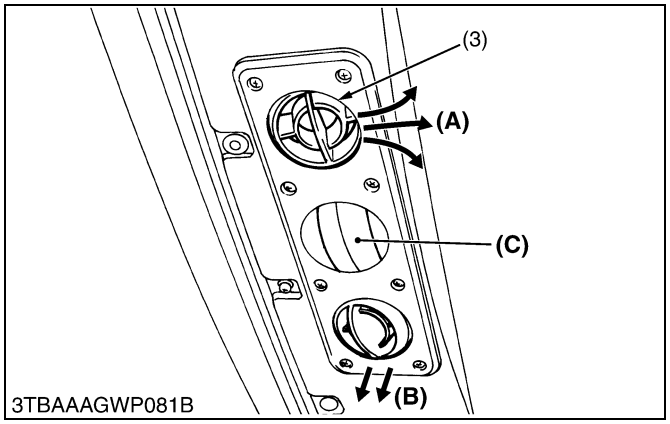
a : Front and Side Air Outlet Position
b : Front Air Outlet Position

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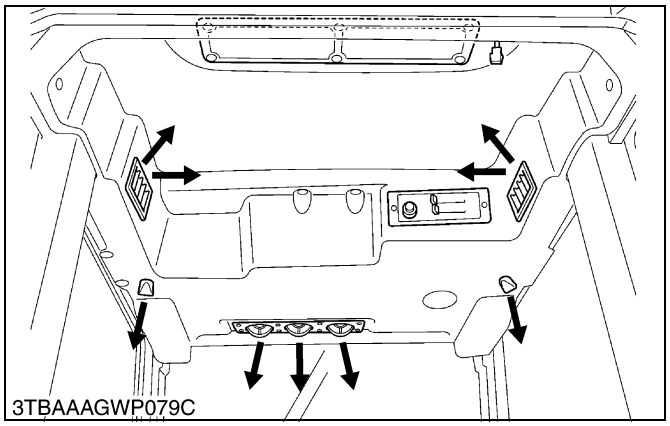
[5] OPERATION



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3TBAAAGWP081B


3TBAAAGWP079C

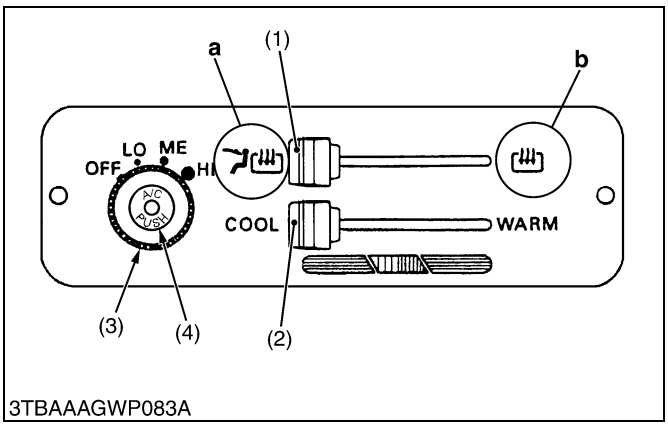
■ Heating

1. Set the mode lever to the **a** position or **b** position.
2. Set the recirculation / fresh air selection lever to the "**FRESH AIR**" position. To raise the temperature in the CAB quickly, set this lever to the "**RECIRCULATION**" position.
3. Adjust the blower (**LO** / **ME** / **HI**) switch and the temperature control lever to achieve a comfortable temperature level.

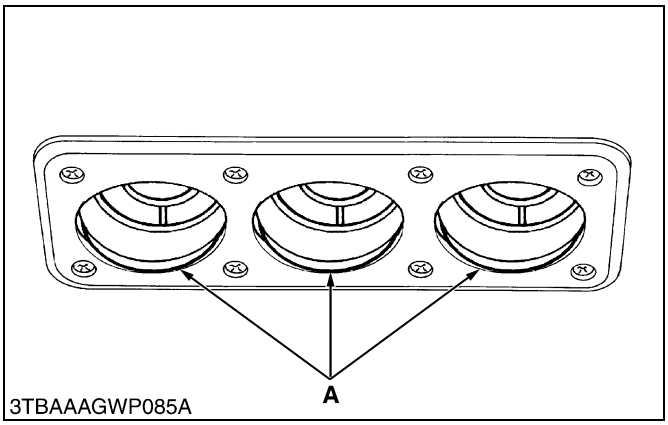
(1) Mode Lever
(2) Blower Switch
(3) Front Air Outlet

(A) Chest Area
(B) Foot Area
(C) Closed
a : Front and Side Air Outlet Position
b : Front Air Outlet Position

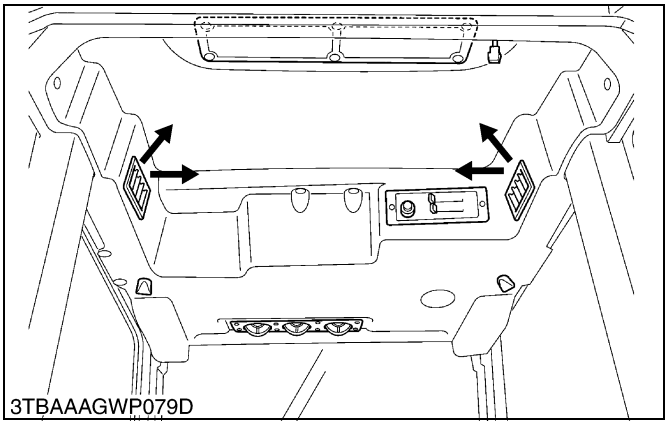
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3TBAAAGWP079D

■ Cooling or Dehumidifying-heating

1. Set the mode lever to the **a** position.
2. Rotate the front air outlet toward the chest area.
3. Set the recirculation / fresh air selection lever to the "**FRESH AIR**" position. To reduce the temperature in the CAB quickly, set this lever to the "**RECIRCULATION**" position.
4. Press and turn on the air-conditioner switch with indicator.
5. Turn on the blower (**LO** / **ME** / **HI**)switch.
6. Adjust the temperature control lever to the "**COOL**" or an intermediate position to achieve a comfortable temperature level.

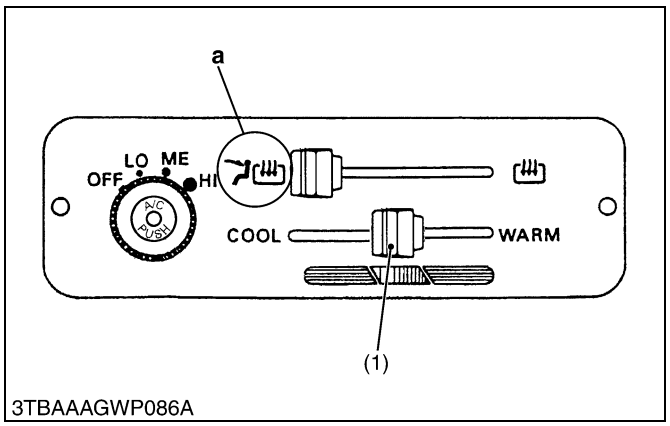
■ NOTE

- **In summer when the heater is not used, keep the temperature control lever at the "COOL" (leftmost) position. Otherwise, hot air will raise the temperature in the CAB.**

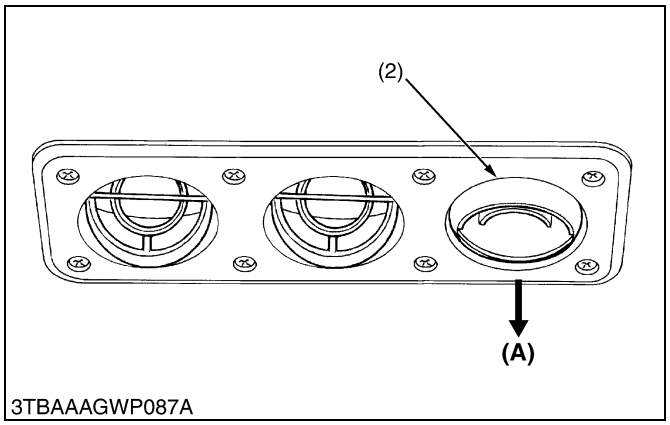
(1) Mode Lever
(2) Temperature Control Lever
(3) Blower Switch
(4) Air Conditioner Switch with Indicator Light

A : Chest Area
a : Front and Side Air Outlet Position
b : Front Air Outlet Position

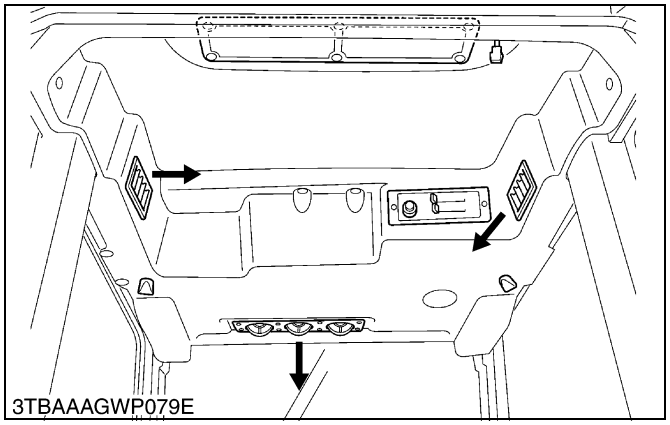
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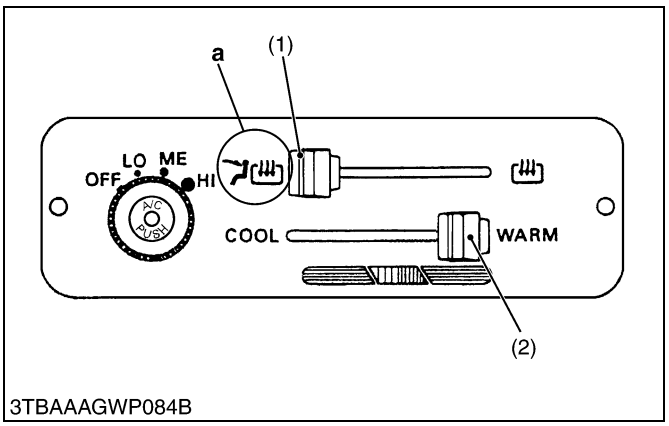

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■ Foot Warming and Head Cooling

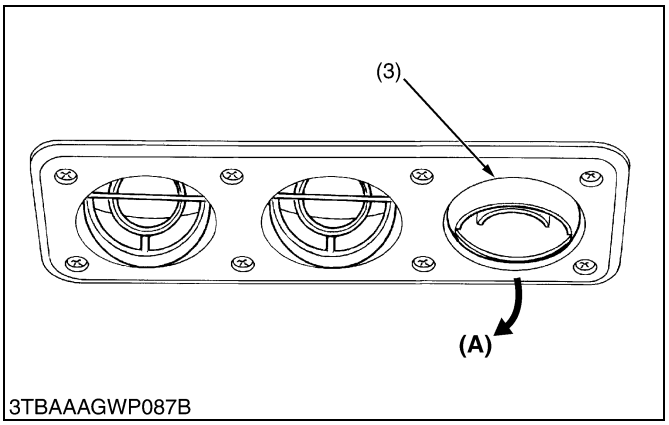
1. Set the mode lever to the **a** position.
2. In the cooling or dehumidifying-heating mode, set the temperature control lever at the center position.
3. Open the front air outlet and direct it to your feet.
4. You can feel your head cool and your feet warm.

(1) Temperature Control Lever
(2) Front Air Outlet
(A) Foot Area
a : Front and Side Air Outlet Position

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3TBAAAGWP087B

■ Defrosting or Demisting

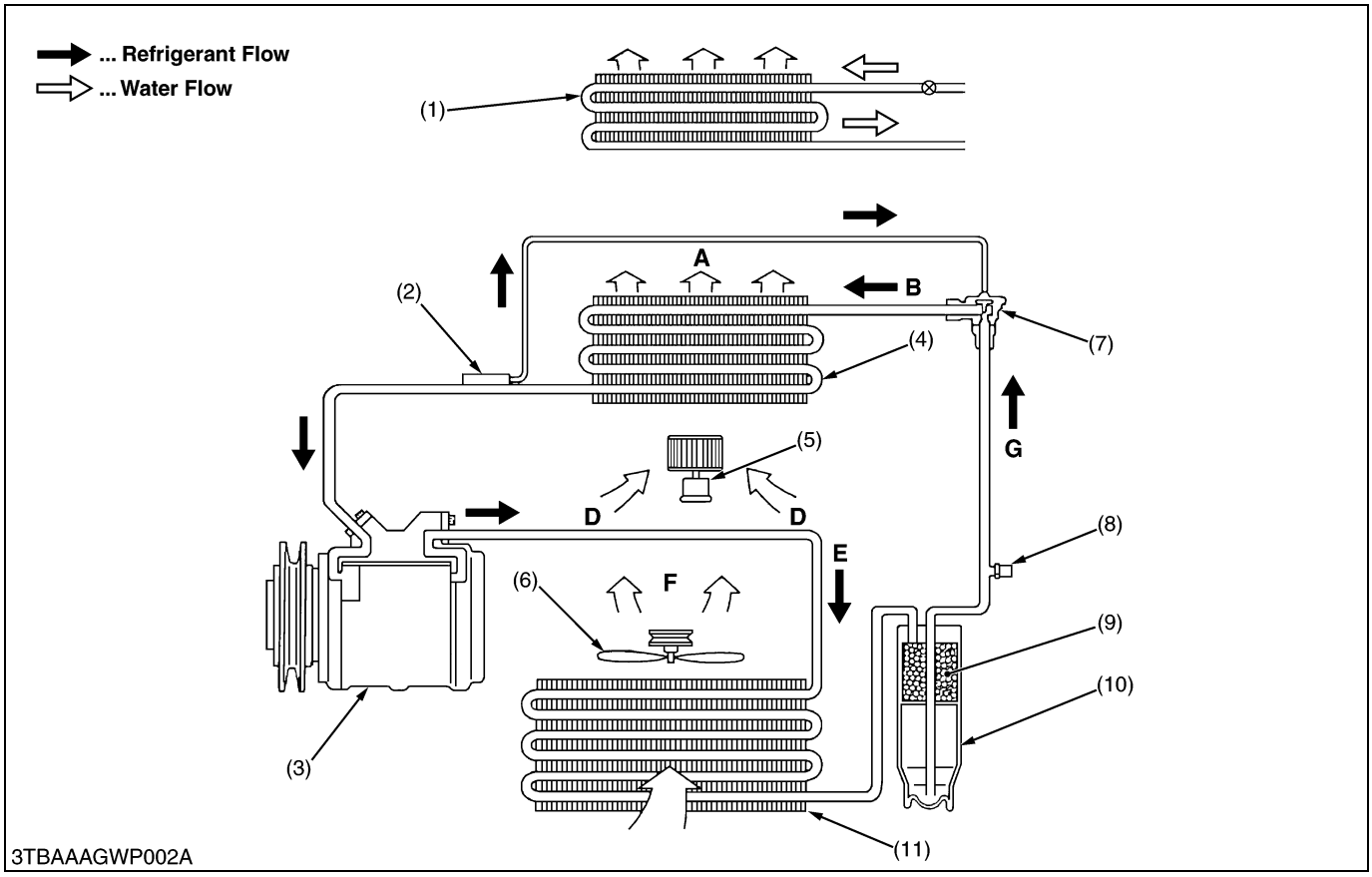
To defrost or demist the windshield, take the following steps.

1. Set the mode lever to the **a** position.
2. Open the front air outlet, door air outlet and direct it to the windshield.
3. Shut the side air outlet.
4. Set the recirculation / fresh air selection lever to the "**FRESH AIR**" position.
5. Set the blower switch and the temperature control lever to the "**HI**" and "**WARM**" (rightmost) positions, respectively.

(1) Mode Lever
(2) Temperature Control Lever
(3) Front Air Outlet
(A) Windshield
a : Front and Side Air Outlet Position

W1017247

2. REFRIGERATION SYSTEM



(1) Heater Core
(2) Heat Sensitive Tube
(3) Compressor
(4) Evaporator
(5) Blower Motor
(6) Engine Cooling Fan
(7) Expansion valve
(8) Pressure Switch
(9) Desiccant
(10) Receiver
(11) Condenser

A : Cold Air
B : Low Pressure, Low Temperature Gas and Liquid Mist
D : Cabin Interior Air
E : High Pressure, High Temperature Gas
F : Hot Air
G : Liquid

1. The gaseous refrigerant pass through the evaporator (4) and the compressor (3) at approx. 1.47 MPa (15 kgf/cm^2, 213 psi) and is also raised in temperature to approx. 70 °C (158 °F) before being delivered to the condenser (11).
2. The gaseous refrigerant is cooled down through the condenser (11) to approx. 50 °C (122 °F) and delivered to the receiver (10) in the liquid state.
   At this time, heat removed from the cabin interior is extracted by means of the condenser (11)
3. The liquid refrigerant is collected in the receiver (10) for a certain period. At this time moisture is removed from the refrigerant by desiccant (9).
4. The liquid refrigerant after removing moisture and dust, is jetted out of the small hole of the expansion valve (7) into the evaporator (4), as if it were distributed by an atomizer. Thus, the refrigerant is reduced in both pressure and temperature, and to ease evaporation.
5. The refrigerant vigorously evaporates at 0 °C (32 °F), taking heat from the surface of the pipes in the evaporator (4).
6. At this time, warm air in a cabin is drawn into the evaporator (4) by the blower motor and is passed over those pipes, transferring its heat to the refrigerant for evaporation. The cooled air is then distributed to the cabin and the heat in the cabin is taken by the evaporator.

(Reference)

- Since warm air in the cabin is cooled suddenly, water in the air is liquefied and removed, which means dehumidification is also performed.

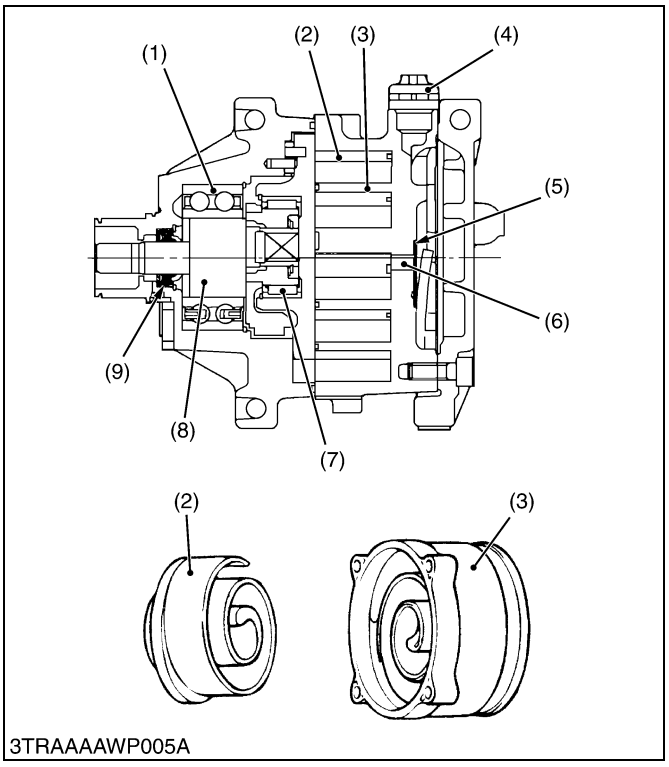
7. The gaseous refrigerant from the evaporator (4) after having performed the cooling action is returned to the compressor (3), and is compressed to liquefy it (high pressure and high temperature). This cycle is repeated.
8. The air coming from the evaporator is fed to the air mixing doors, by which part of the air is introduced into the heater core (1). In doing so, the air temperature can be adjusted to a comfortable level.

[1] COMPRESSOR

The compressor is installed on the engine and is driven by the crank pulley via a belt.

The compressor is a pump designed to raise the pressure of refrigerant. Raising the pressure means raising the temperature. High temperature refrigerant vapor will condense rapidly in the condenser by releasing heat to the surrounding.

(1) Scroll Type Compressor



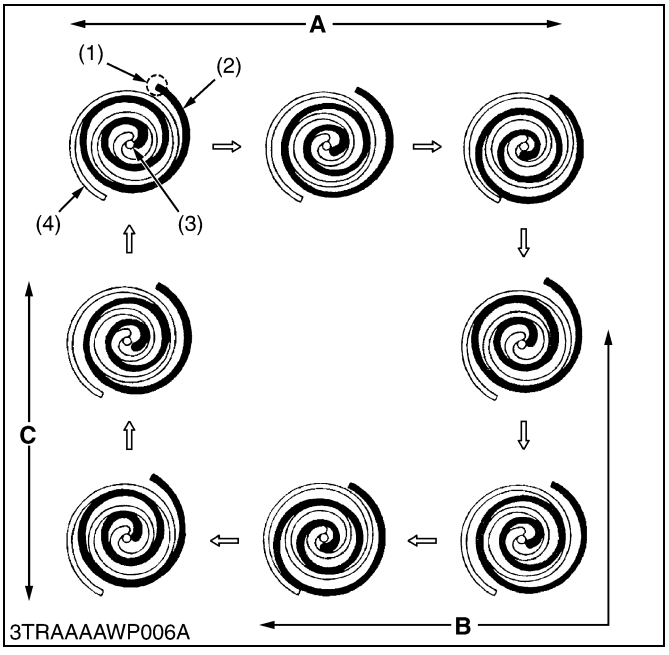
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The scroll type compressor is composed of a pair of swirl shaped fixed scroll (3) and movable scroll (2).

The fixed scroll (3) is fixed to the housing, and movable scroll (2) rotates with the shaft (8). Therefore, the capacity of the space partitioned with both scroll changes. As a result, the refrigerant is inhaled and compressed.

(1) Bearing
(2) Movable Scroll
(3) Fixed Scroll
(4) Service Valve for High Pressure
(5) Discharge Valve
(6) Discharge Port
(7) Bearing
(8) Shaft
(9) Shaft Seal

W1018328



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■ Operation

When the capacity between fixed scroll (4) increases with the rotational movement of the movable scroll (2), the refrigerant is inhaled from the suction port (1). In addition, the refrigerant is compressed by the rotational movement of movable scroll (2).

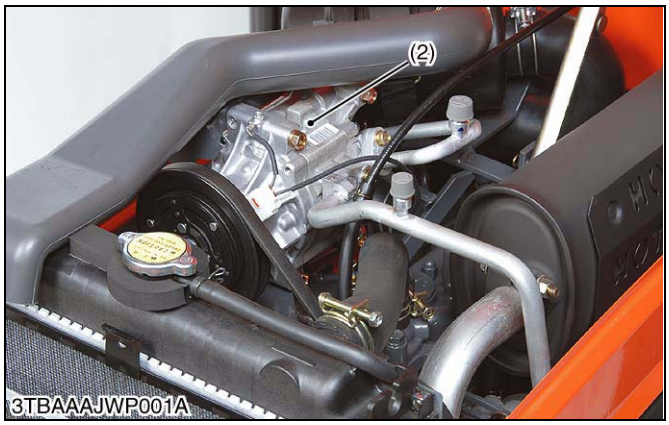
When the refrigerant pressure rises, the discharge valve is pushed open and the refrigerant gas is discharged. In this way, the refrigerant gas is discharged once in each rotation of the compressor shaft.

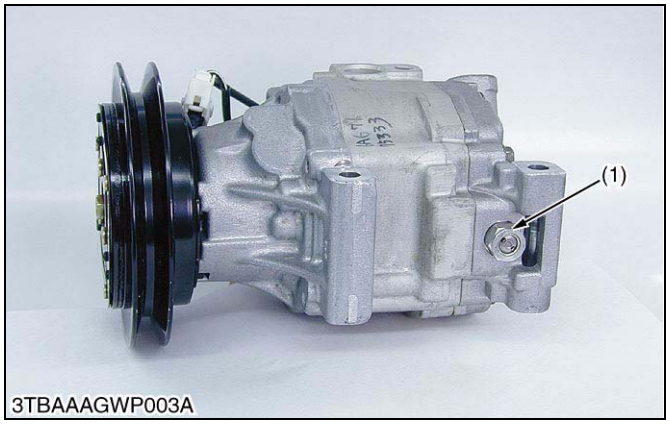
(1) Suction Port
(2) Movable Scroll
(3) Discharge Port
(4) Fixed Scroll

A : Suction Stroke
B : Compression Stroke
C : Discharge Stroke

W1018621

(2) Pressure Relief Valve





If the high pressure is abnormally high, the pressure relief valve (1) opens to protect the circuit.

Even in the worst case, the outflow of refrigerant is stopped at the minimum limit.

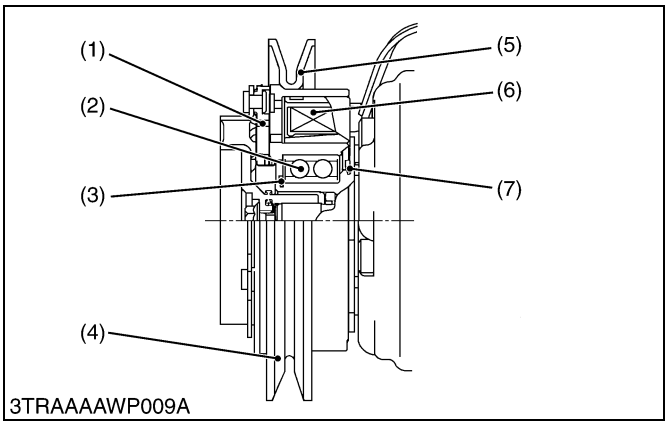
(Reference)

- In normal operation, the high pressure switch is triggered first and the compressor stops, so the pressure relief valve is not triggered so easily.

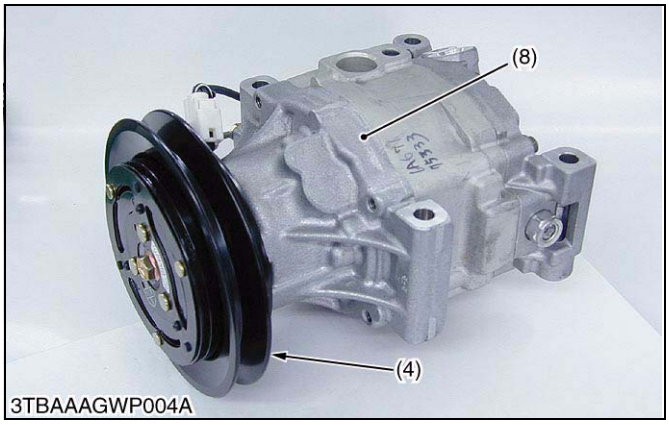
(1) Pressure Relief Valve (2) Compressor

W1018832

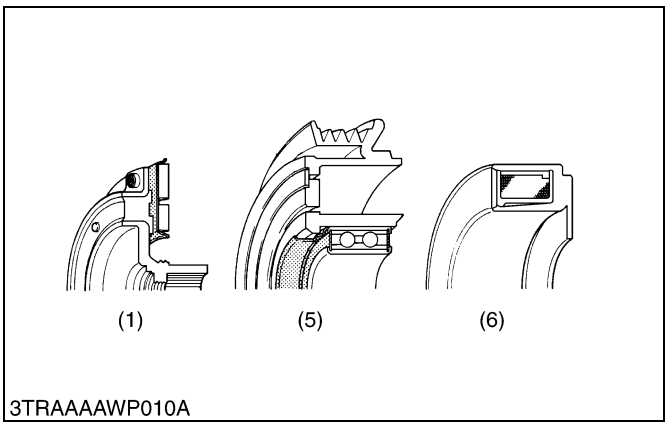
(3) Magnetic Clutch



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3TRAAAAWP010A

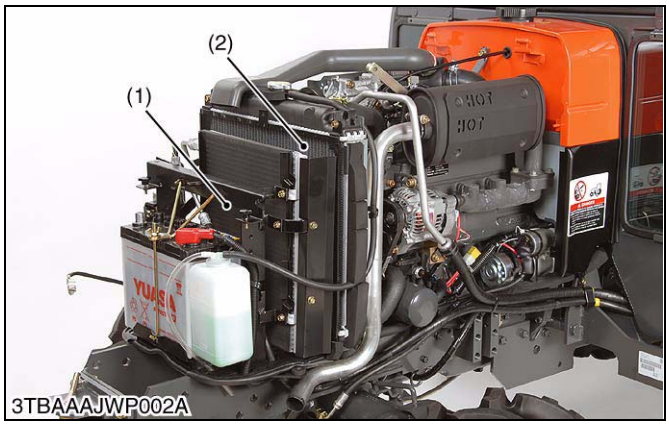
A magnetic clutch is used to engage and disengage the compressor from the engine. Main components are stator (6), rotor with pulley (5), and pressure plate (1) to engage the drive pulley (4) and compressor (8) magnetically.

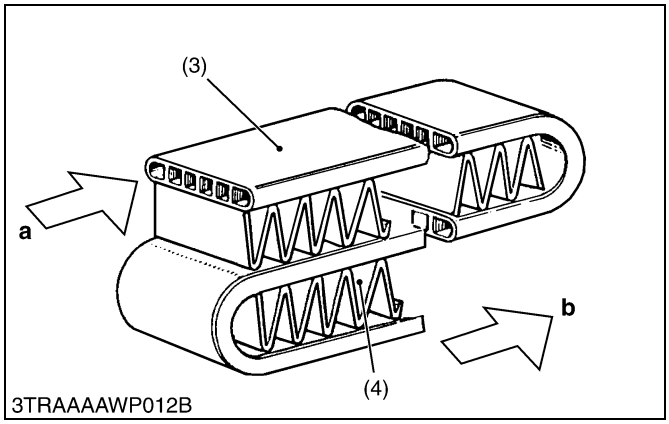
The stator is fixed on the compressor housing, and the pressure plate (1) is attached to the compressor shaft. Two ball bearings (2) are used between the inner surface of the rotor and the front housing of the compressor.

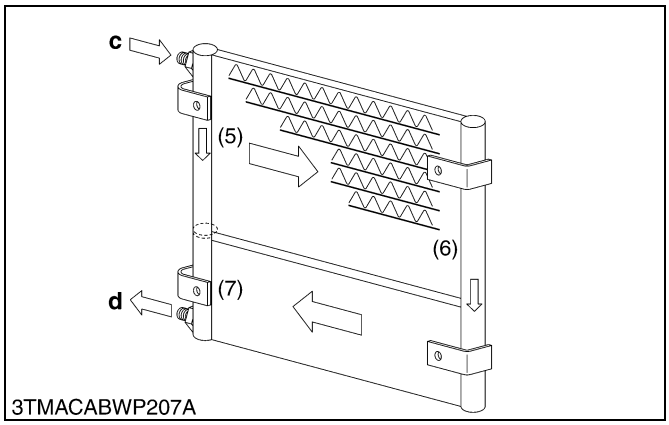
(1) Pressure Plate
(2) Ball Bearing
(3) Snap Ring
(4) Pulley
(5) Rotor with Pulley
(6) Stator
(7) Snap Ring
(8) Compressor

W1019357

[2] CONDENSER







The condenser (1) is installed in the front of the radiator to enable forced cooling by the air drawn in by the engine radiator fan.

The condenser is used for the purpose of cooling by robbing the heat from the refrigerant gas, which has been compressed by the compressor into high temperature, high pressure gas, and change this gas into liquid refrigerant.

The heat given off by the gaseous refrigerant in the condenser is the sum of the heat absorbed at the evaporator and the heat of work required by the compressor to compress the refrigerant. The greater the amount of heat is given off in the condenser, the greater the cooling effect attainable by the evaporator in the cabin.

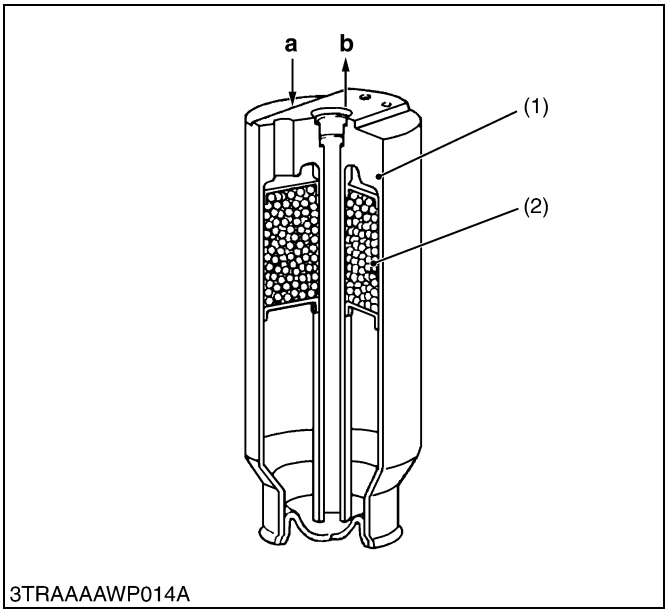
(1) Condenser
(2) Radiator
(3) Tube
(4) Fin
(5) Vapor
(6) Liquefying
(7) Liquefied

a : Gaseous Refrigerant
b : Liquid Refrigerant
c : Heated Vapor from Compressor (70 °C, 158 °F)
d : Cooled Liquid to Receiver (50 °C, 122 °F)

W1019810

[3] RECEIVER





The receiver serves the purpose of storing the liquid refrigerant. The amount of liquid refrigerant flowing through the system varies with the operating condition of the air conditioner. To be accurate, the receiver stores excess refrigerant when the heat load is lowered. It also releases stored refrigerant when additional cooling is needed, thus, maintaining the optimum flow of refrigerant within the system.

The receiver includes a desiccant (2). It has the job of removing moisture as the refrigerant circulates within the system.

The sight glass is installed on the top of the receiver. The amount of refrigerant that is charged has a direct effect on the efficiency of the air conditioner. The sight glass is used to check the amount of refrigerant. If a large flow of bubbles can be seen in the sight glass, there is insufficient refrigerant charged. If so, replenish the refrigerant to the proper level.

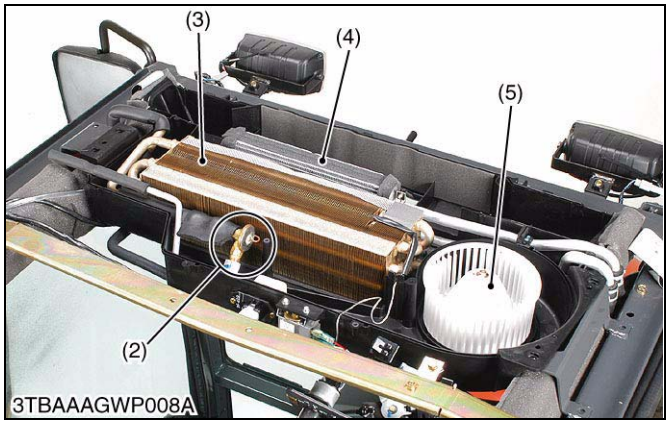
(1) Receiver Body
(2) Desiccant

a : IN
b : OUT

W1027972

[4] AIR CONDITIONER UNIT





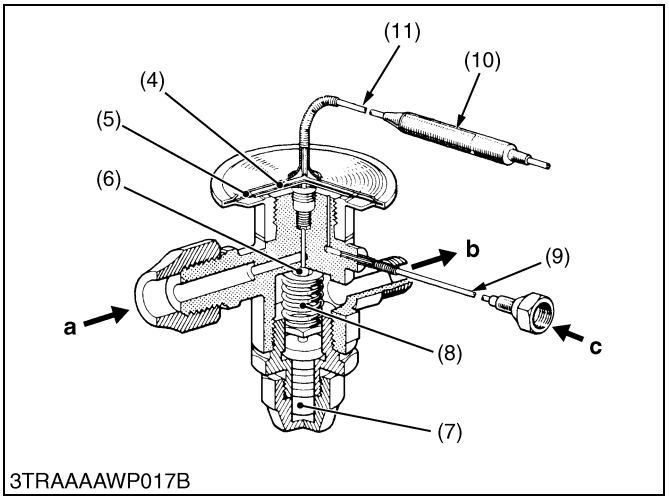
The air conditioner unit (1) consists of evaporator (3), expansion valve (2), heater core (4), blower (5), etc..

(1) Air Conditioner Unit
(2) Expansion Valve
(3) Evaporator
(4) Heater Core
(5) Blower

W1028172

(1) Expansion Valve





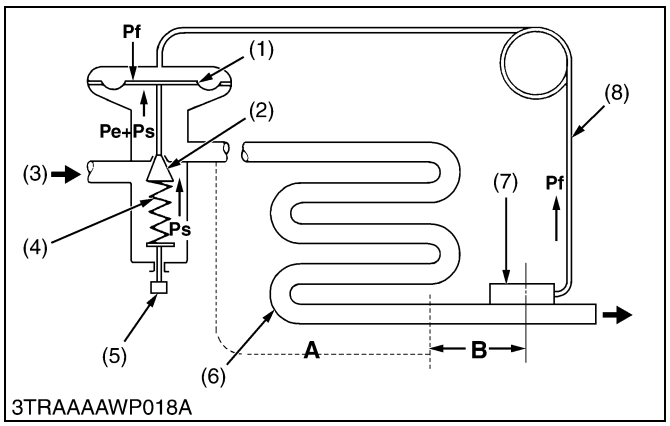
The expansion valve restricts the flow of liquid refrigerant and delivers sprayed refrigerant to the evaporator to facilitate refrigerant evaporation.

The cabin interior will not be cooled sufficiently if the expansion valve outlet is too small. If it is too wide, frost will be produced on the evaporator, decreasing cooling efficiency. Thus the size of this small spray hole has to be controlled according to various conditions.

(1) Pipe
(2) Expansion Valve
(3) Evaporator
(4) Diaphragm Chamber
(5) Diaphragm
(6) Needle Valve
(7) Adjusting Screw
(8) Pressure Spring
(9) Tube
(10) Heat Sensitive Tube
(11) Capillary Tube

a : From Receiver
b : To Evaporator
c : From Evaporator

W1020349



3TRAAAAWP018A

When the vapor pressure of the operating system is stable, **Pf = Pe + Ps** condition will prevail. At this time the needle valve opening will be stationary and constant refrigerant flow will be maintained.

If the evaporator installing expansion valve, the refrigerant in the outlet is always in superheated vapor form for certain length (part **B** in the figure). If the cooling load increases (inlet air temperature of evaporator becomes high), the refrigerant will vaporize faster and cause the length of the superheated vapor part **B** to become longer. Thus, the pressure in the heat sensitive tube (7) rises and increases the needle valve opening, resulting in larger flow of the refrigerant into the evaporator. Conversely, if the amount of refrigerant in the evaporator increases, the length of the superheated vapor part **B** will become shorter. The pressure in the heat sensitizing tube will drop and decrease the needle valve (2) opening.

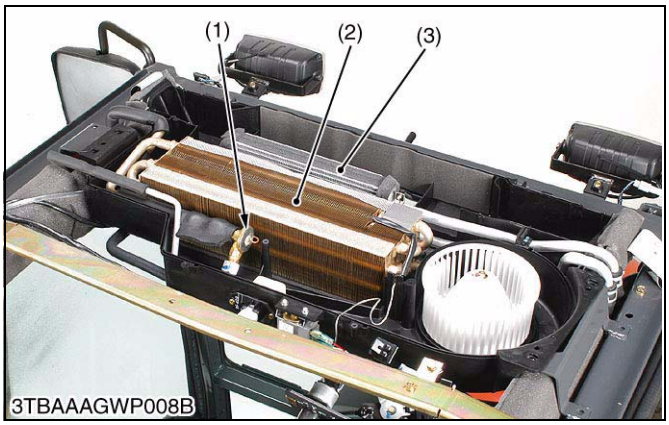
(1) Diaphragm
(2) Needle Valve
(3) Refrigerant Inlet
(4) Spring
(5) Adjusting Screw
(6) Evaporator Tube
(7) Heat Sensitive Tube
(8) Capillary Tube

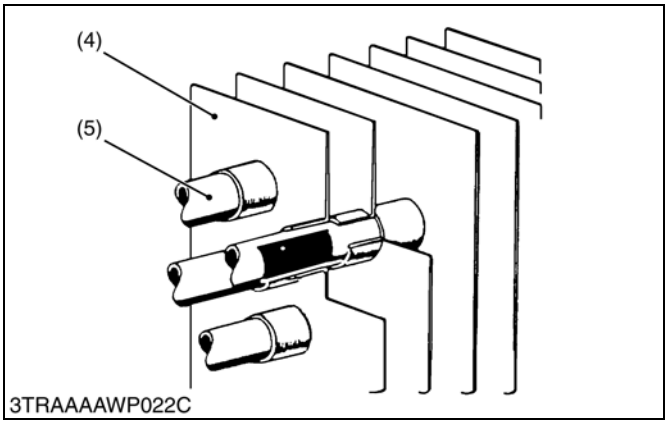
A : Saturated Vapor Part
B : Superheated Vapor Part

Pf : Gas pressure in sensitizing tube
Ps : Spring pressure
Pe : Vapor pressure in evaporator

W1020541

(2) Evaporator





The purpose of the evaporator (1) is just opposite to that of the condenser. The state of refrigerant immediately after the expansion valve is 100 % liquid. As soon as the liquid pressure drops, it starts to boil, and in doing so, absorbs heat. This heat is removed from the air passing over the cooling fins of the evaporator and causes the air to cool.

If too much refrigerant is sent into the evaporator, it will not boil as easily. If the evaporator is filled with liquid refrigerant, it eliminates a place for the refrigerant to properly vaporize. This vaporization is necessary in order to absorb heat. A flooding condition of the evaporator will allow an excess of liquid refrigerant to leave the evaporator and may cause serious damage to the compressor.

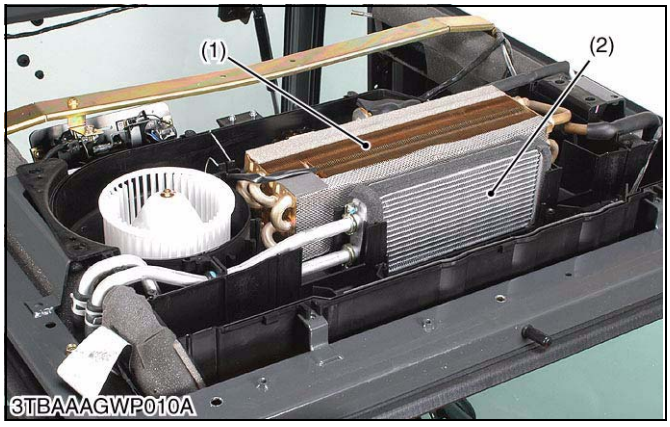
If too little refrigerant is sent into the evaporator, again the evaporator will not cool because the refrigerant will vaporize, or boil off, long before it passes through the evaporator.

Refrigerant properly metered into the evaporator should allow for 100 % liquid just after the expansion valve, and 100 % gas at the outlet.

(1) Expansion Valve
(2) Evaporator
(3) Heater Core
(4) Fin
(5) Tube

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(3) Heater Core



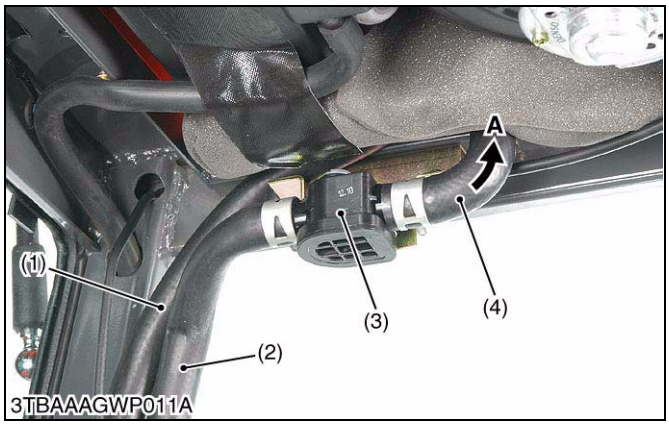
The heater utilizers the heater core to absorb heat from the coolant, which has removed heat from the engine. The inlet port of heater core is connected to the delivery side of the engine water pump by a rubber hose. The water valve is installed on the inlet port of the heater core. Also, the outlet port of the heater core is connected to the engine cylinder block.

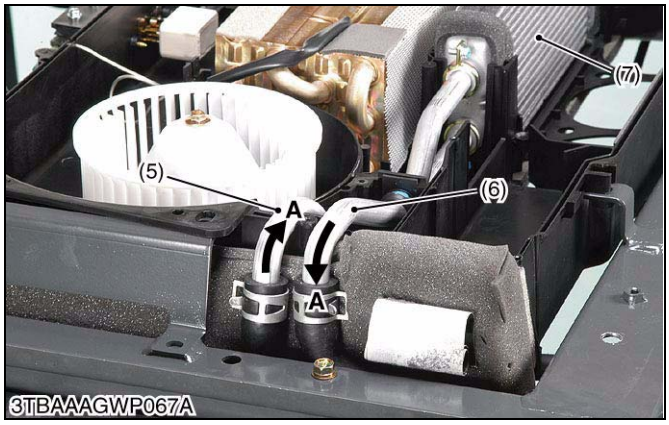
The heater core is a heat exchanger, like the evaporator or condenser. Heat is exchanged between heated coolant passing through the core and air in the cabin or fresh outdoor air. The cab air is heated through this process.

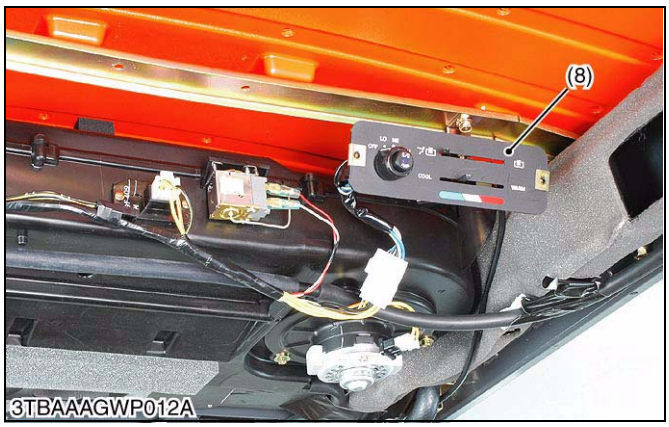
(1) Evaporator
(2) Heater Core

W1021114

(4) Water Valve







The water valve (3) is connected to the temperature control lever (8) by a linkage.

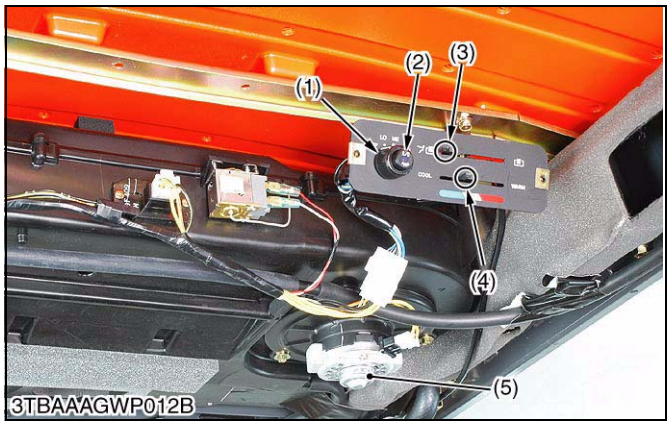
The valve in the water valve (3) is opened or closed by the temperature control lever (8).

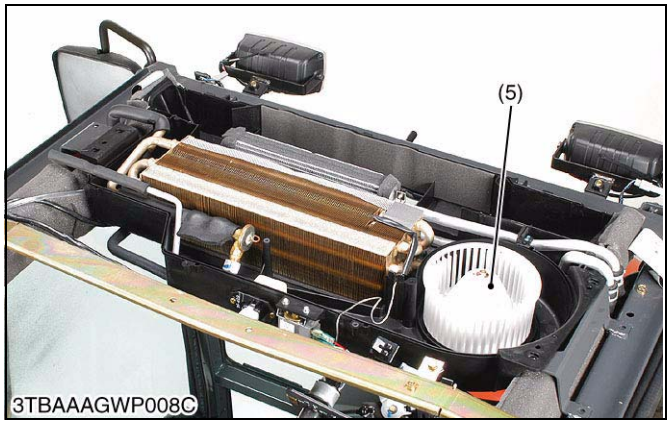
(1) Water Hose (to Engine)
(2) Water Hose (from Engine)
(3) Water Valve
(4) Water Hose (to Heater Core)
(5) Water Pipe (to Heater Core)
(6) Water Pipe (from Heater Core)
(7) Heater Core
(8) Temperature Control Lever

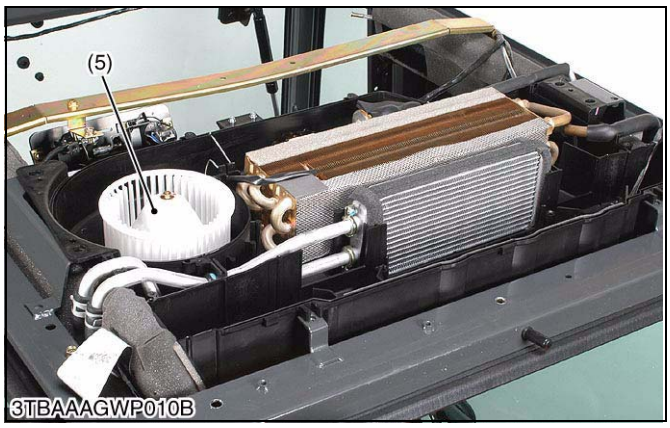
A : Water Flow

W1021257

(5) Blower







The blower unit is installed on the right side of air conditioner unit. The blower serves to force cooling air, hot air or fresh outside air into the cabin through the 7 outlets.

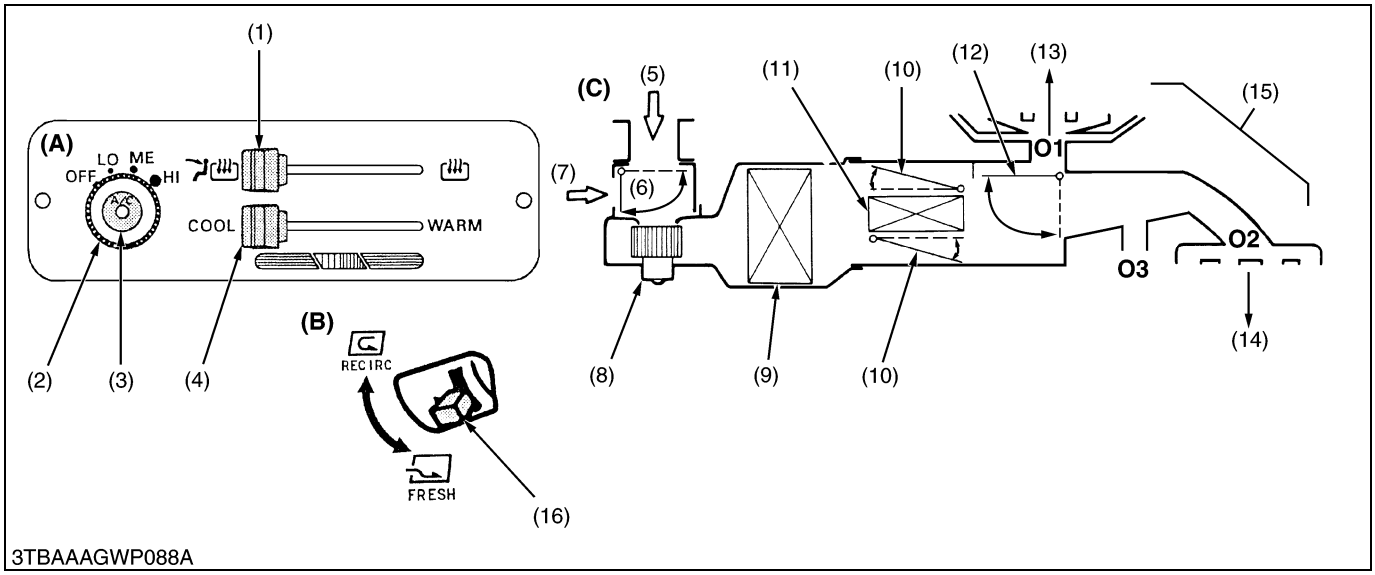
The blower motor used is a ferrite type and its speed is controlled by resistors in 3 steps.

The fan used is a centrifugal type. In this type of fan, the air is drawn in parallel to the rotating axis and is blown out perpendicular to the rotating axis, that is in the direction of the centrifugal force.

(1) Blower Switch
(2) Air Conditioner Switch
(3) Air Mode Lever
(4) Temperature Control Lever
(5) Blower

W1028498

3. SYSTEM CONTROL



3TBAAAGWP088A

(1) Air Mode Lever
(2) Blow Switch
(3) Air Conditioner Switch
(4) Temperature Control Lever
(5) Fresh Air
(6) Air Intake Door D1
(7) Recirculated Air
(8) Blower
(9) Evaporator
(10) Temperature Door D2 (Air Mixed Door)
(11) Heater
(12) Air Outlet Door D3 (Mode Door)
(13) DEFOGGER
(14) FACE
(15) DEF and FACE
(16) Air Selection Lever

(A) Control Plate
(B) Air Selection Lever
(C) Block Diagram of Air Flow Passage
O1 :Front air outlet
O2 :Side air outlet
O3 :Door air outlet

1) Selection of recirculated air (7) or fresh air (5) is done with door D1.

■ **RECIRC**

By setting the air selection lever (16) in rear control panel to **RECIRC** position, door **D1** (6) shuts the fresh air inlet port. Air inside the cabin is then recirculated.

■ **FRESH**

By moving the air selection lever (16) 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 door D2.

■ **COOL**

By setting the temperature control lever (4) in control panel to **COOL** position, door **D2** (10) is moved to close water valve. The air flows to door D3 (12) side without passing the heater core.

■ **WARM**

By moving the temperature lever to **WARM** position door **D2** is moved to open the water valve. 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**

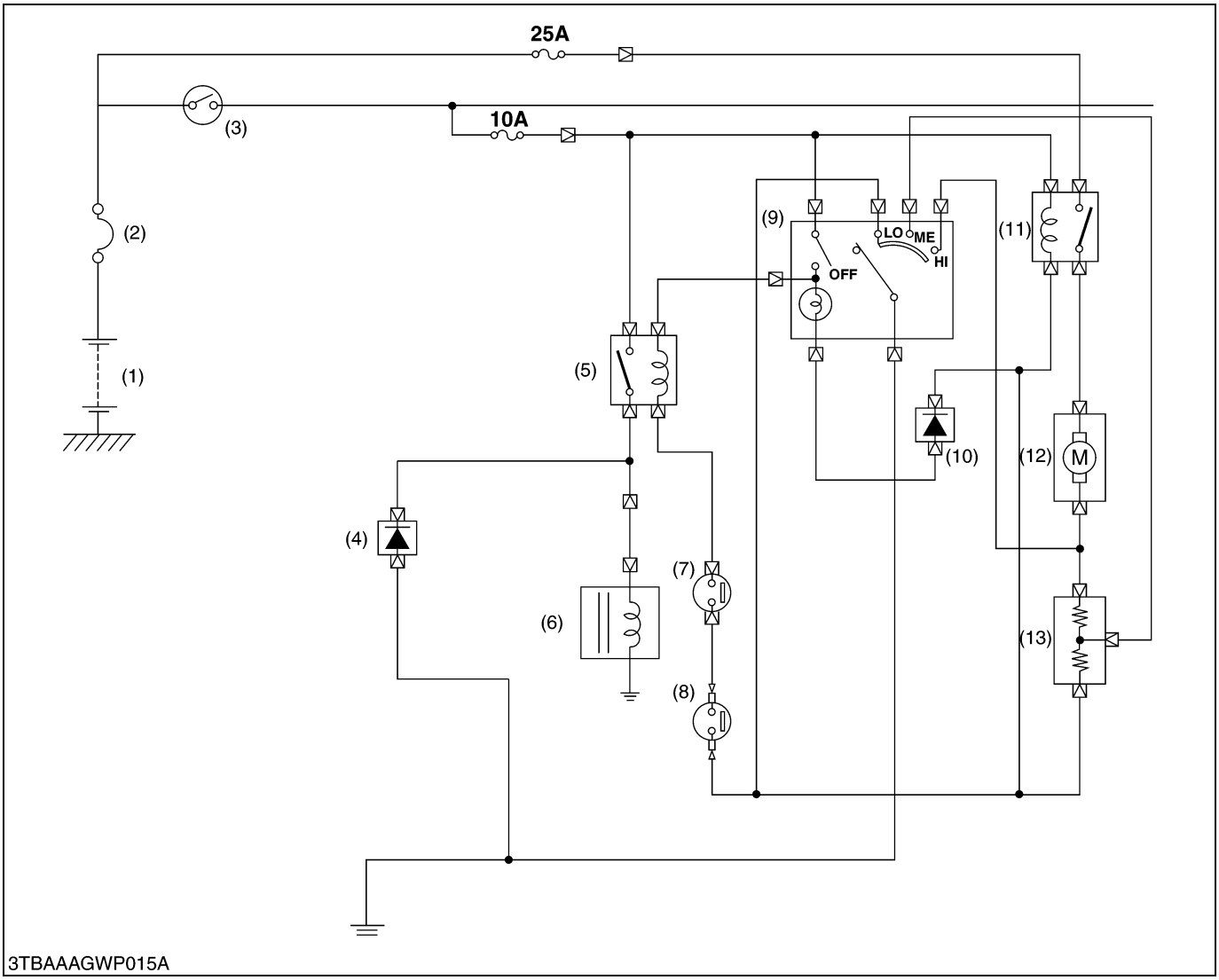
By moving the mode lever to **DEF + FACE** position, the door D3 is moved to establish the air passages to outlets **O1**, **O2** and **O3**. Air comes out from both outlets.

■ **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**.

4. ELECTRICAL SYSTEM

[1] ELECTRICAL CIRCUIT

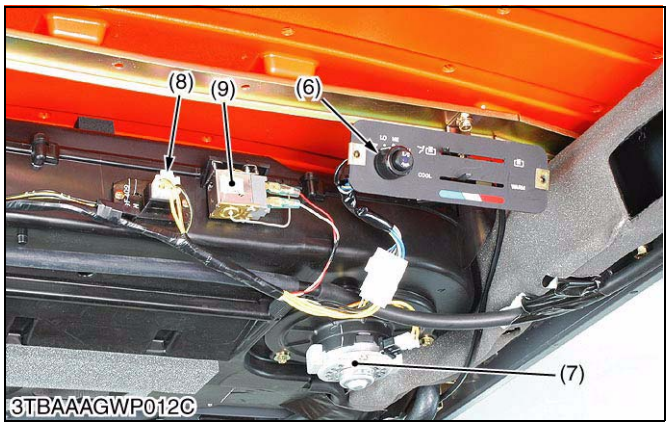


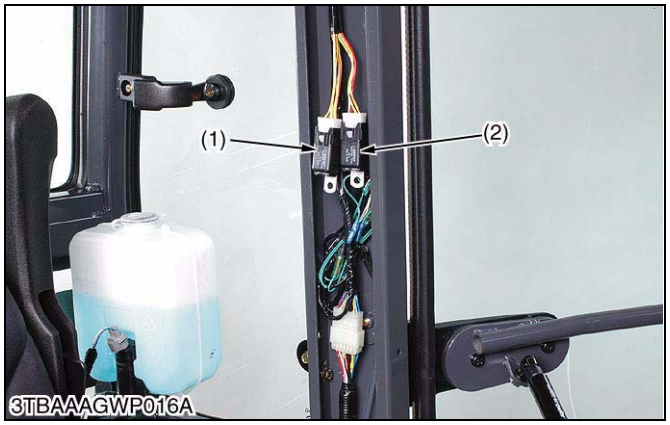
(1) Battery
(2) Slow Blow Fuse
(3) Main Switch
(4) Diode
(5) Compressor Relay
(6) Compressor Magnet Clutch
(7) Thermo Switch
(8) Pressure Switch
(9) A/C Blower Switch
(10) Diode
(11) A/C Blower Relay
(12) A/C Blower Motor
(13) A/C Blower Resistor

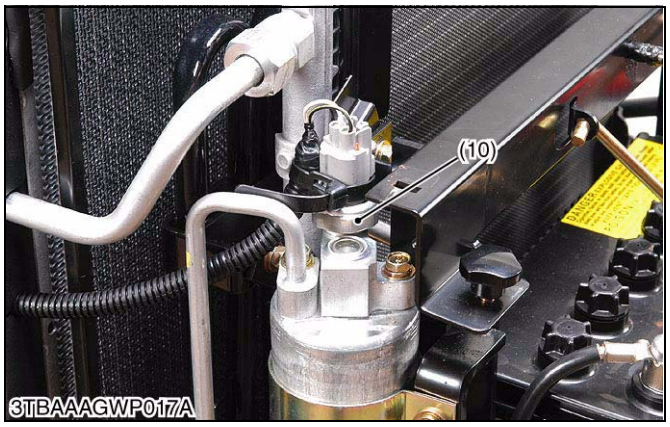
The process of the magnetic clutch being engaged is shown below.

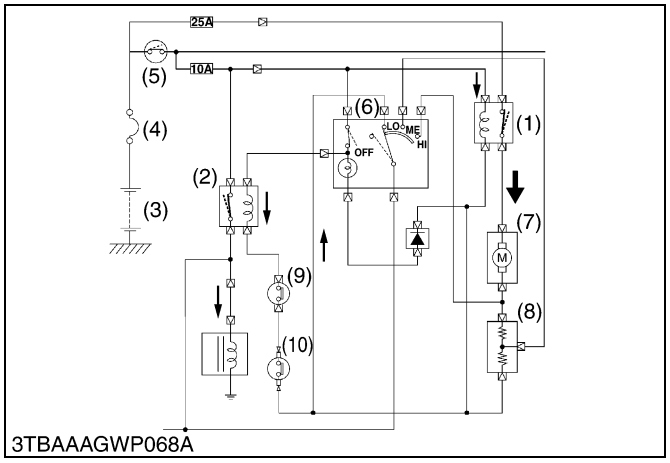
Main Switch (3) **ON** → A/C Switch (9) **ON** → Blower Switch (9) **ON** (Low, medium or high) → Compressor Relay Contact (5) → Thermostat (Thermo Switch) (7) **ON** (the thermostat temperature is more than 4 °C (39.2 °F)) → Pressure Switch (5) **ON** (if refrigerant pressure is between 0.196 MPa (2.0 kgf/cm^2, 28.4 psi) and 2.94 MPa (30.0 kgf/cm^2, 426 psi) → Compressor Magnet Clutch (6) engaged.

[2] BLOWER RELAY, COMPRESSOR RELAY, THERMO SWITCH AND PRESSURE SWITCH









Remove the inner roof and the relays are visible at the left side pillar of the cabin ceiling : blower relay (1) and compressor relay (2). When the blower fan is adjusted for the air flow rate, the blower relay (1) is activated by a signal from the fan switch on the control panel.

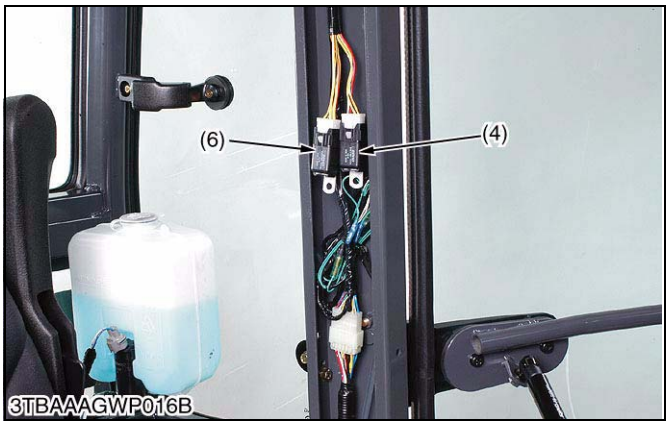
Among the air conditioner components, current flows to the blower motor (7) and magnetic clutch. If all of these current were to be passed through the main switch (5) and supplied, the current would be too large for the main switch (5). This could cause the main switch to burn out. If the current were to be passed directly from the battery (3), forgetting to turn off the blower motor (7) could result in a discharged battery (3).

To protect against such trouble, relays have been provided. These relays have been made so that when current flows through its coil, the contacts close to supply the power from the battery (3). By employing these relays, the current flowing through the main switch (5) has been decreased as only a small current is required to actuate the relay. Thus there will be no danger of burning out the switch contact, and when the main switch (5) is opened, the relay contact will open at the same time. This action stops the current flow in the air conditioner circuit so that there will also be no chance of the battery discharging.

(1) A/C Blower Relay
(2) Compressor Relay
(3) Battery
(4) Slow Blow Fuse
(5) Main Switch
(6) A/C Blower Switch
(7) A/C Blower Motor
(8) A/C Blower Resistor
(9) Thermo Switch
(10) Pressure Switch

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(1) Compressor Relay



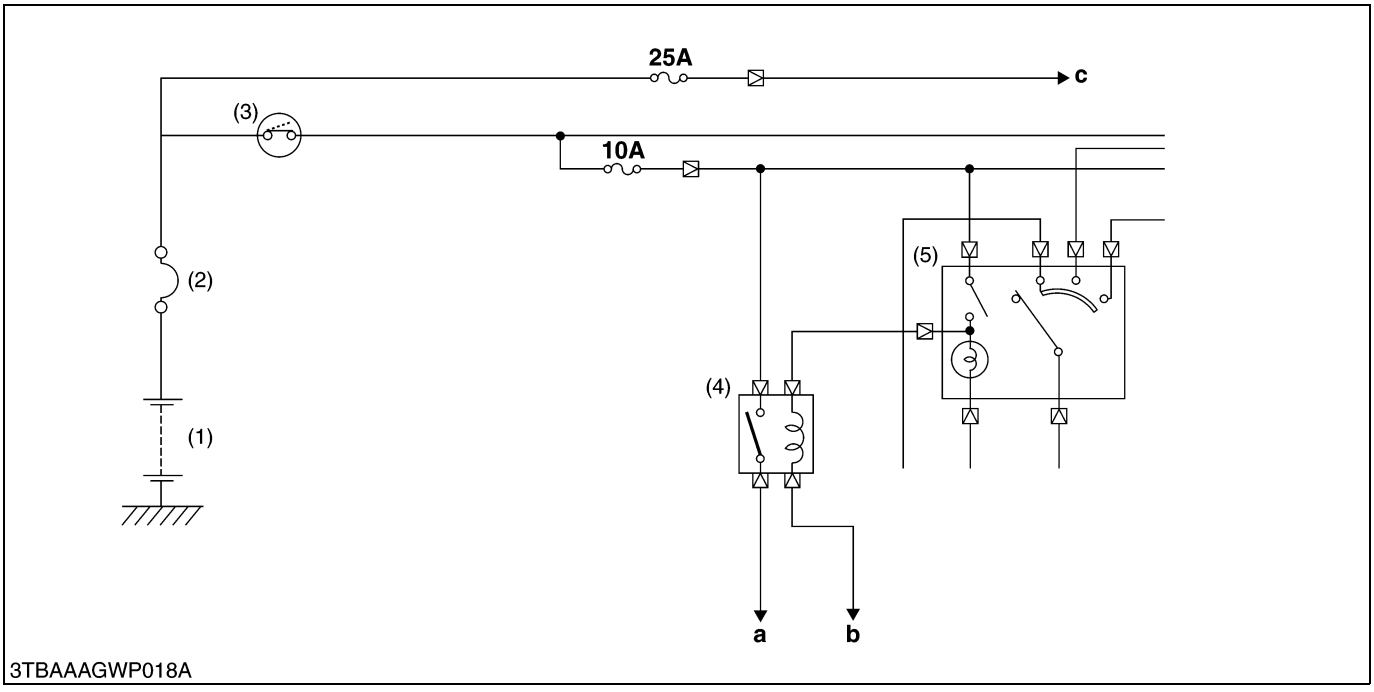
Among the air conditioner components, current flows to the blower motor and magnetic clutch. If all of these current were to be passed through the main switch and supplied, the current would be too large for the main switch so that there will be danger or burning out the main switch contact. If the current were to be passed directly from the battery, forgetting to turn off the blower motor could result in a discharged battery.

To protect against such trouble, a relay has been provided. This relay has been made so that when current flows through its coil, the contacts close to supply the power from the battery. By employing this relay, the current flowing through the main switch has been decreased as only a small current is required to actuate the relay. Thus there will be no danger of burning out the switch contact, and when the main switch is opened, the relay contact will open at the same time. This action stops the current flow in the air conditioner circuit so that there will also be no chance of the battery discharging.

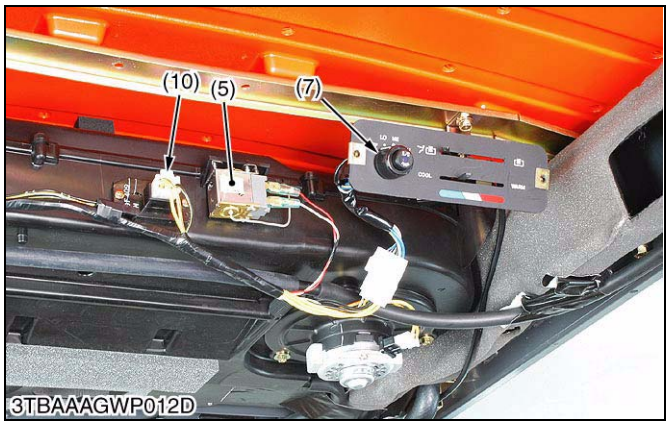
(1) Battery
(2) Slow Blow Fuse
(3) Main Switch
(4) Compressor Relay
(5) A/C Blower Switch
(6) Blower Relay

a : To compressor magnet clutch
b : To A/C blower switch
c : To A/C blower motor

W1023075



(2) Blower Switch



The output of the blower can be used in 3 positions (Low, Medium, High) by changing the blower switch position.

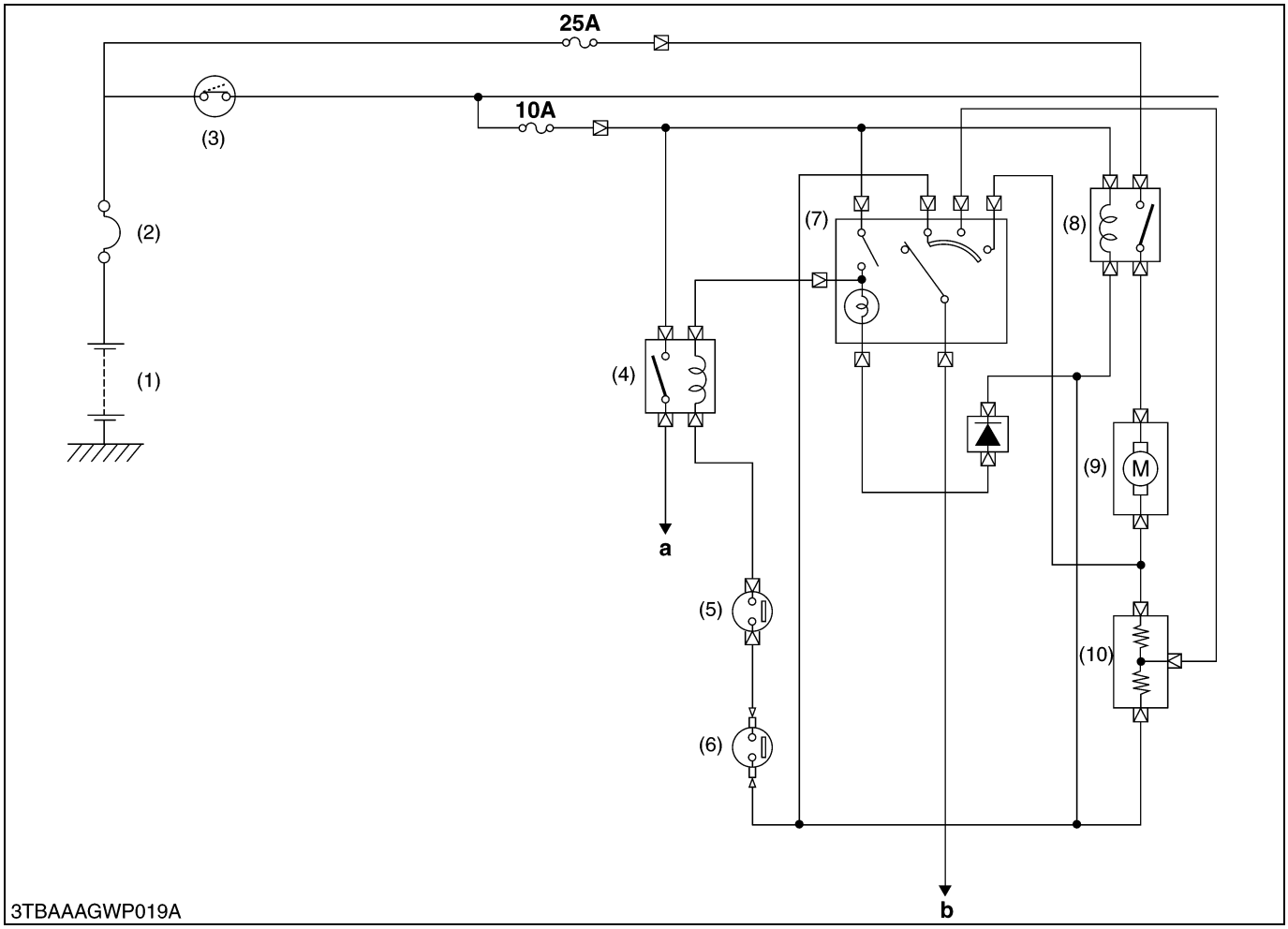
■ **Blower Switch is "OFF" position**

When the blower switch is in "**OFF**" position, even if the main switch is turned to "**ON**" position, air conditioner relay does not operate.

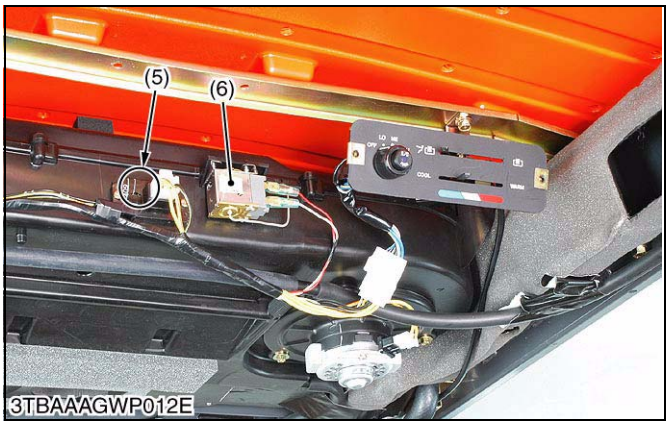
(1) Battery
(2) Slow Blow Fuse
(3) Main Switch
(4) Compressor Relay
(5) Thermo Switch
(6) Pressure Switch
(7) A/C Blower Switch
(8) A/C Blower Relay
(9) A/C Blower Motor
(10) A/C Blower Resister

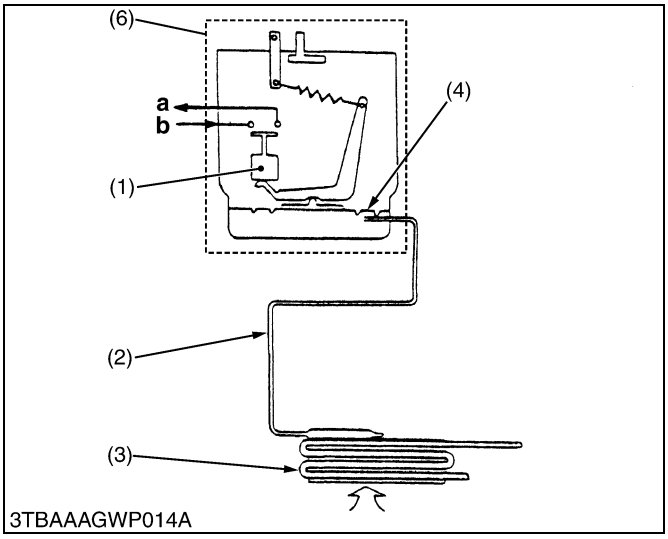
a : To compressor magnet switch
b : To tractor body

W1023377



(3) Thermo Switch





If the evaporator fin temperature, that is the refrigerant vaporizing temperature, drops below 0 °C (32 °F), frost or ice will form on the fins, causing a decrease in air flow and lowering the cooling capacity. To prevent such frosting, and to allow the setting of the cabin interior to the desired temperature, a thermostat has been installed.

In this system, a gas type thermo switch is used. The gas type thermo switch has a capillary tube which is filled with special gas. The capillary tube is connected to the diaphragm chamber. The tip of the capillary tube is positioned on the evaporator fins.

When the evaporator fins temperature is higher than the setting temperature of the thermostat, the micro switch in the thermo switch is turned "**ON**" by increasing the pressure in the diaphragm chamber. When the evaporator fins temperature is low, such as in the winter season, the micro switch is turned "**OFF**" because of the pressure in the diaphragm chamber and spring tension drops, thus turning "**OFF**" the magnetic clutch to prevent the evaporator from frosting.

(Reference)

- Thermo switch (thermostat) setting temperature
  OFF ..... Approx. 1 °C (34 °F)
  ON ..... Approx. 4.5 °C (40.1 °F)

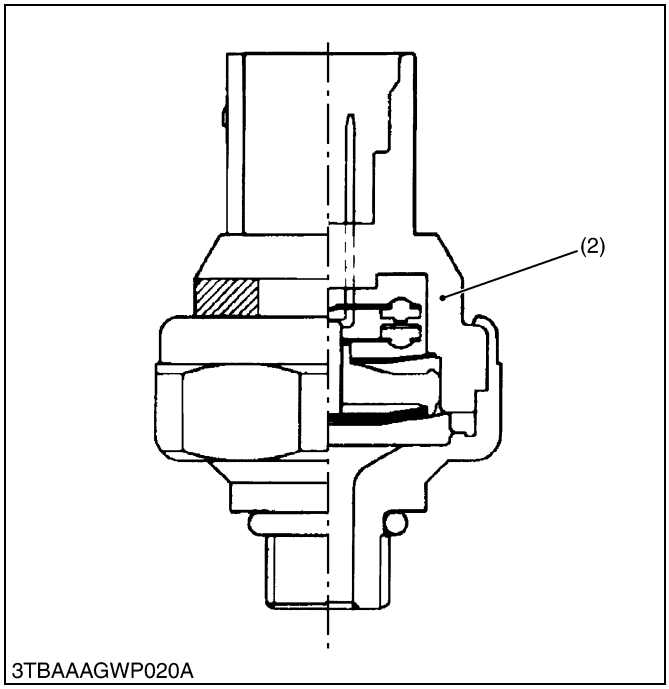
(1) Micro Switch
(2) Capillary Tube
(3) Evaporator
(4) Diaphragm
(5) A/C Blower Resister
(6) Thermo Switch

a : To magnetic clutch
b : From A/C switch

W1023609

(4) Pressure Switch





The pressure switch detects the pressure in the refrigerant cycle, and when something is wrong, turns off the magnetic clutch to prevent the component from damage. This system has a dual type pressure switch, and this switch controls low pressure cut off and high pressure cut off.

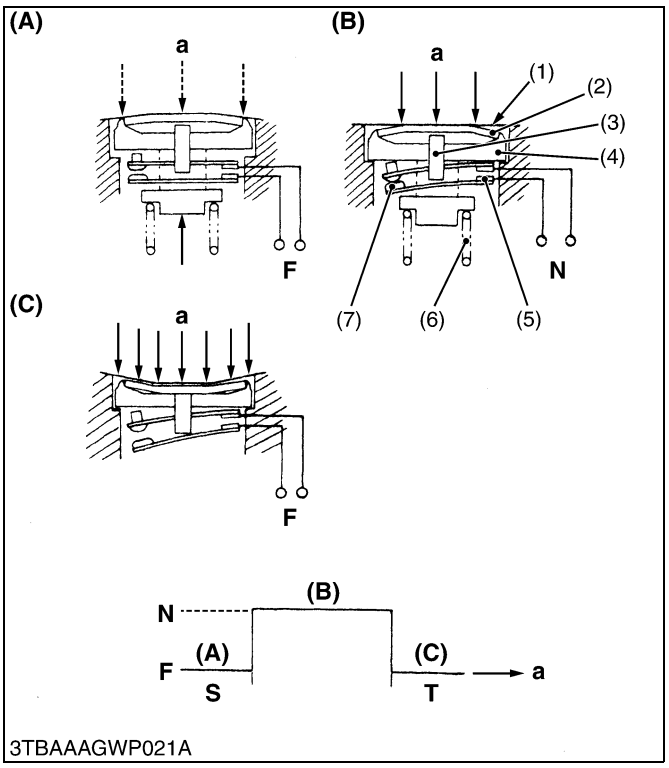
■ **Pressure Switch (Dual Type)**

The pressure switch is installed in the inlet line (liquid line) between the receiver and expansion valve.

The contact of pressure switch is normally an open type.

(1) Receiver (2) Pressure Switch

W1028710



3TBAAAGWP021A

■ **OFF Position : A (When the refrigerant pressure is low)**

The pressure switch detects the pressure drop when the refrigerant leaks from the system causing compressor seizure. When pressure of refrigerant is less than specified pressure the switch turns OFF and disengages magnetic clutch.

■ **NO Position : B (When the refrigerant pressure is normally)**

When the pressure in the inlet line is between 0.196 MPa (2.0 kgf/cm^2, 28.4 psi) and 3.14 MPa (32 kgf/cm^2, 455 psi), the switch is turned ON (the pressure is normal condition), and engages magnetic clutch.

■ **OFF Position : C (When the refrigerant pressure is high)**

When the pressure in the inlet line is higher than specified pressure, the switch is turned OFF, and disengages magnetic clutch.

(Reference)

- Setting pressure

  OFF (Low pressure side) ... Less than approx. 0.196 MPa (2.0 kgf/cm^2, 28.4 psi)

  ON (Normal pressure) ... Between approx. 0.196 MPa (2.0 kgf/cm^2, 28.4 psi) to 2.94 MPa (30.0 kgf/cm^2, 426 psi)

  OFF (High pressure side) ... More than approx. 2.94 MPa (30.0 kgf/cm^2, 426 psi)

(1) Diaphragm
(2) Belleville Spring
(3) Pin
(4) Plate
(5) Terminal
(6) Spring
(7) Contact

a : Pressure
(A) When the refrigerant pressure is low
(B) When the refrigerant pressure is normally
(C) When the refrigerant pressure is high
F : OFF
N : ON
S : 0.196 MPa (2.0 kgf/cm2, 28.4 psi)
T : 3.14 MPa (32 kgf/cm2, 455 psi)

W1024274

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SERVICING

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     - (3) Charging the System 10-S21
     - (4) Checking Charging Refrigerant Amount 10-S23
6. CHECKING, DISASSEMBLING AND SERVICING 10-S24
   - [1] CHECKING AND ADJUSTING 10-S24
     - (1) Compressor 10-S24
     - (2) Air Conditioner Unit 10-S24
     - (3) Front Windshield Wiper 10-S29
     - (4) Working Light 10-S30
   - [2] DISASSEMBLING AND ASSEMBLING 10-S30
     - (1) Separating Cabin from Tractor 10-S30
     - (2) Removing Compressor Assembly 10-S35
     - (3) Removing Receiver and Condenser 10-S38
     - (4) Removing Air Conditioner Unit 10-S40
     - (5) Cabin Windshield 10-S42
   - [3] SERVICING 10-S47
     - (1) Compressor 10-S47

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1. TROUBLESHOOTING

COMPRESSOR

Symptom	Probable Cause	Solution	Reference Page
Noisy (Compressor ON)	Bearing of compressor worn or damaged	Replace	10-S35
	Valves in compressor damaged	Replace	10-S35
	Belt slipping	Adjust or replace	G-26
	Compressor mounting screws loosen	Tighten	10-S35
	Piping resonant	Tighten or add clamp	10-S35
Noisy (Compressor OFF)	Blower motor defective	Repair or replace	10-S40
	Bearings of magnetic clutch, idle pulley or crank pulley worn or damaged	Replace	10-S35

W1014322

AIR CONDITIONING SYSTEM

Does Not Cool (No Air Flow)	Fuse blown	Replace	G-42
	A/C main relay defective	Repair or replace	10-S25
	Blower relay detective	Replace	10-S25
	Blower motor defective	Replace	10-S40
	Blower switch defective	Replace	10-S25
	Wiring harness disconnected or improperly connected	Repair	–
Does Not Cool (Compressor Does Not Rotate)	Fuse blown	Replace	G-42
	Magnetic clutch defective	Repair or replace	10-S35
	A/C switch defective	Replace	10-S25
	Pressure switch defective	Replace	10-S28
	Belt slipping	Adjust or replace	G-26
Does Not Cool (Others)	Insufficient refrigerant	Check with manifold gauge	G-45
	Expansion valve defective	Replace	10-M17
	Compressor defective	Replace	10-S35
Insufficient Cooling (Insufficient Air Flow)	Air conditioner condenser screen clogged	Clean or replace	G-12
	Evaporator frosted	Clean or replace thermo switch	10-M27, 10-S41
	Blower motor defective	Replace	10-S40

W1011779

Symptom	Probable Cause	Solution	Reference Page
Insufficient Cooling (Many Bubbles in Sight Glass)	Insufficient refrigerant	Check with manifold gauge	G-45
	Gas leaking from some place in refrigerating cycle	Repair and charge refrigerant	–
	Air mixed in	Check with manifold gauge	10-S9 to 11
Insufficient Cooling (No Bubbles in Sight Glass)	Too much refrigerant	Check with manifold gauge	10-S9 to 11
Insufficient Cooling (Compressor Does Not Rotate Properly)	Belt slipping	Adjust or replace	G-26
	Magnetic clutch defective	Repair or replace	10-S35
	Compressor defective	Replace	10-S35
Insufficient Cooling (Others)	Thermostat defective	Replace	10-M27
	Water valve defective	Replace	10-S41
	Condenser fin clogged with dust	Clean	G-12
	Expansion valve defective	Replace	10-M17
Insufficient Heating	Water valve defective	Replace	10-S41
	Air mix door malfunctioning	Check control cable	10-S40
	Insufficient coolant	Replenish	G-45
Too Low Air Flow Rate (Blower Motor Does Not Run)	Blower fan switch defective	Replace	10-S25
	A/C main relay defective	Replace	10-S25
	Brush in poor contact	Repair or replace	10-S25
	Fuse blown out	Replace	G-42
	Wrong wiring or loose connections	Check and repair	–
Too Low Air Flow Rate (Flow Rate Does Not Change in Three Steps)	Resistor defective	Replace	10-S27
	Relay defective	Replace	10-S25
	Blower fan switch defective	Replace	10-S25
Too Low Air Flow Rate (Blown Itself in Trouble)	Blower is not tightened enough	Tighten	10-S26
	Blower deformed	Replace or repair	10-S40
	Blower in contact with casing	Repair	10-S40
	Obstacle at near suction port	Repair	G-12
	Evaporator frosted	Check or replace	10-S41
	Air conditioner condenser screen clogged	Clean	G-12
	Blow duct clogged or missing	Clean	10-S40
Air Flow Rate as Specified, But No Cooling. (Belt Tension Is Not Proper.)	Belt slipping	Adjust or replace	G-26

W1011943

Symptom	Probable Cause	Solution	Reference Page
Air Flow Rate as Specified, But No Cooling. (Magnet Switch Does Not Function.)	Low battery voltage	Charge	G-19
	Rotor in contact with stator	Repair	10-S36
	Wrong wiring or loose connections	Check and repair	10-S35
	Relays misadjusted or defective	Replace	10-S25
	Coil shortage	Replace	10-S36
	Ground malfunction	Repair	10-S24
	Coil burst out	Replace	10-S36
Air Flow Rate (Compressor in Trouble)	Compressor defective	Replace	10-S35
Cycle Pressure Is Not as Specified. (High-Pressure Level Is Not Specified level. Too High Pressure)	Refrigerant overcharged	Check	G-45
	Condenser clogged with dust and dirt	Clean	G-12
	Air mixed	Check with manifold gauge	10-S9 to 11
Cycle Pressure Is Not as Specified (High-Pressure Level Is Not Specified Level. Too Low Pressure)	Refrigerant too short	Check	G-45
	Compressor discharge valve damaged	Replace	10-S35
	Compressor gasket damage	Replace	10-S35
	Low-pressure pipe in trouble (Cracked or clogged)	Replace	10-S35
Cycle Pressure Is Not as Specified. (Low-Pressure Level Is Not Specified level. Too High Pressure)	Refrigerant overcharged	Check	G-45
	Heat-sensitive tube in poor contact	Tighten	10-M17
	Expansion valve opened	Replace	10-M17
Cycle Pressure Is Not as Specified (Low-Pressure Level Is Not Specified Level. Too Low Pressure)	Refrigerant too short	Check	G-45
	Gas leak at heat-sensitive tube	Replace	10-M17
	Evaporator frosted	Check or replace	10-S41
	Low-pressure pipe in trouble (Cracked or clogged)	Replace	10-S35
	Expansion valve clogged	Replace	10-M17
Temperature Is Not Controlled Well. (Temperature Control Lever Does Not Function.)	Wire poorly fixed	Repair	10-S40
	Wire wrongly laid	Repair	10-S40
Temperature Is Not Controlled Well. (Water Valve Does Not Open As Specified.)	Water valve wrongly opens at max. cool position	Replace	10-S41
	Cable wrongly set	Adjust	10-S40
	Cable disconnected	Repair	10-S40
Temperature Is Not Controlled Well. (Air Mixing Door Does Not Open As Specified.)	Damper lever wrongly set	Repair	10-S40
	Cable disconnected	Repair	10-S40

W1012107

Symptom	Probable Cause	Solution	Reference Page
Temperature Is Not Controlled Well. (Heater Hose Is Not Laid As Specified.)	Heater hose caught	Repair	10-S41
	Heater hose twisted or bent	Repair	10-S41
Water Leakage	Drain hose disconnected	Repair	10-S33
	Drain hose bent	Replace	10-S33
	Heater hose in poor connection	Repair	10-S41

W1012284

WINDSHIELD WIPER

Windshield Wiper Does Not Operate	Wiring defective	Check and repair	10-S42
	Fuse blown (Short-circuit, burnt component inside motor or other part for operation)	Correct cause and replace	G-42, 10-S29
	Wiper motor defective (Broken armature, worn motor brush or seized motor shaft)	Replace	10-S29
	Wiper switch defective	Replace	10-S29
	Foreign material interrupts movement of link mechanism	Repair	–
	Wiper arm seized or rusted	Lubricate or replace	10-S29
Windshield Wiper Operating Speed Is Too Low	Wiper motor defective (Short-circuit of motor armature, worn motor brush or seized motor shaft)	Replace	10-S29
	Low battery voltage	Recharge or replace	G-19
	Humming occurs on motor in arm operating cycle due to seized arm shaft	Lubricate or replace	10-S29
	Wiper switch contact improper	Replace	10-S29
Winshield Wiper Does Not Stop Correctly	Wiper motor defective (Contaminated auto-return contacts or improper contact due to foreign matter)	Replace	10-S29

W1012448

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WASHER MOTOR

Symptom	Probable Cause	Solution	Reference Page
Washer Motor Does Not Operate	Fuse blown	Correct cause and replace	G-42
	Washer switch defective	Replace	10-S29
	Washer motor defective	Replace	10-S29
	Wiring defective	Repair	10-S29
Washer Motor Operates but Washer Fluid Is Not Ejected	No washer fluid	Replenish	G-40
	Clogged washer nozzle	Clean or replace	–

W1012612

2. SERVICING SPECIFICATIONS

A / C

Item		Factory Specification	Allowable Limit
Air-gap of A/C Compressor Magnet Clutch	Air gap	0.20 to 0.45 mm 0.0079 to 0.0177 in.	–
Refrigerating Cycle (Refrigerating Cycle is Normal Operating)	Pressure (**LO** Pressure Side)	0.15 to 0.20 MPa 1.5 to 2.0 kgf/cm^2 21 to 28 psi	–
	Pressure (**HI** Pressure Side)	1.27 to 1.66 MPa 13 to 17 kgf/cm^2 185 to 242 psi	–
Pressure Switch (Dual Type) (When pressure switch is turned **OFF**)	Setting Pressure (**LO** Pressure Side)	Less than approx. 0.196 MPa 2.0 kgf/cm^2 28.4 psi	–
	Setting Pressure (**HI** Pressure Side)	More than approx. 2.94 MPa 30 kgf/cm^2 426 psi	–
Air Conditioner Drive Belt	Tension	10 to 12 mm (0.39 to 0.47 in.) deflection at 98 N (10 kgf, 22 lbf) of force	–

W1013874

ELECTRICAL PARTS

Stator Coil	Resistance **2P** Connector	3.8 to 4.2 Ω	–
A/C Blower Switch Connector	Voltage **4** Terminal - **3** Terminal	Approx. battery voltage	–
A/C Blower Resister	Resistance **R1** Terminal - **E** Terminal	Approx. 1.0 Ω	–
	Resistance **R2** Terminal - **E** Terminal	Approx. 2.0 Ω	–
Front Wiper Switch COnnector	Voltage **W** Terminal - Chassis	Approx. battery voltage	–
Front Working Light Switch Connector	Voltage **2** Terminal - Chassis	Approx. battery voltage	–

W1033155

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-8.)

Item	N·m	kgf·m	lbf·ft
Cabin mounting bolt and nuts	100 to 120	10.2 to 12.2	73.8 to 88.5
Compressor mounting screws	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Clutch mounting screw (scroll type compressor)	10.8 to 16.2	1.10 to 1.65	8.0 to 11.9
High pressure pipe screw and retainer nut between compressor and condenser (High pressure pipe 1) screw	7.8 to 11.8	0.8 to 1.2	5.8 to 8.7
High pressure pipe screw and retainer nut 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
between condenser and receiver screw	3.9 to 6.9	0.4 to 0.7	2.9 to 5.1
between condenser and receiver retaining nut	11.8 to 14.7	1.2 to 1.5	8.7 to 10.8
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 screw	7.8 to 11.8	0.8 to 1.2	5.8 to 8.7
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
Front wiper arm mounting nut	6.37 to 9.32	0.65 to 0.95	4.7 to 6.9
A/C unit mounting screws (M8)	9.8 to 15.7	1.0 to 1.6	7.23 to 11.6

W1012736

4. PRECAUTIONS AT REPAIRING REFRIGERANT CYCLE

When checking or repairing the air conditioning system, the following precautions and rules must be observed. And it is of first importance that no other personnel than a well-trained serviceman should be allow to handle the refrigerant.

CAUTION

- **Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Always wear goggles to protect your eyes when working around the system.**
- **The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never heat the refrigerant container above 40 °C (104 °F) or drop it from a high height.**
- **Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.**
- **If you improperly connect the hose between the service valve of compressor and gauge manifold, or incorrectly handle the valves, the refrigerant service container or charging hose will explode. When connecting the hose or handling the valve, be sure to check the high pressure side or low pressure side.**
- **In case the refrigerant is charged while the compressor is operated, do not open the high pressure valve of the gauge manifold.**
- **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.**

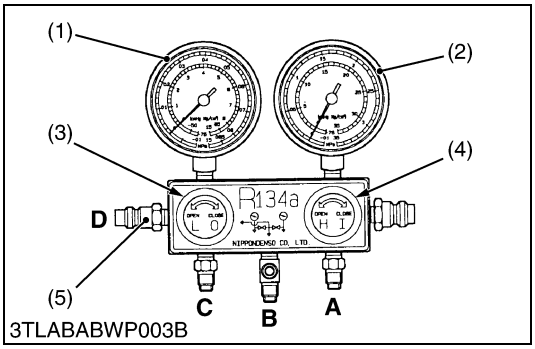
(Reference)

Replacing Parts	Replenish Quantity	Brand Name
Condenser	20 cc 0.021 U.S.qts 0.018 Imp.qts	ND-OIL 8<PAG* oil>
Evaporator	20 cc 0.021 U.S.qts 0.018 Imp.qts	
Receiver	10 cc 0.011 U.S.qts 0.009 Imp.qts	

*PAG : Polyalkyleneglycol (Synthetic oil)

[1] HANDLING OF SERVICE TOOLS

(1) Manifold Gauge Set

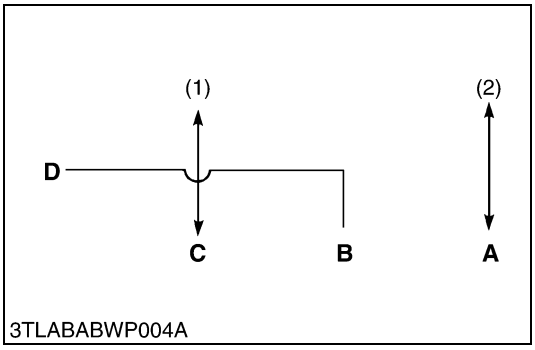


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The hand valves on the manifold gauge set are used to open and close the valve. The hand valve inscribed **LO** is for the low pressure side valve (3) and **HI** is for the high pressure side valve (4). By opening or closing the high and low pressure 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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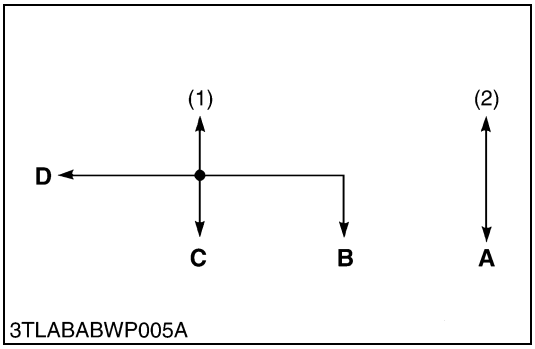
■ **When LO Pressure Side Valve and HI Pressure Side Valve are Closed**

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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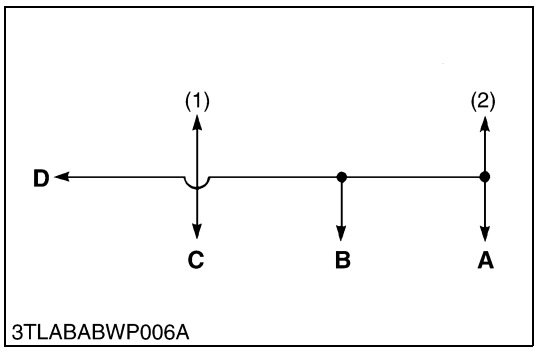
■ **When LO Valve is Opened and HI Valve is Closed**

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.**

W1019669

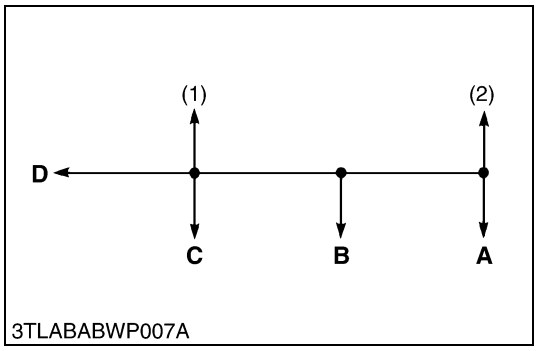


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■ **When LO Valve is Closed and HI Valve is Opened**
Two circuits are established.
Port (**C**) → **HI** pressure gauge (2)
→ Port (**B**)
→ Port (**D**) (Schrader valve must be opened)
Port (**A**) → **LO** pressure gauge (1)

■ **NOTE**
- **Schrader valve (D) must be opened.**

W1019796



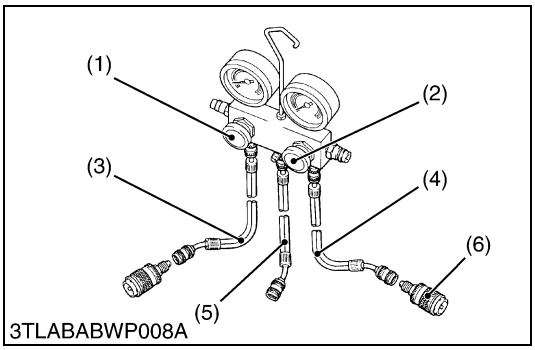
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■ **When LO and HI Valve is Opened**
Two circuits are established.
Port (**A**) → **HI** pressure gauge (2)
→ **LO** pressure gauge (1)
→ Port (**B**)
→ Port (**C**)
→ Port (**D**) (Schrader valve must be opened)

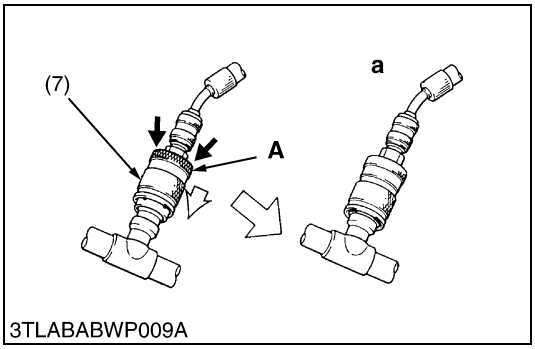
■ **NOTE**
- **Schrader valve (D) must be opened.**

W1019892

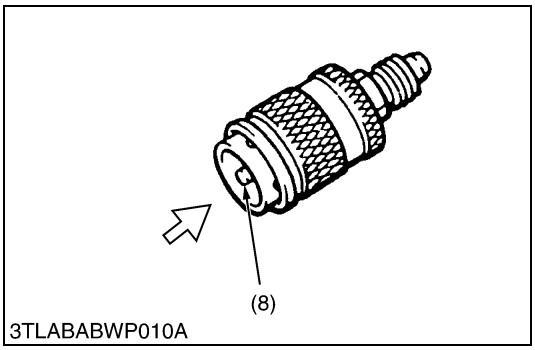
(2) Refrigerant Charging Hose



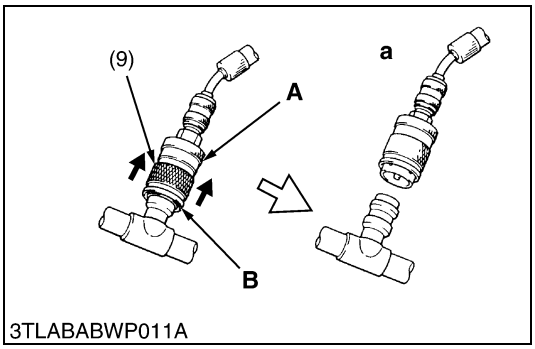
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3TLABABWP009A



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**

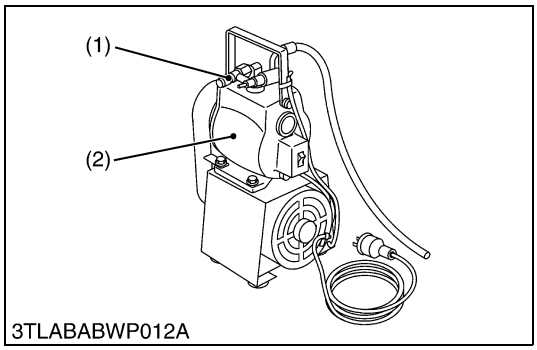
- **After removing the adaptor, ensure to cap the quick disconnect adaptor service valve.**

(1) **LO** Pressure Side Valve
(2) **HI** Pressure Side Valve
(3) Blue Hose
(4) Red Hose
(5) Green Hose
(6) Quick Disconnect Adaptor
(7) Sleeve
(8) Pusher
(9) Sleeve

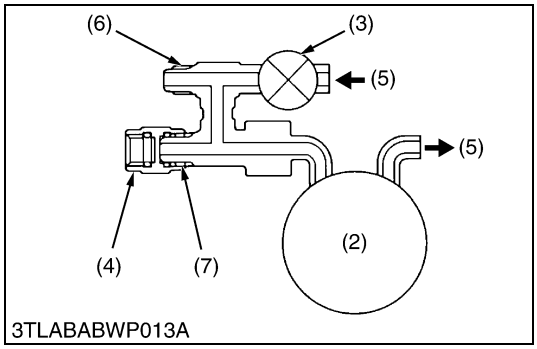
a : CLICK

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(3) Vacuum Pump Adaptor



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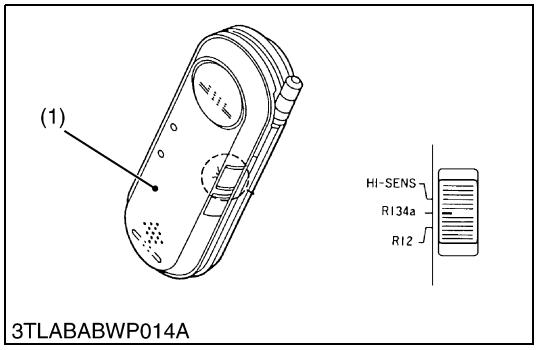
Objective of the Vacuum Pump Adaptor

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
(2) Vacuum Pump
(3) Magnetic Valve
(4) Blind Cap
(5) Air
(6) For R134a
(7) For R12

W1018367

(4) Electric Gas Leak Tester



3TLABABWP014A

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)

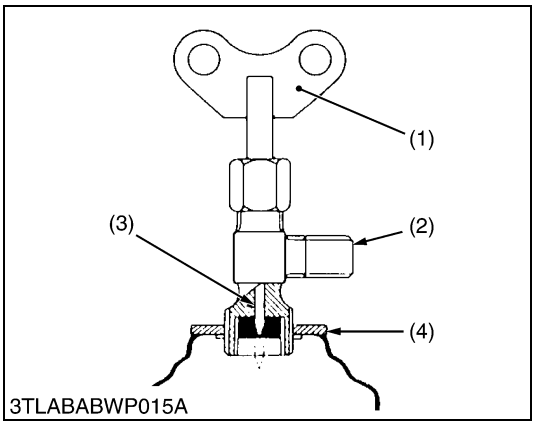
Leak tester with halide torch

- 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

W1022783

(5) Can Tap Valve



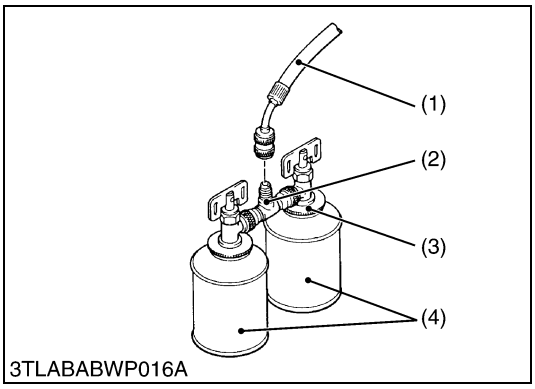
The can tap valve that is used to charge the refrigerant into the air conditioning system, should be used as follows :

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 place nut clockwise fully, and fix the center charging hose to the valve.
4. Tighten the place nut firmly by hand.
5. Turn the handle (1) clockwise, thus making a hole in the sealed tap.
6. To charge the refrigerant into the system, turn the handle (1) counterclockwise. To stop charging, turn it clockwise.

(1) Butterfly Handle
(2) Connection
(3) Needle
(4) Disc

W1024236

(6) T-joint



T-joint (2) is used to increase efficiency of gas charging using two refrigerant containers (4) at a time.

1. Install two refrigerant container service valves to T-joint (2) sides and connect the charging hose (1) to it.

(1) Charging Hose (Green)
(2) T-joint
(3) Can Tap Valve
(4) Refrigerant Container

W1026583

(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.**

W1026968

5. CHECKING AND CHARGING REFRIGERANT CYCLE

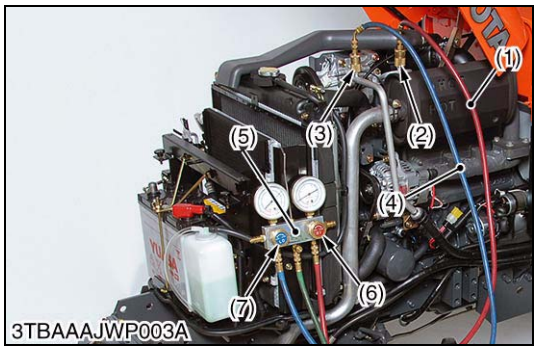
[1] CHECKING WITH MANIFOLD GAUGE

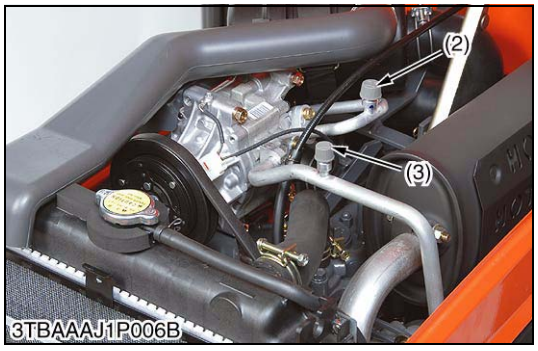
■ **IMPORTANT**

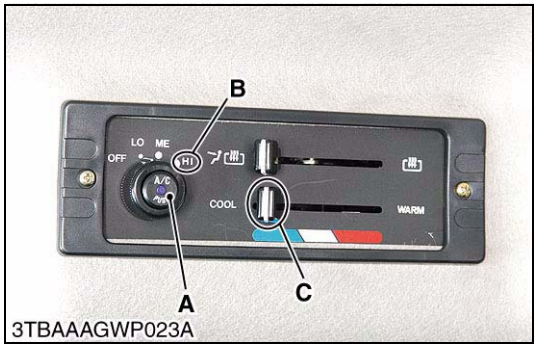
- **The gauge indications described in the following testing are those taken under the same condition, so it should be noted that the gauge readings will differs somewhat with the ambient conditions.**

Condition

- Ambient temperature : **30 to 35 °C (86 to 95 °F)**
- Engine speed : Approx. **1500 min^{-1} (rpm)**
- Temperature control lever : **Maximum cooling position**
- Blower switch : **HI position**







Manifold Gauge Connecting and Test Preparation

1. Close the manifold gauge **HI** and **LO** pressure side valve (7), (6) tightly.
2. Connect the charging hose (1) (red) to the **HI** pressure side charging valve (2) and connect the charging hose (4) (blue) to the **LO** pressure side charging valve (3).

■ **NOTE**

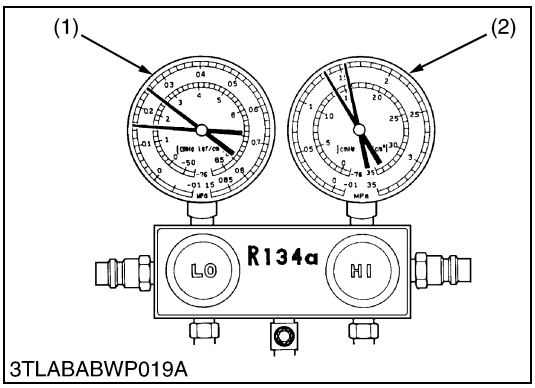
- **Be sure to drive out the air in the charging hoses at the manifold gauge connection end by utilizing the refrigerant pressure in the refrigerating cycle.**

3. Start the engine and set at approx. **1500 min^{-1} (rpm)**.
4. Turn on the A/C switch and set the temperature control dial to **maximum cooling** position "**C**".
5. Set the blower switch to **HI** position "**B**".

(1) Charging Hose (Red)
(2) **HI** Pressure Side Charging Valve
(3) **LO** Pressure Side Charging Valve
(4) Charging Hose (Blue)
(5) Manifold Gauge
(6) **HI** Pressure Side Valve
(7) **LO** Pressure Side Valve

A : A/C Switch "ON" Position
B : Blower Switch "HI" Position
C : Temperature Control Lever "Maximum Cooling" Position

W1027202



3TLABABWP019A

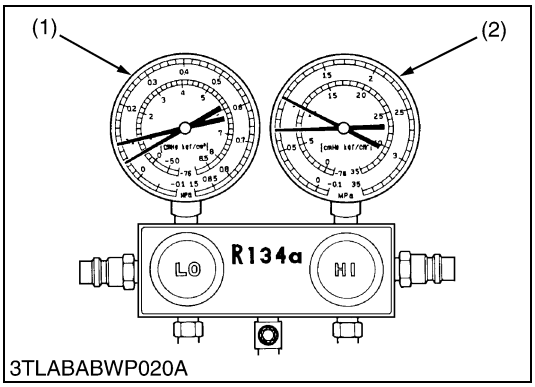
Normal Operating

If the refrigerating cycle is operating normally, the reading at the **LO** pressure side (1) should be generally by around 0.15 to 0.2 MPa (1.5 to 2.0 kgf/cm^2, 21 to 28 psi) and that at the **HI** pressure side (2) around 1.27 to 1.66 MPa (13 to 17 kgf/cm^2, 185 to 242 psi).

Gas pressure	Factory 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

W1029824



3TLABABWP020A

Insufficient Refrigerant

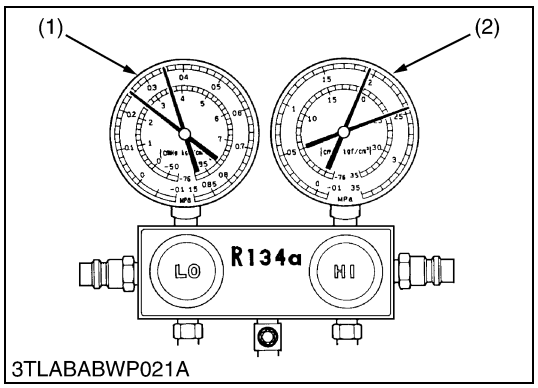
1. Symptoms seen in refrigerating cycle
- Both **LO** and **HI** pressure side (1), (2) pressures too low.
  LO pressure side (1) : 0.05 to 0.1 MPa
  (0.5 to 1.0 kgf/cm^2, 7.1 to 14.2 psi)
  HI pressure side (2) : 0.69 to 0.98 MPa
  (7 to 10 kgf/cm^2, 99.6 to 142.2 psi)
- Bubbles seen in sight glass.
- Air discharged from air conditioner sightly cold.

2. Probable cause
- Gas leaking from some place in refrigerant cycle.

3. Solution
- Check for leakage with electric gas leak tester and repair.
- Recharge refrigerant to the proper level. (See page 10-S23.)

(1) **LO** Pressure Side (2) **HI** Pressure Side

W1031234



3TLABABWP021A

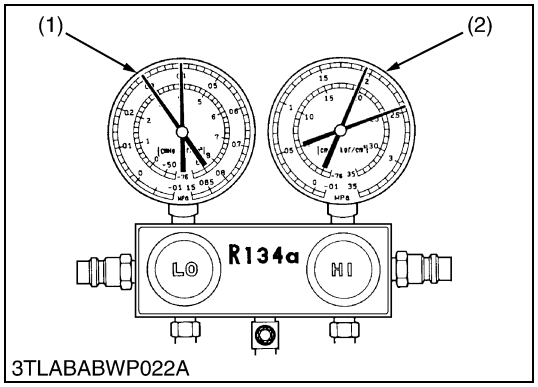
Excessive Refrigerant or Insufficient Condenser Cooling

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/cm^2, 28 to 49.8 psi)
  HI pressure side (2) : 1.96 to 2.45 MPa
  (20 to 25 kgf/cm^2, 284.5 to 355.6 psi)
2. Probable cause
- Overcharging refrigerant into cycle.
- Condenser cooling faulty.
3. Solution
- Clean condenser. (See page G-12.)
- Adjust air conditioner belt to proper tension. (See page G-26.)
- 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

W1032124



3TLABABWP022A

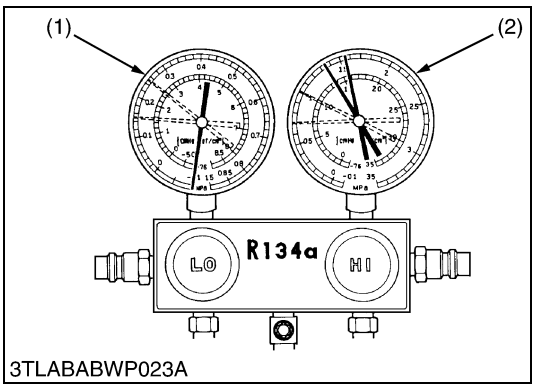
Air Entered in the Cycle

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/cm^2→, 28 to 49.8 psi)
  HI pressure side (2) : 1.96 to 2.45 MPa
  (20 to 25 kgf/cm^2, 284.5 to 355.6 psi)
- **LO** pressure side (1) piping not cold when touched.
2. Probable cause
- Air entered in refrigerating cycle.
3. Solution
- Replace receiver.
- Check compressor oil contamination and quantity.
- Evacuate and recharge new refrigerant. (See page 10-S21.)

■ **NOTE**
- **The above cycle can be seen when the cycle is charged without evacuation.**

(1) **LO** Pressure Side (2) **HI** Pressure Side

W1032490



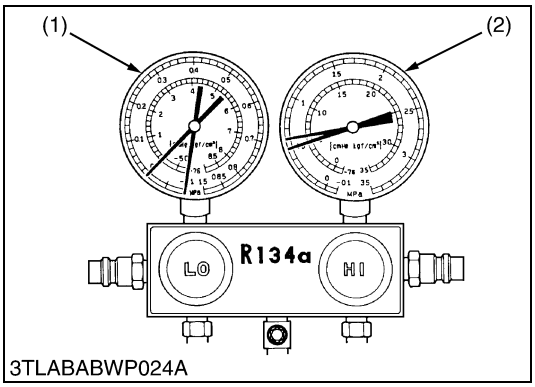
3TLABABWP023A

Moisture Entered in the Cycle

1. Symptoms seen in refrigerating cycle
- The air conditioner operates normally at the beginning, but over time, **LO** pressure side (1) pressure is **vacuum** and **HI** pressure side (2) is low pressure.
  LO pressure side (1) : Vacuum
  HI pressure side (2) : 0.69 to 0.98 MPa
  (7 to 10 kgf/cm^2, 99.6 to 142.2 psi)
2. Probable cause
- The moisture in the refrigerating cycle freezes in the expansion valve orifice and causes temporary blocking. After a time, the ice melts and condition returns to normal.
3. Solution
- Replace receiver.
- Remove moisture in cycle by means of repeated evacuation.
- Recharge new refrigerant to the proper level.
  (See page 10-S23.)

(1) **LO** Pressure Side (2) **HI** Pressure Side

W1032818



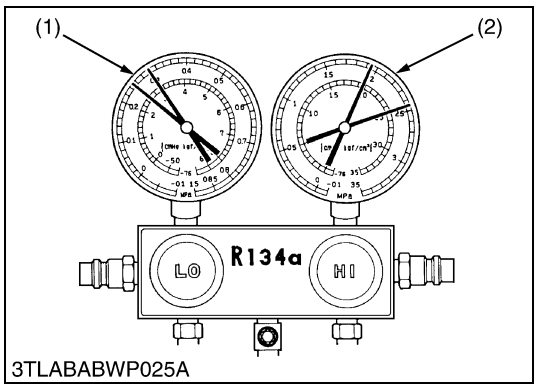
3TLABABWP024A

Refrigerant Fails to Circulate

1. Symptoms seen in refrigerating cycle
- **LO** pressure side (1) pressure is vacuum and, **HI** pressure side (2) is low pressure.
  LO pressure side (1) : Vacuum
  HI pressure side (2) : 0.49 to 0.59 MPa
  (5 to 6 kgf/cm^2, 71.2 to 85.3 psi)
2. Probable cause
- Refrigerant flow obstructed by moisture or dirt in the refrigerating cycle freezing or sticking on the expansion valve orifice.
3. Solution
  Allow to stand for same time and then resume operation to decide whether the plugging is due to moisture or dirt.
- If caused by moisture, correct by referring to instructions in previous.
- If caused by dirt, remove the expansion valve and blow out the dirt with compressed air.
- If unable to remove the dirt, replace the expansion valve.
  Replace the receiver. Evacuate and charge in proper amount of new refrigerant. (See page 10-S23.)
- If caused by gas leakage in heat sensitizing tube, replace the expansion valve.

(1) **LO** Pressure Side (2) **HI** Pressure Side

W1033128



3TLABABWP025A

Expansion Valve Opens Too Far or Improper Installation of Heat Sensitizing Tube

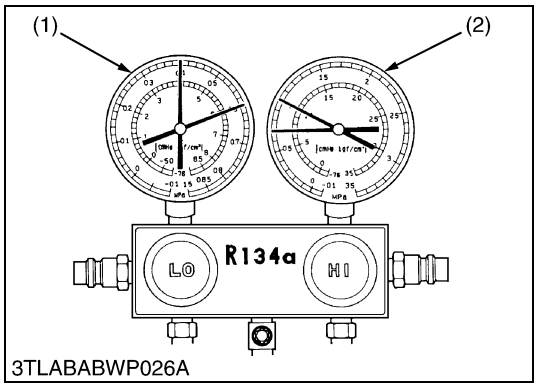
1. Symptoms seen in refrigerating cycle
- Both **LO** and **HI** pressure side (1), (2) pressures too high.
  LO pressure side (1) : 0.29 to 0.39 MPa
  (3.0 to 4.0 kgf/cm^2, 42.71 to 56.9 psi)
  HI pressure side (2) : 1.96 to 2.45 MPa
  (20 to 25 kgf/cm^2, 284.5 to 355.6 psi)
- Frost or heavy dew on low pressure side piping.

2. Probable cause
- Expansion valve trouble or heat sensitizing tube improperly installed.
- Flow adjustment not properly done.

3. Solution
- Check installed condition of heat sensitizing tube.
- If installation of heat sensitizing tube is correct, replace the expansion valve.

(1) **LO** Pressure Side (2) **HI** Pressure Side

W1033363



3TLABABWP026A

Faulty Compression of Compressor

1. Symptoms seen in refrigerating cycle
- **LO** pressure side (1) : 0.39 to 0.59 MPa (4 to 6 kgf/cm^2, 56.9 to 85.3 psi)
- **HI** pressure side (2) : 0.69 to 0.98 MPa (7 to 10 kgf/cm^2, 99.6 to 142.2 psi)

2. Probable cause
- Leak in compressor.

3. Solution
- Replace compressor. (See page 10-S36.)

■ **NOTE**
- **Manifold gauge indications (left side figure) at faulty compressing by compressor.**

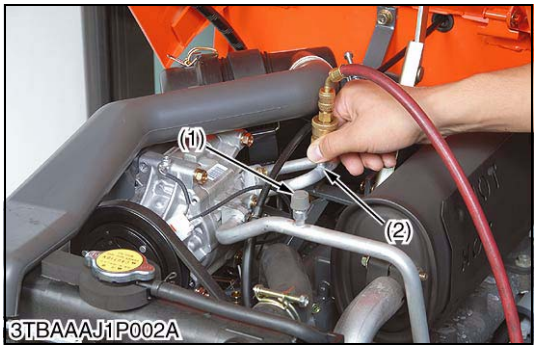
(1) **LO** Pressure Side (2) **HI** Pressure Side

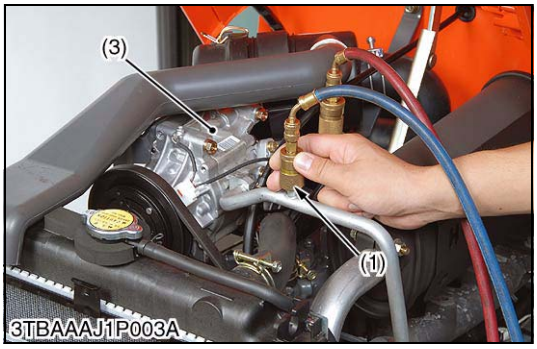
W1033691

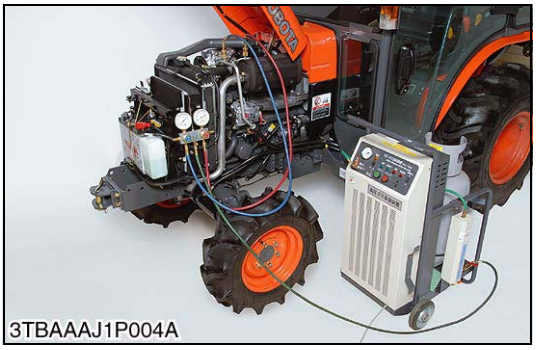
[2] DISCHARGING, EVACUATING AND CHARGING

■ **IMPORTANT**
- **When discharging, evacuating or charging the refrigerating system, be sure to observe the "PRECAUTION AT REPAIRING REFRIGERANT CYCLE".**

(1) Discharging the System







Discharging R134a Refrigerant

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.

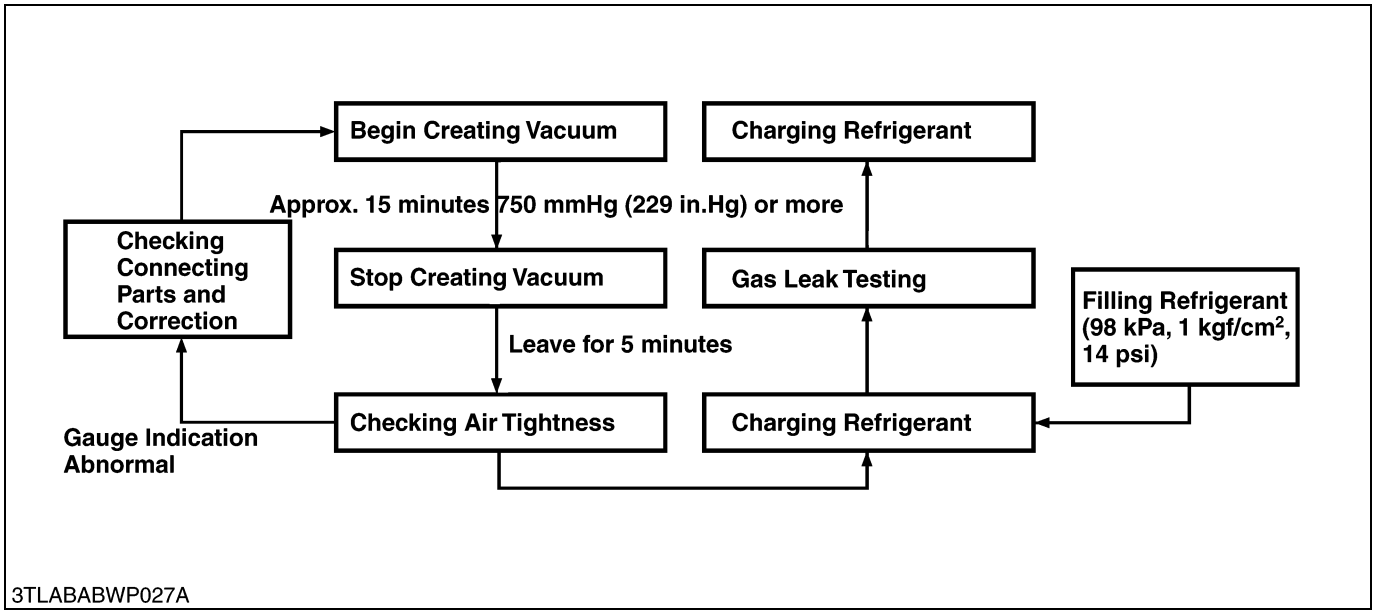
■ **IMPORTANT**
- **Use only R134a refrigerant recovery and recycling machine. Eliminate mixing R134a equipment, refrigerant, and refrigerant oils with R12 systems to prevent compressor damage.**

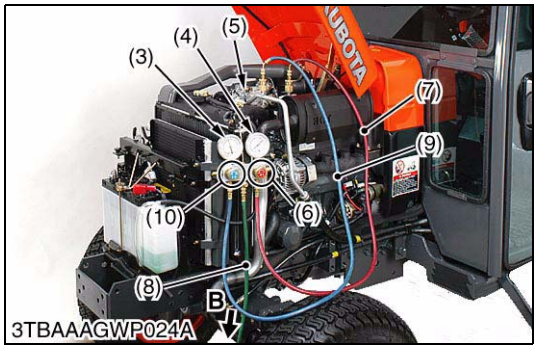
⚠ CAUTION
- **Protect fingers with cloth against frostbite by refrigerant when disconnecting the hose to the charging valve.**

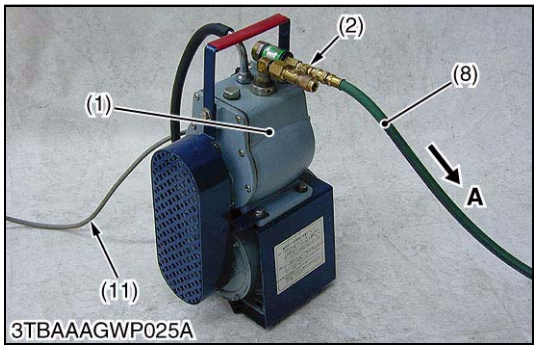
(1) **LO** Pressure Side Charging Valve (3) Compressor
(2) **HI** Pressure Side Charging Valve

W1030074

(2) Evacuating the System







Evacuating the System

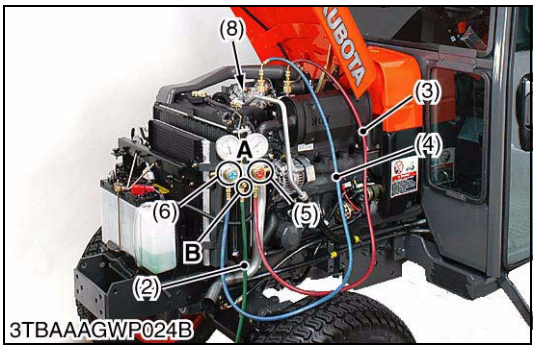
1. Discharge refrigerant from the system by R134a refrigerant recovery and recycling machine. (Refer to "**Discharging the system**".)
2. Connect the charging hose (7) (red) to the **HI** pressure side charging valve and connect the charging hose (9) (blue) to the **LO** pressure side charging valve.
3. Connect the center charging hose (8) (green) to a vacuum pump inlet.
4. Open both valves (6), (10) of manifold gauge fully. Then run the vacuum pump (1) to evacuate the refrigerant cycle. (For approx. **15 minutes**.)
5. When **LO** pressure gauge (10) reading is more than **750 mmHg (299 in.Hg)**, stop the vacuum pump (8) and close both valves (6), (10) of manifold gauge fully.
6. Wait for over 5 minutes with the **HI** and **LO** pressure side valves (6), (10) 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.

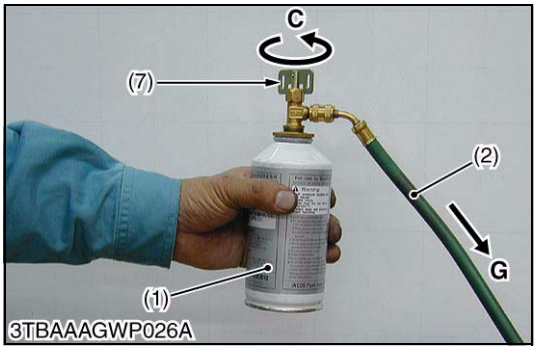
(1) Vacuum Pump (Running)
(2) Vacuum Pump Adaptor
(3) **LO** Pressure Gauge
(4) **HI** Pressure Gauge
(5) Compressor
(6) **HI** Pressure Side Valve (Open)
(7) Red Hose
(8) Green Hose
(9) Blue Hose
(10) **LO** Pressure Side Valve (Close)
(11) Alternative Current Cable

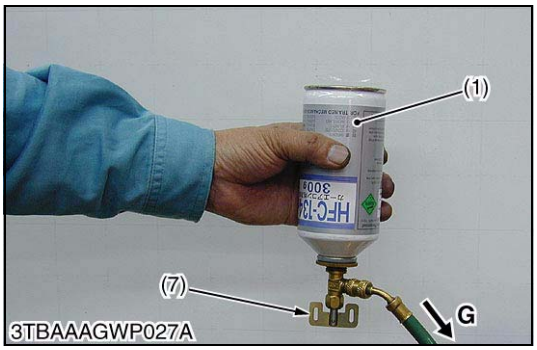
A : Connection to manifold gauge
B : Connection to vacuum pump

W1036001

(3) Charging the System







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. 200 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 (5), (6) of manifold gauge after the system is evacuated completely.
2. Connect the center charging hose (2) 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 (5) 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. 200 g (1.1 lbs) from the **HI** pressure side.

NOTE

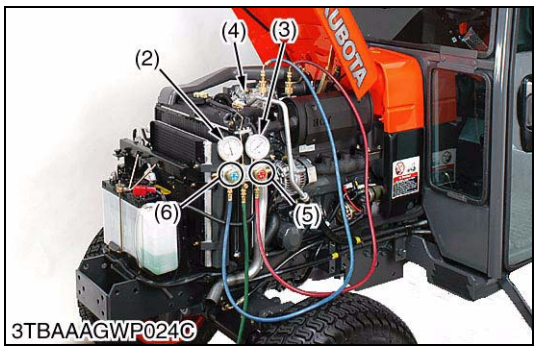
- **If LO pressure gauge does not show a reading, the system is clogged and must be repaired.**

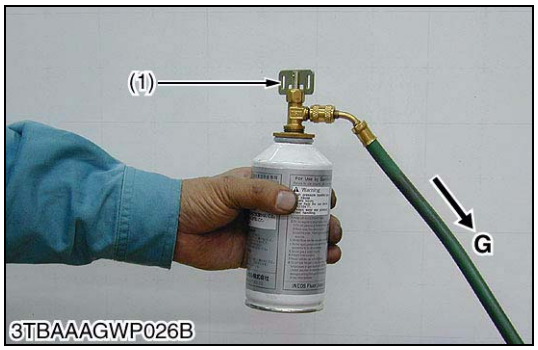
5. Close the **HI** pressure side valve (5) of manifold gauge and can tap valve of refrigerant container.

(1) Refrigerant Container (R134a)
(2) Green Hose
(3) Red Hose
(4) Blue Hose
(5) **HI** Pressure Side Valve (Open)
(6) **LO** Pressure Side Valve (Close)
(7) Can Tap Valve (Open)
(8) Compressor

A : Air Purger
B : Loosen the Nut
C : Open the Can Tap Valve
G : Connection to Manifold gauge

W1037243





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 side valve of manifold gauge while the engine is running.**

NOTE

- **Do not turn the refrigerant container upside-down when charging the system by running the engine.**
- **Put refrigerant container into a pan of warm water (maximum temperature 40 °C (104 °F)) to keep the vapor pressure in the container slightly higher than vapor pressure in the system.**

1. Check that the **HI** pressure side valve (5) is closed.
2. Start the engine and set an approx. **1500 min^{-1} (rpm)**.
3. Turn on the A/C switch.
   Set the temperature control lever to **maximum cooling** position and the blower switch to **HI** position.
4. Open the **LO** pressure side valve (6) of manifold gauge and the can tap valve (1) on refrigerant container and charge the refrigerant until air bubbles in the sight glass of the receiver vanish.
5. After charging the specified amount of refrigerant into the system, close the **LO** pressure side valve (6) of manifold gauge and can tap valve (1), then stop the engine.
6. Check for gas leak with an electric gas leak tester (See page 10-S15.).

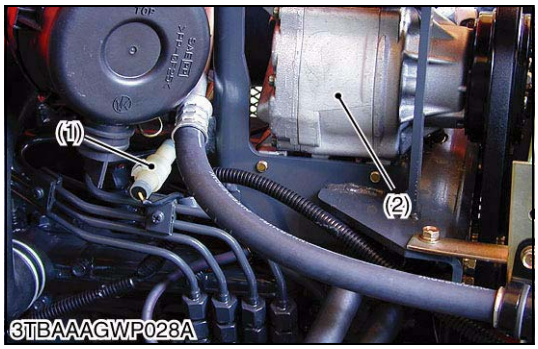
(Reference)

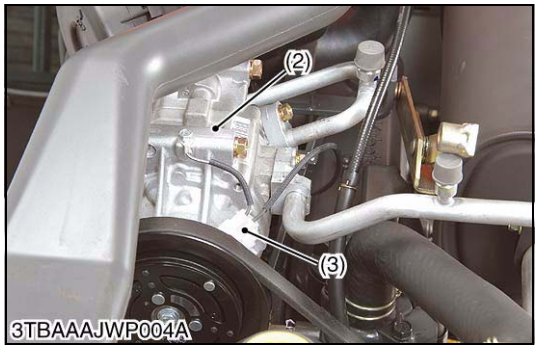
- Specified amount of refrigerant (total) :
  630 to 690 g (1.39 to 1.52 lbs) [Refrigerant R134a]
- Manifold gauge indication at fully charged system (at ambient temperature : 30 °C (86 °F))
  HI pressure side : 1.27 to 1.66 MPa
  13 to 17 kgf/cm^2
  185 to 242 psi
  LO pressure side : 0.15 to 0.20 MPa
  1.5 to 2.0 kgf/cm^2
  21 to 28 psi

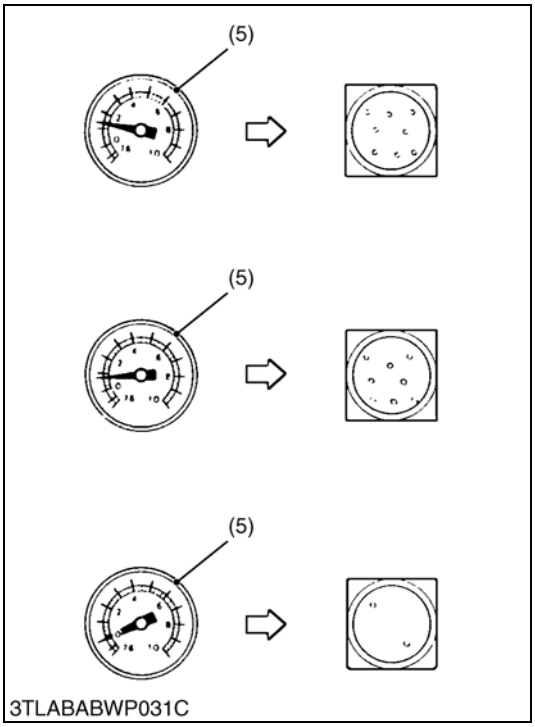
(1) Can Tap Valve
(2) **LO** Pressure Gauge
(3) **HI** Pressure Gauge
(4) Compressor (Running)
(5) **HI** Pressure Side Valve (Close)
(6) **LO** Pressure Side Valve (Open)
G : Connection to Manifold Gauge

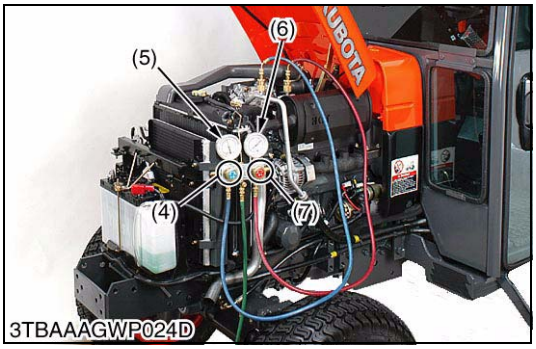
W1038742

(4) Checking Charging Refrigerant Amount









After charging the refrigerant, check for amount of charging refrigerant as follows.

■ **NOTE**

- **The pressure on the following checking are the gauge indications at ambient temperature 30 °C (86 °F), so it should be noted that the pressure will differ some what with the ambient temperature.**

1. Disconnect the **1P** connector (1) of magnetic clutch.
2. Start the engine and set a approx. **1500 min^{-1} (rpm)**.
3. Connect the lead the **1P** connector (1) of magnetic clutch. Connect the lead to the battery positive terminal directly, and then set the blower switch to **HI** position.
4. Leave the system for approx. **5 minutes** until the refrigerant cycle becomes stable, keeping pressure on the **HI** pressure side from 1.27 to 1.66 MPa (13 to 17 kgf/cm^2, 185 to 242 psi).
5. When the refrigerant cycle is stabilizer, turn off the blower switch and let the compressor alone to run. Then pressure on the **LO** pressure side gradually drops. At this time, if pressure on the **HI** pressure side is maintained from 1.27 to 1.66 MPa (13 to 17 kgf/cm^2, 185 to 242 psi), air bubbles which pass through the sight glass becomes as stated below depending on refrigerant charged amount.

■ **Insufficient refrigerant charge**

Air bubbles pass continuously the sight glass when pressure on the **LO** pressure side is over 99.0 kPa (1.01 kgf/cm^2, 14.4 psi). In this case, charge the refrigerant from the **LO** pressure side.

■ **Properly refrigerant charge**

Air bubbles pass through the sight glass continuously when pressure on the **LO** pressure side is within 59 to 98 kPa (0.6 to 1.0 kgf/cm^2, 9 to 14 psi).

If the charge refrigerant amount is proper, no air bubble is observed on the sight glass at pressure on the **LO** pressure side over 99.0 kPa (1.01 kgf/cm^2, 14.4 psi) when the blower switch is turned on. When the blower switch is turned off, bubbles pass through the sight glass in case pressure on the **LO** pressure side is within 59 to 98 kPa (0.6 to 1.0 kgf/cm^2, 9 to 14 psi).

■ **Excessive refrigerant charge**

Air bubbles pass through the sight glass time to time or no air bubble is observed when pressure on the **LO** pressure side is under 59 kPa (0.6 kgf/cm^2, 9 psi).

In this case, discharge excessive refrigerant gradually from the **LO** pressure side.

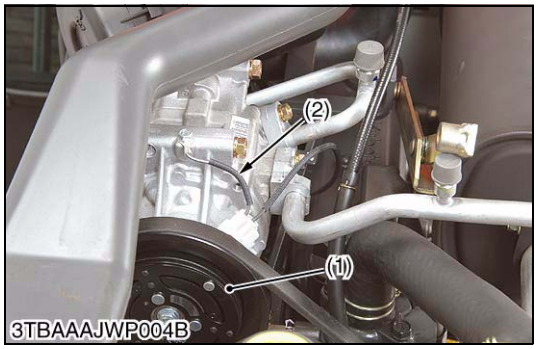
(1) **1P** Connector
(2) Compressor
(3) **2P** Connector
(4) **LO** Pressure Valve (Close)
(5) **LO** Pressure Gauge
(6) **HI** Pressure Gauge
(7) **HI** Pressure Valve

W1030296

6. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Compressor



Operation of Magnetic Clutch

1. Start the engine.
2. Check whether abrasion of 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 (2) Ground Lead

W1040212



Stator Coil

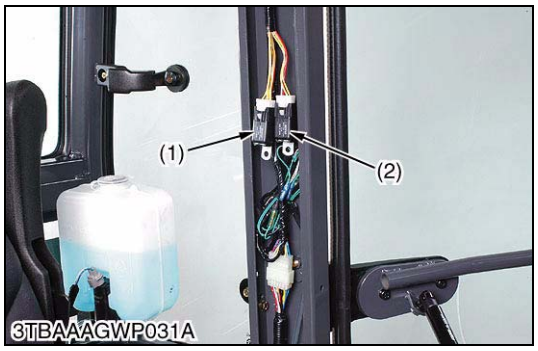
1. Remove the **2P** connector from the magnetic clutch. Measure the resistance of the stator coil with an ohmmeter across the **2P** connector on the magnetic clutch.
2. If the measurement is not within the factory specifications, replace the stator coil.

Stator coil resistance	Factory spec.	3.8 to 4.2 Ω

(1) **2P** Connector

W1043438

(2) Air Conditioner Unit

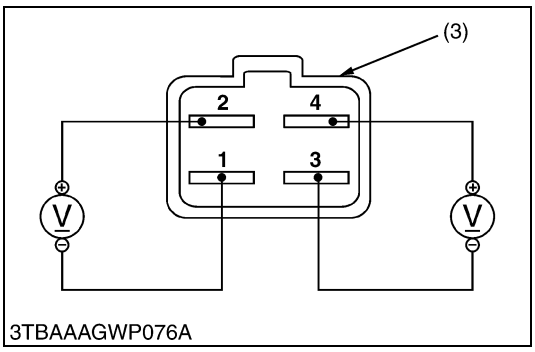


A/C Blower Relay and Compressor Relay

1. Remove the pillar cover and the sound absorber of cabin, and disconnect the relay connectors.
2. Perform the following checkings **1)** and **2)**.

(1) A/C Blower Relay (2) Compressor Relay

W1044646



1) Connector Voltage

a) A/C Blower Relay

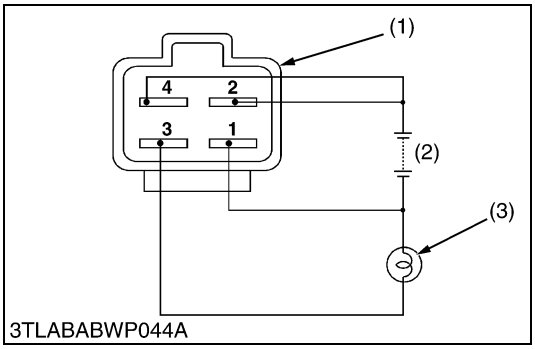
1. The voltage across the **4** terminal and chassis should be approx. battery voltage.
2. When turning the main switch **ON** and A/C blower switch to **LO** position, the voltage across the **2** terminal and chassis should be approx. battery voltage.

b) Compressor Relay

1. The voltage across the **4** terminal and chassis should be approx. battery voltage.
2. When turning the main switch **ON**, A/C blower switch to **LO** and A/C switch **ON**, the voltage across the terminal 2 and chassis should be approx. battery voltage.

(1) A/C Blower Relay
(2) Compressor Relay
(3) Connector Side

W1046167

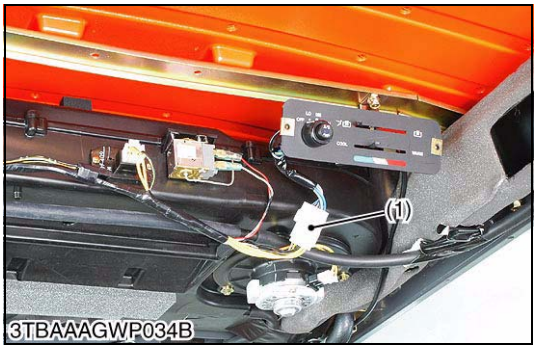


2) Relay Test

1. Remove the relay (1).
2. Connect the battery (2) and bulb (3) with the relay (1) as shown in the left figure.
3. In this condition, the bulb should light on if the relay is proper.
4. If the bulb light off when disconnecting the jumper lead from the relay **4** terminal, the relay is proper.

(1) Relay
(2) Battery
(3) Bulb

W1047070

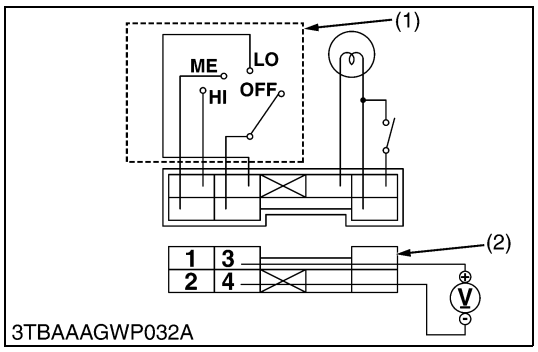


A/C Blower Switch

1. Remove the inner roof and disconnect the A/C blower switch connector (1).
2. Perform the following checkings **1)** and **2)**.

(1) A/C Blower Switch Connector

W1047516



1) Connector Voltage

1. Turn the main switch **ON**.
2. Measure the voltage with a voltmeter across the connector **4** terminal and **3** terminal.
3. If the voltage differs from the battery voltage, the wiring harness, A/C relay, fuse or main switch is faulty.

Voltage	**4** terminal - **3** terminal	Approx. battery voltage

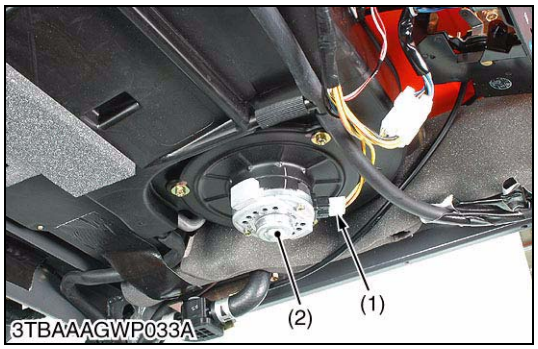
2) A/C Blower Switch

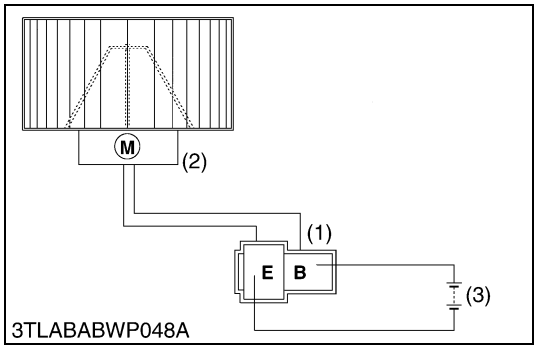
1. Check the continuity through the switch with an ohmmeter.
2. If the continuity specified below are not indicated, the switch is faulty.

Position \ Terminal		3	4	1	2
A/C blower switch	**OFF**	●			
	Low	●	●		
	Medium	●	●	●	
	High	●	●		●

(1) A/C Blower Switch (2) A/C Blower Switch Connector

W1047804



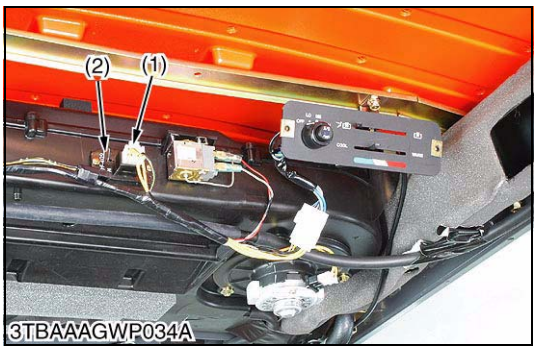


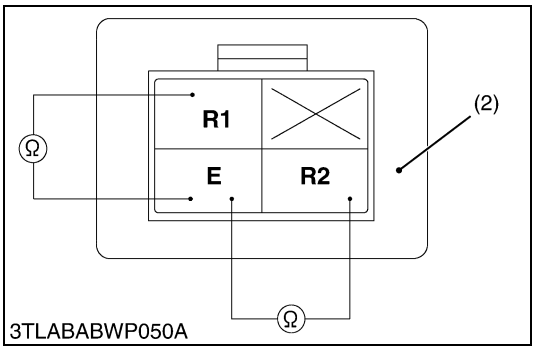
A/C Blower Motor Test

1. Remove the inner roof and the outer roof.
2. Turn the blower motor (2) by hand and check whether it turns smoothly.
3. Disconnect the connector (1) of blower motor (2).
4. Connect a jumper lead from battery (3) positive terminal to connector **E** terminal.
5. Connect a jumper lead from battery negative terminal to connector **B** terminal momentarily.
6. If the blower motor does not run, check the motor.

(1) Blower Motor Connector (3) Battery (12 V)
(2) Blower Motor

W1048917





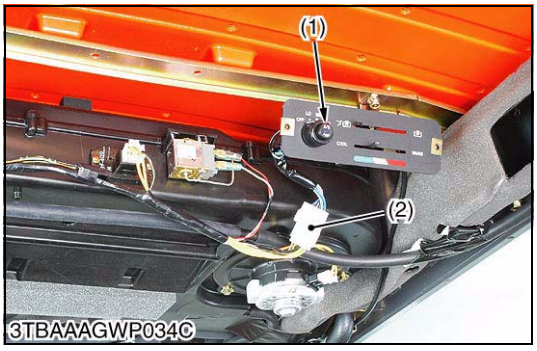
A/C Blower Resistor

1. Remove the inner roof.
2. Disconnect the **4P** connector (1) for A/C blower resistor (2).
3. Measure the resistance with an ohmmeter across the **R1** terminal and **E** terminal, and across the **R2** terminal and **E** terminal.
4. If the factory specifications are not indicated, A/C blower resistor is faulty.

Resistance	Factory spec.	**R1** terminal - **E** terminal	Approx. 1.0 Ω
		R2 terminal - **E** terminal	Approx. 2.0 Ω

(1) A/C Blower Resistor Connector (2) A/C Blower Resistor

W1049829

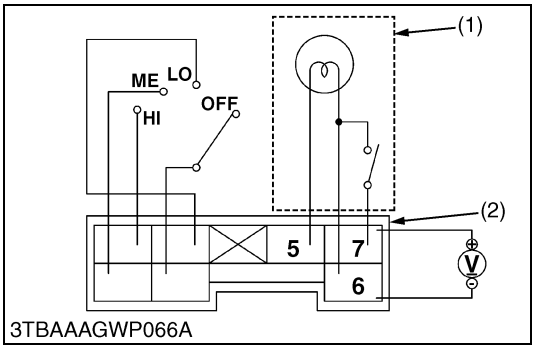


A/C Switch

1. Remove the inner roof, and disconnect the A/C switch connector (2).
2. Perform the following checkings **1)** and **2)**.

(1) A/C Switch (2) A/C Switch Connector

W1050805



1) Connector Voltage

1. Turn the main switch **ON**.
2. Measure the voltage with a voltmeter across the connector 7 terminal and 6 terminal.
3. If the voltage differs from the battery voltage, the wiring harness, A/C relay or fuse is faulty.

2) A/C Switch

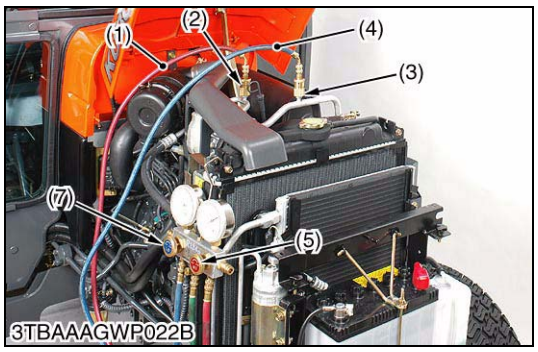
1. Check the continuity through the switch with an ohmmeter.
2. If the continuity specified below is not indicated, the switch is faulty.

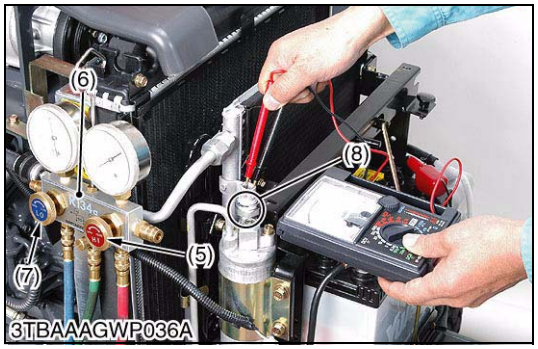
Position \ Terminal		**7**	**6**	**5**
A/C switch	**OFF****			
	ON*	●	●	

*Push the A/C switch button to **ON** position.
Push again the A/C switch button to **OFF position.

(1) A/C Switch (2) A/C Switch Connector

W1051088





Pressure Switch

1) HI Pressure Side

1. Connect the manifold gauge (6) to compressor as following procedure.
   Close the **HI** and **LO** pressure valves (5), (7) of manifold gauge tightly, and connect the charging hoses (red and blue) (1), (4) to the respective compressor service valves.

■ **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 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.	Pressure switch **OFF**.	More than Approx. 2.94 MPa 30 kgf/cm^2 426 psi

2) 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.	Pressure switch **OFF**.	Less than Approx. 0.196 MPa 2.0 kgf/cm^2 28.4 psi

- The resistance of pressure switch is 0 ohm in normal running, but is becomes infinity if the pressure is abnormal (out of factory spec.). Because the pressure switch starts to work.

(1) Charging Hose (Red)
(2) **HI** (High Pressure Side) Charging Valve
(3) **LO** (Low Pressure Side) Charging Valve
(4) Charging Hose (Blue)
(5) **HI** Pressure Valve
(6) Manifold Gauge
(7) **LO** Pressure Valve
(8) Pressure Switch

W1052112

(3) Front Windshield Wiper

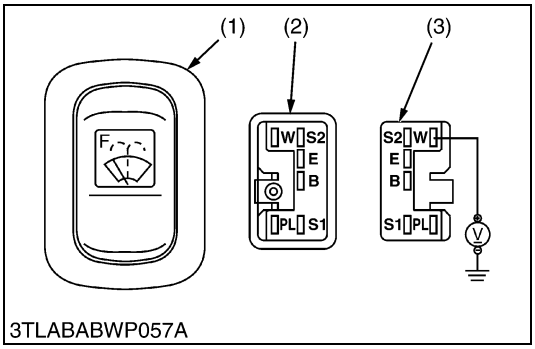


Front Wiper Switch

1. Remove the front wiper cover, and disconnect the front wiper switch connector (1).
2. Perform the following checkings **1)** and **2)**.

(1) Front Wiper Switch Connector (2) Front Wiper Switch

W1054111



1) Connector Voltage

1. Turn the main switch **ON**.
2. Measure the voltage with a voltmeter across the connector **W** terminal and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	**W** terminal - Chassis	Approx. battery voltage

2) Front Wiper Switch

1. Check the continuity through the switch with an ohmmeter.
2. If continuity specified below is not indicated, the switch is faulty.

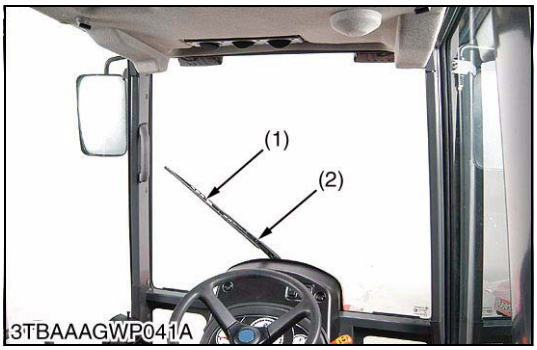
Position \ Terminal		S1	S2	B	W	E	PL
Front Wiper Switch	WASH I				●	●	
	OFF	●	●				
	ON		●	●			
	WASH II		●	●	●	●	●

(Reference)

- **WASH I** : **OFF** side of the wiper switch remains pushed in.
- **WASH II** : **ON** side remains pushed in after the wiper switch is switched **ON** and remains switched **ON**.

(1) Front Wiper Switch
(2) Front Wiper Switch Connector (Switch Side)
(3) Front Wiper Switch Connector (Wiring Harness Side)

W1054889



Front Wiper Motor

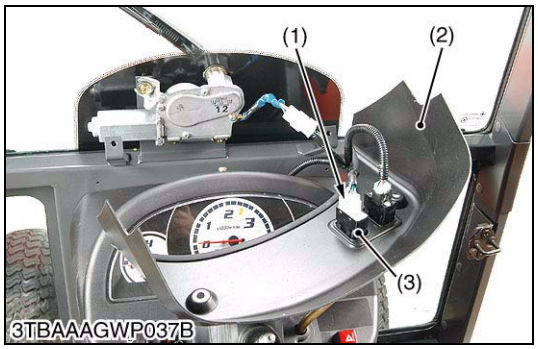
1. Raise up the front wiper arm (2).
2. Turn the main switch **ON**.
3. Push the front wiper switch to **ON** position.
4. Count the number of wiper arm rocking per minutes.
5. If the number differs from the factory specifications, replace the wiper motor assembly.

No load rotating speed	Factory spec.	33 to 43 min^{-1} (rpm)

(1) Wiper Blade (2) Wiper Arm

W1055956

(4) Working Light

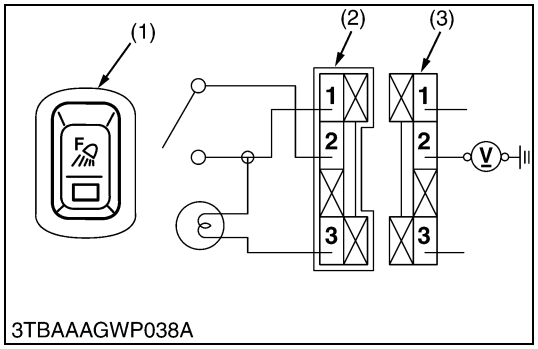


Front Working Light Switch

1. Remove the front wiper cover (2), and disconnect the working light switch connector (1) from the working light switch (3).
2. Perform the following checkings **1)** and **2)**.

(1) Working Light Switch Connector
(2) Front Wiper Cover
(3) Working Light Switch Connector

W1056694



1) Connector Voltage

1. Turn the main switch **ON**.
2. Measure the voltage with a voltmeter across the connector **2** terminal and chassis.
3. If the voltage differs from the battery voltage, the wiring harness, fuse or main switch is faulty.

Voltage	**2** 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, the switch is faulty.

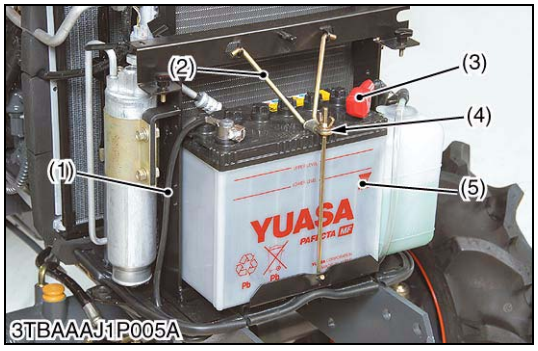
Position \ Terminal		**1**	**2**	**3**
Working Light Switch	**OFF**	●		●
	ON	●	●	●

(1) Working Light Switch
(2) Working Light Switch Connector (Switch Side)
(3) Working Light Switch Connector (Wiring Harness Side)

W1057558

[2] DISASSEMBLING AND ASSEMBLING

(1) Separating Cabin from Tractor



Removing Battery

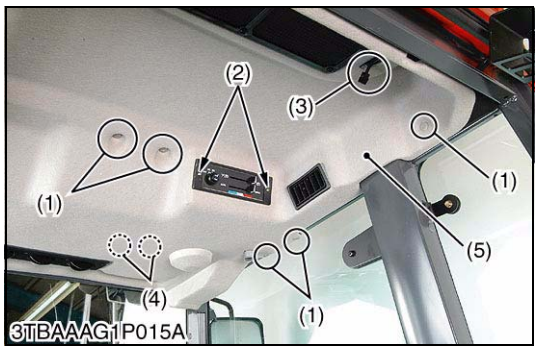
1. Removing the wing nut (4).
2. Remove the battery retainer (2).
3. Disconnect the battery negative cable (1) from the battery (5).
4. Disconnect the battery positive cable (3) from the battery (5).
5. Remove the battery (5).

(When reassembling)

- Connect the battery positive cable first.
- Connect the battery negative cable second.

(1) Battery Negative Cable
(2) Battery Retainer
(3) Battery Positive Cable
(4) Wing Nut
(5) Battery

W1030554

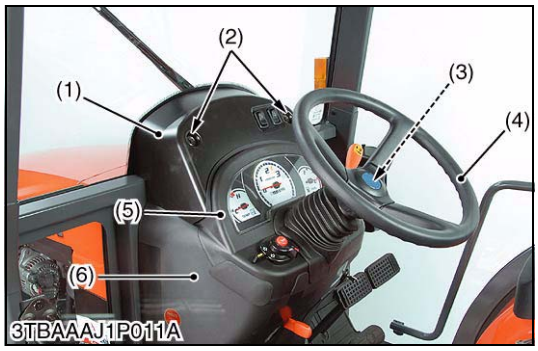


Removing Inner Roof

1. Remove the screws (2) from the control panel.
2. Remove the knob (3).
3. Remove the rivets (1) and the screws (4) from the inner roof (5).

(1) Rivet
(2) Screw
(3) Knob
(4) Screw
(5) Inner Roof

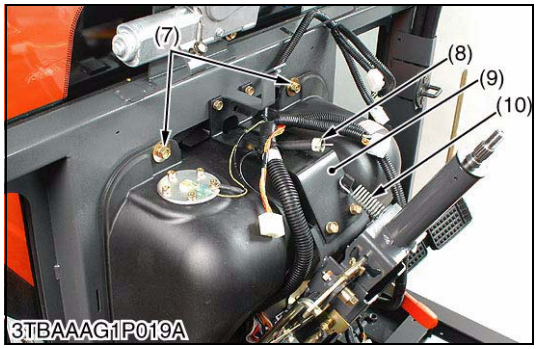
W1078469



Removing Steering Wheel and Meter Panel

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut (3).
3. Remove the steering wheel with a steering wheel puller (Code No. 07916-51090).
4. Remove the bolts (2) and the front wiper cover (1).
5. Disconnect the coupler.
6. Remove the meter panel (5).
7. Disconnect the hour-meter cable (8) from the meter panel.
8. Remove the panel lower cover (6).
9. Remove the spring (10) and the steering post stay (9).
10. Remove the bolts (7) from the cabin frame.

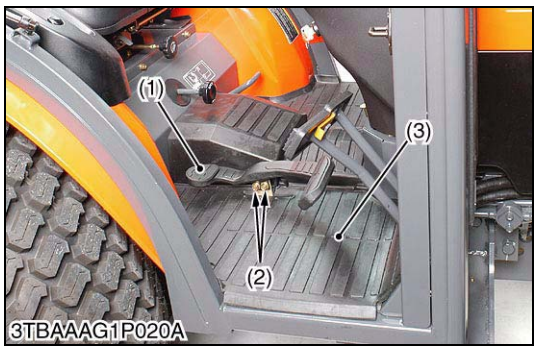
(When reassembling)

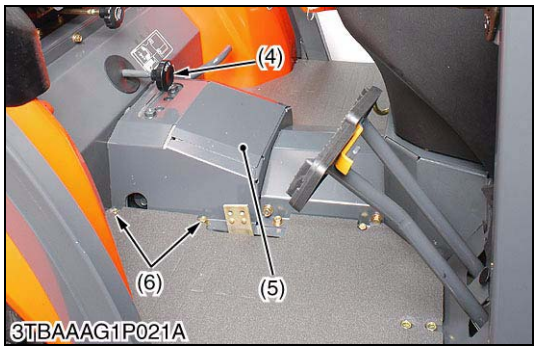


Tightening torque	Steering wheel mounting nut	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft

(1) Front Wiper Cover
(2) Bolt
(3) Nut
(4) Steering Wheel
(5) Meter Panel
(6) Panel Lower Cover
(7) Bolt
(8) Hour-meter Cable
(9) Steering Post Stay
(10) Spring

W1031086





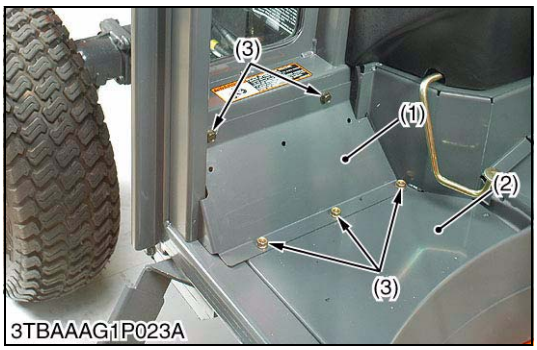


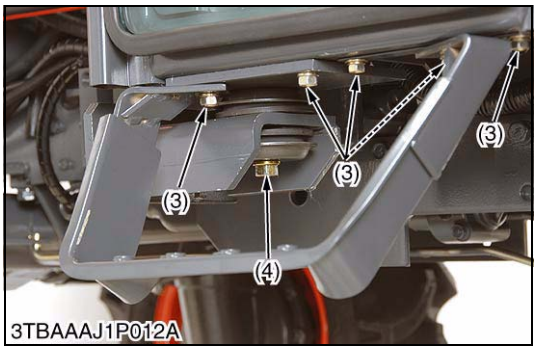
Removing HST Pedal, Floor Mat and Seat Front Cover

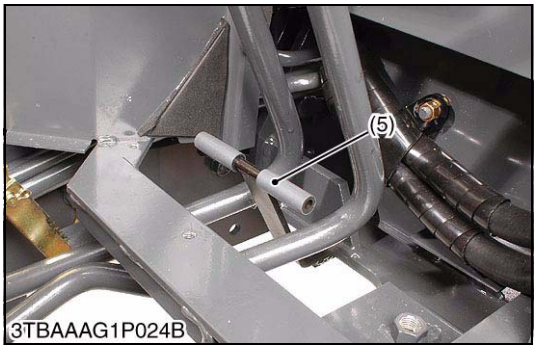
1. Remove the bolts (2) and the HST pedal (1).
2. Remove the grip (4). Remove the differential lock pin at the right side rear axle shaft.
3. Remove the bolts (6) and the seat front cover (5) from the fenders and the steps.

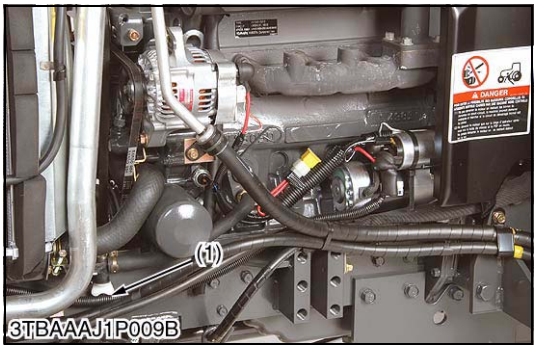
(1) HST Pedal
(2) Bolt
(3) Floor Mat
(4) Grip
(5) Seat Front Cover
(6) Bolt

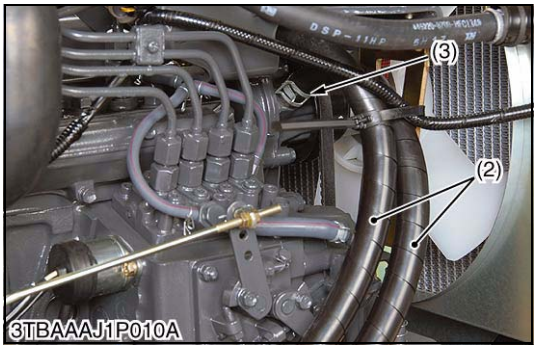
W1031571











Removing Cover, Step and Stopper

1. Remove the bolts (3).
2. Remove the cover (1).
3. Remove the bolts and the step (2).
4. Remove the bolt and the stopper (5).
5. Remove the cabin mounting bolts and the nuts.

(When reassembling)

Tightening torque	Cabin mounting bolts and nuts (M14)	100 to 120 N·m 10.2 to 12.2 kgf·m 73.8 to 88.5 lbf·ft

(1) Cover
(2) Step
(3) Bolt
(4) Bolt and Nut
(5) Stopper

W1031944

Disconnecting Water Hoses

1. Loosen the water drain cock (1).
2. Drain the coolant.
3. Remove the hose clamps (3). Disconnect the water hoses (2) from the engine.

(When reassembling)

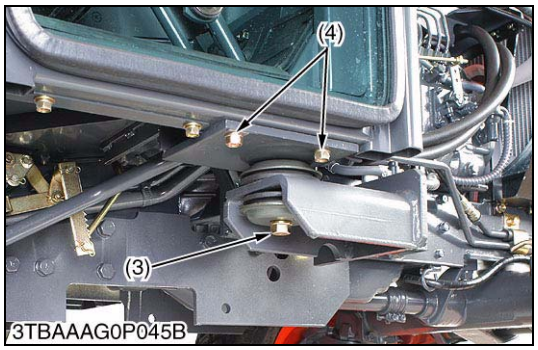
- Fill the coolant to the specified capacity.

Coolant	Capacity	5.2 L 5.5 U.S.qts. 4.6 Imp.qts.

(1) Water Drain Cock
(2) Water Hose
(3) Hose Clamp

W1032210





Removing Tail Light Body and Cabin Mounting Bolts

1. Remove the tail light body (1).
2. Remove the bolts and the nuts (2).
3. Remove the bolts and the nuts (3), (4).

(When reassembling)

Tightening torque	Cabin mounting bolts and nuts (M14)	100 to 120 N·m 10.2 to 12.2 kgf·m 73.8 to 88.5 lbf·ft

(1) Tail Light Body
(2) Bolt and Nut
(3) Bolt and Nut
(4) Bolt

W1065345



Dismounting Cabin

1. Hook the cabin with the nylon slings not to damage the other roof.
2. Dismount the cabin from the tractor body.
3. Support the cabin with the rigid jacks.

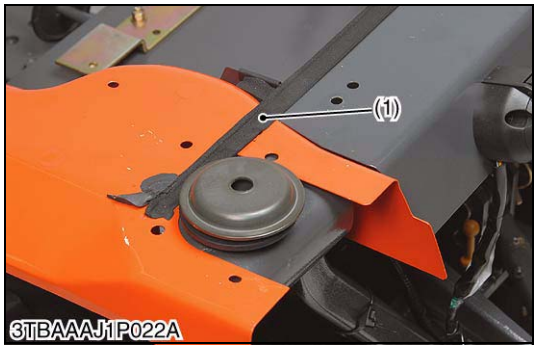
(When reassembling)

- If the beam shield (1) is damaged, replace it with a new one.

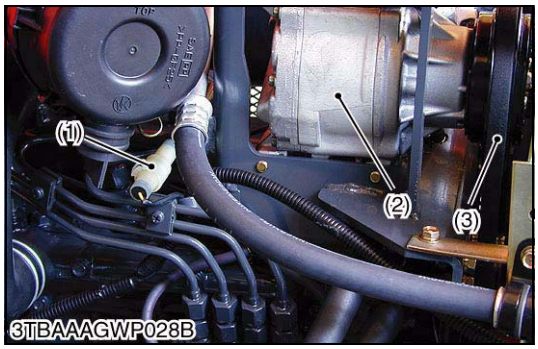
(1) Beam Shield
(2) Bolt and Nut
(3) Bolt and Nut
(4) Bolt

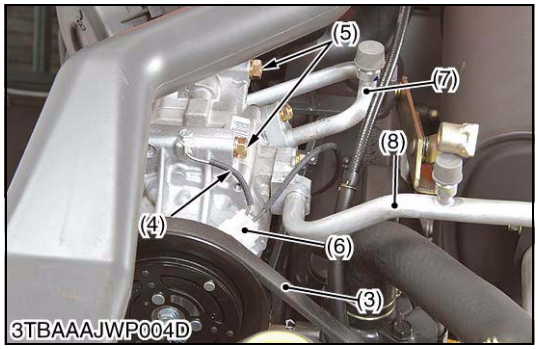
W1032418

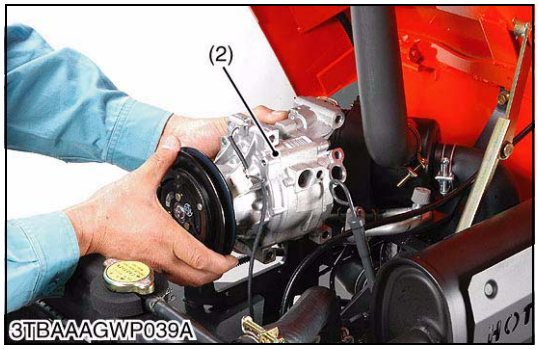


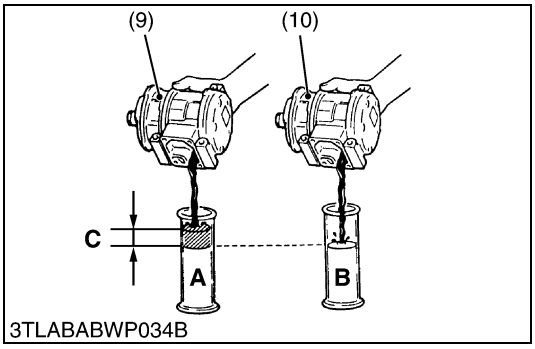


(2) Removing Compressor Assembly









Compressor

1. Discharge the refrigerant from the system. (Refer to "**Discharging the Refrigerant**" : See page 10-S19.)
2. Disconnect the low pressure pipe (suction) (8) and high pressure pipe (discharge) (7) from the compressor (2), then cap the open fitting immediately to keep moisture out of the system.
3. Disconnect the **1P** connector (1), **2P** connector (6) and the ground lead (4).
4. Remove the air conditioner belt (3).
5. Remove the bolts (5) and the compressor (2).

(When reassembling)

- After reassembling the compressor, be sure to adjust the air conditioner belt tension and recharge the refrigerant to the system. (Refer to "**Charging the Refrigerant**" : See page 10-S19.)
- 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.
- Readjust the belt tension. Refer to page G-26.

Tightening torque	High pressure pipe 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 lbf·ft
	Compressor mounting screws	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 lbf·ft

Air conditioner belt deflection	Factory spec.	10 to 12 mm 0.40 to 0.48 in.

(1) **1P** Connector
(2) Compressor
(3) Air Conditioner Belt
(4) Ground Lead
(5) Belt
(6) **2P** Connector
(7) High Pressure Pipe
(8) Low Pressure Pipe
(9) New Compressor
(10) Old Compressor

A : Oil Flow New Compressor
B : Oil Flow Old Compressor
C : Remove the Excess Oil (A - B)

W1067299


3TBAAAGWP040A

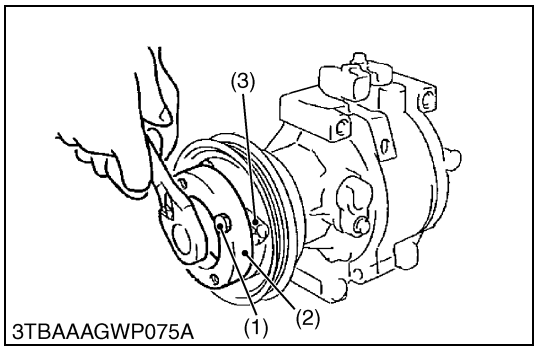
Hub Plate

1. Three stopper bolts (1) are set in stopper magnet clutch (2) at the position corresponding to the shape of compressor.
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 or nut.
4. Remove the hub plate (3).
   Compressor is used remover magnet clutch (4).
5. Remove the shims.

(When reassembling)

- Do not apply grease or oil on the hub plate facing.
- Do not use the screw or nut again.
- It is confirmed to turn rotor by hand after assembling and not contact with stator.
- Check and adjust the air gap before tight the magnet clutch mounting screw to the specified torque.

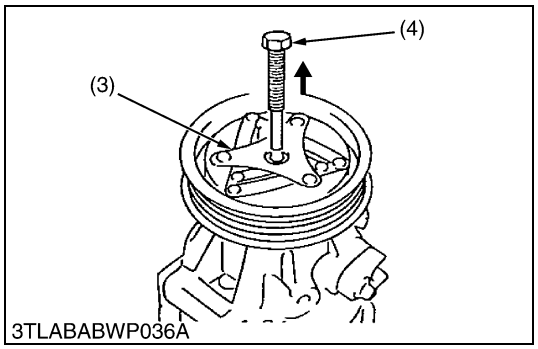
Tightening torque	Clutch mounting screw	10.8 to 16.2 N·m 1.10 to 1.65 kgf·m 8.0 to 11.9 lbf·ft



3TBAAAGWP075A

(1) Stopper Bolt
(2) Stopper Magnet Clutch
(3) Hub Plate
(4) Shim

W1068708



3TLABABWP036A

Rotor

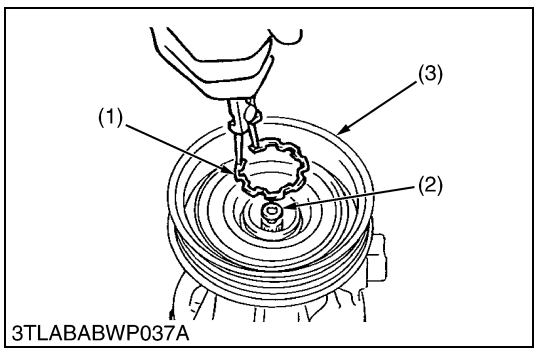
1. Remove the cir-clip (1).
2. Remove the rotor (3).

(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)

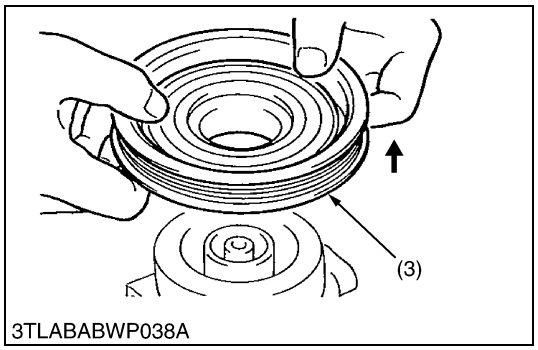
- Code No. for circlip : T1065-87450



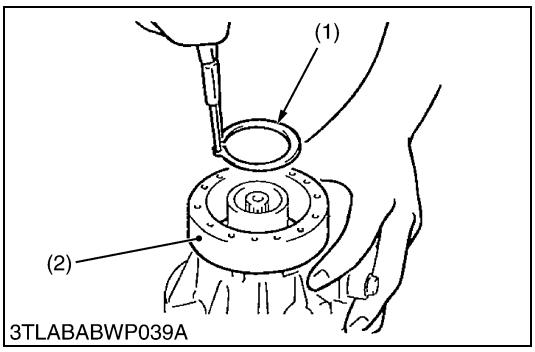
3TLABABWP037A

(1) Cir-Clip
(2) Shim
(3) Rotor

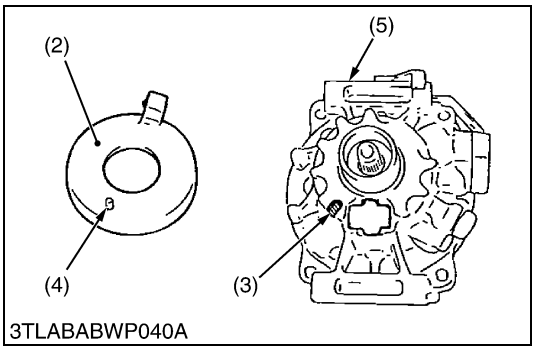
W1069693



3TLABABWP038A



3TLABABWP039A



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.

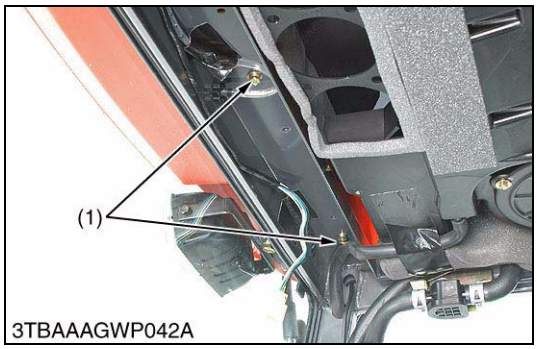
(Reference)

- Code No. for circlip : T1065-87440

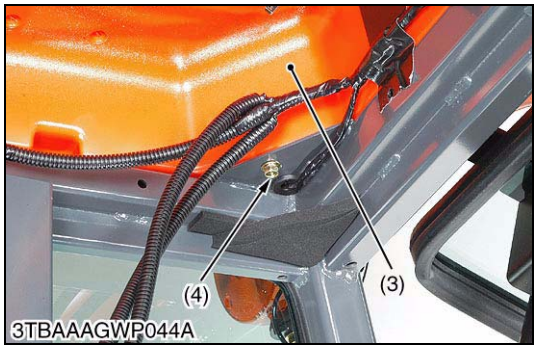
(1) External Circlip
(2) Stator
(3) Concave Part
(4) Pin
(5) Front Housing

W1070189

(3) Removing Receiver and Condenser







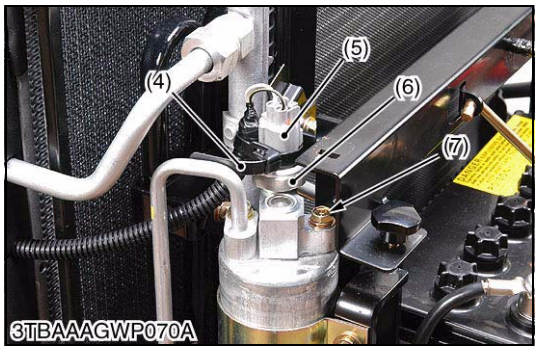
Removing Outer Roof

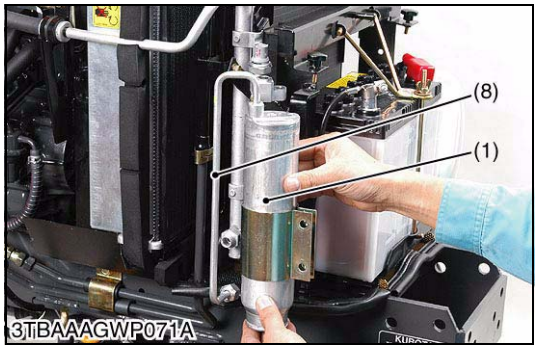
1. Remove the bolts (1), (2) (4).
2. Remove the outer roof (3).

(1) Bolt
(2) Bolt
(3) Outer Roof
(4) Bolt

W1070968







Removing Receiver and condenser

1. Loosen the pipe nut (3) and disconnect the pipe (8).
2. Remove the bolts (7) from the receiver (1).
3. Remove the bolts (2).
4. Remove the receiver (1) with the pipe (8) from the tractor body.

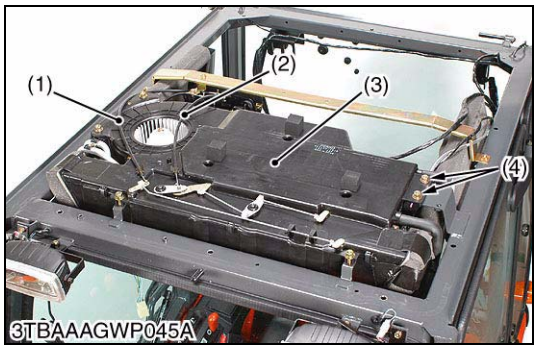
(When reassembling)

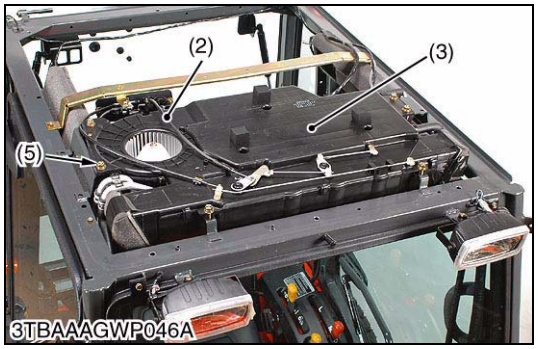
- Do not damage the O-rings.

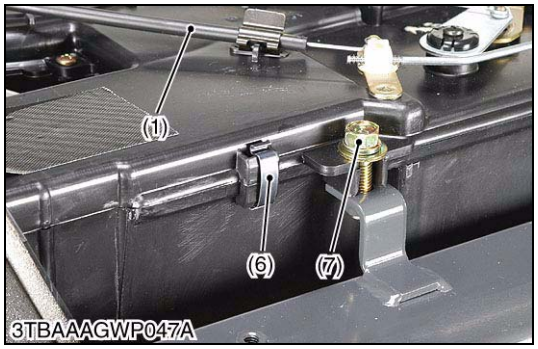
(1) Receiver
(2) Bolt
(3) Pipe Nut
(4) Code Band
(5) **2P** Coupler
(6) Pressure Switch
(7) Bolt
(8) Pipe

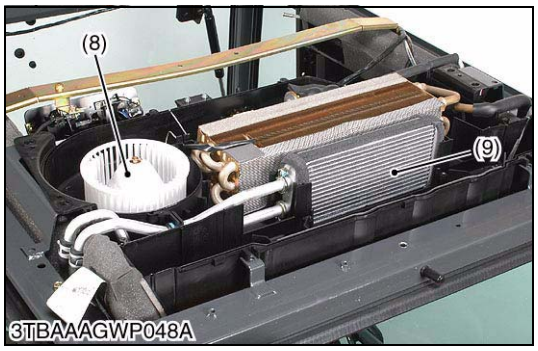
W1071931

(4) Removing Air Conditioner Unit









Removing Air Conditioner Unit Cover

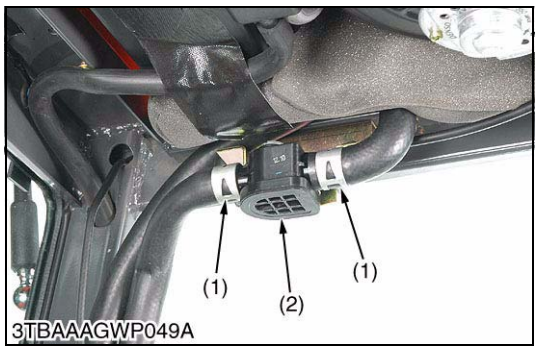
1. Disconnect the cable (1), (2) from the air conditioner unit cover (3).
2. Remove the bolts (4), (5).
3. Disconnect the hooks (6).
4. Remove the air conditioner unit cover (3).

(When assembling)

- Install the cables to the original positions.

(1) Cable
(2) Cable
(3) Air Conditioner Unit Cover
(4) Bolt
(5) Bolt
(6) Hook
(7) Bolt
(8) Blower
(9) Heater Unit

W1073831







Removing Water Valve and Heater Unit

1. Loosen the clamps (1).
2. Disconnect the water hoses from the water valve (2).
3. Remove the water valve (2).
4. Loosen the clamps (3) and disconnect the water hoses (4) from the water pipes (5).
5. Remove the heater unit (6).

(When assembling)

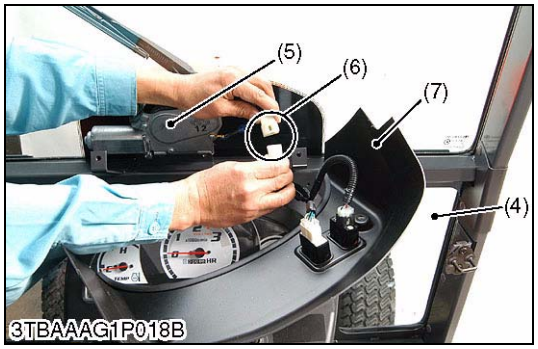
- Connect the water hoses to the water valve and water pipes with the clamps securely.

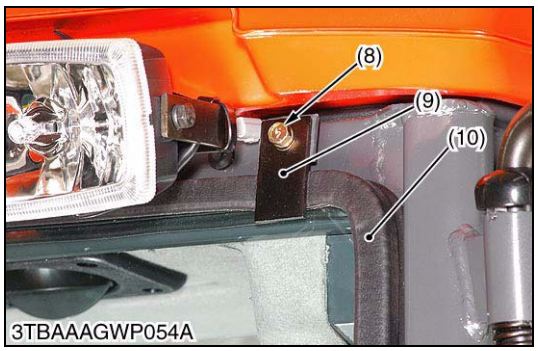
(1) Clamp
(2) Water Valve
(3) Clamp
(4) Water Hose
(5) Water Pipe
(6) Heater Unit

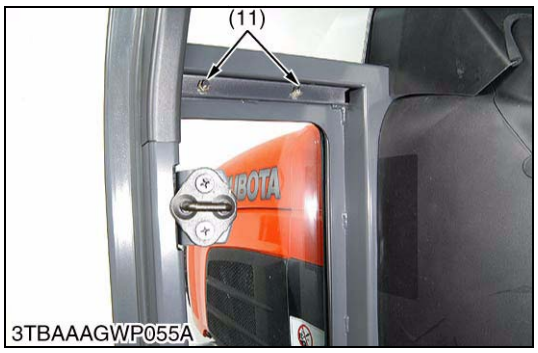
W1074514

(5) Cabin Windshield







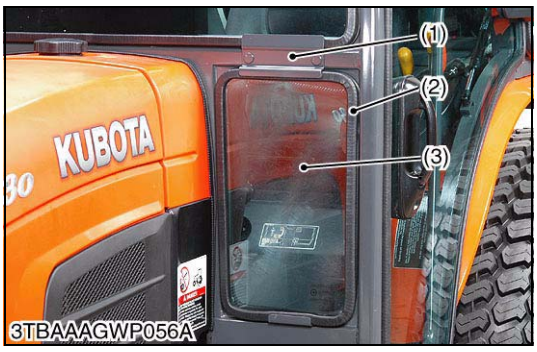


Removing Front Upper Glass and Front Lower Glasses

1. After removing the steering wheel (2), disconnect the wiper motor connector (6).
2. Remove the front wiper panel (7).
3. Remove the nuts (11) and the front glass plates (3).
4. Remove the bolts (8) and the front glass plates (9).
5. Hold and remove the front upper glass (1) with the wiper motor assembly.

(1) Front Upper Glass
(2) Steering Wheel
(3) Front Glass Plate
(4) Front Lower Glass
(5) Wiper Motor
(6) Wiper Motor Connector
(7) Front Wiper Panel
(8) Bolt
(9) Front Glass Plate
(10) Front Weather Strip
(11) Nut

W1075087



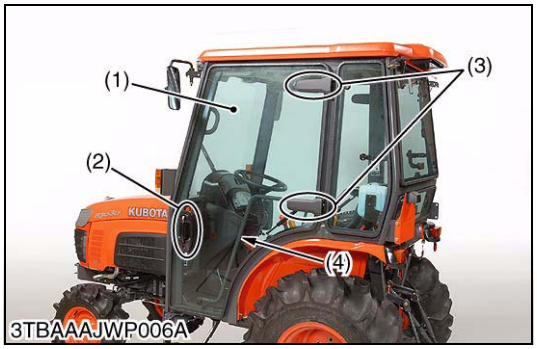


Removing Front Lower Glasses

1. Remove the nuts (4).
2. Remove the front glass plate (1) holding the front lower glass (3).
3. Remove the front lower glass (3) with the front weather strip (2).

(1) Front Lower Glass Plate
(2) Front Weather Strip
(3) Front Lower Glass
(4)Nut

W1077252



Removing Door Glasses

1. Open the door and remove the ball joint (6).
2. Close the door and remove the external cir-clips (7) and the door hinge pins (8).
3. Open the door and hold the door handle (4).
4. Remove the door glass (1).

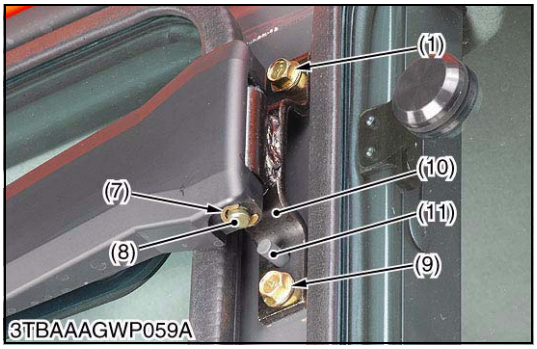
(When reassembling)

- After installing the bracket to the hinge, hook the bracket on the pin of the cabin frame.

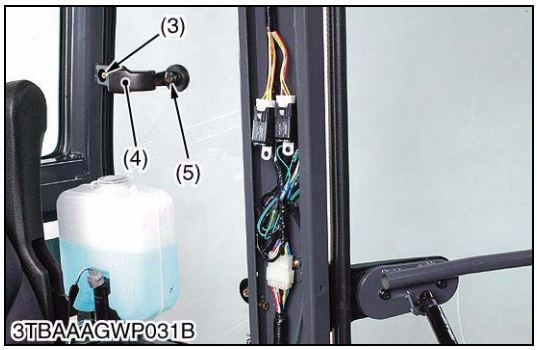
(1) Door Glass
(2) Door Lock Assembly
(3) Hinge
(4) Door Handle
(5) Door Damper
(6) Ball Joint
(7) External Cir-clip
(8) Door Hinge Pin
(9) Bolt
(10) Bracket
(11) Pin
(12) Weather Strip Shield

W1077755







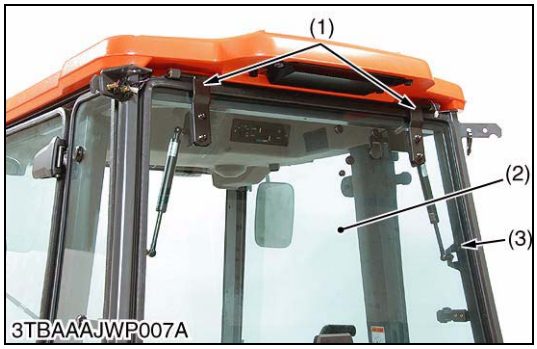


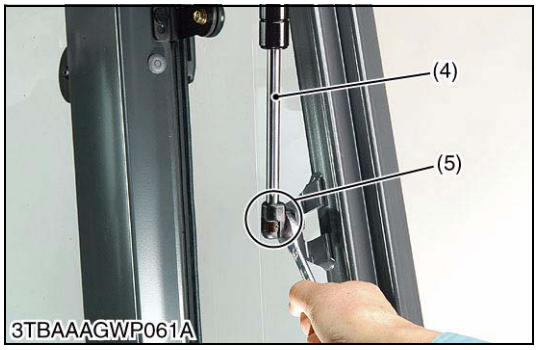
Removing Side Glasses

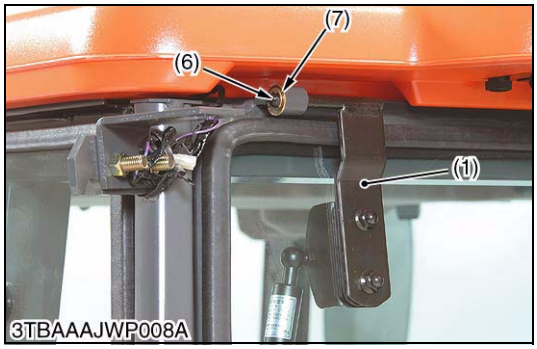
1. Remove the bolt (3) and the screw (5) holding the side glass (1).
2. Remove the side glass (1).

(1) Side Glass
(2) Side Weather Strip
(3) Bolt
(4) Window Lock
(5) Screw

W1078340





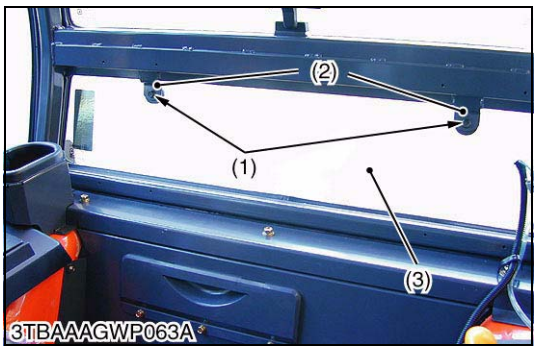


Removing Rear Glass

1. Remove the ball joints (5).
2. Remove the external cir-clip (6) and the plain washer (7).
3. Hold the rear glass (2).
4. Slide the rear glass (2) to the right side so that the hinges (1) may separate from the cabin frame.
5. Remove the rear glass (2).

(1) Hinge
(2) Rear Glass
(3) Rear Weather Strip
(4) Door Damper
(5) Ball Joint
(6) External Cir-clip
(7) Plain Washer

W1078717



Removing Rear Window

1. Remove the bolts (1) and the gasket (2).
2. Hold the rear window (3).
3. Remove the rear window (3).

(1) Bolt
(2) Gasket
(3) Rear Window

W1079337

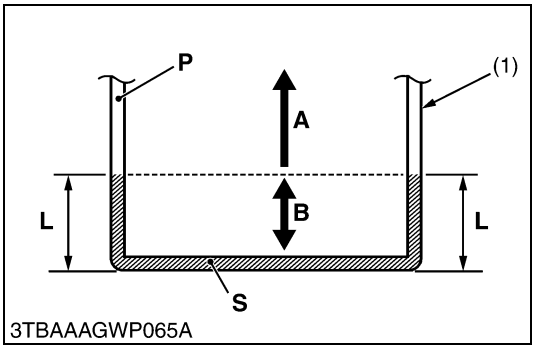


Replacing Weather Strip (Except Door Glass)

■ **NOTE**

- **Liquid gasket is applied to the glass bottom side.**

1. Remove the old weather strip from the glass.
2. Remove the oil liquid gasket from the glass.
3. Clean the glass surface securely.
4. Apply the liquid gasket, **Three Bond 1521C** or equivalent, to the new weather strip to the bottom side as shown in the figure.
5. Extend and shake the weather strip by hands quickly and carefully.
6. Extend the weather strip by a wooden hammer.



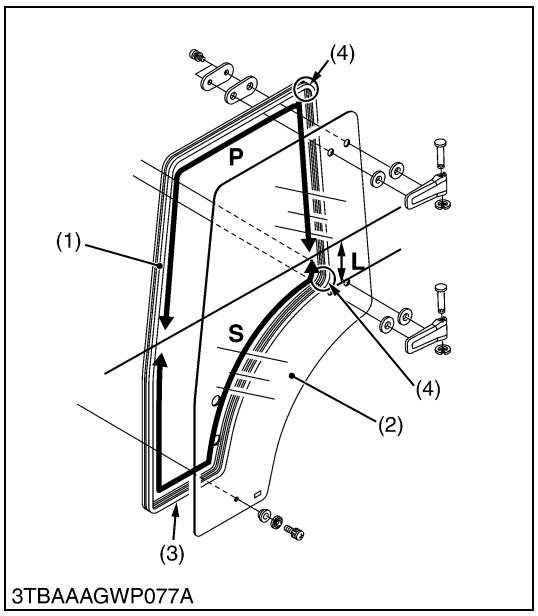
(1) Weather Strip

P : Liquid Gasket not Applied Area
S : Liquid Gasket Applied Area
A : Upper Side
B : Bottom Side
L : Approximately 10 cm (4 in.)

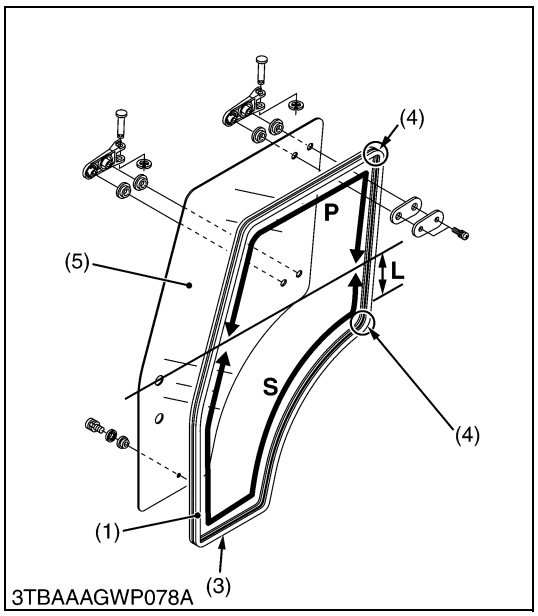
W1079712







3TBAAAGWP077A



3TBAAAGWP078A

Replacing Door Glass Weather Strip

■ **NOTE**

- **Liquid gasket is applied to the lower portion from the middle height of the door glass.**

1. Remove the old weather strip from the door glass.
2. Remove the liquid gasket from the door glass.
3. Clean the glass surface securely.
4. Apply the liquid gasket, **Three Bond 1521C** or equivalent, to the new weather strip to the bottom side as shown in the figure.
5. Extend and shake the weather strip by hands quickly and carefully.
6. Extend the weather strip by a wooden hammer.

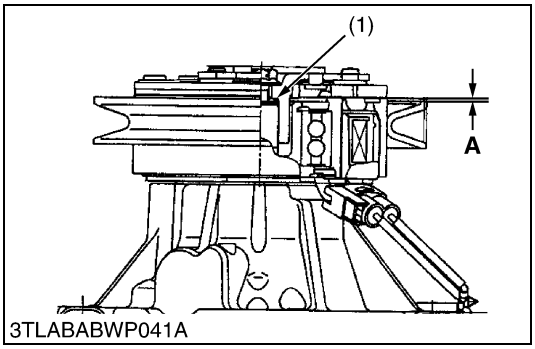
(1) Weather Strip
(2) Door Glass (LH)
(3) Water Drain Hole
(4) Pad
(5) Door Glass (RH)

L : Approximately 100 mm (4.0 in.)
P : Liquid Gasket not Applied Area
S : Liquid Gasket Applied Area

W1080729

[3] SERVICING

(1) Compressor



3TLABABWP041A

Magnetic Clutch 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.	0.20 to 0.45 mm 0.0079 to 0.0177 in.

(Reference)

Adjusting Shim Size	Parts No.
0.10 mm (0.0039 in.)	T1065-87340
0.15 mm (0.0059 in.)	T1065-87350
0.40 mm (0.016 in.)	T1065-87360
0.60 mm (0.024 in.)	T1065-87370
1.0 mm (0.0394 in.)	T1065-87380

(1) Shim **A : Air Gap**

W1042771

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