

WSM

WORKSHOP MANUAL
TRACTOR

L2800, L3400

Kubota

TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of L2800 and L3400. It is divided into three parts, "General", "Mechanism" and "Servicing".

■ 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.

Due to covering many models of this manual, information or picture being used have not been specified as one model.

January 2004

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SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.

It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.



DANGER

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



WARNING

: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



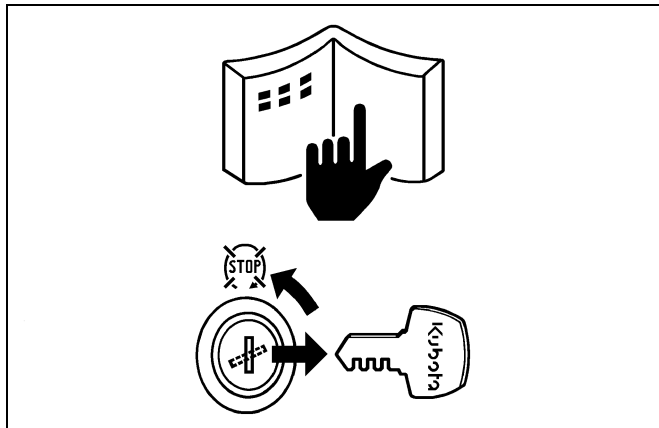
IMPORTANT

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



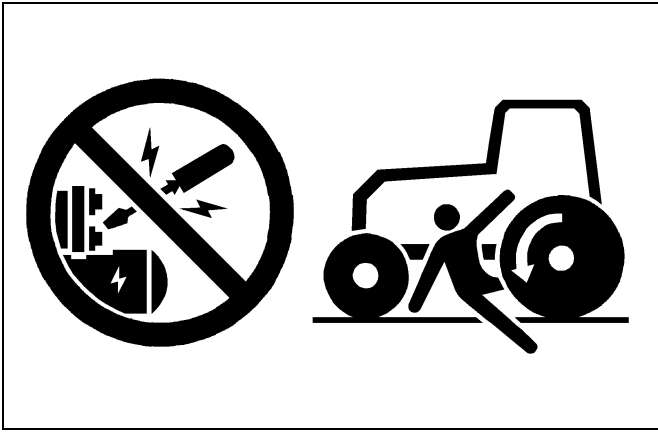
NOTE

: Gives helpful information.



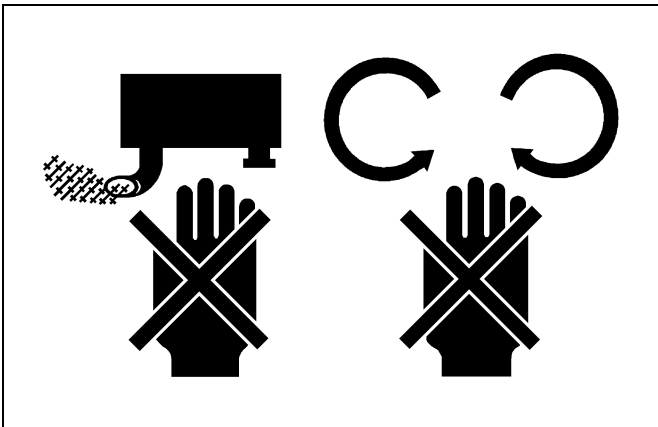
BEFORE SERVICING AND REPAIRING

- 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.



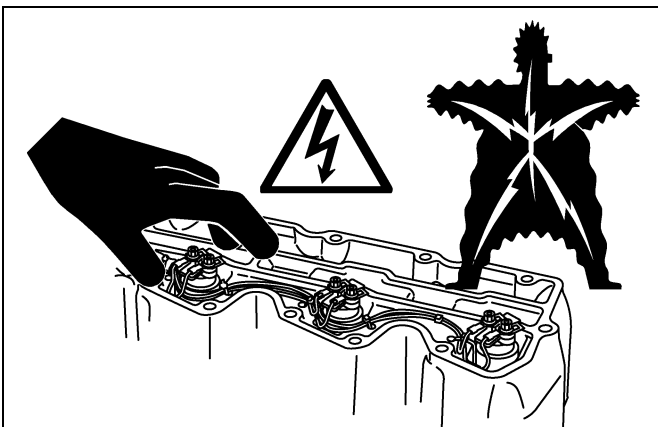
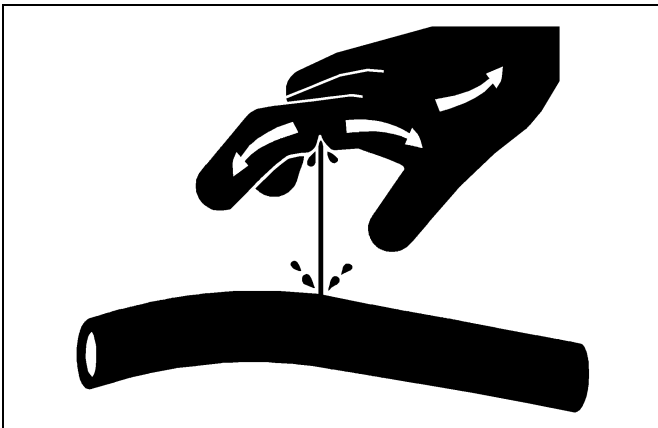
SAFETY STARTING

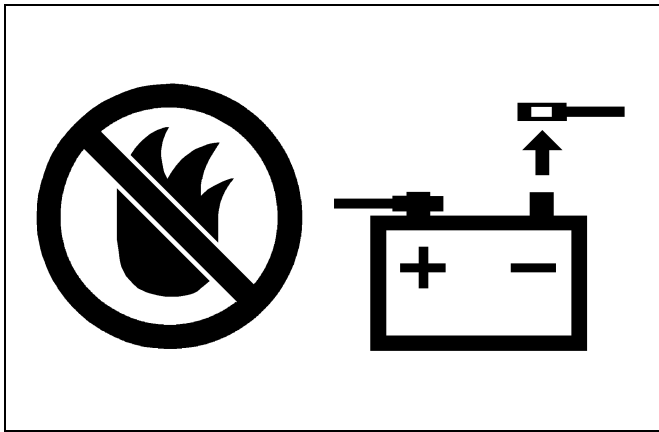
- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine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



SAFETY WORKING

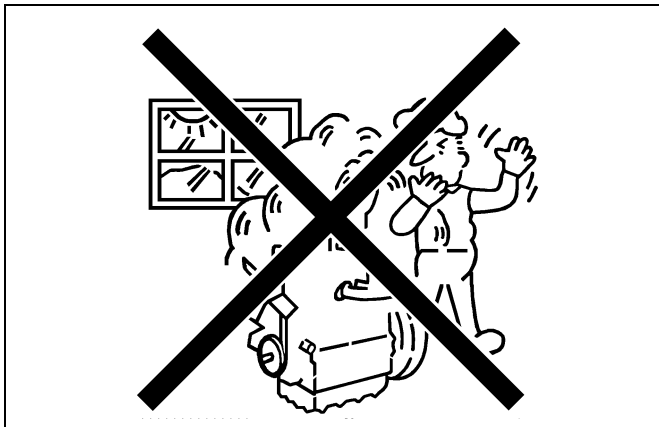
- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing 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.
- Do not open high-pressure fuel system. High-pressure fluid remaining in fuel lines can cause serious injury. Do not disconnect or attempt to repair fuel lines, sensors, or any other components between the high-pressure fuel pump and injectors on engines with high pressure common rail fuel system.
- High voltage exceeding 100 V is generated in the ECU and injector. Pay sufficient caution to electric shock when performing work activities.





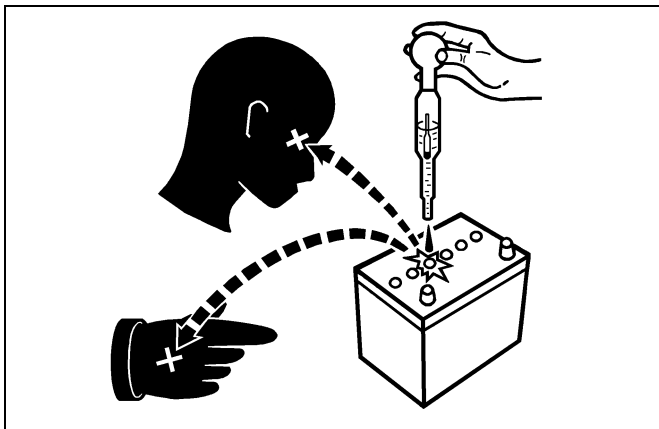
AVOID FIRES

- 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.



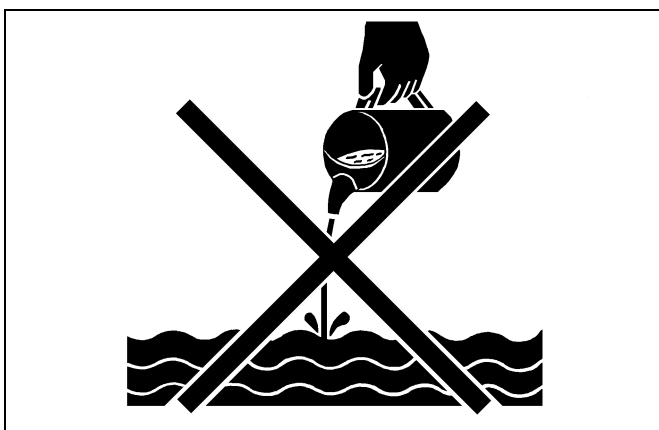
VENTILATE WORK AREA

- 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.



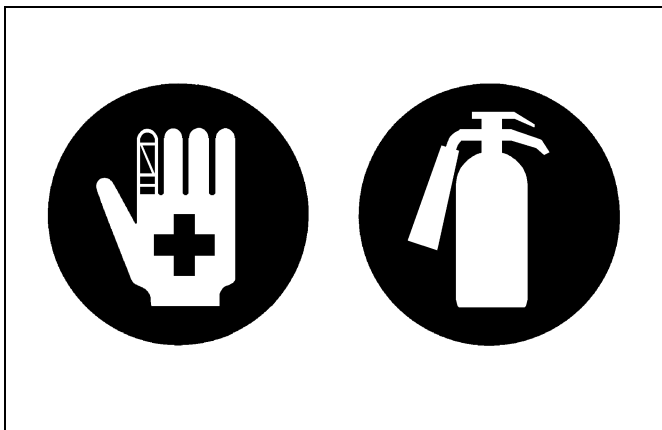
PREVENT ACID BURNS

- 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.


(1) Part No. TA040-4965-2

	<p style="text-align: center;">⚠ DANGER</p> <p>TO AVOID POSSIBLE INJURY OR DEATH FROM A MACHINE RUNAWAY.</p> <ol style="list-style-type: none"> 1. Do not start engine by shorting across starter terminals or bypassing the safety start switch. Machine may start in gear and move if normal starting circuitry is bypassed. 2. Start engine only from operator's seat with transmission and PTO OFF. Never start engine while standing on the ground.
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(4) Part No. TA040-4956-2
Diesel fuel only. No fire

	
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(2) Part No. TA040-4959-3

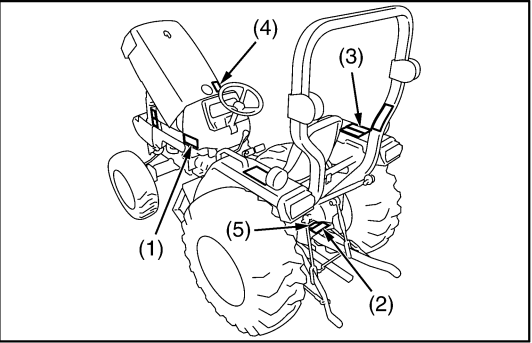
	<p style="text-align: center;">⚠ WARNING</p> <p>TO AVOID PERSONAL INJURY.</p> <ol style="list-style-type: none"> 1. Keep PTO shield in place at all times. 2. Do not operate the PTO at speeds faster than the speed recommended by the implement manufacturer. 3. For trailing PTO-driven implements, set drawbar at towing position. (see operator's manual)
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(5) Part No. TA040-4935-1


<p style="text-align: center;">⚠ WARNING</p> <p>TO AVOID PERSONAL INJURY:</p> <ol style="list-style-type: none"> 1. Attach pulled or towed loads to the drawbar only. 2. Use the 3-point hitch only with equipment designed for 3-point hitch usage.
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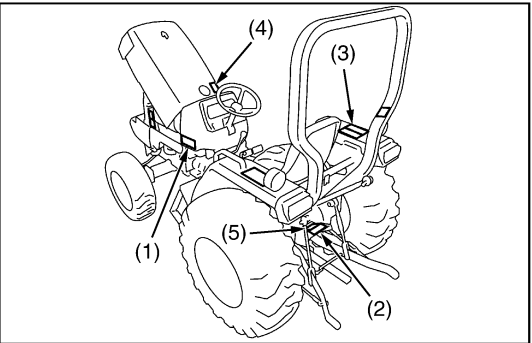
(3) Part No. TA140-4933-1 [Manual Transmission type]

<p>⚠ WARNING</p> 	<p>BEFORE DISMOUNTING TRACTOR:</p> <ol style="list-style-type: none"> 1. ALWAYS SET PARKING BRAKE. 2. PARK ON LEVEL GROUND WHENEVER POSSIBLE. If parking on a slope, position tractor across the slope. 3. LOWER ALL IMPLEMENTS TO THE GROUND. Failure to comply to this warning may allow the wheels to slip, and could cause injury or death. 4. LOCK SHUTTLE SHIFT LEVER IN NEUTRAL POSITION AND STOP THE ENGINE.
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(3) Part No. TA240-4933-2 [HST type]

<p>⚠ WARNING</p> 	<p>BEFORE DISMOUNTING TRACTOR:</p> <ol style="list-style-type: none"> 1. ALWAYS SET PARKING BRAKE. Leaving transmission in gear with the engine stopped will not prevent tractor from rolling. 2. PARK ON LEVEL GROUND WHENEVER POSSIBLE. If parking on a slope, position tractor across the slope. 3. LOWER ALL IMPLEMENTS TO THE GROUND. Failure to comply to this warning may allow the wheels to slip, and could cause injury or death. 4. STOP THE ENGINE.
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(1) Part No. 35260-3491-4

CAUTION

TO AVOID PERSONAL INJURY:

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

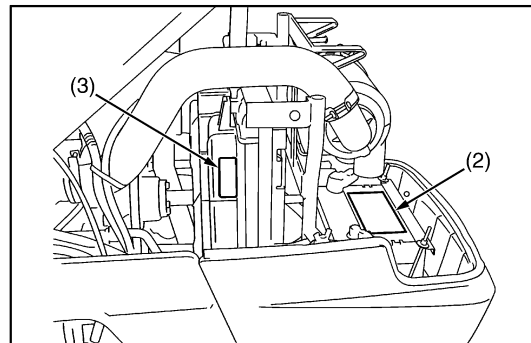
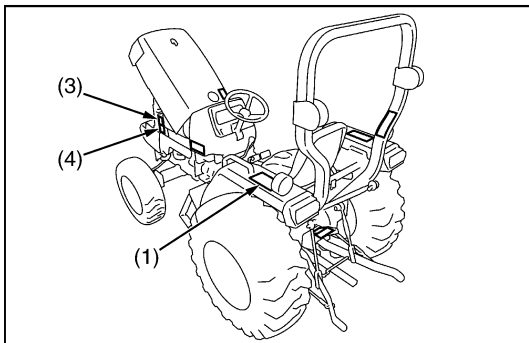
(3) Part No. 32751-4958-1
Stay clear of engine fan and fan belt.



(2) Part No. TD030-3012-2


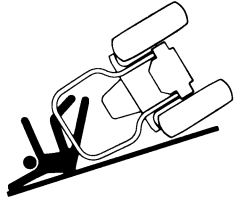
 RECYCLE	 FLAMMABLES	 SHIELD EYES	 KEEP OUT OF THE REACH OF CHILDREN	 CAUTIONS OF SULFURIC ACID	 READ INSTRUCTION MANUAL CAREFULLY	 EXPLOSIVE	HYDROMETER OK CHARGE REPLACE BATTERY BATTERY DK 82105
NS70MF 12V AMP. HR (GHR) 52 RESERVE CAPACITY (MIN) 123 COLD CRANKING AMPS (-18°C) 490	DANGER - DUE TO HYDROGEN GAS GENERATED FROM BATTERY, HANDLING WITHOUT CARE CAN CAUSE FIRE AND EXPLOSION. - THIS 12V BATTERY IS ONLY FOR STARTING ENGINE. DO NOT APPLY THIS PRODUCT FOR OTHER USES. - CHARGE THIS BATTERY ONLY AT WELL VENTILATED PLACES, AND AVOID SHORTS OR SPARKS. - REFER TO THE INSTRUCTION MANUAL OF VEHICLE OR BATTERY BEFORE USING BOOSTER CABLE. - SULFURIC ACID MAY CAUSE BLINDNESS OR SEVERE BURN. IN CASE EYES, SKIN, CLOTHES OR ANY ARTICLES ARE STAINED WITH ACID, FLUSH OBJECTS IMMEDIATELY WITH WATER. IF ACID BEING SWALLOWED, DRINK PLENTY OF WATER PROMPTLY. IN CASE OF ACCIDENTAL CONTACT, CONSULT A DOCTOR IMMEDIATELY. - BATTERY FILLED WITH ACID (DO NOT TILT OR SPILL) - FLAMMABLE. DO NOT CHARGE NEAR FIRE OR SPARKS - DO NOT CHARGE RAPIDLY - DO NOT DISASSEMBLE THE BATTERY (SEALED TYPE)						FITTING DATE: 0 1 2 3 4 5 6 7 8 9 YEAR 1 2 3 4 5 6 7 8 9 10 11 12 MONTH
DANGER EXPLOSIVE GASES Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery. Do not charge or use booster cables or adjust post connections without proper instruction and training.			POISON CAUSES SEVERE BURNS Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately. KEEP OUT OF REACH OF CHILDREN				

(4) Part No. TD030-4958-1
Do not touch hot surface like muffler, etc.


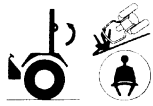


3TLAAABCP002A


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

 WARNING	<p>TO AVOID PERSONAL INJURY OR DEATH FROM ROLL-OVER:</p> <ol style="list-style-type: none"> 1. Kubota recommends the use of a Roll-Over Protective Structures (ROPS) and seat belt in almost all applications. 2. Remove the ROPS only when it substantially interferes with operation or itself presents a safety risk. (Examples include work in orchards and vineyards) ALWAYS REINSTALL IT BEFORE USING THE TRACTOR IN OTHER APPLICATIONS. 3. Never use just the seat belt or just the ROPS. They must be used together. For further details, consult your Operator's Manual or your local dealer.
	



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

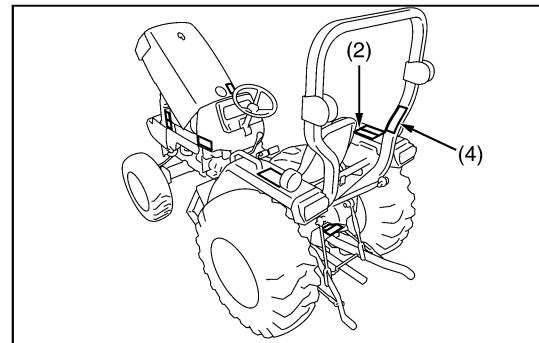
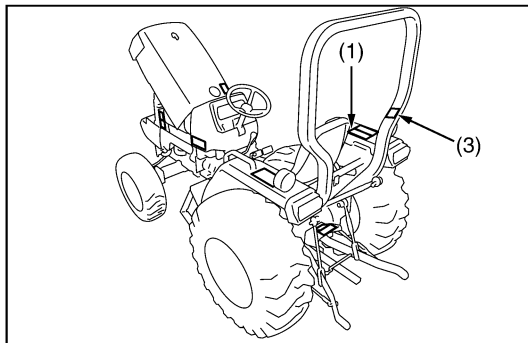
 WARNING	<p>TO AVOID INJURY OR DEATH FROM ROLL-OVER:</p> <ul style="list-style-type: none"> • Keep Roll-Over Protective Structures (ROPS) in the upright and locked position • Fasten SEAT BELT before operating <p>THERE IS NO OPERATOR PROTECTION WHEN THE ROPS IS IN THE FOLDED POSITION:</p> <ul style="list-style-type: none"> • Check the operating area and fold the ROPS only when absolutely necessary • Do not wear SEAT BELT if ROPS is folded • Raise and lock ROPS as soon as vertical clearance allows • Read ROPS related instructions and warnings
	

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

 WARNING
<p>TO AVOID PERSONAL INJURY:</p> <p>Do not modify or repair a ROPS because welding, grinding, drilling or cutting any portion may weaken the structure.</p>

(4) Part No. 3A111-9544-1 [Foldable ROPS type]

 WARNING
<p>Never modify or repair a ROPS because welding, grinding, drilling or cutting any portion may weaken the structure.</p>
 CAUTION
<p>TO AVOID INJURY WHEN RAISING OR FOLDING ROPS:</p> <ul style="list-style-type: none"> • 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.



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.

3TLAAABCP011A

SPECIFICATIONS

Model		L2800		L3400		
		2WD	4WD	4WD	4WD	
PTO power		17.9 kW (24.0 HP)		21.6 kW (29.0 HP)		
Engine	Maker	KUBOTA				
	Model	D1403-M-E2A		D1703-MA-E2A		
	Type	Vertical, water-cooled, 4-cycle diesel				
	Number of cylinders	3		3		
	Bore and stroke	80 × 92.4 mm (3.1 × 3.6 in.)		87 × 92.4 mm (3.4 × 3.6 in.)		
	Total displacement	1.393 L (85.0 cu.in.)		1.647 L (101.0 cu.in.)		
	Engine gross power	21.6 kW (29.0 HP)		25.9 kW (34.7 HP)		
	Rated revolution	46.7 rps (2800 min ⁻¹ (rpm))		45.0 rps (2700 min ⁻¹ (rpm))		
	Maximum torque	89.2 N·m (65.8 ft-lbs)		108.6 N·m (80.1 ft-lbs)		
	Battery	12 V. RC : 123 min, CCA : 490 A				
	Fuel	Diesel fuel No. 2-D				
Capacities	Fuel tank	34.0 L (9.0 U.S.gals)				
	Engine crankcase (with filter)	5.7 L (6.0 U.S.qts)				
	Engine coolant	6.0 L (6.3 U.S.qts)				
	Transmission case	27.0 L (7.1 U.S.gals)	27.5 L (7.3 U.S.gals)	27.0 L (7.1 U.S.gals)	27.5 L (7.3 U.S.gals)	
Dimensions	Overall length (without 3P)	2810 mm (110.6 in.)	2705 mm (106.5 in.)	2810 mm (110.6 in.)	2705 mm (106.5 in.)	
	Overall width (minimum tread)	1305 mm (51.4 in.)				
	Overall height (with ROPS)	2160 mm (85.0 in.)				
	Overall height (Top of steering wheel)	1475 mm (58.1 in.)				
	Wheel base	1610 mm (63.3 in.)				
	Min.ground clearance	345 mm (13.6 in.)	340 mm (13.4 in.)	345 mm (13.6 in.)	340 mm (13.4 in.)	
	Tread	Front 1050 mm (41.3 in.)	1095 mm (43.1 in.)	1050 mm (41.3 in.)	1095 mm (43.1 in.)	
	Rear	1290 mm (50.8 in.)				
Weight (with ROPS)		1070 kg (2359 lbs)	1150 kg (2536 lbs)	1090 kg (2403 lbs)	1170 kg (2580 lbs)	
Clutch		Dry type single stage		Dry type dual stage		
Traveling system	Tires	AG Front	5.00 - 15	7.00 - 16	5.00 - 15	7.00 - 16
		AG Rear	11.2 - 24			
	Indust. (option) Front / Rear	–	27 × 8.50 - 15 / 15 - 19.5R4	–	27 × 8.50 - 15 / 15 - 19.5R4	
	Steering	Integral type power steering				
	Transmission	Gear shift, 8 forward and 4 reverse				
	Brake	Wet disk type				
Min. turning radius (with brake)		2.4 m (7.9 feet)				

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(continued)

Model		L2800		L3400		
		2WD	4WD	4WD	4WD	
Hydraulic unit	Hydraulic control system	Position control				
	Pump capacity (main)	24.7 L/min (6.5 gal/min)		23.9 L/min (6.3 gal/min)		
	Pump capacity (PS)	15.0 L/min (4.0 gal/min)		14.5 L/min (3.8 gal/min)		
	Three point hitch	Category 1				
	Max. lift force	At lift points	906 kg (1998 lbs)			
		24 in. behind lift points	651 kg (1435 lbs)			
	System pressure	15.7 MPa (160 kgf/cm ²)				
PTO	Rear PTO	SAE 1-3/8, 6-splines (with overrunning clutch on single clutch tractor)				
	PTO / Engine speed	540 / 2430 min ⁻¹ (rpm)		540 / 2425 min ⁻¹ (rpm)		

NOTE: *Manufacture's estimate

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

W1032744

Model		L2800	L3400
		4WD HST	4WD HST
PTO power*		16.8 kW (22.5 HP)	20.5 kW (27.5 HP)
Engine	Maker	KUBOTA	
	Model	D1403-M-E2A	D1703-MA-E2A
	Type	Indirect injection, Vertical, Water-cooled 4 cycle diesel	
	Number of cylinders	3	
	Bore and stroke	80 × 92.4 mm (3.1 × 3.6 in.)	87 × 92.4 mm (3.4 × 3.6 in.)
	Total displacement	1.393 L (85.0 cu.in.)	1.647 L (101.0 cu.in.)
	Engine gross power*	21.6 kW (29.0 HP)	25.9 kW (34.7 HP)
	Engine net power*	20.5 kW (27.5 HP)	24.8 kW (33.3 HP)
	Rated revolution	46.7 rps (2800 min ⁻¹ (rpm))	45.0 rps (2700 min ⁻¹ (rpm))
	Maximum torque	89.2 N·m (65.8 ft-lbs)	108.6 N·m (80.1 ft-lbs)
	Battery	12 V. RC : 123 min, CCA : 490 A	
	Fuel	Diesel fuel No. 1-D, No. 2-D	
Capacities	Fuel tank	34.0 L (9.0 U.S.gals)	
	Engine crankcase (with filter)	5.7 L (6.0 U.S.qts)	
	Engine coolant	6.0 L (6.3 U.S.qts)	
	Transmission case	23.5 L (6.2 U.S.gals)	23.5 L (6.2 U.S.gals)
Dimensions	Overall length (with 3P)	2705 mm (106.5 in.)	2705 mm (106.5 in.)
	Overall width (minimum tread)	1305 mm (51.4 in.)	
	Overall height (with ROPS)	2160 mm (85.0 in.)	
	Overall height (Top of steering wheel)	1475 mm (58.1 in.)	
	Wheel base	1610 mm (63.3 in.)	
	Min.ground clearance	340 mm (13.4 in.)	340 mm (13.4 in.)
	Tread	Front	1095 mm (43.1 in.)
Rear		1020 mm (40.2 in.), 1115 mm (43.8 in.), 1195 mm (47.1 in.), 1290 mm (50.8 in.)	
Weight (with ROPS)		1180 kg (2600 lbs)	1180 kg (2600 lbs)
Traveling system	Tires	AG Front	7.00 - 16
		AG Rear	11.2 - 24
	Indust. (option) Front / Rear	27 × 8.50 - 15 / 15 - 19.5R4	27 × 8.50 - 15 / 15 - 19.5R4
	Clutch	Dry type single stage	
	Steering	Integral type power steering	
	Transmission	Hydrostatic transmission, 3 range speed	
	Brake	Wet disk type	
Min. turning radius (with brake)	2.5 m (8.2 feet)		

(Continued)

Model		L2800	L3400	
		4WD HST	4WD HST	
Hydraulic unit	Hydraulic control system		Position control	
	Pump capacity (main)		24.7 L/min (6.5 gal/min)	23.9 L/min (6.3 gal/min)
	Pump capacity (PS)		15.0 L/min (4.0 gal/min)	14.5 L/min (3.8 gal/min)
	Three point hitch		Category 1	
	Max. lift force	At lift points	906 kg (1998 lbs)	
		24 in. behind lift points	651 kg (1435 lbs)	
System pressure		15.7 MPa (160 kgf/cm ²)		
PTO	Rear PTO	PTO shaft size	SAE 1-3/8, 6-splines	
		Type	Live-continuous with overrunning clutch	Live-continuous with overrunning clutch
	PTO / Engine speed		540 / 2580 min ⁻¹ (rpm)	540 / 2580 min ⁻¹ (rpm)

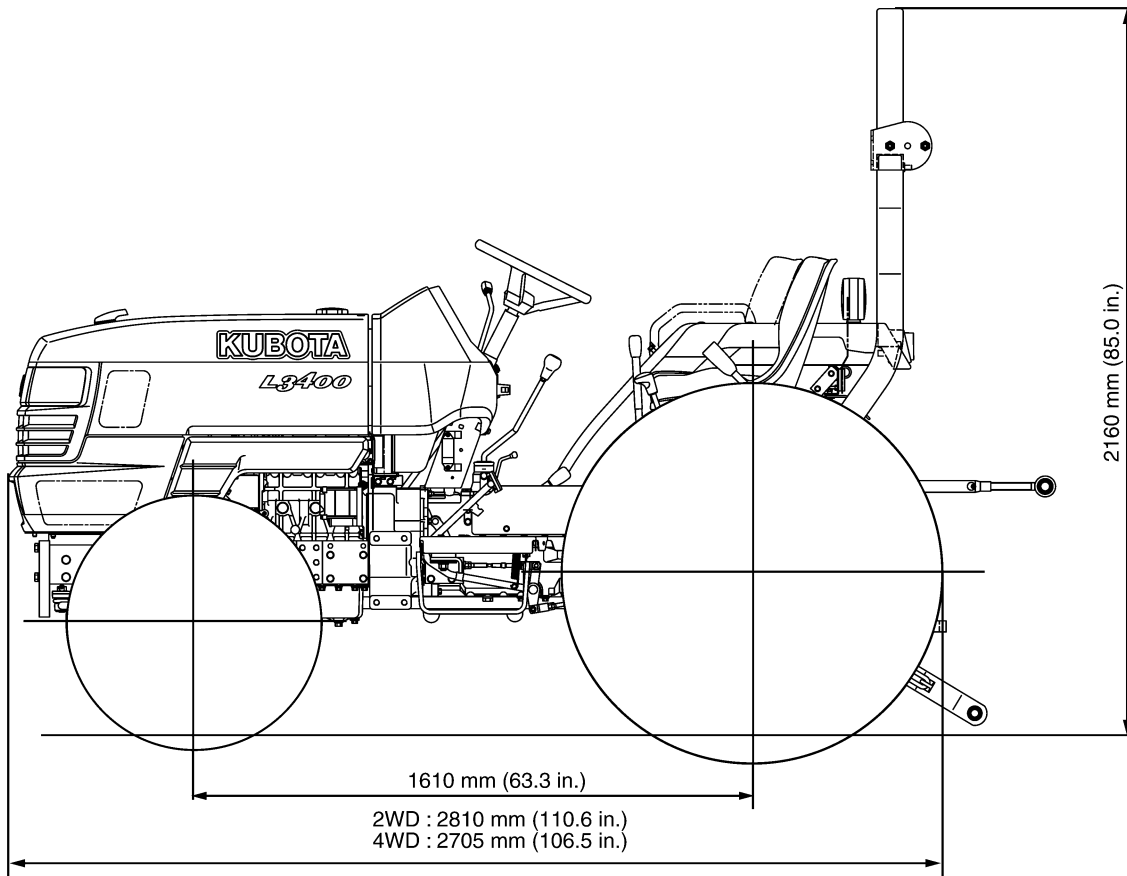
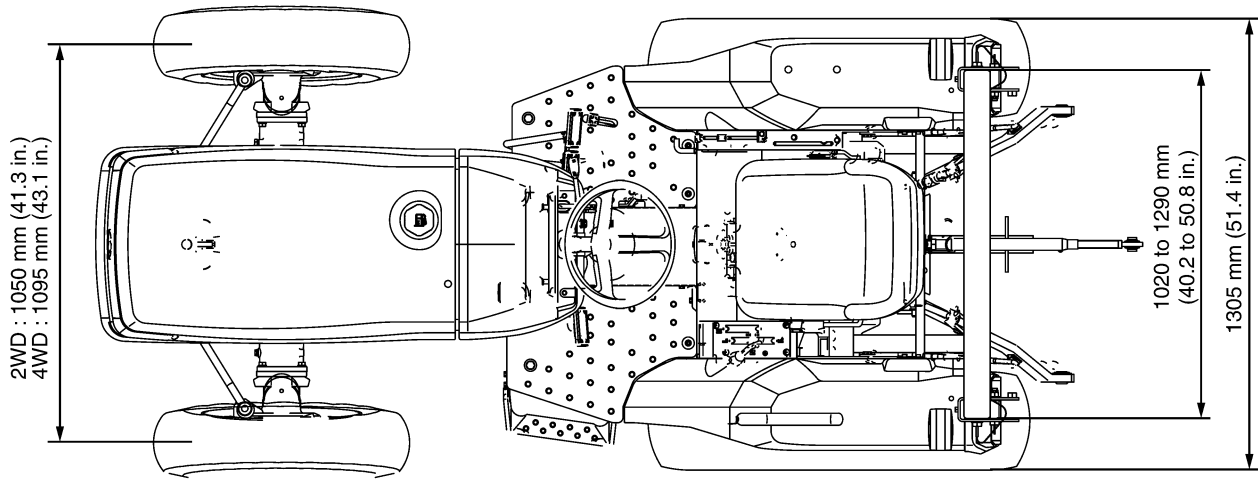
NOTE: *Manufacture's estimate

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

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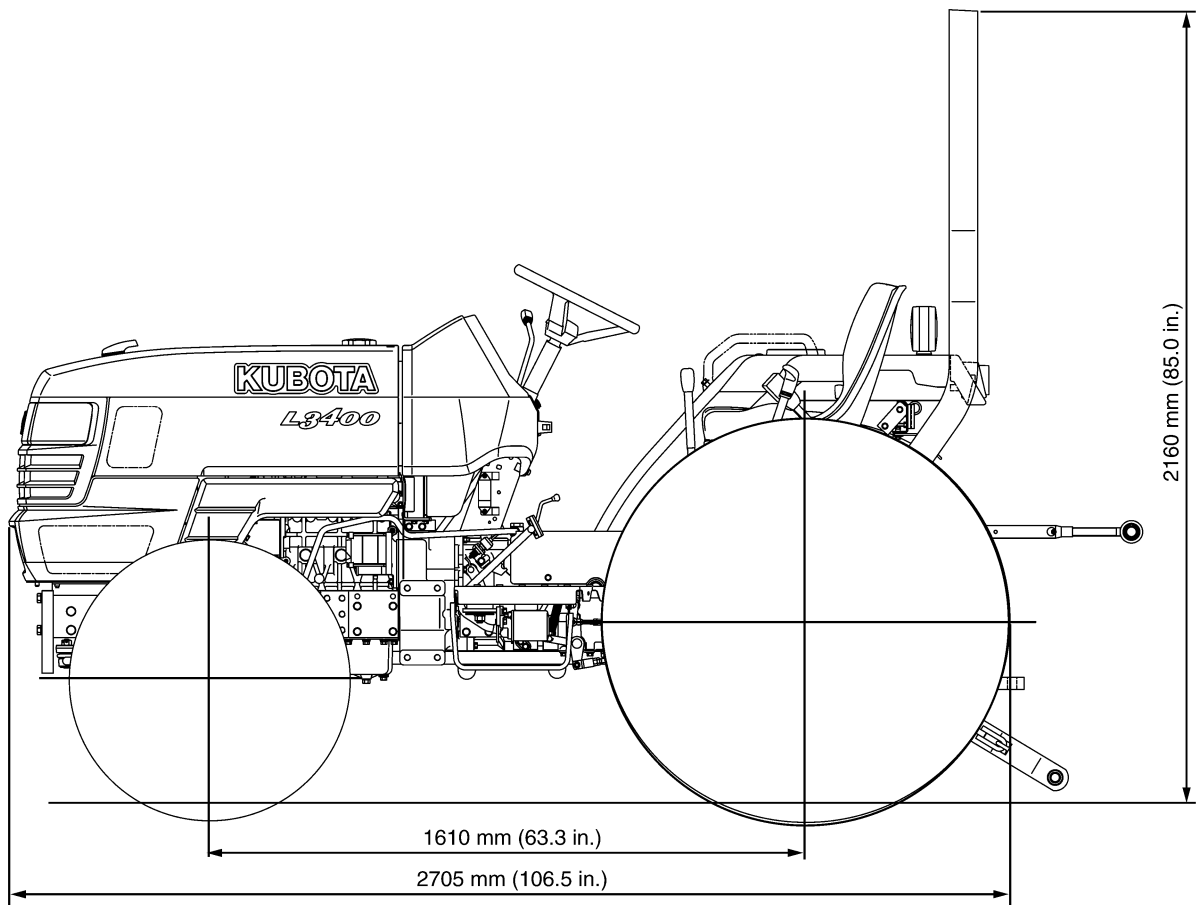
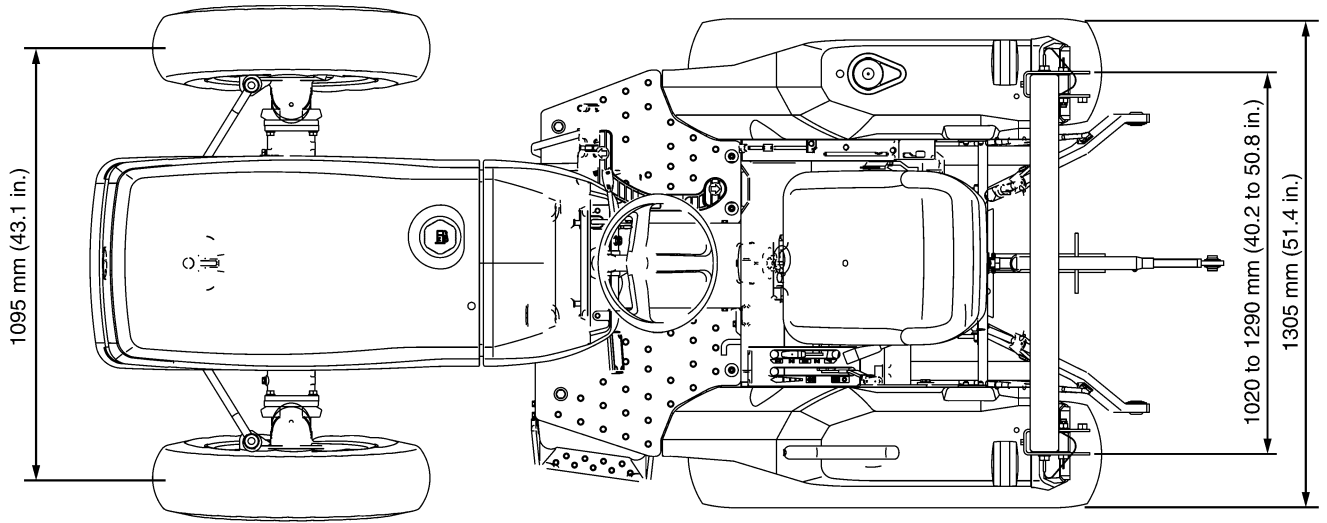
DIMENSIONS

L2800 · L3400 [Manual Transmission Type]



3TLAAABFP003A

L2800 · L3400 [HST Type]



3TLAAABFP002A

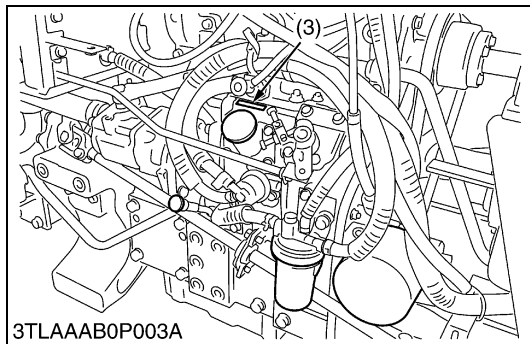
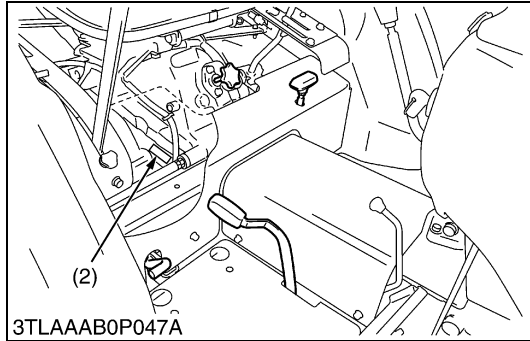
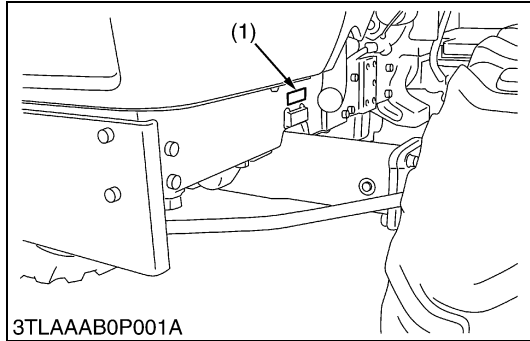
G GENERAL

GENERAL

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1. TRACTOR IDENTIFICATION

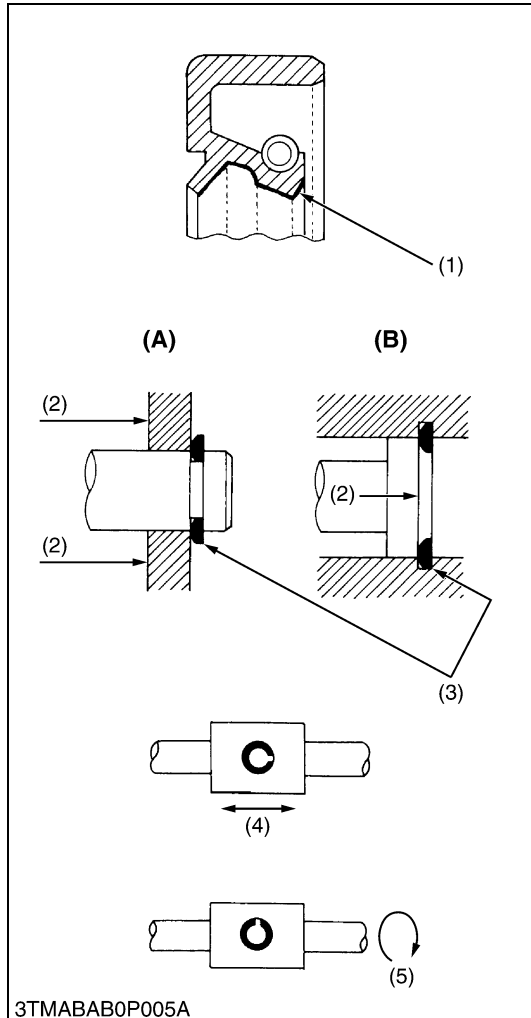


When contacting your local KUBOTA distributor, always specify engine serial number, tractor serial number and hour meter reading.

- (1) Tractor Identification Plate
- (2) Tractor Serial Number
- (3) Engine Serial Number

W1010606

2. GENERAL PRECAUTIONS



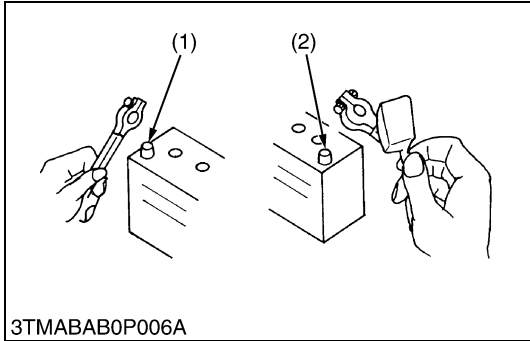
- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be installed in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently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

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

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

W1010904

3. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING



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

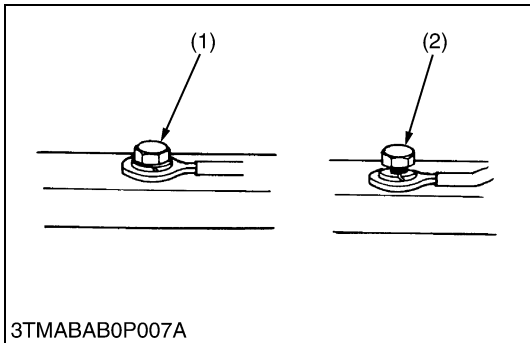
■ IMPORTANT

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

- (1) Negative Terminal (2) Positive Terminal

W1011114

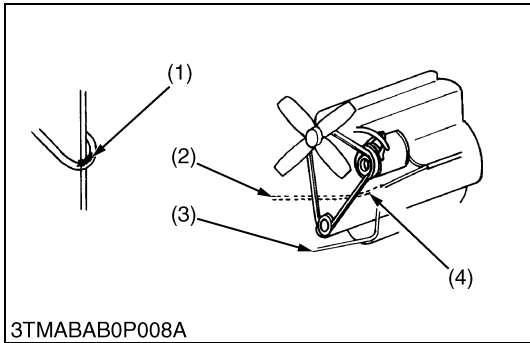
[1] WIRING



- Securely tighten wiring terminals.

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

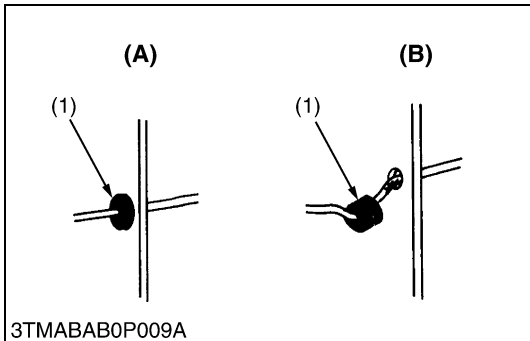
W1011216



- Do not let wiring contact dangerous part.

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

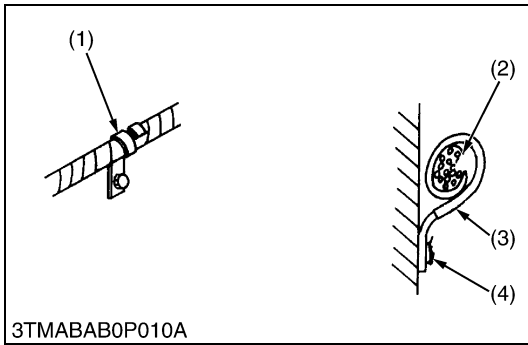
W1011313



- Securely insert grommet.

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

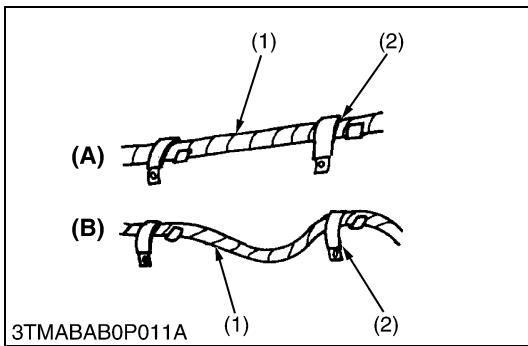
W1011388



- Securely clamp, being careful not to damage wiring.

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

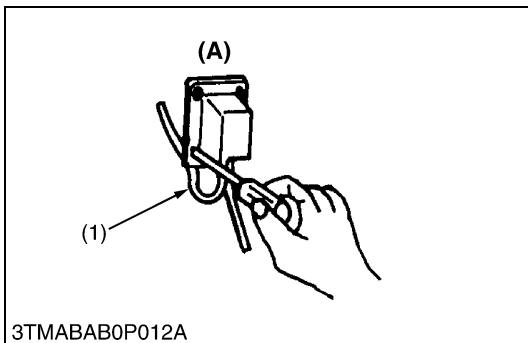
W1011458



- 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

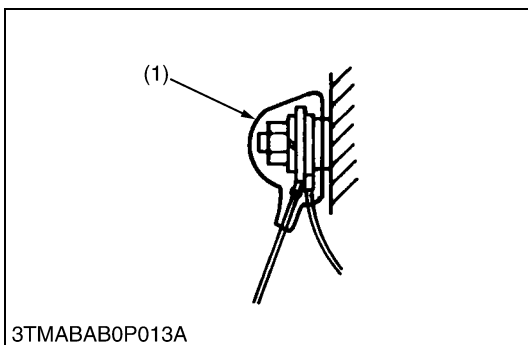
W1011587



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

- (1) Wiring
- (A) Incorrect

W1011670

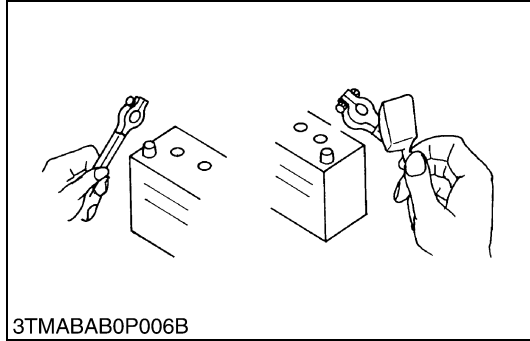


- After installing wiring, check protection of terminals and clamped condition of wiring, only connect battery.

- (1) Cover
 - Securely Install Cover

W1011735

[2] BATTERY



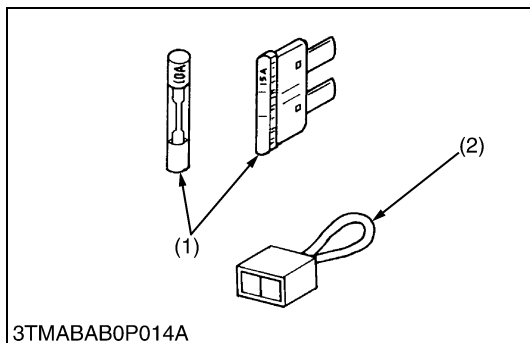
- Take care not to confuse positive and negative terminal posts.
- When removing battery cables, disconnect negative cable first. When installing battery cables, check for polarity and connect positive cable first.
- Do not install any battery with capacity other than is specified (Ah).
- After connecting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

W1011816

[3] FUSE



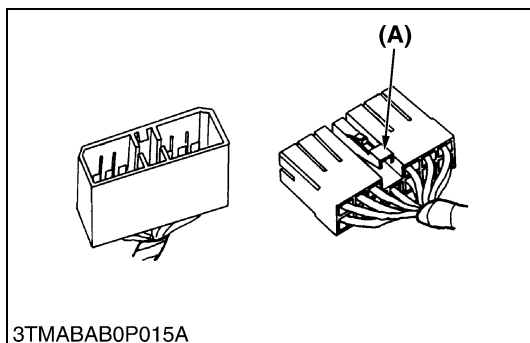
- Use fuses with specified capacity. Neither too large or small capacity fuse is acceptable.
- Never use steel or copper wire in place of fuse.
- Do not install working light, radio set, etc. on machine which is not provided with reserve power supply.
- Do not install accessories if fuse capacity of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

(1) Fuse

(2) Fusible Link

W1012092

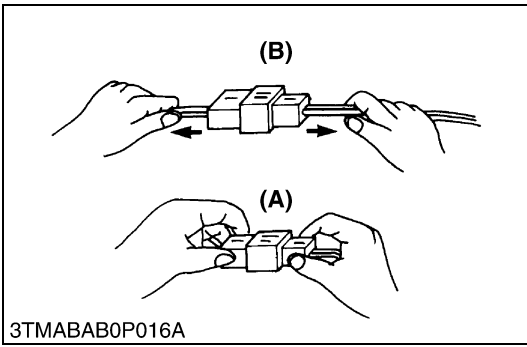
[4] CONNECTOR



- For connector with lock, push lock to separate.

(A) Push

W1012211



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

(A) Correct

(B) Incorrect

W1012272

4. LUBRICANTS, FUEL AND COOLANT

	Place	Capacity		Lubricants, fuel and coolant
		L2800	L3400	
1	Fuel	34 L 9.0 U.S.gals 7.4 Imp.gals		No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below -10 °C (14 °F)
2	Coolant	6.0 L 6.3 U.S.qts 5.3 Imp.qts		Fresh clean water with anti-freeze
	Recovery tank	0.6 L 0.63 U.S.qts 0.53 Imp.qts		
3	Engine crankcase (with filter)	5.7 L 6.0 U.S.qts 5.0 Imp.qts		Engine oil: API service classification CD, CE or CF Below 0 °C (32 °F) : SAE10W, 10W-30 or 10W-40 0 to 25 °C (32 to 77 °F): SAE20, 10W-30 or 10W-40 Above 25 °C (77 °F): SAE30, 10W-30 or 10W-40
4	Transmission case (2WD)	27 L 7.1 U.S.gals 5.9 Imp.gals		KUBOTA UDT or SUPER UDT fluid*
	Transmission case (4WD)	27.5 L 7.3 U.S.gals 6.1 Imp.gals		
	Transmission case (HST (4WD))	23.5 L 6.2 U.S.gals 5.2 Imp.gals		
5	Front axle case (4WD)	4.5 L 4.8 U.S.qts 3.9 Imp.qts		KUBOTA UDT or SUPER UDT fluid* or SAE80 - SAE 90 gear oil
Greasing				
	Place	No. of greasing point	Capacity	Type of grease
6	Front wheel hub	2 [2WD only]	A small amount	Bearing grease
	Knuckle shaft	2 [2WD only]	Until grease overflows	Multipurpose type grease
	Front axle support	2		
	Clutch pedal	1		
	Brake pedal	1		
	Pedal shaft	1		
	Top link bracket	2 [with draft control (if equipped)]		
	Battery terminal	2		
	Lift rod	1		

* KUBOTA original transmission hydraulic fluid.




■ NOTE

- **Engine Oil:**
Oil used in the engine should have an American Petroleum Institute (API) service classification and Proper SAE Engine Oil according to the ambient temperatures as shown above:
- With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low-sulfur fuel on on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the CF, CD or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.
- Lubricating oil recommended when a low-sulfur or high-sulfur fuel employed.

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 tables below.

Indication on top of bolt	 No-grade or 4T						 7T						 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit															
Diameter	N-m	kgf-m	ft-lbs	N-m	kgf-m	ft-lbs	N-m	kgf-m	ft-lbs	N-m	kgf-m	ft-lbs	N-m	kgf-m	ft-lbs
M6 (6 mm, 0.24 in.)	7.85 to 9.31	0.80 to 0.95	5.79 to 6.87	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	16.7 to 19.6	1.7 to 2.0	12.3 to 14.4	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	29.5 to 34.3	3.0 to 3.5	21.7 to 25.3
M10 (10 mm, 0.39 in.)	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2	31.4 to 34.3	3.2 to 3.5	23.2 to 25.3	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5	60.9 to 70.6	6.2 to 7.2	44.9 to 52.0
M12 (12 mm, 0.47 in.)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	-	-	-	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	103 to 117	10.5 to 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5	-	-	-	124 to 147	12.6 to 15.0	91.2 to 108	-	-	-	167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141	-	-	-	197 to 225	20.0 to 23.0	145 to 166	-	-	-	260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209	-	-	-	275 to 318	28.0 to 32.5	203 to 235	-	-	-	344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289	-	-	-	368 to 431	37.5 to 44.0	272 to 318	-	-	-	491 to 568	50.0 to 58.0	362 to 419

W1034542

6. MAINTENANCE

No.	Item		Period	Indication on hour meter												After since	Reference page				
				50	100	150	200	250	300	350	400	450	500	550	600					650	700
1	Engine oil	Change	★ ☆		☆		☆		☆		☆		☆		☆		☆	every 100 Hr	G-14		
2	Engine oil filter	Replace	★			☆			☆					☆				every 200 Hr	G-14		
3	Hydraulic oil filter	Replace	★			☆			☆					☆				every 200 Hr	G-17		
4	HST oil filter	Replace	★			☆			☆					☆				every 200 Hr	G-18		
5	Transmission fluid	Change	★						☆									every 400 Hr	G-15, 16		
6	Front axle case oil (4WD)	Change	★						☆									every 400 Hr	G-19		
7	Front axle pivot	Adjust												☆				every 600 Hr	G-33		
8	Greasing	—	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-21		
9	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-22, 23		
10	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-24		
11	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆		every 100 Hr	G-28		*5
12	Air cleaner element	Clean		☆		☆		☆		☆		☆		☆		☆		every 100 Hr	G-25	@	*1
		Replace																every 1 year	G-25		*2
13	Fuel filter element	Clean		☆		☆		☆		☆		☆		☆		☆		every 100 Hr	G-26	@	
		Replace								☆								every 400 Hr	G-26		
14	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆		every 100 Hr	G-26		
15	Clutch	Adjust	★	☆		☆		☆		☆		☆		☆		☆		every 100 Hr	G-19, 20		
16	Brake	Adjust		☆		☆		☆		☆		☆		☆		☆		every 100 Hr	G-27		
17	Radiator hose and clamp	Check				☆				☆				☆				every 200 Hr	G-30		
		Replace																every 2 years	G-30		
18	Power steering oil line	Check				☆				☆				☆				every 200 Hr	G-31		
		Replace																every 2 years	G-31		
19	Fuel line	Check		☆		☆		☆		☆		☆		☆		☆		every 100 Hr	G-27	@	
		Replace																every 2 years	G-27		*3
20	HST oil line	Check				☆				☆				☆				every 200 Hr	G-31		
		Replace																every 2 years	G-31		

W1035769

No.	Item	Period	Indication on hour meter													After since	Reference page					
			50	100	150	200	250	300	350	400	450	500	550	600	650					700		
21	Toe-in	Adjust				☆						☆				☆			every 200 Hr	G-32		
22	Intake air line	Check				☆						☆				☆			every 200 Hr	G-31	@	
		Replace																	every 2 years	G-31		*3
23	Greasing (2WD front wheel hub)	-										☆							every 400 Hr	G-32		
24	Engine valve clearance	Adjust																	every 800 Hr	1-S12		*4
25	Fuel injection nozzle injection pressure	Check																	every 1500 Hr	1-S18	@	*4
26	Injection pump	Check																	every 3000 Hr	1-S17	@	*4
27	Cooling system	Flush																	every 2 years	G-34, 35, 36		
28	Coolant	Change																	every 2 years	G-34, 35, 36		
29	Fuel system	Bleed																		G-38		
30	Clutch housing water	Drain																		G-38		
31	Fuse	Replace																		G-39		
32	Light bulb	Replace																		G-39		

W1029476

■ 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 : Consult your local KUBOTA distributor for this service.
- *5 : 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.

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.

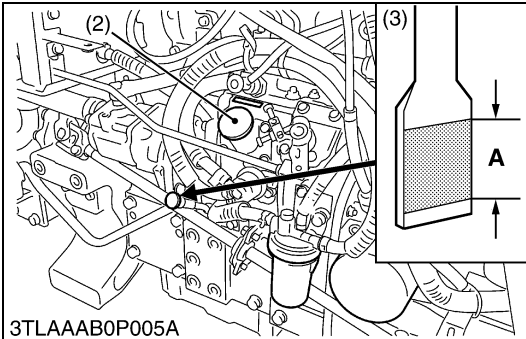
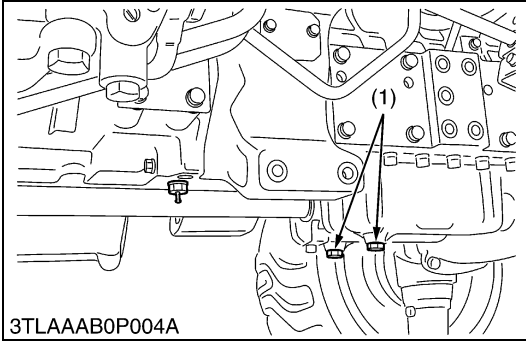
[1] DAILY CHECK

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 machine.
 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 nuts of tires are tight.
 9. Care of danger, warning and caution labels.
 10. Clean around the exhaust manifold and the muffler of the engine.
- While sitting in the operator's seat.
 1. Check the brake pedals and clutch pedal.
 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.

[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 (3).

■ IMPORTANT

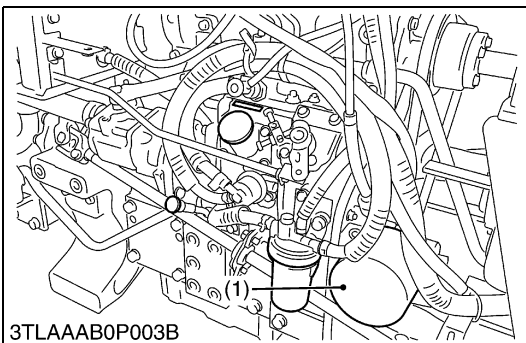
- **When using an oil of different manufacture or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Use the proper SAE Engine Oil according to ambient temperatures.**
- **Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)**

Engine oil	Capacity	5.7 L 6.0 U.S.qts 5.0 Imp.qts

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

A : Oil level is acceptable within this range.

W1014533



Replacing Engine Oil Filter Cartridge

⚠ CAUTION

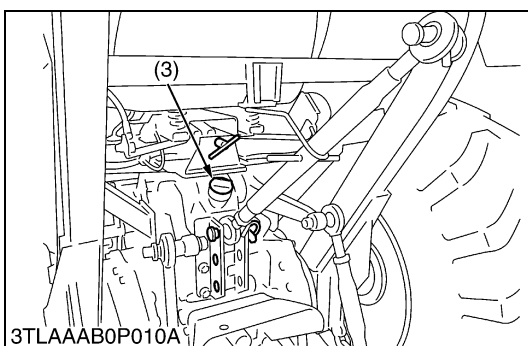
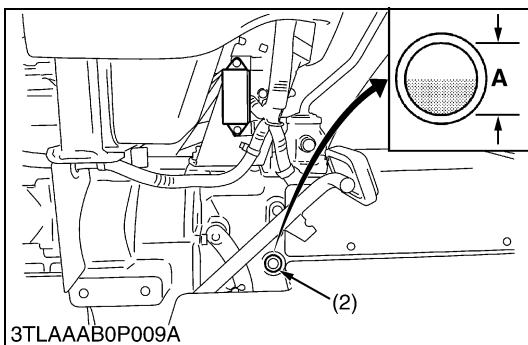
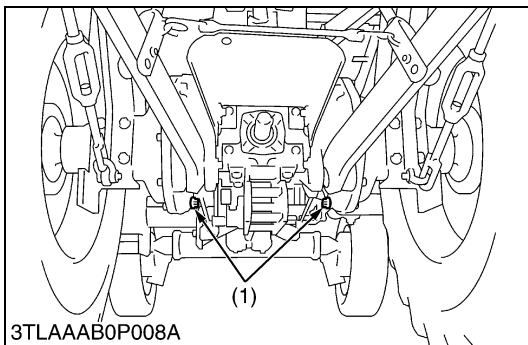
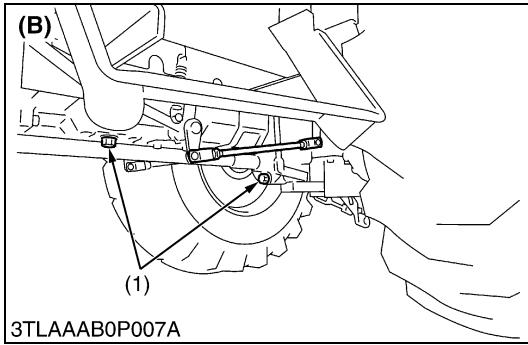
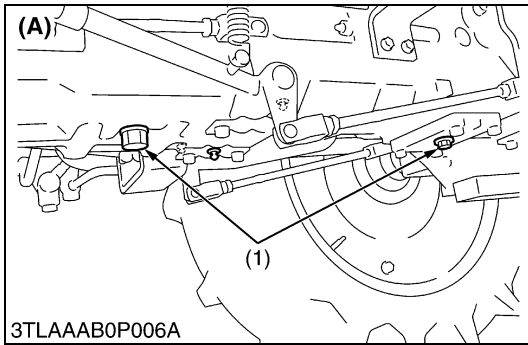
- **Be sure to stop the engine before changing oil filter cartridge (1).**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**
- 1. Remove the engine oil filter cartridge (1).
- 2. Put a film of clean engine oil on rubber seal of new filter.
- 3. Tighten the filter quickly until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

■ IMPORTANT

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

- (1) Engine Oil Filter Cartridge

W1014892



Changing Transmission Fluid (Manual Transmission Type)

CAUTION

- Be sure to stop the engine before checking and changing the transmission fluid.
- 1. Place an oil pan underneath the transmission case.
- 2. Remove the drain plugs (1) at the bottom of the transmission case.
- 3. Drain the transmission fluid.
- 4. After draining, screw in the drain plugs (1).
- 5. Fill with the new KUBOTA SUPER UDT fluid up to the upper line of the gauge (2).
- 6. After running the engine for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

IMPORTANT

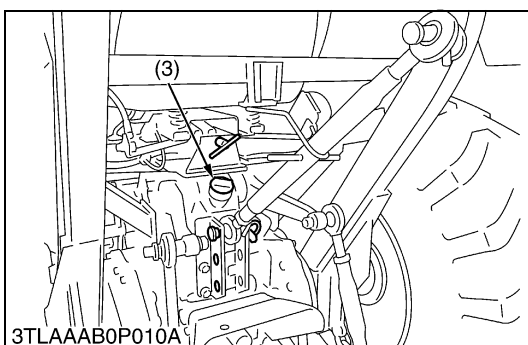
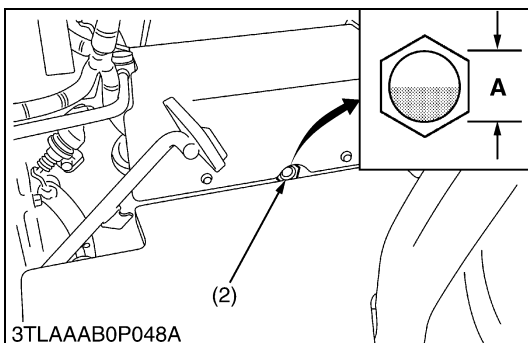
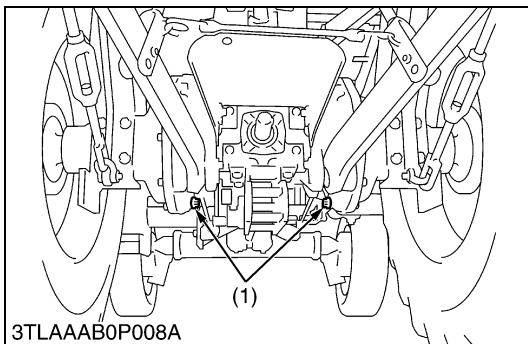
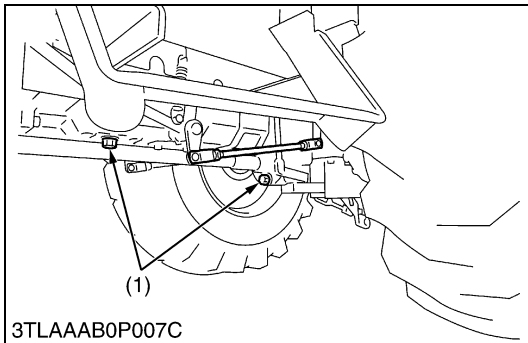
- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to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

Transmission fluid	Capacity	2WD	27 L 7.1 U.S.gals 5.9 Imp.gals
		4WD	27.5 L 7.3 U.S.gals 6.1 Imp.gals

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

A : Oil level is acceptable within this range.
 (A) 2WD Type
 (B) 4WD Type

W1015055



Changing Transmission Fluid (HST Type)

⚠ CAUTION

- Be sure to stop the engine before checking and changing the transmission fluid.

1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. After draining, screw in the drain plugs (1).
5. Fill with the new KUBOTA SUPER UDT fluid up to the upper line of the gauge (2).
6. After running the engine for a few minutes, stop it and check the fluid level again, if low, add fluid prescribed level (A).

■ IMPORTANT

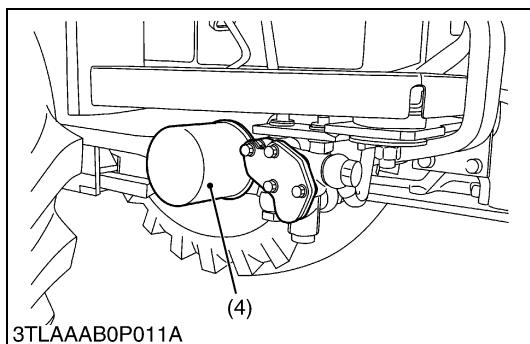
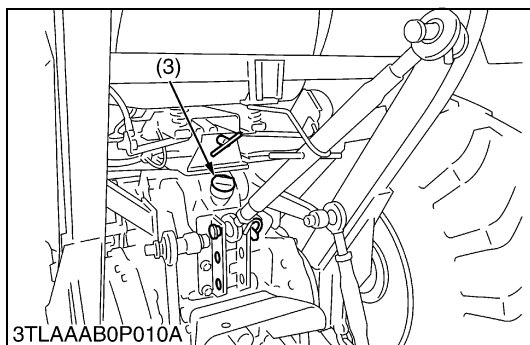
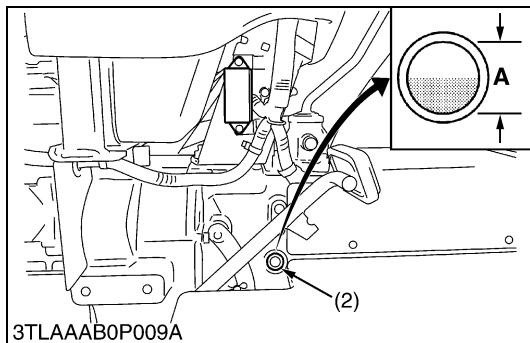
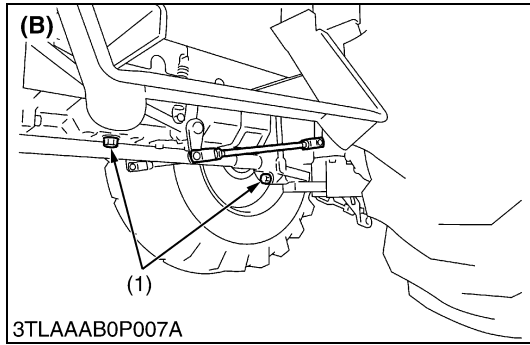
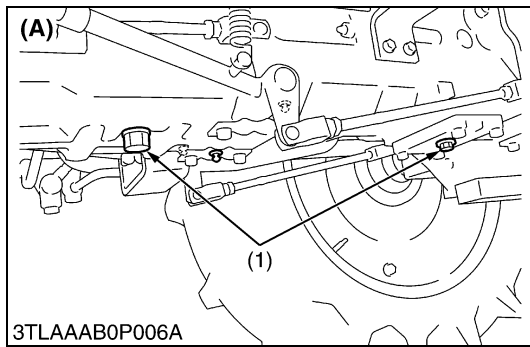
- Use only multi-grade transmission fluid. Use of other fluids may damage the transmission or hydraulic system.
- Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)
- Never work the tractor immediately after changing the transmission fluid. Keeping the engine at medium speed for a few minutes to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

Transmission fluid	Capacity	
		23.5 L
		6.2 U.S.gals
		5.2 Imp.gals

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

A : Oil level is acceptable within this range.

W1031890



Replacing Hydraulic Oil Filter (Manual Transmission Type)

⚠ 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. Place an oil pan under the tractor.
 2. Remove the drain plugs (1) at the bottom of the transmission case.
 3. Drain the transmission fluid.
 4. After draining, screw in the drain plugs.
 5. Remove the oil filter cartridge (4) by using a filter wrench.
 6. Make sure the mounting surface is clean.
Put a film of clean transmission fluid on the rubber seal of the new filter.
 7. Install the new filter cartridge.
 8. Quickly tighten the filter until it contacts the mounting surface, then tighten it by hand an additional 1/2 turn only.
 9. After the new filter have been replaced, fill with oil up to the upper line of the gauge (2).
 10. After running the engine for a few minutes, stop it and recheck the oil level, add oil to the prescribed level.
 11. Make sure that the transmission fluid doesn't leak through the seal of the filter.

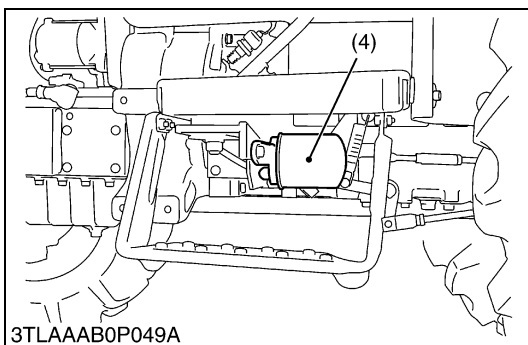
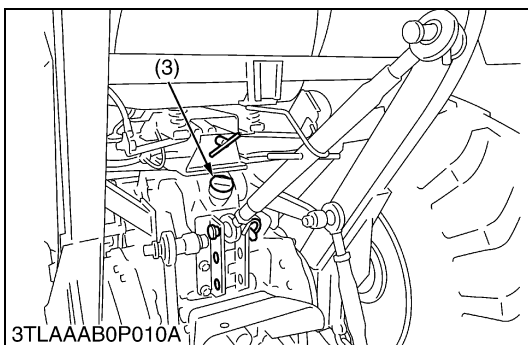
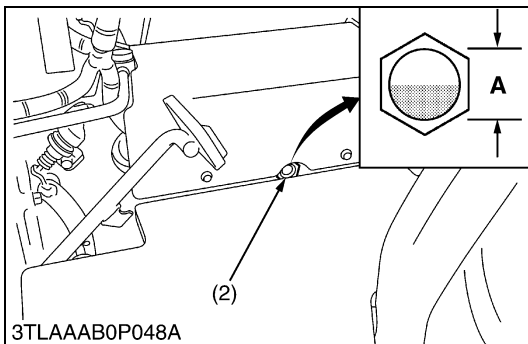
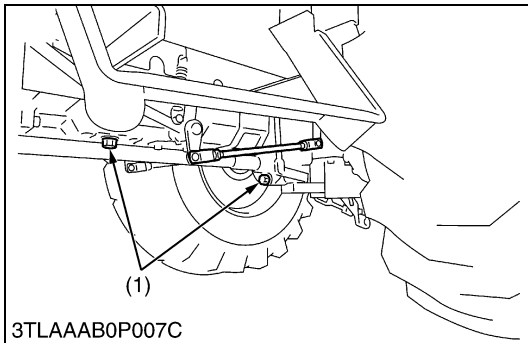
■ IMPORTANT

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

- (1) Drain Plug
 (2) Gauge
 (3) Filling Plug
 (4) Hydraulic Oil Filter

- A : Oil level is acceptable within this range.
 (A) 2WD Type
 (B) 4WD Type

W1015586



Replacing Hydraulic Oil Filter (HST Type)

⚠ 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. Place an oil pan under the tractor.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. After draining, screw in the drain plugs.
5. Remove the oil filter cartridge (4) by using a filter wrench.
6. Make sure the mounting surface is clean.
Put a film of clean transmission fluid on the rubber seal of the new filter.
7. Install the new filter cartridge.
8. Quickly tighten the filter until it contacts the mounting surface, then tighten it by hand an additional 1/2 turn only.
9. After the new filter have been replaced, fill with oil up to the upper line of the gauge (2).
10. After running the engine for a few minutes, stop it and recheck the oil level, add oil to the prescribed level.
11. Make sure that the transmission fluid doesn't leak through the seal of the filter.

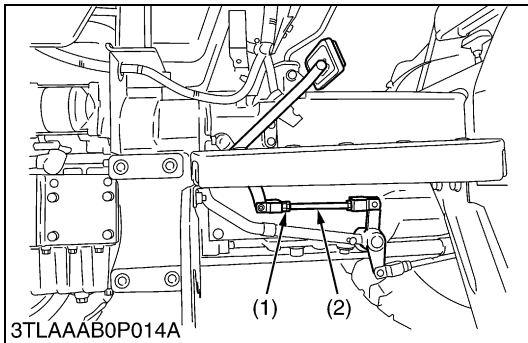
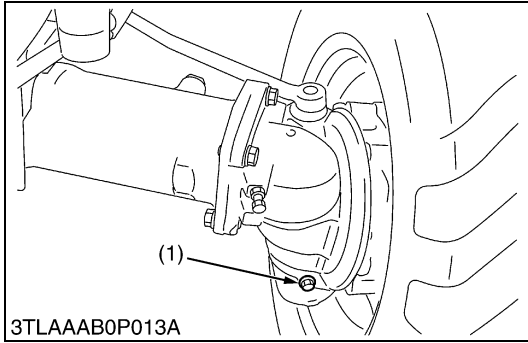
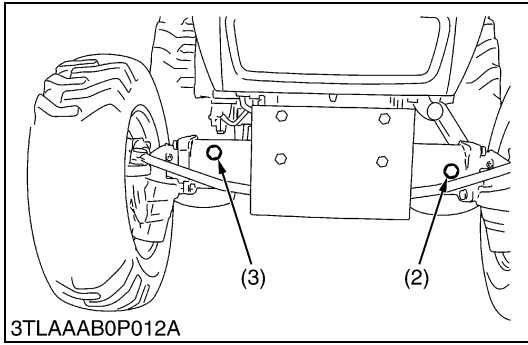
■ IMPORTANT

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

- (1) Drain Plug
 (2) Gauge
 (3) Filling Plug
 (4) Hydraulic Oil Filter

A : Oil level is acceptable within this range.

W1034395



Changing Front Axle Case Oil [4WD Type]

1. Place the oil pans underneath the front axle case.
2. Remove the drain plug (1) both sides and filling port plug (3) to drain the oil.
3. After draining, reinstall the drain plug.
4. Remove the oil level check plug (2).
5. Fill with the new oil up to the check plug (2) port.
6. After filling, reinstall the check plug (2) and filling port plug.

■ IMPORTANT

- Use KUBOTA SUPER UDT fluid or SAE 80, 90 gear oil. Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)

Front axle case oil	Capacity	4.5 L 4.8 U.S.qts 3.9 Imp.qts
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- (1) Drain Plug (2) Check Plug (3) Filling Port Plug

W1030064

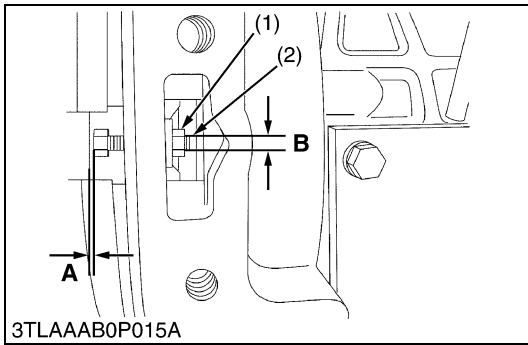
Adjusting Clutch Pedal Free Travel (L2800)

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

Clutch pedal free travel	Factory spec.	20 to 30 mm 0.8 to 1.2 in.
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- (1) Lock Nut (2) Turnbuckle

W1044872



Adjusting Clutch Pedal Free Travel (L3400)

1. At first adjust the clutch pedal free travel, as is mentioned above.
2. Remove the cover located on the right side of flywheel housing case.
3. Loosen the lock nut (1), tighten the adjust bolt (2) by using 6 mm spanner until head of the bolt contacts pressure plate slightly. Make 7/6 turn counterclockwise to give 1.4 to 1.5 mm (0.055 to 0.059 in.) clearance.
4. Tighten the lock nut (1), holding the adjusting bolt (2).
5. Turn the flywheel to adjust the clearance of other adjusting bolts (three bolts).
6. Repeat step 3 and readjust clutch pedal free travel if necessary.

Clearance (A) between pressure plate and adjusting bolt	Factory spec.	1.4 to 1.5 mm 0.055 to 0.059 in.
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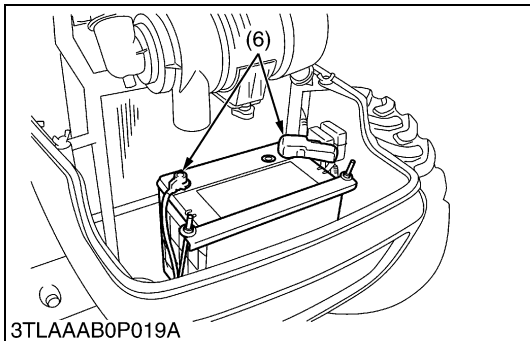
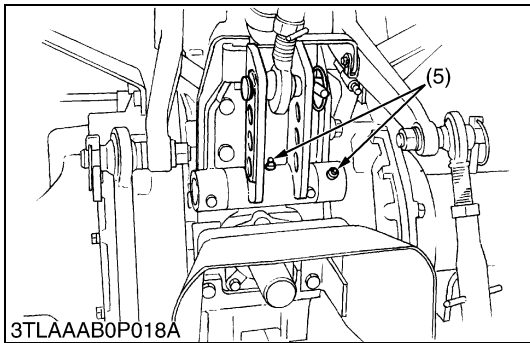
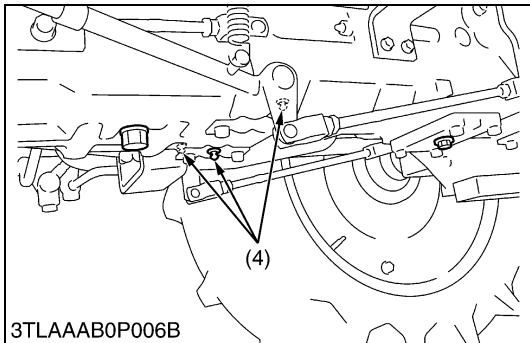
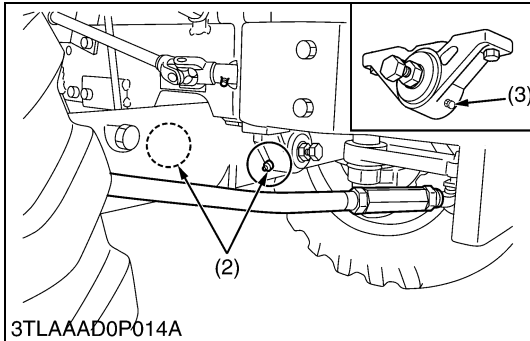
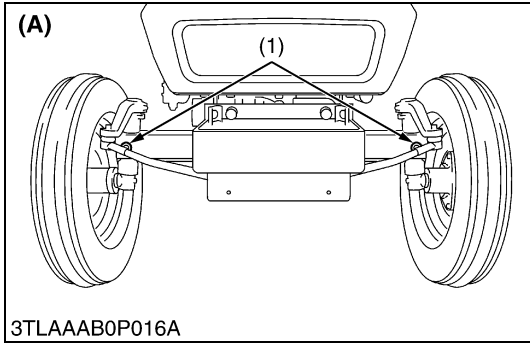
Tightening torque	Lock nut	15.7 to 21.6 N·m 1.6 to 2.2 kgf·m 11.6 to 15.9 ft-lbs
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- (1) Lock Nut
(2) Adjusting Bolt

A : Clearance between pressure plate and adjusting bolt
B : 6 mm (0.24 in.)

W1036272

[3] CHECK POINTS OF EVERY 50 HOURS

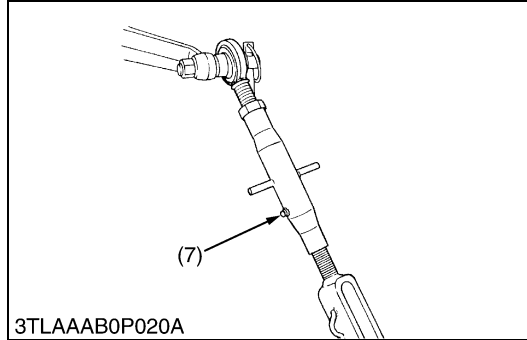


Greasing

1. Apply a grease to the following position as figures.

NOTE

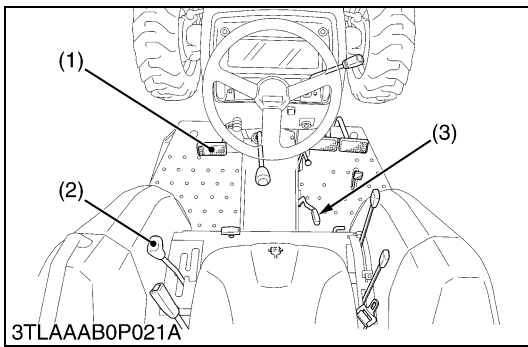
- Apply a small amount of multipurpose grease to the following points every 50 hours. If you operated the machine in extremely wet and muddy conditions, lubricate grease fittings more often.
- When apply a grease to the front axle support, remove the breather plug and apply a grease until grease overflows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



- (1) Grease Fitting (Knuckle Shaft RH, LH)
- (2) Grease Fitting (Front Axle Support)
- (3) Breather Plug
- (4) Pedal Shaft
- (5) Top Link Bracket (with Draft Control) (If equipped)
- (6) Battery Terminal
- (7) Lifting Rod (RH)

(A) 2WD Type

W1030865



Checking Engine Start System (Manual Transmission Type)

⚠ CAUTION

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

■ Preparation before testing

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

■ Test : Switch for the range gear shift lever

1. Sit on the operator's seat.
2. Shift the range gear shift lever to "L", "H" or "R" position.
3. Depress the clutch pedal fully.
4. Disengage the PTO gear shift lever.
5. Turn the key to "START" position.
6. The engine must not crank.

■ Test : Switch for the PTO gear shift lever

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

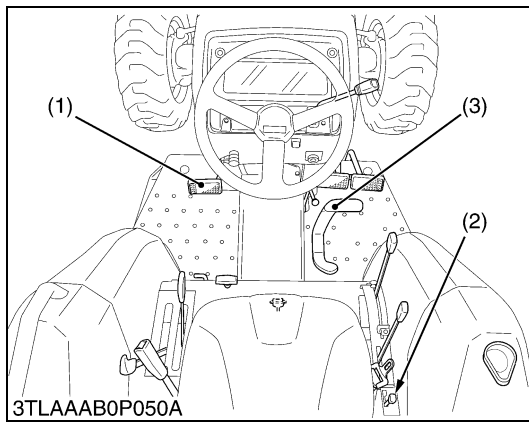
■ Test : Switch for the operator's seat

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

- (1) Clutch Pedal
(2) Range Gear Shift Lever

- (3) PTO Gear Shift Lever

W1031201



Checking Engine Start System (HST Type)

⚠ CAUTION

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

■ Test : Switch for the speed control pedal

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

■ Test : Switch for the PTO gear shift lever

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

■ Test : Switch for the clutch pedal

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

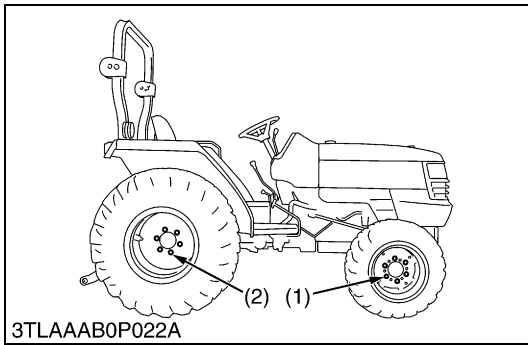
■ Test : Switch for the operator's seat

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

(1) Clutch Pedal
(2) PTO Gear Shift

(3) Speed Control Pedal

W1039549



Checking Wheel Mounting Screws and Nuts Tightening Torque

⚠ CAUTION

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

Tightening torque	Front wheel mounting screw and nut or lug nut	137 N·m 14.0 kgf·m 100 ft-lbs
	Rear wheel mounting screws and nuts	215 N·m 22.0 kgf·m 160 ft-lbs

(1) Front Wheel Mounting Screw and Nut or Lug Nut

(2) Rear Wheel Mounting Screws and Nuts

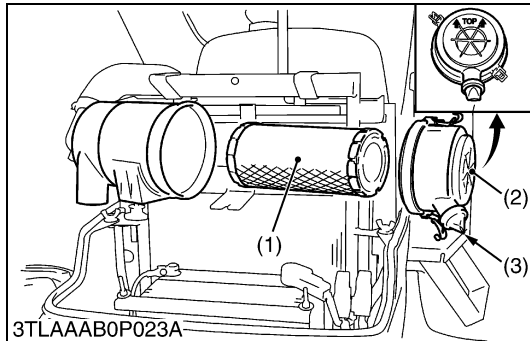
W1030999

[4] CHECK POINTS OF EVERY 100 HOURS

Changing Engine Oil

1. See page G-14.

W1032035



Cleaning Air Cleaner Element

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

■ NOTE

- Check to see if the evacuator valve (3) is blocked with dust.

■ IMPORTANT

- The air cleaner uses a dry element, never apply oil.
- Do not run the engine with filter element removed.
- Be sure to refit the dust cup with the arrow ↑ (on the rear) upright. If the dust cup is improperly fitted, dust passes by the baffle and directly adheres to the element.

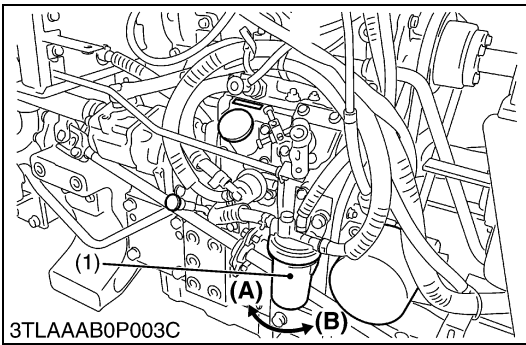
■ Evacuator Valve (3)

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

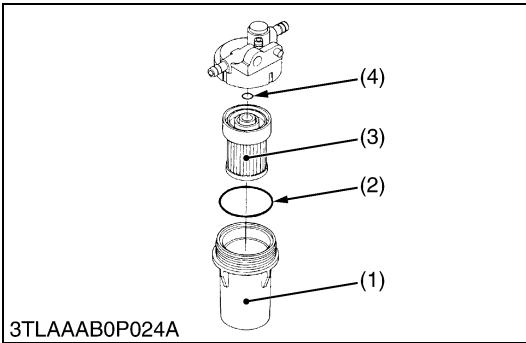
(1) Air Cleaner Element
(2) Cover

(3) Evacuator Valve

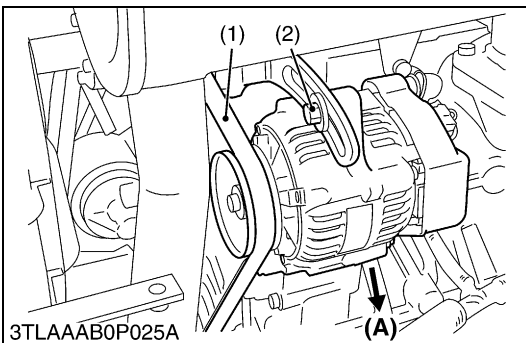
W1032216



3TLAAAB0P003C



3TLAAAB0P024A



3TLAAAB0P025A

Cleaning Fuel Filter

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

1. 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. (See "**SERVICE AS REQUIRED**" in Periodic service section.)

■ 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.

- | | |
|----------------------|-------------|
| (1) Fuel Filter Bowl | (A) Loosen |
| (2) O-ring | (B) Tighten |
| (3) Filter Element | |
| (4) O-ring | |

W1017467

Adjusting Fan Belt Tension

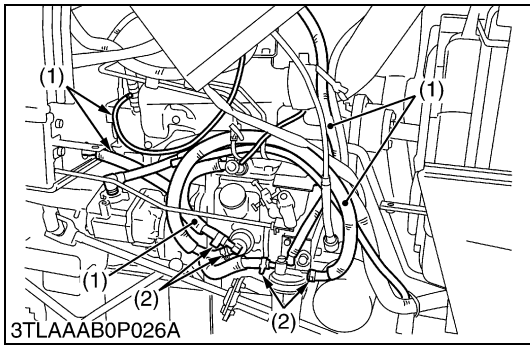
⚠ CAUTION

- **Be sure to stop the engine before checking fan belt tension.**
1. Stop the engine and remove the key.
 2. Apply moderate thumb pressure to belt between pulleys.
 3. If tension is incorrect, loosen the alternator mounting bolts (2), and using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within the factory specifications.
 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.
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- | | |
|--------------------------------|-----------------------------|
| (1) Check Part of Belt Tension | (A) To Tighten the Fan Belt |
| (2) Alternator Mounting Bolt | |

W1032627



Checking Fuel Line

CAUTION

- Stop the engine when attempting the check and change prescribed below.
- Remember to check the fuel line periodically. The fuel line is subject to wear and aging, fuel may leak out onto the running engine, causing a fire.

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

NOTE

- If the fuel line is removed, be sure to properly bleed the fuel system.
- Refer to "Bleeding Fuel System". (See page G-38.)

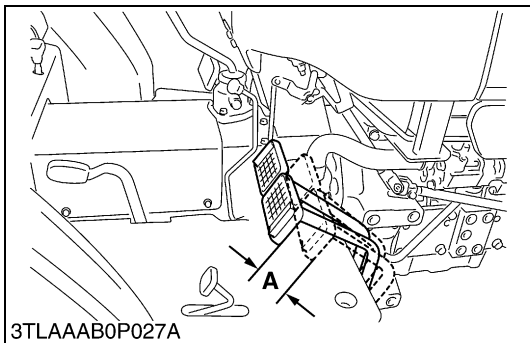
(1) Fuel Line (2) Clamp Band

W1051696

Adjusting Clutch Pedal Free Travel

1. See page G-19, 20.

W1032922



Adjusting Brake Pedal Free Travel

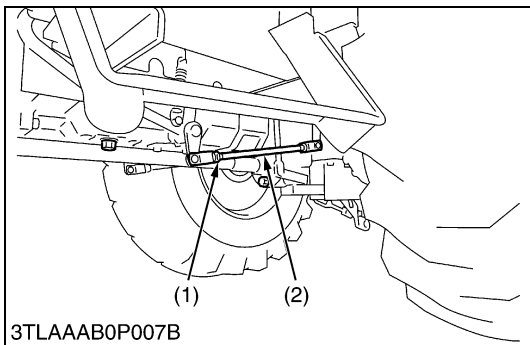
1. Stop the engine and remove the key, then release the parking brake.
2. Slightly depressed the brake pedals and measure free travel (A) at top of pedal stroke.
3. If adjustment is needed, loosen the lock nut (1) and turn the turnbuckle (2) to adjust the rod length.
4. Retighten the lock nut (1).
5. Other side same as above.

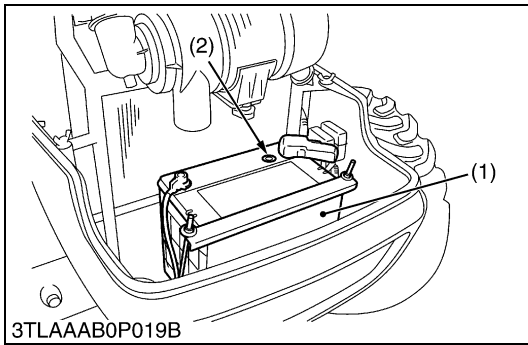
Brake pedal free travel	Factory spec.	15 to 20 mm (0.6 to 0.8 in.) on the pedal
		Keep the free travel in the right and left brake pedals equal

(1) Lock Nut
(2) Turnbuckle

A : Free Travel

W1033181





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 splattered with it, wash it away completely with water immediately and get medical attention.
- Wear eye protection and rubber gloves when working around battery.

■ NOTE

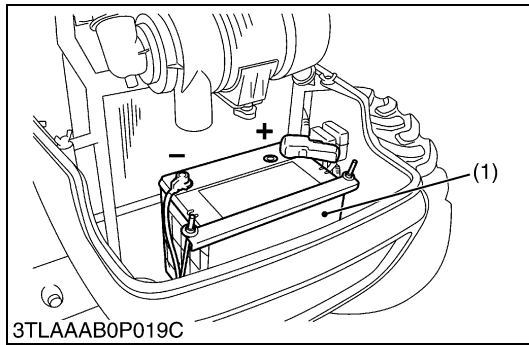
- The factory-installed battery is of non-refillable type. If the indicator turns white, do not charge the battery but replace it with new one.
1. Mishandling the battery shortens the service life and adds to maintenance costs.
 2. The original battery is maintenance free type battery, but need some 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.
 3. Check the battery condition by reading the indicator display.
State of indicator display.
Green : Specific gravity of electrolyte and quality of electrolyte are both in good condition.
Black : Need charging battery.
White : Need changing battery.
Check the battery condition by reading the indicator.

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

(1) Battery

(2) Indicator

W1034257



Battery Charging

⚠ CAUTION

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

Use a voltmeter or hydrometer.

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

Table 1

Tractor model	Battery type	Volts	Reserve capacity (min)	CCA (SAE)	Normal Charging Rate
L2800	75D26R	12	123	490	6.5
L3400					

CCA: Cold Cranking Ampere

■ Direction for Storage

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

(1) Battery

W1054307

[5] CHECK POINTS OF EVERY 200 HOURS

Replacing Engine Oil Filter Cartridge

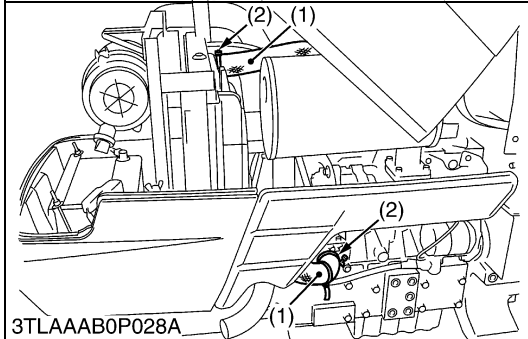
1. See page G-14.

W1034421

Replacing Hydraulic Oil Filter / Replacing Transmission Oil Filter [HST Type]

1. See page G-17, 18.

W1034472



Checking Radiator Hose and Hose Clamp

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

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

■ **Precaution at Overheating**

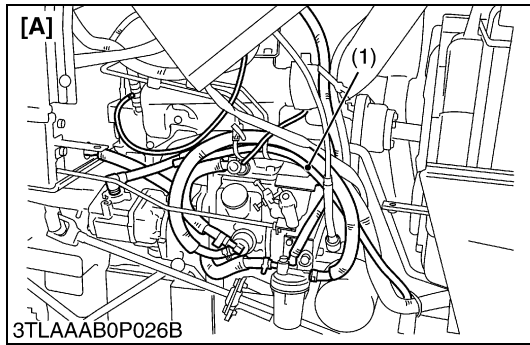
Take the following actions in the event the coolant temperature be nearly or more than the boiling point, what is called "Overheating".

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

(1) Radiator Hose

(2) Clamp

W1034737



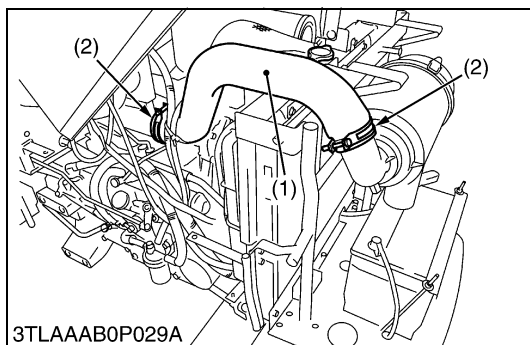
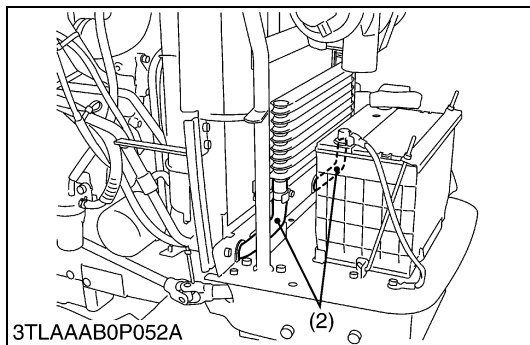
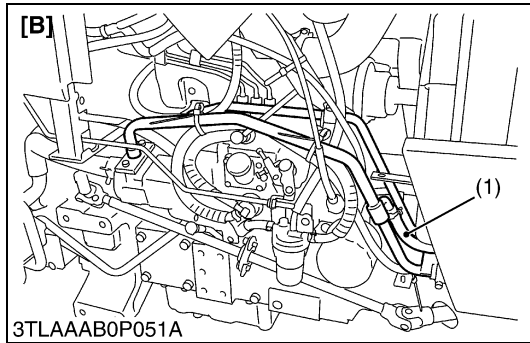
Checking Power Steering Line / Checking HST Oil Line [HST Type]

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

- (1) Power Steering Pressure Hose
(2) HST Oil Line

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

W1034635



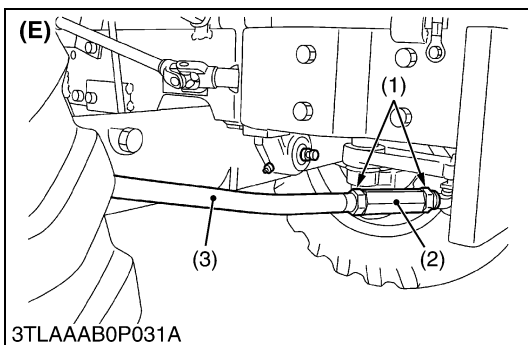
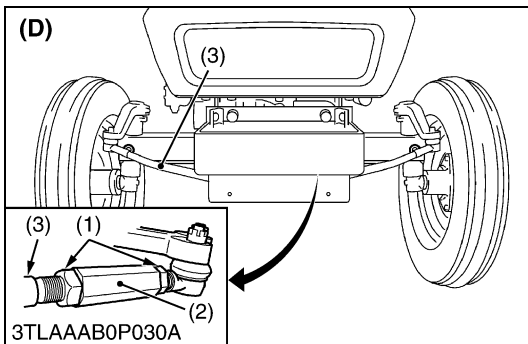
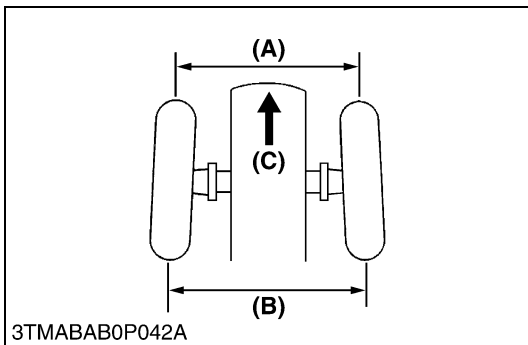
Checking Intake Air Line

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

- (1) Hose

- (2) Hose Clamp

W1042094



Adjusting Toe-in

1. Park the tractor on the flat place.
2. Inflate the tires to the specified pressure.
3. Turn steering wheel so front wheels are in the straight ahead position.
4. Lower the implement, lock the parking brake and stop the engine.
5. Measure distance between tire beads at front of tire, hub height.
6. Measure distance between tire beads at rear of tire, hub height.
7. Front distance should be 2 to 8 mm (0.079 to 0.315 in.) less than rear distance.
8. If the measurement is not within the factory specifications, adjust by changing the tie-rod length.

Toe-in ((B) - (A))	Factory spec.	2 to 8 mm 0.08 to 0.32 in.
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Adjusting

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

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

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

- (1) Lock Nut
(2) Turnbuckle
(3) Tie-rod

- (A) Wheel to Wheel Distance at front
(B) Wheel to Wheel Distance at rear
(C) Front
(D) 2WD
(E) 4WD

W1035017

[6] CHECK POINTS OF EVERY 400 HOURS

Changing Transmission Fluid

1. See page G-15, 16.

W1036512

Replacing Fuel Filter Element

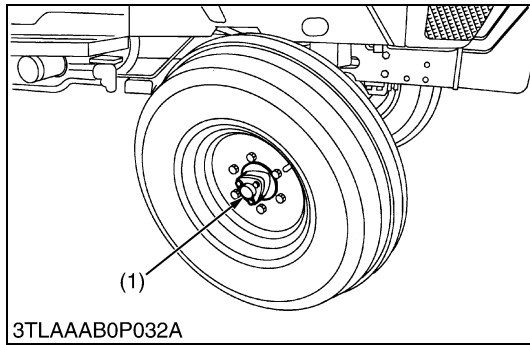
1. See page G-26.

W1055417

Changing Front Axle Case Oil

1. See page G-19.

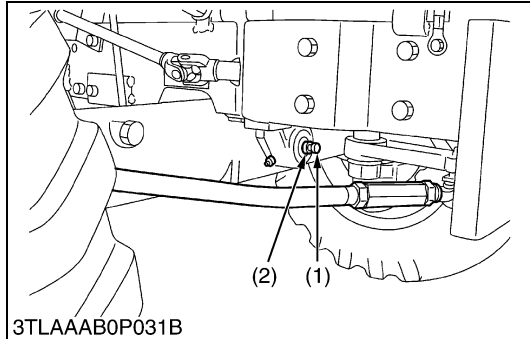
W1036559

**Lubricating Grease Fitting [2WD]**

1. Detach the cover (1), and apply bearing grease.

(1) Front Wheel Hub Cover

W1036668

[7] CHECK POINTS OF EVERY 600 HOURS**Adjust Front Axle Pivot**

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

2. Retighten the lock nut (2).

(1) Adjusting Screw

(2) Lock Nut

W1056178

[8] CHECK POINTS OF EVERY 800 HOURS**Checking Valve Clearance**

1. See page 1-S12.

W1018974

[9] CHECK POINTS OF EVERY 1500 HOURS**Checking Fuel Injection Nozzle Injection Pressure**

1. See page 1-S18.

W1036874

[10] CHECK POINTS OF EVERY 3000 HOURS**Checking Injection Pump**

1. See page 1-S17.

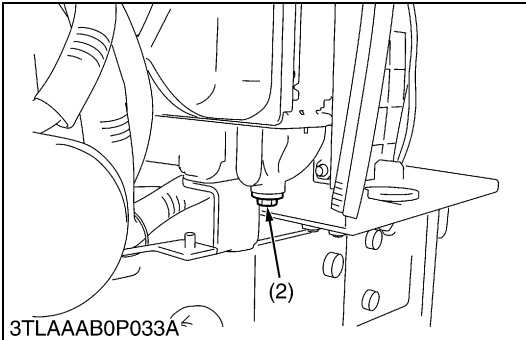
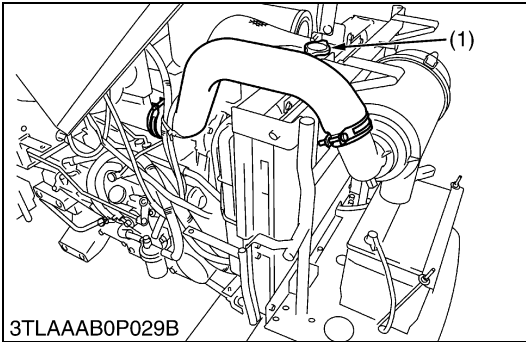
W1056315

[11] CHECK POINTS OF EVERY 1 YEARS**Replacing Air Cleaner Element**

1. See page G-25.

W1056392

[12] CHECK POINTS OF EVERY 2 YEARS



Flush Cooling System and Changing Coolant (Manual Transmission Type)

CAUTION

- **Do not remove the radiator cap when the engine is hot. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.**
1. Stop the engine and let cool down.
 2. To drain the coolant, open the radiator drain plug (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 plug (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 port.
 7. Start and operate the engine for a few minutes.
 8. Stop the engine. Check coolant level and add coolant if necessary.
 9. Install the radiator cap (1) securely.

IMPORTANT

- **Do not start engine without coolant.**
- **Use clean, fresh water and anti-freeze is mixed with water, the anti-freeze mixing ratio must be less than 50 %.**
- **Securely tighten radiator cap (1). If the cap is loose or improperly fitted, water may lead out and the engine could overheat.**

Anti-Freeze

If coolant freezes, the cylinders and radiator can be damaged. It is necessary, if the ambient temperature falls below 0 °C (32 °F), to remove coolant mix it with anti-freeze and full the radiator with it.

1. There are two types of anti-freeze available; use the permanent type (PT) for this engine.
2. Before adding anti-freeze for the first time, clean the radiator interior by pouring fresh water and draining it a few times.
3. The procedure for mixing of water and anti-freeze differs according to the maker of the anti-freeze and the ambient temperature, basically should be referred to SAE J1034, more specifically also to SAE J814c.
4. Mix the anti-freeze with water, and then fill in to the radiator.

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

* At 10 kPa (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) Radiator Cap

(2) Drain Plug

W1037510

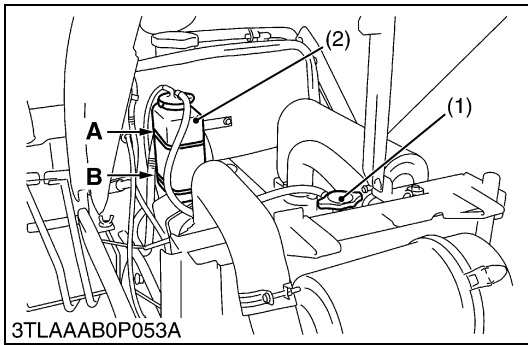
**Flush Cooling System and Changing Coolant
(Manual Transmission Type) (Continued)**

■ **NOTE**

- The above data represent industry standards that necessitate a minimum glycol content in the concentrates anti-freeze.
- When the coolant level drops due to evaporation, add water only. In case of leakage, add anti-freeze and water in the specified mixing ratio.
- Anti-freeze absorbs moisture. Keep unused anti-freeze in a tightly sealed container.
- Do not use radiator cleaning agents when anti-freeze has been added to the coolant. (Anti-freeze contains an anti-corrosive agent, which will react with the radiator cleaning agent forming sludge which will affect the engine parts.)

Coolant	Capacity	6.0 L 6.3 U.S.qts 5.3 Imp.qts
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W1043635



Flush Cooling System and Changing Coolant (HST Type)

⚠ CAUTION

- Do not remove the radiator cap when the engine is hot. Then loosen cap slightly to the stop to relieve any excess pressure before removing cap completely.
1. Stop the engine and let cool down.
 2. To drain the coolant, open the radiator drain plug and remove radiator cap. The radiator cap must be removed to completely drain the coolant.
 3. After all coolant is drained, close the drain plug.
 4. Fill with clean water and cooling system cleaner.
 5. Follow directions of the cleaner instruction.
 6. After flushing, fill with clean water and anti-freeze until the coolant level is just below the radiator cap. Install the radiator cap securely.
 7. Fill with fresh water up to the "FULL" mark on the recovery tank.
 8. Start and operate the engine for a few minutes.
 9. Stop the engine and let cool.
 10. Check coolant level of recovery tank and add coolant if necessary.

■ IMPORTANT

- Do not start engine without coolant.
- Use clean, fresh water and anti-freeze is mixed with water, the anti-freeze mixing ratio must be less than 50 %.
- Securely tighten radiator cap (1). If the cap is loose or improperly fitted, water may lead out and the engine could overheat.

■ Anti-Freeze

If coolant freezes, the cylinders and radiator can be damaged. It is necessary, if the ambient temperature falls below 0 °C (32 °F), to remove coolant mix it with anti-freeze and full the radiator with it.

1. There are two types of anti-freeze available; use the permanent type (PT) for this engine.
2. Before adding anti-freeze for the first time, clean the radiator interior by pouring fresh water and draining it a few times.
3. The procedure for mixing of water and anti-freeze differs according to the maker of the anti-freeze and the ambient temperature, basically should be referred to SAE J1034, more specifically also to SAE J814c.
4. Mix the anti-freeze with water, and then fill in to the radiator.

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

* At 10 kPa (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) Radiator Cap
(2) Recovery Tank

A : FULL
B : LOW

W1045312

**Flush Cooling System and Changing Coolant (HST Type)
(Continued)****■ NOTE**

- The above data represent industry standards that necessitate a minimum glycol content in the concentrates anti-freeze.
- When the coolant level drops due to evaporation, add water only. In case of leakage, add anti-freeze and water in the specified mixing ratio.
- Anti-freeze absorbs moisture. Keep unused anti-freeze in a tightly sealed container.
- Do not use radiator cleaning agents when anti-freeze has been added to the coolant. (Anti-freeze contains an anti-corrosive agent, which will react with the radiator cleaning agent forming sludge which will affect the engine parts.)

Coolant (recovery tank)	Capacity	0.6 L 0.63 U.S.qts 0.53 Imp.qts
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W1045113

Replacing Fuel Hose

1. Replace the fuel hoses and clamps.
Refer to "**Checking Fuel Line**". (See page G-27.)

W1056937

Replacing Radiator Hose (Water Pipes)

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

W1057415

Replacing Air Hose

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

W1046774

Replacing Power Steering Hose

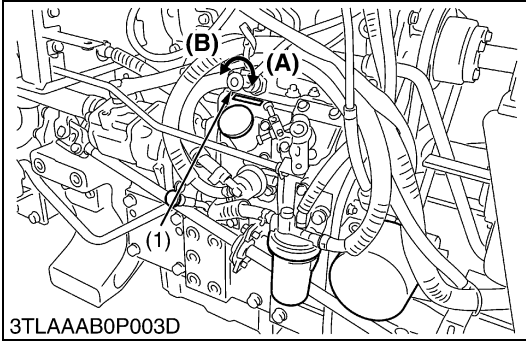
1. Replace the hoses and clamps. (See "**Checking Power Steering Line**" in every 200 hours maintenance.)

W1046898

Replacing HST Oil Line (HST Type)

1. Replace the hoses and clamps. (See "**Checking HST Oil Line**" in every 200 hours maintenance.)

W1046969

[13] OTHERS**Bleeding Fuel System**

Air must 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.

**CAUTION**

- **Do not bleed the fuel system when the engine is hot.**

Bleeding procedure is as follows :

1. Fill the fuel tank with fuel.
2. Open the air vent cock (1) on the fuel injection pump.
3. Close the air vent cock (1) after 30 seconds.

■ IMPORTANT

- **Always close the air vent cock (1) except for bleeding fuel lines.**

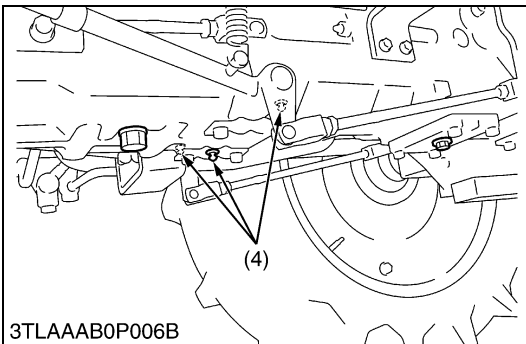
Otherwise, engine runs irregularly or stalls frequently.

(1) Air Vent Cock

(A) Close

(B) Open

W1039026

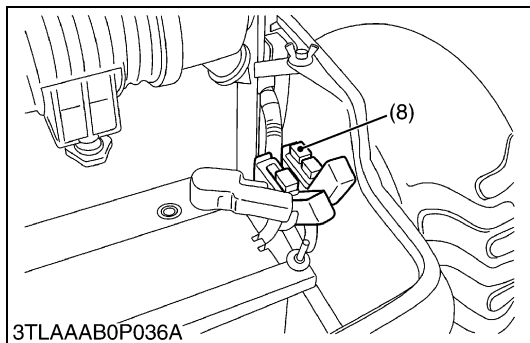
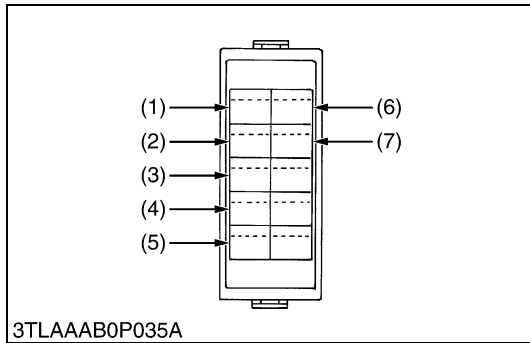
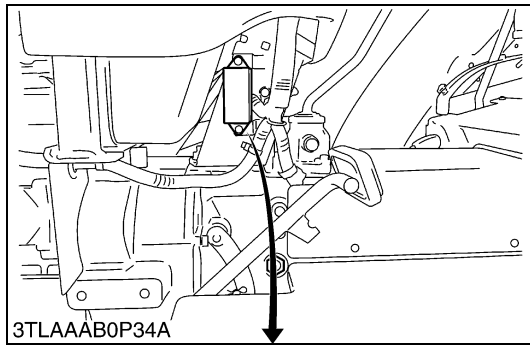
**Draining Clutch Housing Water****■ NOTE**

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

1. Check it by pushing in the split pin (1).
2. If water enters into the clutch housing, remove the plug (1) and drain the water, then reinstall the plug.

(1) Split Pin (Plug)

W1039199



Replacing Fuse

- 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.
- 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.

Fuse No.	Capacity (A)	Protected circuit
(1)	15	Hazard
(2)	10	Working Light
(3)	10	Panel
(4)	15	Head Light
(5)	5	Key stop
(6)	5	Glow lamp
(7)	5	Starter relay
(8)	Slow blow fuse	Check circuit against wrong battery connection.

W1039315

Replacing Light Bulb

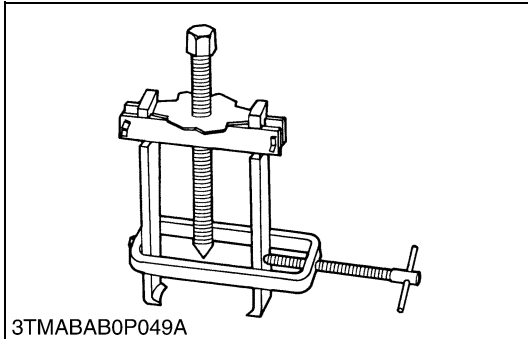
- Head lights and rear combination lights.
Take the bulb out of the light body and replace with a new one.
- Other lights
Detach the lens and replace the bulb.

Light	Capacity
Head light	25 W / 25W
Tail light	8 W
Turn signal / Hazard light (rear)	23 W
Turn signal / Hazard light (front)	27 W
Instrument panel light	1.7 W

W1039659

8. SPECIAL TOOLS

[1] SPECIAL TOOLS FOR ENGINE

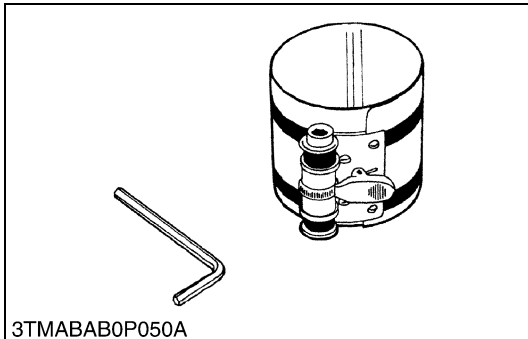


Special Use Puller Set

Code No.: 07916-09032

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

W10520950

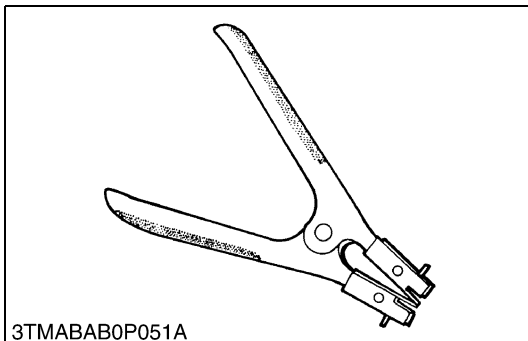


Piston Ring Compressor

Code No.: 07909-32111

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

W10520290

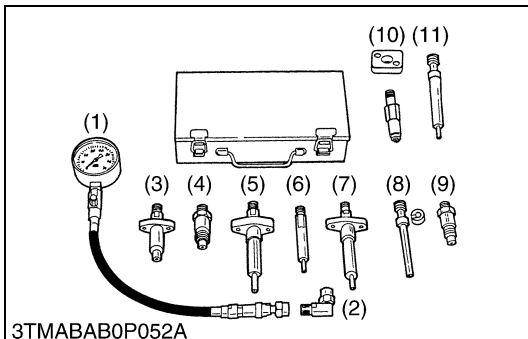


Piston Ring Tool

Code No.: 07909-32121

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

W10241500



Diesel Engine Compression Tester (for Injection Nozzle)

Code No.: 07909-30208 (Assembly) 07909-31251 (G)

07909-30934 (A to F) 07909-31271 (I)

07909-31211 (E and F) 07909-31281 (J)

07909-31231 (H)

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

(1) Gauge

(7) Adaptor F

(2) L Joint

(8) Adaptor G

(3) Adaptor A

(9) Adaptor H

(4) Adaptor B

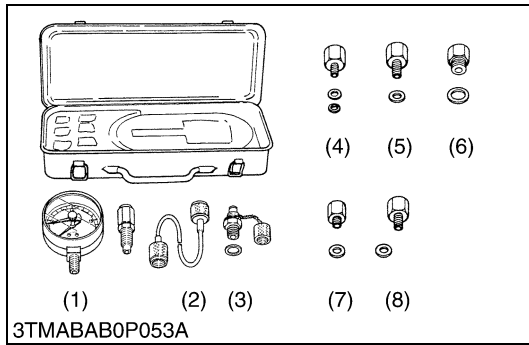
(10) Adaptor I

(5) Adaptor C

(11) Adaptor J

(6) Adaptor E

W10508990

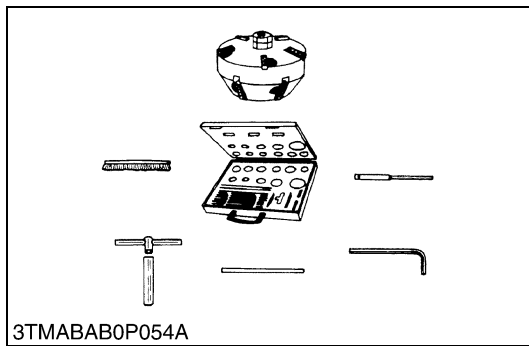
**Oil Pressure Tester**

Code No.: 07916-32032

Application: Use to measure lubricating oil pressure.

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

W10243180

**Valve Seat Cutter**

Code No.: 07909-33102

Application: Use to reseat valves.

Angle: 0.785 rad (45°)

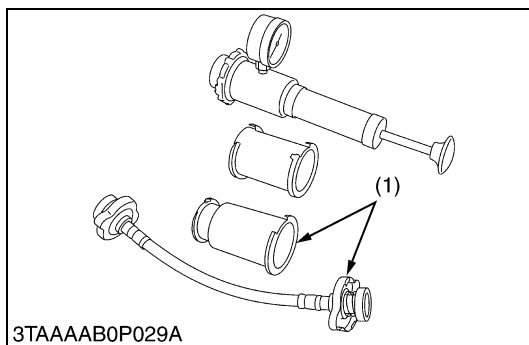
0.262 rad (15°)

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.)

W10244580

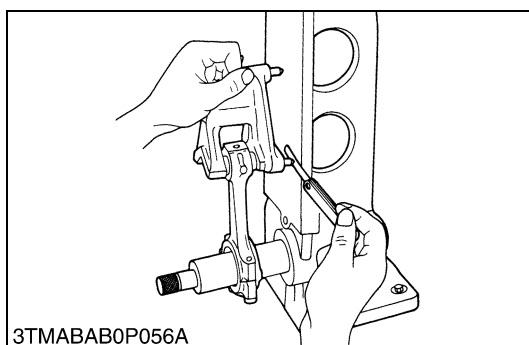
**Radiator Tester**

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.

W10519660

**Connecting Rod Alignment Tool**

Code No.: 07909-31661

Application: Use to check the connecting rod alignment.

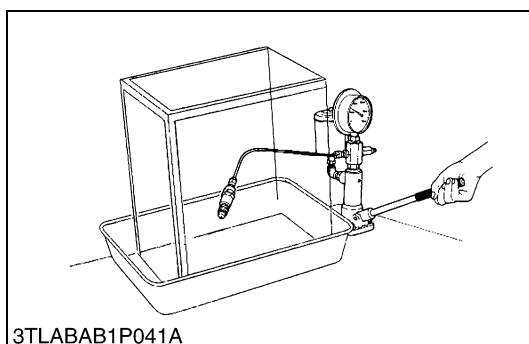
Applicable: Connecting rod big end I.D.

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

Connecting rod length

65 to 300 mm (2.56 to 11.81 in.)

W10245830

**Nozzle Tester**

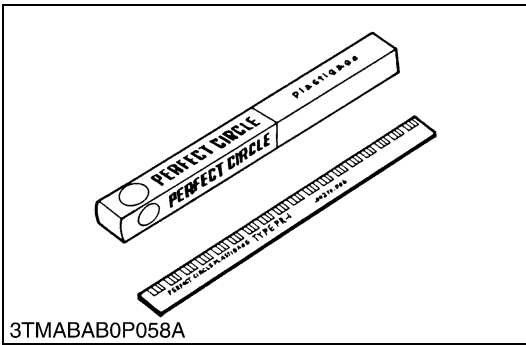
Code No.: 07909-31361

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

Measuring: 0 to 50 MPa

range (0 to 500 kgf/cm², 0 to 7000 psi)

W10246530



3TMABAB0P058A

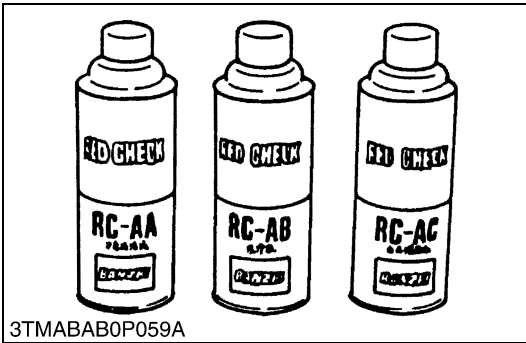
Plastigage

Code No.: 07909-30241

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

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

W10247190



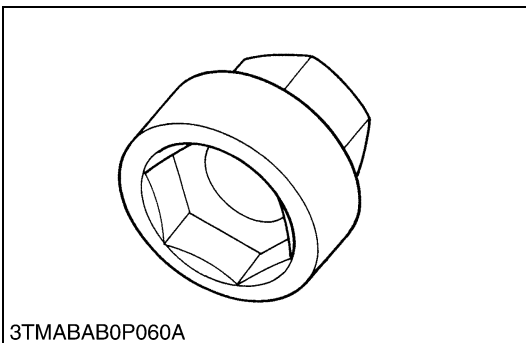
3TMABAB0P059A

Red Check

Code No.: 07909-31371

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

W10249090



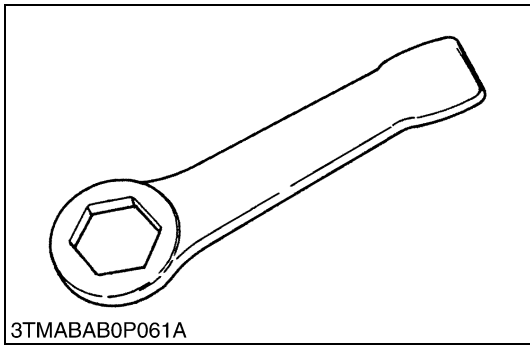
3TMABAB0P060A

Crankshaft Nut Socket 46

Code No.: 07916-30821

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

W10621260

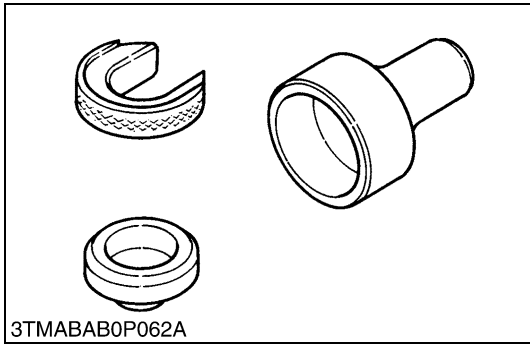


Socket Wrench 46

Code No.: 07916-30901

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

W10621950



Auxiliary Socket For Fixing Crankshaft Sleeve

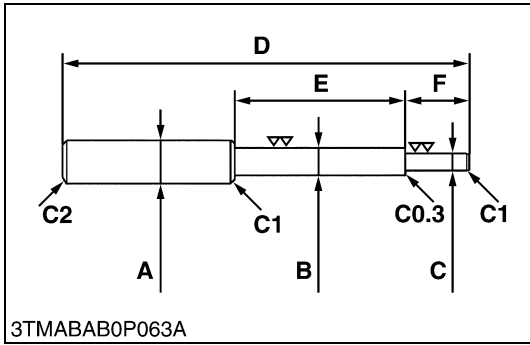
Code No.: 07916-32091

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

W10625580

NOTE

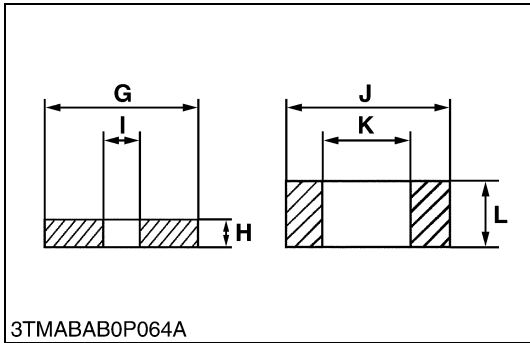
- The following special tools are not provided, so make them referring to the figure.



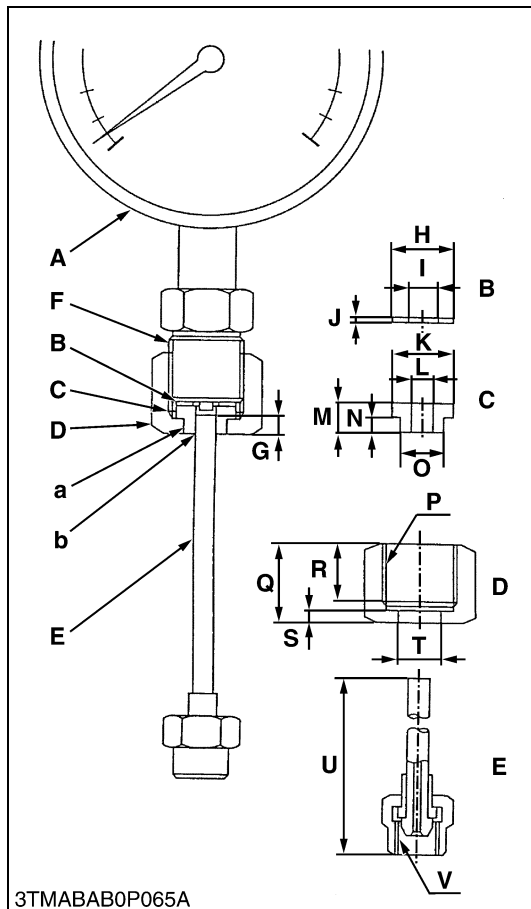
Valve Guide Replacing Tool

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

A	20 mm dia. (0.79 in. dia.)
B	11.7 to 11.9 mm dia. (0.460 to 0.468 in. dia.)
C	6.5 to 6.6 mm dia. (0.256 to 0.259 in. dia.)
D	225 mm (8.86 in.)
E	70 mm (2.76 in.)
F	45 mm (1.77 in.)
G	25 mm (0.98 in.)
H	5 mm (0.197 in.)
I	6.7 to 7.0 mm dia. (0.263 to 0.275 in. dia.)
J	20 mm dia. (0.787 in. dia.)
K	12.5 to 12.8 mm dia. (0.492 to 0.504 in. dia.)
L	8.9 to 9.1 mm (0.350 to 358 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.012 in.)



W10250170

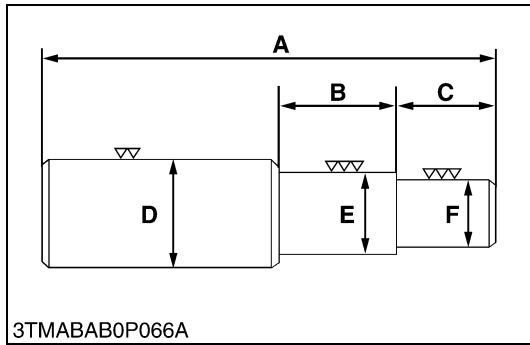


Injection Pump Pressure Tester

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 (1.06 in.) across the plat
E	Injection pipe
F	PF 1/2
G	5 mm (0.20 in.)
H	17 mm dia. (0.67 in. dia.)
I	8 mm dia. (0.31 in. dia.)
J	1.0 mm (0.039 in.)
K	17 mm dia. (0.67 in. dia.)
L	6.10 to 6.20 mm dia. (0.2402 to 0.2441 in. dia.)
M	8 mm (0.31 in.)
N	4 mm (0.16 in.)
O	11.97 to 11.99 mm dia. (0.4713 to 0.4721 in. dia.)
P	PF 1/2
Q	23 mm (0.91 in.)
R	17 mm (0.67 in.)
S	4 mm (0.16 in.)
T	12.00 to 12.02 mm dia. (0.4724 to 0.4732 in. dia.)
U	100 mm (3.94 in.)
V	M12 x 1.5
a	Adhesive application
b	Fillet welding on the enter circumference

W1025240



Bushing Replacing Tools

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

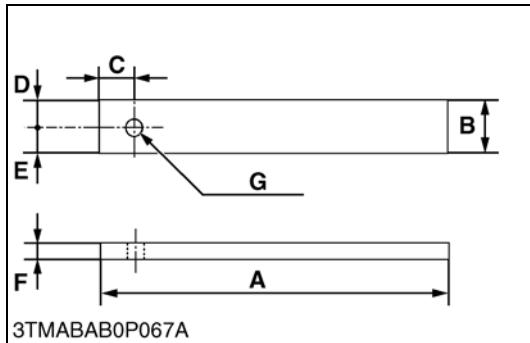
(1) For small end bushing

A	162 mm (6.38 in.)
B	35 mm (1.38 in.)
C	27 mm (1.06 in.)
D	35 mm dia. (1.38 in. dia.)
E	27.90 to 27.95 mm dia. (1.098 to 1.100 in. dia.)
F	25.00 to 25.01 mm dia. (0.984 to 0.985 in. dia.)

(2) For idle gear bushing

A	175 mm (6.89 in.)
B	40 mm (1.57 in.)
C	38 mm (1.49 in.)
D	45 mm dia. (1.77 in. dia.)
E	41.90 to 41.95 mm dia. (1.650 to 1.652 in. dia.)
F	37.95 to 37.97 mm dia. (1.494 to 1.495 in. dia.)

W10255000

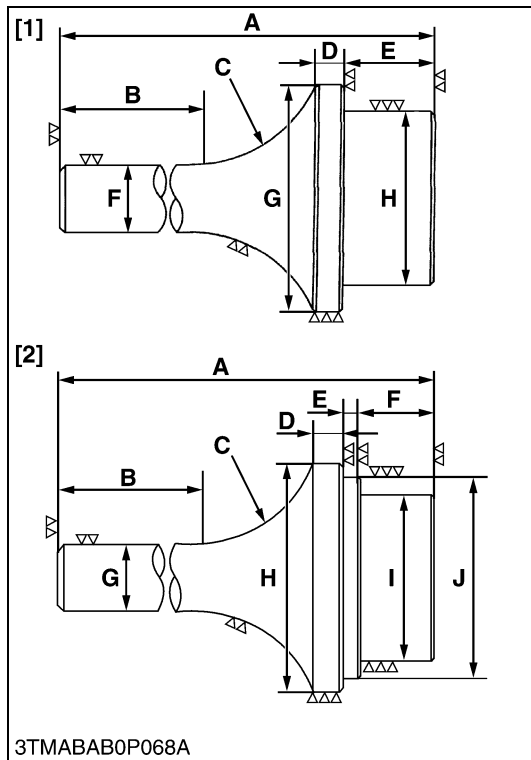


Flywheel Stopper

Application: Use to loosen and tighten the flywheel screw.

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

W10259480



Crankshaft Bearing 1 Replacing Tool

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

1. Extracting tool

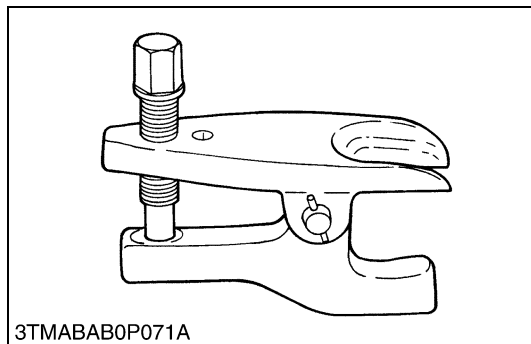
A	135 mm (5.31 in.)
B	72 mm (2.83 in.)
C	R40 mm (R1.57 in.)
D	10 mm (0.39 in.)
E	20 mm (0.79 in.)
F	20 mm dia. (0.79 in. dia.)
G	56.8 to 56.9 mm dia. (2.236 to 2.240 in. dia.)
H	51.8 to 51.9 mm dia. (2.039 to 2.043 in. dia.)

2. Inserting tool

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

W10261390

[2] SPECIAL TOOLS FOR TRACTOR

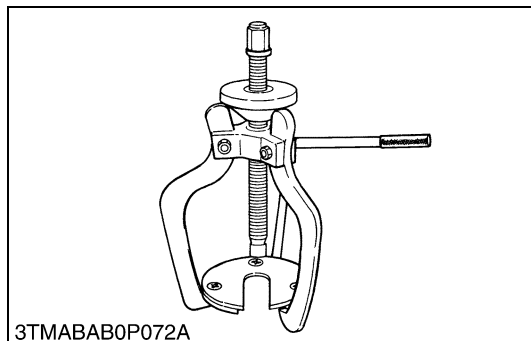


Tie-rod End Lifter

Code No.: 07909-39051

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

W10264720

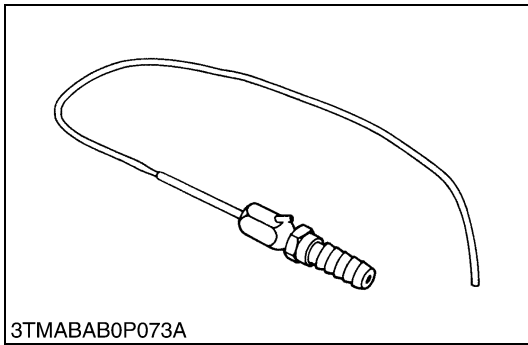


Steering Wheel Puller

Code No.: 07916-51090

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

W10265330



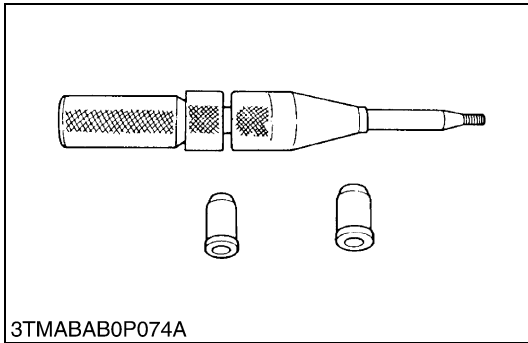
3TMABAB0P073A

Injector CH3

Code No.: 07916-52501

Application: Use for injecting calcium chloride solution into, and removing it from, rear and 4WD type front wheel tires.

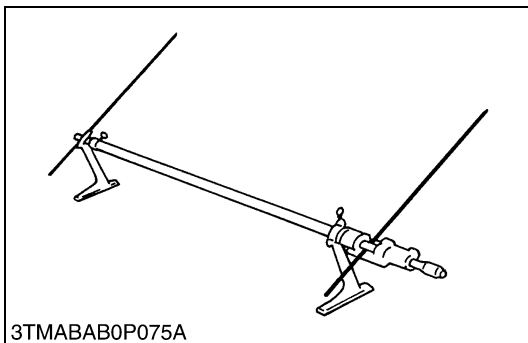
W10265850



3TMABAB0P074A

Clutch Center Tool (For B and L Series Tractors)Application: The clutch center tool can be used for all **B** and **L** series tractors with a diaphragm clutch by changing tip guides. Center piece diameter is 20 mm (0.79 in.).

W10642960



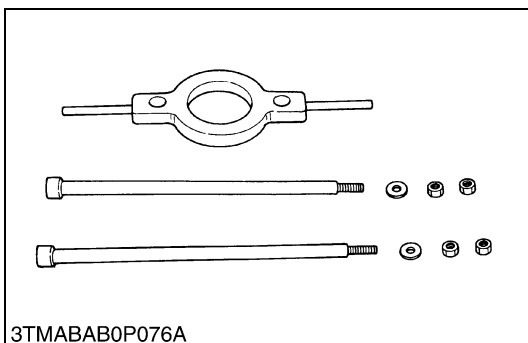
3TMABAB0P075A

Toe-in Gauge

Code No.: 07909-31681

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

W10266890



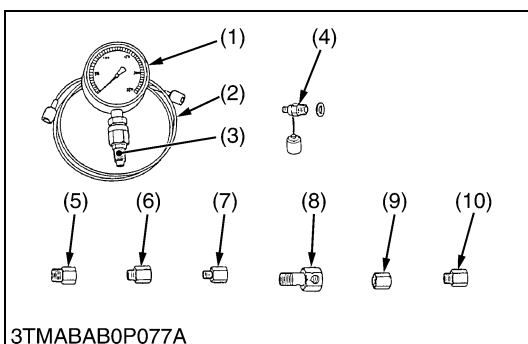
3TMABAB0P076A

Rear Axle Cover Puller

Code No.: 07916-51041

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

W10732590



3TMABAB0P077A

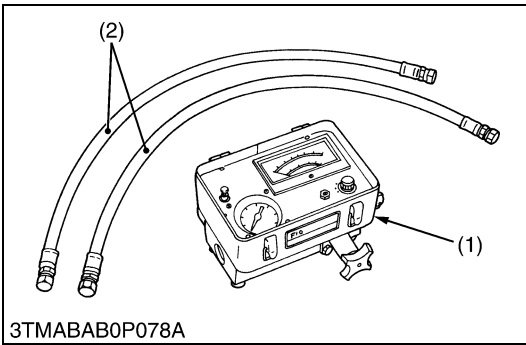
Relief Valve Pressure Tester

Code No.: 07916-50045

Application: This allows easy measurement of relief set pressure.

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

W10267410

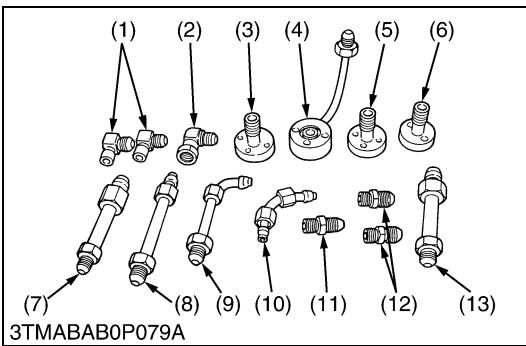
**Flow Meter**

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

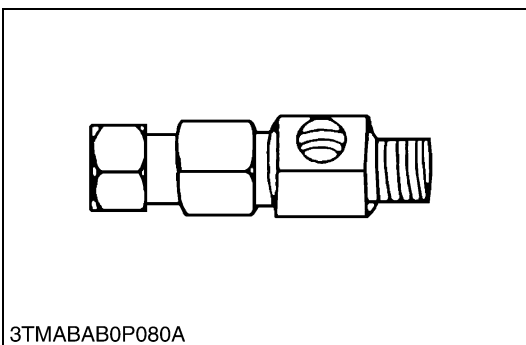
**Adaptor Set for Flow Meter**

Code No.: 07916-54031

Application: Use for testing the hydraulic system.

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

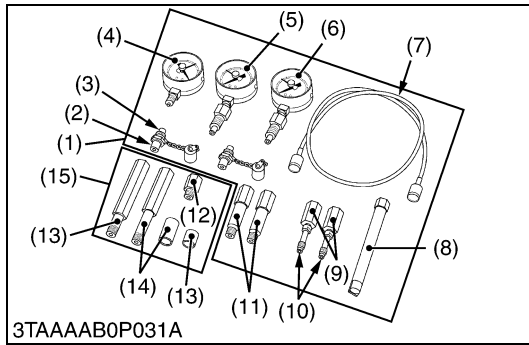
W10313960

**Power Steering Adaptor**

Code No.: 07916-54021

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

W10442870



Hydrostatic Transmission Tester and HST Adaptor Set

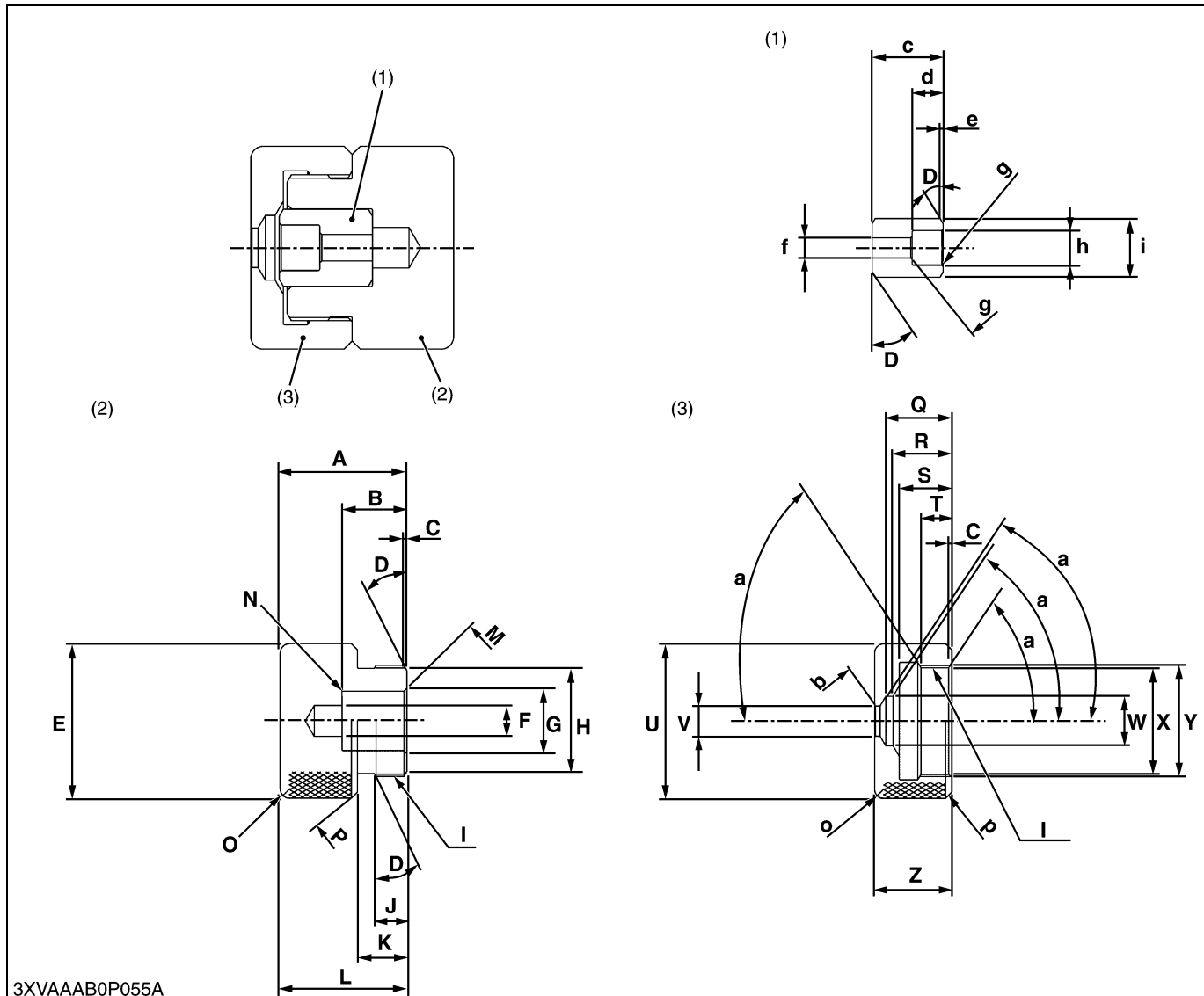
Code No.: 07916-52040 (Hydrostatic Transmission Tester)
07916-53072 (HST Adaptor Set)

Application: This allows easy measurement of hydrostatic transmission pressure.

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

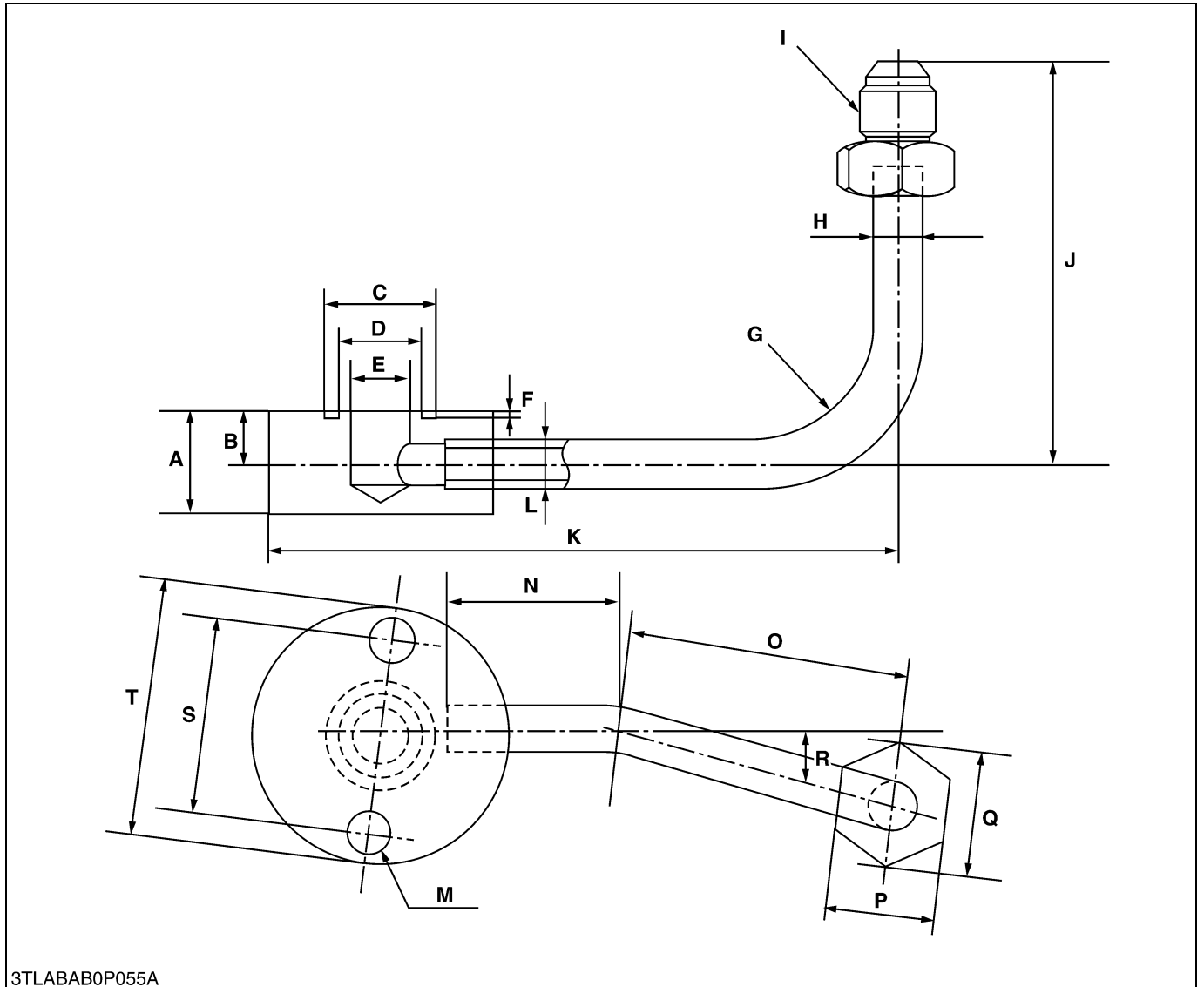
W10650730

Check and High Pressure Relief Valve Assembly Tool



Application : Use for Readjusting relief valve pressure.

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

Pump Adaptor

3TLABAB0P055A

Application : Use for checking the main hydraulic pump.

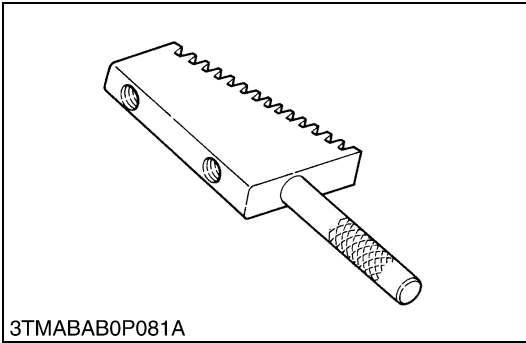
NOTE

- When using, attach with following parts.
O-ring : 04811-00180
- This adaptor is modified from Adaptor 61 of flowmeter adaptor set. (See page G-37.)

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

(Reference)

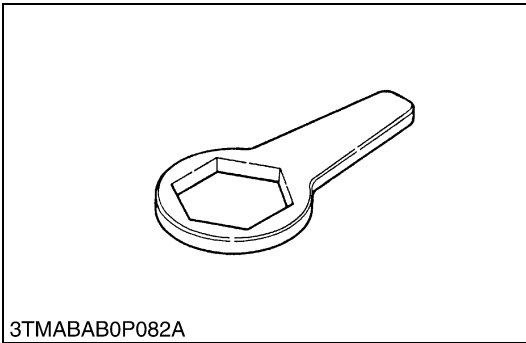
- From size A to size R are same size as adaptor 61.

**Pinion Locking Tool**

Code No.: 07916-52311

Application: Use for preventing the shaft from turning when removing or tighten a bevel pinion shaft staking nut.

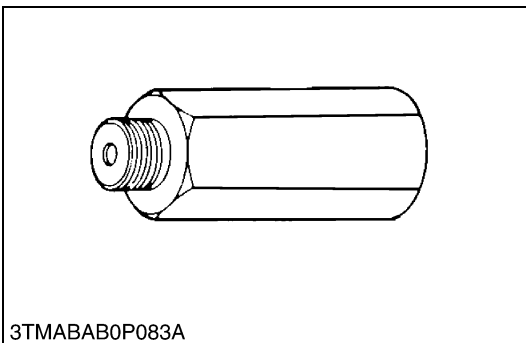
W10445520

**Rear Axle Nut Wrench 71**

Code No.: 07916-52531

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

W10655900

**Relief Valve Setting Pressure Adaptor G**

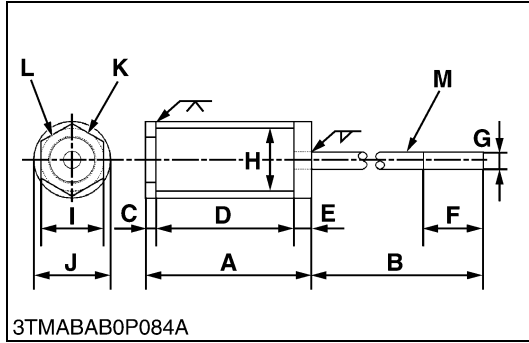
Code No.: 07916-52751

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

W10656670

■ **NOTE**

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

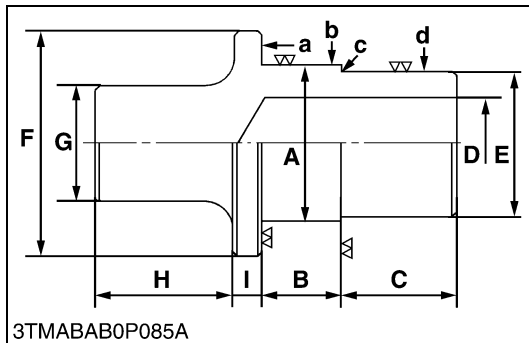


Pinion Shaft Remover

Application: Use for removing a pinion shaft.

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

W10315930

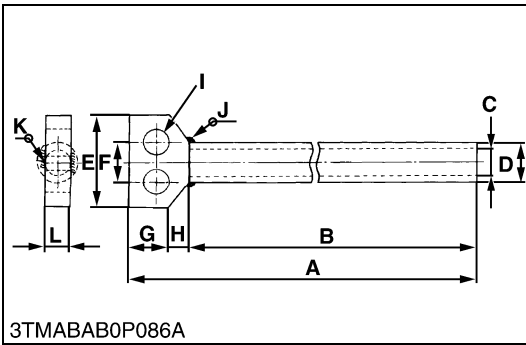


Hydraulic Arm Shaft Bushing Press-Fitting Tool

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

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

W10316550



Draft Control Test Bar

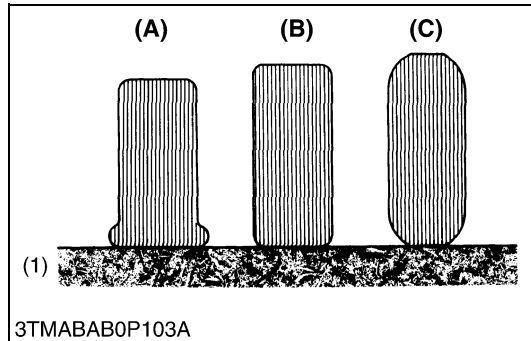
Application: Use for checking the lift range and floating range of hydraulic draft control.

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

W10642280

9. TIRES

[1] TIRE PRESSURE



Though the tire pressure is factory-set to the prescribed level, it naturally drops slowly in the course of time. Thus, check it everyday and inflate as necessary. To inflate the wheel tires, use an air compressor or hand pump.

- **Recommended inflation pressure**
Maintain the pressure shown below.

	Tire sizes	Inflation Pressure
Rear	11.2-24, 4PR	100 kPa (1.0 kgf/cm ² , 14 psi)
	13.6-16, 4PR	100 kPa (1.0 kgf/cm ² , 14 psi)
	15-19.5, 6PR	210 kPa (2.1 kgf/cm ² , 30 psi)
Front	5.00-15, 4PR	220 kPa (2.2 kgf/cm ² , 32 psi)
	7-16, 6PR	250 kPa (2.5 kgf/cm ² , 36 psi)
	23 x 8.50-12, 4PR	160 kPa (1.6 kgf/cm ² , 23 psi)
	25 x 8.50-14, 6PR	160 kPa (1.6 kgf/cm ² , 23 psi)
	27 x 8.50-15, 6PR	210 kPa (2.1 kgf/cm ² , 30 psi)

⚠ CAUTION

- Do not attempt to mount a tire. This should be done by a qualified person with the proper equipment. Qualified person with the proper tire mounting equipment should recognize the following warning.

■ IMPORTANT

- Never exceed 241 kPa (2.5 kgf/cm², 35 psi) when attempting to seat a bead. If beads have not been seated by the time the pressure reached 241 kPa (2.5 kgf/cm², 35 psi), deflate the assembly, reposition the tire on the rim, relubricate and reinflate. After seating the bead, adjust inflation pressure as recommended in the inflation pressure chart.

(1) Ground

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

W10440050

[2] TREADS ADJUSTMENT

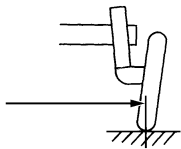
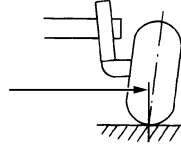
CAUTION

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

(1) Front Wheel

Front Wheels (with two wheel drive)

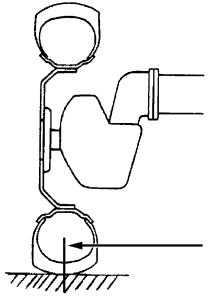
Front tread can not be adjusted.

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

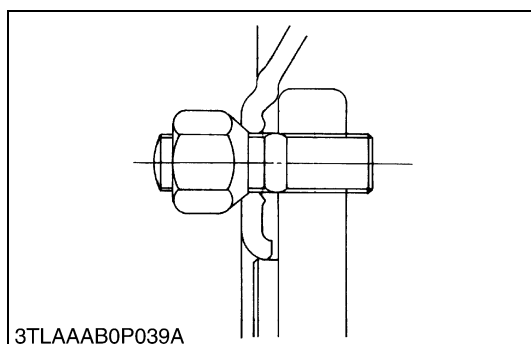
W1051180

Front Wheels (with four wheel drive)

Front tread can not be adjusted.

 3TMABAB0P095A	Tire	7-16 Farm	27 × 8.5-15 Turf	25 × 8.5-14 IND*
	Tread	1095 mm (43.1 in.)	1115 mm (43.9 in.)	1105 mm (43.5 in.)

*IND : for Industrial



(2) Rear Wheels

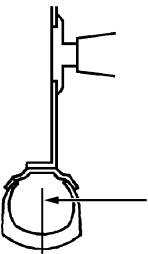
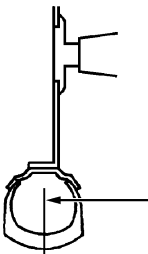
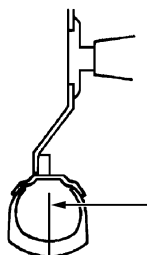
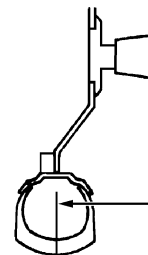
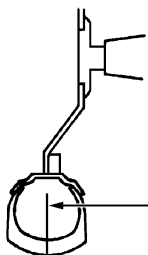
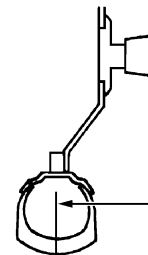
Rear tread can be adjusted in 6 steps depending on the model.

To change the tread

1. Lift the rear tires off the ground.
2. Follow the illustrations below to get the desired tread width.

■ IMPORTANT

- If not attached as illustrated, transmission parts may be damaged.
- When re-fitting or adjusting a wheel, tighten the bolts to the specified torques then recheck after driving the tractor 200 m (200 yards) and thereafter according to service interval.

15-19.5 Industry		13.6-16 Turf	
			
3TMABAB0P101A		3TMABAB0P101A	
1145 mm (45.1 in.)		1115 mm (43.9 in.)	
11.2-24 Farm			
			
3TMABAB0P097A	3TMABAB0P098A	3TMABAB0P099A	3TMABAB0P100A
1020 mm (40.2 in.)	1115 mm (43.8 in.)	1195 mm (47.1 in.)	1290 mm (50.8 in.)

W1052721

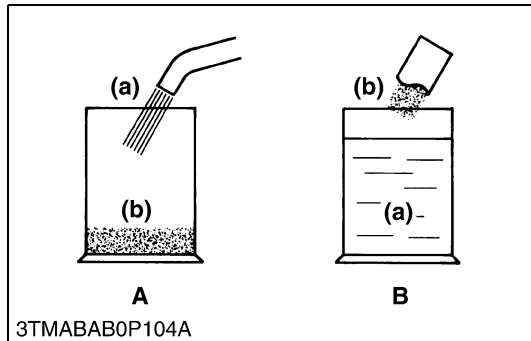
[3] TIRE LIQUID INJECTION

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

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

■ IMPORTANT

- Do not fill the front tires with liquid.



Preparation of Calcium Chloride Solution

⚠ CAUTION

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

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

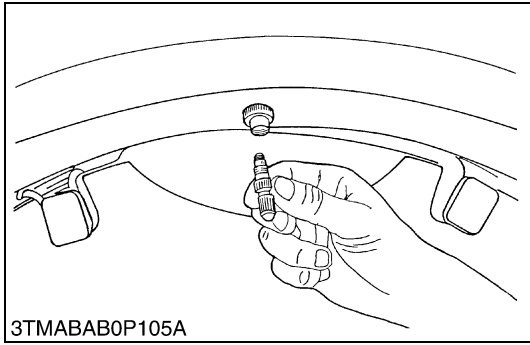
(a) Water

(b) CaCl₂ (Calcium Chloride)

A : Bad

B : Good

W10330830



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

W10333310

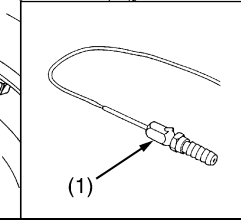
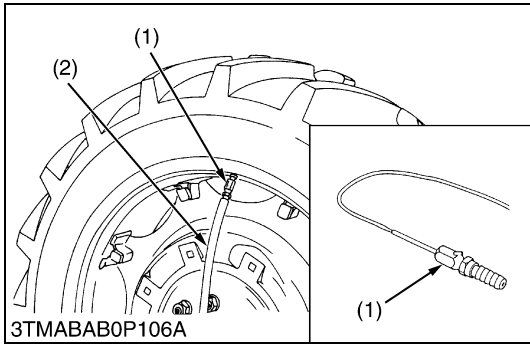


Fig. 1

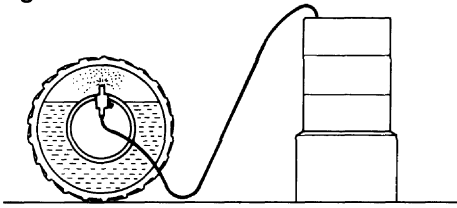


Fig. 2

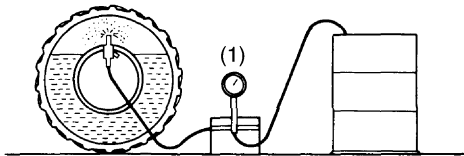
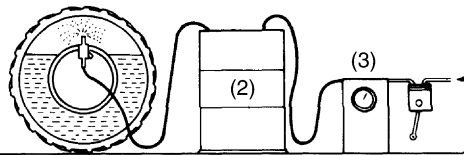
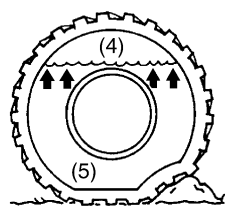


Fig. 3

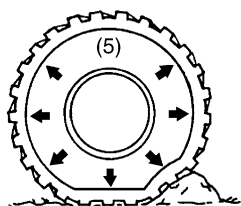


3TMABAB0P111A

(A)



(B)



3TMABAB0P107A

Injection

⚠ CAUTION

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

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

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

■ NOTE

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

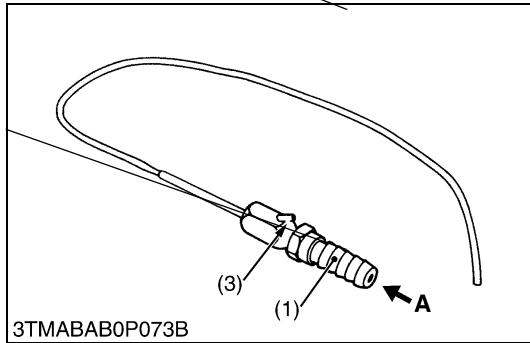
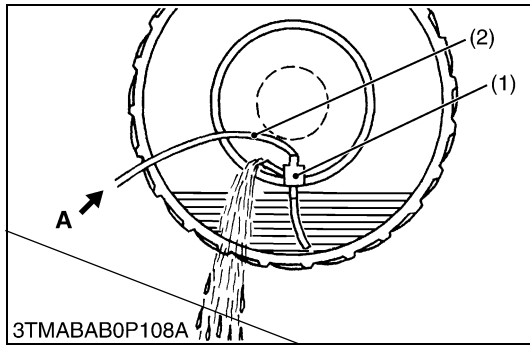
Weight of Calcium Chloride Solution Filling 75 % of Full Capacity of a Tire

Tire sizes	11.2-24	15-19.5
Slush free at -10°C (14°F) Solid at -30°C (-22°F) [Approx. 1 kg (2 lbs.) CaCl ₂ per 4 L (1 gal.) of water]	103 kg (227 lbs)	140 kg (309 lbs)
Slush free at -24°C (-11°F) Solid at -47°C (-53°F) [Approx. 1.5 kg (3.5 lbs.) CaCl ₂ per 4 L (1 gal.) of water]	108 kg (237 lbs)	150 kg (331 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]	115 kg (253 lbs)	160 kg (353 lbs)

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

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

W10334350



Draining Water or Solution

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

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

A : Compressed Air

W10451670

[4] IMPLEMENT LIMITATIONS

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

	Tread (max. width)			Lower link end max. loading weight W_0
	Front		Rear	
	2WD	4WD		
L2800	1050 mm (41.3 in.)	1095 mm (43.1 in.)	1290 mm (50.8 in.)	900 kg (1985 lbs)
L3400				

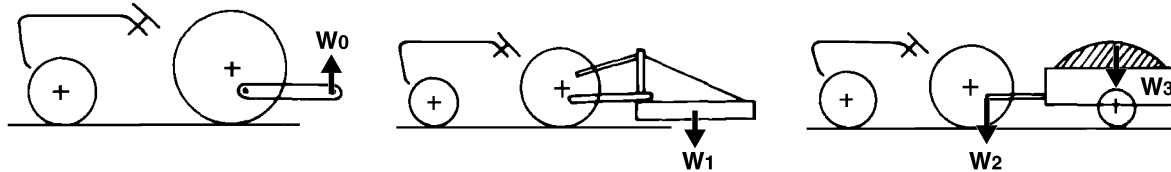
	Actual figures		
	Implement weight W_1 and / or size	Max. Drawbar Load W_2	Trailer loading weight W_3 Max. capacity
L2800 L3400	Refer to page G-63.	330 kg (730 lbs)	1000 kg (2200 lbs)

Lower link end max. hydraulic lift capacity W_0

Implement weight.....The implement's weight which can be put on the link : W_1

Max. drawbar load W_2

Trailer loading weightThe max. loading weight for trailer (without trailer's weight) : W_3



3TMABAB0P109A

■ NOTE

- Implement size may vary depending on soil operating conditions.

No.	Implement		Remarks	L2800	L3400
1	Trailer		Max. Load Capacity	1000 kg (2200 lbs)	
			Max. Drawbar Load	330 kg (730 lbs)	
2	Mower	Rotary-cutter	Max. Cutting Width	1829 mm (72 in.)	
			Max. Weight	350 kg (770 lbs)	
		Flail Mower	Max. Cutting Width	1270 mm (50 in.)	
			Max. Weight	350 kg (770 lbs)	
	Sickle Bar	Max. Cutting Width	1829 mm (72 in.)		
		Max. Weight	400 kg (880 lbs)		
3	Sprayer	Rear Mounted	Max. Tank-capacity	300 L (80 U.S.gals, 66 Imp.gals)	
		Pull Type	Max. Tank-capacity	800 L (210 U.S.gals, 176 Imp.gals)	
4	Rotary Tiller		Max. Tilling Width	1370 mm (54 in.)	
5	Bottom Plow		Max. Size	12 in. × 2, 16 in. × 1	
6	Disc-harrow : Pull Type		Max. Harrowing Width	1524 mm (60 in.)	
			Max. Weight	300 kg (660 lbs)	
7	Chisel Plow		Max. Width	1829 mm (72 in.)	
			Max. Weight	350 kg (770 lbs)	
8	Broad Caster		Max. Tank-capacity	200 L (53 U.S.gals, 44 Imp.gals)	
			Max. Weight	100 kg (220 lbs)	
9	Manure Spreader		Max. Capacity	1000 kg (2200 lbs)	
10	Cultivator		Max. Width	1524 mm (60 in.)	
			Number of Rows	1	
			Max. Weight	250 kg (550 lbs)	
11	Front Loader		Max. Cutting Width	1829 mm (72 in.)	
			Max. Oil Pressure	15.9 MPa (162 kgf/cm ² , 2311 psi)	
			Sub Frame	Necessary	
12	Rear Blade		Max. Cutting Width	1829 mm (72 in.)	
			Max. Oil Pressure	15.9 MPa (162 kgf/cm ² , 2311 psi)	
13	Front-end Loader		Max. Lifting Capacity	460 kg (1014 lbs)	
			Max. Oil Pressure	15.9 MPa (162 kgf/cm ² , 2311 psi)	
			Sub Frame	Not necessary	
14	Box Blade		Max. Cutting Width	1321 mm (52 in.)	
			Max. Weight	315 kg (694 lbs)	
15	Back Hoe		Max. Digging Depth	2288 mm (90 in.)	
			Max. Weight	420 kg (926 lbs)	
			Sub Frame	Necessary	
16	Snow Blade		Max. width	1524 mm (60 in.)	
			Max. weight	300 kg (600 lbs)	
17	Snow Blower		Max. working width	1524 mm (60 in.)	
			Max. weight	250 kg (550 lbs)	

■ **NOTE**

- Implement size may vary depending on soil operating conditions.

W1012736

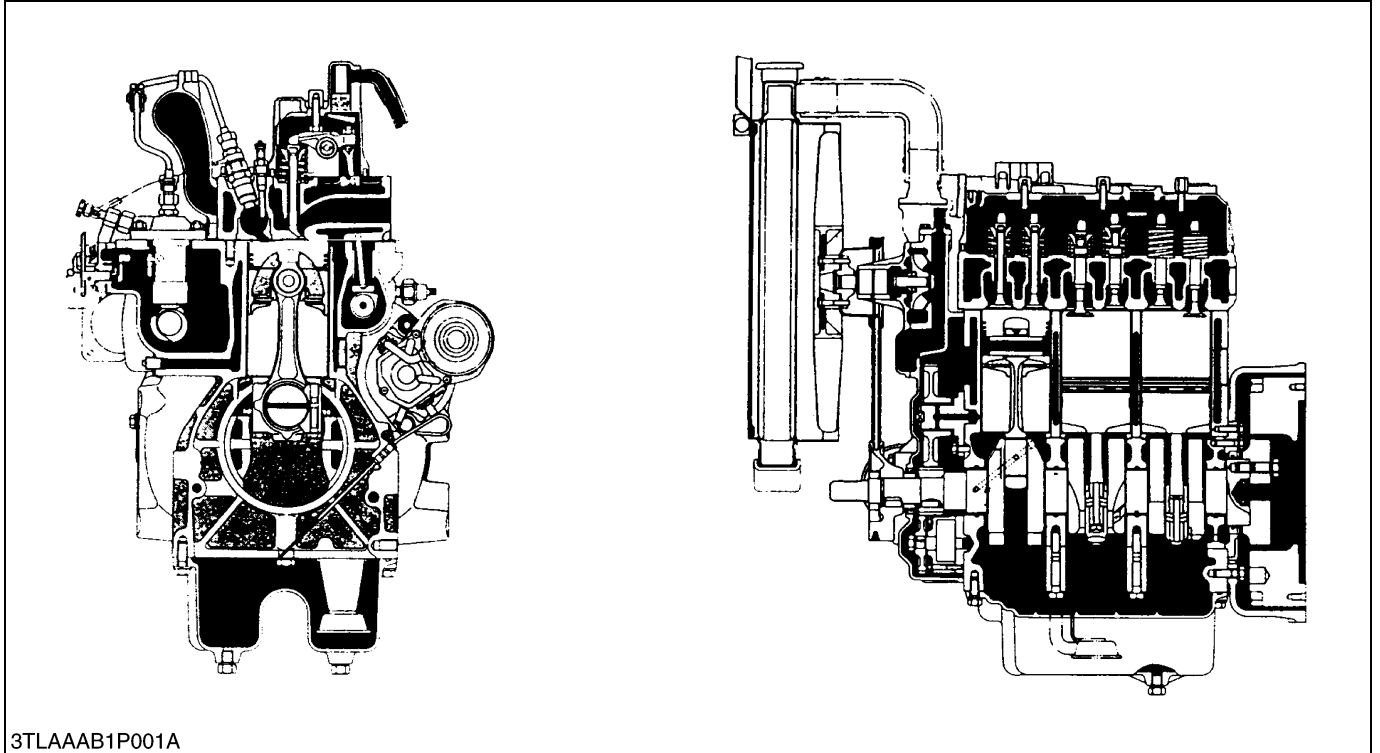
1 ENGINE

MECHANISM

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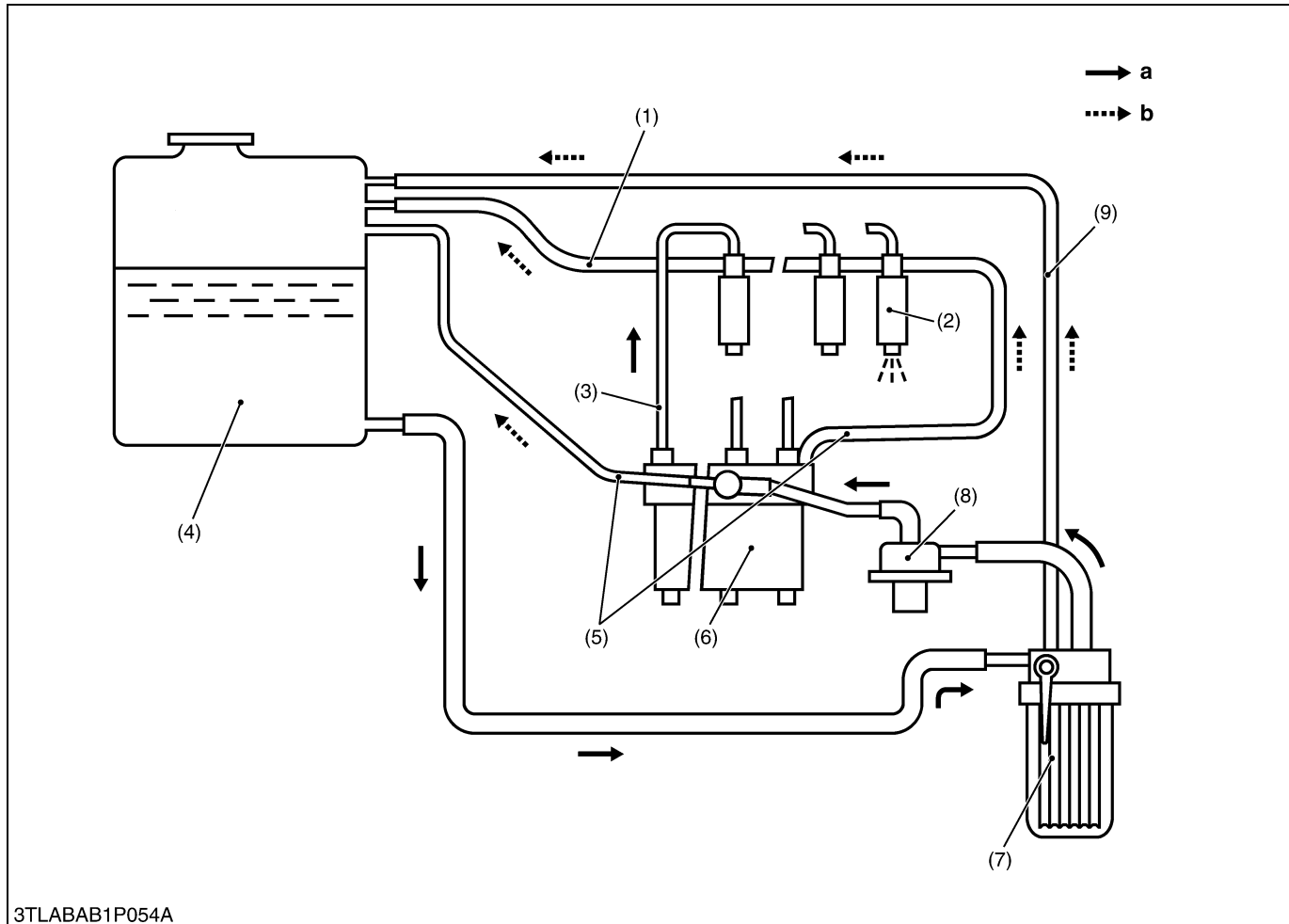
1. FEATURES	1-M1
2. FUEL SYSTEM	1-M2
3. LUBRICATING SYSTEM	1-M3
4. COOLING SYSTEM	1-M4

1. FEATURES



The D1503-MA-E, D1703-MA-E are vertical, water-cooled, 4 cycle diesel engines. This is incorporated KUBOTA's foremost technologies. With KUBOTA's E-TVCS (Three Vortex Combustion System), well-known Bosch type injection pump and the well-balanced designs, they give greater power, low fuel consumption, little vibration and quiet operation.

2. FUEL SYSTEM



- | | | | |
|------------------------|----------------------------------|-------------------------------|-------------------------------|
| (1) Fuel Overflow Pipe | (4) Fuel Tank | (7) Fuel Filter | a : Injected Fuel Flow |
| (2) Injection Nozzle | (5) Injection Pump Air Vent Pipe | (8) Fuel Feed Pump | b : Returned Fuel Flow |
| (3) Injection Pipe | (6) Injection Pump | (9) Fuel Filter Air Vent Pipe | |

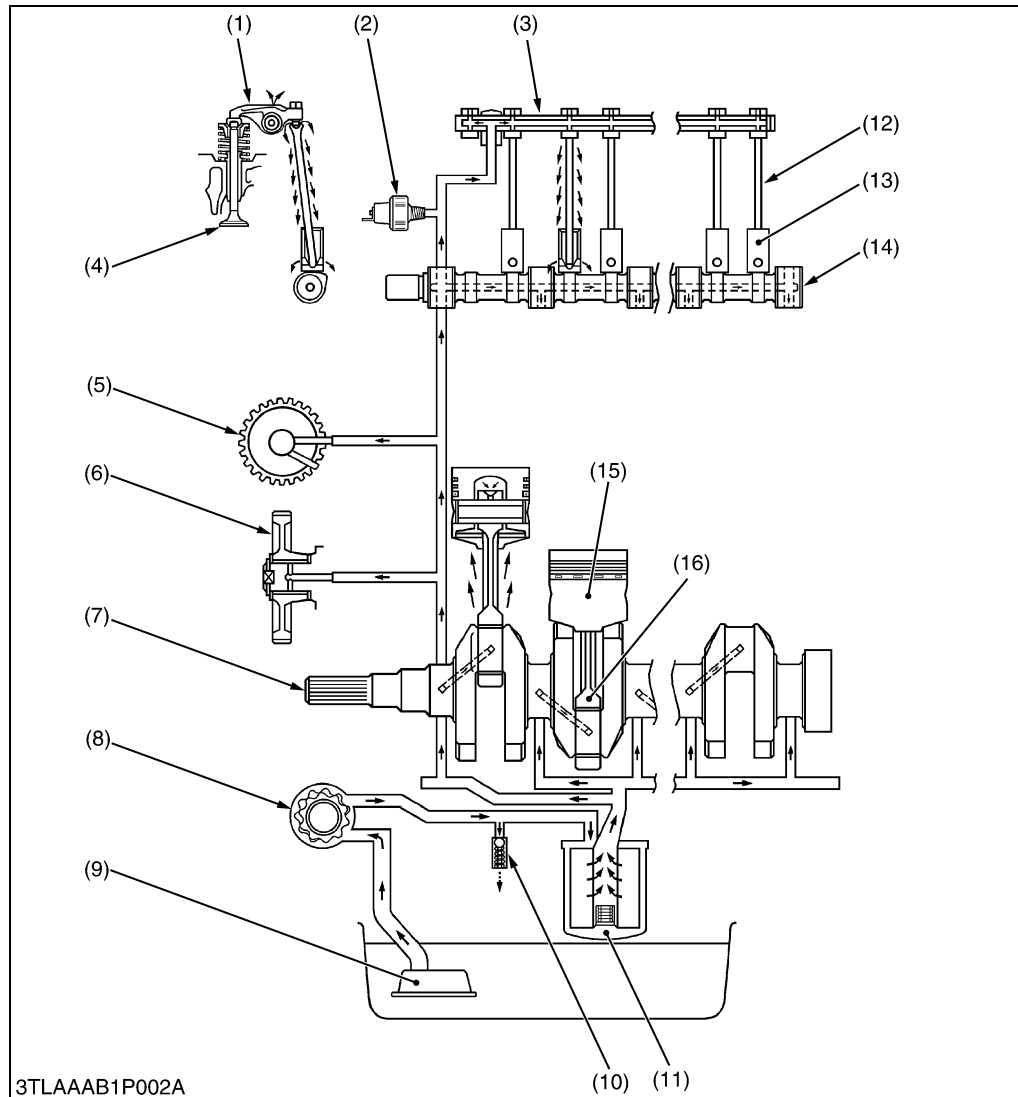
The fuel system of this tractor is shown in the diagram above.

Fuel from the tank flows in the passage as shown by the arrows, and is injected from the nozzle via the fuel injection pump. Overflow fuel returns to the tank.

The system includes filters and other concerns to protect it from entrance of air, water and dust.

While the engine is running, fuel is fed into the injection pump (6) by the fuel feed pump (8) after passing through the fuel filter (7). The fuel camshaft actuates the injection pump and force-feeds fuel to the injection nozzle (2) through the injection pipe (3). Fuel is then sprayed through the nozzle into the combustion chamber. The fuel discharged after lubricating and cooling the injection nozzle is returned to the fuel tank (4) automatically through the overflow pipe (1).

3. LUBRICATING SYSTEM



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

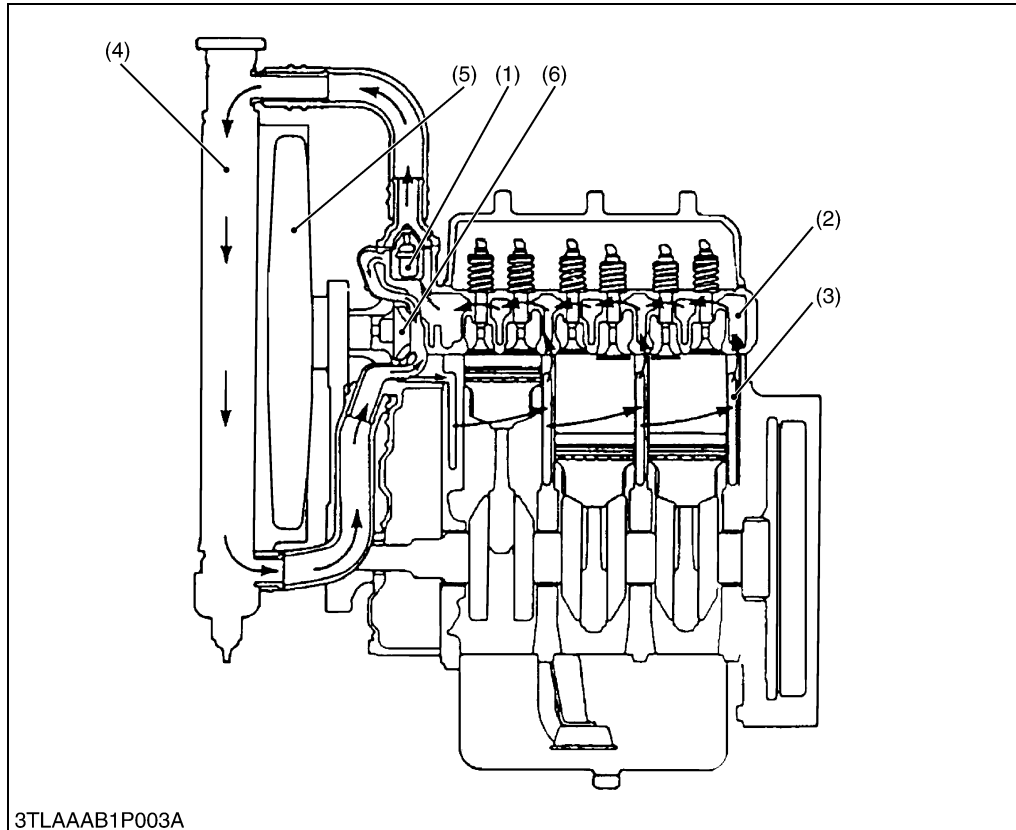
W1012968

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A lubricating system consists of an oil strainer (9), oil pump (8), relief valve (10), oil filter cartridge (11) and oil pressure switch (2).

The oil pump sucks lubricating oil from the oil pan through the oil strainer and the oil flows down to the oil filter cartridge where it is further filtered. Then the oil is forced to crankshaft (7), connecting rods (16), idle gear (6), governor shaft (5), camshaft (14) and rocker arm shaft (3) to lubricate each part through the oil gallery.

4. COOLING SYSTEM



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

W1013306

3TLAAB1P003A

The cooling system consists of a radiator (4), a centrifugal water pump (6), a cooling fan (5) and a thermostat (1). The water is cooled as it flows through the radiator core, and the cooling air through the radiator core by cooling fan. The water pump receives water from the radiator or from the cylinder head and force it into the cylinder block.

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

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

SERVICING

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(5) Cylinder.....	1-S59
(6) Oil Pump	1-S61

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	–
	Air in the fuel system	Bleed	G-38
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel pipe clogged	Clean	–
	Fuel filter clogged	Change	G-26
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-7, 14
	Fuel with low cetane number	Use specified fuel	G-7
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S25
	Incorrect injection timing	Adjust	1-S17
	Fuel camshaft worn	Replace	1-S33
	Injection nozzle clogged	Clean	1-S40
	Injection pump malfunctioning	Replace	1-S29
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	–
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S11
	Improper valve timing	Correct or replace timing gear	1-S32
	Piston ring and cylinder worn	Replace	1-S35, S36
Excessive valve clearance	Adjust	1-S12	
Starter Does Not Run	Battery discharged	Charge	G-29
	Starter malfunctioning	Repair or replace	G-22, 23, 9-S22
	Main switch malfunctioning	Repair or replace	9-S9
	Safety switches malfunctioning	Adjust or replace	9-S10
	Wiring disconnected	Connect	–
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-26
	Air cleaner clogged	Clean or replace	G-25
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S25
	Injection pump malfunctioning	Repair or replace	1-S29
	Incorrect nozzle injection pressure	Adjust	1-S18, S40
	Injection nozzle stuck or clogged	Repair or replace	1-S18, S40
	Governor malfunctioning	Repair	1-S33

W1014322

Symptom	Probable Cause	Solution	Reference Page
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to specified level	G-14
	Piston ring and cylinder worn or stuck	Repair or replace	1-S35, S36, S51
	Incorrect injection timing	Adjust	1-S17
	Deficient compression	Adjust top clearance	1-S13
Either Black or Dark Gray Exhaust Gas Is Observed	Overload	Reduce the load	–
	Low grade fuel used	Use specified fuel	G-7
	Fuel filter clogged	Replace	G-26
	Air cleaner clogged	Clean or replace	G-25
	Deficient nozzle injection	Repair or replace nozzle	1-S18, S40
Deficient Output	Incorrect injection timing	Adjust	1-S17
	Engine's moving parts seem to be seizing	Repair or replace	–
	Uneven fuel injection	Replace injection pump	1-S29
	Deficient nozzle injection	Repair or replace nozzle	1-S18, S40
	Compression leak	Replace head gasket, tighten cylinder head screws, glow plug and nozzle holder	1-S11
Excessive Lubricant Oil Consumption	Piston ring's gap facing the same direction	Shift ring gap direction	1-S35
	Oil ring worn or stuck	Replace	1-S35, S36, S51
	Piston ring groove worn	Replace piston	1-S35, S36, S51
	Valve stem and valve guide worn	Replace	1-S43
	Oil leaking due to defective seals or packing	Replace	–

W1014322

Symptom	Probable Cause	Solution	Reference Page
Fuel Mixed into Lubricant Oil	Injection pump's plunger worn	Repair or replace	1-S29
	Deficient nozzle injection	Repair or replace nozzle	1-S18, S40
	Injection pump broken	Replace	1-S29
Water Mixed into Lubricant Oil	Head gasket defective	Replace	–
	Cylinder block or cylinder head flawed	Replace	–
Low Oil Pressure	Engine oil insufficient	Replenish	G-14
	Oil filter clogged	Clean	G-14
	Relief valve stuck with dirt	Clean	–
	Relief valve spring weaken or broken	Replace	–
	Excessive oil clearance of crankshaft bearing	Replace	1-S55
	Excessive oil clearance of crankpin bearing	Replace	1-S54
	Excessive oil clearance of rocker arm	Replace	1-S27
	Oil passage clogged	Clean	–
	Different type of oil	Use specified type of oil	G-7
	Oil pump defective	Repair or replace	1-S33, S61
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-14
	Fan belt broken or elongated	Replace or adjust	G-26, 1-S14
	Coolant insufficient	Replenish	G-7
	Radiator net and radiator fin clogged with dust	Clean	–
	Inside of radiator corroded	Clean or replace	–
	Coolant flow route corroded	Clean or replace	–
	Radiator cap defective	Replace	1-S16
	Overload running	Loosen load	–
	Head gasket defective	Replace	–
	Incorrect injection timing	Adjust	1-S17
	Unsuitable fuel used	Use specified fuel	G-7

W1014322

2. SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Cylinder Head Surface	Flatness	–	0.05 mm / 500 mm 0.0020 in. / 19.69 in.
Compression Pressure (When Cranking with Starting Motor)		3.53 to 4.02 MPa / 290 min ⁻¹ (rpm) 36 to 41 kgf/cm ² / 250 min ⁻¹ (rpm) 512 to 583 psi / 290 min ⁻¹ (rpm)	2.55 MPa / 290 min ⁻¹ (rpm) 26 kgf/cm ² / 290 min ⁻¹ (rpm) 370 psi / 290 min ⁻¹ (rpm)
Difference among Cylinders		–	10 % or less
Top Clearance		0.55 to 0.70 mm 0.0217 to 0.0276 in.	–
Valve Clearance (When Cold)		0.18 to 0.22 mm 0.0071 to 0.0087 in.	–
Valve Seat	Width (Intake)	2.12 mm 0.0835 in.	–
	Width (Exhaust)	2.12 mm 0.0835 in.	–
Valve Seat	Angle (Intake)	1.047 rad 60 °	–
	Angle (Exhaust)	0.785 rad 45 °	–
Valve Face	Angle (Intake)	1.047 rad 60 °	–
	Angle (Exhaust)	0.785 rad 45 °	–
Valve Stem to Valve Guide	Clearance	0.040 to 0.070 mm 0.00157 to 0.00276 in.	0.1 mm 0.0039 in.
Valve Stem	O.D.	7.960 to 7.975 mm 0.31339 to 0.31398 in.	–
Valve Guide	I.D.	8.015 to 8.030 mm 0.31555 to 0.31614 in.	–
Valve Recessing	Protrusion	0.05 mm 0.0020 in.	–
	Recessing	0.15 mm 0.0059 in.	0.4 mm 0.0157 in.

W1013874

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Valve Timing (Intake Valve) [D1403-M] [D1703-M]	Open	0.14 rad (8 °) before T.D.C.	—
	Close	0.35 rad (20 °) after B.D.C.	—
	Open	0.21 rad (12 °) before T.D.C.	—
	Close	0.63 rad (36 °) after B.D.C.	—
Valve Timing (Exhaust Valve) [D1403-M] [D1703-M]	Open	1.05 rad (60 °) before B.D.C.	—
	Close	0.21 rad (12 °) after T.D.C.	—
	Open	1.00 rad (57 °) before B.D.C.	—
	Close	0.21 rad (12 °) after T.D.C.	—
Valve Spring	Free Length	41.7 to 42.2 mm 1.6417 to 1.6614 in.	41.2 mm 1.6220 in.
	Setting Load / Setting Length	117.6 N / 35.0 mm 12.0 kgf / 35.0 mm 26.4 lbs / 1.3780 in.	100.0 N / 35.0 mm 10.2 kgf / 35.0 mm 22.5 lbs / 1.3780 in.
	Squareness	—	1.0 mm 0.039 in.
Rocker Arm Shaft to Rocker Arm	Clearance	0.016 to 0.045 mm 0.00063 to 0.00177 in.	0.1 mm 0.0039 in.
	Rocker Arm Shaft O.D.	13.973 to 13.984 mm 0.55012 to 0.55055 in.	—
	Rocker Arm I.D.	14.000 to 14.018 mm 0.55118 to 0.55189 in.	—
Push Rod	Alignment	—	0.25 mm 0.0098 in.
Tappet to Tappet Guide	Clearance	0.020 to 0.062 mm 0.00079 to 0.00244 in.	0.07 mm 0.0028 in.
	Tappet O.D.	23.959 to 23.980 mm 0.94327 to 0.94410 in.	—
	Tappet Guide I.D.	24.000 to 24.021 mm 0.94488 to 0.94571 in.	—

W1013874

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Timing Gear Crank Gear to Idle Gear	Backlash	0.0415 to 0.1122 mm 0.00163 to 0.00442 in.	0.15 mm 0.0059 in.
Idle Gear to Cam Gear	Backlash	0.0415 to 0.1154 mm 0.00163 to 0.00454 in.	0.15 mm 0.0059 in.
Idle Gear to Injection Pump Gear	Backlash	0.0415 to 0.1154 mm 0.00163 to 0.00454 in.	0.15 mm 0.0059 in.
Crank Gear to Oil Pump Gear	Backlash	0.0415 to 0.1090 mm 0.00163 to 0.00201 in.	0.15 mm 0.0059 in.
Idle Gear	Side Clearance	0.12 to 0.48 mm 0.0047 to 0.0189 in.	0.9 mm 0.0354 in.
Idle Gear Shaft to Idle Gear Bushing	Clearance	0.025 to 0.066 mm 0.00098 to 0.00260 in.	0.1 mm 0.0039 in.
Idle Gear Shaft	O.D.	37.959 to 37.975 mm 1.49445 to 1.49508 in.	–
Idle Gear Bushing	I.D.	38.000 to 38.025 mm 1.49606 to 1.49704 in.	–
Camshaft	Side Clearance	0.07 to 0.22 mm 0.0028 to 0.0087 in.	0.3 mm 0.0118 in.
Camshaft	Alignment	–	0.01 mm 0.0004 in.
Cam	Height (Intake / Exhaust)	33.90 mm 1.3346 in.	33.85 mm 1.3327 in.
Camshaft Journal to Cylinder Block Bore	Clearance	0.050 to 0.091 mm 0.00197 to 0.00358 in.	0.15 mm 0.0059 in.
Camshaft Journal	O.D.	39.934 to 39.950 mm 1.57221 to 1.57284 in.	–
Cylinder Block Bore	I.D.	40.000 to 40.025 mm 1.57480 to 1.57579 in.	–
Piston Pin Bore	I.D.	25.000 to 25.013 mm 0.98425 to 0.98476 in.	25.05 mm 0.9862 in.
Second Ring to Ring Groove [D1403-M]	Clearance	0.093 to 0.128 mm 0.0037 to 0.0050 in.	0.2 mm 0.0079 in.
[D1703-M]	Clearance	0.093 to 0.128 mm 0.0037 to 0.0050 in.	0.2 mm 0.0079 in.
Oil Ring to Ring Groove	Clearance	0.020 to 0.060 mm 0.0008 to 0.0021 in.	0.15 mm 0.0059 in.
Top Ring [D1403-M]	Ring Gap	0.20 to 0.35 mm 0.0079 to 0.0138 in.	1.25 mm 0.0492 in.
[D1703-M]	Ring Gap	0.20 to 0.40 mm 0.0079 to 0.0157 in.	1.25 mm 0.0492 in.

W1013874

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Second Ring	Ring Gap	0.30 to 0.45 mm 0.0118 to 0.0177 in.	1.25 mm 0.0492 in.
Oil Ring	Ring Gap	0.25 to 0.45 mm 0.0098 to 0.0177 in.	1.25 mm 0.0492 in.
Connecting Rod	Alignment	–	0.05 mm 0.0020 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.	25.002 to 25.011 mm 0.98433 to 0.98468 in.	–
Small End Bushing	I.D.	25.025 to 25.040 mm 0.98523 to 0.98582 in.	–
Crankshaft	Alignment	–	0.02 mm 0.00079 in.
Crankshaft Journal to Crankshaft Bearing 1	Oil Clearance	0.040 to 0.118 mm 0.00157 to 0.00465 in.	0.2 mm 0.0079 in.
Crankshaft Journal [D1403-M, D1703-M]	O.D.	51.921 to 51.940 mm 2.04413 to 2.04488 in.	–
Crankshaft Bearing 1 [D1403-M, D1703-M]	I.D.	51.980 to 52.039 mm 2.04645 to 2.04878 in.	–
Crankshaft Journal to Crankshaft Bearing 2	Oil Clearance	0.040 to 0.104 mm 0.00157 to 0.00409 in.	0.2 mm 0.0079 in.
Crankshaft Journal [D1403-M, D1703-M]	O.D.	51.921 to 51.940 mm 2.04413 to 2.04488 in.	–
Crankshaft Bearing 2 [D1403-M, D1703-M]	I.D.	51.980 to 52.025 mm 2.04645 to 2.04822 in.	–
Crankpin to Crankpin Bearing	Oil Clearance	0.025 to 0.087 mm 0.00098 to 0.00343 in.	0.2 mm 0.0079 in.
Crankpin	O.D.	46.959 to 46.975 mm 1.84878 to 1.84941 in.	–
Crankpin Bearing	I.D.	47.000 to 47.046 mm 1.85039 to 1.85220 in.	–
Crankshaft [D1403-M, D1703-M]	Side Clearance	0.15 to 0.35 mm 0.0059 to 0.0138 in.	0.5 mm 0.0197 in.
Crankshaft Sleeve	Wear	–	0.1 mm 0.0039 in.

W1013874

ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Cylinder Bore [Standard] [D1403-M] [D1703-M] [Oversize] [D1403-M] [D1703-M]	I.D.	80.000 to 80.019 mm 3.14967 to 3.15042 in.	+ 0.15 mm + 0.0059 in.
	I.D.	87.000 to 87.022 mm 3.42519 to 3.42606 in.	+ 0.15 mm + 0.0059 in.
	I.D.	80.250 to 80.272 mm 3.15951 to 3.16038 in.	+ 0.15 mm + 0.0059 in.
	I.D.	87.250 to 87.272 mm 3.43503 to 3.43590 in.	+ 0.15 mm + 0.0059 in.

W1030924

LUBRICATING SYSTEM

Engine Oil Pressure	At Idle Speed	More than 98 kPa 1.0 kgf/cm ² 14 psi	49 kPa 0.5 kgf/cm ² 7 psi
	At Rated Speed	294 to 441 kPa 3.0 to 4.5 kgf/cm ² 43 to 64 psi	245 kPa 2.5 kgf/cm ² 36 psi
Engine Oil Pressure Switch	Working Pressure	49 kPa 0.5 kgf/cm ² 7 psi	–
Inner Rotor to Outer Rotor	Clearance	0.03 to 0.14 mm 0.0012 to 0.0055 in.	0.2 mm 0.0079 in.
Outer Rotor to Pump Body	Clearance	0.11 to 0.19 mm 0.0043 to 0.0075 in.	0.25 mm 0.0098 in.
Inner Rotor to Cover	Clearance	0.105 to 0.150 mm 0.00413 to 0.00591 in.	0.2 mm 0.0079 in.

W1013973

COOLING SYSTEM

Item		Factory Specification	Allowable Limit
Fan Belt	Tension	7.0 to 9.0 mm (0.28 to 0.35 in.) deflection at 98 N (10 kgf, 22 lbs) of force	—
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	Water Tightness	No leak at 137 kPa 1.4 kgf/cm ² 20 psi	—
Radiator Cap	Pressure Falling Time	More than 10 seconds for pressure falling from 88 to 59 kPa from 0.9 to 0.6 kgf/cm ² from 13 to 9 psi	—

W1013874

FUEL SYSTEM

Injection Pump	Injection Timing	0.279 to 0.314 rad (16 to 18 °) before T.D.C.	—
Injection Nozzle	Injection Pressure	13.73 to 14.71 MPa 140 to 150 kgf/cm ² 1991 to 2133 psi	—
Injection Nozzle Valve Seat	Valve Seat Tightness	When the pressure is 12.75 MPa (130 kgf/cm ² , 1849 psi), the valve seat must be fuel tightness.	—

W1013973

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-9.)

Item	Size x Pitch	N-m	kgf-m	ft-lbs
Starter's B terminal mounting nut	M8	7.8 to 9.8	0.8 to 1.0	5.8 to 7.2
Steering wheel mounting nut	M12 × 1.25	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
3P delivery pipe joint bolt	–	49 to 69	5.0 to 7.0	36.1 to 50.6
Power steering delivery pipe joint bolt	–	34 to 39	3.5 to 4.0	25.3 to 28.9
Muffler mounting screw	–	31.4 to 37.2	3.2 to 3.8	23.1 to 27.5
Engine mounting screw	M10 × 1.25	48.1 to 55.8	4.9 to 5.7	35.4 to 41.2
Front axle frame mounting screw to engine	M12 × 1.25	102.9 to 117.6	10.5 to 12.5	76.0 to 86.8
Clutch mounting screw and reamer screw	M8 × 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
* Cylinder head bolt	M11 × 1.25	93.1 to 98.0	9.5 to 10.0	68.7 to 72.3
Cylinder head cover cap nut	M8 × 1.25	6.9 to 11.3	0.7 to 1.15	5.1 to 8.32
Injection pipe retaining nut	M12 × 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Nozzle holder assembly	M20 × 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Overflow pipe assembly retaining nut	–	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Glow plug	M10 × 1.25	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
* Rocker arm bracket nut	M8 × 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
* Crankshaft nut	M30 × 1.5	137.3 to 156.9	14.0 to 16.0	101.3 to 115.7
* Idle gear shaft screw	M8 × 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
* Connecting rod screw	M8 × 1.0	44.1 to 49.0	4.5 to 5.0	32.5 to 36.2
* Flywheel screw	M12 × 1.25	98.0 to 107.8	10.0 to 11.0	72.3 to 79.5
* Main bearing case screw 2	M10 × 1.25	68.6 to 73.5	7.0 to 7.5	50.6 to 54.2
* Main bearing case screw 1	M9 × 1.25	46.1 to 50.9	4.7 to 5.2	34.0 to 37.6
Oil Switch taper screw	PT 1/8	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

■ NOTE

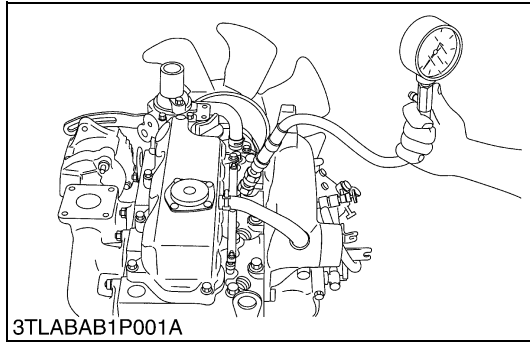
- For “ * “ marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.
- The letter “M” in Size x Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal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

W1013236

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Compression Pressure



Compression Pressure

1. Run the engine until it is warmed up.
2. Stop the engine and disconnect the **2P** connector from the stop solenoid in order to inject fuel.
3. Remove the air cleaner, the muffler and all injection nozzles.
4. Set a compression tester (Code No. 07909-30208) with the adaptor to the nozzle hole.
5. Keep the engine stop lever at "**Stop Position**".
6. While cranking the engine with the starter, measure the compression pressure.
7. Repeat steps 4 through 6 for each cylinder.
8. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the nozzle hole and measure the compression pressure again.
9. If the compression pressure is still less than the allowable limit, check the top clearance, valve and cylinder head.
10. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

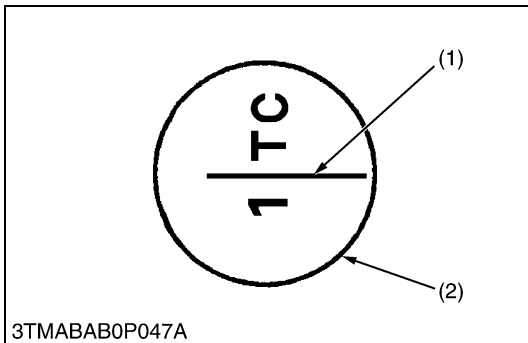
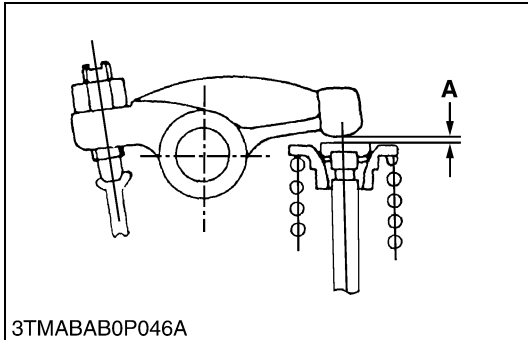
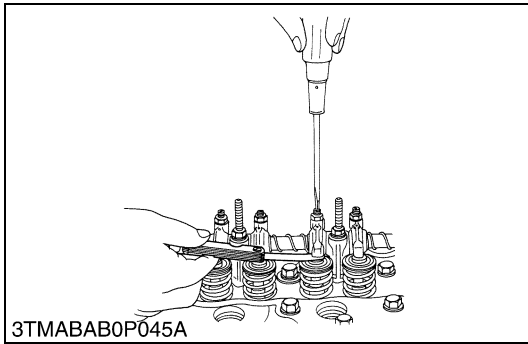
■ NOTE

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

Compression pressure	Factory spec.	3.53 to 4.02 MPa 36 to 41 kgf/cm ² 512 to 583 psi
	Allowable limit	2.55 MPa 26 kgf/cm ² 370 psi

W1080655

(2) Valve Clearance



Valve Clearance

■ 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 or overlap 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.	0.18 to 0.22 mm 0.0071 to 0.0086 in.
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■ 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 is aligned with center of timing window on clutch-housing. 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.

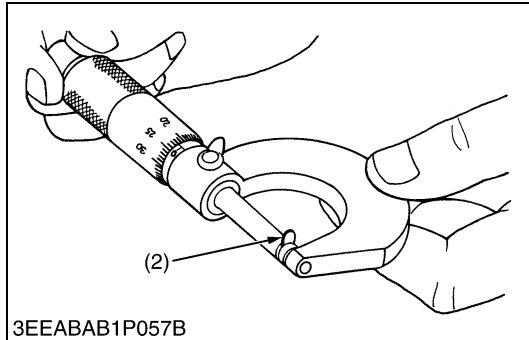
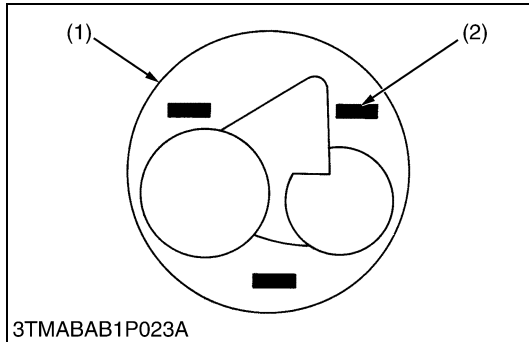
Valve arrangement		D1503-M D1703-M	
		IN.	EX.
Adjustable cylinder location of piston	No. 1	☆	☆
	No. 2		☆
	No. 3	☆	
When No. 1 piston is overlap position	No. 1		
	No. 2	☆	
	No. 3		☆

- (1) TC Mark Line
- (2) Timing Window

A : Valve Clearance

W10113200

(3) Top Clearance



Top Clearance

1. Remove the cylinder head.
2. Move the piston and stick a strip of fuse on the piston head at three positions with grease.
3. Lower the piston and install the cylinder head. (Use a new cylinder head gasket and tighten with a specified tightening torque.)
4. Turn the flywheel until the piston passes through the T.D.C..
5. Remove the cylinder head and measure the thickness of the fuses.
6. If the measurement is not within the factory specifications, check the oil clearance between the crankpin and bearing and between the piston pin and bushing.

■ NOTE

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

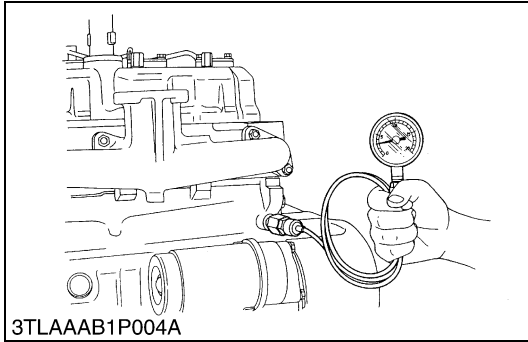
Top clearance	Factory spec.	0.55 to 0.70 mm 0.0217 to 0.0276 in.
Tightening torque	Cylinder head screws	93.1 to 98.0 N·m 9.5 to 10.0 kgf·m 68.7 to 72.3 ft-lbs

(1) Piston

(2) Fuse

W1020190

(4) Engine Oil Pressure



Engine Oil Pressure

1. Remove the engine oil pressure switch, and set an oil pressure tester (Code No. 07916-32032). (Adaptor screw size : PT 1/8).
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 98 kPa 1.0 kgf/cm ² 14 psi
		Allowable limit	49 kPa 0.5 kgf/cm ² 7 psi
	At rated speed	Factory spec.	294 to 441 kPa 3.0 to 4.5 kgf/cm ² 42.7 to 64 psi
		Allowable limit	245 kPa 2.5 kgf/cm ² 36 psi

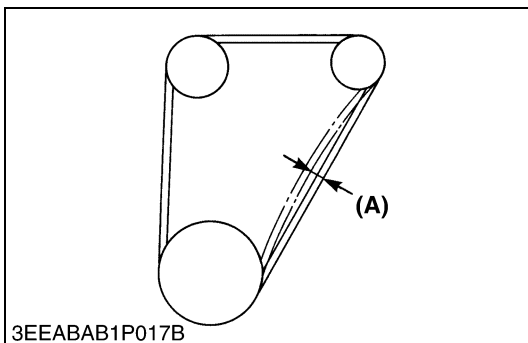
(When reassembling)

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

Tightening torque	Oil pressure switch	14.7 to 19.6 N·m 1.5 to 2.0 kgf·m 10.8 to 14.5 ft-lbs
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W1034952

(5) Fan Belt



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 lbs).
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.	7.0 to 9.0 mm 0.28 to 0.35 in.
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W1035667



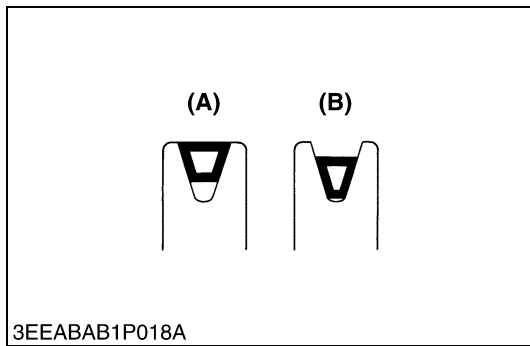
Fan Belt Damage and Wear

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.

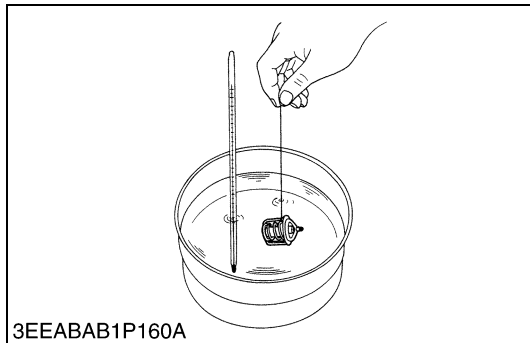
(A) Good

(B) Bad

W1035758



(6) Radiator

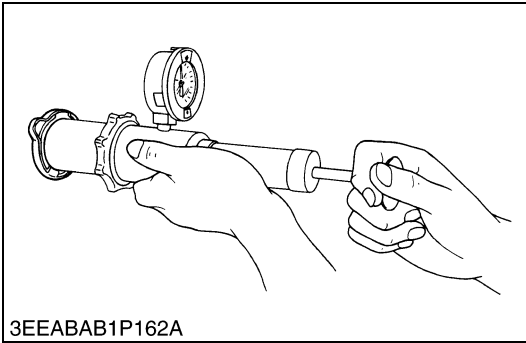


Thermostat Valve Opening Temperature

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. 6 mm (0.236 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

W1035849



Radiator Cap Air Leakage

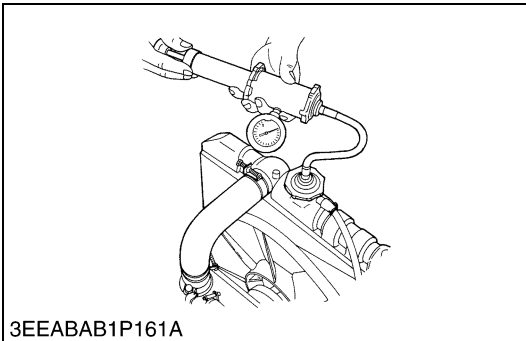
⚠ CAUTION

- 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.

1. Set a radiator tester (Code No. 07909-31551) and an adapter (BANZAI Code No. RCT-2A-30S) on the radiator cap.
2. Apply the specified pressure 88 kPa (0.9 , 13 psi), and measure the time for the pressure to fall to 59 kPa (0.6 kgf/cm², 9 psi).
3. If the measurement is less than the factory specification, replace the radiator cap.

Pressure falling time	Factory spec.	More than 10 seconds for pressure fall from 88 to 59 kPa (from 0.9 to 0.6 kgf/cm ² , from 13 to 9 psi)
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W1054156



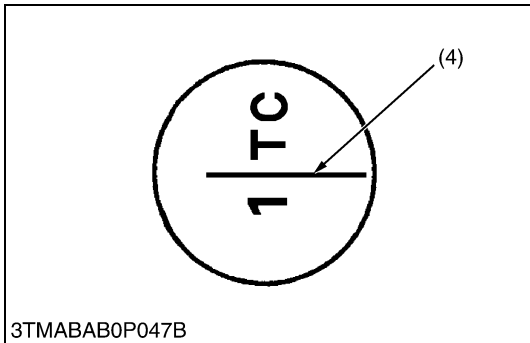
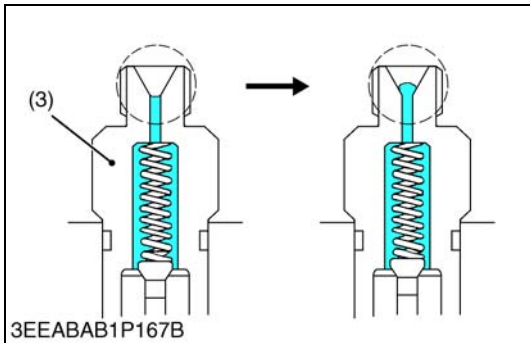
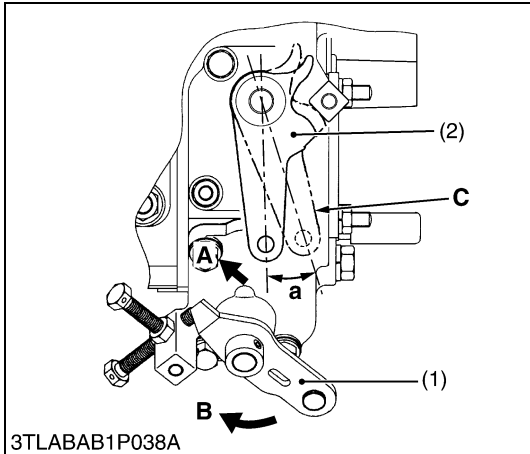
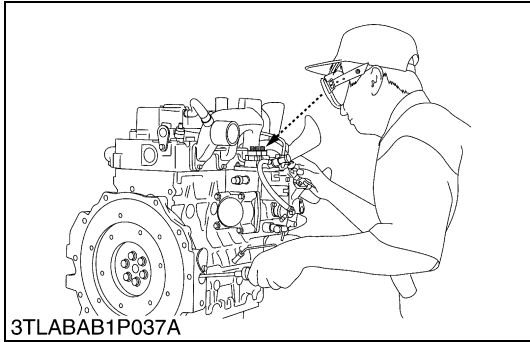
Radiator Water Leakage

1. Pour a specified amount of water into the radiator.
2. Set a radiator tester (Code No. 07909-31551) with an adaptor (BANZAI Code No. RCT-2A-30S) and raise the water pressure to the specified pressure.
3. Check the radiator for water leak.
4. For water leak from the pinhole, replace the radiator or repair with the radiator cement. When water leak is excessive, replace the radiator.

Radiator water leakage test pressure	Factory spec.	No leak at 137 kPa 1.4 kgf/cm ² 20 psi
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W10357590

(7) Injection Pump



Injection Timing

1. Remove the stop solenoid.
2. Remove the injection pipes and nozzle.
3. Set the speed control lever to maximum fuel discharge position.

(Reference)

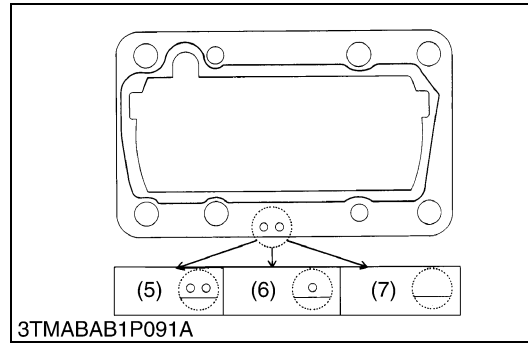
- Turn the flywheel with screwdriver.
4. Turn the flywheel counterclockwise (facing the flywheel) until the fuel fills up to the hole of the delivery valve holder for 1st cylinder.
 5. Turn the flywheel further and stop turning when the fuel begins to flow over, to get the present injection timing.
 6. (The flywheel has mark 1TC and four lines indicating every 0.087 rad (5 °) of crank angle from 0.175 rad (10 °) to 0.436 rad (25 °) before mark 1TC) Calculate the angle which the center of the window points out. If the calculation differs from specified injection timing, add or remove the shim to adjust.

(Injection Timing)

Injection timing	Factory spec.	0.279 to 0.314 rad 16 ° to 18 ° B.T.D.C.
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NOTE

- The sealant is applied to both sides of the soft metal gasket shim. The liquid gasket is not required for assembling.
- Shims are available in thickness of 0.20 mm, 0.25 mm and 0.30 mm. 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, be sure to use the same number of new gasket shims with the same thickness.



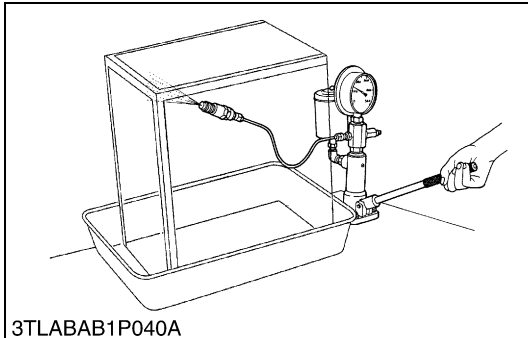
- (1) Speed Control Lever
- (2) Stop Lever
- (3) Delivery Valve Holder
- (4) TC Mark Line
- (5) 2-Holes: 0.20 mm (Shim)
- (6) 1-hole: 0.25 mm (Shim)
- (7) Without hole: 0.30 mm (Shim)

- A : To STOP Position**
B : To Max. Speed Position
C : Stop Lever in Free Position
- a : 0.267 ± 0.035 rad (15.3 ± 2 °)**

W1036402

(8) Injection Nozzle**CAUTION**

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

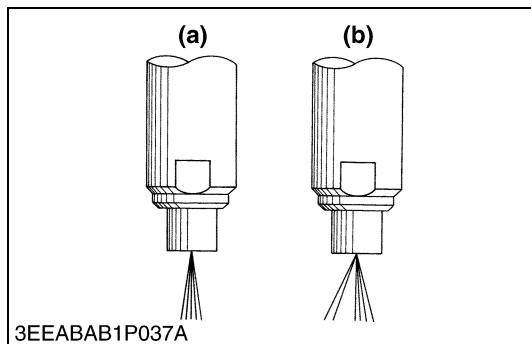
**Nozzle Injection Pressure**

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 injection nozzle assembly.

Fuel injection pressure	Factory spec.	13.73 to 14.71 MPa 140 to 150 kgf/cm ² 1991 to 2133 psi
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(1) Adjusting Washer

W1037197

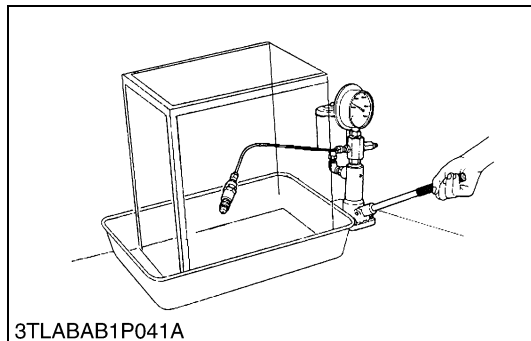
**Nozzle Spraying Condition**

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

W1037394

**Valve Seat Tightness**

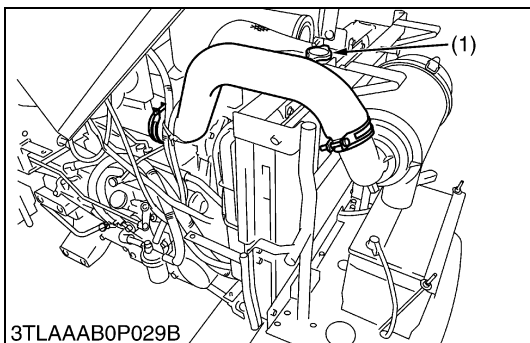
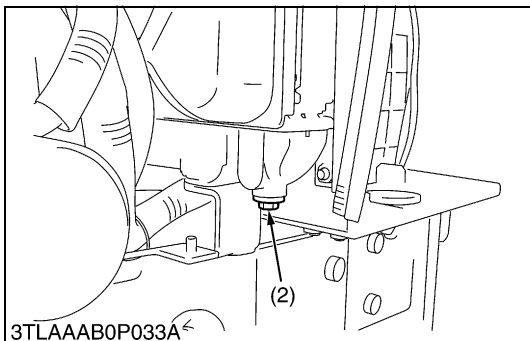
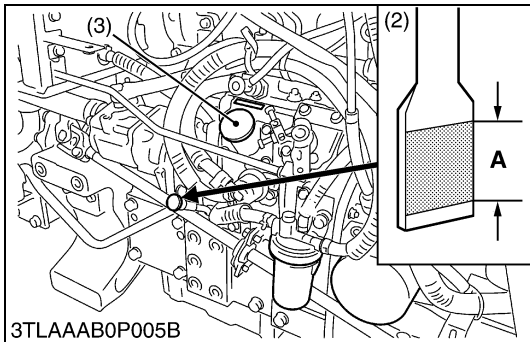
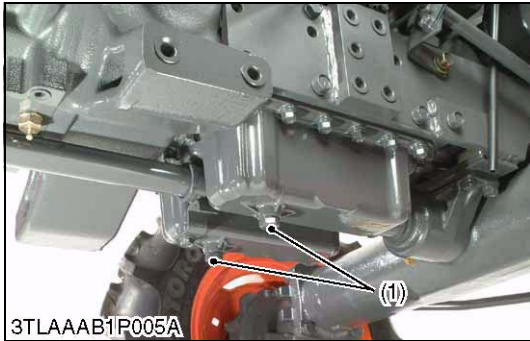
1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361).
2. Raise the fuel pressure, and keep at 12.75 MPa (130 kgf/cm², 1849 psi) for 10 seconds.
3. If any fuel leak is found, replace the nozzle piece.

Valve seat tightness	Factory spec.	No fuel leak at 12.75 MPa 130 kgf/cm ² 1849 psi
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W1088949

[2] PREPARATION

(1) Separating Engine and Clutch Housing



Draining Engine Oil

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. Remove the drain plugs (1) to drain oil.
4. Screw in the drain plugs (1).

(When refilling)

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

■ IMPORTANT

- **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	6.0 L 5.7 U.S.qts 5.0 Imp.qts
------------	----------	-------------------------------------

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

A : Oil level is acceptable within this range.

W1050040

Draining Coolant

⚠ CAUTION

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

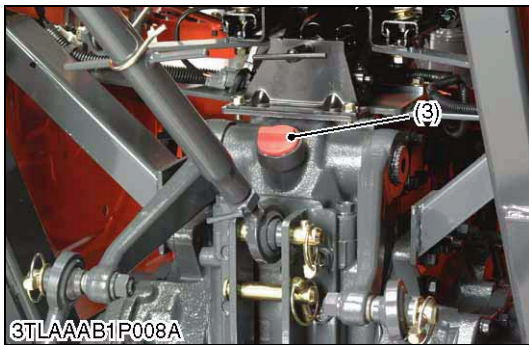
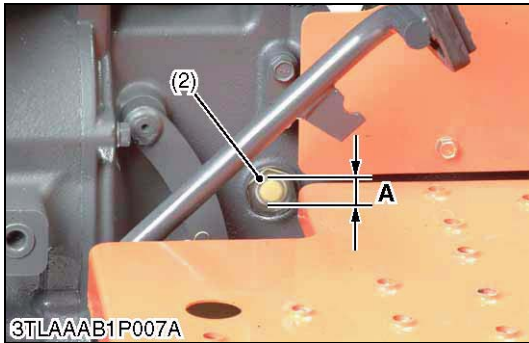
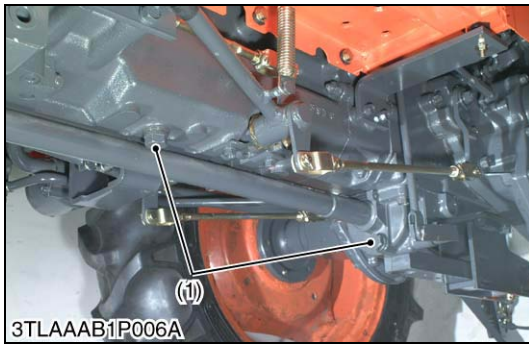
1. Stop the engine and let cool down.
2. Loosen the drain plug (2) to drain the coolant.
3. Remove the radiator cap (1) to completely drain the coolant.
4. After all coolant is drained, retighten the drain plug (2).

Coolant	Capacity (with recovery tank)	6.0 L 6.3 U.S.qts 5.3 Imp.qts
---------	----------------------------------	-------------------------------------

- (1) Radiator Cap

- (2) Drain Plug

W1048932



Draining the Transmission Fluid

1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. Screw in the drain plugs (1).

(When reassembling)

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

■ IMPORTANT

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

Transmission fluid	Capacity	2WD	27 L 7.1 U.S.gals 5.98 Imp.gals
		4WD	27.5 L 7.3 U.S.gals 6.1 Imp.gals
		HST (4WD)	23.5 L 6.2 U.S.gals 5.2 Imp.gals

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

A : Oil level is acceptable within this range.

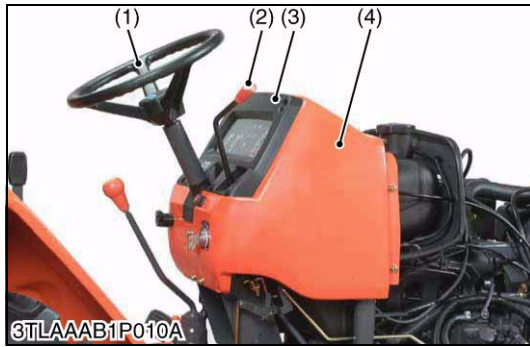
W1012748

Bonnet and Front Cover

1. Disconnect the battery negative cable.
2. Disconnect the connector for head light.
3. Remove bonnet (1) and side cover (2).
4. Remove the front cover (3).

- (1) Bonnet
- (2) Side Cover
- (3) Front Cover

W1044556



Steering Wheel and Rear Bonnet

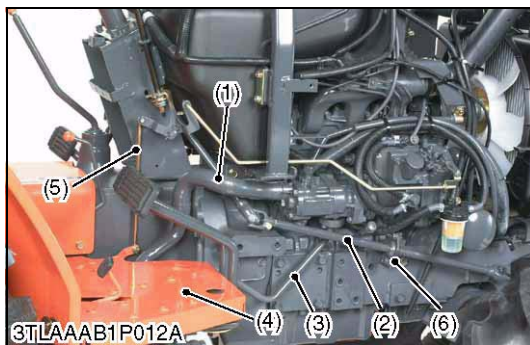
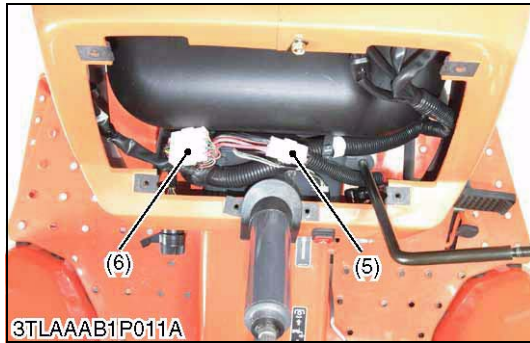
1. Remove the steering wheel (1) with steering puller.
2. Remove the throttle grip (2).
3. Disconnect the hour-meter cable from the engine.
4. Remove the meter panel (3).
5. Disconnect the **4P** connector (5) for main switch.
6. Disconnect the **8P** connector (6) for combination switch.
7. Remove the rear bonnet (4).

(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 ft·lbs
-------------------	-----------------------------	---

- | | |
|--------------------|-------------------------|
| (1) Steering Wheel | (4) Rear Bonnet |
| (2) Throttle Grip | (5) 4P Connector |
| (3) Meter Panel | (6) 8P Connector |

W1012884



Suction Hose and Delivery Pipe

1. Disconnect the suction hose (1).
2. Remove the step (4) mounting screws.
3. Remove the steering joint shaft (2).
4. Remove the delivery pipe (3).
5. Remove the throttle rod (5).

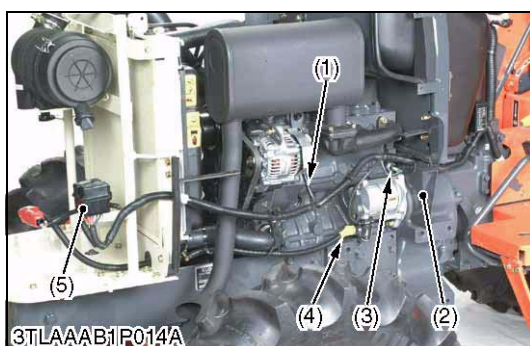
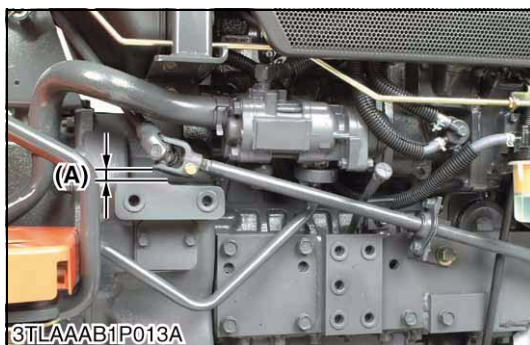
(When reassembling)

- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.19 in.) between the universal joint and flywheel housing. Then fit the support (6) in position.

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 36.1 to 50.6 ft·lbs
-------------------	--------------------------	---

- | | |
|--------------------------|----------------------|
| (1) Suction Hose | (5) Throttle Rod |
| (2) Steering Joint Shaft | (6) Support |
| (3) Delivery Pipe | |
| (4) Step | (A) Clearance |

W1045309

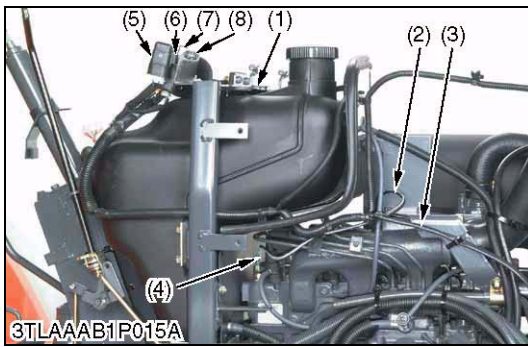


Wirings

1. Disconnect the wiring (1) for the alternator.
2. Disconnect the wiring (4) for starter motor.
3. Disconnect the **1P** Connector (3) for the engine oil switch.
4. Remove the shutter plate (2).
5. Remove the slow blow fuse (5).

- | | |
|---------------------------|------------------------------|
| (1) Wiring for Alternator | (4) Wiring for Starter Motor |
| (2) Shutter Plate | (5) Slow Blow Fuse |
| (3) 1P Connector | |

W1045710



Wirings

1. Disconnect the wiring (1) for the fuel sensor.
2. Disconnect the key stop solenoid connector (3).
3. Disconnect the wiring (2) for the glow plug.
4. Disconnect the **1P** connector (4) for the water temperature sensor.
5. Disconnect the starter relay **4P** connector (7), OPC timer **4P** connector (6), flasher unit **6P** connector (5) and glow relay **4P** connector (8).

- | | |
|---------------------------------|---------------------------------------|
| (1) Wiring for Fuel Sensor | (5) Flasher Unit 6P Connector |
| (2) Wiring for Glow Plug | (6) OPC timer 4P Connector |
| (3) Key Stop Solenoid Connector | (7) Starter Relay 4P Connector |
| (4) 1P Connector | (8) Glow Relay 4P Connector |

W1046003



Propeller Shaft (4WD)

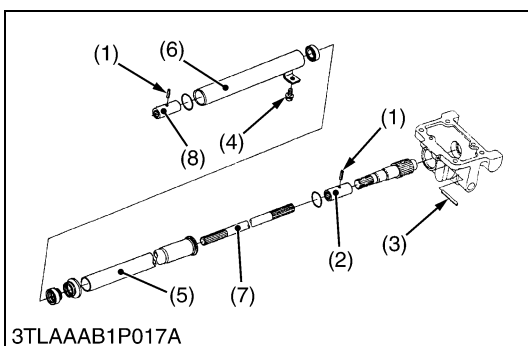
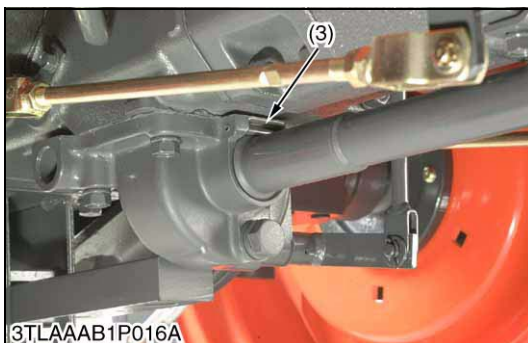
1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (7) and pinion shaft.

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

W1014306





Separating Engine from Clutch Housing Case

1. Check the engine and clutch housing case are securely mounted on the disassembling stands.
2. Remove the engine mounting screws, and separate the engine from the clutch housing case.

(When reassembling)

- Apply grease to the splines.
- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the engine and clutch housing case.

Tightening torque	Engine mounting screws to clutch housing	48.1 to55.8 N·m 4.9 to5.7 kgf·m 35.4 to41.2 ft-lbs
-------------------	--	--

W1046981



Clutch Assembly

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

(When reassembling)

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

■ IMPORTANT

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

■ NOTE

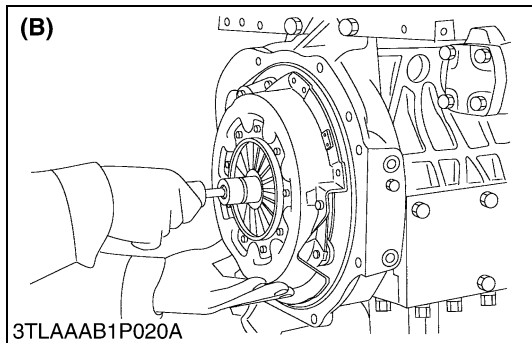
- **Do not allow grease and oil on the clutch disc facing.**

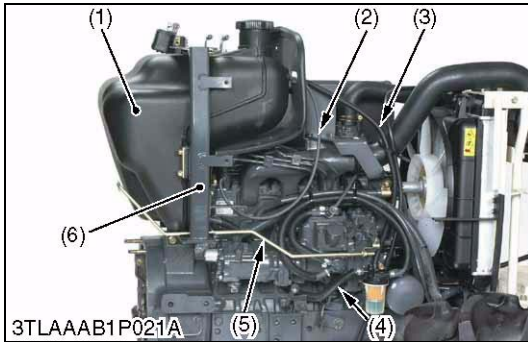
Tightening torque	Clutch cover mounting screws and reamer screws	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.5 to 20.3 ft-lbs
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(A) L3400

(B) L2800

W1017588

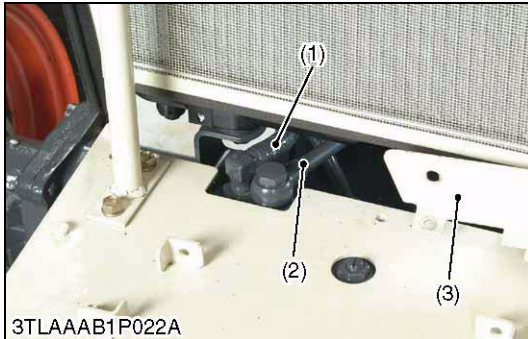


(2) Separating Engine from Front Axle Frame**Fuel Tank**

1. Disconnect the fuel pipe (4) and drain the fuel.
2. Disconnect the return fuel pipe (2), (3).
3. Remove the fuel tank mounting screws.
4. Remove the fuel tank (1).
5. Remove the fuel tank support (6).
6. Remove the throttle rod (5).

- | | |
|----------------------|-----------------------|
| (1) Fuel Tank | (4) Fuel Pipe |
| (2) Return Fuel Pipe | (5) Throttle Rod |
| (3) Return Fuel Pipe | (6) Fuel Tank Support |

W1055997

**Power Steering Delivery Pipe and Return Hose**

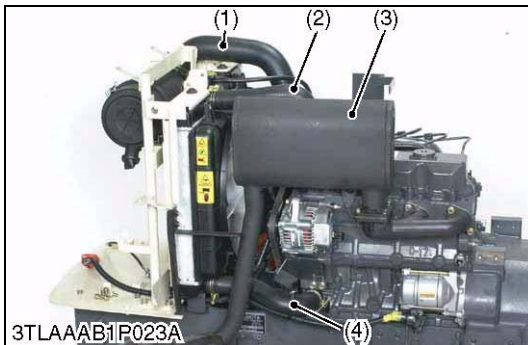
1. Remove the shutter plate (3).
2. Disconnect the power steering delivery pipe (2).
3. Disconnect the power steering return hose (1).

(When reassembling)

Tightening torque	Delivery pipe joint bolt	34 to 39 N-m 3.5 to 4.0 kgf-m 25.3 to 28.9 ft-lbs
-------------------	--------------------------	---

- | | |
|----------------------------------|-------------------|
| (1) Power Steering Return Pipe | (3) Shutter Plate |
| (2) Power Steering Delivery Pipe | |

W1052855

**Radiator Hose and Muffler**

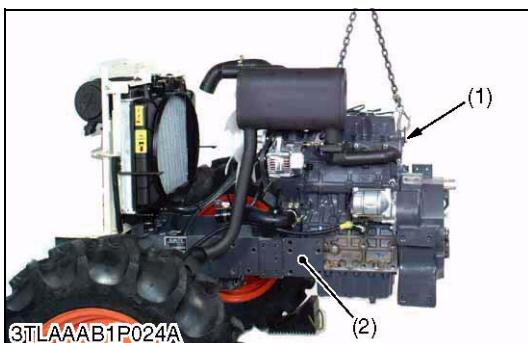
1. Remove the muffler (3).
2. Disconnect the radiator hose (2), (4).
3. Disconnect the air cleaner hose (1).

(When reassembling)

Tightening torque	Muffler mounting screw	31.4 to 37.2 N-m 3.2 to 3.8 kgf-m 23.1 to 27.5 ft-lbs
-------------------	------------------------	---

- | | |
|----------------------|-------------------|
| (1) Air Cleaner Hose | (3) Muffler |
| (2) Radiator Hose | (4) Radiator Hose |

W1048170

**Separating Engine from Front Axle Frame**

1. Hoist the engine by the chain at the engine hook (1).
2. Remove the front axle frame mounting screw.
3. Separate the engine from the front axle frame (2).

(When reassembling)

- Lift the front of the front axle frame by the gap in the bolt hole, and tighten the front axle mounting screws.

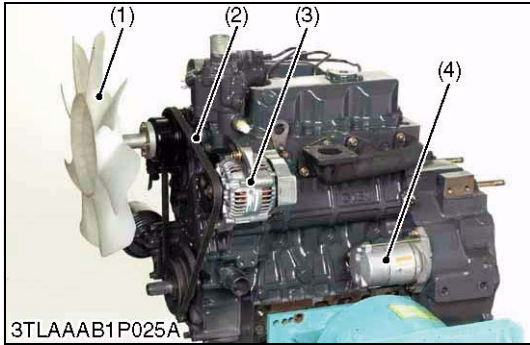
Tightening torque	Front axle frame mounting screw (M12)	102.9 to 117.6N-m 10.5 to 12.5 kgf-m 76.0 to 86.8 ft-lbs
-------------------	---------------------------------------	--

- | | |
|-----------------|----------------------|
| (1) Engine Hook | (2) Front Axle Frame |
|-----------------|----------------------|

W1048360

[3] DISASSEMBLING AND ASSEMBLING

(1) Cylinder Head and Valves



External Components

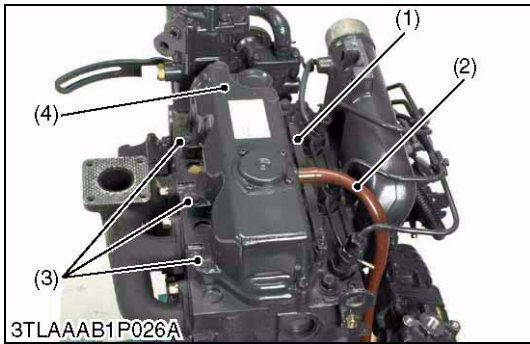
1. Set the engine to the disassembling stand.
2. Remove the cooling fan (1).
3. Remove the alternator (3) and fan belt (2).
4. Remove the starter motor (4).

■ IMPORTANT

- After reassembling the fan belt, be sure to adjust the fan belt tension. (See page 1-S14.)

- | | |
|-----------------|-------------------|
| (1) Cooling Fan | (3) Alternator |
| (2) Fan Belt | (4) Starter Motor |

W1018655



Cylinder Head Cover

1. Remove the lead (1).
2. Remove the breather hose (2).
3. Remove the head cover screws (3).
4. Remove the cylinder head cover (4).

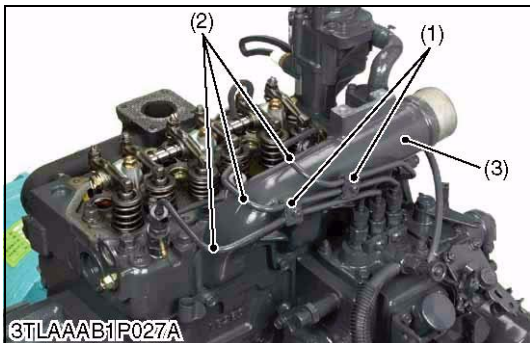
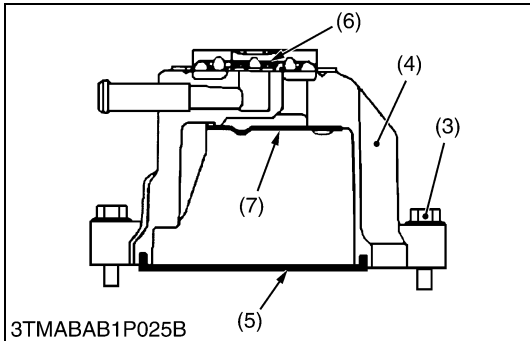
(When reassembling)

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

Tightening torque	Cylinder head cover screw	6.9 to 11.3 N·m 0.7 to 1.15 kgf·m 5.1 to 8.32 ft-lbs
-------------------	---------------------------	--

- | | |
|-------------------------|--------------------------------|
| (1) Lead | (5) Cylinder Head Cover Gasket |
| (2) Breather Hose | (6) Breather Valve |
| (3) Head Cover Screw | (7) Plate |
| (4) Cylinder Head Cover | |

W1018946



Injection Pipes

1. Loosen the screws on the pipe clamps (1).
2. Detach the injection pipes (2).
3. Remove the inlet manifold (3).

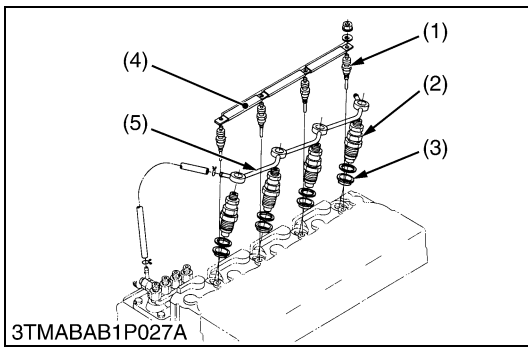
(When reassembling)

- Blow out dust inside the pipes.

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

- | | |
|--------------------|--------------------|
| (1) Pipe Clamp | (3) Inlet Manifold |
| (2) Injection Pipe | |

W1019092



Nozzle Holder Assembly and Glow Plug

1. Remove the overflow pipe assembly (5).
2. Remove the nozzle holder assemblies (2) using a 21 mm deep socket wrench.
3. Remove the copper gasket and heat seal (3).
4. Remove the glow plugs (1).

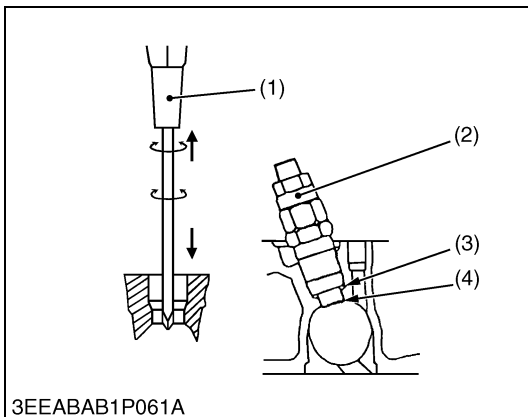
(When reassembling)

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

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

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

W1020917



Nozzle Heat Seal Service Removal Procedure

■ IMPORTANT

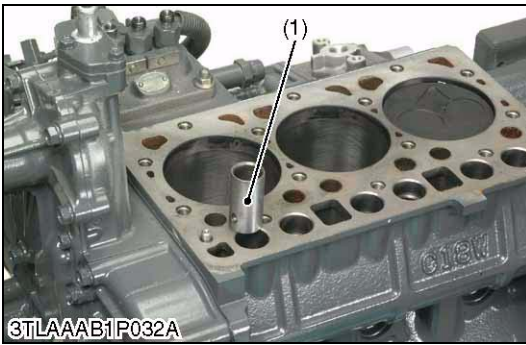
- Use a plus (phillips head) screw driver (1) that has a Dia. which is bigger than the heat seal hole (Approx. 6 mm) 1/4 in.
1. Drive screw driver (1) lightly into the heat seal hole.
 2. Turn screw driver three or four times each way.
 3. While turning the screw driver, slowly pull the heat seal (4) out together with the injection nozzle gasket (3).
 4. If the heat seal drops, repeat the above procedure.

(When reassembling)

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

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

W1021255



Tappets

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

(When reassembling)

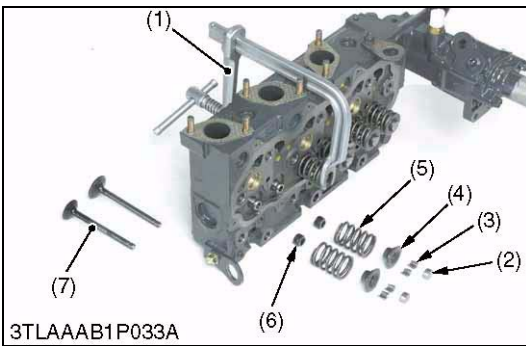
- Visually check the contact between tappets and cams for proper rotation. If defect is found, replace tappets.
- Before installing the tappets, apply engine oil thinly around them.

■ **IMPORTANT**

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

(1) Tappet

W1022001



Valves

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

(When reassembling)

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

■ **IMPORTANT**

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

(1) Valve Spring Replacer

(2) Valve Cap

(3) Valve Spring Collet

(4) Valve Spring Retainer

(5) Valve Spring

(6) Valve Stem Seal

(7) Valve

W1022102

(2) Timing Gears, Camshaft and Fuel Camshaft

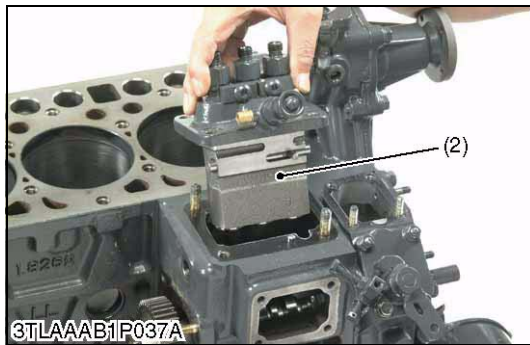
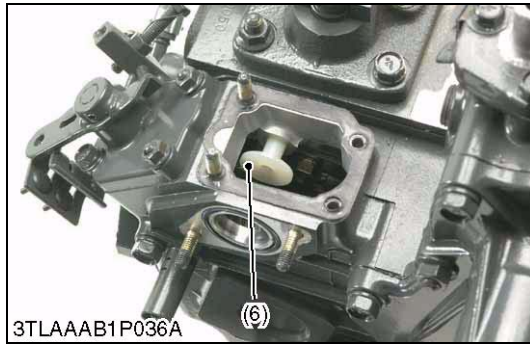
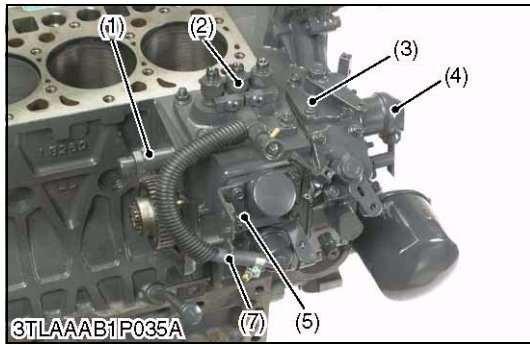


Hydraulic Pump

1. Remove the hydraulic pump mounting screws.
2. Detach the hydraulic pump (1).

(1) Hydraulic Pump

W1020540



Injection Pump

1. Remove the stop solenoid (4) and hi-idling body (1).
2. Remove the engine stop lever (3) and stop solenoid guide (6).
3. Remove the fuel hose (7), pump cover (5) and fuel injection pump assembly (2).

■ IMPORTANT

- Before removing the injection pump assembly (2), be sure to remove the stop solenoid (4), hi-idling body (1), engine stop lever (3) and stop solenoid guide (6).

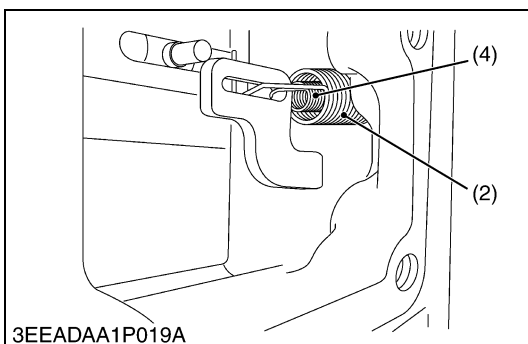
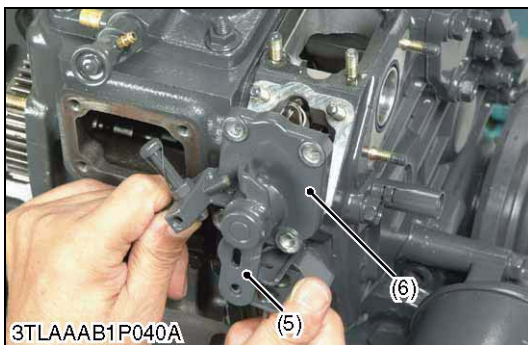
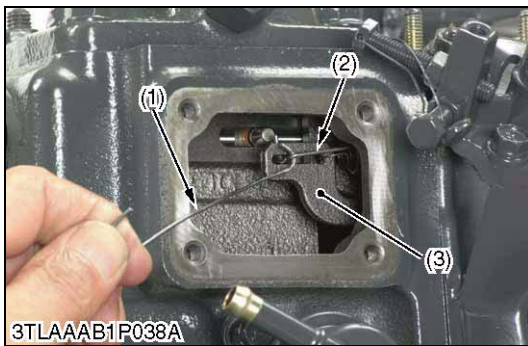
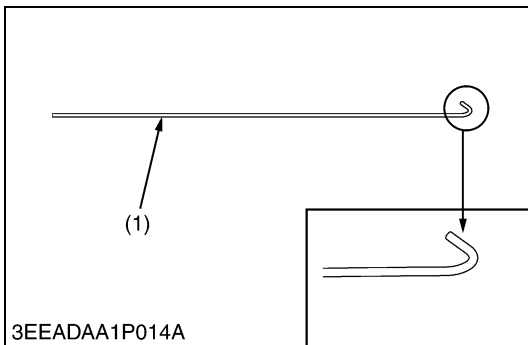
(When reassembling)

- Before attaching the stop solenoid, hi-idling body and solenoid guide, install the injection pump first into position.
- Replace the hi-idling body gasket with a new one.
- Before fitting the stop lever to the gear case, install the solenoid guide first into position. Then attach the stop lever and use it to see if it functions well.
- Before fitting the idling limiter in place, attach the solenoid guide and the engine stop lever in their respective positions.
- When installing the stop solenoid, be careful to keep the O-ring in place.
- Be sure to insert the push rod of the stop solenoid into the hole at the center of the solenoid guide.

Tightening torque	Hi-idling body	44.1 to 49.0 N·m 4.5 to 5.0 kgf·m 32.6 to 36.3 ft·lbs

- | | |
|-----------------------------|--------------------|
| (1) Hi-idling Body | (5) Pump Cover |
| (2) Injection Pump Assembly | (6) Solenoid Guide |
| (3) Stop Lever | (7) Fuel Hose |
| (4) Stop Solenoid | |

W1023686



Governor Springs and Speed Control Plate

NOTE

- **Specific tool (1) :**
1.2 mm diameter hard wire with its end hooked, overall length 200 mm (7.87 in.).

The tip of wire is bent like the hook to hang governor springs.

1. Remove the injection pump cover.
2. Remove the speed control plate mounting nuts and bolts.
3. Using the specific tool (1), undo the large governor spring (2) from the fork lever (3).
4. Using the specific tool, undo the small governor spring (4) from the fork lever (3).
5. Set the speed control lever (5) as the photo.
6. Take out the speed control plate (6) with care not to let the large and small governor springs come off this plate and fall into the gear case.

(When reassembling)

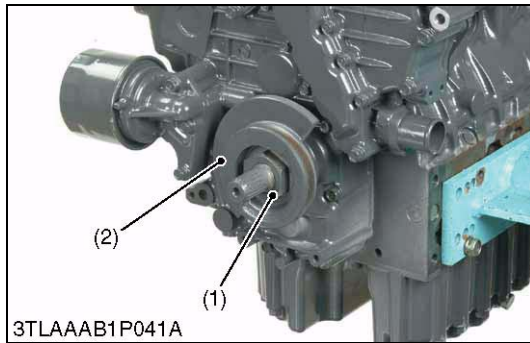
- Hook the small spring (4) first and then the large governor spring (2) on the speed control plate (6).
- Put the specific tool (1) from the injection pump side to catch the large governor spring (2). Keep this spring slightly extended and place the speed control plate (6) in its specified position.
- Using the specific tool (1), hook the small governor spring onto the fork lever (3).

NOTE

- **Be careful not to stretch the small governor spring too long because otherwise it may get deformed permanently.**
- **Using the specific tool (1), hook the large governor spring (2) onto the fork lever (3).**
- **Make sure both the governor springs (2), (4) are tight on the fork lever (3).**
- **Apply and tighten up the two bolts and two nuts on the speed control plate (6).**
- **Check that the speed control lever (5) positions low idle, after assembling governor springs.**
- **Check that the speed control lever (5) returns to the high idle position rather than the low idle position, after moving the lever to the maximum speed position.**
- **Finally attach the injection pump cover in position.**

- | | |
|---------------------------|---------------------------|
| (1) Specific Tool | (4) Small Governor Spring |
| (2) Large Governor Spring | (5) Speed Control Lever |
| (3) Fork Lever | (6) Speed Control Plate |

W1148604



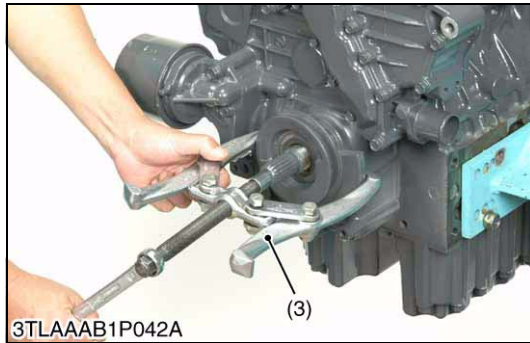
Fan Drive Pulley

1. Lock the flywheel not to turn using the flywheel stopper.
2. Remove the fan drive pulley mounting nut (1).
3. Remove the fan drive pulley (2) with gear puller (3).
4. Remove the feather key.

(When reassembling)

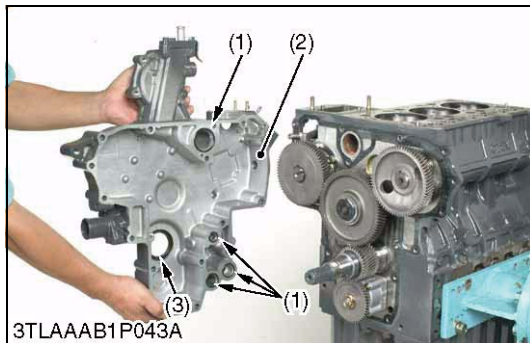
- Apply grease to the splines of coupling.

Tightening torque	Fan drive pulley mounting nut	137.3 to 156.9 N·m 14.0 to 16.0 kgf·m 101.3 to 115.7 ft·lbs
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- (1) Nut
(2) Fan Drive Pulley
(3) Gear Puller

W1024348



Gear Case

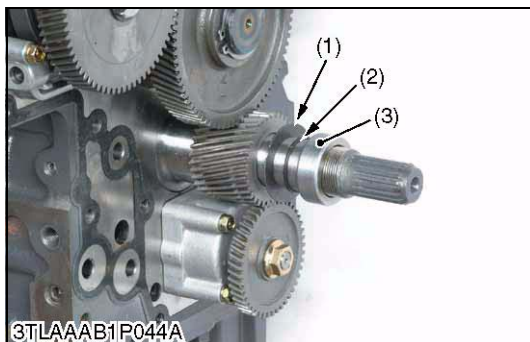
1. Remove the hour meter gear case.
2. Remove the gear case (2).
3. Remove the O-rings (1).

(When reassembling)

- Apply liquid gasket (Three Bond 1215 or equivalent) to both side of hour meter gear case gasket.
- Check to see if there are four O-rings (1) inside the gear case (2).
- Apply a thin film of engine oil to the oil seal (3), and install it, noting the lip come off.
- Before installing the gear case gasket, apply a non-drying adhesive.

- (1) O-ring
(2) Gear Case
(3) Oil Seal

W1024531

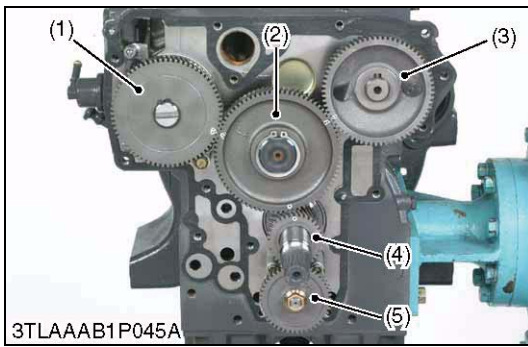


Crankshaft Oil Slinger

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

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

W1024731



3TLAAAB1P045A

Idle Gear

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

(When reassembling)

- Check to see each gear is aligned with its aligning mark.
 - Idle gear (2) and crank gear (4)
 - Idle gear (2) and camshaft gear (3)
 - Idle gear (2) and injection pump gear (1)

(1) Injection Pump Gear

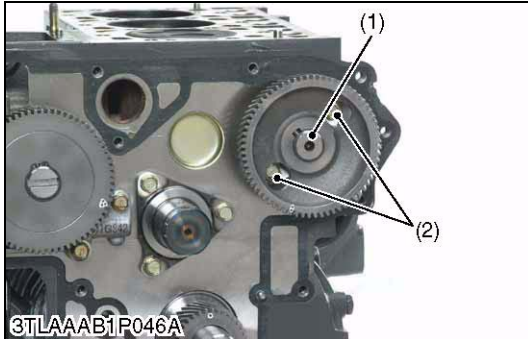
(4) Crank Gear

(2) Idle Gear

(5) Oil Pump Drive Gear

(3) Cam Gear

W1024941



3TLAAAB1P046A

Camshaft

1. Remove the camshaft set bolts (2) and draw out the camshaft (1).

(When reassembling)

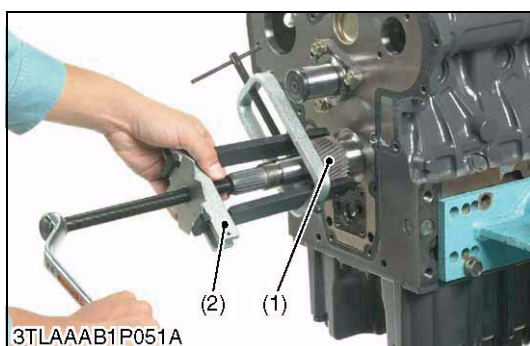
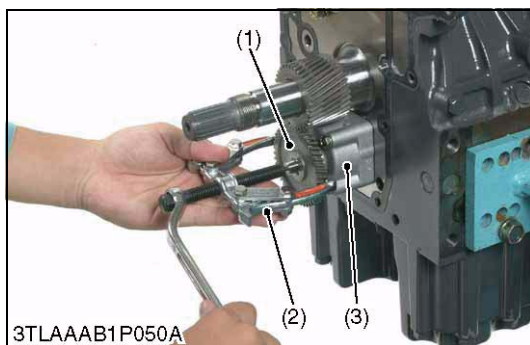
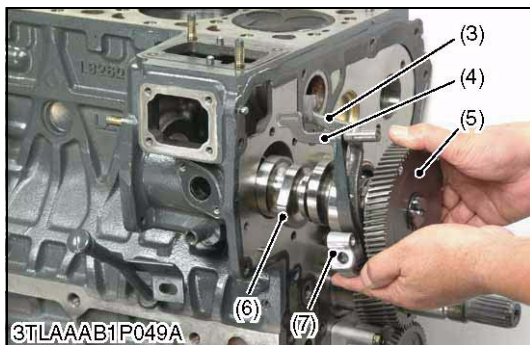
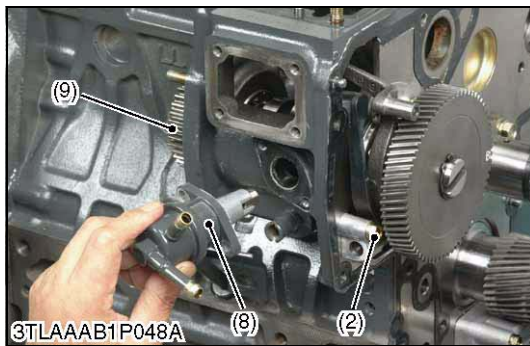
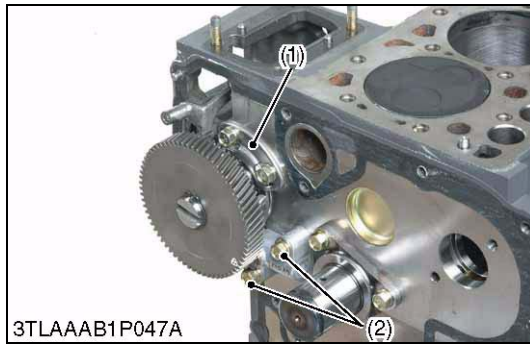
- When installing the idle gear, be sure to align the alignment marks on gears.

Tightening torque	Camshaft set bolt	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs
-------------------	-------------------	---

(1) Camshaft

(2) Camshaft Set Bolt

W1025098



Fuel Camshaft and Fork Lever Assembly

1. Remove the fuel feed pump (8) and hydraulic pump drive gear (9).
2. Detach the fuel camshaft stopper (1).
3. Remove the three fork lever holder mounting screws (2).
4. Draw out the fuel camshaft assembly (5), (6) and fork lever assembly (3), (4), (7) at the same time.

(When reassembling)

- After installation, check to see that the fork lever 1 (3) and 2 (4) are fixed to the fork lever shaft, and that they can turn smoothly in the holder (7).

- | | |
|---------------------------------------|-------------------------------|
| (1) Fuel Camshaft Stopper | (6) Fuel Camshaft |
| (2) Fork Lever Holder Mounting Screws | (7) Fork Lever Holder |
| (3) Fork Lever 1 | (8) Fuel Feed Pump |
| (4) Fork Lever 2 | (9) Hydraulic Pump Drive Gear |
| (5) Injection Pump Gear | |

W1025309

Oil Pump

1. Remove the nut.
2. Draw out the oil pump drive gear (1) with gear puller (2).
3. Remove the four oil pump mounting screws. Detach the oil pump (3).

- | | |
|-------------------------|--------------|
| (1) Oil Pump Drive Gear | (3) Oil Pump |
| (2) Gear Puller | |

W1025581

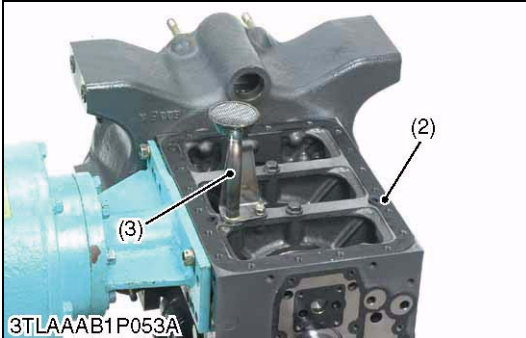
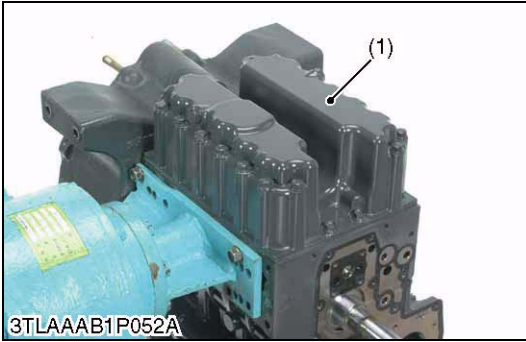
Crank Gear

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

- | | |
|----------------|-----------------|
| (1) Crank Gear | (2) Gear Puller |
|----------------|-----------------|

W1025476

(3) Connecting Rod and Piston



Oil Pan and Oil Strainer

1. Remove the oil pan mounting screws.
2. Remove the oil pan (1) by lightly tapping the rim of the pan with a wooden hammer.
3. Remove the oil pan gasket (2).
4. Remove the oil strainer (3) and O-ring.

(When reassembling)

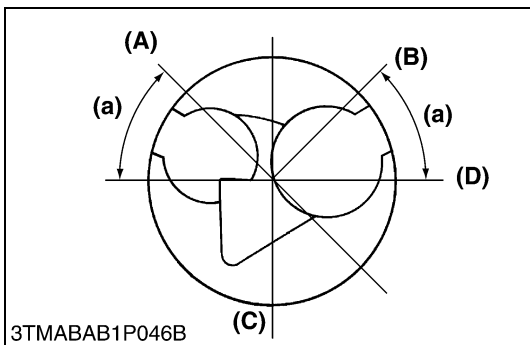
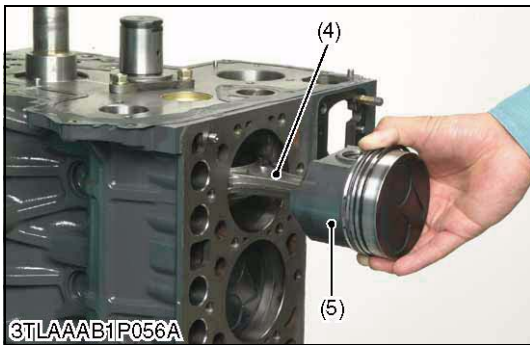
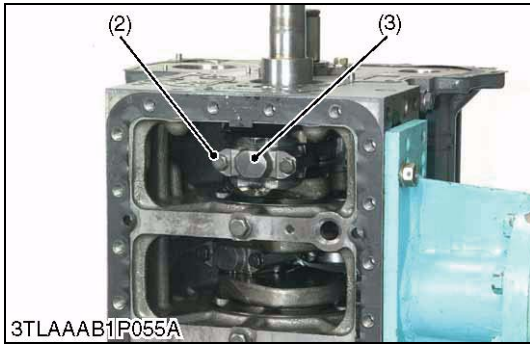
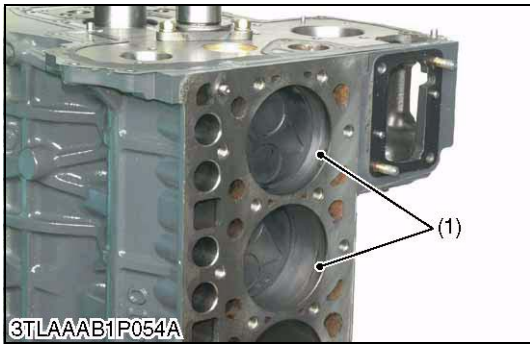
- After cleaning the oil strainer (3), check to see that the filter mesh is clean, and install it.
- Visually check the O-ring, apply engine oil, and install it.
- Securely fit the O-ring to the oil strainer (3).
- Apply a liquid gasket (Three Bond 1215 or equivalent) to the oil pan side of the oil pan gasket (2).
- To avoid uneven tightening, tighten oil pan mounting screws in diagonal order from the center.

(1) Oil Pan

(3) Oil Strainer

(2) Oil Pan Gasket

W1025687



Pistons

1. Completely clean carbon (1) in the cylinders.
2. Remove the connecting rod cap (3).
3. Turn the flywheel and bring the piston to top dead center.
4. Draw out the piston upward by lightly tapping it from the bottom of the crankcase with the grip of a hammer.
5. Draw out the other piston in the same method as above.

(When reassembling)

- Before inserting 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.

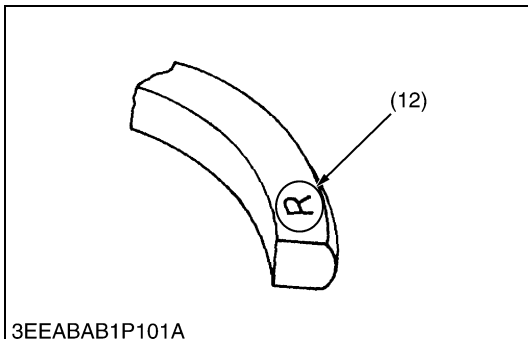
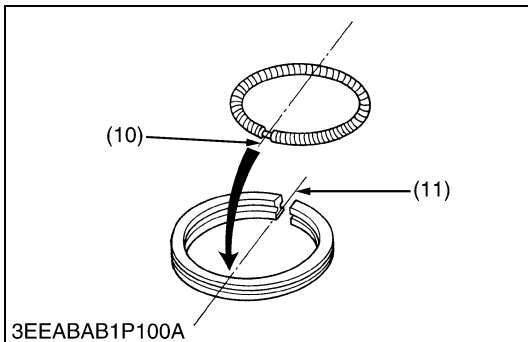
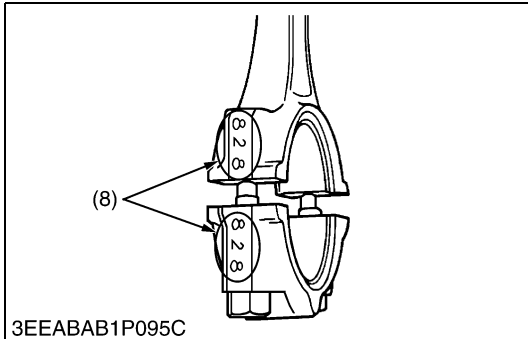
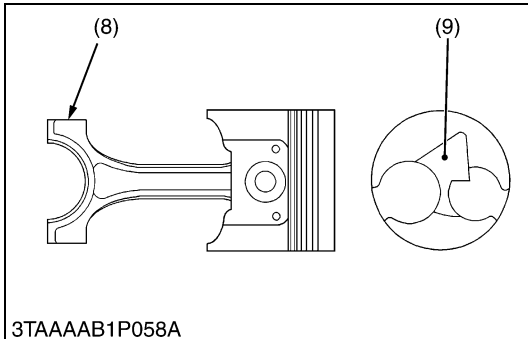
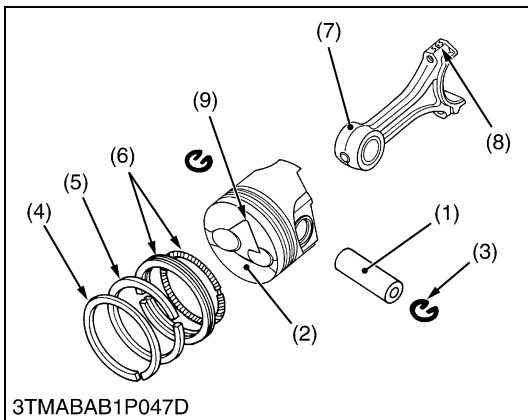
■ IMPORTANT

- **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.**
- **Place the piston rings with their gaps at 0.785 rad (45 °) from the piston pin's direction as shown in the figure.**
- **Carefully insert the pistons using a piston ring compressor.**
- **When inserting the piston in place, be careful not to get the molybdenum disulfide coating torn off its skirt. This coating is useful in minimizing the clearance with the cylinder liner. Just after the piston pin has been press-fitted, in particular, the piston is still hot and the coating is easy to peel off. Wait until the piston cools down.**

Tightening torque	Connecting rod screw	44.1 to 49.0 N·m 4.5 to 5.0 kgf·m 32.5 to 36.2 ft-lbs
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- | | |
|--|--|
| <ul style="list-style-type: none"> (1) Carbon (2) Connecting Rod Screw (3) Connecting Rod Cap (4) Connecting Rod (5) Molybdenum Disulfide Coating in Piston Skirt | <ul style="list-style-type: none"> (A) Top Ring Gap (B) Second Ring Gap (C) Oil Ring Gap (D) Piston Pin Hole (a) 0.785 rad (45 °) |
|--|--|

W1026141



Piston Ring and Connecting Rod

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

(When reassembling)

- When installing the rings, 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 piston pin, 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).

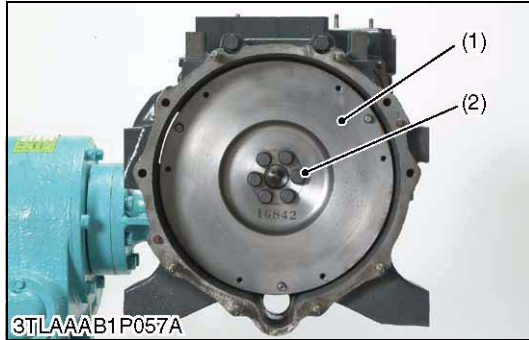
■ NOTE

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

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

W1026376

(4) Crankshaft



Flywheel

1. Fit the stopper to the flywheel (1).
2. Remove the all flywheel screws (2).
3. Remove the flywheel (1) slowly.

(When reassembling)

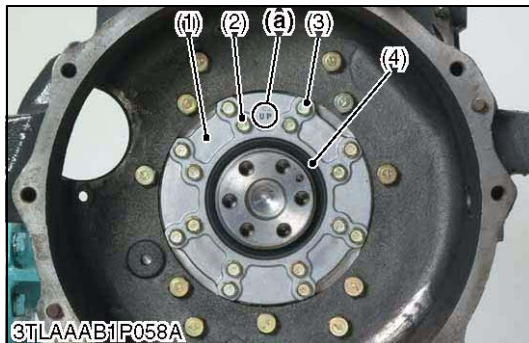
- Insert two pieces of the flywheel guide screws.
- Check to see that there are no metal particles left on the flywheel mounting surfaces.
- Apply engine oil to the threads and the undercut surface of the flywheel bolt and fit the bolt.

Tightening torque	Flywheel screws	98.0 to 107.8 N·m 10.0 to 11.0 kgf·m 72.3 to 79.5 ft-lbs
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(1) Flywheel

(2) Flywheel Screw

W1026863



Bearing Case Cover

1. Remove the bearing case cover mounting screws. First, remove inside screws (2) and then outside screws (3).
2. Remove the bearing case cover (1).

■ IMPORTANT

- **The length of inside screws and outside screws are different. Do not take a mistake using inside screws and outside screws.**

(When reassembling)

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

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

(5) Bearing Case Gasket

(2) Bearing Case Cover Mounting Screw

(6) Bearing Case Cover Gasket

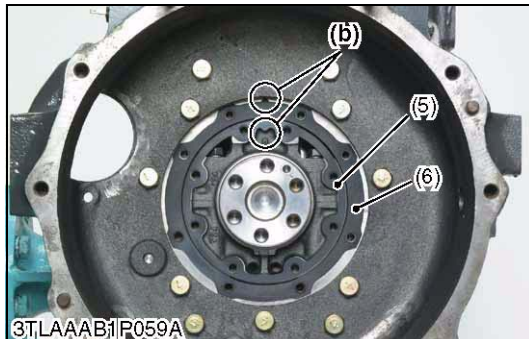
(3) Bearing Case Cover Mounting Screw

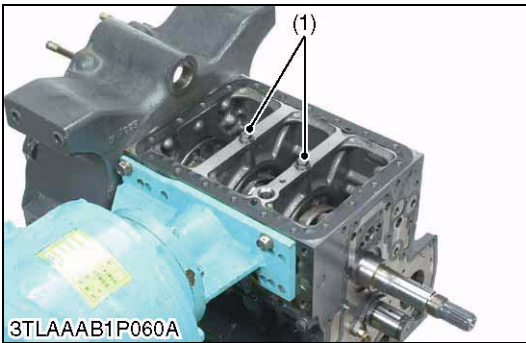
(4) Oil Seal

(a) Mark "UP"

(b) Upside

W10292140





Crankshaft

■ NOTE

- Before disassembling, check the side clearance of crankshaft. Also check it during reassembling.

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

(When reassembling)

■ IMPORTANT

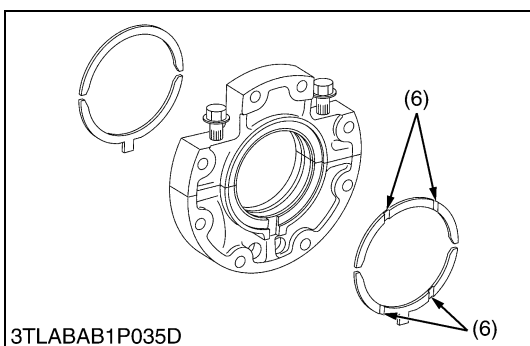
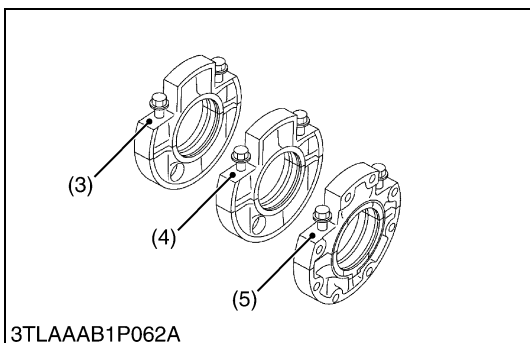
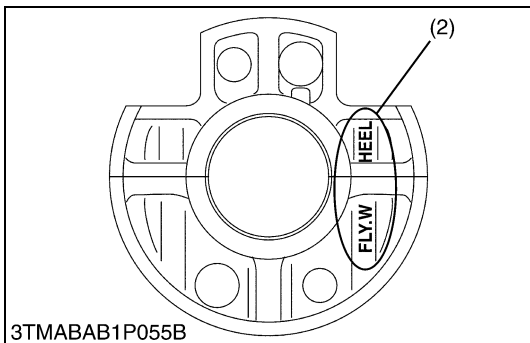
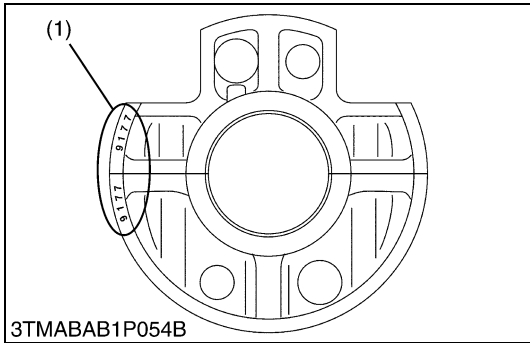
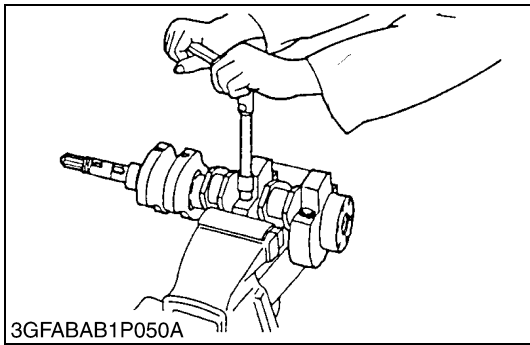
- Install the crankshaft sub assembly, aligning the screw hole of main bearing case 2 with the screw hole of cylinder block.
- When tightening the main bearing case screw 2, apply oil to the screw and screw by hand before tightening the specific torque.

If not smooth to screw by hand, align the screw holes between the cylinder block and the main bearing case.

Tightening torque	Main bearing case screws	68.6 to 73.5 N·m
	2	7.0 to 7.5 kgf·m 50.6 to 54.2 ft-lbs

(1) Main Bearing Case Screw 2

W1066311



Main Bearing Case Assembly

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

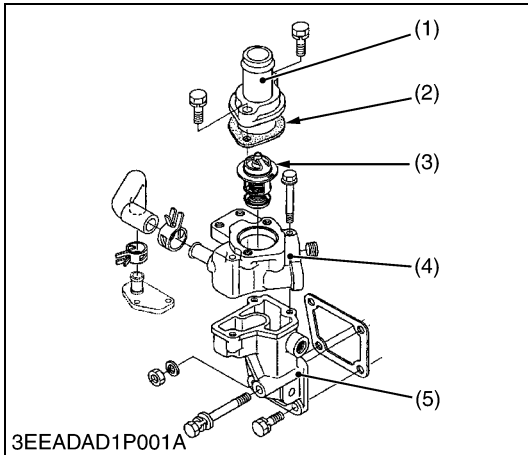
(When reassembling)

- Clean the oil passage in the main bearing case.
- Apply clean engine oil on the bearings.
- Install the main bearing case assemblies in the original positions. Since diameters of main bearing cases vary, install them in order of markings A, B from the gear case side.
- Match the alignment numbers (1) and mark (2) on the main bearing case.
- When installing the main bearing case 1 and 2, face the mark "FLYWHEEL" to the flywheel.
- Install the thrust bearing with its oil groove facing (6) outward.
- Confirm that the main bearing case moves smoothly after tightening the main bearing case screw 1 to the specified torque.

Tightening torque	Main bearing case screw 1	46.1 to 50.9 N·m 4.7 to 5.2 kgf·m 34.0 to 37.6 ft·lbs
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- | | |
|----------------------|----------------|
| (1) Alignment Number | (4) B |
| (2) Alignment Mark | (5) No Mark |
| (3) A | (6) Oil Groove |

W1027366

(5) Thermostat**Thermostat Assembly**

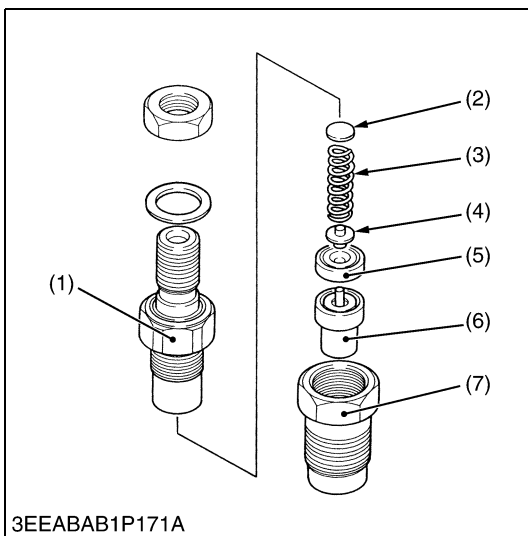
1. Remove the thermostat cover mounting screws, and remove the thermostat cover (1).
2. Remove the thermostat assembly (3).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) only at the thermostat cover side of the thermostat cover gasket (2).
- Apply a liquid gasket (Three Bond 1215 or equivalent) to the thermostat flange 1 (4) and flange 2 (5).

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

W1105115

(6) Injection Nozzle**Nozzle Holder**

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

(When reassembling)

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

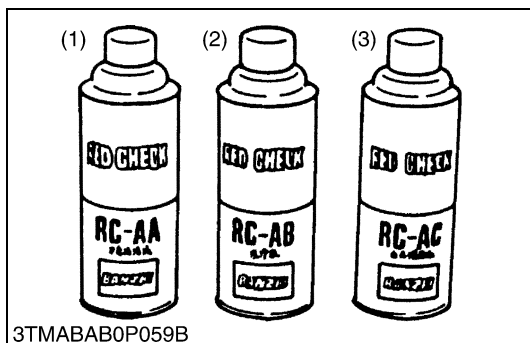
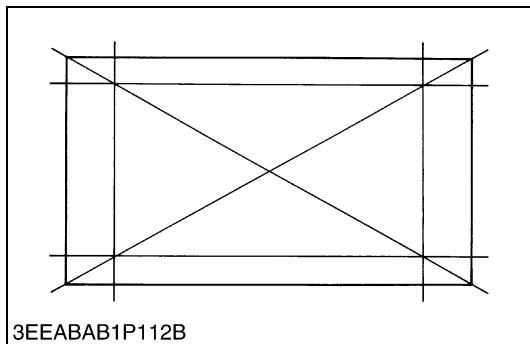
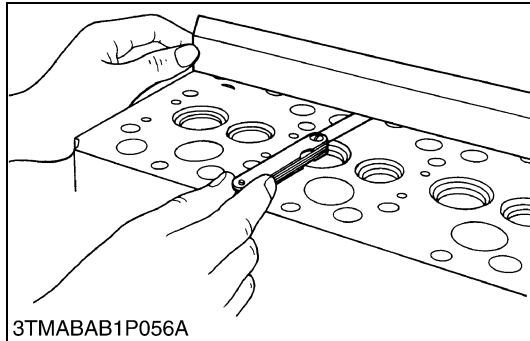
Tightening torque	Nozzle holder	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 25.3 to 28.9 ft-lbs
	Overflow pipe nut	19.6 to 24.5 N·m 2.0 to 2.5 kgf·m 14.5 to 18.1 ft-lbs
	Nozzle holder assembly	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs

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

W1089102

[4] SERVICING

(1) Cylinder Head and Valves



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 feeler 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 / 500 mm 0.0020 in. / 19.69 in.
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W1027737

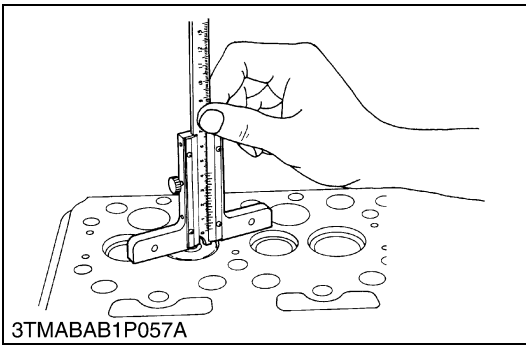
Cylinder Head Flaw

1. Prepare an air spray red check (Code No. 07909-31371).
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 red 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

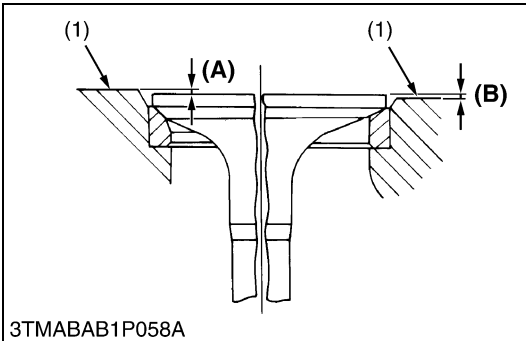
- (3) White Developer

W1076542



Valve Recessing

1. Clean the cylinder head surface (1), valve face and valve seat.
2. Insert the valve into the valve guide.
3. Measure the valve recessing with a depth gauge.
4. If the measurement exceeds the allowable limit, replace the valve.
5. If it still exceeds the allowable limit after replacing the valve, correct the valve seat face of the cylinder head with a valve seat cutter or valve seat grinder.
6. Then, correct the cylinder head surface with a surface grinder, or replace the cylinder head.



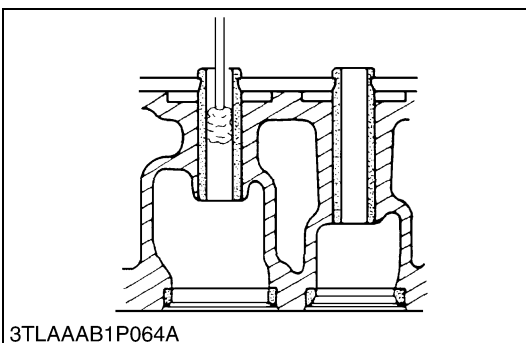
Valve recessing	Factory spec.	0.05 (protrusion) to 0.15 (recessing) mm 0.0020 (protrusion) to 0.0059 (recessing) in.
	Allowable limit	0.40 (recessing) mm 0.0157 (recessing) in.

(1) Cylinder Head Surface

(A) Recessing

(B) Protrusion

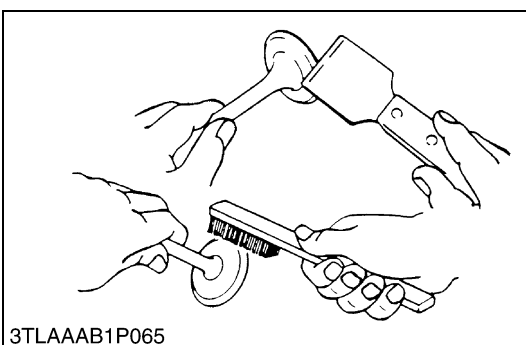
W1076880



Cleaning Valve Guide

1. Wash and clean the inner surface of the valve guide with kerosene or diesel fuel.

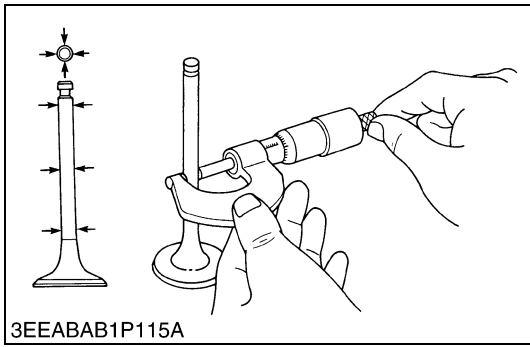
W1024806



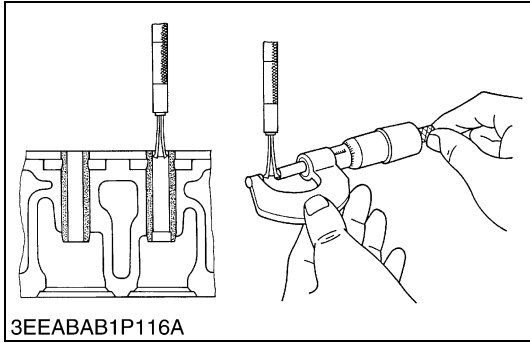
Cleaning Valve

1. Use a scraper and remove carbon.
2. Use a wire brush and remove carbon completely.

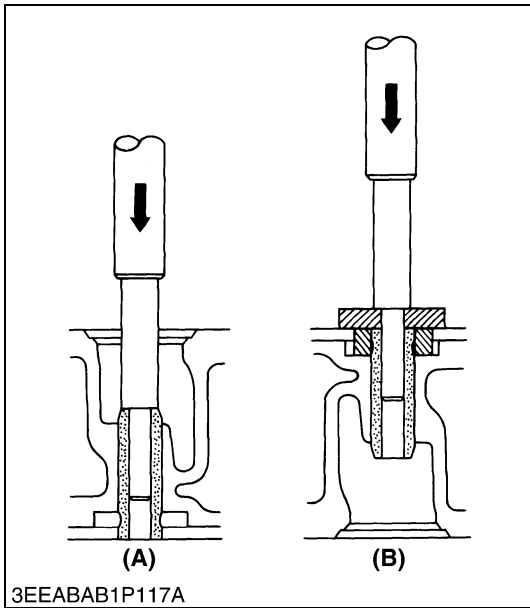
W1024856



3EEABAB1P115A



3EEABAB1P116A



3EEABAB1P117A

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 guide	Factory spec.	0.040 to 0.070 mm 0.00157 to 0.00276 in.
	Allowable limit	0.1 mm 0.0039 in.

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

W1077495

Replacing Valve Guide

(A) (When removing)

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

(B) (When installing)

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

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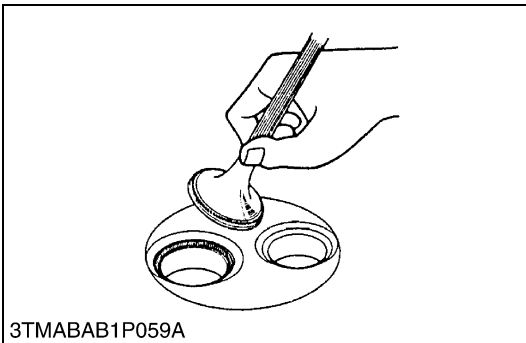
■ IMPORTANT

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

(A) When Removing

(B) When Installing

W1027889



Valve Seating

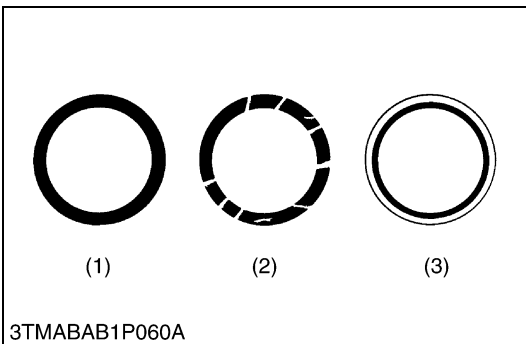
1. Coat the valve face lightly with prussian blue and put the valve on its seat to check the contact.
2. If the valve does not seat all the way around the valve seat or the valve contact is less than 70 %, correct the valve seating as follows.
3. If the valve contact does not comply with the reference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

W1028219



Correcting Valve and Valve Seat

NOTE

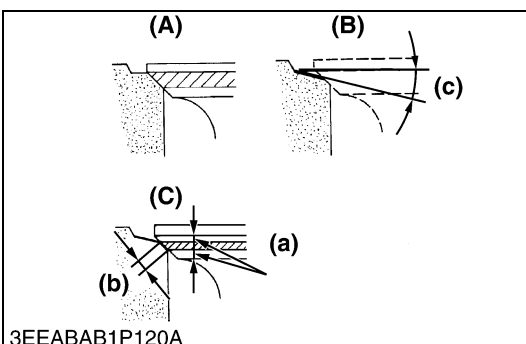
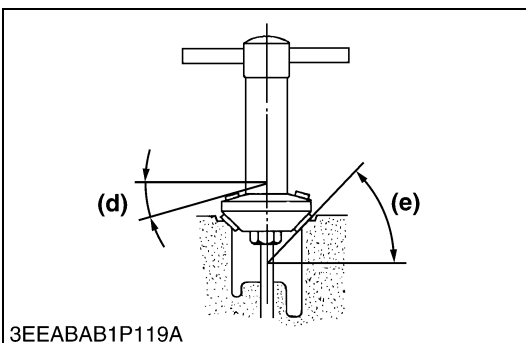
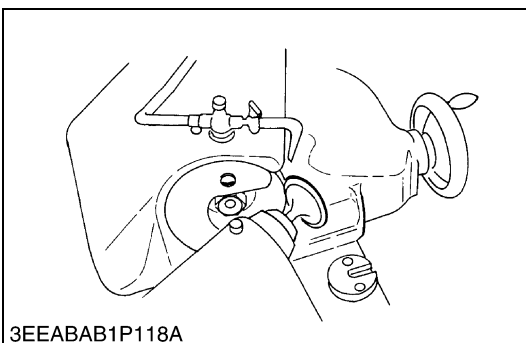
- Before correcting the valve and seat, check the valve stem and the I.D. of valve guide section, and repair them if necessary.
- After correcting the valve seat, be sure to check the valve recessing.

1) Correcting Valve

1. Correct the valve with a valve refacer.

2) Correcting Valve Seat

1. Slightly correct the seat surface with a 1.047 rad (60 °) (intake valve) or 0.785 rad (45 °) (exhaust valve) seat cutter (Code No. 07909-33102).
2. Resurface the seat surface with a 0.523 rad (30 °) valve seat cutter to intake valve seat and with a 0.262 rad (15 °) valve seat cutter to exhaust valve seat so that the width is close to specified valve seat width (2.12 mm, 0.0835 in.).
3. After resurfacing the seat, inspect for even valve seating, apply a thin film of compound between the valve face and valve seat, and fit them with valve lapping tool.
4. Check the valve seating with prussian blue. The valve seating surface should show good contact all the way around.



(a) Identical Dimensions

A : Check Correct

(b) Valve Seat Width

B : Correct Seat Width

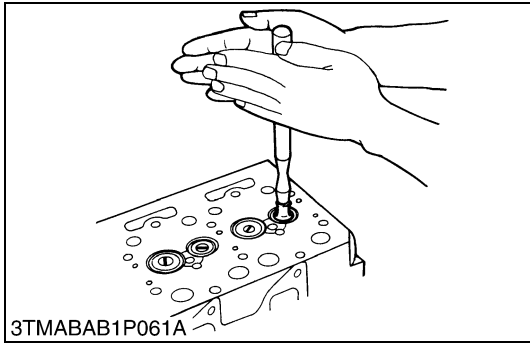
(c) 0.523 rad (30 °) or 0.262 rad (15 °)

C : Check Contact

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

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

W1028350



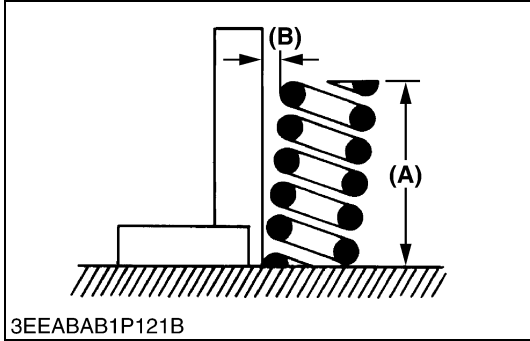
Valve Lapping

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.

W1028814



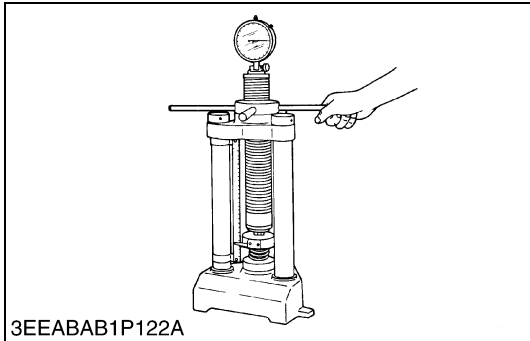
Free Length and Tilt of Valve Spring

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

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

Tilt (B)	Allowable limit	1.0 mm 0.039 in.
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W1028935

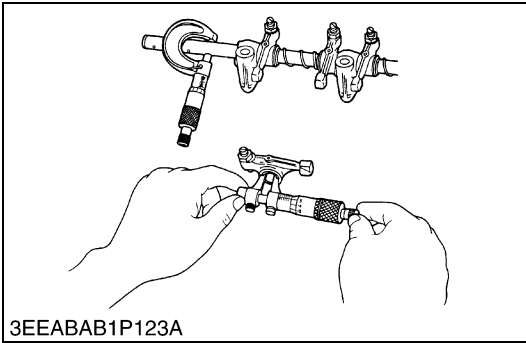


Valve Spring Setting Load

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

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

W1078436



3EEABAB1P123A

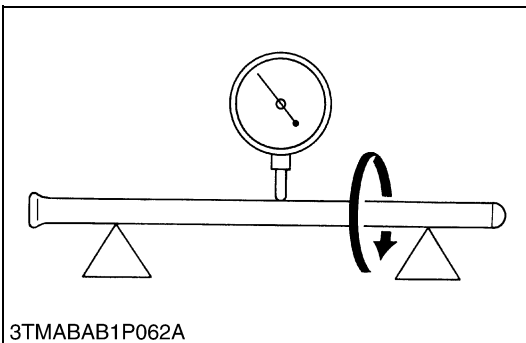
Oil Clearance between Rocker Arm and Rocker Arm Shaft

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

W1029150



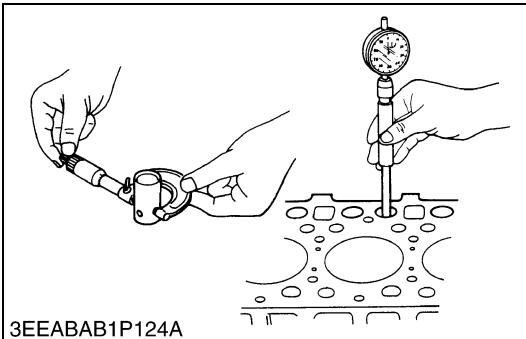
3TMABAB1P062A

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.
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W1029290



3EEABAB1P124A

Oil Clearance between Tappet and Tappet Guide Bore

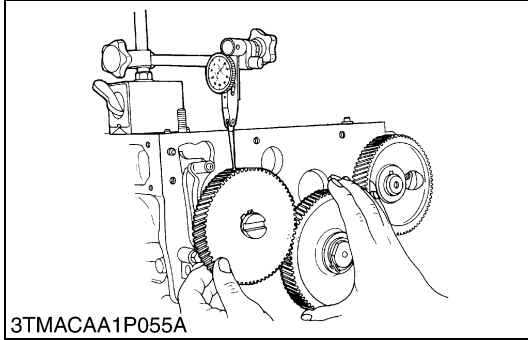
1. Measure the tappet O.D. with an outside micrometer.
2. Measure the I.D. of the tappet guide bore with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit or the tappet is damaged, replace the tappet.

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

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

W1029366

(2) Timing Gears, Camshaft and Fuel Camshaft



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.

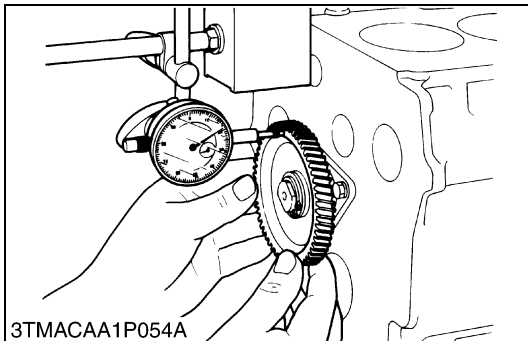
Backlash between idle gear and crank gear	Factory spec.	0.0415 to 0.1122 mm 0.00163 to 0.00442 in.
	Allowable limit	0.15 mm 0.0059 in.

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

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

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

W1029564

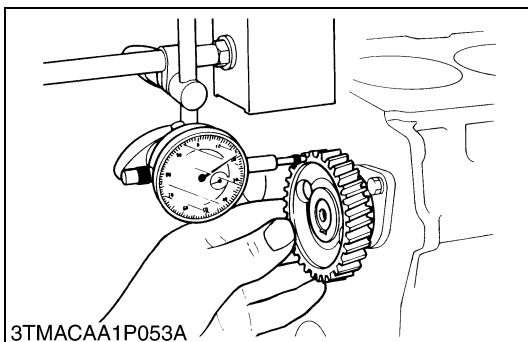


Idle Gear Side Clearance

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

Idle gear side clearance	Factory spec.	0.12 to 0.48 mm 0.0047 to 0.0189 in.
	Allowable limit	0.9 mm 0.0354 in.

W1029843

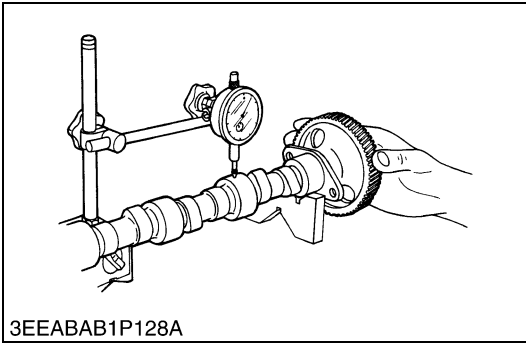


Camshaft Side Clearance

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

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.

W1030012



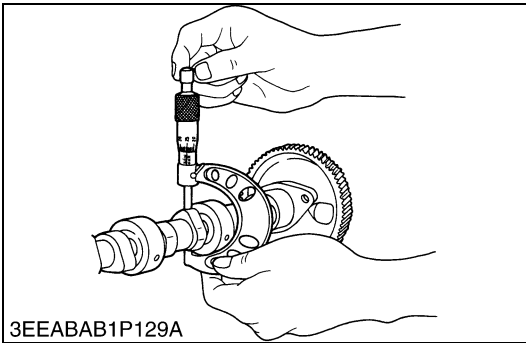
3EEABAB1P128A

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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W1081899



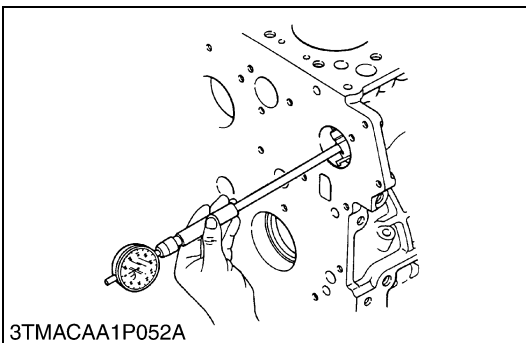
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Cam Height

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

Cam height of intake and exhaust	Factory spec.	33.90 mm 1.3346 in.
	Allowable limit	33.85 mm 1.3327 in.

W1082129



3TMACAA1P052A

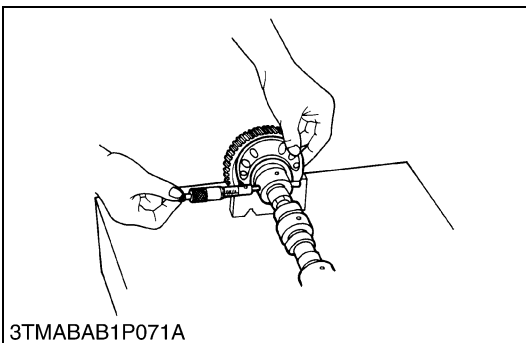
Oil Clearance of Camshaft Journal

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

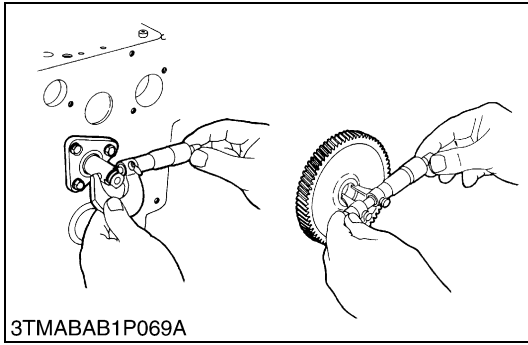
Oil clearance of camshaft journal	Factory spec.	0.050 to 0.091 mm 0.00197 to 0.00358 in.
	Allowable limit	0.15 mm 0.0059 in.

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

W1082358



3TMABAB1P071A



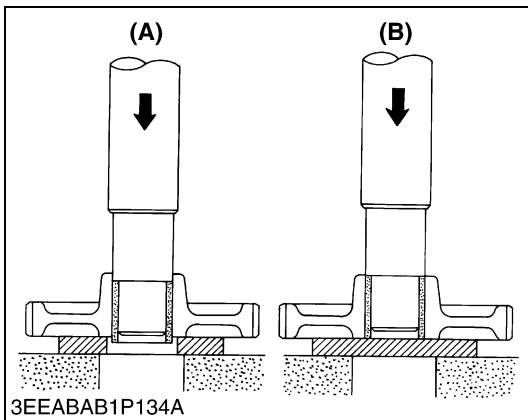
Oil Clearance between Idle Gear Shaft and Idle Gear Bushing

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

Clearance between idle gear shaft and idle gear bushing	Factory spec.	0.025 to 0.066 mm 0.00098 to 0.00260 in.
	Allowable limit	0.1 mm 0.0039 in.

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

W1030933



Replacing Idle Gear Bushing

(A) (When removing)

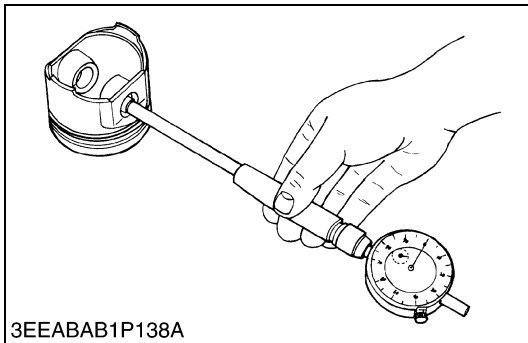
1. Press out the used idle gear bushing using an idle gear bushing replacing tool.

(B) (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.

W1031083

(3) Piston and Connecting Rod

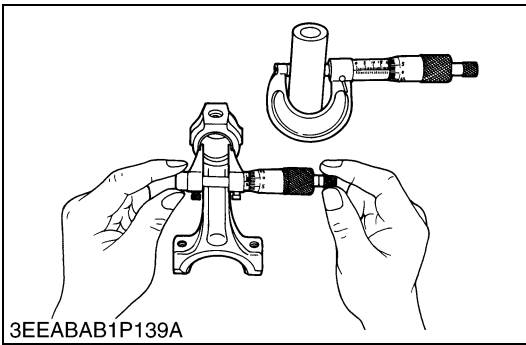


Piston Pin Bore I.D.

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

Piston pin bore I.D.	Factory spec.	25.000 to 25.013 mm 0.98425 to 0.98476 in.
	Allowable limit	25.05 mm 0.9862 in.

W1031817



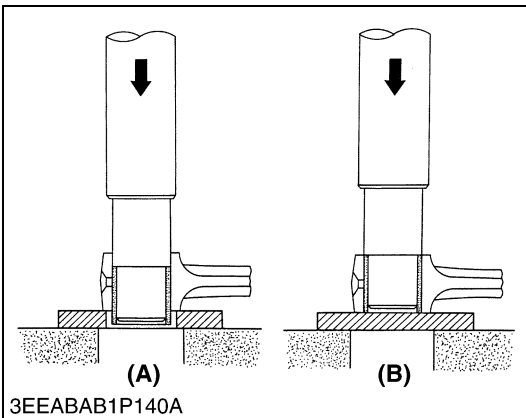
Oil Clearance between Piston Pin and Small End Bushing

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

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

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

W1031982



Replacing Connecting Rod Small End Bushing

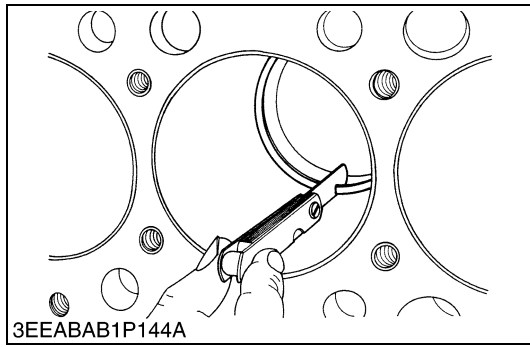
(A) (When removing)

1. Press out the small end bushing with a connecting rod small end bushing replacing tool.

(B) (When installing)

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Press fit a new bushing, taking due care to see that the connecting rod hole matches the bushing hole.

W1032140



Piston Ring Gap

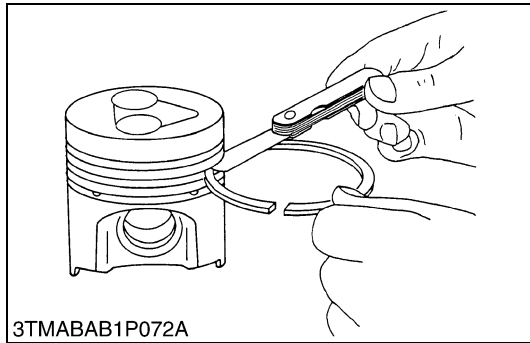
1. Insert the piston ring into the lower part of the liner (the least worn out part) with the piston.
2. Measure the ring gap with a feeler gauge.
3. If the gap exceeds the allowable limit, replace the ring.

Top ring	Factory spec.	D1403-M	0.20 to 0.35 mm 0.0079 to 0.0138 in.
		D1703-M	0.20 to 0.40 mm 0.0079 to 0.0157 in.
	Allowable limit		1.25 mm 0.0492 in.

Second ring	Factory spec.	0.30 to 0.45 mm 0.0118 to 0.0179 in.
	Allowable limit	1.25 mm 0.0492 in.

Oil ring	Factory spec.	0.25 to 0.45 mm 0.0098 to 0.0177 in.
	Allowable limit	1.25 mm 0.0492 in.

W1032246



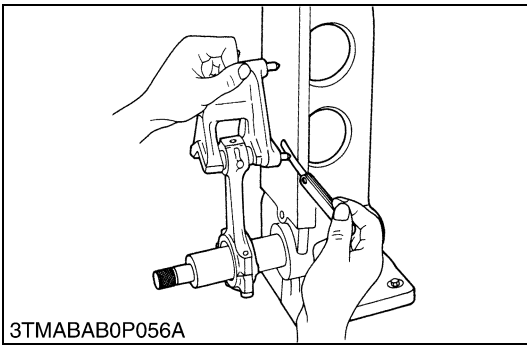
Clearance between Piston Ring and Groove

1. Remove carbon from the ring grooves.
2. Measure the clearance between the ring and the groove with a feeler gauge or depth gauge.
3. If the clearance exceeds the allowable limit, replace the ring since compression leak and oil shortage result.
4. If the clearance still exceeds the allowable limit after replacing the ring, replace the piston.

Second ring	Factory spec.	D1403-M	0.093 to 0.128 mm 0.0037 to 0.0050 in.
		D1703-M	0.093 to 0.128 mm 0.0037 to 0.0050 in.
	Allowable limit		0.2 mm 0.0079 in.

Oil ring	Factory spec.	0.020 to 0.060 mm 0.0008 to 0.0021 in.
	Allowable limit	0.15 mm 0.0059 in.

W1032489



Connecting Rod Alignment

■ NOTE

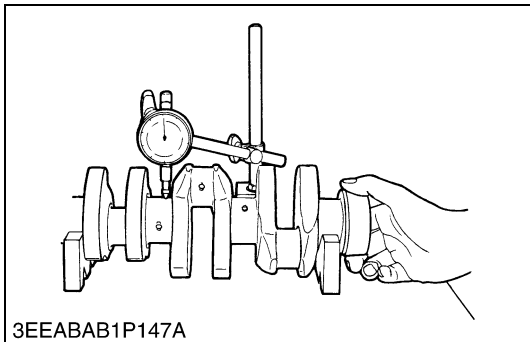
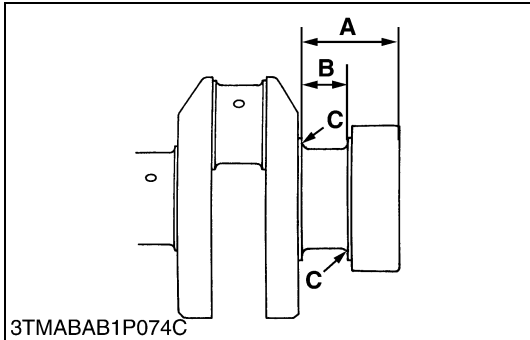
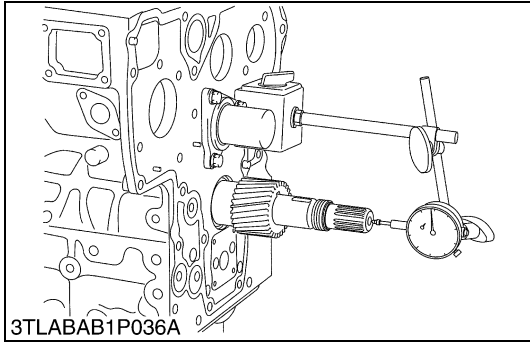
- Since the I.D. of the connecting rod small end bushing is the basis of this check, check bushing for wear beforehand.

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

Connecting rod alignment	Allowable limit	0.05 mm 0.0020 in.
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W1032720

(4) Crankshaft



Side Clearance of Crankshaft

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	0.5 mm 0.0197 in.

(Reference)

- Oversize dimensions of crankshaft journal

Oversize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	54.5 to 54.7 mm 2.1457 to 2.1535 in.	54.6 to 54.8 mm 2.1496 to 2.1575 in.
Dimension B	26.20 to 26.25 mm 1.0315 to 1.0335 in.	26.40 to 26.45 mm 1.0394 to 1.0413 in.
Dimension C	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
(0.4S) The crankshaft journal must be fine-finished to higher than ∇∇∇∇		

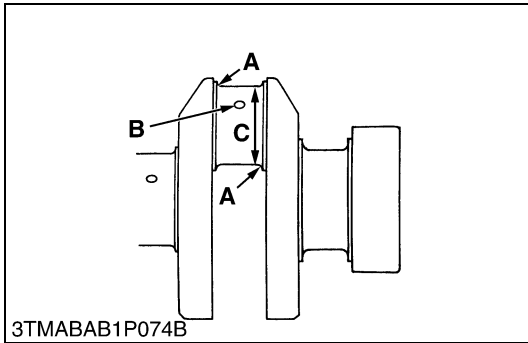
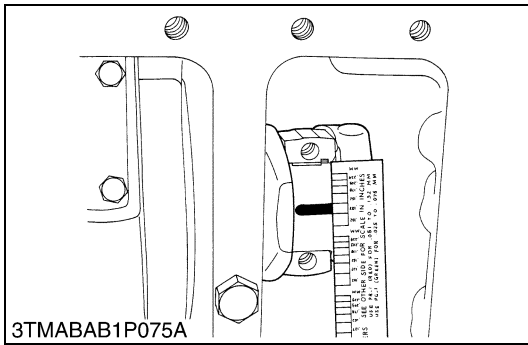
W1032880

Crankshaft Alignment

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

Crankshaft alignment	Allowable limit	0.02 mm 0.00079 in.
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W1033001



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.	0.025 to 0.087 mm 0.00098 to 0.00343 in.
	Allowable limit	0.20 mm 0.0079 in.

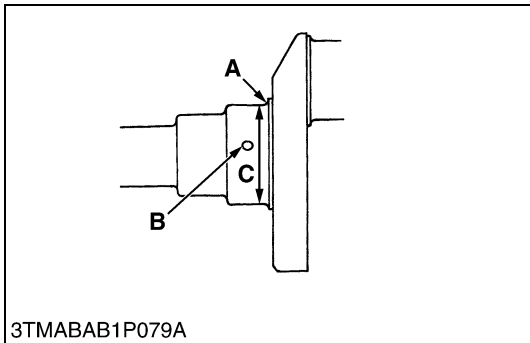
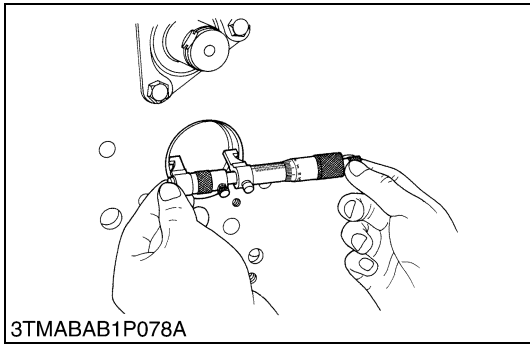
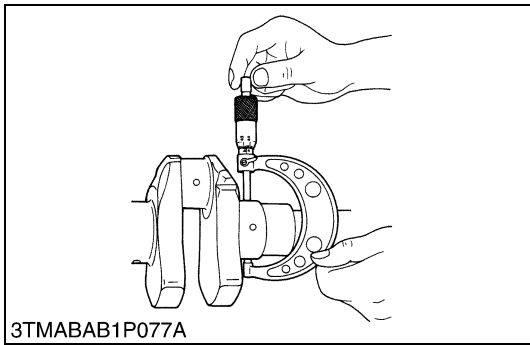
Crankpin O.D.	Factory spec.	46.959 to 46.975 mm 1.84878 to 1.84941 in.
Crankpin bearing I.D.	Factory spec.	47.000 to 47.046 mm 1.85039 to 1.85221 in.

(Reference)

- Undersize dimensions of crankpin

Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	3.3 to 3.7 mm radius 0.1299 to 0.1457 in. radius	3.3 to 3.7 mm radius 0.1299 to 0.1457 in. radius
*Dimension B	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief
Dimension C	46.759 to 46.775 mm dia. 1.84091 to 1.84154 in. dia.	46.559 to 46.575 mm dia. 1.83303 to 1.83366 in. dia.
(0.4S)		
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.		

W1033106



Oil Clearance between Crankshaft Journal and Crankshaft Bearing 1

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

Oil clearance between crankshaft journal and crankshaft bearing 1	Factory spec.	0.040 to 0.118 mm 0.00157 to 0.00465 in.
	Allowable limit	0.2 mm 0.0079 in.

Crankshaft journal O.D.	Factory spec.	59.921 to 59.940 mm 2.35910 to 2.35984 in.
Crankshaft bearing 1 I.D.	Factory spec.	59.980 to 60.039 mm 2.36142 to 2.36374 in.

(Reference)

- Undersize dimensions of crankshaft journal

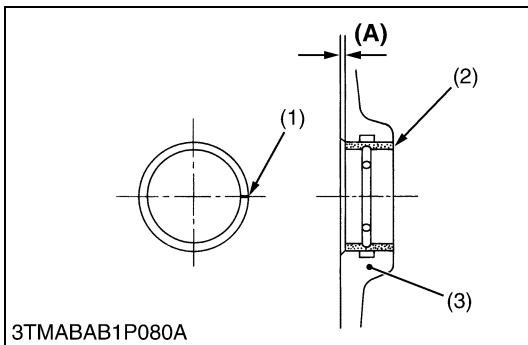
Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius
*Dimension B	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief
Dimension C	59.721 to 59.740 mm dia. 2.35122 to 2.35197 in. dia.	59.521 to 59.540 mm dia. 2.34335 to 2.34410 in. dia.

(0.4S)

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.

W1033717



Replacing Crankshaft Bearing 1

(When removing)

1. Press out the used crankshaft bearing 1 (2) using a crankshaft bearing 1 replacing tool.

(When installing)

1. Clean a new crankshaft bearing 1 (2) 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.

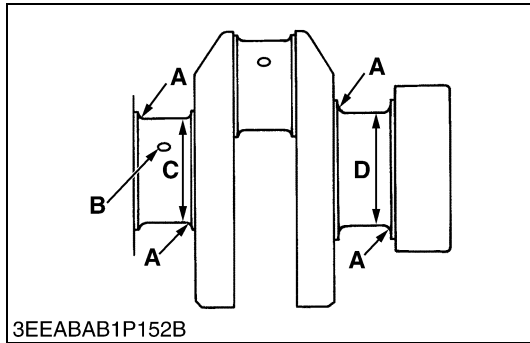
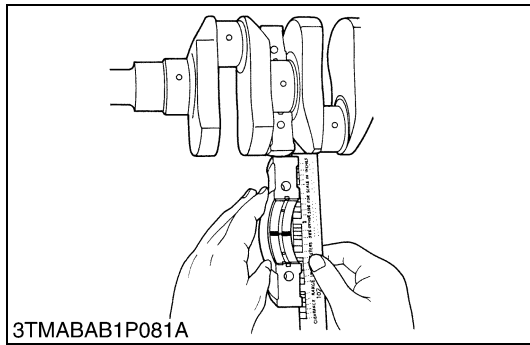
Dimension (A)	Factory spec.	4.2 to 4.5 mm 0.1654 to 0.1772 in.

(1) Seam

(2) Crankshaft Bearing 1

(3) Cylinder Block

W1033946



Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2

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

NOTE

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

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

Crankshaft journal O.D.	Factory spec.	59.921 to 59.940 mm 2.35910 to 2.35984 in.
Crankshaft bearing 2 I.D.	Factory spec.	59.980 to 60.025 mm 2.36142 to 2.36319 in.

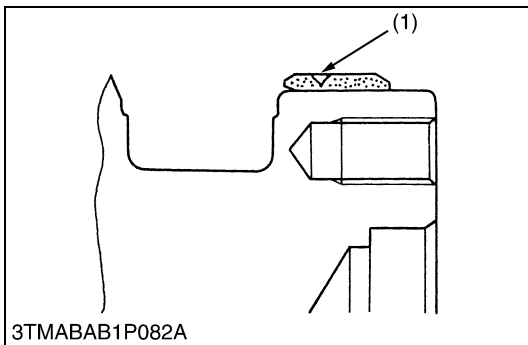
(Reference)

- Undersize dimensions of crankshaft journal

Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius	2.8 to 3.2 mm radius 0.1102 to 0.1260 in. radius
*Dimension B	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief	1.0 to 1.5 mm relief 0.0394 to 0.0591 in. relief
Dimension C, D	59.721 to 59.740 mm dia. 2.35122 to 2.35197 in. dia.	59.521 to 59.540 mm dia. 2.34335 to 2.34410 in. dia.

(0.4S)
The crankshaft journal must be fine-finished to higher than $\nabla\nabla\nabla\nabla$
*Holes to be de-burred and edges rounded with 1.0 to 1.5 mm
(0.0394 to 0.0591 in.) relief.

W1083821



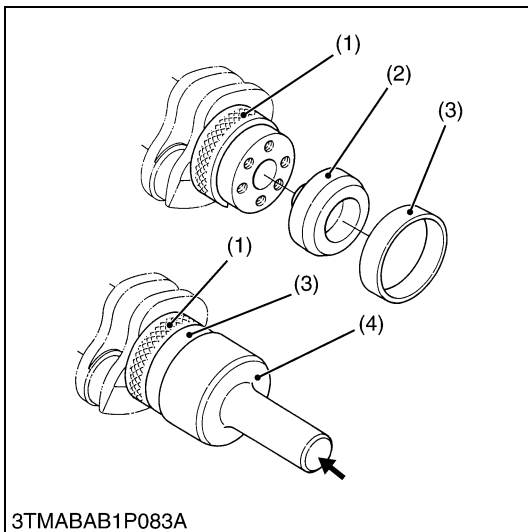
Crankshaft Sleeve Wear

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

Wear of sleeve	Allowable limit	0.1 mm 0.0004 in.

(1) Crankshaft Sleeve

W1033354



Replacing Crankshaft Sleeve

1. Remove the used crankshaft sleeve (3).
2. Set the sleeve guide (2) to the crankshaft (5).
3. Set the stopper (1) to the crankshaft (5) as shown in figure.
4. Heat a new sleeve to a temperature between 150 and 200 °C (302 and 392 °F), and fix the sleeve to the crankshaft (5) as shown in figure.
5. Press fit the sleeve using the auxiliary socket for pushing (4). (Refer to "SPECIAL TOOLS".)

NOTE

- Mount the sleeve with its largely chamfered surface facing outward.
- Should heating is not enough, a sleeve might stop halfway, so careful.

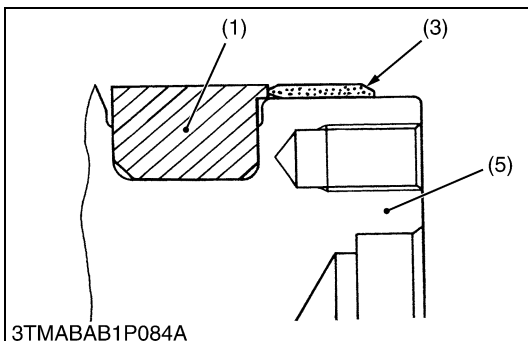
(1) Stopper

(2) Sleeve Guide

(3) Crankshaft Sleeve

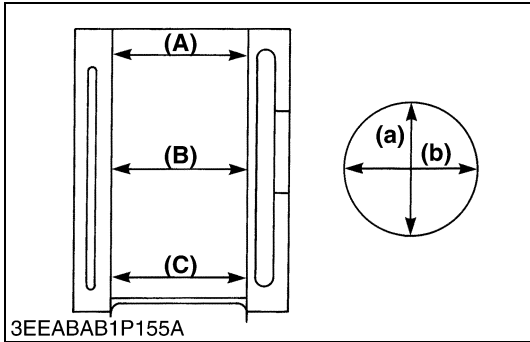
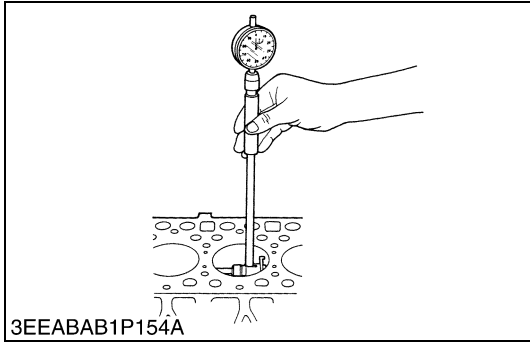
(4) Auxiliary Socket for Pushing

(5) Crankshaft



W1033503

(5) Cylinder



Cylinder Wear

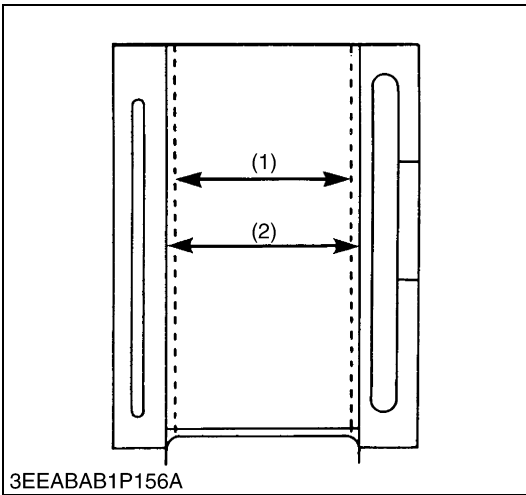
1. Measure the I.D. of the cylinder at the six positions (see figure) with a cylinder gauge to find the maximum and minimum I.D.'s.
2. Get the difference (Maximum wear) between the maximum and the minimum I.D.'s.
3. If the wear exceeds the allowable limit, bore and hone to the oversize dimension. (Refer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

Cylinder I.D.	Factory spec.	D1403-M	80.000 to 80.019 mm 3.14967 to 3.15042 in.
		D1703-M	87.000 to 87.022 mm 3.42519 to 3.42606 in.
Maximum wear	Allowable limit	D1403-M	+0.15 mm +0.0059 in.
		D1703-M	+0.15 mm +0.0059 in.

A : Top
B : Middle
C : Bottom (Skirt)

(a) Right-angled to Piston Pin
(b) Piston Pin Direction

W1034389



Correcting Cylinder (Oversize)

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

Oversize cylinder I.D.	Factory spec.	D1403-M	80.250 to 80.272 mm 3.15951 to 3.16038 in.
		D1703-M	87.250 to 87.272 mm 3.43503 to 3.43590 in.
Maximum wear	Allowable limit	D1403-M	+0.15 mm +0.0059 in.
		D1703-M	+0.15 mm +0.0059 in.
Finishing	Hone to 2.2 to 3.0 mm μ R max. $\nabla\nabla\nabla$ (0.00087 to 0.00118 in. μ R max.)		

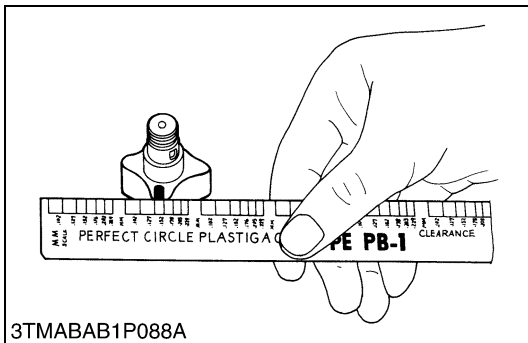
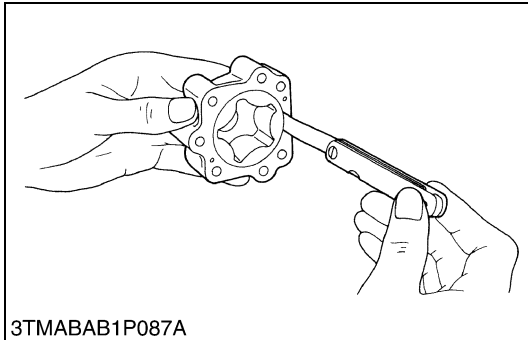
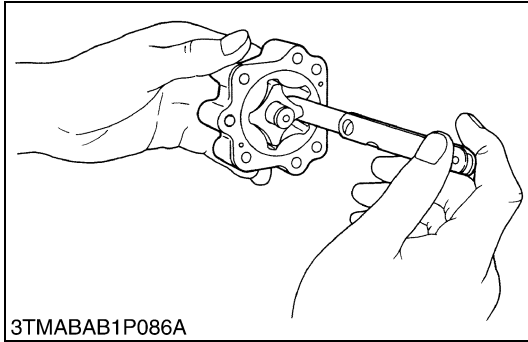
- Replace the piston and piston rings with oversize ones.
Oversize : 0.25 mm (0.098 in.)

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)

W1034448

(6) Oil Pump**Rotor Lobe Clearance**

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

Clearance between inner rotor and outer rotor	Factory spec.	0.03 to 0.14 mm 0.0012 to 0.0055 in.
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Clearance between outer rotor and pump body	Factory spec.	0.11 to 0.19 mm 0.0043 to 0.0075 in.
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W1035296

Clearance between Rotor and Cover

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

Clearance between inner rotor and cover	Factory spec.	0.105 to 0.150 mm 0.00413 to 0.00591 in.
	Allowable limit	0.2 mm 0.0079

W1035444

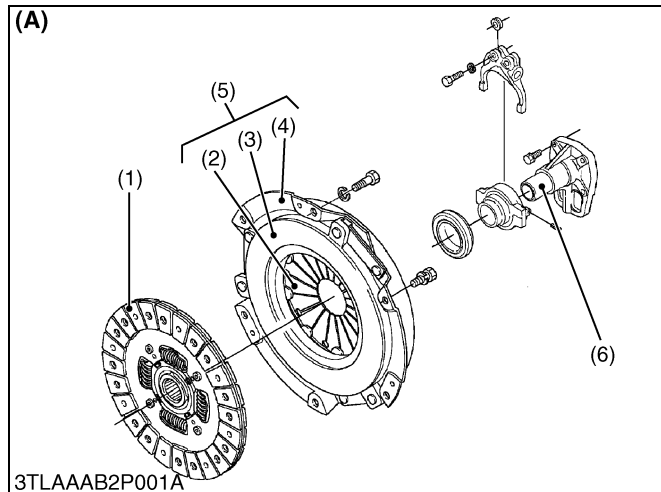
2 CLUTCH

MECHANISM

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1. STRUCTURE



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

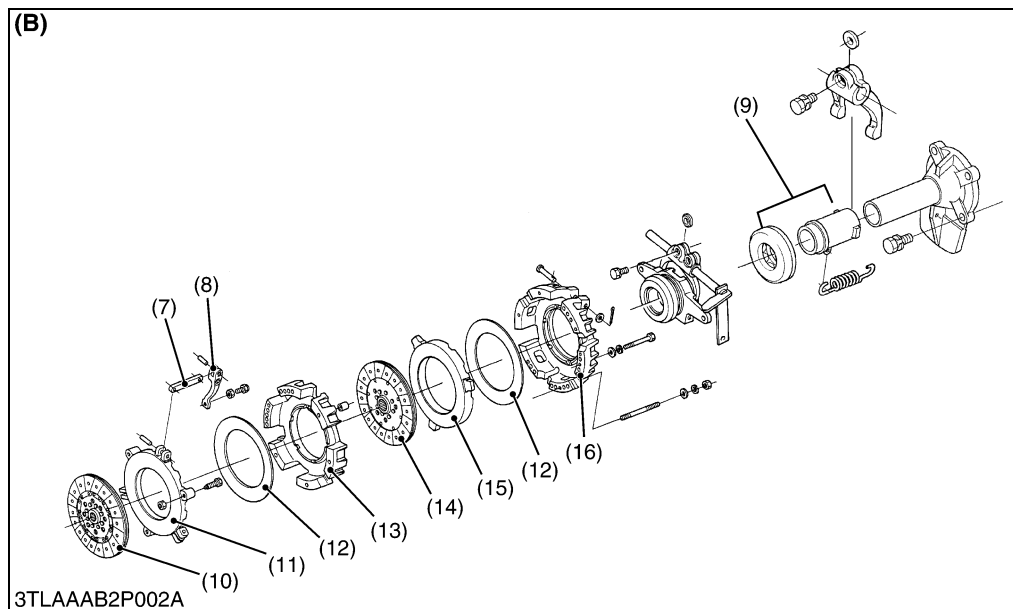
When the clutch pedal is depressed, the clutch is disengaged and when it is released, the clutch is engaged and power from the engine is transmitted to the transmission.

L2800 tractor is equipped with the dry single plate type clutch.

L3400 tractor is equipped with the dual stage type clutch.

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

W1012642



- (1) Clutch Disc
- (2) Diaphragm Spring
- (3) Pressure Plate
- (4) Clutch Cover
- (5) Pressure Plate Assembly
- (6) Release Hub
- (7) Release Rod
- (8) Release Lever
- (9) Release Hub
- (10) Clutch Disc 1 (Travelling)
- (11) Pressure Plate 1
- (12) Belleville Spring
- (13) Clutch Cover 1
- (14) Clutch Disc 2 (PTO)
- (15) Pressure Plate 2
- (16) Clutch Cover 2

(A) Signal Plate Clutch
(B) Dual Stage Clutch

W1012753

SERVICING

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(1) Single Plate Clutch (L2800)	2-S13
(2) Dual Stage Clutch (L3400).....	2-S14

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Clutch Drags	Clutch pedal free play excessive	Adjust	2-S6
	Clutch disc boss spline sticking or rusted	Replace or remove rust	2-S11
	Dust on clutch disc generated from clutch disc facing	Remove rust	–
	Release fork broken	Replace	2-S11
	Grease or oil on clutch disc facing	Replace	2-S10, S11
	Clutch disc or pressure plate warped	Replace	2-S10, S11
	Pilot bearing sticking or worn	Replace	–
	Release lever improperly adjusted (L3400)	Adjust	2-S6, S15
Clutch Slips	Clutch disc excessively worn	Replace	2-S13
	Grease or oil on clutch disc facing	Replace	2-S10, S11
	Clutch disc or pressure plate warped	Replace	2-S10, S11
	Diaphragm spring weaken or broken	Replace	2-S10, S11
	Wire ring worn or broken (clutch cover side)	Replace (Pressure plate assembly)	2-S10, S11
	Release lever improperly adjusted (L3400)	Adjust	2-S6, S15
Chattering	Grease or oil on clutch disc facing	Replace	2-S10, S11
	Clutch disc or pressure plate warped	Replace	2-S10, S11
	Clutch disc boss spline worn or rusted	Replace or remove rust	2-S11
	Main shaft bent	Replace	3-S16, S17
	Pressure plate or flywheel face cracked or scored	Replace	2-S10, S11
	Clutch disc boss spline and gear shaft spline worn	Replace	2-S11, 3-S16, S17
	Diaphragm spring strength uneven or diaphragm spring broken	Replace	2-S10, S11
Rattle During Running	Clutch disc boss spline worn	Replace	2-S10, S11
	Thrust ball bearing worn or sticking	Replace	2-S11
	Pilot bearing worn or sticking	Replace	–
Clutch Squeaks	Thrust ball bearing worn or sticking	Replace	2-S11
	Pilot bearing worn or sticking	Replace	–
	Clutch disc excessively worn	Replace	2-S10, S11

W1014322

Symptom	Probable Cause	Solution	Reference Page
Vibration	Main shaft bent	Replace	3-S16, S17
	Clutch disc rivet worn or broken	Replace	2-S10, S11
	Clutch parts broken	Replace	2-S10, S11

W1015002

2. SERVICING SPECIFICATIONS

[L2800]

Item		Factory Specification	Allowable Limit
Clutch Pedal	Free Travel	20 to 30 mm 0.8 to 1.2 in.	–
Pressure Plate to Adjusting Bolt	Clearance	1.4 to 1.5 mm 0.055 to 0.059 in.	–
Clutch Disc Boss to Main Shaft (Travelling)	Backlash (Displacement around Disc Edge)	–	2.0 mm 0.079 in.
Clutch Disc	Disc Surface to Rivet Top (Depth)	–	0.3 mm 0.012 in.
Diaphragm Spring	Mutual Difference	–	0.5 mm 0.020 in.
Pressure Plate to Straightedge	Clearance	–	0.2 mm 0.008 in.
Brake Pedal Shaft to Clutch Pedal Bushing	Clearance	0.05 to 0.20 mm 0.002 to 0.008 in.	1.0 mm 0.039 in.
Brake Pedal Shaft	O.D.	24.90 to 25.00 mm 0.980 to 0.984 in.	–
Clutch Pedal Bushing	I.D.	25.05 to 25.10 mm 0.986 to 0.988 in.	–
Clutch Lever	O.D.	14.97 to 15.00 mm 0.589 to 0.591 in.	14.13 mm 0.556 in.

W1013874

[L3400]

Item		Factory Specification	Allowable Limit
Clutch Pedal	Free Travel	20 to 30 mm 0.8 to 1.2 in.	–
Pressure Plate to Adjusting Bolt	Clearance	0.95 to 1.00 mm 0.037 to 0.039 in.	–
Clutch Disc Boss to Main Shaft (Travelling)	Backlash (Displacement around Disc Edge)	–	2.0 mm 0.079 in.
Clutch Disc Boss to Main Shaft (PTO)	Backlash (Displacement around Disc Edge)	–	2.0 mm 0.079 in.
Clutch Disc	Disc Surface to Rivet Top (Depth)	–	0.3 mm 0.012 in.
Release Lever	Mutual Difference	0.0 to 0.2 mm 0.000 to 0.008 in.	–
Gauge Ring to Top of Adjusting Screw	Clearance	0.0 to 0.7 mm 0.000 to 0.028 in.	–
Pressure Plate 2 to Adjusting Screw	Clearance	0.95 to 1.00 mm 0.037 to 0.039 in.	–
Pressure Plate to Straightedge	Clearance	–	0.2 mm 0.008 in.
Belleville Spring	Free Height	7.24 mm 0.285 in.	6.76 mm 0.266 in.
Brake Pedal Shaft to Clutch Pedal Bushing	Clearance	0.05 to 0.20 mm 0.002 to 0.008 in.	1.0 mm 0.039 in.
Brake Pedal Shaft	O.D.	24.90 to 25.00 mm 0.980 to 0.984 in.	–
Clutch Pedal Bushing	I.D.	25.05 to 25.10 mm 0.986 to 0.988 in.	–
Clutch Lever	O.D.	14.97 to 15.00 mm 0.589 to 0.591 in.	14.13 mm 0.556 in.

W1019107

3. TIGHTENING TORQUES

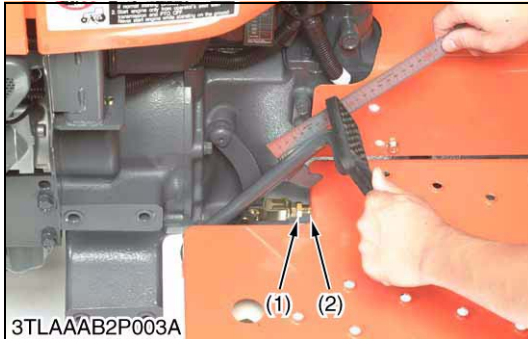
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-9.)

Item	N·m	kgf·m	ft-lbs
Lock nut (L3400)	15.7 to 21.6	1.6 to 2.2	11.6 to 15.9
Starter's B terminal mounting nut	7.8 to 9.8	0.8 to 1.0	5.8 to 7.2
Engine mounting screw	48.1 to 55.8	4.9 to 5.7	35.4 to 41.2
Clutch mounting screws and reamer screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Release fork setting screw (L3400)	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Adjusting screw lock nut (L3400)	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5
Pressure plate 2 height adjusting screw lock nut (3400)	15.7 to 21.6	1.6 to 2.2	11.6 to 15.9
Steering wheel mounting nut	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Delivery pipe joint bolt	49.0 to 69.0	5.0 to 7.0	36.1 to 50.6

W1012736

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



Adjusting Clutch Pedal Free Travel (L2800)

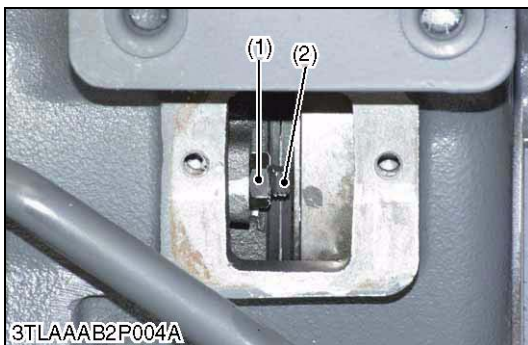
1. Stop the engine and remove the key.
2. Slightly depress the clutch pedal and measure free travel at top of pedal stroke.
3. If adjustment is needed, loosen the lock nut (1), and turn the turnbuckle (2) to adjust the clutch pedal free travel within factory specification.
4. Retighten the lock nut (1).

Clutch pedal free travel	Factory spec.	20 to 30 mm 0.8 to 1.2 in.
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(1) Lock Nut

(2) Turnbuckle

W1011840



Adjusting Clutch Pedal Free Travel (L3400)

1. At first adjust the clutch pedal free travel, as is mentioned above.
2. Remove the cover located on the right side of flywheel housing case.
3. Loosen the lock nut (1), tighten the adjust bolt (2) by using 6 mm spanner until head of the bolt contacts pressure plate slightly. Make 7/6 turn counterclockwise to give 1.4 to 1.5 mm (0.055 to 0.059 in.) clearance.
4. Tighten the lock nut (1), holding the adjusting bolt (2).
5. Turn the flywheel to adjust the clearance of other adjusting bolts (three bolts).
6. Repeat step 3 and readjust clutch pedal free travel if necessary.

Clearance (A) between pressure plate and adjusting bolt	Factory spec.	0.95 to 1.00 mm 0.037 to 0.039 in.
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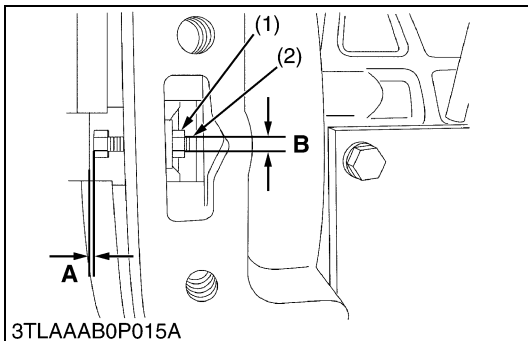
Tightening torque	Lock nut	15.7 to 21.6 N-m 1.6 to 2.2 kgf-m 11.6 to 15.9 ft-lbs
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(1) Lock Nut

(2) Adjusting Bolt

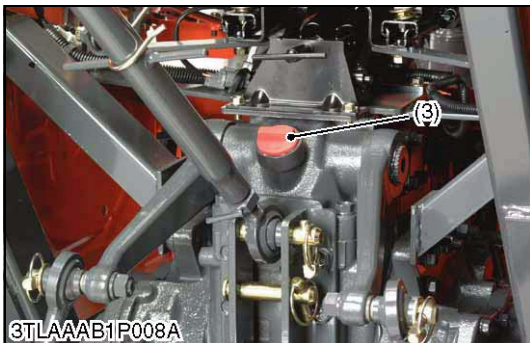
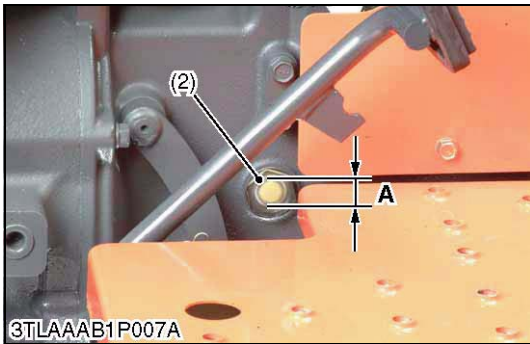
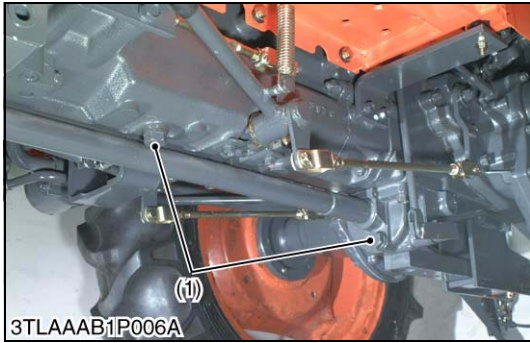
A : Clearance**B : 6 mm (0.24 in.)**

W1014671



[2] PREPARATION

(1) Separating Engine and Clutch Housing



Draining the Transmission Fluid

1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. Screw in the drain plugs (1).

(When reassembling)

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

■ IMPORTANT

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

Transmission fluid	Capacity	2WD	27 L 7.1 U.S.gals 5.98 Imp.gals
		4WD	27.5 L 7.3 U.S.gals 6.1 Imp.gals
		HST (4WD)	23.5 L 6.2 U.S.gals 5.2 Imp.gals

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

A : Oil level is acceptable within this range.

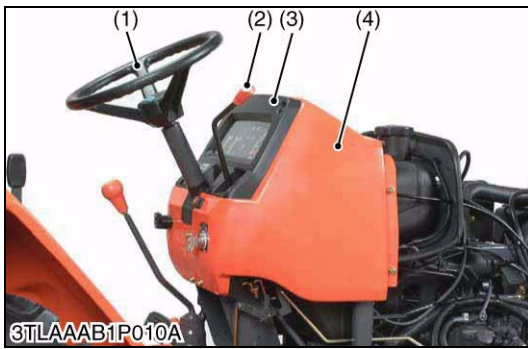
W1015970

Bonnet and Front Cover

1. Disconnect the battery negative cable.
2. Disconnect the connector for head light.
3. Remove bonnet (1) and side cover (2).
4. Remove the front cover (3).

- (1) Bonnet (3) Front Cover
(2) Side Cover

W1016314



Steering Wheel and Rear Bonnet

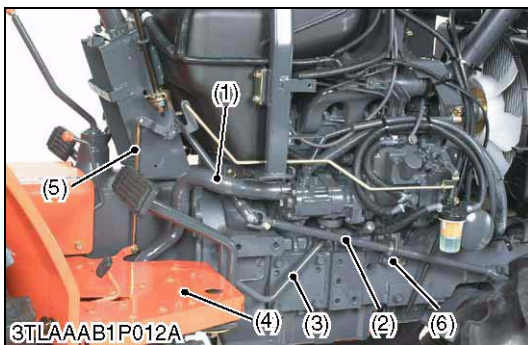
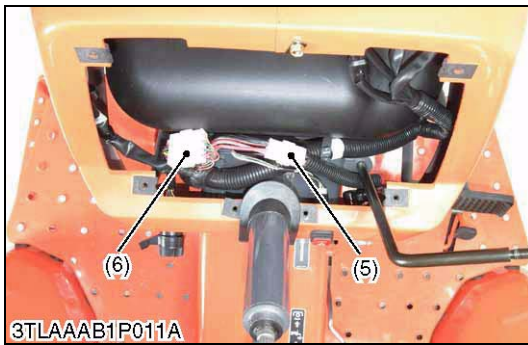
1. Remove the steering wheel (1) with steering puller.
2. Remove the throttle grip (2).
3. Disconnect the hour-meter cable from the engine.
4. Remove the meter panel (3).
5. Disconnect the **4P** connector (5) for main switch.
6. Disconnect the **8P** connector (6) for combination switch.
7. Remove the rear bonnet (4).

(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 ft-lbs
-------------------	-----------------------------	---

- | | |
|--------------------|-------------------------|
| (1) Steering Wheel | (4) Rear Bonnet |
| (2) Throttle Grip | (5) 4P Connector |
| (3) Meter Panel | (6) 8P Connector |

W1012884



Suction Hose and Delivery Pipe

1. Disconnect the suction hose (1).
2. Remove the step (4) mounting screws.
3. Remove the steering joint shaft (2).
4. Remove the delivery pipe (3).
5. Remove the throttle rod (5).

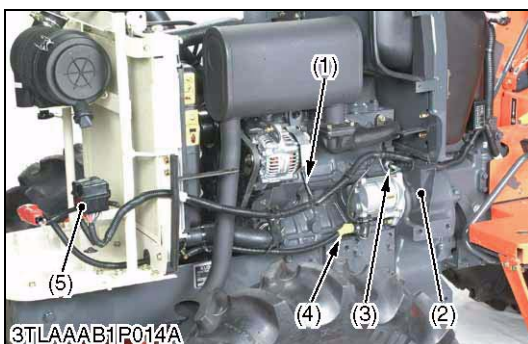
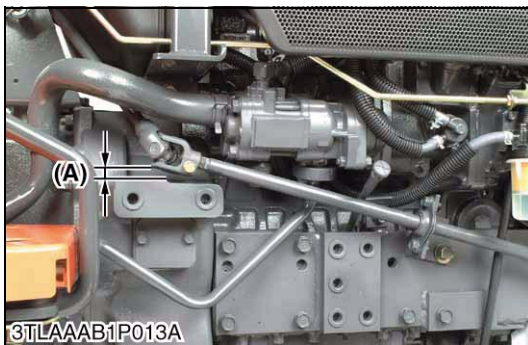
(When reassembling)

- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.19 in.) between the universal joint and flywheel housing. Then fit the support (6) in position.

Tightening torque	Delivery pipe joint bolt	49 to 69 N-m 5.0 to 7.0 kgf-m 36.1 to 50.6 ft-lbs
-------------------	--------------------------	---

- | | |
|--------------------------|----------------------|
| (1) Suction Hose | (5) Throttle Rod |
| (2) Steering Joint Shaft | (6) Support |
| (3) Delivery Pipe | |
| (4) Step | (A) Clearance |

W1045309

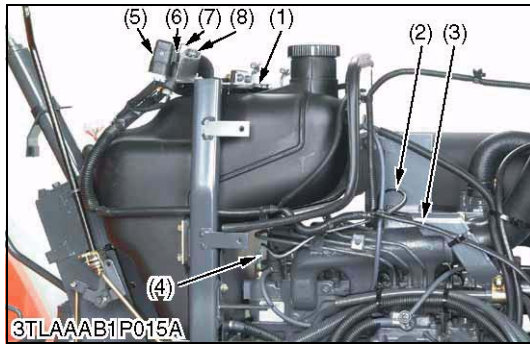


Wirings

1. Disconnect the wiring (1) for the alternator.
2. Disconnect the wiring (4) for starter motor.
3. Disconnect the **1P** Connector (3) for the engine oil switch.
4. Remove the shutter plate (2).
5. Remove the slow blow fuse (5).

- | | |
|---------------------------|------------------------------|
| (1) Wiring for Alternator | (4) Wiring for Starter Motor |
| (2) Shutter Plate | (5) Slow Blow Fuse |
| (3) 1P Connector | |

W1016906

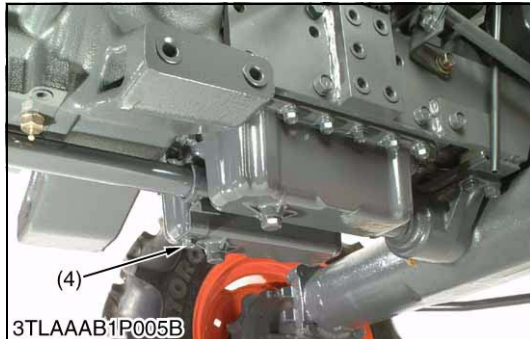


Wirings

1. Disconnect the wiring (1) for the fuel sensor.
2. Disconnect the key stop solenoid connector (3).
3. Disconnect the wiring (2) for the glow plug.
4. Disconnect the **1P** connector (4) for the water temperature sensor.
5. Disconnect the starter relay **4P** connector (7), OPC timer **4P** connector (6), flasher unit **6P** connector (5) and glow relay **4P** connector (8).

- | | |
|---------------------------------|---------------------------------------|
| (1) Wiring for Fuel Sensor | (5) Flasher Unit 6P Connector |
| (2) Wiring for Glow Plug | (6) OPC timer 4P Connector |
| (3) Key Stop Solenoid Connector | (7) Starter Relay 4P Connector |
| (4) 1P Connector | (8) Glow Relay 4P Connector |

W1046003



Propeller Shaft (4WD)

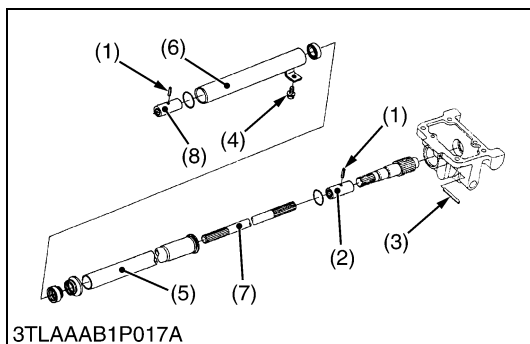
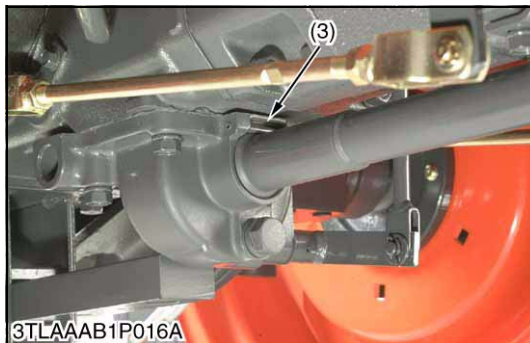
1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (7) and pinion shaft.

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

W1017347





3TLAAAB1P018A

Separating Engine from Clutch Housing Case

1. Check the engine and clutch housing case are securely mounted on the disassembling stands.
2. Remove the engine mounting screws, and separate the engine from the clutch housing case.

(When reassembling)

- Apply grease to the splines.
- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the engine and clutch housing case.

Tightening torque	Engine mounting screws to clutch housing	48.1 to55.8 N·m 4.9 to5.7 kgf·m 35.4 to41.2 ft·lbs
-------------------	--	--

W1017559

(2) Separating Clutch Assembly



3TLAAAB1P019A

Clutch Assembly

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

(When reassembling)

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

■ IMPORTANT

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

■ NOTE

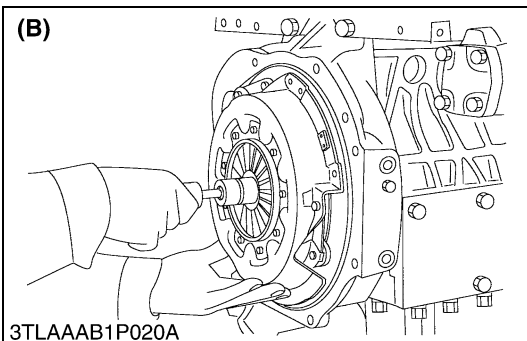
- Do not allow grease and oil on the clutch disc facing.

Tightening torque	Clutch cover mounting screws and reamer screws	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.5 to 20.3 ft·lbs
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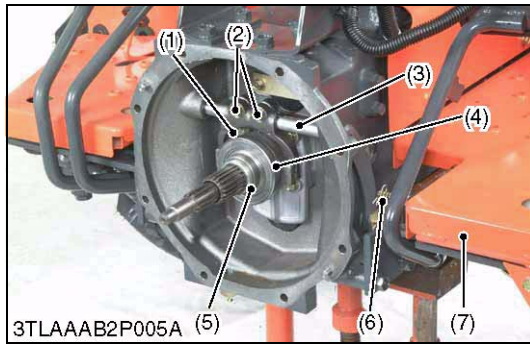
(A) L3400

(B) L2800

W1017686



3TLAAAB1P020A



Release Hub and Clutch Lever (L3400)

1. Remove the step (7) mounting screws.
2. Remove the clutch rod (6).
3. Remove the release fork setting screws (2).
4. Remove the thrust ball bearing (5) and release hub (4) as a unit.
5. Draw out the clutch lever (3).
6. Remove the release fork (1).

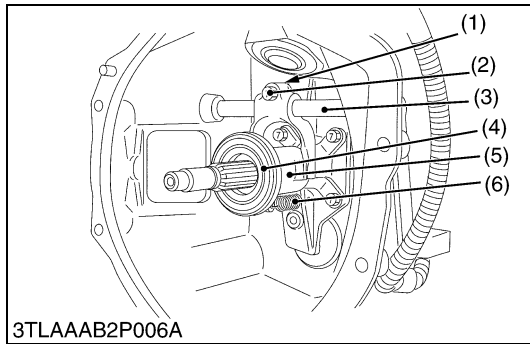
(When reassembling)

- Make sure the direction of the release fork is correct.
- Inject grease to the release hub.
- Apply grease to the contact surfaces of the release fork and release hub.
- Apply grease on the clutch lever.

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

- | | |
|------------------|-------------------------|
| (1) Release Fork | (5) Thrust Ball Bearing |
| (2) Screw | (6) Clutch Rod |
| (3) Clutch Lever | (7) Step |
| (4) Release Hub | |

W1013553



Release Hub and Clutch Lever (L2800)

1. Remove the release fork (1) mounting screw (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the hub return spring (6).
4. Remove the thrust ball bearing (4) and release hub (5) as a unit.

(When reassembling)

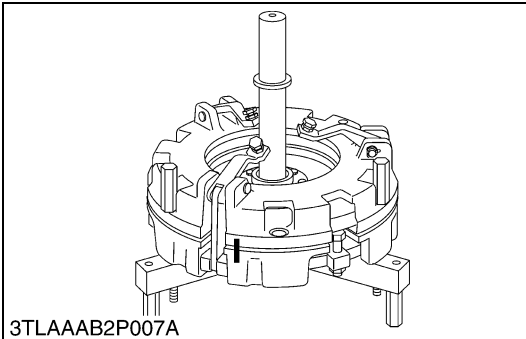
- Make sure the direction of the release fork (1) is correct.
- Inject grease to the release hub (5).
- Be sure to set the hub return spring (6).

- | | |
|------------------|-------------------------|
| (1) Release Fork | (4) Thrust Ball Bearing |
| (2) Screw | (5) Release Hub |
| (3) Clutch Lever | (6) Hub Return Spring |

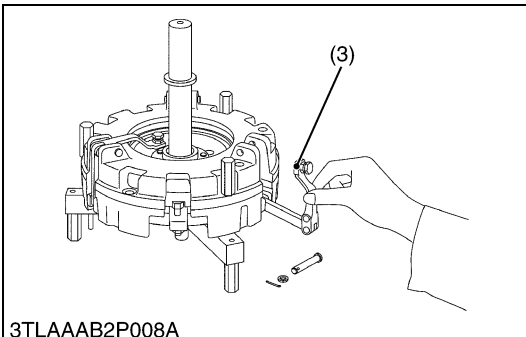
W1018044

[3] DISASSEMBLING AND ASSEMBLING

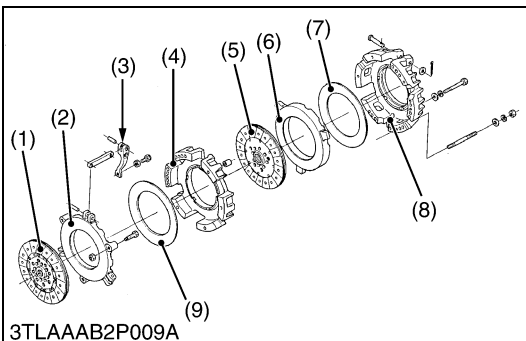
(1) Dual Stage Clutch (L3400)



3TLAAAB2P007A



3TLAAAB2P008A



3TLAAAB2P009A

Mounting to Main Clutch Assembling Tool

1. Put parting marks on the clutch cover and pressure plate.
2. Mount the clutch on dual stage clutch exclusive tool (Code No. 07916-90052).

W1017217

Disassembling Clutch Assembly

1. Draw out the clevis pins and remove the release levers (3).
2. Loosen the three mounting screws evenly and remove them.
3. Remove the clutch cover 2 (8), belleville spring (7), pressure plate 2 (PTO) (6), and clutch disc (PTO) (5) in order.
4. Remove the clutch cover 1 (4), belleville spring (9), and pressure plate 1 (travelling) (2) in order.

(When reassembling)

■ IMPORTANT

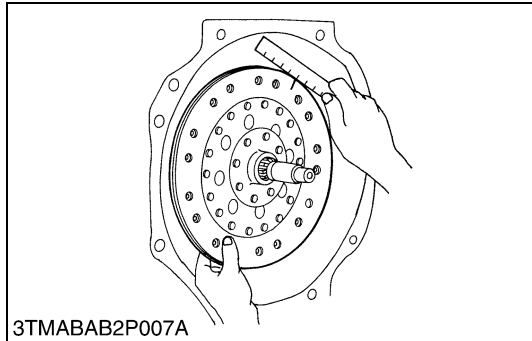
- When assembling the clutch covers and pressure plates, be sure to align the parting marks to ensure correct dynamic balance.

- | | |
|----------------------------------|----------------------------|
| (1) Clutch Disc (Traveling) | (6) Pressure Plate 2 (PTO) |
| (2) Pressure Plate 1 (Traveling) | (7) Belleville Spring |
| (3) Release Lever | (8) Clutch Cover 2 |
| (4) Clutch Cover 1 | (9) Belleville Spring |
| (5) Clutch Disc (PTO) | |

W1017279

[4] SERVICING

(1) Single Plate Clutch (L2800)

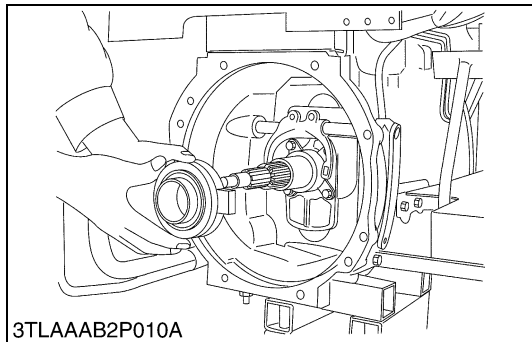


Backlash between Clutch Disc Boss and Shaft

1. Mount the clutch disc to the main shaft.
2. Hold the main shaft so that it does not turn.
3. Rotate disc lightly and measure the displacement around the disc edge.
4. If the measurement exceeds the allowable limit, replace the clutch disc.

Backlash (Displacement around disc edge)	Allowable limit	2.0 mm 0.079 in.
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W1013772



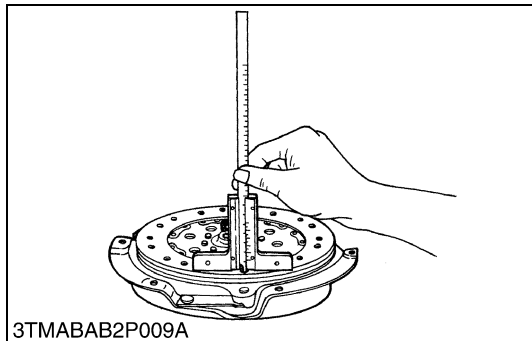
Release Bearing

1. Check for abnormal wear on contact surface.
2. Rotate bearing outer race, while applying pressure to it.
3. If the bearing rotation is rough or noisy, replace the release bearing.

■ NOTE

- Do not depress bearing outer race, when replacing release bearing.
- Do not wash the release bearing with a cleaning solvent.

W1013883

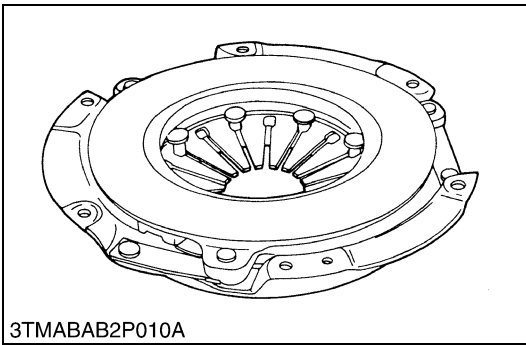


Clutch Disc Wear

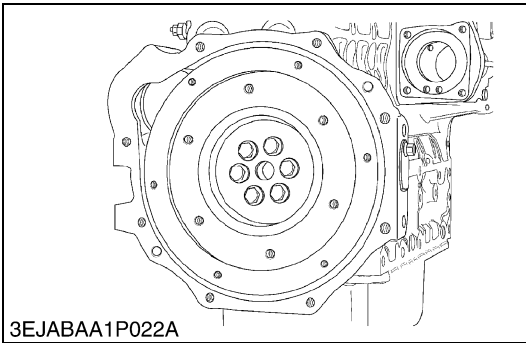
1. Measure the depth from clutch disc surface to the top of rivet at least 10 points with a depth gauge.
2. If the depth is less than the allowable limit, replace the disc.
3. If oil is sticking to clutch disc, or disc surface is carbonized, replace the disc.
In this case, inspect transmission gear shaft oil seal, engine rear oil seal and other points for oil leakage.

Disc surface to rivet top (Depth)	Allowable limit	0.3 mm 0.012 in.
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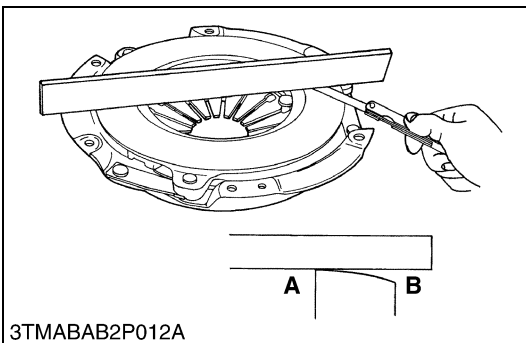
W1014100



3TMABAB2P010A



3EJABAA1P022A



3TMABAB2P012A

Checking Pressure Plate Assembly and Flywheel

1. Wash the disassembling parts except clutch disc with a suitable cleaning solvent to remove dirt and grease before making inspection and adjustment.
2. Check friction surface of pressure plate and flywheel for scoring or roughness.
 - Slight roughness may be smoothed by using fine emery cloth.
 - If these parts have deep scores or grooves on their surface, they should be replaced.
3. Inspect the surface of the diaphragm spring for wear. If excessive wear is found, replace clutch cover assembly.
4. Inspect thrust rings (wire ring) for wear or damage. As these parts are invisible from outside, shake pressure plate assembly up and down to listen for chattering noise, or lightly hammer on rivets for a slightly cracked noise. Any of these noises indicates need of replace as a complete assembly.

Diaphragm spring mutual difference	Allowable limit	0.5 mm 0.020 in.
------------------------------------	-----------------	---------------------

W1014308

Pressure Plate Flatness

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

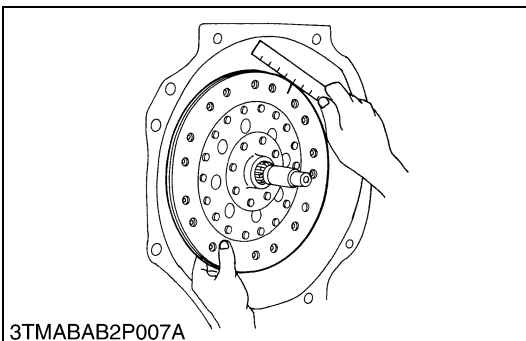
Clearance between pressure plate and straight edge	Allowable limit	0.2 mm 0.008 in.
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A : Inside

B : Outside

W1017610

(2) Dual Stage Clutch (L3400)



3TMABAB2P007A

Backlash between Clutch Disc Boss and Shaft

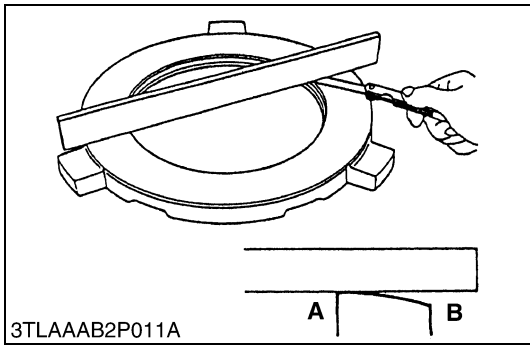
1. Mount the PTO clutch disc to the 16T gear shaft.
2. Hold the gear 16T gear shaft so that it does not turn.
3. Rotate disc lightly and measure the displacement around the disc edge.
4. If the measurement exceeds the allowable limit, replace.

Backlash (Displacement around disc edge (PTO))	Allowable limit	2.0 mm 0.079 in.
--	-----------------	---------------------

5. perform measurement for the traveling clutch disc and the main shaft in the same way as a above.

Backlash (Displacement around disc edge (Travelling))	Allowable limit	2.0 mm 0.079 in.
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W1016866



Pressure Plate Flatness

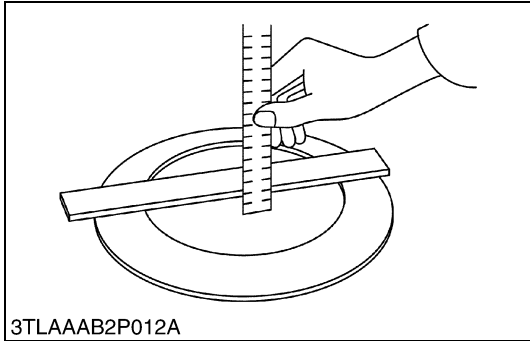
1. Place a straightedge on the pressure plate and measure clearance with a feeler gauge at several points.
2. If the clearance exceeds the allowable limit, replace it.
3. When the pressure plate is worn around its outside and its inside surface only is in contact with the straightedge, replace even if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

Clearance between pressure plate and straightedge	Allowable limit	2.0 mm 0.079 in.
---	-----------------	---------------------

A : Inside

B : Outside

W1018116

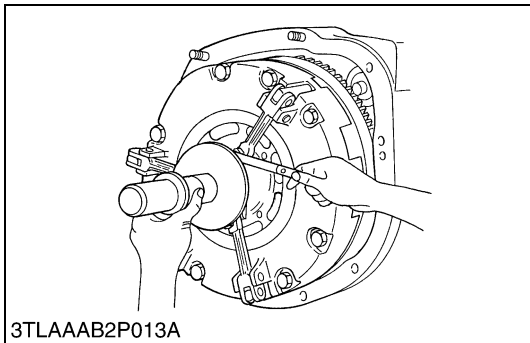


Belleville Spring Free Height

1. Put the belleville spring on the surface plate.
2. Place a straightedge on the belleville spring and measure the free height.
3. If the measurement is less than the allowable limit, replace.
4. Check for cracks, if defects are found, replace.

Belleville spring free height	Factory spec.	7.24 mm 0.285 in.
	Allowable limit	6.76 mm 0.266 in.

W1018241

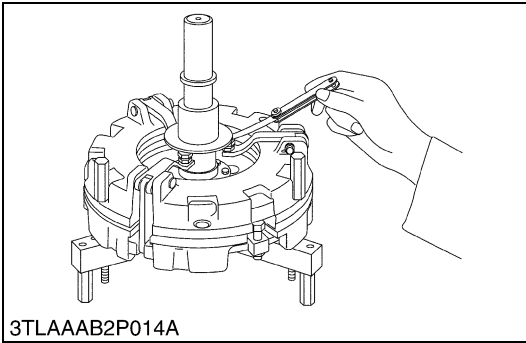


Mutual Difference of Release Lever

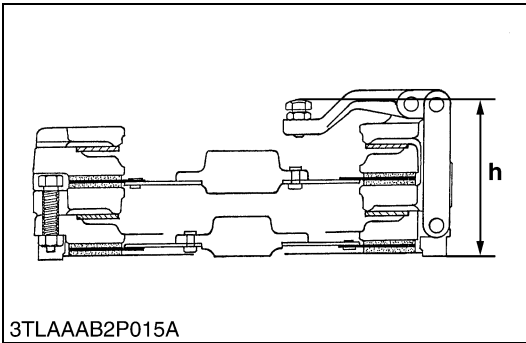
1. Insert the dual stage clutch exclusive tool (Code No, 07916-90052).
2. Measure the clearance between gauge ring and the top of adjusting screw with a feeler gauge.
3. If the clearance is not within the factory specifications, adjust with the adjusting screws.

Mutual difference of release lever	Factory spec.	0.0 to 0.2 mm 0.000 to 0.008 in.
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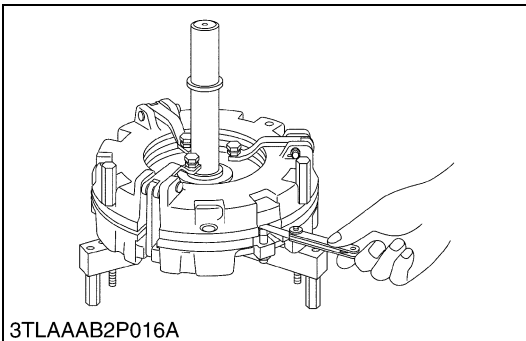
W1018442



3TLAAAB2P014A



3TLAAAB2P015A



3TLAAAB2P016A

Release Lever Height

1. Mount the dual stage clutch exclusive tool (Code No. 07916-90052).
2. Measure the clearance between gauge ring and the top of adjusting screw with a feeler gauge.
3. If the clearance is not within the factory specifications, adjust with the adjusting screws.

Clearance between gauge ring and the top of adjusting screw	Factory spec.	0.0 to 0.7 mm 0.000 to 0.0028 in.
---	---------------	--------------------------------------

Tightening torque	Adjusting screw lock nut	14.7 to 19.6 N·m 1.5 to 2.0 Kgf·m 10.8 to 14.5 ft-lbs
-------------------	--------------------------	---

■ IMPORTANT

- Be sure to adjust the mutual difference of release lever to within the factory specifications.

■ NOTE

- Apply adhesive (Cemdine No. 110 by Cemdine Industry Co., Ltd. or equivalent) to the adjusting screws, replace lever and lock nuts.

(Reference)

Release lever height (h)	Reference value	97.8 to 99.2 mm 3.850 to 3.906 in.
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W1018555

Clearance between Pressure Plate 2 and Adjusting Screw

1. Measure the clearance between pressure plate 2 and the top of adjusting screw with a feeler gauge.
2. If the clearance is not within the factory specifications, rotate adjusting screw to adjust.

Clearance between pressure plate 2 and adjusting screw	Factory spec.	0.9 to 1.0 mm 0.035 to 0.039 in.
--	---------------	-------------------------------------

Tightening torque	Pressure plate 2 height adjusting screw lock nut	15.7 to 21.6 N·m 1.6 to 2.2 Kgf·m 11.6 to 15.9 ft-lbs
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W1018781

3 TRANSMISSION (MANUAL TYPE)

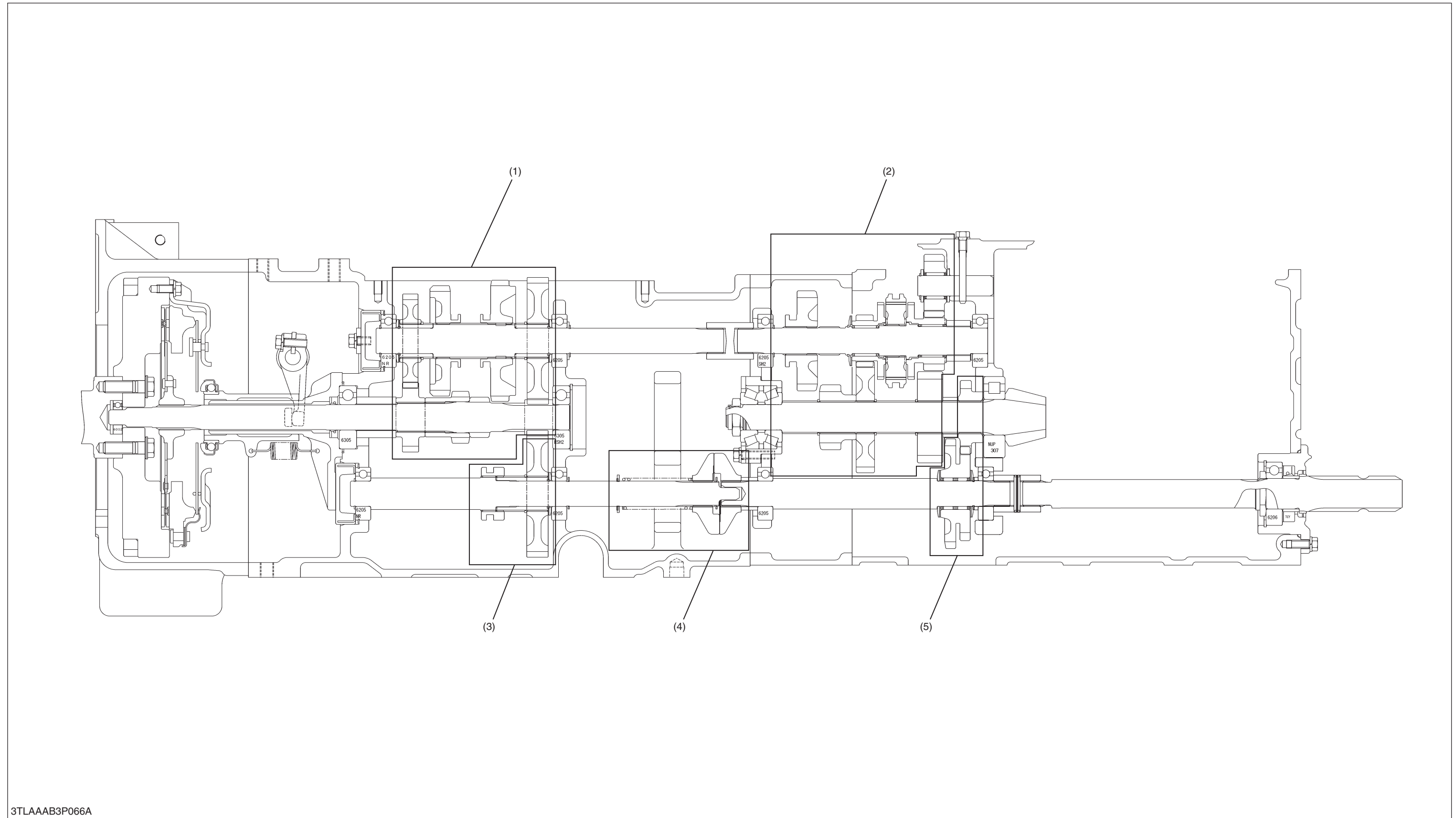
MECHANISM

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[1] L2800	3-M1
[2] L3400	3-M2

1. STRUCTURE

[1] L2800



3TLAAB3P066A

(1) Main Gear Shift Section

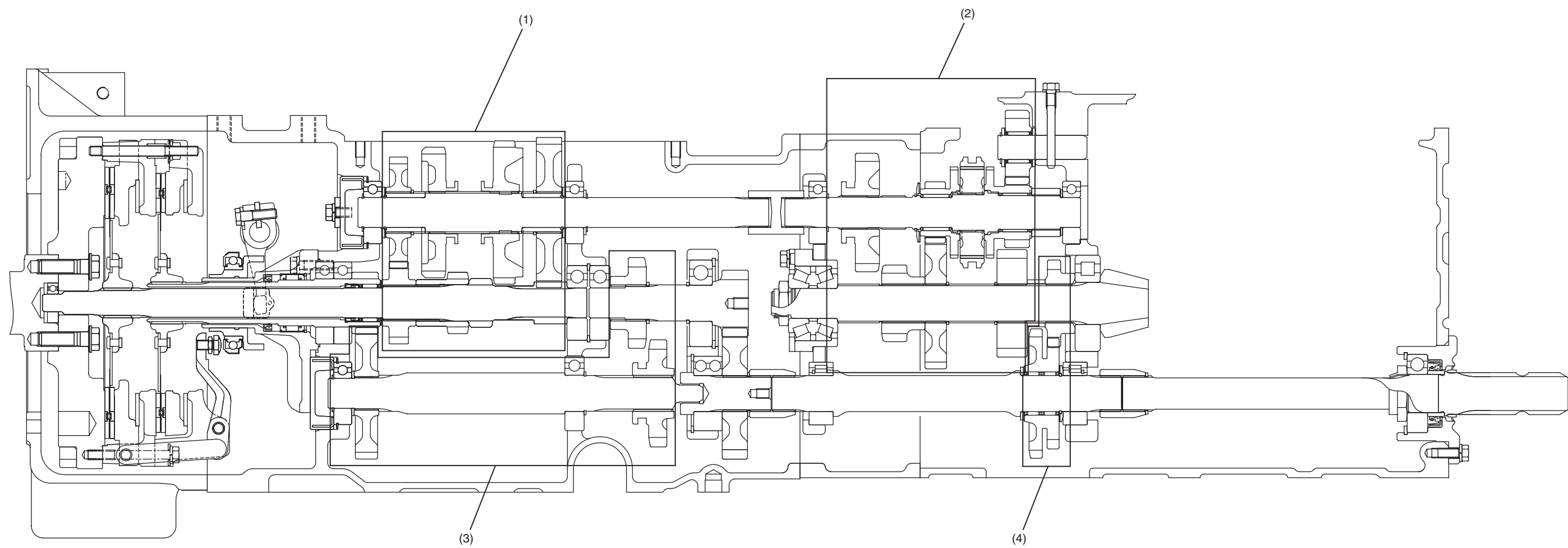
(2) Lo-Reverse, Hi-Shift Section

(3) PTO Gear Section

(4) One-Way Clutch Section

(5) 4WD Section (Drive Gear)

[2] L3400



3TLAAB3P067A

(1) Main Gear Shift Section

(2) Lo-Reverse, Hi-Shift Section

(3) PTO Gear Section

(4) 4WD Section (Drive Gear)

SERVICING

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive Transmission Noise	Transmission fluid insufficient	Replenish	3-S6
	Gear worn or backlash improper	Replace	3-S30
	Bearing worn or broken	Replace	3-S30
	Shift fork worn	Replace	3-S30
	Spline worn	Replace	3-S30
	Snap rings on the shaft come off	Repair or replace	–
	Spiral bevel pinion lock nut improperly tightened	Tighten	3-S21
	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S32
	Improper backlash between differential pinion and differential side gear	Adjust	3-S35
Gear Slip Out of Mesh	Shift linkages rusted	Repair	–
	Shifter or shift fork or damaged	Replace	3-S30
	Shift fork interlock ball spring weaken or damaged	Replace	3-S31
	Interlock ball fallen	Reassemble	–
	Gears worn or broken	Replace	–
Hard Shifting	Shifter or shift fork worn or damaged	Replace	3-S30
	Shift fork bent	Replace	–
	Shift linkage rusted	Repair	–
	Shaft part of shift arms rusted	Repair	–
Gears Clash When Shifting	Clutch does not release	Adjust or repair	2-S6
	Gears worn or damaged	Replace	–
Differential Lock Can Not Be Set	Differential lock shift fork damaged	Replace	–
	Differential lock shift fork mounting spring pin damaged	Replace	3-S20
	Differential lock shifter pin bent or damaged	Replace	3-S20
	Differential lock fork shaft bent or damaged	Replace	3-S20
Differential Lock Pedal Does Not Return	Differential lock pedal return spring weaken or damaged	Replace	–
	Differential lock shifter pin bent or damaged	Replace	3-S20
	Differential lock fork shaft bent	Replace	3-S20

W1014322

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual at All Time	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S32
	Improper backlash between differential pinion and differential side gear	Adjust	3-S35
	Bearings worn	Replace	3-S30
	Insufficient or improper type of transmission fluid used	Replenish or replace	G-7, 3-S6
Noise While Turning	Differential pinions or differential side gears worn or damaged	Replace	3-S35
	Differential lock binding (does not disengage)	Replace	–
	Bearing worn	Replace	3-S30

W1020446

2. SERVICING SPECIFICATIONS

[L2800]

Item		Factory Specification	Allowable Limit
Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	0.4 mm 0.016 in.
Gear to Spline	Clearance	0.030 to 0.078 mm 0.0012 to 0.0031 in.	0.2 mm 0.0079 in.
Shift Fork to Shift Gear Groove	Clearance	0.15 to 0.40 mm 0.006 to 0.016 in.	0.6 mm 0.024 in.
Shift Fork to Shifter Groove	Clearance	0.15 to 0.40 mm 0.006 to 0.016 in.	0.6 mm 0.024 in.
Shift Fork Spring	Free Length	22 mm 0.866 in.	20 mm 0.787 in.
Reverse Gear Bushing to Reverse Shaft	Clearance	0.020 to 0.054 mm 0.0008 to 0.0021 in.	0.3 mm 0.0118 in.
Spiral Bevel Pinion and Differential Assembly	Combined Turning Torque	1.96 to 2.94 N·m 0.2 to 0.3 kgf·m 1.45 to 2.17 ft-lbs	–
Spiral Bevel Pinion to Bevel Gear	Backlash	0.15 to 0.30 mm 0.0059 to 0.0118 in.	–
	Tooth Contact	–	More than 35 %
	Center of Tooth Contact	–	1/3 of the entire width from the small end
Differential Case Bore to Differential Side Gear Boss	Clearance	0.025 to 0.124 mm 0.00098 to 0.00488 in.	0.35 mm 0.0138 in.
Differential Case Bore	I.D.	38.025 to 38.065 mm 1.49704 to 1.49862 in.	–
Differential Side Gear Boss	O.D.	37.941 to 38.000 mm 1.49374 to 1.49696 in.	–
Differential Pinion Shaft to Differential Pinion	Clearance	0.080 to 0.122 mm 0.00315 to 0.00480 in.	0.30 mm 0.0118 in.
Differential Pinion	I.D.	19.959 to 19.980 mm 0.78579 to 0.78661 in.	–
Differential Pinion Shaft	O.D.	20.060 to 20.081 mm 0.78976 to 0.79059 in.	–
Differential Pinion to Differential Side Gear	Backlash	0.15 to 0.30 mm 0.0059 to 0.0118 in.	0.4 mm 0.016 in.

W1013874

[L3400]

Item		Factory Specification	Allowable Limit
Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	0.4 mm 0.016 in.
Gear to Spline	Clearance	0.030 to 0.078 mm 0.0012 to 0.0031 in.	0.2 mm 0.0079 in.
Shift Fork to Shift Gear Groove	Clearance	0.15 to 0.40 mm 0.006 to 0.016 in.	0.6 mm 0.024 in.
Shift Fork to Shifter Groove	Clearance	0.15 to 0.40 mm 0.006 to 0.016 in.	0.6 mm 0.024 in.
Shift Fork Spring	Free Length	22 mm 0.866 in.	20 mm 0.787 in.
Reverse Gear Bushing to Reverse Shaft	Clearance	0.020 to 0.054 mm 0.0008 to 0.0021 in.	0.3 mm 0.0118 in.
Spiral Bevel Pinion and Differential Assembly	Combined Turning Torque	3.92 to 6.37 N·m 0.4 to 0.65 kgf·m 2.89 to 4.7 ft-lbs	–
Spiral Bevel Pinion to Bevel Gear	Backlash	0.15 to 0.30 mm 0.0059 to 0.0118 in.	–
	Tooth Contact	–	More than 35 %
	Center of Tooth Contact	–	1/3 of the entire width from the small end
Differential Case Bore to Differential Side Gear Boss	Clearance	0.050 to 0.151 mm 0.00197 to 0.00594 in.	0.35 mm 0.0138 in.
Differential Case Bore	I.D.	40.500 to 40.562 mm 1.59449 to 1.59693 in.	–
Differential Side Gear Boss	O.D.	40.411 to 40.450 mm 1.59098 to 1.59252 in.	–
Differential Case Cover Bore to Differential Side Gear Boss	Clearance	0.090 to 0.169 mm 0.00354 to 0.00666 in.	0.35 mm 0.0138 in.
Differential Case Cover Bore	I.D.	40.540 to 40.580 mm 1.59606 to 1.59764 in.	–
Differential Side Gear Boss	O.D.	40.411 to 40.450 mm 1.59098 to 1.59252 in.	–
Differential Pinion Shaft to Differential Pinion	Clearance	0.080 to 0.122 mm 0.00315 to 0.00480 in.	0.25 mm 0.0098 in.
Differential Pinion	I.D.	19.959 to 19.980 mm 0.78579 to 0.78661 in.	–
Differential Pinion Shaft	O.D.	20.060 to 20.081 mm 0.78976 to 0.79059 in.	–
Differential Pinion to Differential Side Gear	Backlash	0.15 to 0.30 mm 0.0059 to 0.0118 in.	0.4 mm 0.016 in.

W1013874

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-9.)

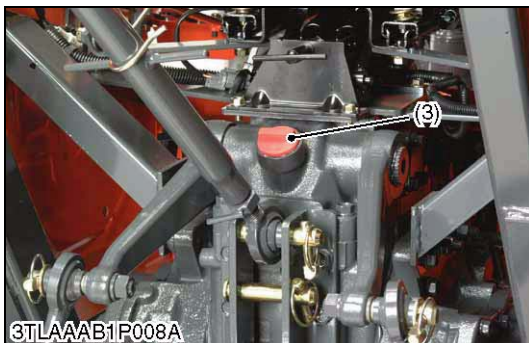
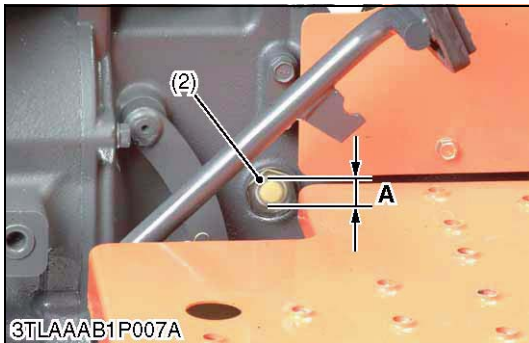
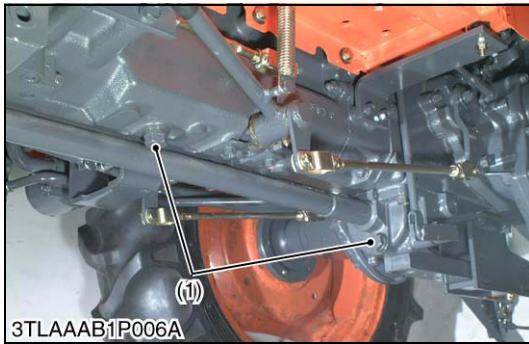
Item	N-m	kgf-m	ft-lbs
Deliver pipe joint bolt	49 to 69	5.0 to 7.0	36.1 to 50.6
Steering support mounting screw	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Engine and clutch housing mounting screws	48.1 to 55.8	4.9 to 5.7	35.4 to 41.2
Steering wheel mounting nut	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Power steering pipes retaining nut (Power Steering Type)	34.3 to 44.1	3.5 to 4.5	25.3 to 32.5
Screw with seal washer	11.8 to 20.6	1.2 to 2.1	8.7 to 14.5
Release fork mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Rear wheel mounting screw and nut	197 to 226	20 to 23	145 to 166
ROPS mounting screw	167 to 196	17.0 to 20.0	123 to 144
ROPS fulcrum screw	118 to 137	12.0 to 14.0	87 to 101
Front wheel drive case	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Hydraulic cylinder assembly mounting stud bolt	34.3 to 49.0	3.5 to 5.0	25.3 to 36.2
Hydraulic cylinder mounting screw	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Rear axle case mounting screw and nut	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Brake case mounting screw and nut	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Speed change cover mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Rear axle case mounting stud bolt	24.5 to 31.4	2.5 to 3.2	18.1 to 23.1
Brake case mounting stud bolt	38.2 to 45.1	3.9 to 4.6	28.2 to 33.3
Brake cam mounting nut	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5
Transmission case and clutch housing mounting nut	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Spiral bevel pinion shaft lock nut	147 to 196	15 to 20	109 to 145
PTO shaft lock nut	147 to 196	15 to 20	109 to 145
Differential case cover mounting screw	48.1 to 55.8	4.9 to 5.7	35.4 to 41.2
Spiral bevel gear UBS screw (L2800)	68.6 to 88.3	7.0 to 9.0	50.6 to 65.1
Spiral bevel gear UBS screw (L3400)	70.6 to 90.2	7.2 to 9.2	52.1 to 66.5
Pinion bearing case mounting screw	39.2 to 44.1	4.0 to 4.5	28.9 to 32.5
Oil gauge	1.5 to 2.0	0.15 to 0.25	1.1 to 1.8

W1012736

4. CHECKING, DISASSEMBLING AND SERVICING

[1] PREPARATION

(1) Separating Engine and Clutch Housing



Draining the Transmission Fluid

1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. Screw in the drain plugs (1).

(When reassembling)

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

■ IMPORTANT

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

Transmission fluid	Capacity	2WD	27 L 7.1 U.S.gals 5.98 Imp.gals
		4WD	27.5 L 7.3 U.S.gals 6.1 Imp.gals

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

A : Oil level is acceptable within this range.

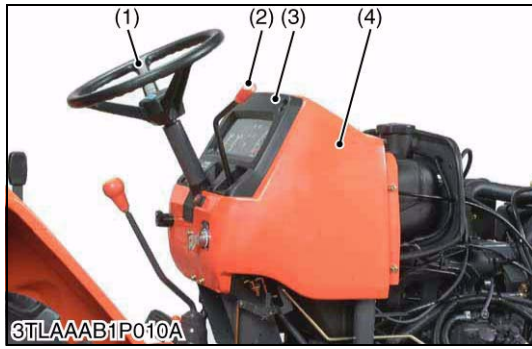
W1012748

Bonnet and Front Cover

1. Disconnect the battery negative cable.
2. Disconnect the connector for head light.
3. Remove bonnet (1) and side cover (2).
4. Remove the front cover (3).

- (1) Bonnet
(2) Side Cover
(3) Front Cover

W1044556



Steering Wheel and Rear Bonnet

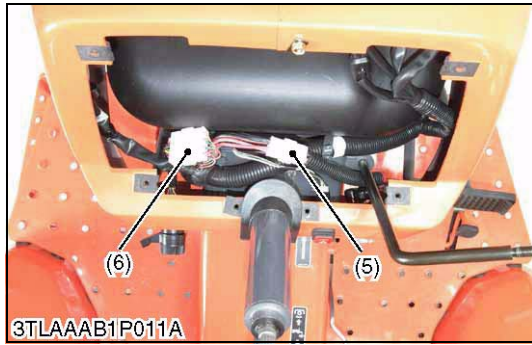
1. Remove the steering wheel (1) with steering puller.
2. Remove the throttle grip (2).
3. Disconnect the hour-meter cable from the engine.
4. Remove the meter panel (3).
5. Disconnect the **4P** connector (5) for main switch.
6. Disconnect the **8P** connector (6) for combination switch.
7. Remove the rear bonnet (4).

(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 ft·lbs
-------------------	-----------------------------	---

- | | |
|--------------------|-------------------------|
| (1) Steering Wheel | (4) Rear Bonnet |
| (2) Throttle Grip | (5) 4P Connector |
| (3) Meter Panel | (6) 8P Connector |

W1012884



Suction Hose and Delivery Pipe

1. Disconnect the suction hose (1).
2. Remove the step (4) mounting screws.
3. Remove the steering joint shaft (2).
4. Remove the delivery pipe (3).
5. Remove the throttle rod (5).

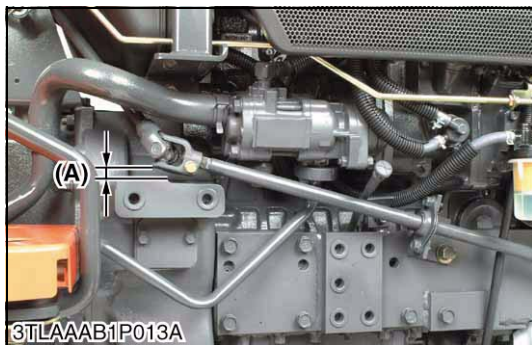
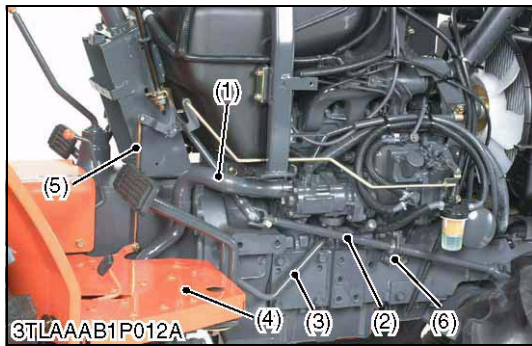
(When reassembling)

- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.19 in.) between the universal joint and flywheel housing. Then fit the support (6) in position.

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 36.1 to 50.6 ft·lbs
-------------------	--------------------------	---

- | | |
|--------------------------|----------------------|
| (1) Suction Hose | (5) Throttle Rod |
| (2) Steering Joint Shaft | (6) Support |
| (3) Delivery Pipe | |
| (4) Step | (A) Clearance |

W1045309

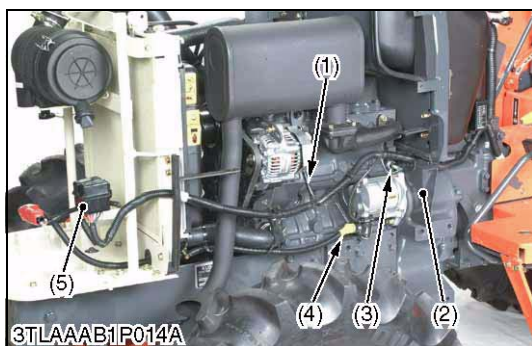


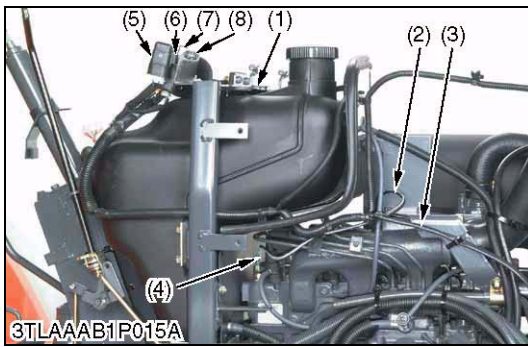
Wirings

1. Disconnect the wiring (1) for the alternator.
2. Disconnect the wiring (4) for starter motor.
3. Disconnect the **1P** Connector (3) for the engine oil switch.
4. Remove the shutter plate (2).
5. Remove the slow blow fuse (5).

- | | |
|---------------------------|------------------------------|
| (1) Wiring for Alternator | (4) Wiring for Starter Motor |
| (2) Shutter Plate | (5) Slow Blow Fuse |
| (3) 1P Connector | |

W1045710





Wirings

1. Disconnect the wiring (1) for the fuel sensor.
2. Disconnect the key stop solenoid connector (3).
3. Disconnect the wiring (2) for the glow plug.
4. Disconnect the **1P** connector (4) for the water temperature sensor.
5. Disconnect the starter relay **4P** connector (7), OPC timer **4P** connector (6), flasher unit **6P** connector (5) and glow relay **4P** connector (8).

- | | |
|---------------------------------|---------------------------------------|
| (1) Wiring for Fuel Sensor | (5) Flasher Unit 6P Connector |
| (2) Wiring for Glow Plug | (6) OPC timer 4P Connector |
| (3) Key Stop Solenoid Connector | (7) Starter Relay 4P Connector |
| (4) 1P Connector | (8) Glow Relay 4P Connector |

W1046003



Propeller Shaft (4WD)

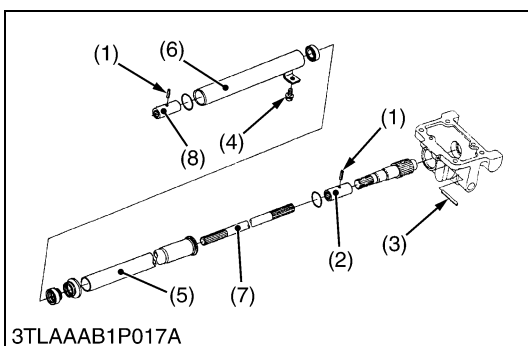
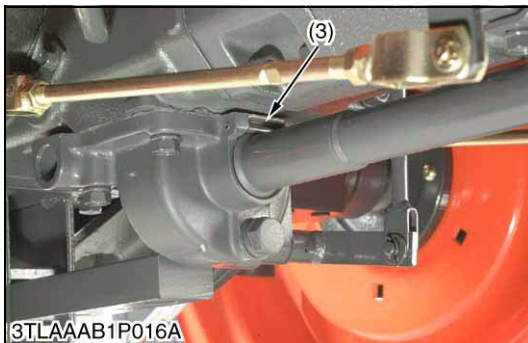
1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

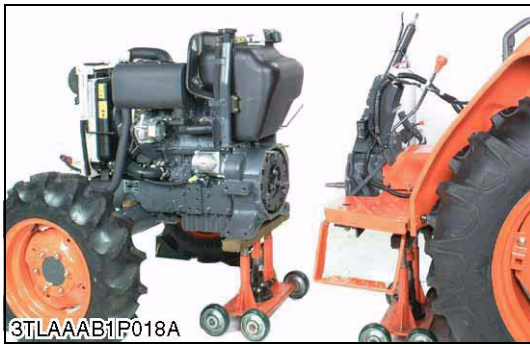
(When reassembling)

- Apply grease to the splines of the propeller shaft (7) and pinion shaft.

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

W1014306





Separating Engine from Clutch Housing Case

1. Check the engine and clutch housing case are securely mounted on the disassembling stands.
2. Remove the engine mounting screws, and separate the engine from the clutch housing case.

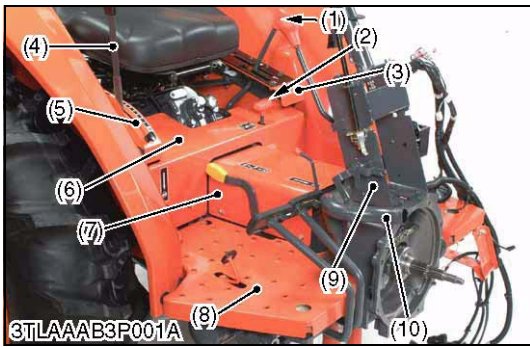
(When reassembling)

- Apply grease to the splines.
- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the engine and clutch housing case.

Tightening torque	Engine mounting screws to clutch housing	48.1 to55.8 N·m 4.9 to5.7 kgf·m 35.4 to41.2 ft-lbs
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W1026299

(2) Separating Clutch Housing Case



Outer Components

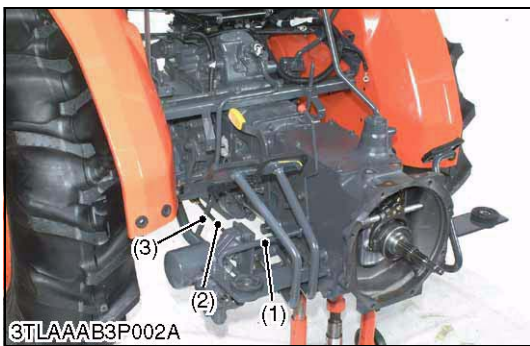
1. Remove the grip (1) and auxiliary change lever guide (3).
2. Remove the grip (2).
3. Remove the grip (4) and position control lever guide (5).
4. Remove the housing cover (7) and center cover (6).
5. Remove the step (8) (R.H), (L.H).
6. Remove the steering support (9).
7. Remove the suction pipe (10).

(When reassembling)

Tightening torque	Steering support mounting screw	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 ft-lbs
-------------------	---------------------------------	---

- | | |
|----------------------------------|----------------------|
| (1) Grip | (6) Center Cover |
| (2) Grip | (7) Housing Cover |
| (3) Auxiliary change lever guide | (8) Step |
| (4) Grip | (9) Steering Support |
| (5) Position Control Lever Guide | (10) Suction Pipe |

W1013738



Delivery Pipe and Return Pipe

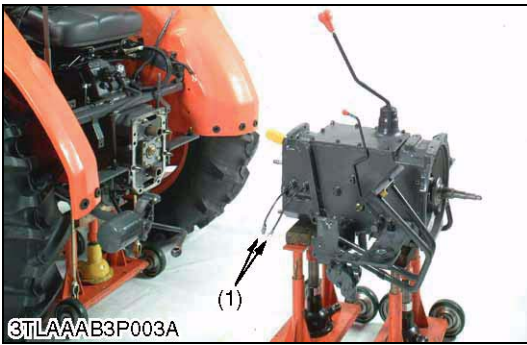
1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Remove the return pipe (1) and delivery pipe (3).
3. Remove the brake rods (2) (R.H), (L.H).

(When reassembling)

Tightening torque	Delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 36.1 to 50.6 ft-lbs
-------------------	--------------------------	---

- | | |
|-----------------|-------------------|
| (1) Return Pipe | (3) Delivery Pipe |
| (2) Brake Rod | |

W1027455



Separating Clutch Housing from Transmission Case

1. Remove the clutch housing mounting screws.
2. Disconnect the PTO safety switch connectors (1).
3. Separate the clutch housing from the transmission case.

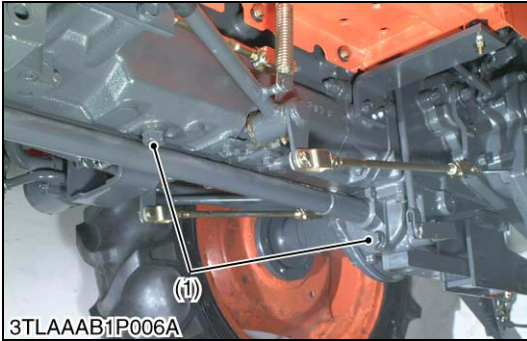
(When reassembling)

Tightening torque	Clutch housing mounting nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.2 to 66.5 ft-lbs
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(1) Connector

W1014109

(3) Separating Transmission Case



Draining the Transmission Fluid

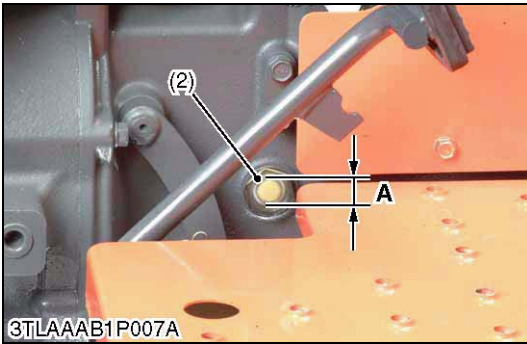
1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. Screw in the drain plugs (1).

(When reassembling)

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

■ IMPORTANT

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

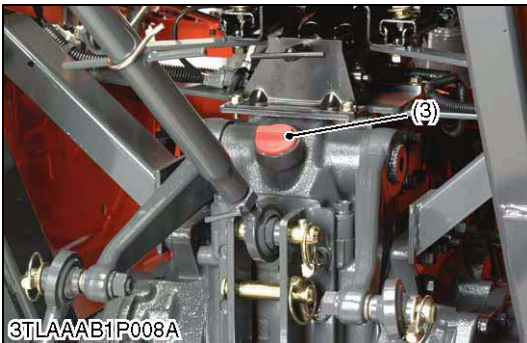


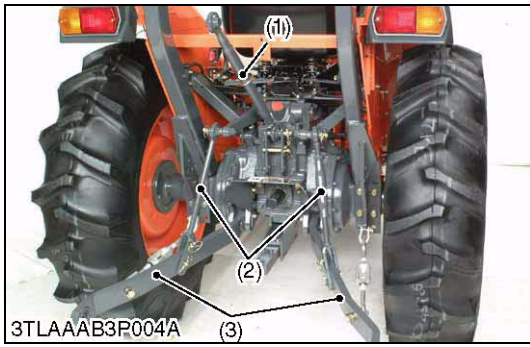
Transmission fluid	Capacity	2WD	27 L 7.1 U.S.gals 5.98 Imp.gals
		4WD	27.5 L 7.3 U.S.gals 6.1 Imp.gals

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

A : Oil level is acceptable within this range.

W1028796



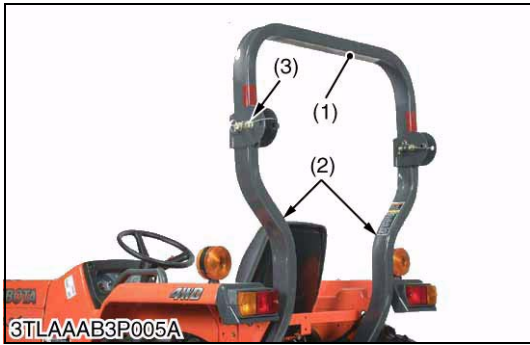


Three Point Linkage

1. Remove the top link (1).
2. Remove the lift rod (2).
3. Remove the lower link (3).

- (1) Top Link
- (2) Lift Rod
- (3) Lower Link

W1014601



ROPS

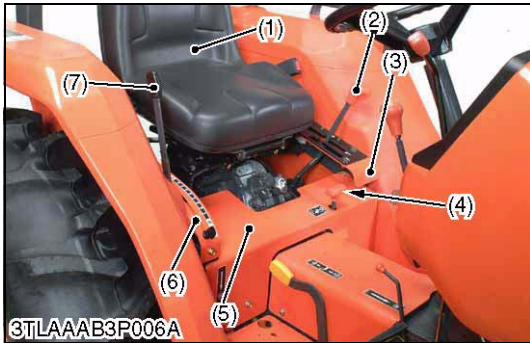
1. Remove the ROPS upper frame (1).
2. Remove the ROPS lower frame (2).

(When reassembling)

Tightening torque	ROPS mounting screw	167 to 196 N-m 17.0 to 20.0 kgf-m 123 to 144 ft-lbs
	ROPS fulcrum screw	118 to 137 N-m 12 to 14 kgf-m 87 to 101 ft-lbs

- (1) ROPS Upper Frame
- (2) ROPS Lower Frame
- (3) ROPS Fulcrum Screw

W1029286



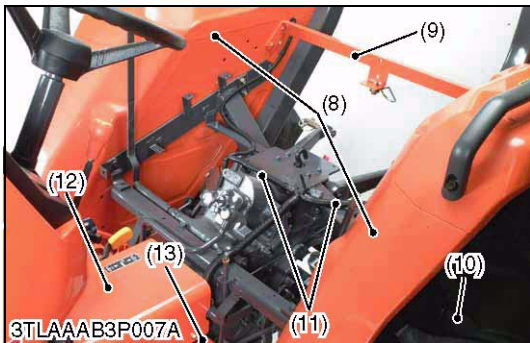
Outer Components

1. Place the disassembling stands under the transmission case.
2. Remove the seat (1).
3. Remove the grip (2), (4), (7).
4. Remove the auxiliary change lever guide (3) and position control lever guide (6).
5. Remove the center cover (5).
6. Remove the rear wheels (10).
7. Disconnect the wirings (11) from the rear fender.
8. Remove the rear fenders (8) and fender rear stay (9).
9. Remove the housing cover (12) and both side steps (13).

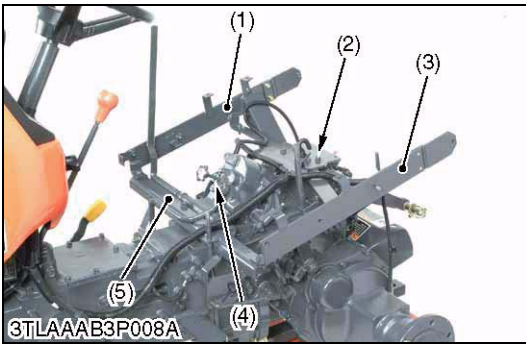
(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	197 to 226 N-m 20 to 23 kgf-m 145 to 166 ft-lbs
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- (1) Seat
- (2) Grip
- (3) Auxiliary Change Lever Guide
- (4) Grip
- (5) Center Cover
- (6) Position Control Lever Guide
- (7) Grip
- (8) Rear Fender
- (9) Fender Stay
- (10) Rear Wheel
- (11) Wiring
- (12) Housing Cover
- (13) Step



W1014739



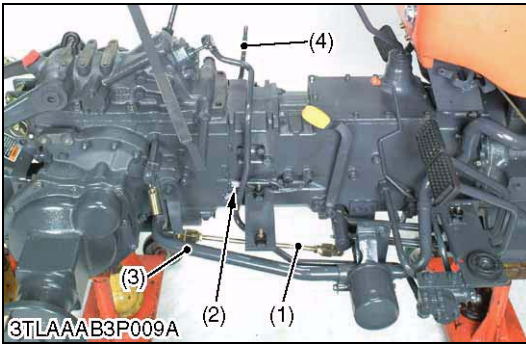
Fender Support and Delivery Pipe

1. Remove the fender support (1), (2), (3), (5).
2. Disconnect the delivery pipe (4).

Tightening torque	Delivery pipe joint bolt	49.0 to 69.0 N-m 5.0 to 7.0 kgf-m 36.1 to 50.6 ft-lbs
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- (1) Fender Support (RH) (4) Delivery Pipe
 (2) Support (5) Support Center
 (3) Fender Support

W1015500

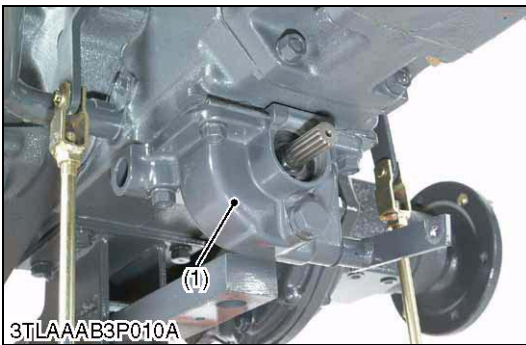


Suction Pipe and Brake Rods

1. Remove the brake rod (1) (R.H), (L.H).
2. Remove the suction pipe (3).
3. Disconnect the PTO safety switch connectors (2).
4. Remove the front wheel drive lever (4).

- (1) Brake Rod (3) Suction Pipe
 (2) PTO Safety Switch Connector (4) Front Wheel Drive Lever

W1015833



Front Wheel Drive Case

1. Remove the front wheel drive case (1).

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to join face of front wheel drive case and transmission case.

Tightening torque	Front wheel drive case mounting screw	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.2 to 66.5 ft-lbs
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- (1) Front Wheel Drive Case

W1016020



Separating Transmission Case and Clutch Housing

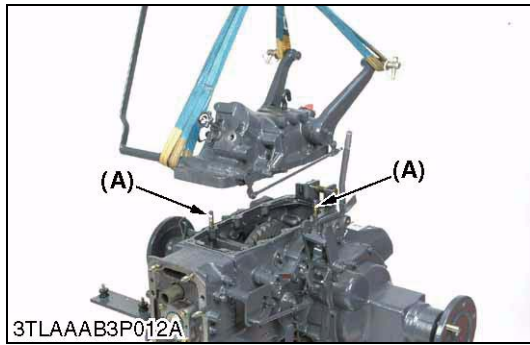
1. Check the clutch housing case and transmission case are securely mounted on the disassembling stands.
2. Loosen and remove the transmission case mounting nut.
3. Separate the transmission case from the clutch housing case.

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of transmission case and clutch housing case.

Tightening torque	Transmission case mounting nut	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.2 to 66.5 ft-lbs
-------------------	--------------------------------	---

W1016201



Hydraulic Cylinder Assembly

1. Loosen and remove the hydraulic cylinder assembly mounting screws and nuts.
2. Support the hydraulic cylinder assembly with nylon lift strap and hoist, and then take out it.

(When reassembling)

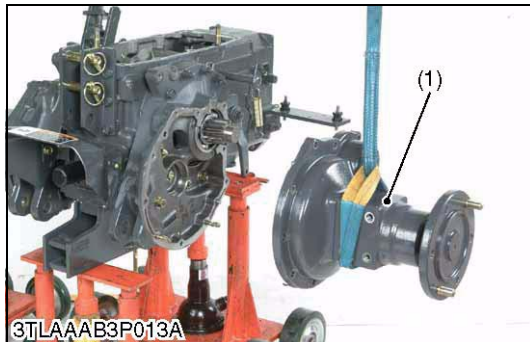
- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.
- When replacing the hydraulic cylinder assembly mounting stud bolts, apply liquid lock (Three Bond 1372 or equivalent) to (A) portion of the stud bolt.

Tightening torque	Hydraulic cylinder assembly mounting stud bolts	34.3 to 49.0 N·m 3.5 to 5.0 kgf·m 25.3 to 36.2 ft-lbs
	Hydraulic cylinder assembly mounting screws and nuts	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 ft-lbs

NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod. (See page 8-S12.)

W1016745



Rear Axle Case

1. Loosen and remove the rear axle case mounting screws and nuts.
2. Support the rear axle case (1) with the nylon lift strap and hoist.
3. Separate the rear axle case from brake case.
4. Follow the same procedure as above for the other side.

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

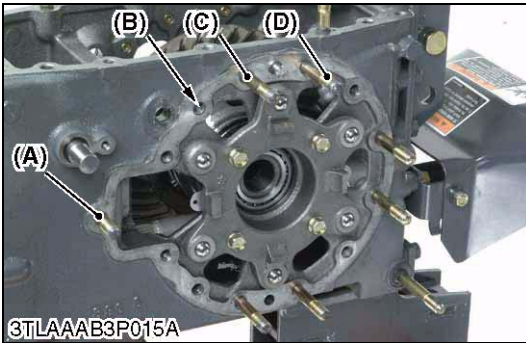
Tightening torque	Rear axle case mounting screws and nuts	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft-lbs
	Rear axle case mounting stud bolt	24.5 to 31.4 N·m 2.5 to 3.2 kgf·m 18.1 to 23.1 ft-lbs

(1) Rear Axle Case

W1016596



3TLAAAB3P014A



3TLAAAB3P015A

Brake Case

1. Loosen and remove the brake case mounting screws and nuts.
2. Separate the brake case, tapping the brake case lever lightly.

(When reassembling)

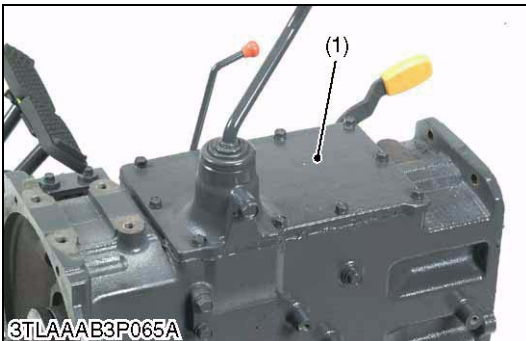
- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.
- Apply liquid lock (Three Bond 1324 or equivalent) to "(A), (B), (C), (D)" portions of the stud bolts, RH and LH.

Tightening torque	Brake case mounting stud bolts	38.2 to 45.1 N-m 3.9 to 4.6 kgf-m 28.2 to 33.3 ft-lbs
	Brake case mounting screws and nuts	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs
	Brake case mounting lever shaft screw	62.8 to 72.5 N-m 6.4 to 7.4 kgf-m 46.3 to 53.5 ft-lbs

W1016886

[2] DISASSEMBLING AND ASSEMBLING

(1) Clutch Housing Case



3TLAAAB3P065A

Speed Change Cover

1. Remove the speed change cover (1).

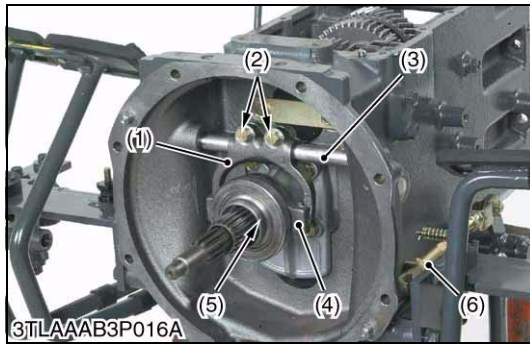
(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of speed change cover and clutch housing.

Tightening torque	Speed change cover mounting screw	23.6 to 27.4 N-m 2.4 to 2.8 kgf-m 17.4 to 20.3 ft-lbs
-------------------	-----------------------------------	---

(1) Speed Change Cover

W1014296

**Release Hub and Clutch Lever (L3400)**

1. Remove the clutch rod (6).
2. Remove the release fork setting screws (2).
3. Remove the thrust ball bearing (5) and release hub (4) as a unit.
4. Draw out the clutch lever (3).
5. Remove the release fork (1).

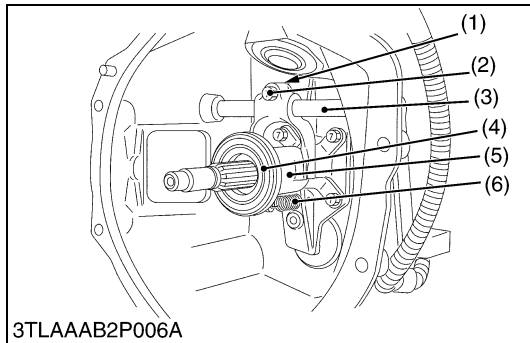
(When reassembling)

- Make sure the direction of the release fork is correct.
- Inject grease to the release hub.
- Apply grease to the contact surfaces of the release fork and release hub.
- Apply grease on the clutch lever.

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

- | | |
|------------------|-------------------------|
| (1) Release Fork | (4) Release Hub |
| (2) Screw | (5) Thrust Ball Bearing |
| (3) Clutch Lever | (6) Clutch Rod |

W1017592

**Release Hub and Clutch Lever (L2800)**

1. Remove the release fork (1) mounting screw (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the hub return spring (6).
4. Remove the thrust ball bearing (4) and release hub (5) as a unit.

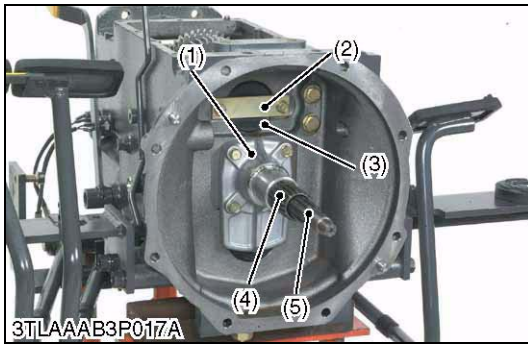
(When reassembling)

- Make sure the direction of the release fork (1) is correct.
- Inject grease to the release hub (5).
- Be sure to set the hub return spring (6).

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

- | | |
|------------------|-------------------------|
| (1) Release Fork | (4) Thrust Ball Bearing |
| (2) Screw | (5) Release Hub |
| (3) Clutch Lever | (6) Hub Return Spring |

W1032000

**Main Shaft Case**

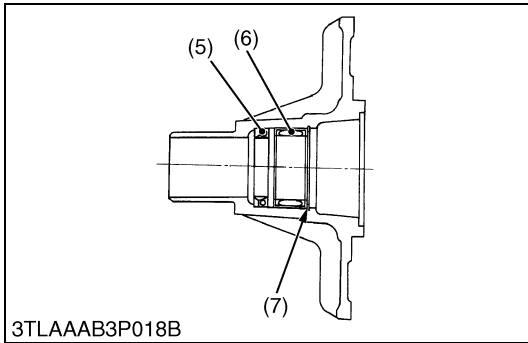
1. Remove the main shaft case (1).
2. Remove the stopper plate (2).
3. Remove the bearing cover (3).

(When reassembling)

- Apply grease to the O-ring and install it to the clutch housing.
- After reassembling the main shaft case, check that 16T gear shaft (4) and main shaft (5) rotate respectively and that they have a little axial play.
- Bearing cover (3) should be replaced with new one.

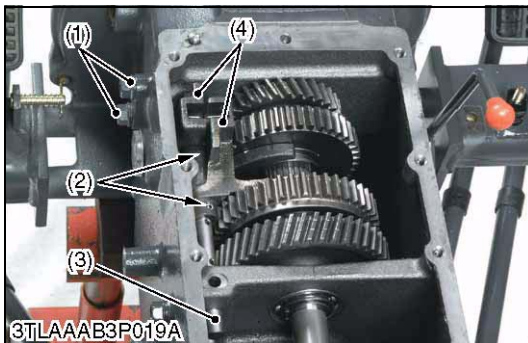
(When replacing bearing and oil seal in main shaft case)

- Install the oil seal (6) as shown in the figure, noting its direction.
- Apply grease to the needle bearing (7) and press-fit it up to the groove of internal snap ring (8).



- | | |
|----------------------|--------------------|
| (1) Main Shaft Cover | (5) Main Shaft |
| (2) Stopper Plate | (6) Oil Seal |
| (3) Bearing Cover | (7) Needle Bearing |
| (4) 16T Gear Shaft | (8) Snap Ring |

W1014893

**Counter Shaft**

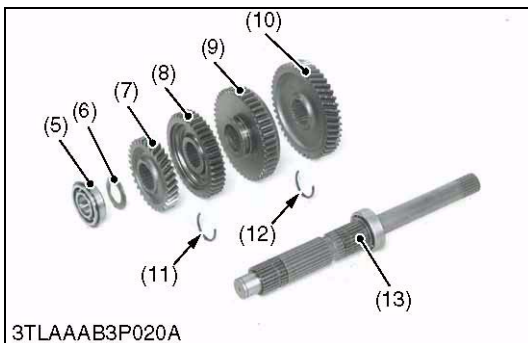
1. Remove the bolt (1) and take out the spring and ball.
2. Tap out the spring pin (2).
3. Draw out the fork rod (3) to the front and take out the shift fork (4) and balls.
4. Remove the snap ring (11), (12).
5. Tap out the counter shaft (13) to the rear.

NOTE

- **When drawing out the counter shaft, take out the following parts one by one: thrust collar (6), 32T gear (10), 38T gear (8) and 45T gear (9) and 45T gear (10).**

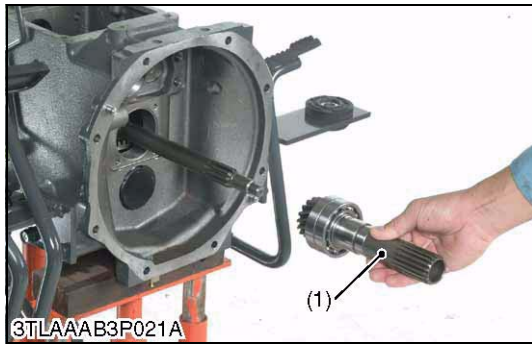
(When reassembling)

- Apply molybdenum disulfide (Three Bond 1091 or equivalent) to the inner circumferential surface of the spline boss.
- Point the oil groove side of thrust collar (6) towards the spline boss.
- With the snap rings in position, make sure that the 32T and 45T gears turn smoothly.



- | | |
|-------------------|--------------------|
| (1) Bolt | (8) 41T Gear |
| (2) Spring Pin | (9) 45T Gear |
| (3) Fork Rod | (10) 45T Gear |
| (4) Shift Fork | (11) Snap Ring |
| (5) Bearing | (12) Snap Ring |
| (6) Thrust Collar | (13) Counter Shaft |
| (7) 32T Gear | |

W1015187



16T Gear Shaft

1. Draw out the 16T gear shaft (1) to the front.

(When reassembling)

- Apply grease to the oil seal (2) and needle bearing (3).

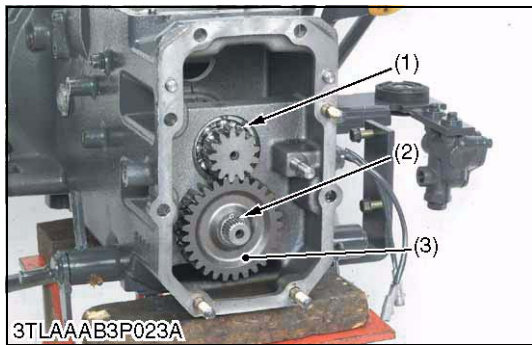
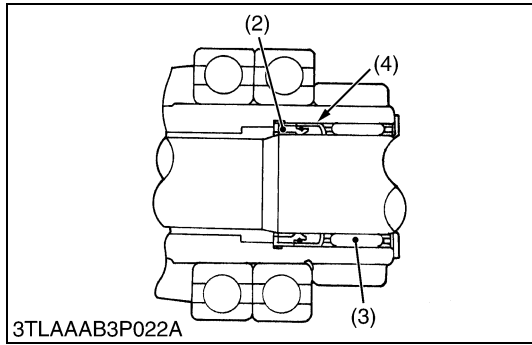
■ IMPORTANT

- Apply grease to the outside of oil seal (2).
- Install the oil seal as shown in the figure noting its direction, and press-fit it to 18 mm (0.709 in.) inside of shaft end using guide (4).

- (1) 16T Gear Shaft
- (2) Oil Seal

- (3) Needle Bearing
- (4) Guide

W1034033



PTO Gear Shaft

1. Remove the external snap ring (2) and 29T gear (3).

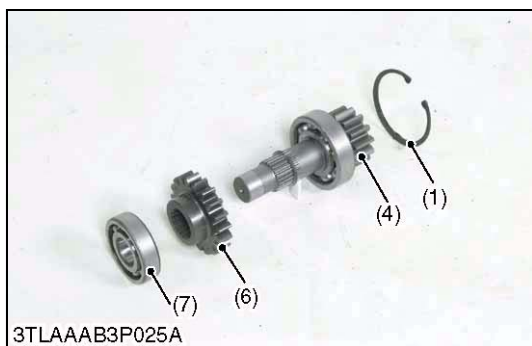
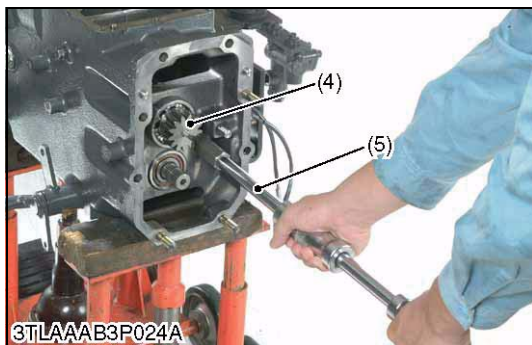
2. Remove the internal snap ring (1).

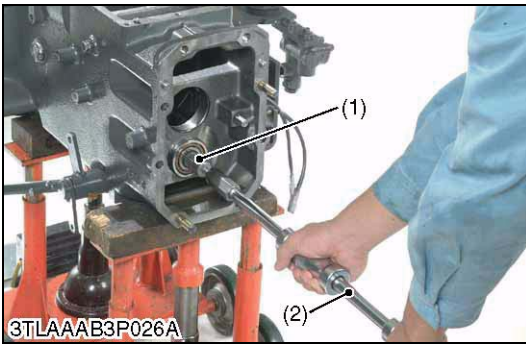
3. Draw out the PTO gear shaft assembly (4) to the rear with sliding hammer (5).

- (1) Internal Snap Ring
- (2) External Snap Ring
- (3) 29T Gear
- (4) PTO Gear Shaft Assembly

- (5) Sliding Hammer
- (6) 19T Gear
- (7) Bearing

W1035117



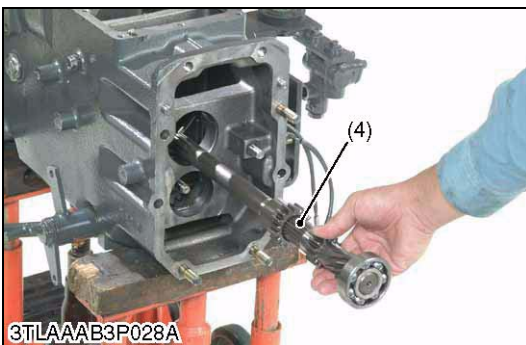
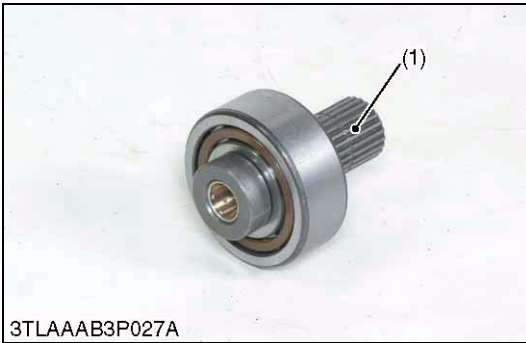
**PTO Transmitted Shaft**

1. Draw out the PTO transmitted shaft assembly (1) to the rear with sliding hammer (2).

(1) PTO Transmitted Shaft

(2) Sliding Hammer

W1036012

**Main Shaft**

1. Remove the internal snap ring (6).
2. Tap out the main shaft (4) to the rear.

NOTE

- When drawing out the main shaft, take out the following parts one by one: copper washer (1), 23T gear (2) and 17T gear (3).

(When reassembling)

- Install the copper washer to the front of 25T gear.

(1) Copper Washer

(4) Main Shaft

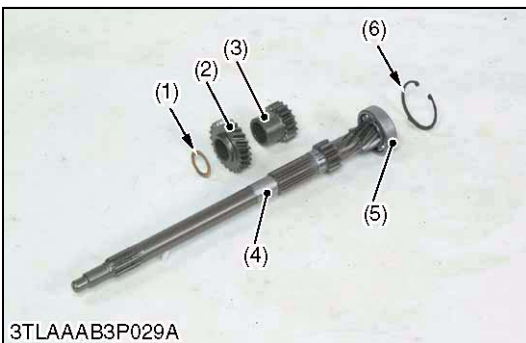
(2) 23T Gear

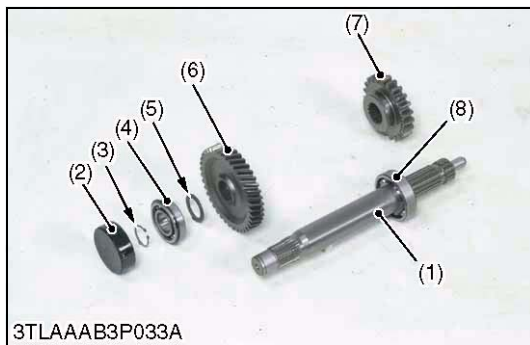
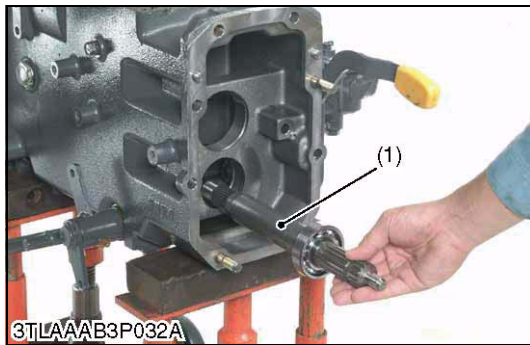
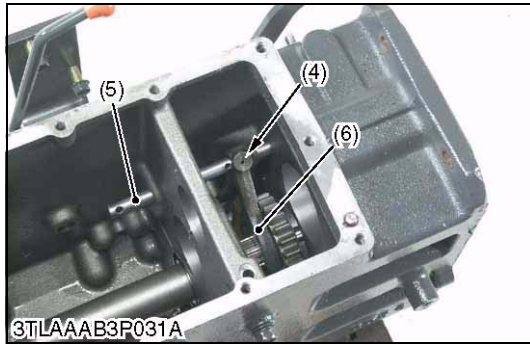
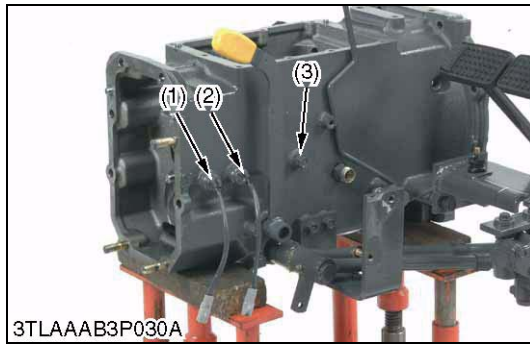
(5) Ball Bearing

(3) 17T Gear

(6) Internal Snap Ring

W1018805



**PTO Shift Fork (L3400)**

1. Remove the PTO safety switch (1), (2).
2. Remove the bolt (3) and take out the spring and ball.
3. Tap out the spring pin (4).
4. Draw out the fork rod (5) to the rear.
5. Take out the shift fork (6).

(When reassembling)

- Take care not to damage or lose ball or spring.

- | | |
|-----------------------|----------------|
| (1) PTO Safety Switch | (4) Spring Pin |
| (2) PTO Safety Switch | (5) Shift Rod |
| (3) Bolt | (6) Shift Fork |

W1019275

PTO Counter Shaft (L3400)

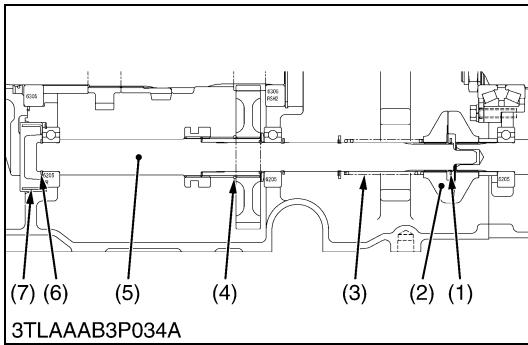
1. Remove the bearing cover (2).
2. Remove the external snap ring (3).
3. Tap out the PTO counter shaft (1) to the rear and take out the 39T gear (6).
4. Tap out the PTO counter shaft (1) to the front and take out the 23T gear (7).
5. Tap out the PTO counter shaft (1) to the rear with bearing (8).

(When reassembling)

- Bearing cover (2) should be replaced with new one.

- | | |
|------------------------|-------------------|
| (1) PTO Counter Shaft | (5) Thrust Collar |
| (2) Bearing Cover | (6) 39T Gear |
| (3) External Snap Ring | (7) 23T Gear |
| (4) Bearing | (8) Bearing |

W1038181

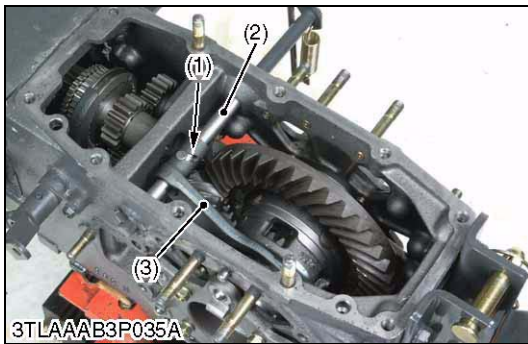
**PTO Counter Shaft (L2800)**

1. Remove the shift rod and shift fork.
2. Remove the external snap ring (1) and oneway clutch (2).
3. Tap out the PTO counter shaft (5) to the front to take off bearing cover (7).
4. Remove the external snap ring (6) and (4).
5. Tap out the PTO counter shaft (5) to the rear.

(When reassembling)

- Bearing cover (2) should be replaced with new one.
- | | |
|------------------------|------------------------|
| (1) External Snap Ring | (5) PTO Counter Shaft |
| (2) Oneway Clutch | (6) External Snap Ring |
| (3) Spring | (7) Bearing Cover |
| (4) External Snap Ring | |

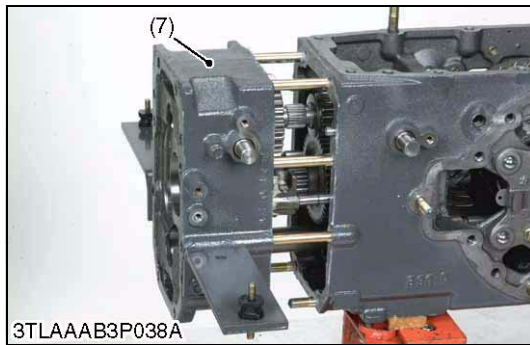
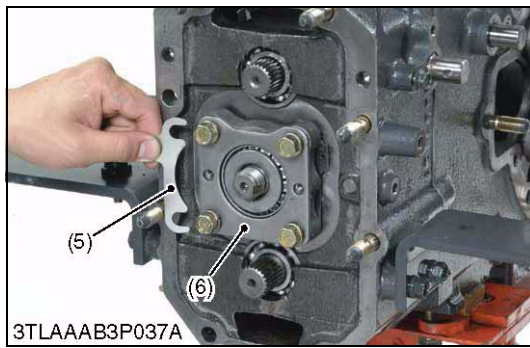
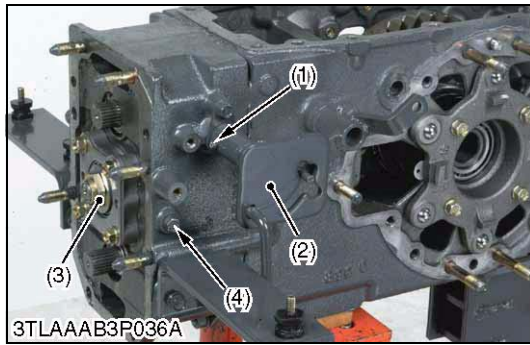
W1038673

(2) Transmission Case**Differential Lock**

1. Remove the clevis pin (1).
2. Draw out the differential lock fork shaft (2).
3. Take out the shift fork (3).

- | | |
|----------------|----------------|
| (1) Clevis Pin | (3) Shift Fork |
| (2) Fork Shaft | |

W1020311

**Mid Case**

1. Tap out the spring pin (1).
2. Remove the guide plate (2).
3. Remove the lock nut (3) and lock bolt (4).
4. Remove the pinion bearing cover (6) and shims (5).
5. Separate the mid case (7) from the transmission case.

(When reassembling)

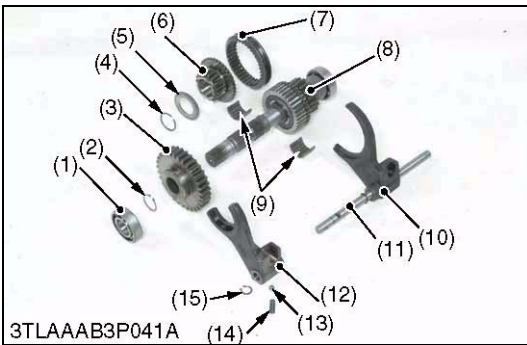
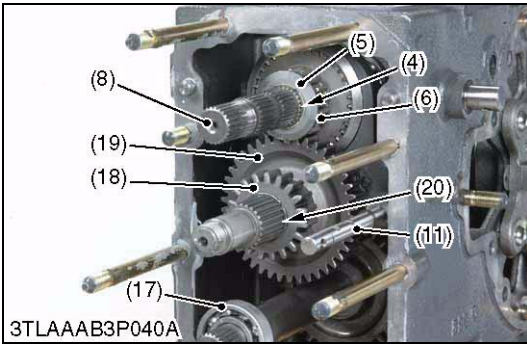
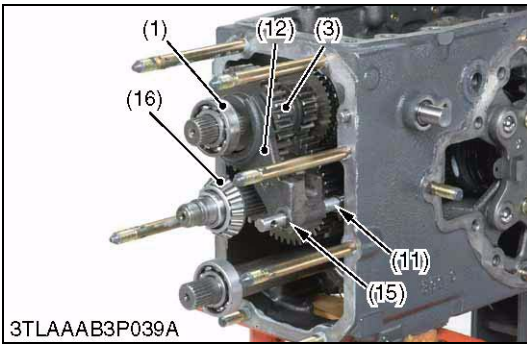
- Make sure of the number of shims in the pinion bearing cover.
- Replace the lock nut (3) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

Tightening torque	Lock nut	147 to 196 N·m 15 to 20 kgf·m 109 to 145 ft-lbs
	Pinion bearing case mounting screw	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 ft-lbs

- (1) Spring Pin
(2) Guide Plate
(3) Lock Nut
(4) Lock Bolt

- (5) Shim
(6) Pinion Bearing Cover
(7) Mid Case

W1020909



Sub Shaft

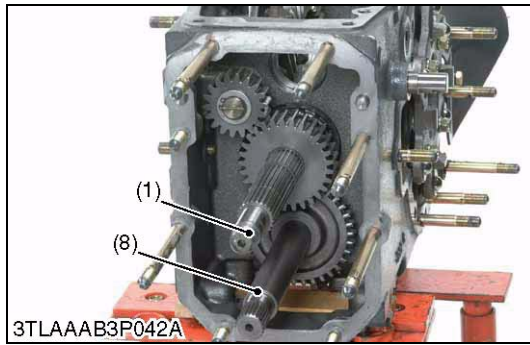
1. Remove the bearing (1) and (16) with bearing puller.
2. Remove the external snap ring (2) and (15).
3. Remove the shift fork (12) and 31T gear (3).
4. Remove the external snap ring (4) and collar (5).
5. Remove the bearing (17) and external snap ring (20).
6. Take out the 19T gear (18) and 42T gear (19).
7. Remove the 18T gear (6).
8. Remove the shift fork (10) and shift rod (11) with shifter (7).
9. Tap out the sub shaft (8) to the front.

(When reassembling)

- Take care not to damage or lose ball or spring.

- | | |
|------------------------|-------------------------|
| (1) Bearing | (11) Shift Rod |
| (2) External Snap Ring | (12) Shift Fork |
| (3) 31T Gear | (13) Ball |
| (4) External Snap Ring | (14) Spring |
| (5) Collar | (15) External Snap Ring |
| (6) 18T Gear | (16) Bearing |
| (7) Shifter | (17) Bearing |
| (8) Sub Shaft Assembly | (18) 19T Gear |
| (9) Needle Bearing | (19) 42 T Gear |
| (10) Shift Fork | (20) External Snap Ring |

W1020895

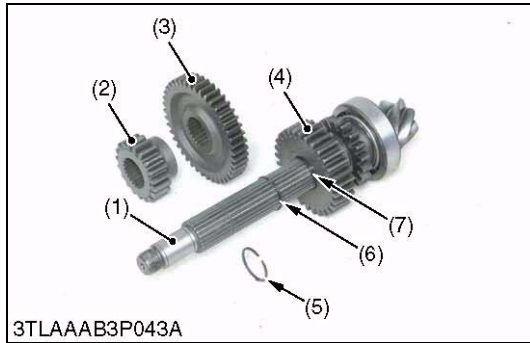


Pinion Shaft

1. Remove the pinion shaft (1) and PTO drive shaft assembly (8).

- | | |
|------------------|------------------------------|
| (1) Pinion Shaft | (5) External Snap Ring |
| (2) 19T Gear | (6) External Snap Ring |
| (3) 42T Gear | (7) External Snap Ring |
| (4) 29T Gear | (8) PTO Drive Shaft Assembly |

W1021656

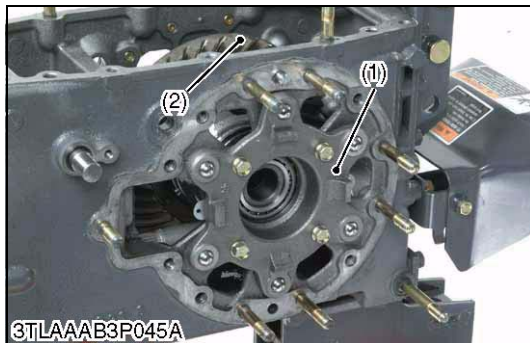


Differential Gear Assembly

1. Remove the differential bearing case (1) mounting screws.
2. Remove the differential bearing case (1), noting the number of left and right shims.
3. Take out the differential gear assembly (2) from transmission case.

(When reassembling)

- Use same number of shim as before disassembling.
- Replace the left and right bearing cases on the same sides as before.
- Apply grease to ball and ball seats.

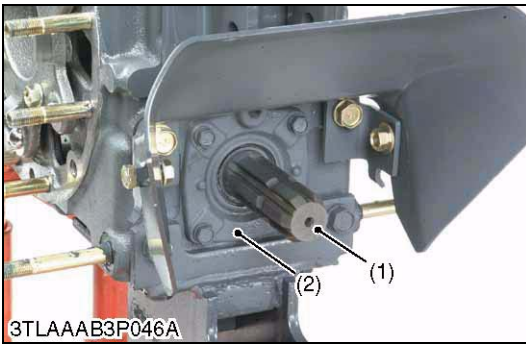


Tightening torque	Differential bearing case mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 ft-lbs
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(1) Differential Bearing Case

(2) Differential Gear Assembly

W1042963



3TLAAB3P046A

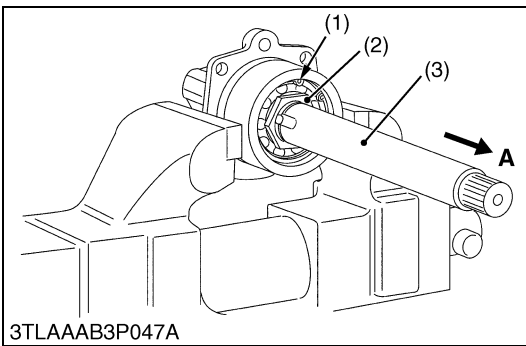
PTO Bearing Case

1. Remove the bearing case (2) mounting screws.
2. Take out the PTO shaft (1) with bearing case.

(1) PTO Shaft

(2) PTO Bearing Case

W1021660



3TLAAB3P047A

PTO Shaft

1. Remove the internal snap ring (2).
2. Tap out the PTO shaft (6) to the front (A).

(When reassembling)

- In the staking nut (1) was removed, replace a new one, and after tightening it to the specified torque, be sure to stake it firmly.
- Install the slinger (5) firmly.
- After applying liquid gasket (Three Bond 1141 or equivalent) to joint face of the collar (4), and insert the collar to PTO shaft.
- Apply grease to oil seal (3) and install it, noting its direction.

Tightening torque	Lock nut	147 to 196 N·m 15 to 20 kgf·m 108 to 145 ft·lbs
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(1) Staking Nut

(2) Internal Snap Ring

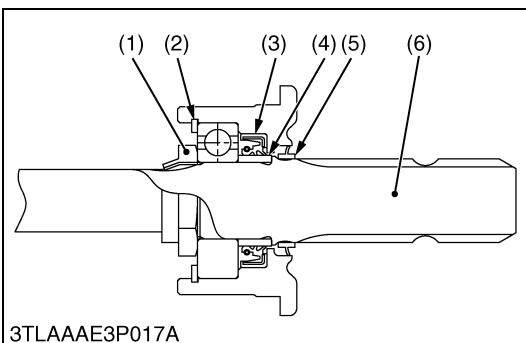
(3) Oil Seal

(4) Collar

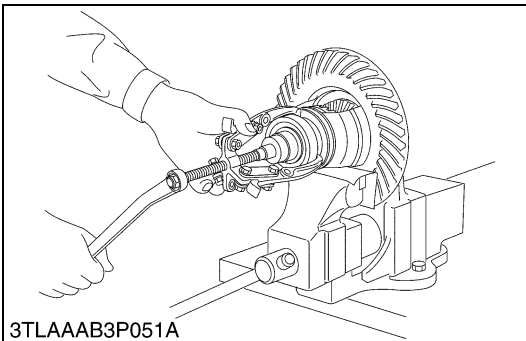
(5) Slinger

(6) PTO Shaft

W1021874



3TLAAAE3P017A

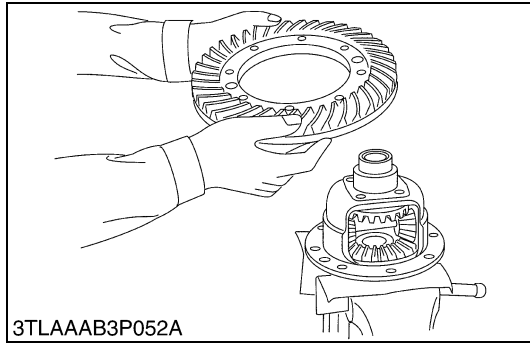
(3) Disassembling Differential Gear Assembly (L2800)

3TLAAB3P051A

Bearing and Differential Lock Shifter

1. Secure the differential gear in a vise.
2. Remove the ball bearing with a puller.
3. Remove the differential lock shifter.

W1022758



Spiral Bevel Gear

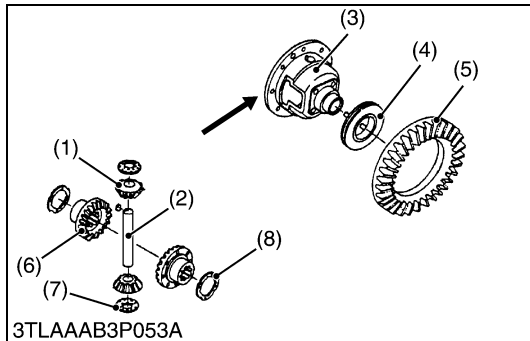
1. Remove the spiral bevel gear.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion.
- Apply liquid lock (Three Bond 1324 or equivalent) to the spiral bevel gear UBS screws.

Tightening torque	Spiral bevel gear UBS screw	68.6 to 88.3 N·m 7.0 to 9.0 kgf·m 50.6 to 65.1 ft·lbs
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W1022834



Differential Pinion and Differential Side Gear

1. Draw out the differential pinion shaft (2).
2. Take out the differential pinions (1), differential pinion washers (7) and the differential side gears (6), differential side gear washers (8).

■ NOTE

- **Arrange the parts to know their original position.**

(When reassembling)

- Examine the thrust and bearing surface of both differential side gears (6). If they are worn or damaged, bores in the differential case may also be damaged.
- Check the differential pinions (1) and pinion shaft (2) for excessive wear. If these parts are damaged or excessively worn, also replace parts they are in mesh with, or they are sliding on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential pinions.
- Install the parts to their original position.

(1) Differential Pinion	(5) Spiral Bevel Gear
(2) Differential Pinion Shaft	(6) Differential Side Gear
(3) Differential Case	(7) Differential Pinion Washer
(4) Differential Lock Shifter	(8) Differential Side Gear Washer

W1022943

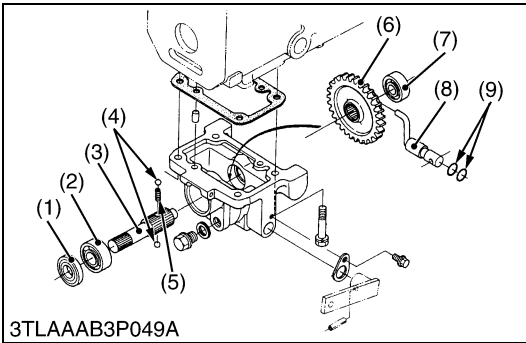


Front Drive Case (4WD Type)

1. Remove the front drive case.
2. Remove the oil seal (1).
3. Tap out the propeller shaft 1 (3) to the front.
4. Take out the shift gear (6).

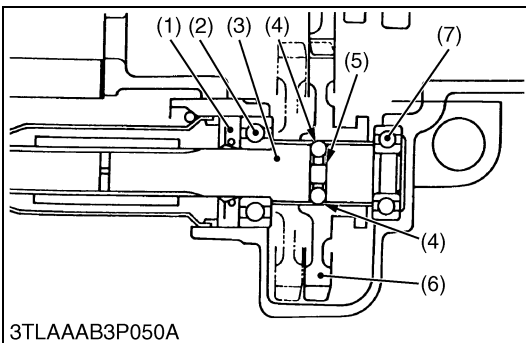
(When reassembling)

- Replace the oil seal (1) with new one and apply grease to its inside.
- Apply liquid gasket (Three Bond 1208D, 1141 or equivalent) to both faces of the gasket that is to be installed between the front drive case and the transmission case.

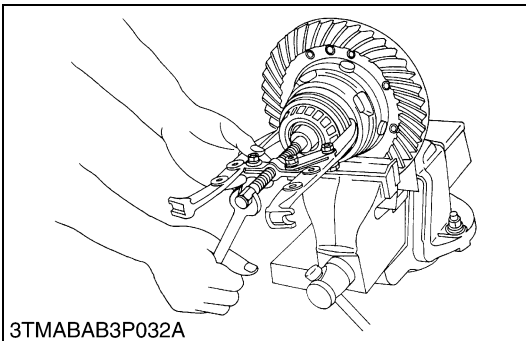


- | | |
|-----------------------|------------------|
| (1) Oil Seal | (6) Shift Gear |
| (2) Ball Bearing | (7) Ball Bearing |
| (3) Propeller Shaft 1 | (8) Shift Lever |
| (4) Ball | (9) O-ring |
| (5) Spring | |

W1040163



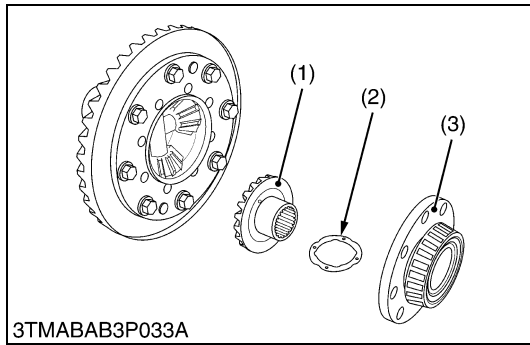
(4) Disassembling Differential Gear Assembly (L3400)



Bearing and Differential Lock Shifter

1. Secure the differential gear in a vise.
2. Remove the differential lock shifter and taper roller bearing as a unit with a puller.

W1043145



Differential Case Cover and Differential Side Gear

1. Remove the differential case cover (3).
2. Remove the differential side gear (1) and differential side gear washer (2).

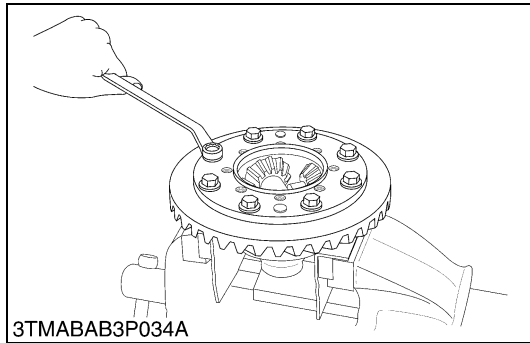
(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gear boss.

Tightening torque	Differential case cover mounting screw	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft·lbs
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- (1) Differential Side Gear (3) Differential Case Cover
(2) Differential Side Gear Washer

W10247220



Spiral Bevel Gear

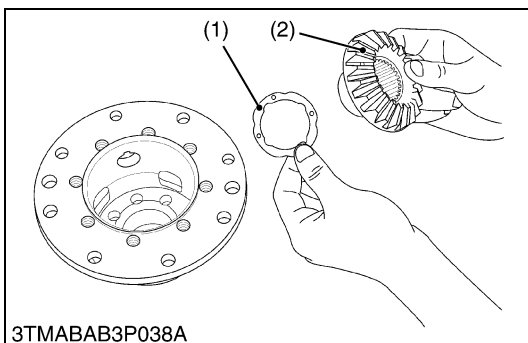
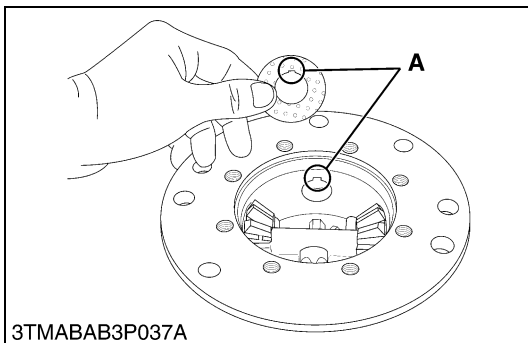
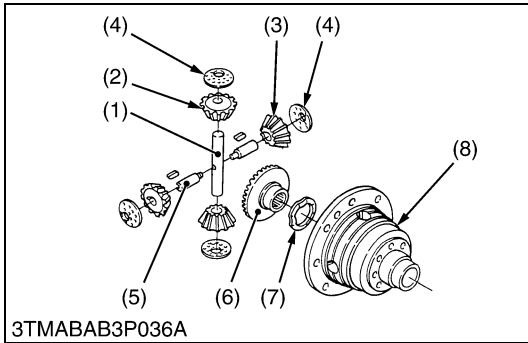
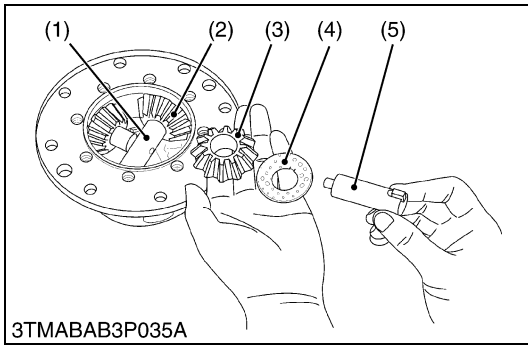
1. Remove the spiral bevel gear.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion shaft.
- Apply liquid lock (Three Bond 1372 or equivalent) to the spiral bevel gear UBS screws.

Tightening torque	Spiral bevel gear UBS screw	70.6 to 90.2 N·m 7.2 to 9.2 kgf·m 52.1 to 66.5 ft·lbs
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W10249330



Differential Pinion Shaft and Differential Pinion

1. Draw out the differential pinion shaft 2 (5), and take out the differential pinion (3) and differential pinion washer (4).
2. Draw out the differential pinion shaft (1), and take out the differential pinion (2) and differential pinion washer.

NOTE

- Arrange the parts to know their original position.

(When reassembling)

- Check the differential pinions (2) and (3), and pinion shaft (1) and (5) for excessive wear. If these parts are damaged or excessively worn, replace their parts they are in mesh with, or they sliding on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential pinions.
- Install the parts to their original position.
- Install the differential pinion washer (4), noting its groove position.

- (1) Differential Pinion Shaft
 (2) Differential Pinion
 (3) Differential Pinion
 (4) Differential Pinion Washer
 (5) Differential Pinion Shaft 2

- (6) Differential Side Gear
 (7) Differential Side Gear Washer
 (8) Differential Case

A : Fit Groove

W10250420

Differential Side Gear

1. Take out the differential side gear (2) and differential side gear washer (1).

(When reassembling)

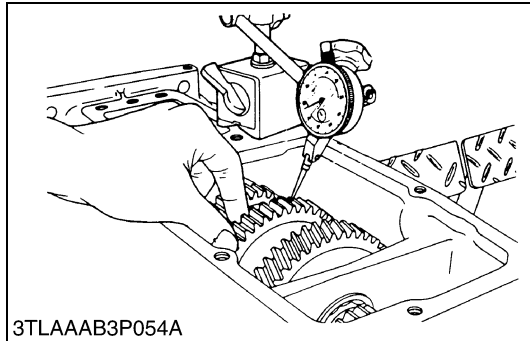
- Check the thrust and bearing surface of both differential side gears (2). If they are worn or damaged, bores in the differential case may also be damaged. Be sure to replace their parts.

- (1) Differential Side Gear Washer (2) Differential Side Gear

W10252580

[3] SERVICING

(1) Clutch Housing



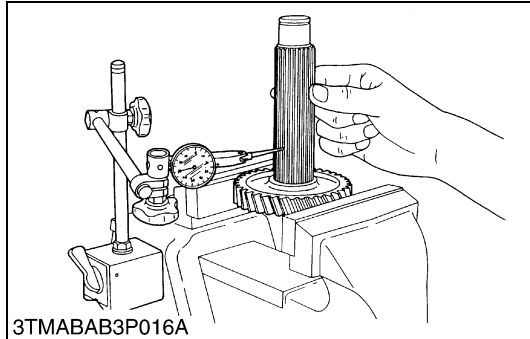
3TLAAB3P054A

Gear Backlash

1. Set a dial indicator (lever type) on one of the tooth faces.
2. Clamp the mating gear.
3. Measure backlash by turning the gear to be measured.
4. If the reading exceeds the allowable limit, replace the gear.

Gear backlash	Factory spec.	0.1 to 0.3 mm 0.004 to 0.012 in.
	Allowable limit	0.4 mm 0.016 in.

W1023827



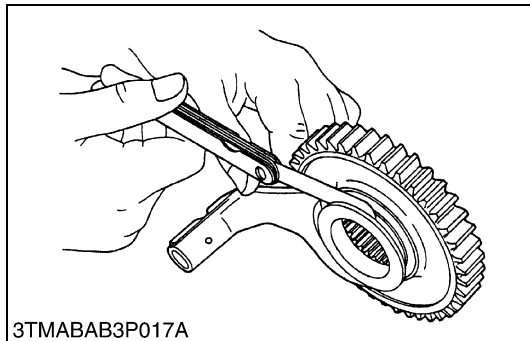
3TMABAB3P016A

Clearance between Gear and Spline

1. Secure the gear with a vise.
2. Set a dial indicator (lever type) with its finger on the spline.
3. Move the shaft to measure the clearance.
4. If the clearance exceeds the allowable limit, replace them.

Clearance between gear and spline	Factory spec.	0.030 to 0.078 mm 0.0012 to 0.0031 in.
	Allowable limit	0.2 mm 0.0079 in.

W10258480



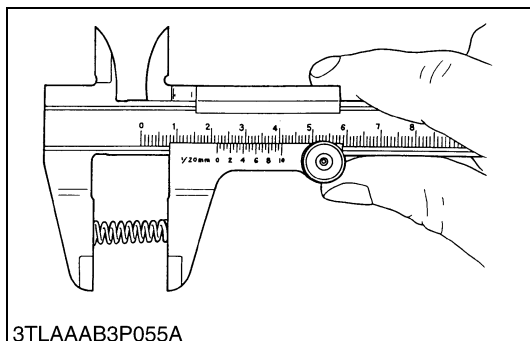
3TMABAB3P017A

Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

1. Place for in the groove to check clearance with feeler gauge.
2. If the clearance exceeds allowable limit, replace.

Clearance between shift fork and shift gear groove	Factory spec.	0.15 to 0.40 mm 0.006 to 0.016 in.
	Allowable limit	0.6 mm 0.024 in.
Clearance between shift fork and shifter groove	Factory spec.	0.15 to 0.40 mm 0.006 to 0.016 in.
	Allowable limit	0.6 mm 0.024 in.

W10269970



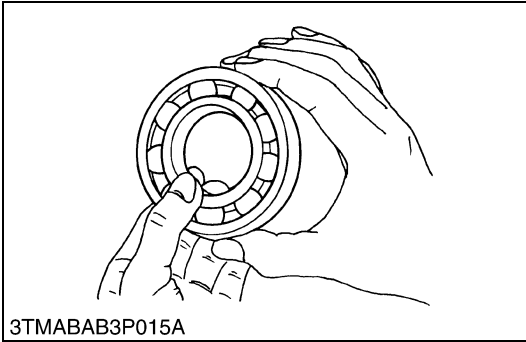
3TLAAB3P055A

Free Length of the Shift Fork Spring

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

Free length of the shift fork spring	Factory spec.	22 mm 0.866 in.
	Allowable limit	20 mm 0.787 in.

W1023724

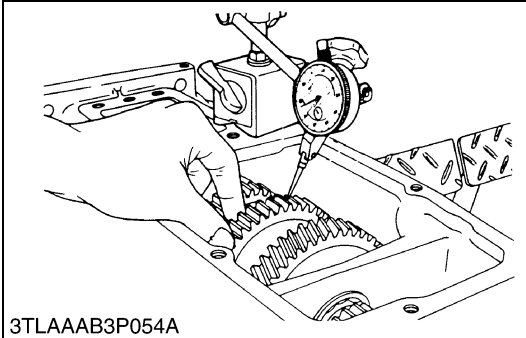
(2) Transmission Case

3TMABAB3P015A

Checking Bearing

1. Hold the inner race, and push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then turn the outer race to check rotation.
3. If there is any defect, replace it.

W1043436



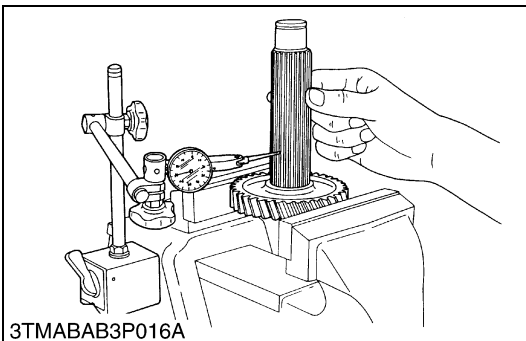
3TLAAB3P054A

Gear Backlash

1. Set a dial indicator (lever type) on one of the tooth faces.
2. Clamp the mating gear.
3. Measure backlash by turning the gear to be measured.
4. If the reading exceeds the allowable limit, replace the gear.

Gear backlash	Factory spec.	0.1 to 0.3 mm 0.004 to 0.012 in.
	Allowable limit	0.4 mm 0.016 in.

W1025475



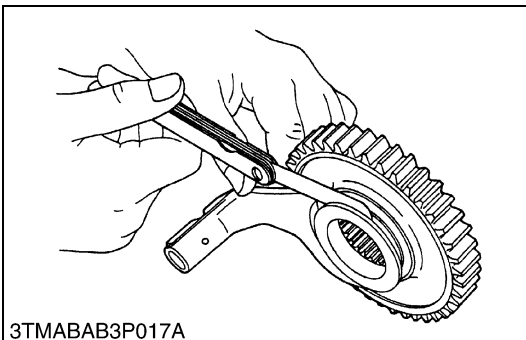
3TMABAB3P016A

Clearance between Gear and Spline

1. Secure the gear with a vise.
2. Set a dial indicator (lever type) with its finger on the spline.
3. Move the shaft to measure the clearance.
4. If the clearance exceeds the allowable limit, replace them.

Clearance between gear and spline	Factory spec.	0.030 to 0.078 mm 0.0012 to 0.0031 in.
	Allowable limit	0.2 mm 0.0079 in.

W1043557



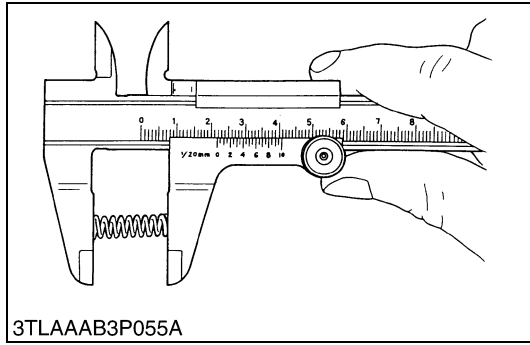
3TMABAB3P017A

Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

1. Place for in the groove to check clearance with feeler gauge.
2. If the clearance exceeds allowable limit, replace.

Clearance between shift fork and shift gear groove	Factory spec.	0.15 to 0.40 mm 0.006 to 0.016 in.
	Allowable limit	0.6 mm 0.024 in.

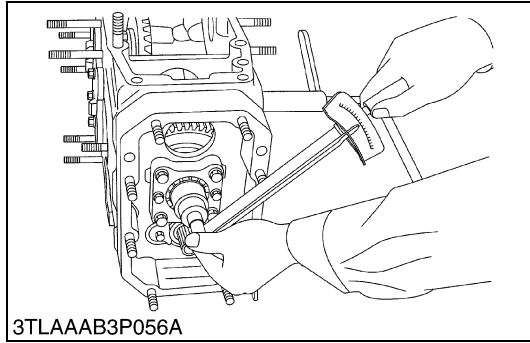
W1043683

**Free Length of the Shift Fork Spring**

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

Free length of the shift fork spring	Factory spec.	22 mm 0.866 in.
	Allowable limit	20 mm 0.787 in.

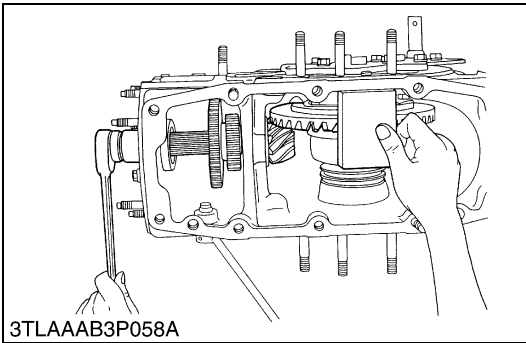
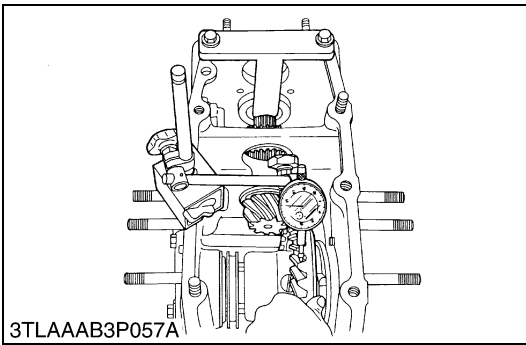
W1025587

**Spiral Bevel Pinion Turning Torque (with Differential Gear)**

1. Grip the spiral bevel pinion nut with a torque wrench and measure the turning torque.
2. If the turning torque is not within the factory specifications, check the differential gear turning force, backlash and tooth contact again.

Differential gear rotating torque (Combined)	Factory spec.	L2800	1.96 to 2.94 N·m 1.45 to 2.17 ft-lbs 0.2 to 0.3 Kgf·m
		L3400	3.92 to 6.37 N·m 0.40 to 0.65 ft-lbs 2.89 to 4.70 Kgf·m

W1025673



Backlash and Tooth Contact between Bevel Gear and 8T Spiral Bevel Pinion

1. Set the dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the 8T spiral bevel pinion and moving the bevel gear by hand.
3. If the backlash exceeds the factory specification, decrease the number of shims at right bearing case (right) and insert the removed shims to the left bearing case (left).
If the backlash is less than the factory specification, decrease the number of shims at left bearing case (left) and insert the removed shims to the right bearing case (right)..
4. Adjust the backlash properly by repeating the above procedures.

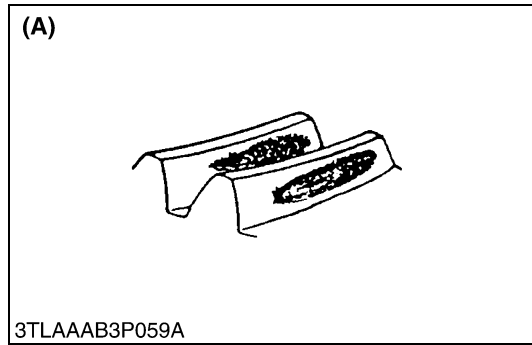
Backlash between spiral bevel gear and 8T spiral bevel pinion	Factory spec.	0.15 to 0.30 mm 0.0059 to 0.0118 in.
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5. Apply red lead lightly over several teeth at three positions equally spaced on the bevel gear.
6. Turn the 8T spiral bevel pinion while pressing a wooden piece against the periphery of the bevel gear..
7. Check the tooth contact. If not proper, adjust according to the instructions below.

(Reference)

- Thickness of differential side shims :
 - 0.1 mm (0.004 in.) (Parts No. 37150-26170)
 - 0.2 mm (0.008 in.) (Parts No. 37150-26160)
 - 0.5 mm (0.020 in.) (Parts No. 37150-26180)
- Thickness of spiral bevel pinion shims :
 - 0.1 mm (0.004 in.) (Parts No. 34150-22630)
 - 0.2 mm (0.008 in.) (Parts No. 34150-22620)
 - 0.5 mm (0.020 in.) (Parts No. 37450-22610)

W10279260

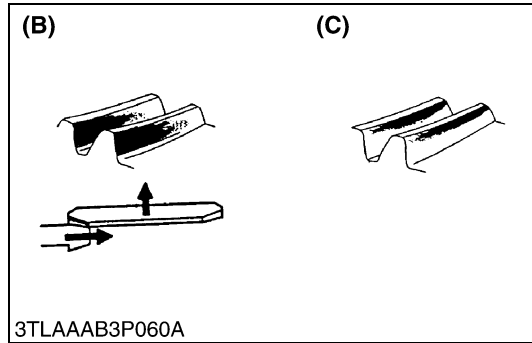


Proper Contact

More than 35 % red lead contact area on the gear tooth surface.
The center of tooth contact at 1/3 of the entire width from the small end.

(A) Proper Contact

W10187470



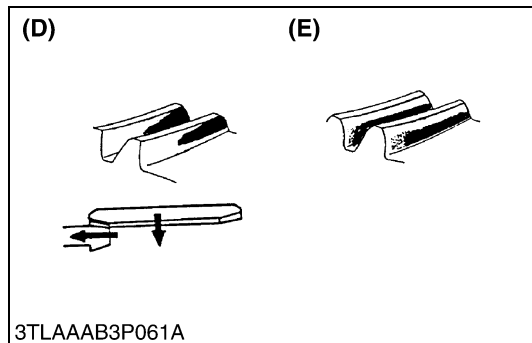
Heel Contact and Tip Contact

Replace the adjusting shim with thicker one to move the bevel pinion shaft forward.
And place the left side shim to the right to move the bevel gear rightward.
Repeat above until the proper tooth contact and backlash are achieved.

(B) Heel Contact

(C) Tip Contact

W10189000



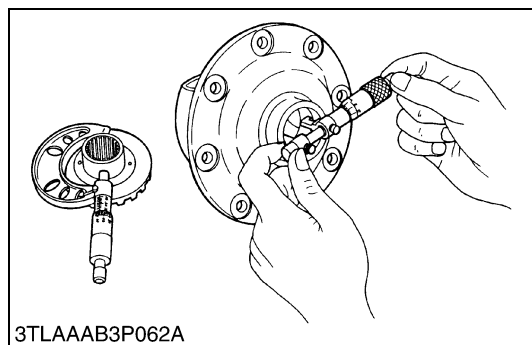
Toe Contact and Base Contact

Replace adjusting shim with thicker one to move the bevel pinion shaft forward.
And place the right side shim to the left to move the bevel gear leftward.
Repeat above until the proper tooth contact and backlash are achieved.

(D) Toe Contact

(E) Base Contact

W10189730



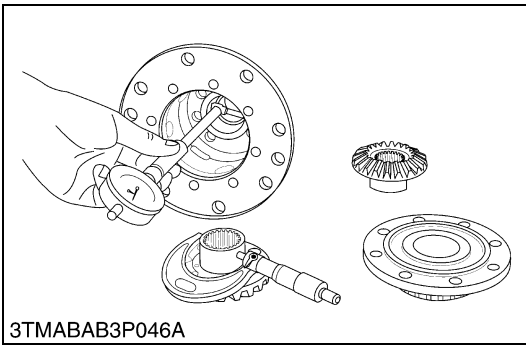
Clearance between Differential Case Bore and Differential Side Gear Boss (L2800)

1. Measure the bore I.D. of the differential case.
2. Measure the boss O.D. of the differential side gear and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace.

Clearance between differential case bore and differential side gear boss	Factory spec.	0.025 to 0.124 mm 0.00098 to 0.00488 in.
	Allowable limit	0.35 mm 0.0138 in.

Differential case bore I.D.	Factory spec.	38.025 to 38.065 mm 1.49704 to 1.49862 in.
Differential side gear boss O.D.	Factory spec.	37.941 to 38.000 mm 1.49374 to 1.49606 in.

W10284030



Clearance between Differential Case Bore (Differential Case Cover Bore) and Differential Side Gear Boss (L3400)

1. Measure the bore I.D. of the differential case and differential case cover.
2. Measure the differential side gear boss O.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

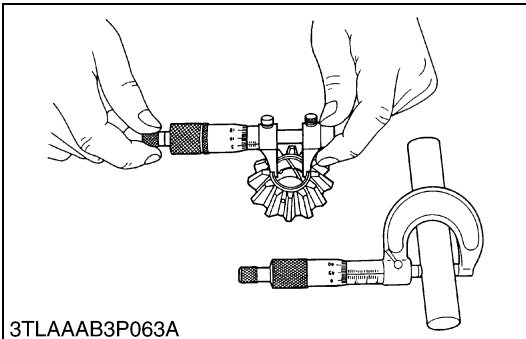
Clearance between differential case bore and differential side gear boss	Factory spec.	0.050 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.0138 in.

Differential case bore I.D.	Factory spec.	40.500 to 40.562 mm 1.59449 to 1.59693 in.
Differential side gear boss O.D.	Factory spec.	40.411 to 40.450 mm 1.59098 to 1.59252 in.

Clearance between differential case cover bore and differential side gear boss	Factory spec.	0.090 to 0.169 mm 0.00354 to 0.00666 in.
	Allowable limit	0.35 mm 0.0138 in.

Differential case cover bore I.D.	Factory spec.	40.540 to 40.580mm 1.59606 to 1.59764 in.
Differential side gear boss O.D.	Factory spec.	40.411 to 40.450 mm 1.59098 to 1.59252 in.

W102840310



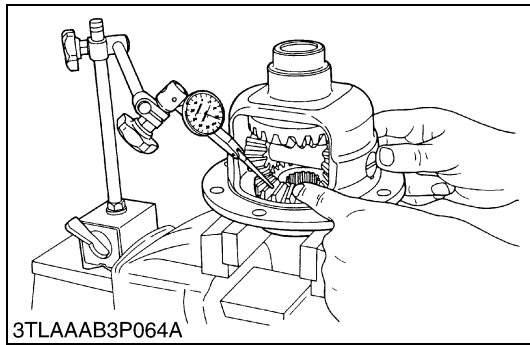
Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceed the allowable limit, replace them.

Clearance between differential pinion shaft and differential pinion	Factory spec.	0.080 to 0.122 mm 0.00315 to 0.00480 in.
	Allowable limit	0.30 mm 0.0118 in.

Differential pinion shaft O.D.	Factory spec.	19.959 to 19.980 mm 0.78579 to 0.78661 in.
Differential pinion I.D.	Factory spec.	20.060 to 20.081 mm 0.78976 to 0.79059 in.

W10287600



Backlash between Differential Pinion and Differential Side Gear

1. Secure the differential case in a vise.
2. Set a dial indicator (lever type) on the tooth of the differential side gear.
3. Hold the differential pinion and move the differential side gear to measure the backlash.
4. If the measurement exceeds the allowable limit, adjust with the differential side gear washer.

Backlash between differential pinion and differential side gear	Factory spec.	0.15 to 0.30 mm 0.0059 to 0.0118 in.
	Allowable limit	0.4 mm 0.016 in.

(Reference)

- Thickness of differential side gear washers :

[L2800]

- 1.5 mm (0.059 in.) (Parts No. 31331-26470)
- 1.6 mm (0.063 in.) (Parts No. 31331-26480)
- 1.7 mm (0.067 in.) (Parts No. 31331-26490)

[L3400]

- 1.5 mm (0.059 in.) (Parts No. 31351-26470)
- 1.6 mm (0.063 in.) (Parts No. 31351-26480)
- 1.7 mm (0.067 in.) (Parts No. 31351-26490)
- 1.8 mm (0.071 in.) (Parts No. 3A011-32760)
- 2.0 mm (0.079 in.) (Parts No. 3A011-32780)

W10289200

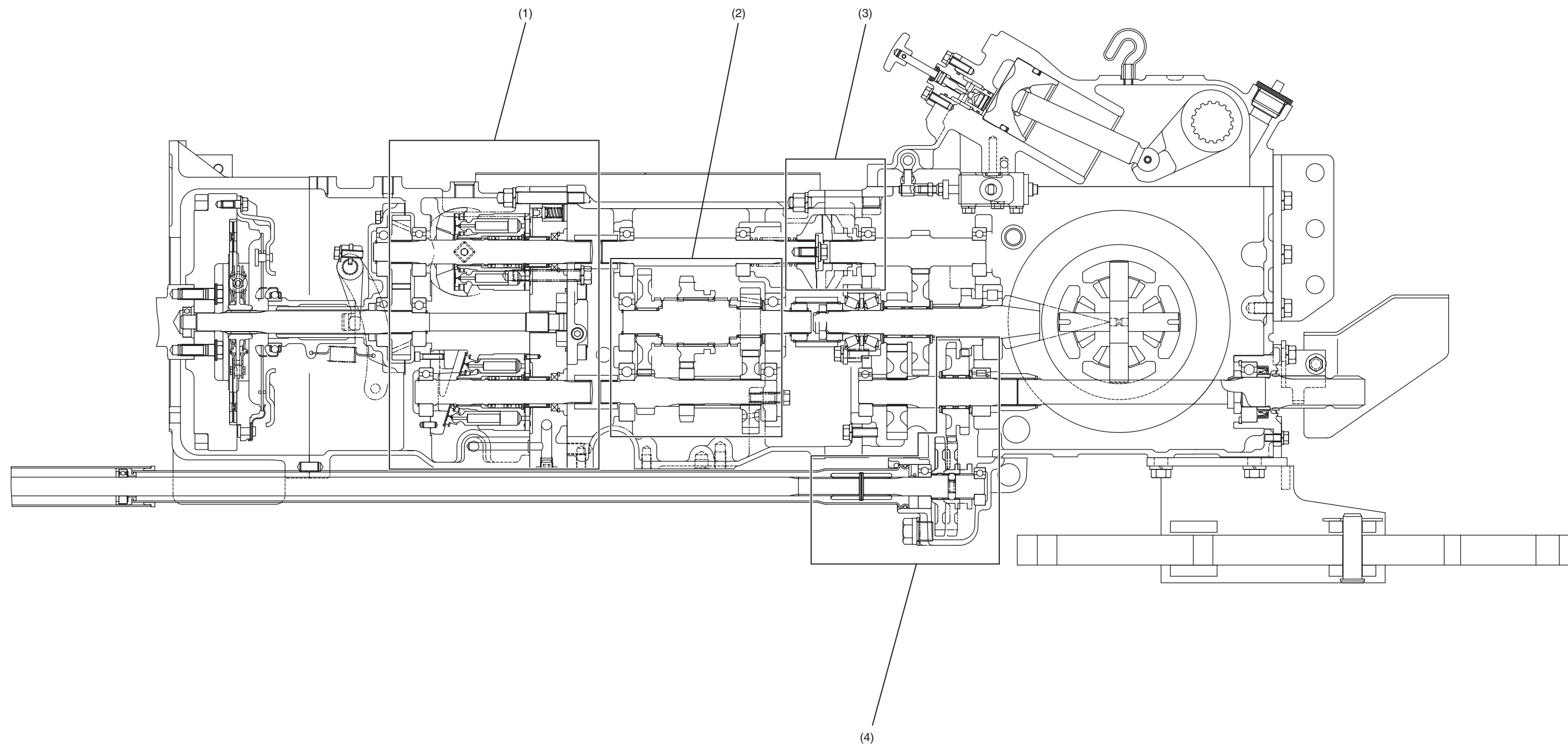
H3 TRANSMISSION (HST TYPE)

MECHANISM

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1. STRUCTURE	H3-M1
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1. STRUCTURE



3TLAAB3P068A

(1) Hydrostatic Transmission Section

(2) Range Gear Shift Section

(3) PTO Clutch Section

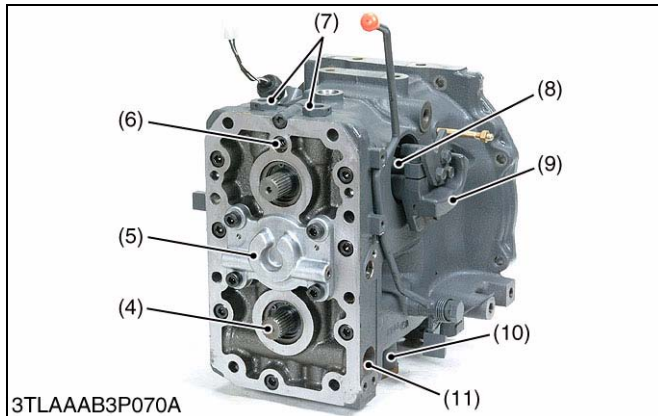
(4) Front Wheel Drive Section

2. POWER TRAIN FOR TRAVELLING

The transmission of this model consists of a series of gears as shown in previous page. The traveling system is chiefly composed of hydrostatic transmission section, range gear shift section and front wheel drive section.

[1] HYDRAULIC TRANSMISSION (HST)

(1) Structure



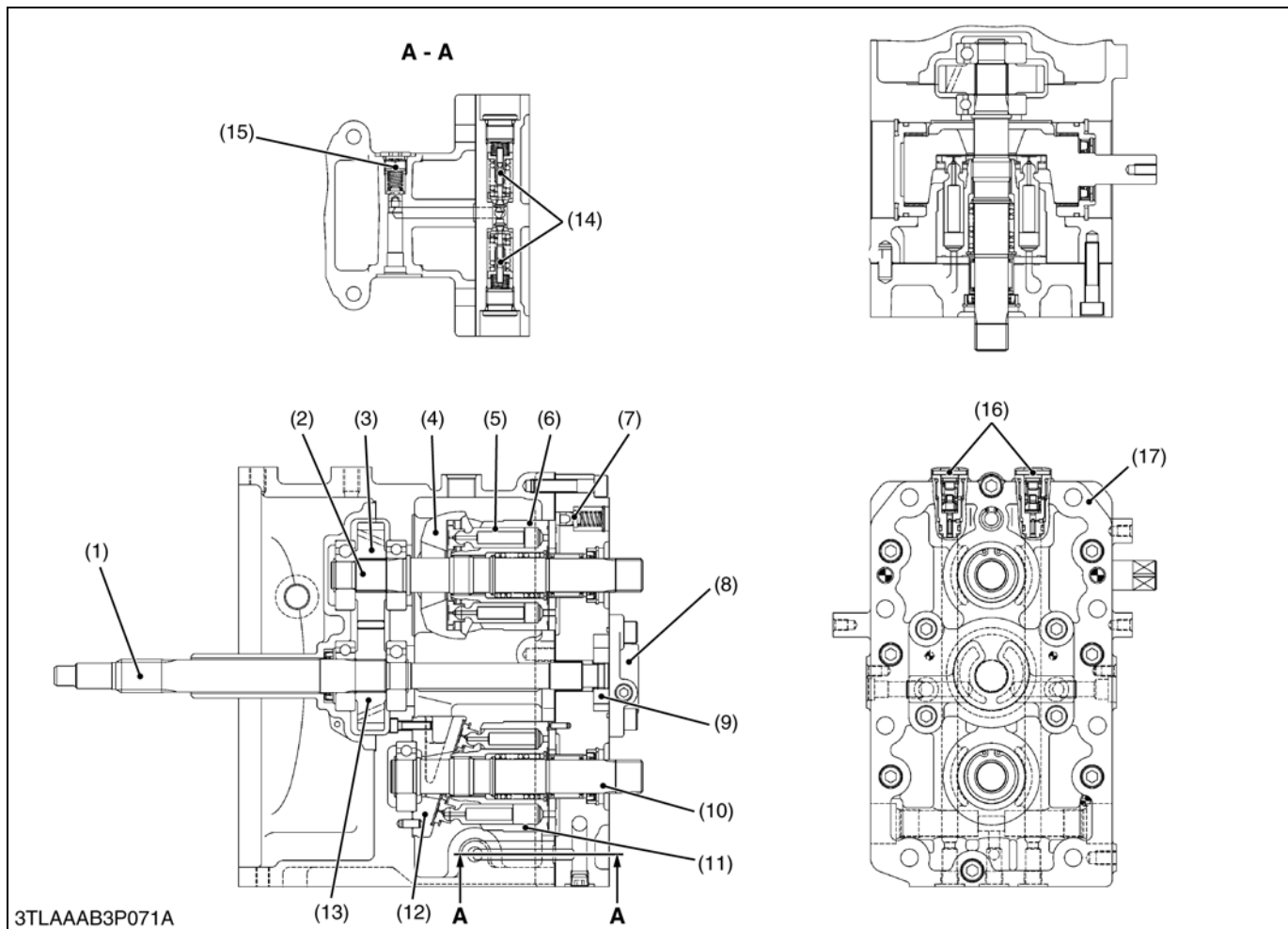
The HST of this tractor is a built-in type to the clutch housing.

HST assembly is chiefly composed of HST case (clutch housing), variable displacement piston pump, fixed displacement piston motor, charge pump and various valves.

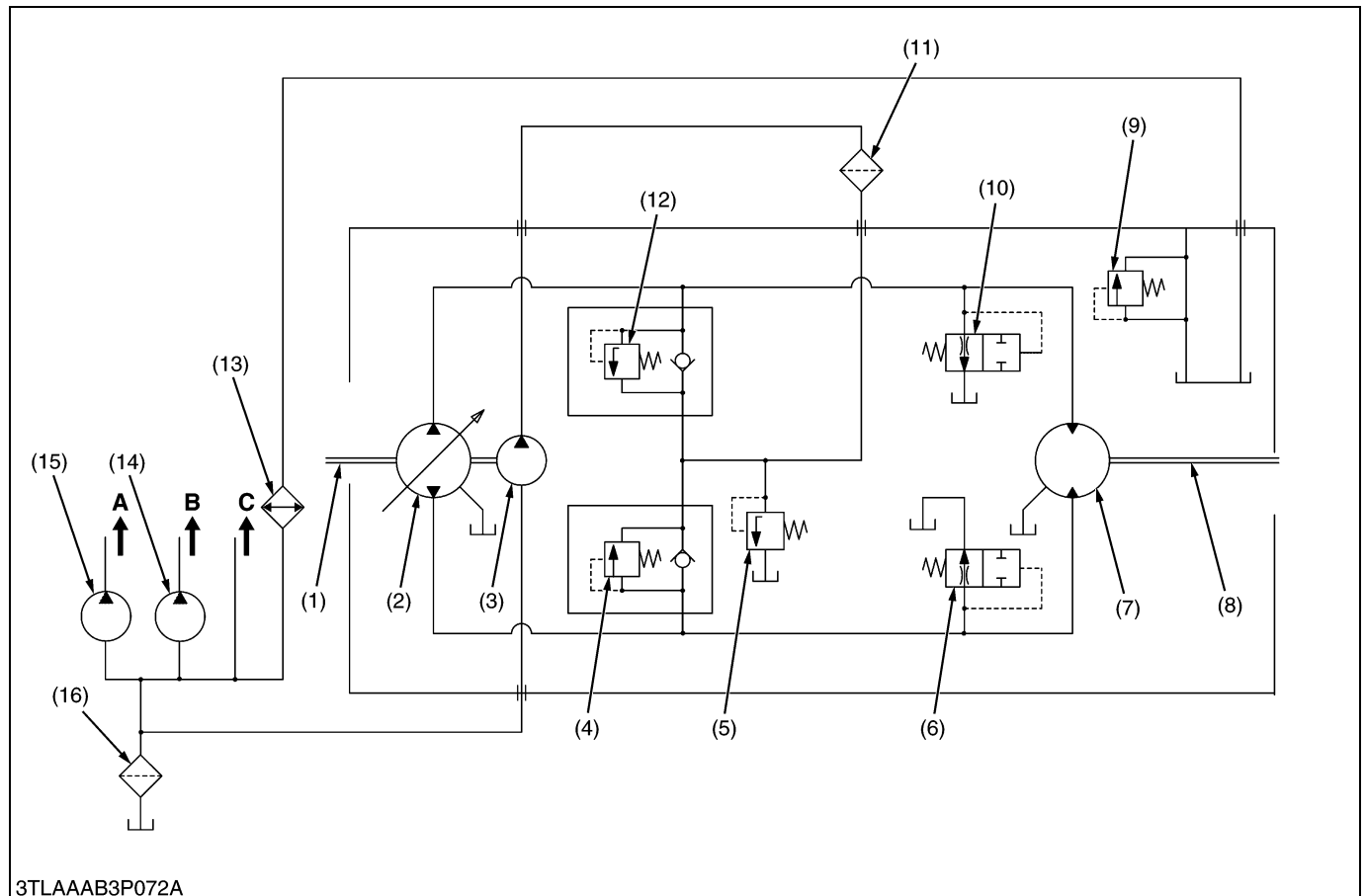
Refer to the next page for detailed parts in HST.

- | | |
|--|---|
| (1) Input Shaft | (6) Case Relief Valve |
| (2) HST Case (Clutch Housing) | (7) Neutral Valve |
| (3) Check and High Pressure Relief Valve | (8) Trunnion Shaft |
| (4) Output Shaft (Motor Shaft) | (9) Neutral Holder |
| (5) Charge Pump | (10) Charge Relief Valve |
| (6) Case Relief Valve | (11) Check and High Pressure Relief Valve |

W1013776



- | | | | |
|-------------------------|---------------------------|-----------------------------|---|
| (1) Input Shaft | (6) Cylinder Block (Pump) | (10) Output Shaft (Motor) | (14) Check and High Pressure Relief Valve |
| (2) Pump Shaft | (7) Case Relief Valve | (11) Cylinder Block (Motor) | (15) Charge Relief Valve |
| (3) 27T Gear | (8) Charge Pump Cover | (12) Fixed Swashplate | (16) Neutral Valve |
| (4) Variable Swashplate | (9) Charge pump | (13) 28T Gear | (17) Port Block Cover |
| (5) Piston (Pump) | | | |

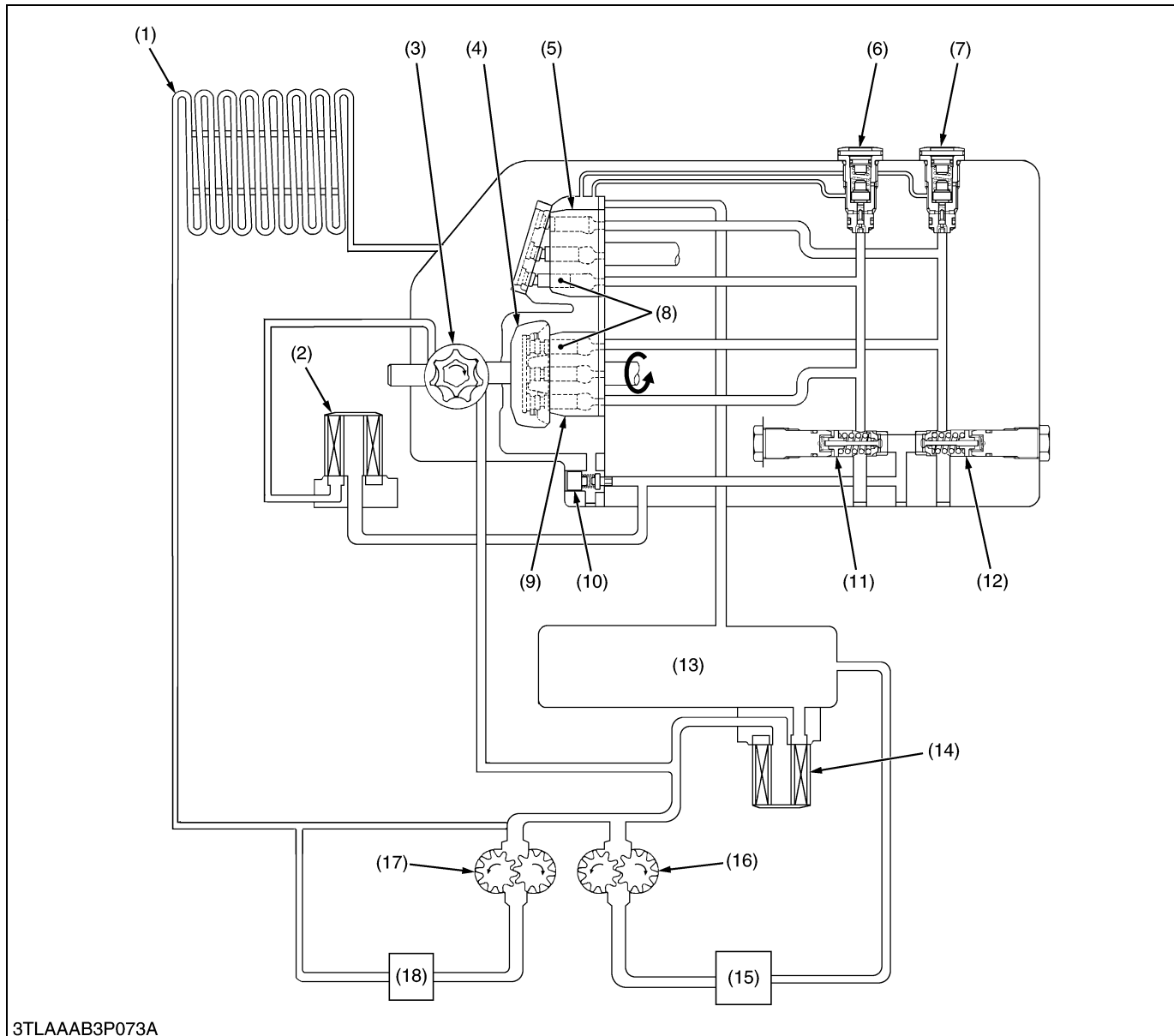
[2] OIL FLOW

- | | | | |
|--|------------------------------|---|-------------------------------------|
| (1) Pump Shaft | (6) Neutral Valve | (12) Check and High Pressure Relief Valve | A : To Hydraulic Block |
| (2) Variable Displacement Pump | (7) Fixed Displacement Motor | (13) Oil Cooler | B : To Power Steering |
| (3) Charge Pump | (8) Output Shaft (Motor) | (14) Pump | C : From Steering Controller |
| (4) Check and High Pressure Relief Valve | (9) Case Relief Valve | (15) Pump | |
| (5) Charge Relief Valve | (10) Neutral Valve | (16) Oil Filter | |

The pump (2) and motor (7) are joined in a closed hydraulic loop and most of oil circulates within the main oil circuit. When the variable swash-plate is at right angle to the pump piston, the oil is not send to the motor (7). When the variable swash-plate is tilted to forward or reverse, oil forced out of pump (2) at high pressure and send to the motor.

But the neutral valve (6), (10) in the main oil circuit lines are open and pass the oil to the case when in neutral, and oil pressure in their lines becomes low. And when the oil pressure in the high pressure line increase to a specified pressure, the neutral valve (6), (10) closes. Then the output shaft (8) rotates with the motor and oil is forced out of motor at low pressure and return to the pump (2). On the other hand, oil is send to the main circuit with the charge pump (3) through the filter (11) and check valve and excessive oil passes to the case through the charge relief valve (5). The case relief valve (9) controls pressure in the HST case.

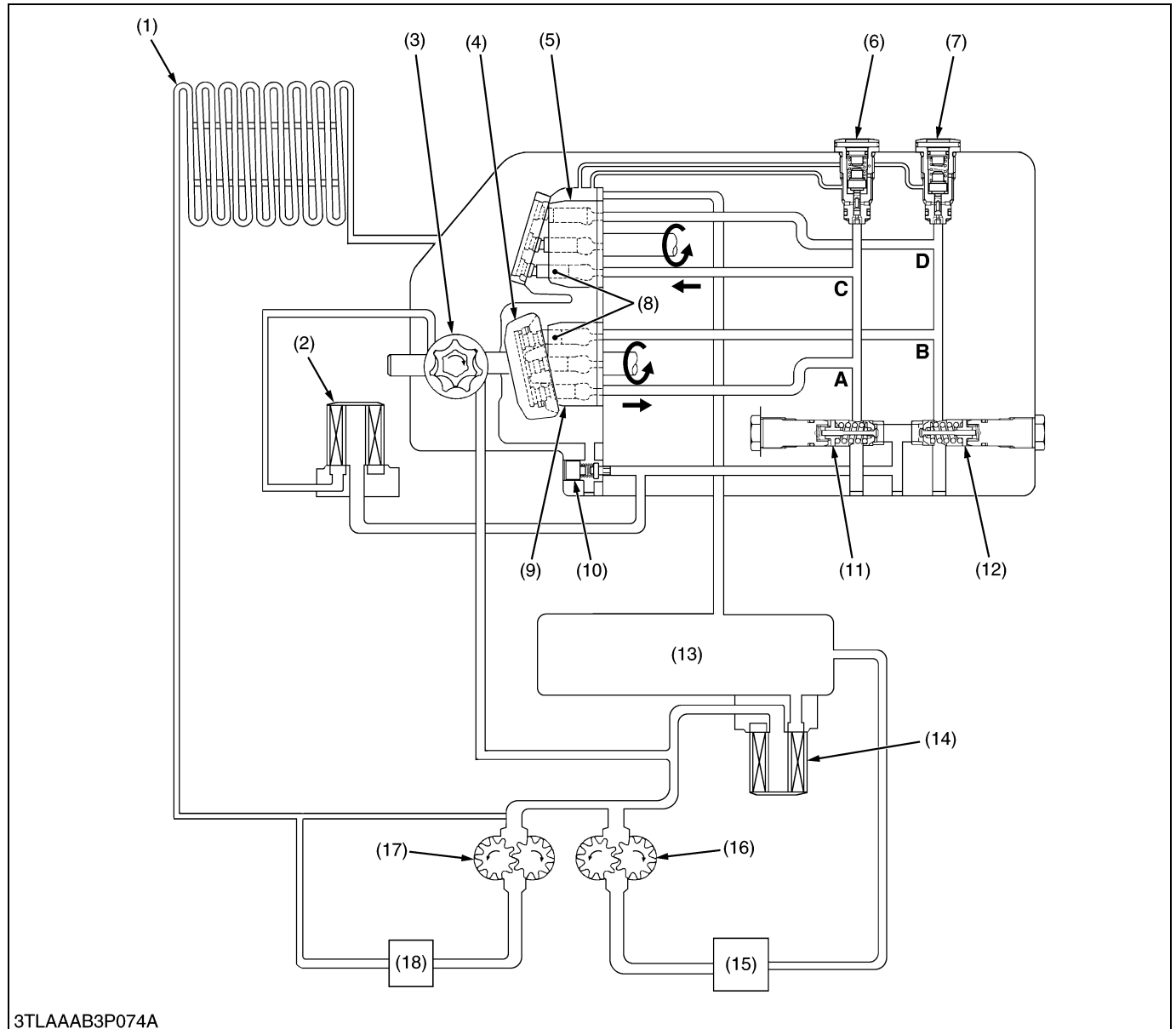
The high pressure relief valve (4), (12) between the two lines in the main oil circuit monitors the oil pressure in each line, it opens and close the oil into another line.

[3] OPERATION**(1) Neutral**

3TLAAAB3P073A

- | | | | |
|----------------------------|-----------------------------|---|--|
| (1) Oil Cooler | (6) Neutral Valve (Forward) | (11) Check and High Pressure Relief Valve (Forward) | (15) Hydraulic Control Valve |
| (2) Oil Filter (For HST) | (7) Neutral Valve (Reverse) | (12) Check and High Pressure Relief Valve (Reverse) | (16) Hydraulic Pump (For Main Circuit) |
| (3) Charge Pump | (8) Piston | (13) Transmission Case | (17) Hydraulic Pump (For Power Steering) |
| (4) Swash plate | (9) Cylinder Block (Pump) | (14) Oil Filter | (18) Power Steering Controller |
| (5) Cylinder Block (Motor) | (10) Charge Relief Valve | | |

When the speed control pedal is in neutral, the variable swash-plate is at right angles to the pump piston and they only rotate with cylinder block without reciprocating. Since the oil is not being pumped to the motor, the cylinder block in the motor is stationary and the output shaft does not move.

(2) Forward

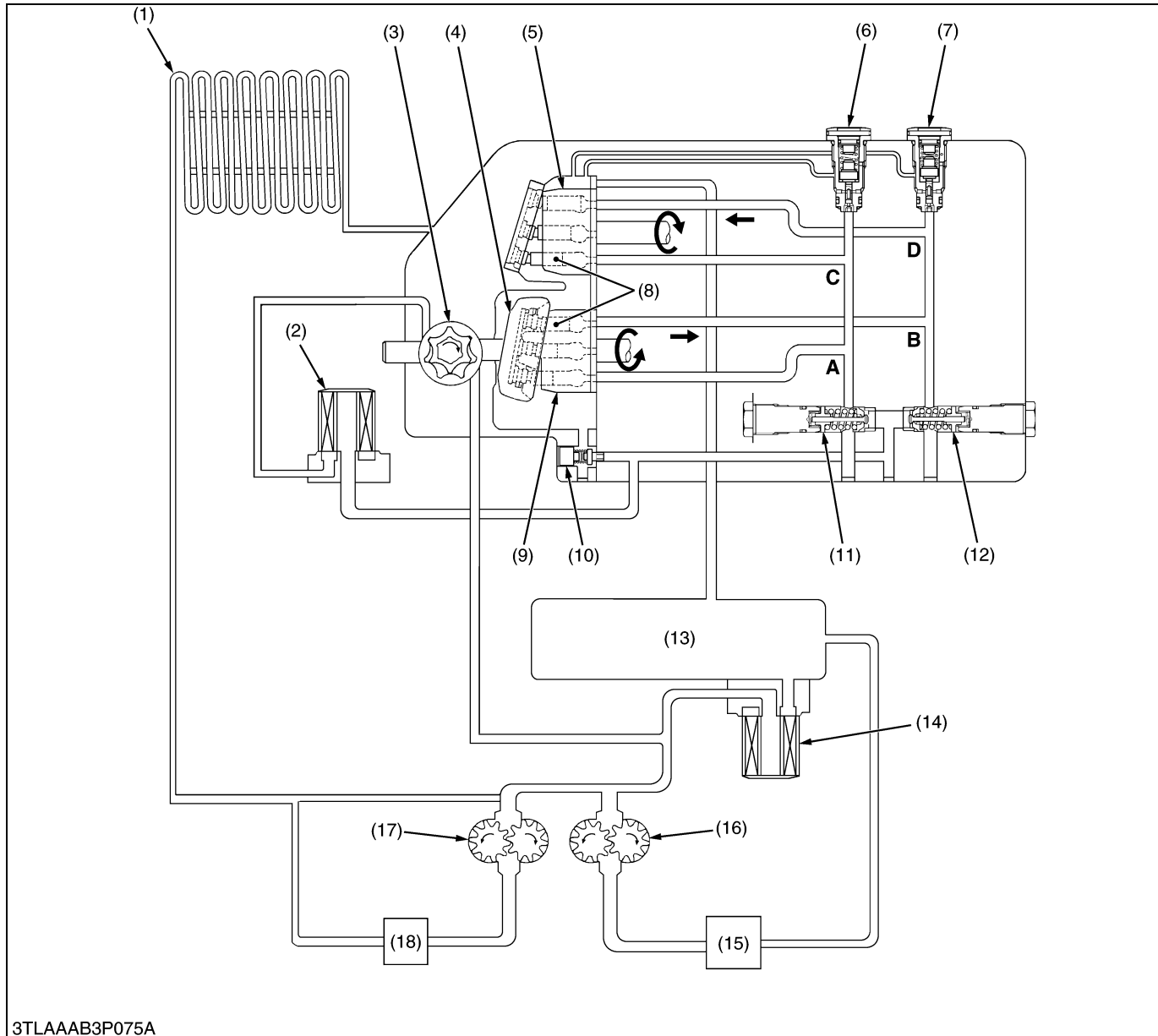
- | | | | |
|-----------------------------|---|--|-------------------------|
| (1) Oil Cooler | (7) Neutral Valve (Reverse) | (13) Transmission Case | A : Pump Port A |
| (2) Oil Filter (For HST) | (8) Piston | (14) Oil Filter | B : Pump Port B |
| (3) Charge Pump | (9) Cylinder Block (Pump) | (15) Hydraulic Control Valve | C : Motor Port C |
| (4) Swash Plate | (10) Charge Relief Valve | (16) Hydraulic Pump (For Main Circuit) | D : Motor Port D |
| (5) Cylinder Block (Motor) | (11) Check and High Pressure Relief Valve (Forward) | (17) Hydraulic Pump (For Power Steering) | |
| (6) Neutral Valve (Forward) | (12) Check and High Pressure Relief Valve (Reverse) | (18) Power Steering Controller | |

When the speed control pedal is stepped on and in forward, the variable swash-plate is tilted as shown in figure above.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **A** at high pressure. As pressure oil enters motor port **C**, the pistons, which align with port **C**, are pushed against the swash-plate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine forward and the angle of pump swash-plate determines the output shaft speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **D** at low pressure and returns to the pump port **B**.

(3) Reverse

- | | | | |
|-----------------------------|---|--|-------------------------|
| (1) Oil Cooler | (7) Neutral Valve (Reverse) | (13) Transmission Case | A : Pump Port A |
| (2) Oil Filter (For HST) | (8) Piston | (14) Oil Filter | B : Pump Port B |
| (3) Charge Pump | (9) Cylinder Block (Pump) | (15) Hydraulic Control Valve | C : Motor Port C |
| (4) Swash Plate | (10) Charge Relief Valve | (16) Hydraulic Pump (For Main Circuit) | D : Motor Port D |
| (5) Cylinder Block (Motor) | (11) Check and High Pressure Relief Valve (Forward) | (17) Hydraulic Pump (For Power Steering) | |
| (6) Neutral Valve (Forward) | (12) Check and High Pressure Relief Valve (Reverse) | (18) Power Steering Controller | |

When the speed control pedal is stepped on and in reverse, the variable swash-plate is tilted as shown in figure above.

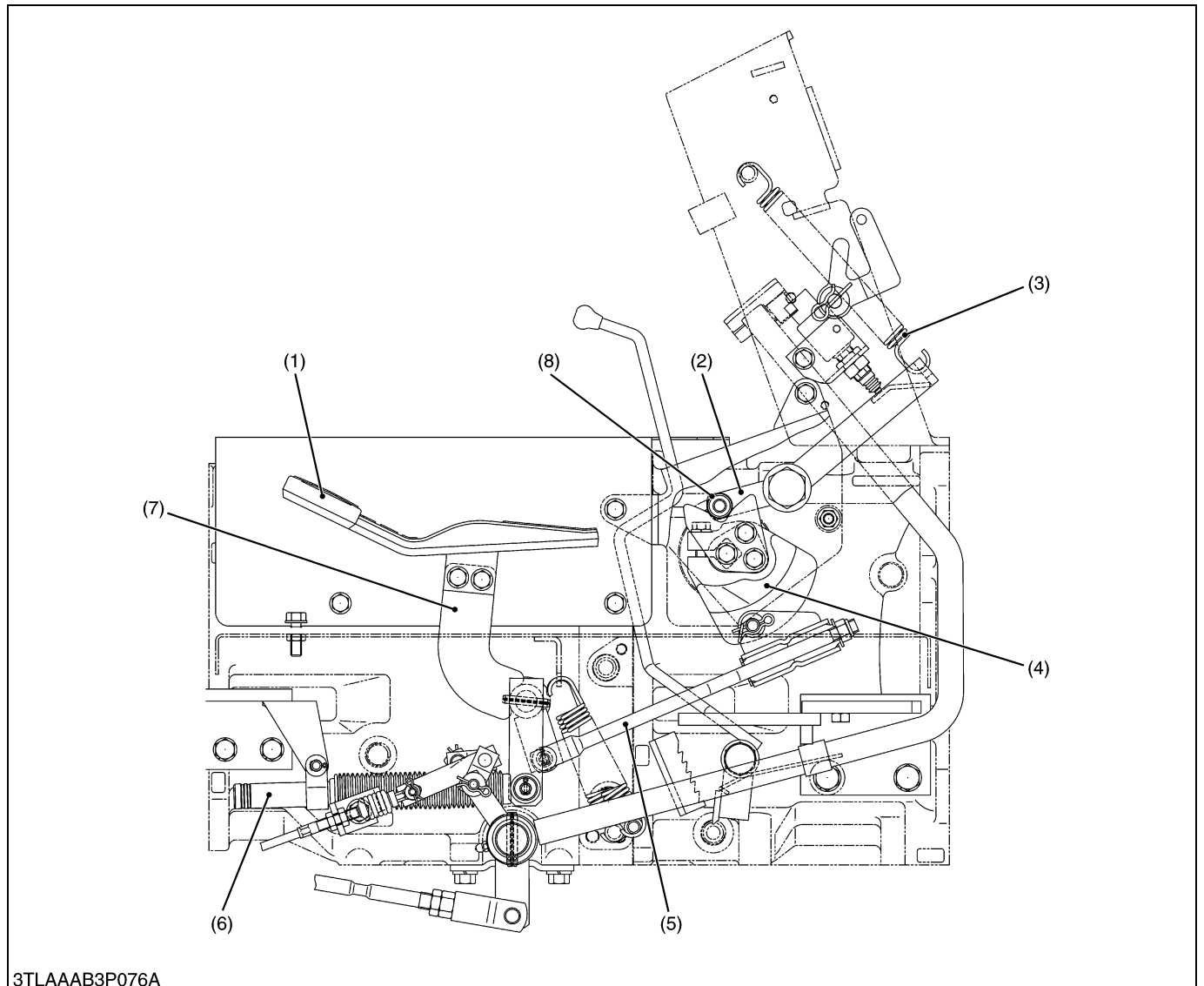
As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **B** at high pressure. As pressure oil enters motor port **D**, the pistons, which align with port **D**, are pushed against the swash-plate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine rearward and the angle of pump swash-plate determines the output shaft speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **C** at low pressure and returns to the pump port **A**.

[4] CONTROL LINKAGE

(1) HST Pedal Linkage

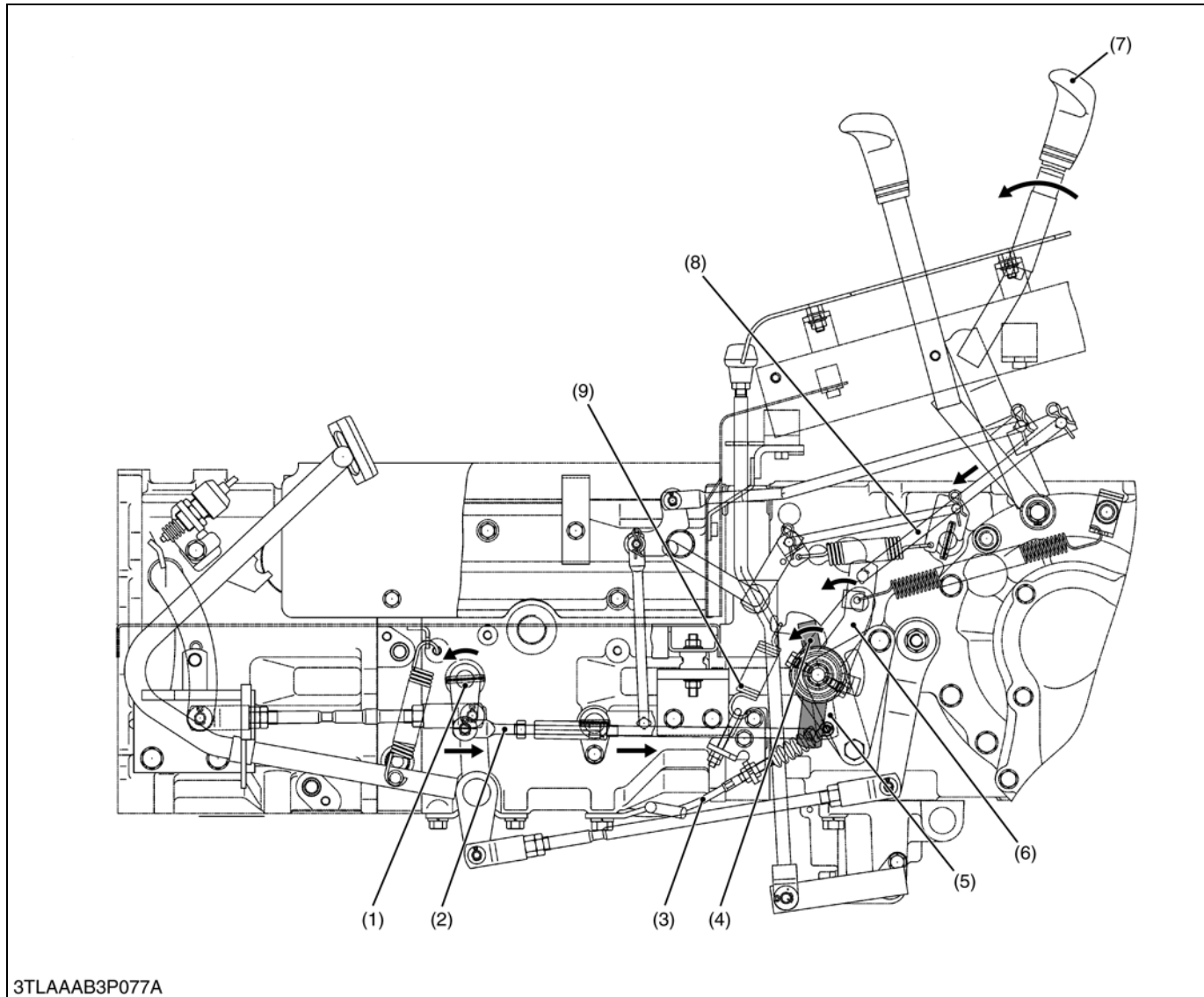


- | | | | |
|------------------------|--------------------|-----------------|-------------------|
| (1) HST Pedal | (3) Spring | (5) Neutral Rod | (7) Pedal Bracket |
| (2) Neutral Holder Arm | (4) Neutral Holder | (6) Damper | (8) Ball Bearing |

The speed control pedal (HST pedal) (1) and the holder (Trunnion) are linked with the pedal bracket and HST neutral rod (5).

As the HST pedal (1) is depressed to forward, the HST holder (4) is rotated, then the swash-plate is tilted by trunnion shaft and forward travelling speed increases. Then, the swash-plate is returned to neutral with the neutral holder arm (2), when the pedal is released. The ball bearing (8) on the neutral holder (2) pulled with the neutral spring (3) seats the detent of the neutral holder arm (4) so that the neutral holder arm returns to neutral.

The damper (6) is connected to the HST pedal (1) and restricts the movement of the linkage to prevent abrupt operation or reversing.

(2) Cruise Control

- | | | | |
|--------------------------|--------------------|--------------------------|--------------------|
| (1) Connecting Shaft | (4) Cruise Lever 1 | (6) Cruise Lever 2 | (8) Lever Rod |
| (2) Cruise Adjusting Rod | (5) Release Lever | (7) Cruise Control Lever | (9) Release Spring |
| (3) Release Wire | | | |

The cruise control lever (7) and HST pedal are linked with the lever rod (8), cruise lever 1 (4), cruise lever 2 (6), cruise adjusting rod (2) and connecting shaft (1).

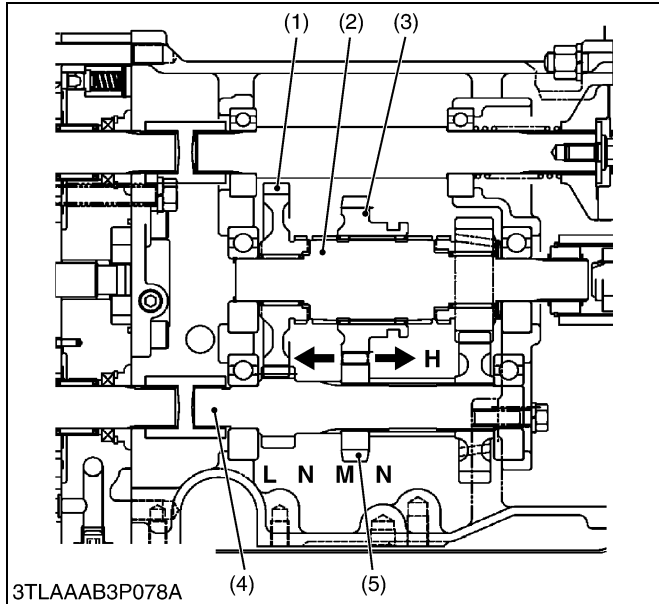
When the cruise control lever (7) is moved to forward direction, cruise lever 2 (6) is moved to arrow direction by the lever rod (8). The cruise lever 1 (4) is moved forward by being pushed to the cruise lever 2 (6), and cruise adjusting rod (2) is pulled backward. Because cruise adjusting rod (2) and the HST pedal are connected by the connecting shaft (1), the HST pedal is moved and HST becomes forward position.

The cruise control can be returned to neutral automatically when brake pedals are depressed.

When brake pedals are depressed, release wire pull the release lever (5) to forward.

As result, the holding force of cruise control lever (7) is lost and the cruise control lever (7) return to neutrality by force of release spring (9).

[5] RANGE GEAR SHIFT SECTION



The range gear shift section is located in the mid case.

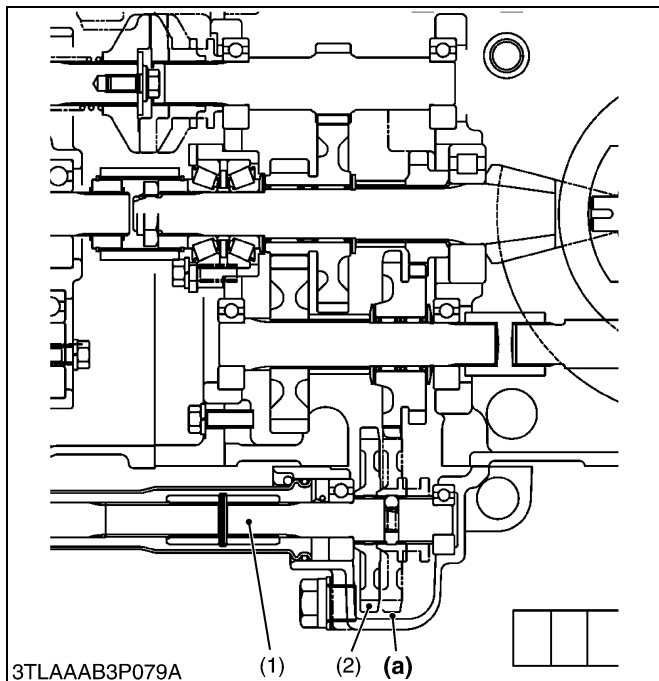
It changes the speed to five position (**L**, **N**, **M**, **N** and **H**) by shifting of shift gear (3) in the straight line on shaft (2).

- (1) 37T Gear
- (2) Shaft
- (3) 31T Gear
- (4) 13T Gear Shaft
- (5) 19T Gear

L : Low Speed Position
N : Neutral Position
M : Middle Speed Position
H : High Speed Position

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[6] FRONT DRIVE WHEEL SECTION



Front wheel drive section is located in the differential gear case.

2 wheel drive or 4 wheel drive is selected by operating the front wheel drive lever to shift the Shifter gear (2).

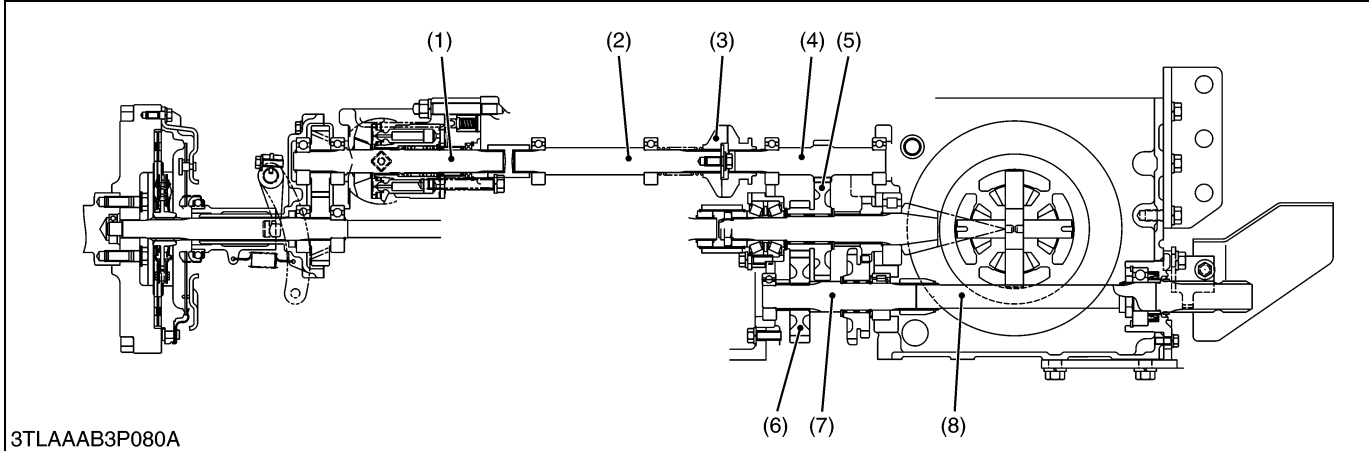
- (1) Front Wheel Drive Shaft
- (2) Shifter Gear

(a) 4 Wheel Drive Position

W1015787

3. POWER TRAIN FOR PTO

[1] STRUCTURE



(1) Pump Shaft (HST)
(2) PTO Counter Shaft

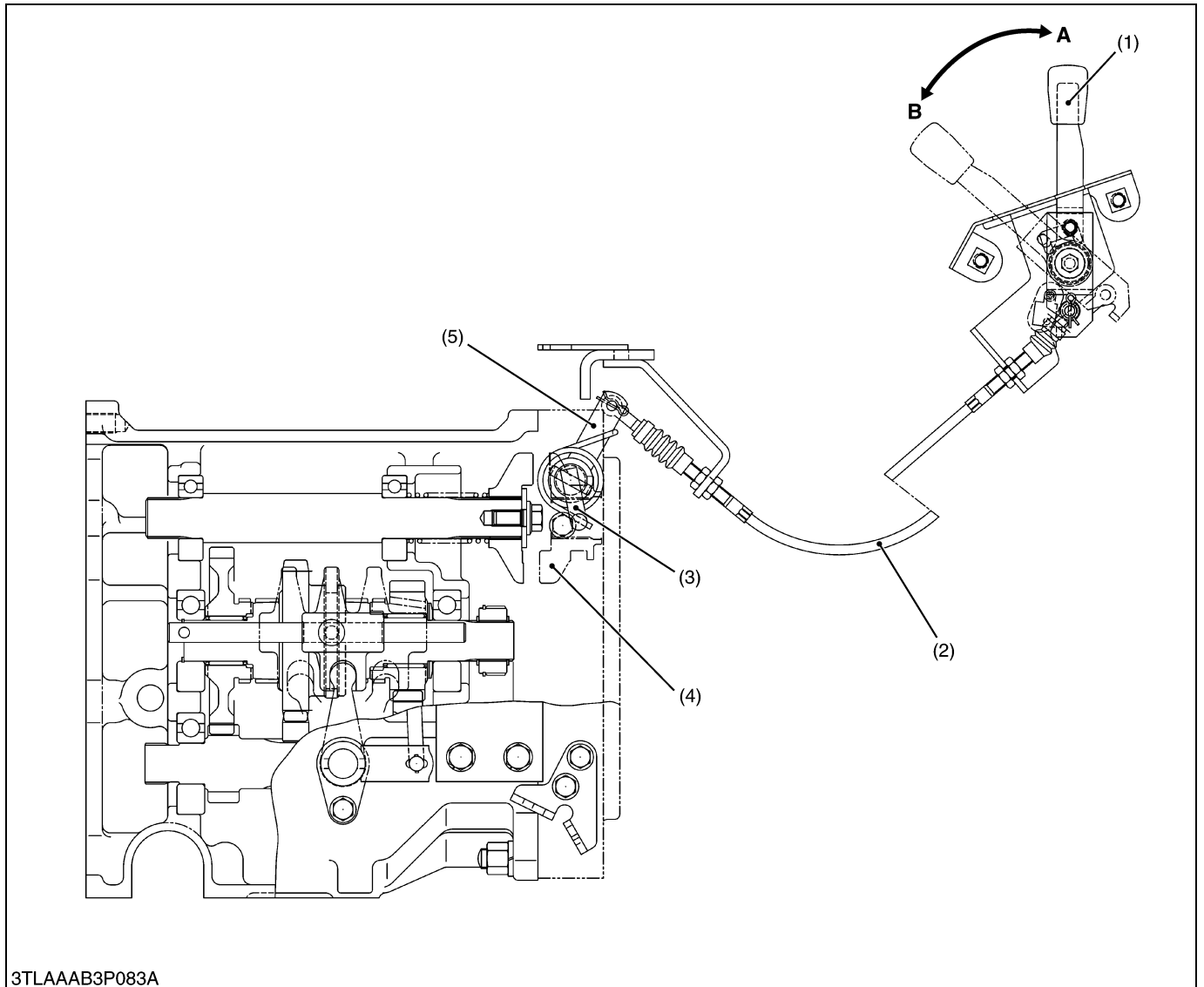
(3) PTO Dog Clutch
(4) 16T Gear Shaft

(5) 15T-44T Gear
(6) 27T Gear

(7) PTO Drive Shaft
(8) PTO Shaft

PTO is "**ENGAGED**" or "**DISENGAGED**" by operating the shift lever of the PTO clutch (3).
The power train from the clutch to PTO shaft is composed as shown in figure above.

[2] SHIFTING LINKAGE



(1) PTO Lever
(2) PTO Shift Cable

(3) PTO Shift Fork
(4) 16T PTO Clutch

(5) Lever

A : Disengaged
B : Engaged

The shift lever (1) through the shift fork (3) are connected by shift cable (2), as shown in the figure above.

When the shift lever (1) is moved to the **A** side or the **B** side, the shift fork (3) is moved by means of the shift cable (2) and lever (5).

When the shift lever (1) is moved to the **A** side, the PTO is shifted to the "**Disengaged**" position.

When the shift lever (1) is moved to the **B** side, the PTO is shifted to the "**Engaged**" position.

SERVICING

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(2) Differential Gear	H3-S26
(3) HST	H3-S27

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive Transmission Noise	Transmission fluid insufficient	Replenish	H3-S12
	Gear worn or backlash improper	Replace	3-S30
	Bearing worn or broken	Replace	3-S30
	Shift fork worn	Replace	H3-S24
	Spline worn	Replace	3-S30
	Snap rings on the shaft come off	Repair or replace	–
	Spiral bevel pinion lock nut improperly tightened	Tighten	H3-S25
	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S32
	Improper backlash between differential pinion and differential side gear	Adjust	3-S35
Gear Slip Out of Mesh	Shift linkages rusted	Repair	–
	Shifter or shift fork worn or damaged	Replace	–
	Shift fork interlock ball spring weaken or damaged	Replace	–
	Interlock ball fallen	Reassemble	–
	Gears worn or broken	Replace	–
Hard Shifting	Shifter or shift fork worn or damaged	Replace	–
	Shift fork bent	Replace	–
	Shift linkage rusted	Repair	–
	Shaft part of shift arms rusted	Repair	–
Gears Clash When Shifting	Clutch does not release	Adjust or repair	2-S6
	Gears worn or damaged	Replace	–
Differential Lock Can Not Be Set	Differential lock shift fork damaged	Replace	–
	Differential lock shift fork mounting spring pin damaged	Replace	3-S20
	Differential lock shifter pin bent or damaged	Replace	3-S20
	Differential lock fork shaft bent or damaged	Replace	3-S20
Differential Lock Pedal Does Not Return	Differential lock pedal return spring weaken or damaged	Replace	–
	Differential lock shifter pin bent or damaged	Replace	3-S20
	Differential lock cam bent	Replace	3-S20

W1014322

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual at All Time	Improper backlash between spiral bevel pinion and spiral bevel gear	Adjust	3-S32
	Improper backlash between differential pinion and differential side gear	Adjust	3-S35
	Bearings worn	Replace	3-S30
	Insufficient or improper type of transmission fluid used	Replenish or replace	G-7
Noise While Turning	Differential pinions or differential side gears worn or damaged	Replace	3-S35
	Differential lock binding (does not disengage)	Replace	–
	Bearing worn	Replace	3-S30

W1023446

HYDROSTATIC TRANSMISSION

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-16
	Speed control pedal linkage defective	Repair linkage	H3-S10, S11
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-18
		2. Check charge pressure	H3-S8
		3. Inspect or flush charge relief valve	H3-S23
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	H3-S7, S20
	Neutral valve defective	Inspect or replace neutral valve	H3-S20
Component parts defective	Replace hydrostatic transmission assembly	H-S19, S20	
Vibration and Noise	Oil level is too low	Check oil level or fill oil to proper level	G-16
	Speed control pedal linkage defective	Power linkage	H3-S10, S11
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-18
		2. Check charge pressure	H3-S8
		3. Inspect or flush charge relief valve	H3-S23
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	H3-S7, S20
	Neutral valve defective	Inspect or replace neutral valve	H3-S20
Component parts defective	Replace hydrostatic transmission assembly	H-S19, S20	

W1023752

HYDROSTATIC TRANSMISSION (Continued)

Symptom	Probable Cause	Solution	Reference Page
Loss of Power	Oil level is low	Check oil level or fill oil to proper level	G-16
	Speed control pedal linkage defective	Repair linkage	H3-S10, S11
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-18
		2. Check charge pressure	H3-S8
		3. Inspect or flush charge relief valve	H3-S23
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	H3-S7, S20
	Neutral valve defective	Inspect or replace neutral valve	H3-S20
Component parts defective	Replace hydrostatic transmission assembly	H-S19, S20	
Transmission Oil Over Heats	Low transmission oil level	Fill transmission oil level up to proper level	G-16
	Radiator net clogged	Clean radiator net	–
	Excessive machine load	Reduce machine load	–
	Improper charge pressure	1. Check high relief pressure	H3-S7
		2. Replace transmission oil filter cartridge	G-18
		3. Replace check and high pressure relief valve	H3-S7, S20
		4. Inspect and replace charge relief valve	H3-S23
Machine Will Not Stop in Neutral Position	Speed control linkage is out of adjustment or sticking	Repair or replace linkage	H3-S10, S11
		Adjust neutral adjuster	H3-S10
	Neutral valve defective	Inspect or replace neutral valve	H3-S20
System Operates in One Direction Only	Speed control linkage defective	Repair or replace linkage	H3-S10, S11
	Check and high pressure relief valve defective	Replace check and high pressure relief valve	H3-S20, S28

W1025090

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Check and High Pressure Relief Valve Condition	Setting Pressure	33.3 to 36.3 MPa 340 to 370 kgf/cm ² 4836 to 5262 psi	–
Charge Relief Valve Condition	Setting Pressure	0.49 to 0.78 MPa 5 to 8 kgf/cm ² 71 to 114 psi	–
Cruise Control Lever	Operating Force (Forward Direction)	59 to 98 N 6.0 to 10 kgf 13.2 to 22.1 lbs	–
Cruise Control Rod	Length	315 mm 12.4 in.	–

W1013874

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-9.)

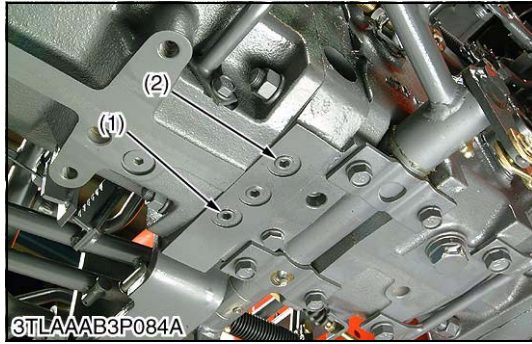
Item	N-m	kgf-m	ft-lbs
Delivery pipe joint bolt	49 to 69	5.0 to 7.0	36.1 to 50.6
Steering support mounting screw	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Engine and clutch housing mounting screws	48.1 to 55.8	4.9 to 5.7	35.4 to 41.2
Steering wheel mounting nut	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Release fork mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
HST return pipe joint bolt	88.0 to 98.0	9.0 to 10.0	65.0 to 72.2
Delivery pipe joint bolt for 3 point hitch	39.0 to 49.0	4.5 to 5.0	32.5 to 36.2
Return pipe (from front hydraulic block)	49.0 to 69.0	5.0 to 7.0	36.1 to 50.6
Clutch housing and MID case mounting screw	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
MID case and transmission case mounting screw	102.9 to 117.6	10.5 to 12.0	75.9 to 86.8
Plate mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
PTO clutch cam mounting screw	60.8 to 70.6	6.2 to 7.2	44.8 to 52.1
Spiral bevel pinion shaft lock nut	147 to 196	15 to 20	109 to 145
Pinion bearing holder mounting screw	39.2 to 44.1	4.0 to 4.5	28.9 to 32.5
Neutral holder mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Charge pump cover mounting screw	49.0 to 58.8	5.0 to 6.0	36.2 to 43.4
Hex. head plug for high pressure relief valve	58.8 to 78.5	6.0 to 8.0	43.4 to 57.9
Neutral valve	58.8 to 78.5	6.0 to 8.0	43.4 to 57.9
Swash plate mounting hex. head screw	28.0 to 35.0	2.7 to 3.6	21.0 to 26.0
Spacer mounting screw	48.1 to 55.9	4.9 to 5.7	35.5 to 41.2
Hex. head plug for charge relief valve	30.0 to 37.0	3.1 to 3.8	22.4 to 27.5

W1012736

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Checking High Pressure Relief Valve Pressure



Checking High Pressure Relief Valve Pressure

CAUTION

- **When checking, park the machine on flat ground, apply the parking brake.**
1. Remove the hex. socket head plug from **P1** or **P2** port. (**P2** is for forward and **P1** is for reverse.)
 2. Assemble long adaptor (07916-60831) and threaded joint (07916-50341) with the gasket between them.
 3. Install the assemble long adaptor and threaded joint to **P2** (forward) or **P1** (reverse) port.
 4. Install the cable, threaded joint in relief valve set pressure tester and high pressure gauge to threaded joint in order.
 5. Check to see that parking brake is applied.
 6. Run the engine at maximum speed.
 7. Place the range gear shift lever in **H** position.
 8. Depress the HST pedal, and measure the check and high pressure relief valve pressure.
 9. If the measurement is not within the factory specification, check the check and high relief valve assembly. (See page H3-S21.)

Check and high relief pressure (Oil temperature at 40 to 60 °C (104 to 140 °F))	Factory spec.	33.3 to 36.3 MPa 340 to 370 kgf/cm ² 4836 to 5262 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/cm², 5800 psi) full scale.**

(When reassembling)

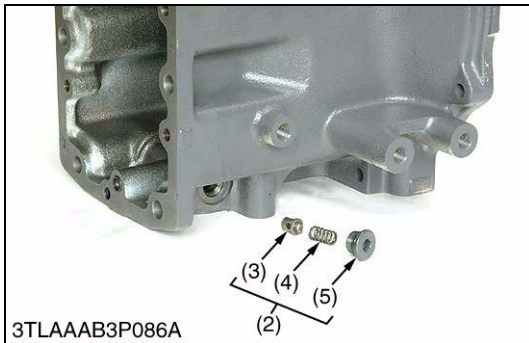
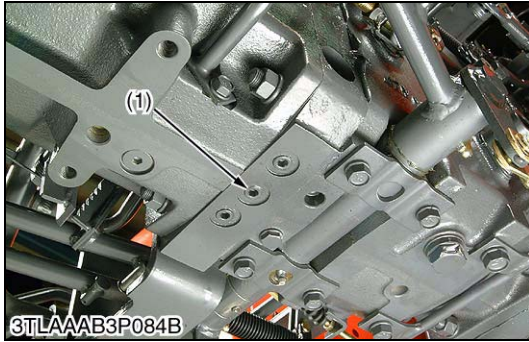
- Install the hex. socket head plug to the port with O-ring.

(1) **P1** Port (for Reverse)

(2) **P2** Port (for Forward)

W1028057

(2) Checking Charge Relief Pressure



Checking Charge Relief Pressure

⚠ CAUTION

- When checking, park the machine on flat ground, apply the parking brake.

■ NOTE

- Use a new transmission oil filter.

1. Remove the hex. socket head plug from **P** port.
2. Assemble long adaptor (07916-6083) and thread joint (07916-50341) with the gasket between them.
3. Install the assembled long adaptor and thread joint to **P** port.
4. Install the cable, thread joint in relief valve set pressure tester and low pressure gauge to threaded joint in order.
5. Place the range gear shift lever in neutral.
6. Run the engine at maximum speed.
7. Release the HST pedal to set in neutral, and measure the charge pressure.
8. If the measurement is no within the factory specifications, check charge relief valve (2).

(When reassembling)

- Apply liquid lock (Three Bond 1324B or its equivalent) to the hex. socket head plug.

Charge pressure	Factory spec.	0.49 to 0.78 MPa 5.0 to 8.0 kgf/cm ² 71 to 114 psi

■ NOTE

- Low pressure gauge is 2.9 MPa (30 kgf/cm², 427 psi) full scale.

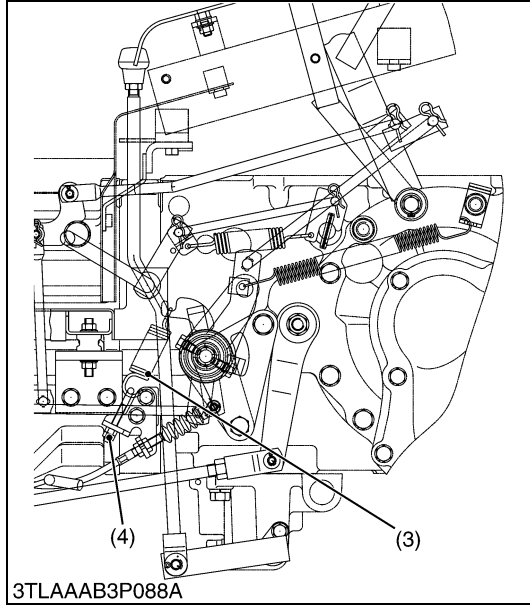
(Condition)

- Engine speed : Maximum.
- Oil temperature : 45 to 55 °C
113 to 131 °F

- | | |
|-------------------------|------------|
| (1) P Port | (4) Spring |
| (2) Charge Relief Valve | (5) Plug |
| (3) Poppet | |

W1029913

(3) Checking Cruise Lever Operating Force



Cruise Lever Operating Force

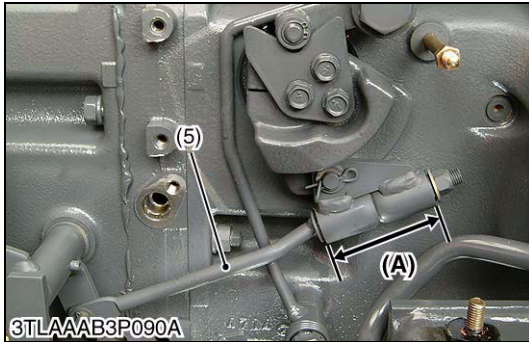
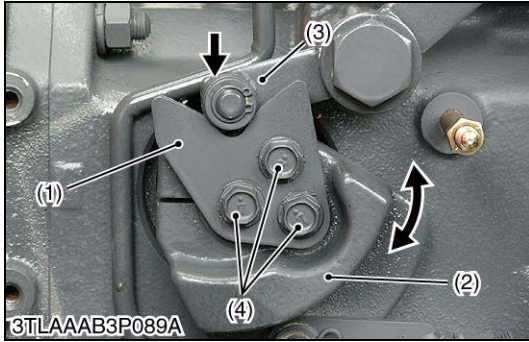
1. Push the cruise control lever (1) into maximum tied position. After that pull it 50 mm (2 in.) back.
2. Measure the force needed to move the cruise control lever back into the maximum position at the top of the lever grip (2).
3. If the force is not within the factory specifications, loosen the lock nut (4) and adjust the tension of cruise spring (3).
4. Retighten the lock nut securely.

Cruise control lever operation force	Factory spec.	59 to 98 N 6.0 to 10 kgf 13.2 to 22.1 lbs
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(1) Cruise Control Lever
(2) Lever Grip

(3) Cruise Spring
(4) Lock Nut

W1032263

(4) Adjusting Neutral**Adjusting Neutral**

1. Disengage the front wheel drive lever. (Drive only rear wheels.)
2. Set the cruise control to "OFF" position. (HST pedal is neutral position).
3. Check to see that the length **(A)** of HST neutral rod (5) is specified length.
If not, adjust as follows
Length **(A)** : 73 to 74 mm (2.87 to 2.91 in.).
4. Lift the rear of the tractor so that the rear wheels are off the ground and run the engine at low idling and drive only rear wheels.
5. Slightly loosen the plate mounting screws (4).
6. Press the neutral holder arm (3) to the plate (1).
7. Then rotate the neutral holder (2) clockwise or counter clockwise until wheels stop completely.
8. Hold the neutral holder (2) and tighten the plate mounting screws (4).

NOTE

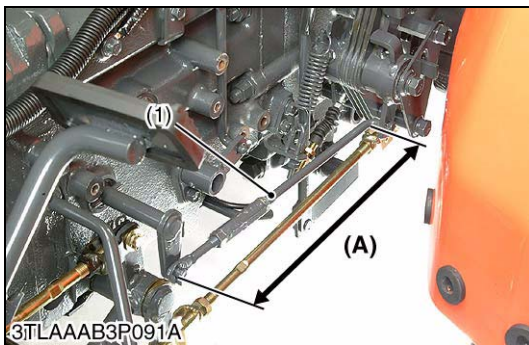
- Be sure to tighten the plate mounting screw with specified torque.

Tightening torque	Plate mounting screw	23.6 to 27.4 N-m 2.4 to 2.8 kgf-m 17.4 to 20.2 ft-lbs
-------------------	----------------------	---

- (1) Plate
(2) Neutral Holder
(3) Neutral Holder Arm
(4) Screws
(5) HST Neutral Rod

A : Length

W1033891

(5) Checking Cruise Lever Operating Force**Adjusting Cruise Control Rod**

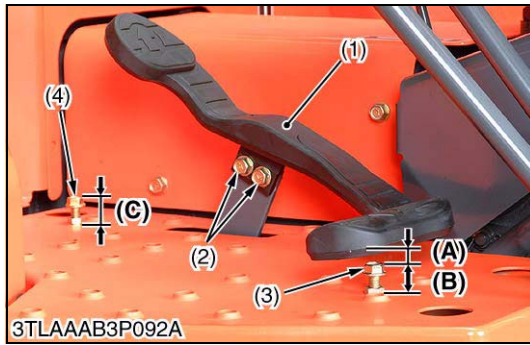
1. Set the cruise control lever to fully forward.
2. Adjust the cruise control rod (1) so that trunnion shaft may maximum incline forward.

Length of cruise control rod (A)	Factory spec.	315 mm 12.4 in.
---	---------------	--------------------

- (1) Cruise Control Rod

(A) Length

W1036351



Adjusting HST Pedal and Stopper Bolt

NOTE

- Stop the engine when adjusting the cruise control linkage and pedal stroke.
- Be sure to adjust the HST neutral position (See page H3-S10.).

1. Adjust the height (B) and (C) of the pedal stopper bolt (3), (4).
2. Loosen the HST pedal mounting screws (2).
3. Set the cruise control lever to fully forward.
4. Tighten the HST pedal mounting screws (2) so that the clearance (A) between HST pedal and stopper bolt (3) may become 10 to 15 mm (0.39 to 0.59 in.).

Clearance (A)	Factory spec.	10 to 15 mm 0.39 to 0.59 in.
Height (B)		15 mm 0.59 in.
Height (C)		20 mm 0.78 in.

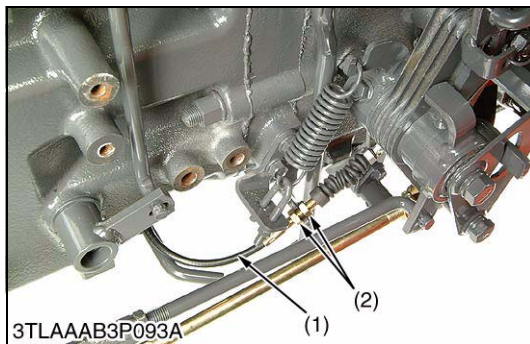
(1) HST Pedal

(3) Stopper Bolt (Forward)

(2) Screws

(4) Stopper Bolt (Reverse)

W1037923



Adjusting Cruise Control Release Linkage

1. Adjust the brake pedals play first.
2. Depress one of the brake pedals to make sure the cruise control is not released. Also depress both the brake pedals coupled together to make sure that the cruise control is released.
3. If the cruise control does not work as above adjust with release wire (1) as follows.
 - Check to see that the threaded portion of the wire (1) rear side is set at the center position. If not, set by lock nuts (2).
4. In the end of the play of the brake pedal, adjust the lock nuts (3) so that slack of the wire may become 0.
 - Confirm whether to move as above-mentioned 2. If not, adjust by lock nut (3).

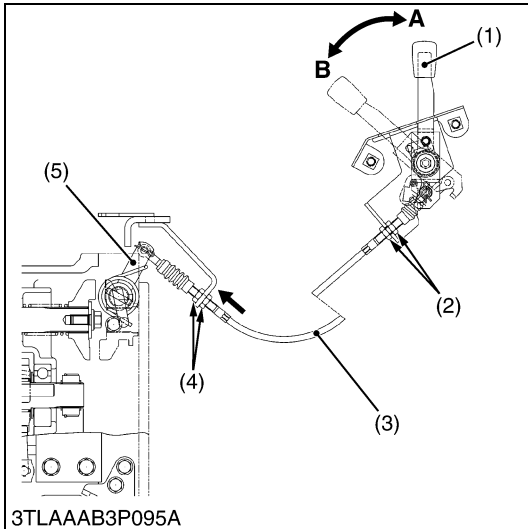
(1) Release Wire

(3) Lock Nut (Front)

(2) Lock Nut (Rear)

W1038922

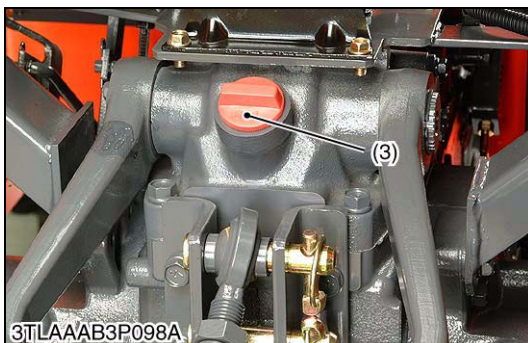
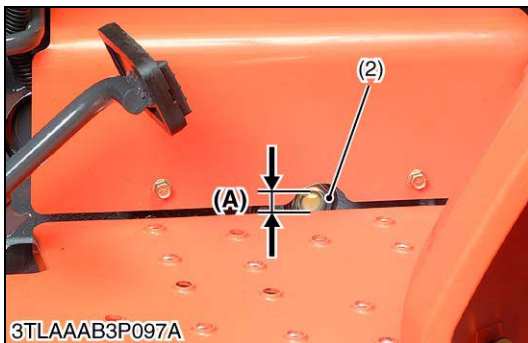
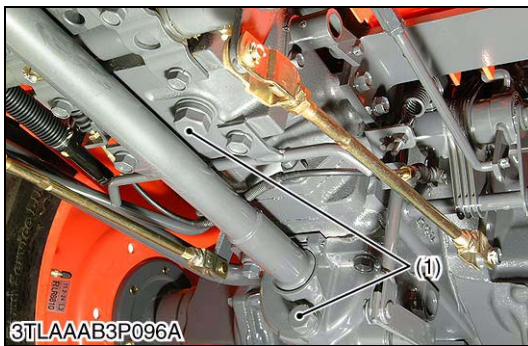


(6) Adjusting PTO Wire**Adjusting PTO Wire**

1. Check to see that the threaded portion of wire (3) rear side is set at center position.
If not, set by lock nuts (2).
2. Set the PTO lever (1) at the **OFF** position (A).
3. The lock nut (4) is tightened in the direction of the arrow. Then stop it before the lever (5) moves.
4. Retighten the lock nut securely.

- | | |
|---------------------------|-------------------------|
| (1) PTO Lever | A : OFF Position |
| (2) Lock Nuts (Rear Side) | B : ON Position |
| (3) PTO Wire | |
| (4) Lock Nuts Front Side | |
| (5) Lever | |

W1039856

[2] PREPARATION**(1) Separating Engine and Clutch Housing****Draining the Transmission Fluid**

1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. Screw in the drain plugs (1).

(When reassembling)

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

■ IMPORTANT

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

Transmission fluid	Capacity	23.5 L 6.2 U.S.gals 5.2 Imp.gals

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

(A) Oil level is acceptable within this range.

W1012748

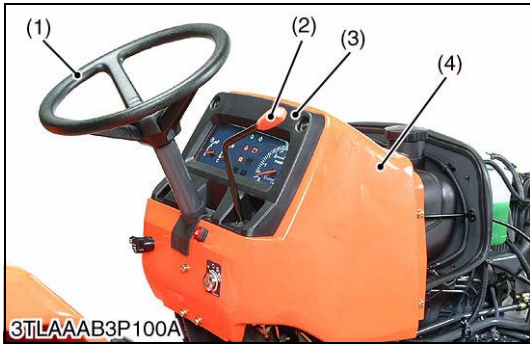


Bonnet and Front Cover

1. Disconnect the battery negative cable.
2. Disconnect the connector for head light.
3. Remove bonnet (1) and side cover (2).
4. Remove the front cover (3).

- (1) Bonnet (3) Front Cover
 (2) Side Cover

W1044556



Steering Wheel and Rear Bonnet

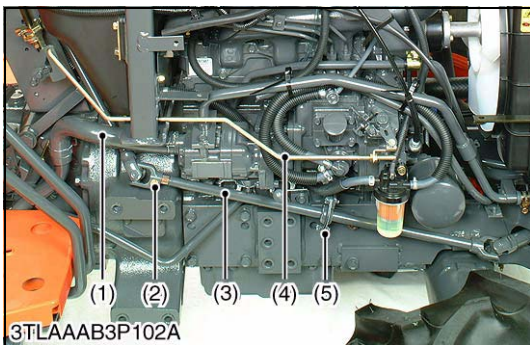
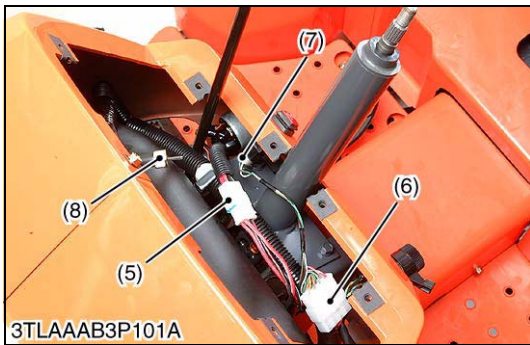
1. Remove the steering wheel (1) with steering puller.
2. Remove the throttle grip (2).
3. Disconnect the hour-meter cable (8).
4. Remove the meter panel (3).
5. Disconnect the **4P** connector (5) for main switch.
6. Disconnect the **8P** connector (6) for combination switch.
7. Disconnect the **4P** connector (7) for hazard switch.
8. Remove the rear bonnet (4).

(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 ft-lbs
-------------------	-----------------------------	---

- (1) Steering Wheel (5) **4P** Connector
 (2) Throttle Grip (6) **8P** Connector
 (3) Meter Panel (7) **4P** Connector
 (4) Rear Bonnet (8) Hour-meter Cable

W1012884



Suction Pipe and Steering Joint Shaft

1. Disconnect the suction hose (1) from hydraulic pump side.
2. Remove the screw (2) and steering joint shaft support (5).
3. Remove the steering joint shaft (3).
4. Remove the throttle rod (4).

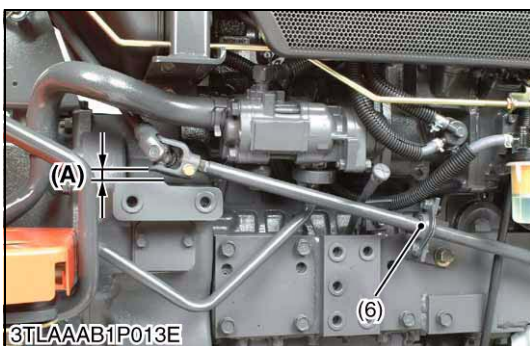
(When reassembling)

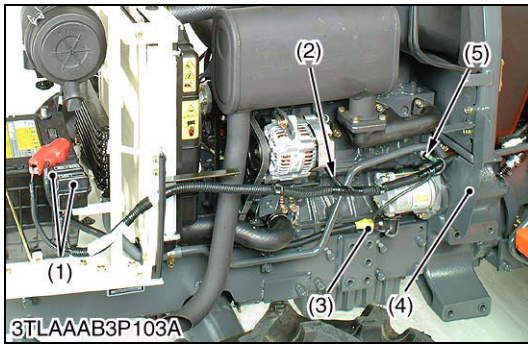
- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.19 in.) between the universal joint and flywheel housing. Then fit the support (5) in position.

Tightening torque	Delivery pipe joint bolt	49 to 69 N-m 5.0 to 7.0 kgf-m 36.1 to 50.6 ft-lbs
-------------------	--------------------------	---

- (1) Suction Hose (A) **Clearance**
 (2) Screw
 (3) Steering Joint Shaft
 (4) Throttle Rod
 (5) Steering Joint Shaft Support

W1045309

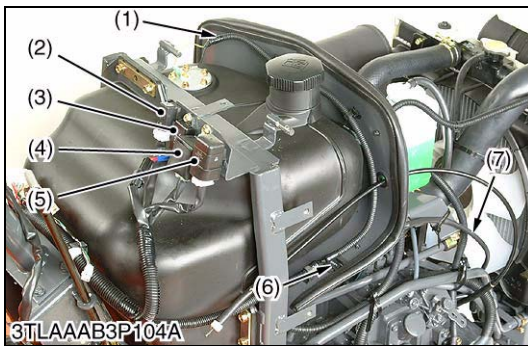


**Wirings (L.H)**

1. Disconnect the wiring (2) for alternator.
2. Disconnect the wiring (3) for starter motor.
3. Disconnect the **1P** connector (5) for engine oil switch.
4. Remove the shutter plate (4).
5. Remove the slow blow fuse (1).

- | | |
|------------------------------|-------------------------|
| (1) Slow Blow Fuse | (4) Shutter Plate |
| (2) Wiring for Alternator | (5) 1P Connector |
| (3) Wiring for Starter Motor | |

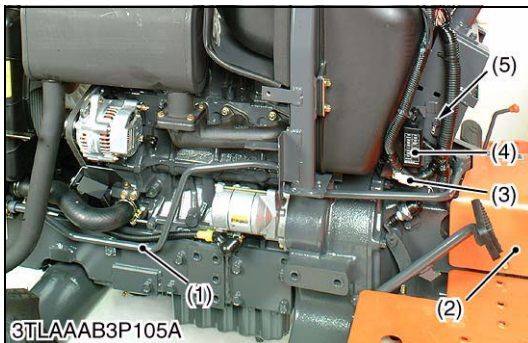
W1045710

**Wirings (R.H)**

1. Disconnect the wiring (1) for the fuel sensor.
2. Disconnect the starter relay (2), OPC timer (3), glow relay (4) and flasher unit (5).
3. Disconnect the wiring (6) for glow plug and water temperature sensor.
4. Disconnect the wiring (7) for engine stop solenoid.

- | | |
|----------------------------|---|
| (1) Wiring for Fuel Sensor | (5) Flasher Unit |
| (2) Starter Relay | (6) Wiring For Glow Plug and Water Temperature Sensor |
| (3) OPC Timer | (7) Wiring for Engine Stop Solenoid |
| (4) Glow Relay | |

W1046003

**Pipe and Wirings**

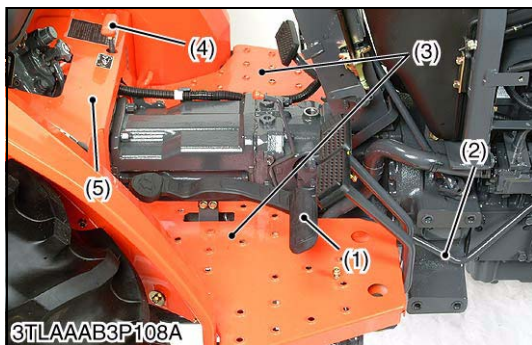
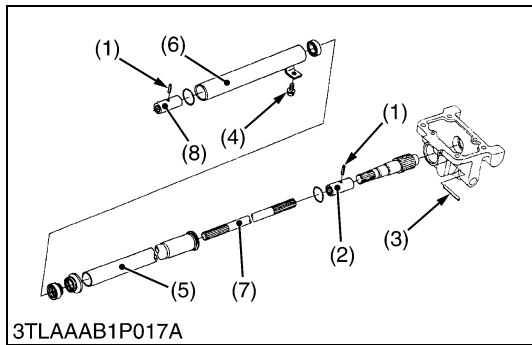
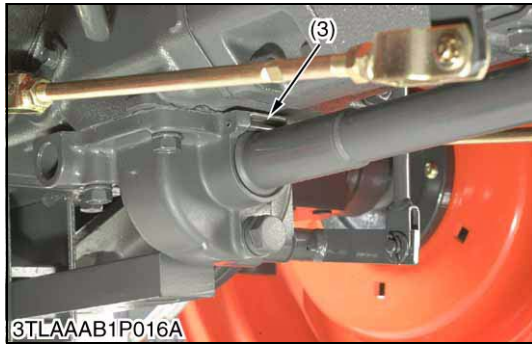
1. Remove the HST return pipe (1).
2. Remove the fuse box (4) and ground cable (5).
3. Disconnect the connector (3) for safety switch.
4. Remove the clutch housing cover (2).

(When reassembling)

Tightening torque	HST Return pipe joint bolt	88 to 98 N-m 9.0 to 10 kgf-m 65.0 to 72.2 ft-lbs
-------------------	----------------------------	--

- | | |
|---------------------------------|------------------|
| (1) Return Pipe | (4) Fuse Box |
| (2) Clutch Housing Cover | (5) Ground Cable |
| (3) Connector for Safety Switch | |

W1043042



Propeller Shaft (4WD)

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

(When reassembling)

- Apply grease to the splines of the propeller shaft (7) and pinion shaft.

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

W1014306

Step and Delivery Pipe

1. Remove the HST pedal (1).
2. Remove the grip (4) and center cover (5).
3. Remove the brake springs and differential look rod.
4. Remove the step mounting screws and steps (3).
5. Remove the delivery pipe (2).

(When reassembling)

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 36.1 to 50.6 ft·lbs
-------------------	--------------------------	---

- | | |
|-------------------|------------------|
| (1) HST Pedal | (4) Grip |
| (2) Delivery Pipe | (5) Center Cover |
| (3) Step | |

W1043542



Separating Engine from Clutch Housing Case

1. Check the engine and clutch housing case are securely mounted on the disassembling stands.
2. Remove the engine mounting screws, and separate the engine from the clutch housing case.

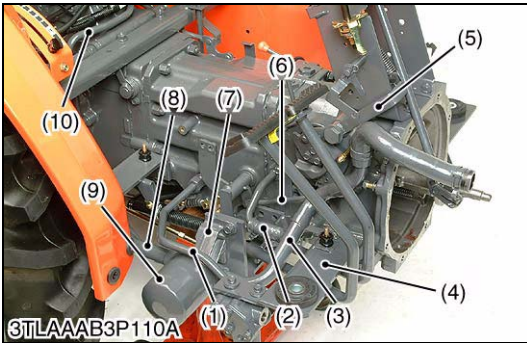
(When reassembling)

- Apply grease to the splines.
- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the engine and clutch housing case.

Tightening torque	Engine mounting screws to clutch housing	48.1 to55.8 N-m 4.9 to5.7 kgf-m 35.4 to41.2 ft-lbs
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W1026299

(2) Separating Clutch Housing from MID Case



Hydraulic Pipes

1. Remove the suction pipe 1 (3) and pipe (2).
2. Remove the suction pipe 2 (8) with oil filter (9) and oil filter bracket (7).
3. Remove the delivery pipe (10) and return pipe (1).
4. Remove the step support (4) with front hydraulic block.
5. Remove the HST neutral rod (6) and neutral holder arm (5).

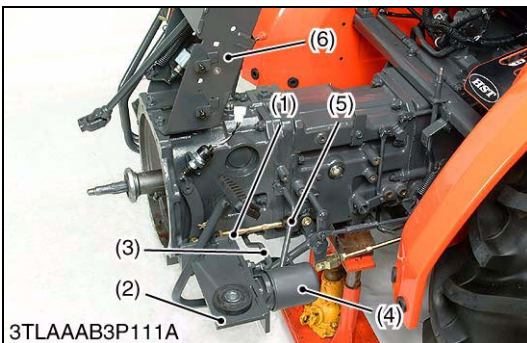
(When reassembling)

- Be sure to adjust the HST neutral position. (See page H3-S10.)
- Install the copper washer securely.

Tightening torque	Delivery pipe (10) joint bolt	39.0 to 49.0 N-m 4.5 to 5.0 kgf-m 32.5 to 36.2 ft-lbs
	Return pipe (1) joint bolt and nut	49.0 to 69.0 N-m 5.0 to 7.0 kgf-m 36.1 to 50.6 ft-lbs

- | | |
|------------------------|------------------------|
| (1) Return Pipe | (6) HST Neutral Rod |
| (2) Pipe | (7) Oil Filter Bracket |
| (3) Suction Pipe 1 | (8) Suction Pipe 2 |
| (4) Step support | (9) Oil Filter |
| (5) Neutral Holder Arm | (10) Delivery pipe |

W1013738



Steering Support Clutch Rods and Pipes

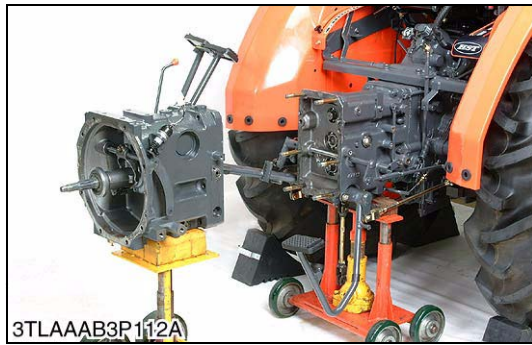
1. Remove the steering support (6).
2. Remove the oil filter (4) with bracket and pipes (3), (5).
3. Remove the step support (2) and clutch rods (1).

(When reassembling)

Tightening torque	Steering support mounting screw	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.2 to 66.5 ft-lbs
-------------------	---------------------------------	---

- | | |
|------------------|----------------------|
| (1) Clutch Rod | (4) Oil Filter |
| (2) Step Support | (5) Pipe |
| (3) Pipe | (6) Steering Support |

W1027455



Separating Clutch Housing (HST) from MID Case

1. Place the disassembling stand under the clutch housing case.
2. Remove the clutch housing and MID case mounting screws.
3. Separate the clutch housing and MID case.

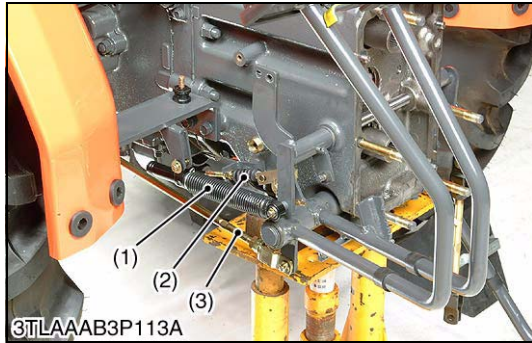
(When reassembling)

- Apply liquid gasket (Three bond 1208D or equivalent) to joint face of clutch housing and MID case

Tightening torque	Clutch housing and MID case mounting screws and nuts	77.5 to 90.2 N-m 7.9 to 9.2 kgf-m 57.2 to 66.5 ft-lbs
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W1014109

(3) Separating MID Case from Transmission Case



Brake and Cruise Linkage

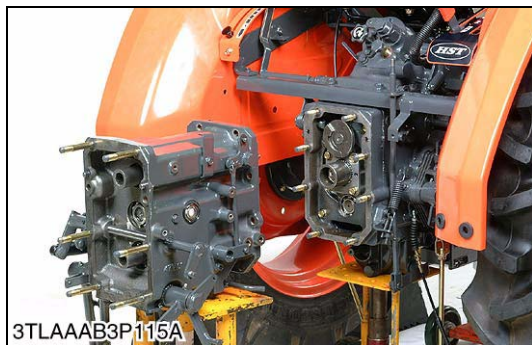
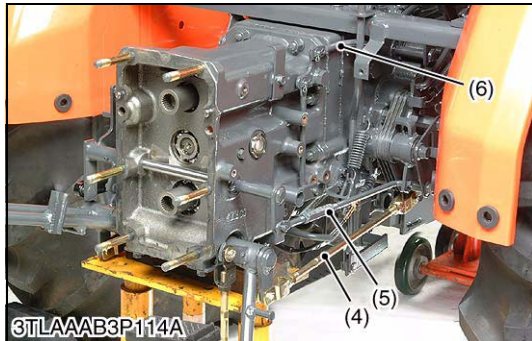
1. Remove the damper (1).
2. Disconnect the brake rods (3), (4) and cruise release wire (2).
3. Remove the cruise control rod (5).
4. Remove the range shift rod (6).

(When reassembling)

- Be sure to adjust the cruise release wire (2). (See page H3-S11.).

- | | |
|-------------------------|------------------------|
| (1) Damper | (4) Brake Rod L.H |
| (2) Cruise Release Wire | (5) Cruise Control Rod |
| (3) Brake Rod R.H | (6) Range Shift Rod |

W1028796



Separating MID Case from Transmission Case

1. Place the disassembling stand under the MID case.
2. Remove the MID case and transmission case mounting nuts.
3. Separate the MID case and transmission case.

(When reassembling)

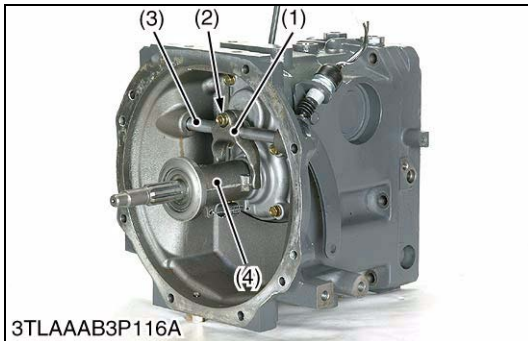
- Apply liquid gasket (Three bond 1208D or equivalent) to joint face of MID case and transmission case.

Tightening torque	MID case and transmission case mounting nut	102.9 to 117.6 N-m 10.5 to 12.0 kgf-m 75.9 to 86.8 ft-lbs
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W1014601

[3] DISASSEMBLING AND ASSEMBLING

(1) Clutch Housing and HST



Clutch Lever, Release Fork and Release Bearing

1. Remove the release fork mounting screws (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the release bearing and release hub (4) together.

(When reassembling)

- Apply grease to the sliding surface of the clutch release hub.
- Apply grease to the clutch lever.

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

- (1) Release Fork (3) Clutch Lever
(2) Release Fork Mounting Screw (4) Release Hub

W1014296

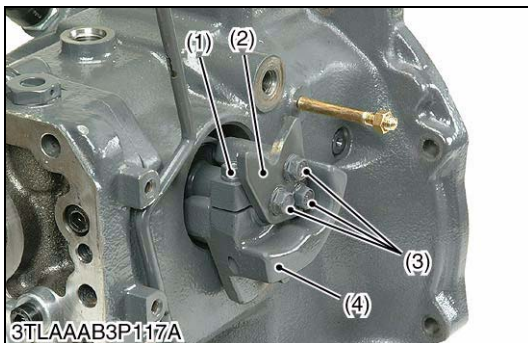


Plate and Neutral Holder

1. Remove the plate mounting screws (3) and plate (2).
2. Remove the neutral holder mounting screw (1) and neutral holder (4).

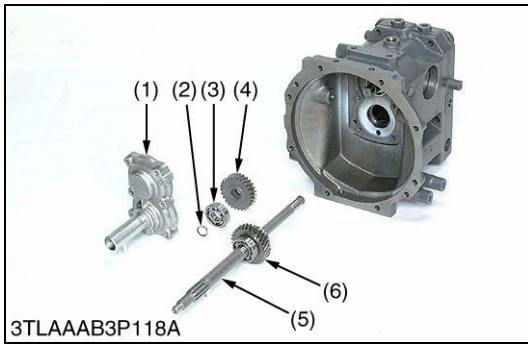
(When reassembling)

- Be sure to adjust the HST neutral position. (See page H3-S10.).

Tightening torque	Plate mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs
		Neutral holder mounting screw

- (1) Neutral Holder Mounting Screw (3) Plate Mounting Screw
(2) Plate (4) Neutral Holder

W1017592



Shaft Case, Input Shaft and Gear

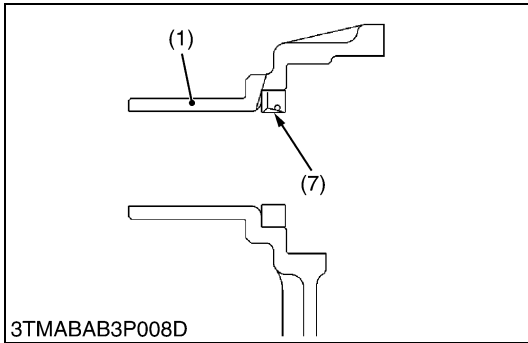
1. Remove the shaft case mounting screws.
2. Screw down the two M6 screws into the shaft case (1).
3. Take out the shaft case (1).
4. Take out the input shaft (5) with 28T gear (6).
5. Remove the external snap ring (2).
6. Remove the bearing (3) with a bearing puller and 27T gear (4).

(When reassembling)

- Be sure to install the gasket.

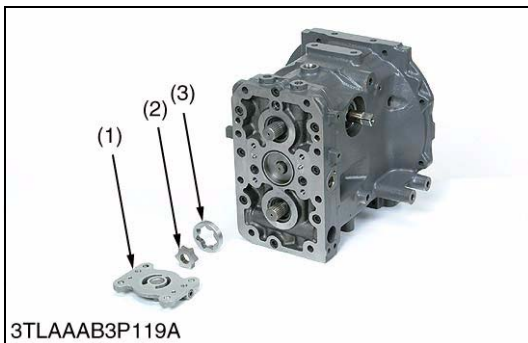
(When replacing oil seal in shaft case)

- Install the oil seal (7) as shown in the figure, noting its direction.
- Apply grease to the oil seal (7).



- | | |
|------------------------|-----------------|
| (1) Shaft Case | (5) Input Shaft |
| (2) External Snap Ring | (6) 28T Gear |
| (3) Bearing | (7) Oil Seal |
| (4) 27T Gear | |

W1032000



Charge Pump

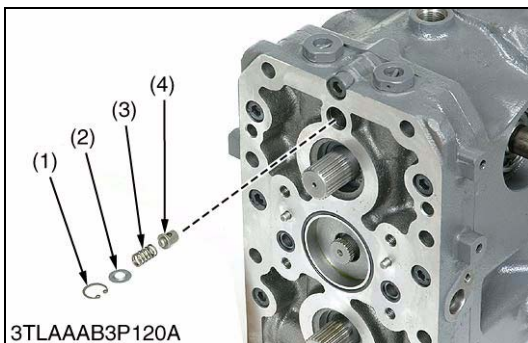
1. Remove the charge pump mounting hex. head screws, and remove the pump cover (1).
2. Take out the rotors (2), (3).

(When reassembling)

Tightening torque	Charge pump case mounting screw	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 36.2 to 43.4 ft·lbs
-------------------	---------------------------------	---

- | | |
|-----------------------|-----------------|
| (1) Charge Pump Cover | (3) Outer Rotor |
| (2) Inner Rotor | |

W1014893



Case Relief Valve

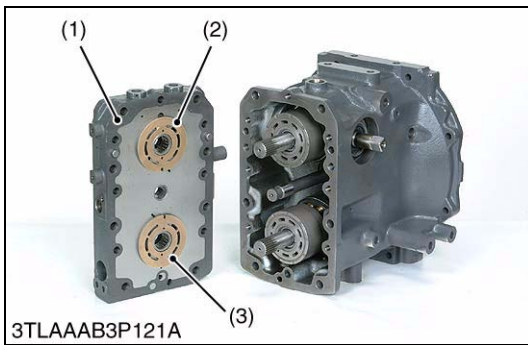
1. Remove the internal snap ring (1).
2. Remove the spring seat (2), spring (3) and valve poppet (4).

(When reassembling)

- Apply hydrostatic transmission oil to the poppet before reassembling.

- | | |
|------------------------|------------------|
| (1) Internal Snap Ring | (3) Spring |
| (2) Spring Seat | (4) Valve Poppet |

W1047438



Port Block

1. Remove the port block mounting hex. head screws.
2. Pull and remove the port block (1) from HST housing.

(When reassembling)

- Install port block (1) with valve plates (2), (3) and new gasket in place.

■ IMPORTANT

- **Valve plates (2), (3) may stick to the port block but they are not fixed. Take care not to drop them. And these valve plates are not interchangeable.**

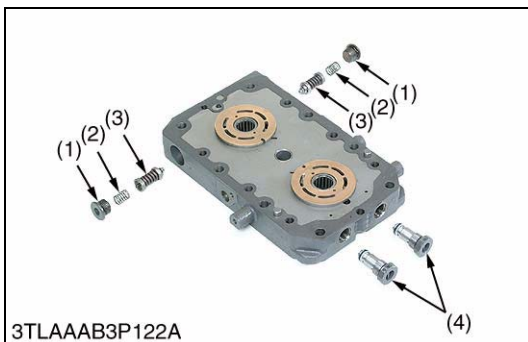
Tightening torque	Port block mounting hex. socket screw	98 to 123 N-m 10 to 12.5 kgf-m 72.3 to 90.4 ft-lbs
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(1) Port Block

(3) Valve Plate of Motor

(2) Valve Plate of Pump

W1049241



Check and High Pressure Relief Valve and Neutral Valve

1. Remove the hex. head plug (1) and remove the spring (2) and relief valve assembly (3).
2. Remove the neutral valve assembly (4).

(When reassembling)

- Take care not to damage the O-ring on the plug.

■ NOTE

- **Neutral valve for forward and reverse are not interchangeable.**
- **It is indicated "F" on top of forward neutral valve and "R" for reverse neutral valve.**

Tightening torque	Hex. head plug	58.8 to 78.5 N-m 6.0 to 8.0 kgf-m 43.4 to 57.9 ft-lbs
	Neutral valve assembly	58.8 to 78.5 N-m 6.0 to 8.0 kgf-m 43.4 to 57.9 ft-lbs

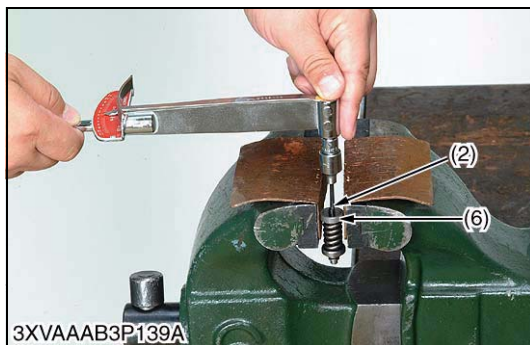
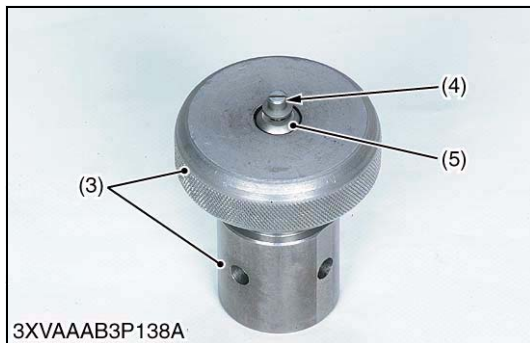
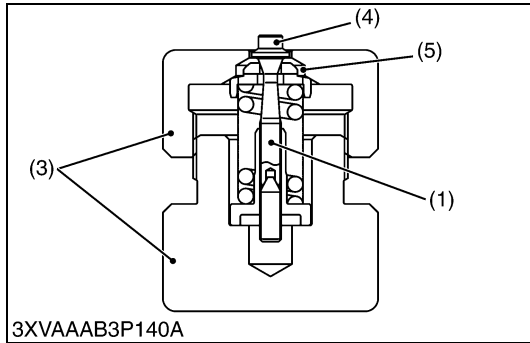
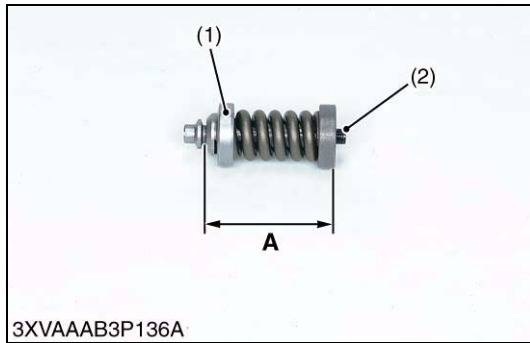
(1) Hex. Head Plug

(2) Spring

(3) Check and High Pressure Relief Valve

(4) Neutral Valve

W1049724



Readjustment of Relief Valve (When the HST does not work due to its loose hexagon socket head screw)

■ **IMPORTANT**

- The KUBOTA does not recommend the readjustment of relief valve. And KUBOTA will recommend the exhaust with genuine parts.
- As the HST may be damaged if the pressure is set to higher by mistake, be careful when adjusting it.

■ **NOTE**

- The relief pressure is set in between 33.3 to 36.3 MPa (340 to 370 kgf/cm², 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/cm², 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). (See page G-50.)
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 H3-S7.
The distance **A** is for refresh only. Make sure to check the relief pressure after readjustment.
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/cm², 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 ft·lbs
-------------------	------------------------	---

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

W1050218



Motor Cylinder Block Assembly

1. Remove the motor swashplate setting hex. head screw (1).
2. Remove the motor cylinder block assembly (3) with a motor shaft (2).

(When reassembling)

- Apply clean hydrostatic transmission oil to cylinder block.
- When installing the swashplate to clutch housing, be sure to align the hole of swashplate and straight pin.

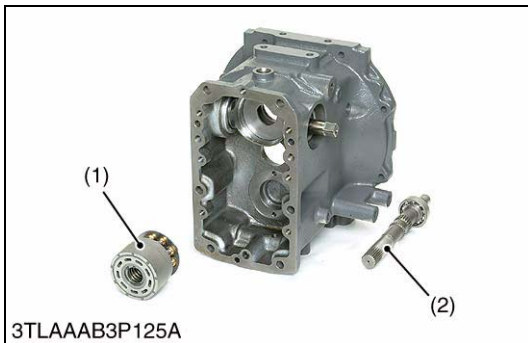
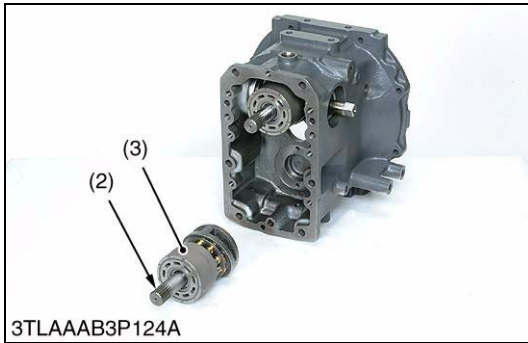
■ NOTE

- Take care not to damage the surface of cylinder block, pistons.
- Do not interchange pistons between pump and motor cylinder block.

Tightening torque	Swashplate setting hex. head screw	28 to 35 N·m 2.9 to 3.6 kgf·m 21 to 26 ft·lbs

- (1) Swashplate setting hex. head Screw (3) Motor cylinder Block Assembly
(2) Motor Shaft

W1051794



Pump Cylinder Block Assembly

1. Remove the pump cylinder block assembly (1) and pump shaft (2).

(When reassembling)

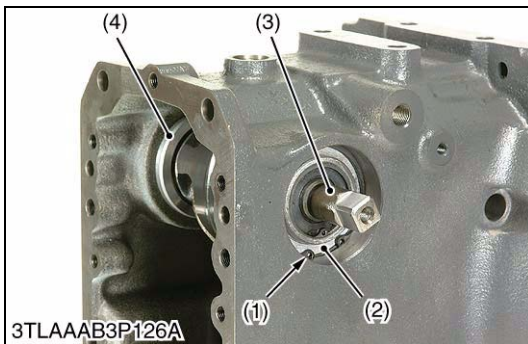
- Apply clean hydrostatic transmission oil to cylinder block.

■ NOTE

- Take care not to damage the surface of cylinder block, pistons.
- Do not interchange pistons between pump and motor cylinder block.

- (1) Pump Cylinder Block Assembly (2) Pump Shaft

W1052509



Trunnion

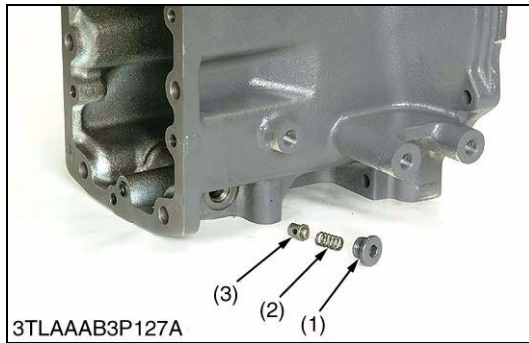
1. Remove the internal snap ring (1) both side.
2. Remove the cover (2) and (4).
3. Remove the trunnion (3).

(When reassembling)

- Apply hydrostatic transmission oil to the O-ring.

- (1) Internal Snap Ring (3) Trunnion
(2) Cover (4) Cover

W1052959



Charge Relief Valve

1. Remove the hex. head plug (1).
2. Remove the spring (2) and valve poppet (3).

(When reassembling)

- Take care not to damage the O-ring.
- When replacing the valves, check and adjust the setting pressure. (Refer to page H3-S8.)

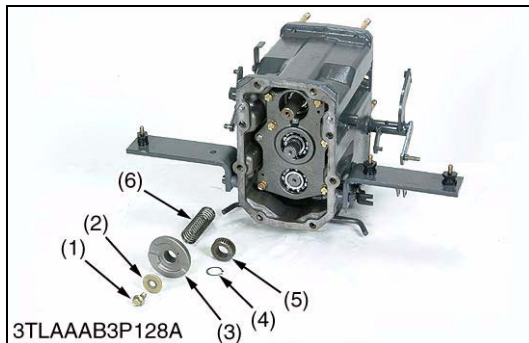
Tightening torque	Hex. head plug	30 to 37 N·m 3.1 to 3.8 kgf·m 22.4 to 27.5 ft·lbs
-------------------	----------------	---

- (1) Hex. Head Plug
(2) Spring

(3) Valve Poppet

W1053426

(2) MID Case



PTO Clutch

1. Remove the PTO clutch mounting screw (1).
2. Remove the washer (2), clutch cam (3) and spring (6).
3. Remove the external snap ring (4) and sleeve (5).

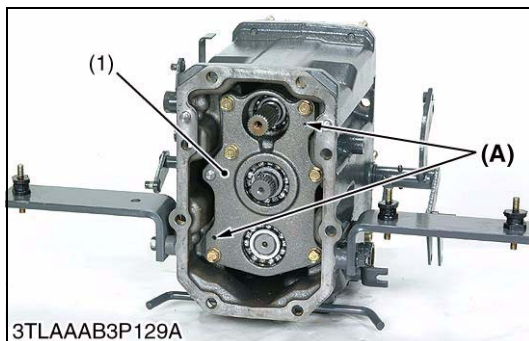
(When reassembling)

Tightening torque	Clutch cam mounting screw	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 44.8 to 52.1 ft·lbs
-------------------	---------------------------	---

- (1) Screw
(2) Washer
(3) Clutch Cam

- (4) External Snap Ring
(5) Sleeve
(6) Spring

W1054063



Bearing Holder

1. Remove the bearing holder mount screws.
2. Jack up the bearing holder (1) by using the two jack screws then remove the bearing holder (1).

(When reassembling)

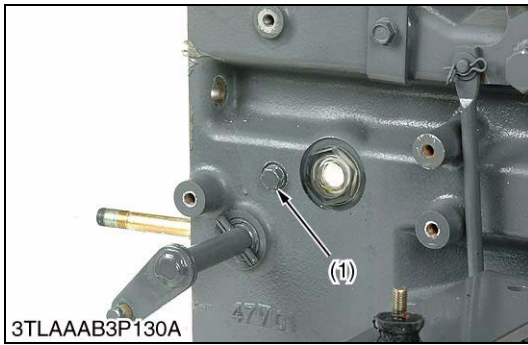
- Tap in the bearing holder (1) with plastic hammer until contact to mid case and then tighten the screws to specified torque.

Tightening torque	Bearing holder mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft·lbs
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- (1) Bearing Holder

A : Hole for Jack Screw

W1054488

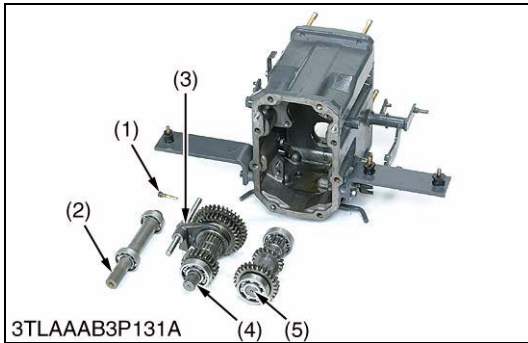


Gears and Shafts

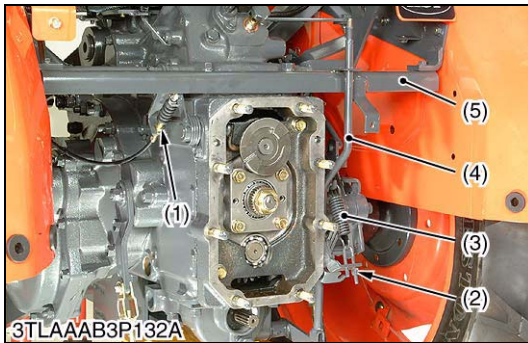
1. Remove the screw (1).
2. Tap out the PTO counter shaft (2).
3. Remove the shift fork (3) and sub shaft assembly (4).
4. Remove the 13T gear shaft assembly (5).

- | | |
|-----------------------|-----------------------------|
| (1) Screw | (4) Sub Shaft Assembly |
| (2) PTO Counter Shaft | (5) 13T Gear Shaft Assembly |
| (3) Shift Fork | |

W1054873



(3) Transmission Case



PTO Wire, DT Rod and Fender Support

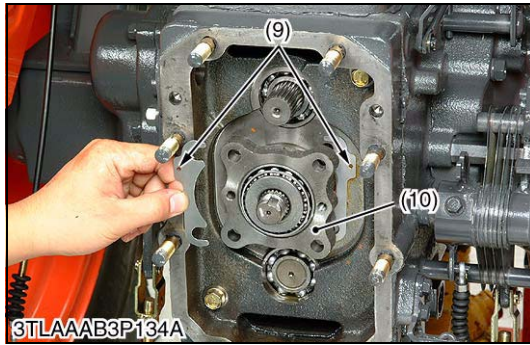
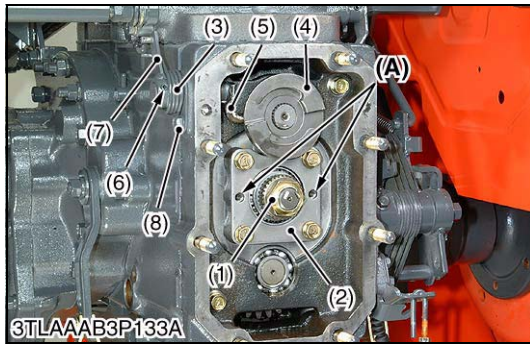
1. Disconnect the PTO wire (1).
2. Remove the DT rod (4) and fender support (5).
3. Loosen the lock nut (2) and then remove the spring (3).

(When reassembling)

- Be sure to adjust the PTO wire (1). (See page H3-S12.).

- | | |
|--------------|--------------------|
| (1) PTO wire | (4) DT Rod |
| (2) Lock Nut | (5) Fender Support |
| (3) Spring | |

W1020311



PTO Clutch and Pinion Bearing Holder

1. Tap out the spring pin (6) and remove the screw (8), spring (3) and lever (7).
2. Remove the PTO clutch cam (4) and shift fork (5).
3. Remove the pinion bearing mounting screws and bearing cover (2).
4. Remove the lock nut (1).
5. Screw down the two M8 screws into the hole (A).
6. Remove the pinion bearing holder (10) and shim (9).

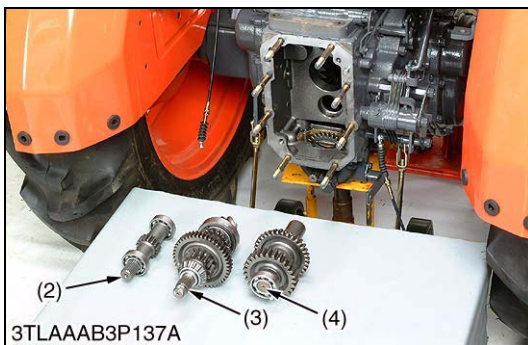
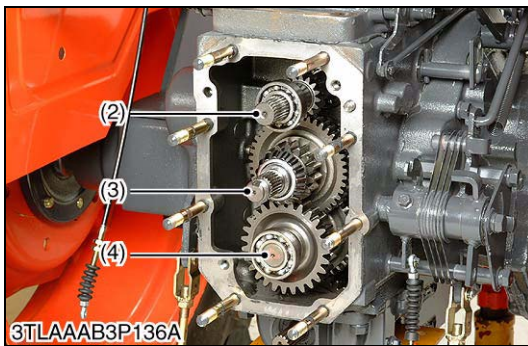
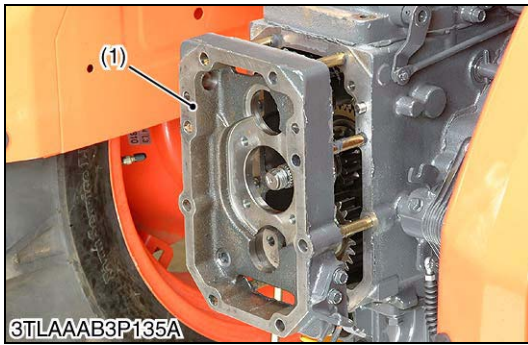
(When reassembling)

- Make sure of the number of shims in the pinion bearing holder.
- Replace the lock nut (1) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

Tightening torque	Lock nut	147 to 196 N·m 15 to 20 kgf·m 109 to 145 ft-lbs
	Pinion bearing holder mounting screw	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 ft-lbs

- | | |
|--------------------|----------------------------|
| (1) Lock Nut | (7) Lever |
| (2) Bearing Cover | (8) Screw |
| (3) Spring | (9) Shim |
| (4) PTO Clutch Cam | (10) Pinion Bearing Holder |
| (5) Shift Fork | |
| (6) Spring Pin | (A) Hole |

W1020909



Gear and Shaft Assembly

1. Remove the spacer mounting screws.
2. Separate the spacer (1) from the transmission case.
3. Remove the 16T gear shaft assembly (2).
4. Remove the pinion shaft assembly (3) and PTO drive shaft assembly (4).

(When reassembling)

- Apply liquid gasket (Three bond 1208D or equivalent) to joint face of spacer and transmission case.

Tightening torque	Spacer mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 ft·lbs

(1) Spacer

(2) 16T Gear Shaft Assembly

(3) Pinion Shaft Assembly

(4) PTO Drive Shaft Assembly

W1021874

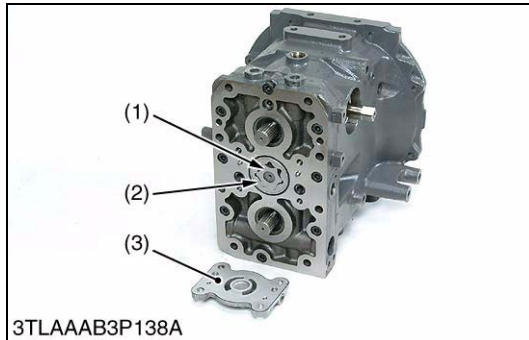
[4] SERVICING

(1) Bearing, Gear and Shaft

- See page 3-S29, S30.

(2) Differential Gear

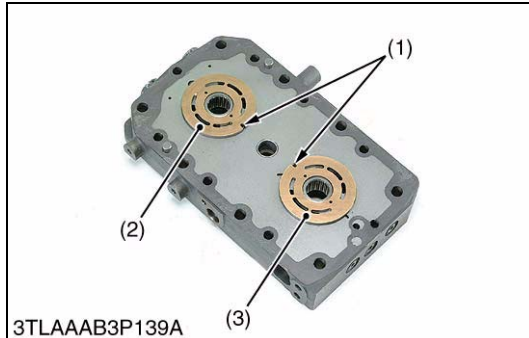
- See page 3-S31, S33.

(3) HST**Charge Pump**

1. Check the charge pump housing and the rotor (1), (2) for scratches and wear.
2. If scratch or worn, replace the charge pump complete assembly.

(1) Inner Rotor
 (2) Outer Rotor
 (3) Pump cover

W10279260

**Valve Plate**

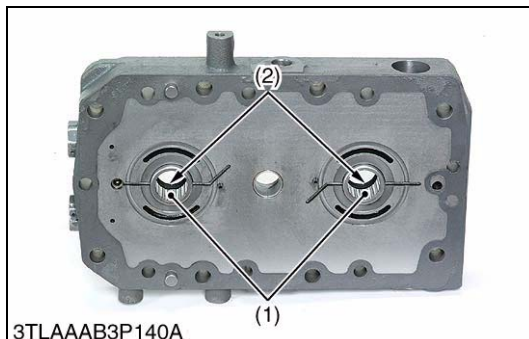
1. Check the engagement of the valve plate (2), (3) and the anchor pin (1).
2. Pushing the valve plate against the anchor pin, lift it to remove.
3. Check the valve plate for foreign particles.
4. Clean the valve plate and dry with compressed air.
5. Check the valve plate for scratches, wear and erosion. (Run a finger nail across the valve plate surface. If worn, it will be felt.)
6. If worn or scored, replace.

NOTE

- After checking, coat them with transmission oil.
- Valve plates are not interchangeable.

(1) Anchor Pin
 (2) Valve Plate (Pump)
 (3) Valve Plate (Motor)

W10580610

**Oil Seals and Bearing for Shaft**

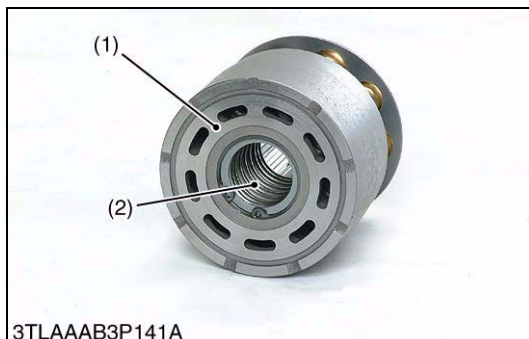
1. Remove the internal snap ring and check the oil seals (2) for damage.
2. Check the bearings (1) for wear.
3. If the bearings are worn, replace.

NOTE

- After checking, coat the bearing with transmission oil and the oil seal lip with grease.

(1) Needle Bearing
 (2) Oil Seal

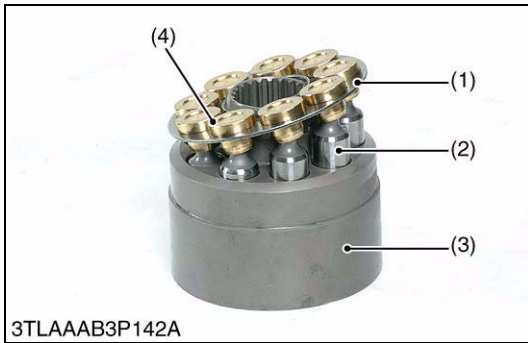
W10582810

**Cylinder Block Face**

1. Check the polished face (1) of cylinder block for scoring.
2. If scored, replace cylinder block assembly.
3. Check the spring (2) for breakage.
4. If broken, replace cylinder block assembly.

(1) Polished Face
 (2) Spring

W10584790



Cylinder Block Bore and Pistons

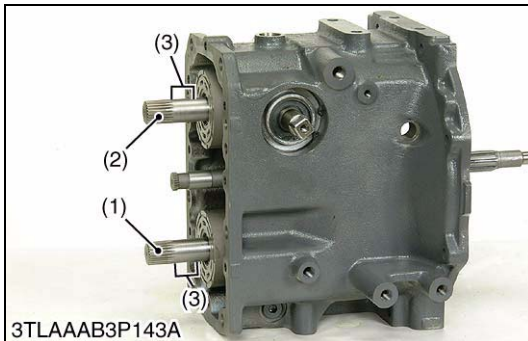
1. Lift the pistons gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace cylinder block assembly.
4. Check the slipper (4) for flatness.
5. If rounded, replace.

■ IMPORTANT

- Do not interchange pistons between pump and motor cylinder block.

- | | |
|--------------------|--------------------|
| (1) Retainer Plate | (3) Cylinder Block |
| (2) Piston | (4) Piston Slipper |

W10586380

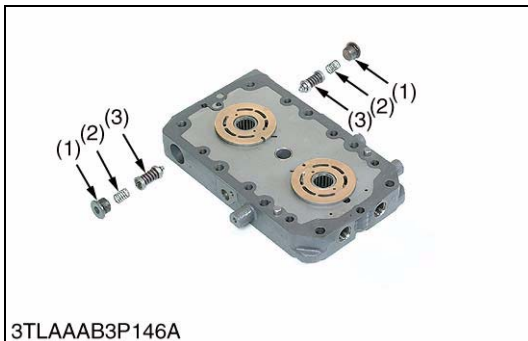


Pump Shaft and Motor Shaft

1. Check the seal surface (3).
2. If the shaft is rough or groove, replace.

- | | |
|-----------------|------------------|
| (1) Motor Shaft | (3) Seal Surface |
| (2) Pump Shaft | |

W10589240



Check and High Pressure Relief Valve

1. Check the spring (2) and check and high pressure relief valve for scratches and damage.
2. Check the valve seat in the port block cover for damage.

- | | |
|--------------------|--|
| (1) Hex. Head Plug | (3) Check and High Pressure Relief Valve |
| (2) Spring | |

W10591070

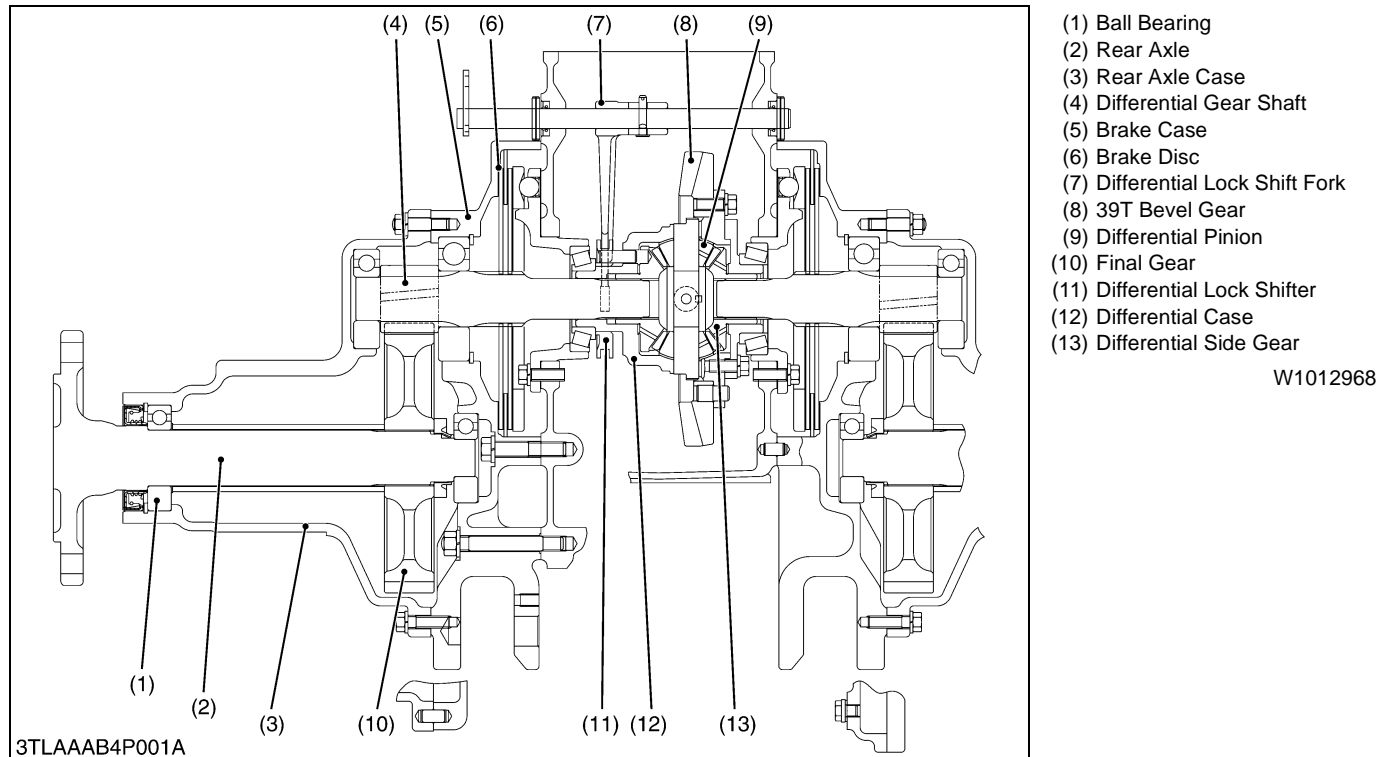
4 REAR AXLE

MECHANISM

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1. STRUCTURE	4-M1
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1. STRUCTURE



The final gears (10) are final reduction mechanism which further reduces the speed of rotation. The direction of power transmitted is changed by the differential gear.

The rear axles (2) are the final transmission mechanisms which transmit the power from the transmission to the rear wheels. The rotation speed is reduced by the final gears (10).

The rear axles are the semi-floating type with the ball bearing (1) between the rear axle (2) and rear axle case (3), which support the rear wheel load besides transmitting power to the rear wheel. The rear axles also support the weight of the tractor.

SERVICING

CONTENTS

1. TROUBLESHOOTING	4-S1
2. TIGHTENING TORQUES	4-S2
3. DISASSEMBLING AND SERVICING.....	4-S3
[1] PREPARATION	4-S3
[2] DISASSEMBLING REAR AXLE.....	4-S5
[3] SERVICING	4-S5

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive or Unusual Noise at All Time	Improper backlash between differential gear shaft and final gear	Replace	4-S5
	Bearing worn	Replace	4-S5
	Insufficient or improper type of transmission fluid used	Replenish or change	G-7
Noise while Turning	Differential gear shaft and final gear worn or damaged	Replace	4-S5

W1012214

2. TIGHTENING TORQUES

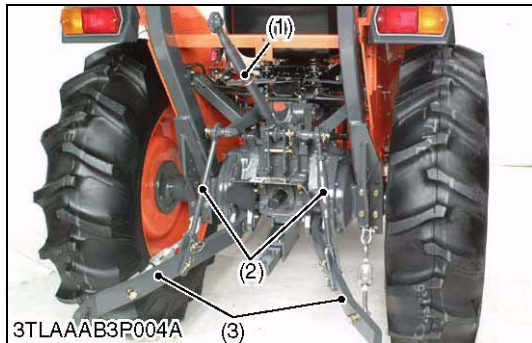
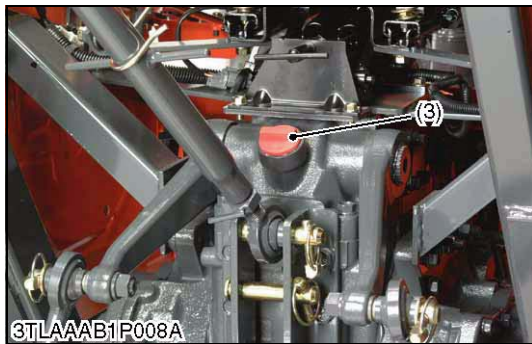
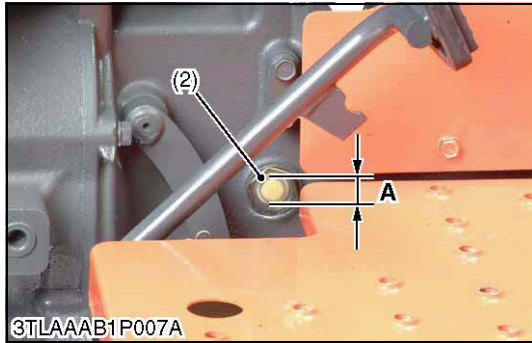
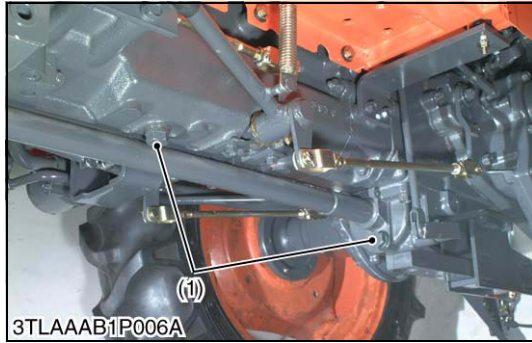
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-9.)

Item	N-m	kgf-m	ft-lbs
Rear wheel mounting screw and nut	197 to 226	20 to 23	145 to 166
ROPS mounting screw (M14 9T)	167 to 196	17.0 to 20	123 to 144
ROPS fulcrum screw	118 to 137	12 to 14	87 to 101
Rear axle case mounting screw and nut	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2
Rear axle case mounting stud bolt	24.5 to 31.4	2.5 to 3.2	18.1 to 23.1
Lock nut	196 to 245	20 to 25	145 to 181

W1012736

3. DISASSEMBLING AND SERVICING

[1] PREPARATION



Draining the Transmission Fluid

1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. Screw in the drain plugs (1).

(When reassembling)

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

■ IMPORTANT

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

Transmission fluid	Capacity	2WD	27 L 7.1 U.S.gals 5.98 Imp.gals
		4WD	27.5 L 7.3 U.S.gals 6.1 Imp.gals
		HST (4WD)	23.5 L 6.2 U.S.gals 5.2 Imp.gals

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

A : Oil level is acceptable within this range.

W1013525

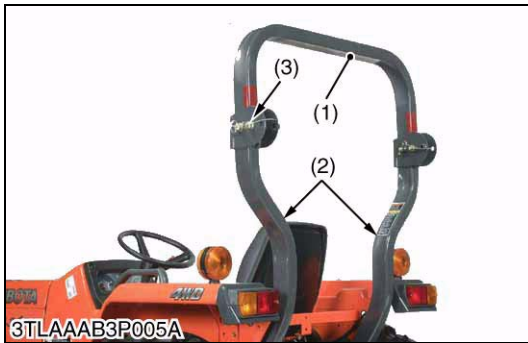
Three Point Linkage

1. Remove the top link (1).
2. Remove the lift rod (2).
3. Remove the lower link (3).

- (1) Top Link
- (2) Lift Rod

(3) Lower Link

W1012538

**ROPS**

1. Remove the ROPS upper frame (1).
2. Remove the ROPS lower frame (2).

(When reassembling)

Tightening torque	ROPS mounting screw	167 to 196 N-m 17.0 to 20.0 kgf-m 123 to 144 ft-lbs
	ROPS fulcrum screw	118 to 137 N-m 12 to 14 kgf-m 87 to 101 ft-lbs

- (1) ROPS Upper Frame
(2) ROPS Lower Frame

(3) ROPS Fulcrum Screw

W1012666

**Rear Wheel and Fender**

1. Place the disassembling stand under the transmission case.
2. Loosen and remove the rear wheel mounting screws and nuts.
3. Remove the rear wheel (2).
4. Remove the rear wheel fender (1).
5. Follow the same procedure as above for the other side.

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	197 to 226 N-m 20 to 23 kgf-m 145 to 166 ft-lbs
-------------------	-----------------------------------	---

(1) Rear Fender

(2) Rear Wheel

W1011172

**Rear Axle Case**

1. Loosen and remove the rear axle case mounting screws and nuts.
2. Support the rear axle case (1) with the nylon lift strap and hoist.
3. Separate the rear axle case from brake case.
4. Follow the same procedure as above for the other side.

(When reassembling)

- Apply liquid gasket (Three Bond 1208D, 1141 or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

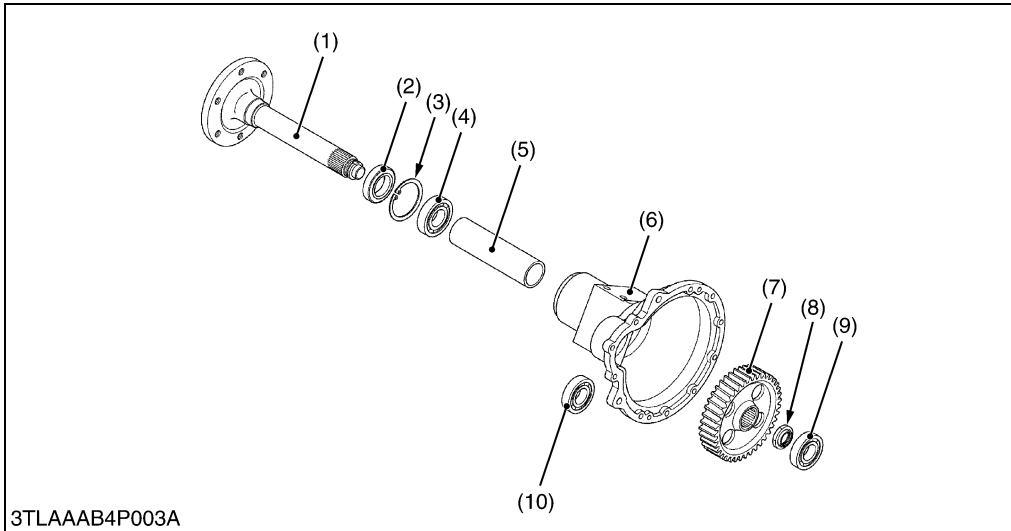
Tightening torque	Rear axle case mounting screws and nuts	48.1 to 55.9 N-m 4.9 to 5.7 kgf-m 35.4 to 41.2 ft-lbs
	Rear axle case mounting stud bolt	24.5 to 31.4 N-m 2.5 to 3.2 kgf-m 18.1 to 23.1 ft-lbs

(1) Rear Axle Case

W1012958

[2] DISASSEMBLING REAR AXLE

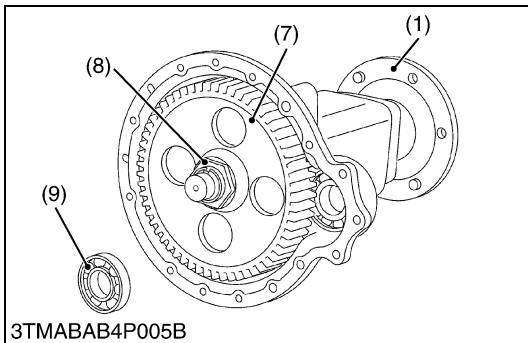
Rear Axle



- (1) Rear Axle
- (2) Oil Seal
- (3) Internal Snap Ring
- (4) Ball Bearing
- (5) Spacer
- (6) Rear Axle Case
- (7) Gear
- (8) Lock Nut
- (9) Ball Bearing
- (10) Ball Bearing

W1011594

3TLAAB4P003A

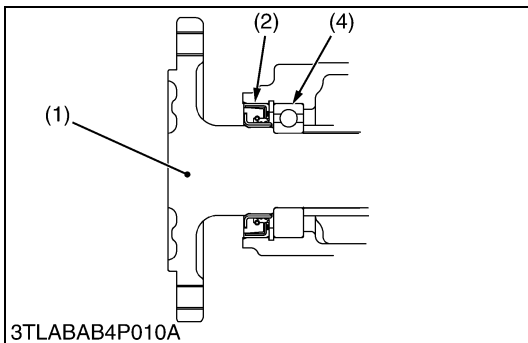


1. Remove the ball bearing (9) with a puller.
2. Remove the stake of lock nut (8).
3. Secure the rear axle (1) in a vise and remove the lock nut.
4. Take out the gear (7) and spacer (5).
5. Tap out the rear axle (1).

(When reassembling)

- Apply grease to the oil seal (2) and install it.
- Replace the lock nut with new one, and after tightening it to specified torque, stake it firmly.
- Assemble the oil seal (2) with correct direction. (See figure on the left.)

3TMABAB4P005B

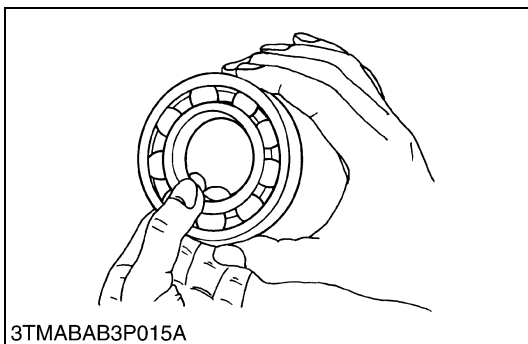


Tightening torque	Lock nut	196 to 245 N·m 20 to 25 kgf·m 145 to 181 ft·lbs
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W1011681

3TLABAB4P010A

[3] SERVICING



Checking Bearing

1. Hold the inner race, and push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then turn the outer race to check rotation.
3. If there is any defect, replace it.

W1011912

3TMABAB3P015A

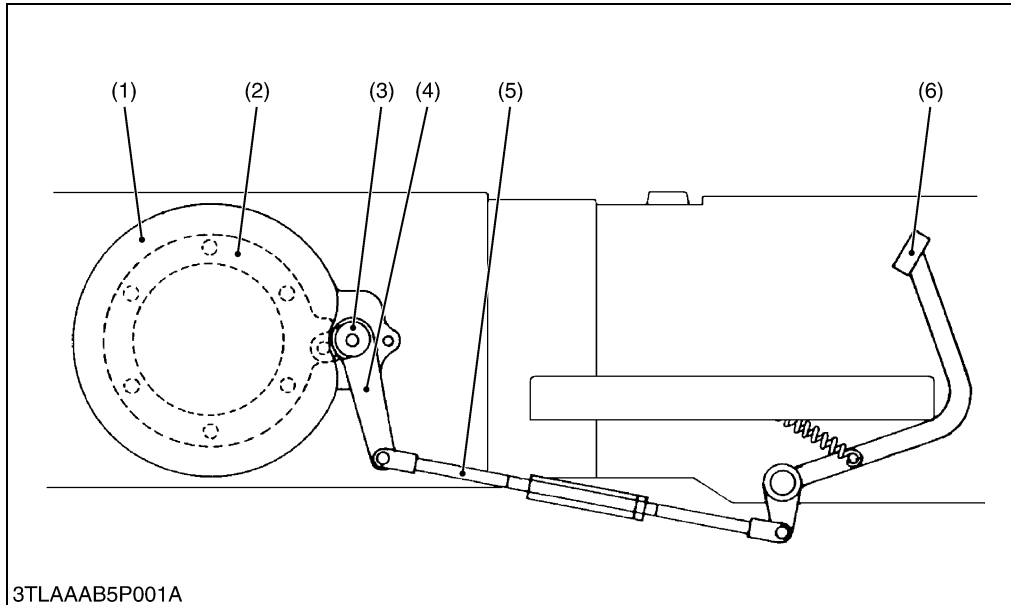
5 BRAKES

MECHANISM

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1. FEATURES	5-M1
2. OPERATION	5-M2

1. FEATURES



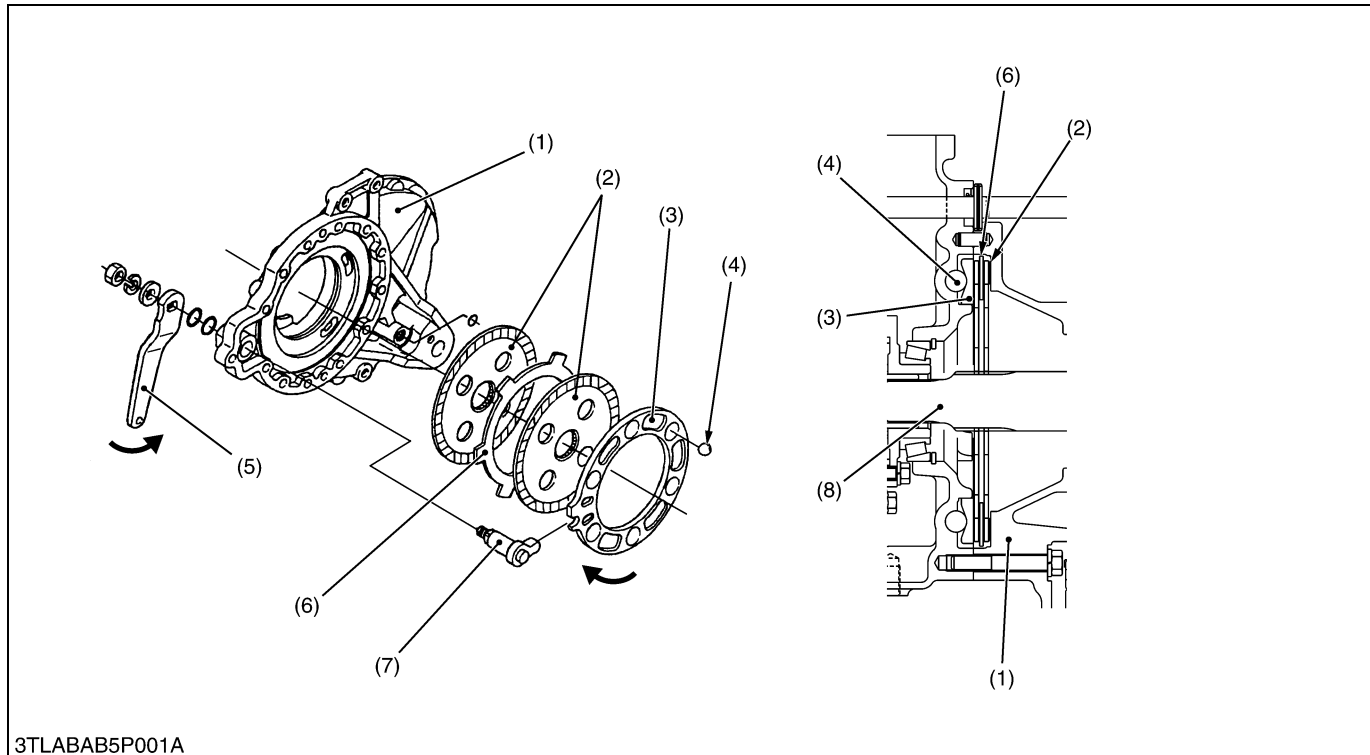
- (1) Brake Case
- (2) Cam Plate
- (3) Brake Cam
- (4) Camshaft Lever
- (5) Brake Rod
- (6) Brake Pedal

W1012543

Independent mechanical wet disc brakes are used for the right and left traveling brakes. They are operated by the brake pedals through the mechanical linkages.

The parking brake is a mechanical type which is designed to actuate the traveling brakes through the linkage. Pulling the parking brake lever (6) results in the same state as that obtained when the brake pedals are pressed.

2. OPERATION



3TLABAB5P001A

- | | | | |
|----------------|----------------|---------------------|-----------------|
| (1) Brake Case | (3) Cam Plate | (5) Brake Cam Lever | (7) Brake Cam |
| (2) Brake Disc | (4) Steel Ball | (6) Plate | (8) Brake Shaft |

The brakes are provided on the power transmitting shafts (brake shafts (8)) through which power is transmitted to the final reduction system. The brakes are incorporated in the brake case (1) filled with transmission oil. They are designed to brake when the brake discs (2), spline-coupled and rotating with the brake shaft, are pressed against the brake case by cam plate (3) with the cam mechanism incorporating steel balls (4). For greater braking force, two brake discs are provided respectively, and the plate (6) fixed to the brake case are arranged between the brake discs.

■ During Braking

When the brake pedal is pressed, the force causes the brake cam lever (5) to move in the direction of arrow through the brake rod. At the same time, the brake cam (7) spline-couples with the brake cam lever also moves. Due to this force, cam plate (3) moves in the direction of arrow. Since the steel balls (4) are set in the grooves of differential case, cam plate (3) is pushed out against the brake discs (2), causing braking with the friction force created.

SERVICING

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1. TROUBLESHOOTING	5-S1
2. SERVICING SPECIFICATIONS	5-S2
3. TIGHTENING TORQUES	5-S3
4. CHECKING, DISASSEMBLING AND SERVICING.....	5-S4
[1] CHECKING AND ADJUSTING	5-S4
[2] PREPARATION	5-S5
[3] DISASSEMBLING AND ASSEMBLING.....	5-S7
[4] SERVICING	5-S8

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Uneven Braking Force	Brake disc worn	Replace	5-S9
	Cam plate warped	Replace	5-S9
Brake Drags	Ball holes of cam plate for uneven wear	Replace	5-S9
	Brake pedal return spring weaken or broken	Replace	–
	Brake cam rusted	Repair	–
Poor Braking Force	Brake disc worn	Replace	5-S9
	Cam plate warped	Replace	5-S9
	Brake cam or lever damaged	Replace	5-S9

W1014322

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Brake Pedal	Free Travel	20 to 30 mm 0.79 to 1.2 in.	–
	Right and Left (Difference)	Less than 5mm 0.20 in.	–
Brake Pedal Shaft to Bushing	Clearance	0.020 to 0.153 mm 0.00079 to 0.00602 in.	1.0 mm 0.039 in.
Brake Pedal Shaft	O.D.	24.9 to 25.0 mm 0.980 to 0.984 in.	–
Brake Pedal Bushing	I.D.	25.020 to 25.053 mm 0.98504 to 0.98634 in.	–
Brake Pedal Shaft to Support Bushing	Clearance	0.05 to 0.20 mm 0.0020 to 0.0079 in.	1.0 mm 0.039 in.
Support Bushing	I.D.	25.05 to 25.10 mm 0.9862 to 0.9882 in.	–
Cam Plate	Flatness	–	0.3 mm 0.012 in.
Cam Plate and Ball	Height	20.9 to 21.1 mm 0.823 to 0.831 in.	20.5 mm 0.8071 in.
Brake Disc	Thickness	4.6 to 4.8 mm 0.181 to 0.189 in.	4.2 mm 0.165 in.
Plate	Thickness	2.54 to 2.66 mm 0.1000 to 0.1047 in.	2.1 mm 0.0827 in.

W1013874

3. TIGHTENING TORQUES

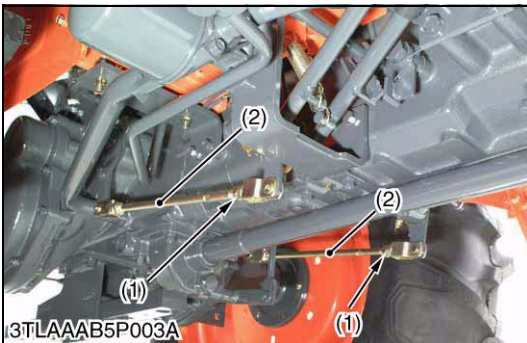
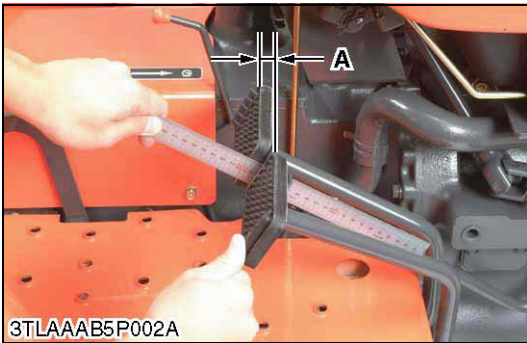
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-9.)

Item	N·m	kgf·m	ft-lbs
Rear wheel mounting screw and nut	197 to 226	20 to 23	145 to 166
ROPS mounting screw	167 to 196	17.0 to 20.0	123 to 144
Rear axle case mounting stud bolt	24.5 to 31.4	2.5 to 3.2	18.1 to 23.1
Brake case mounting stud bolt	34.3 to 49.0	3.5 to 5.0	25.3 to 36.1
Brake cam mounting nut	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5

W1012736

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



Brake Pedal Free Travel

⚠ CAUTION

- Stop the engine and remove the key, then chock the wheel before checking brake pedals.
1. Release the parking brake.
 2. Slightly depress the brake pedals and measure free travel (A) at top of pedal stroke.
 3. If the measurement is not within the factory specifications, loosen the lock nut (1) and turn the turnbuckle (2) to adjust it within the factory specifications.

Brake pedal free travel (A)	Factory spec.	20 to 30 mm 0.79 to 1.2 in.
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■ IMPORTANT

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

■ NOTE

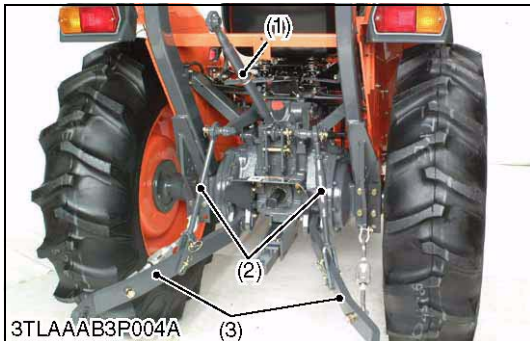
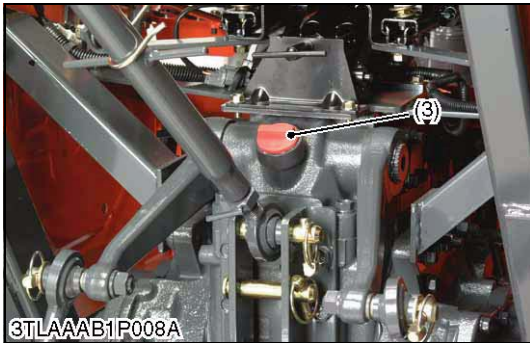
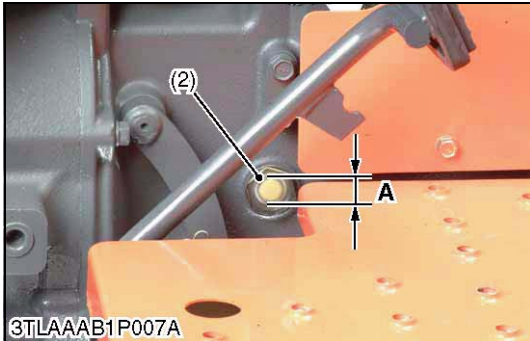
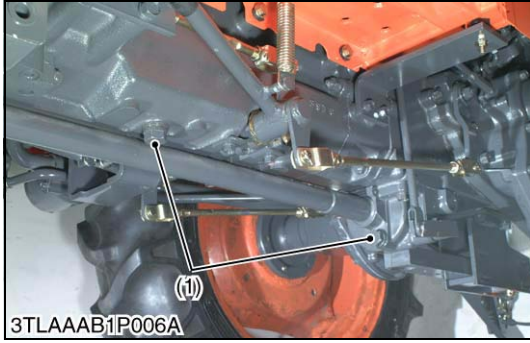
- The difference between the right and left pedal free travels must be less than 5 mm (0.20 in.).
- After checking brake pedal free travel, be sure to engage the parking brake lock fully and check to see that the brake pedals are securely locked.

- (1) Lock Nut
(2) Turnbuckle

A : Free Travel

W1011645

[2] PREPARATION



Draining the Transmission Fluid

1. Place an oil pan underneath the transmission case.
2. Remove the drain plugs (1) at the bottom of the transmission case.
3. Drain the transmission fluid.
4. Screw in the drain plugs (1).

(When reassembling)

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

IMPORTANT

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

Transmission fluid	Capacity	2WD	27 L 7.1 U.S.gals 5.98 Imp.gals
		4WD	27.5 L 7.3 U.S.gals 6.1 Imp.gals
		HST (4WD)	23.5 L 6.2 U.S.gals 5.2 Imp.gals

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

A : Oil level is acceptable within this range.

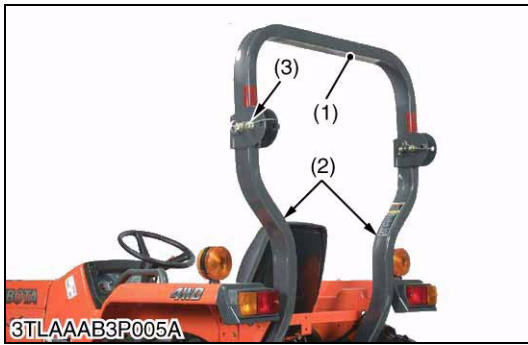
W1015523

Three Point Linkage

1. Remove the top link (1).
2. Remove the lift rod (2).
3. Remove the lower link (3).

- (1) Top Link
- (2) Lift Rod
- (3) Lower Link

W1014185

**ROPS**

1. Remove the ROPS upper frame (1).
2. Remove the ROPS lower frame (2).

(When reassembling)

Tightening torque	ROPS mounting screw	167 to 196 N-m 17.0 to 20.0 kgf-m 123 to 144 ft-lbs
	ROPS fulcrum screw	118 to 137 N-m 12 to 14 kgf-m 87 to 101 ft-lbs

- (1) ROPS Upper Frame
(2) ROPS Lower Frame

- (3) ROPS Fulcrum Screw

W1014459

**Rear Wheel and Rear Fender**

1. Disconnect the battery negative cable.
2. Place the disassembling stand under the transmission case.
3. Loosen and remove the rear wheel mounting screws and nuts.
4. Remove the rear wheel (3) and rear fender (1).
5. Remove the grip (2).

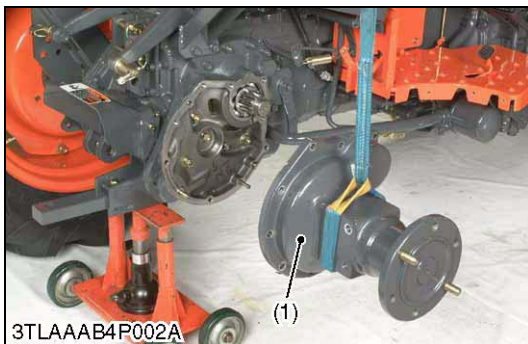
(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	197 to 226 N-m 20 to 23 kgf-m 145 to 166 ft-lbs
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- (1) Rear Fender
(2) Grip

- (3) Rear Wheel

W1011172

**Rear Axle Case**

1. Loosen and remove the rear axle case mounting screws and nuts.
2. Support the rear axle case (1) with the nylon lift strap and hoist.
3. Separate the rear axle case from brake case.
4. Follow the same procedure as above for the other side.

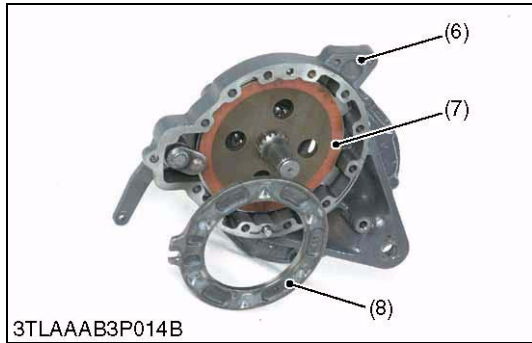
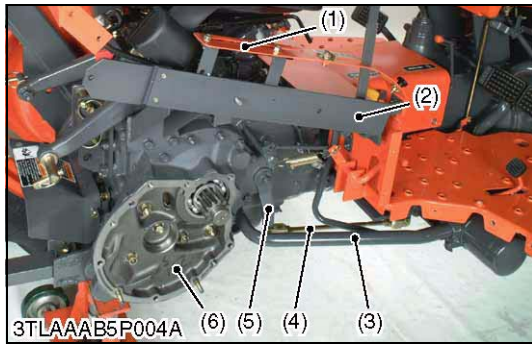
(When reassembling)

- Apply liquid gasket (Three Bond 1208D, 1141 or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting screws and nuts	48.1 to 55.9 N-m 4.9 to 5.7 kgf-m 35.4 to 41.2 ft-lbs
	Rear axle case mounting stud bolt	24.5 to 31.4 N-m 2.5 to 3.2 kgf-m 18.1 to 23.1 ft-lbs

- (1) Rear Axle Case

W1014849



Rear Fender Support

1. Remove the position control lever guide (1).
2. Remove the rear fender support (2).
3. Remove the suction pipe (3).
4. Remove the brake rod (4).
5. Separate the brake case (6), tapping the brake cam lever (5).

(When reassembling)

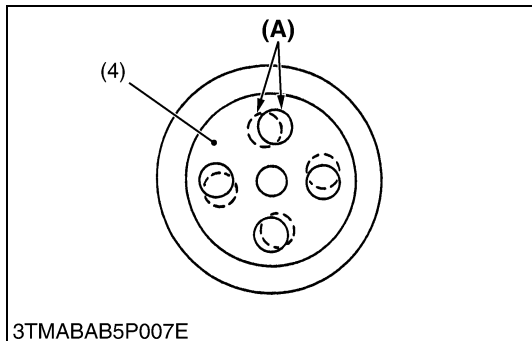
- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1208D, 1141 or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate around the four protrusions on the differential bearing case.
- Apply liquid lock (Three Bond 1324 or equivalent) to the stud bolts.

Tightening torque	Brake case mounting stud bolt	34.3 to 49.0 N·m 3.5 to 5.0 kgf·m 25.3 to 36.1 ft·lbs
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- | | |
|----------------------------------|---------------------|
| (1) Position Control Lever Guide | (5) Brake Cam Lever |
| (2) Fender Support | (6) Brake Case |
| (3) Suction Pipe | (7) Brake Disc |
| (4) Brake Rod | (8) Cam Plate |

W1015975

[3] DISASSEMBLING AND ASSEMBLING



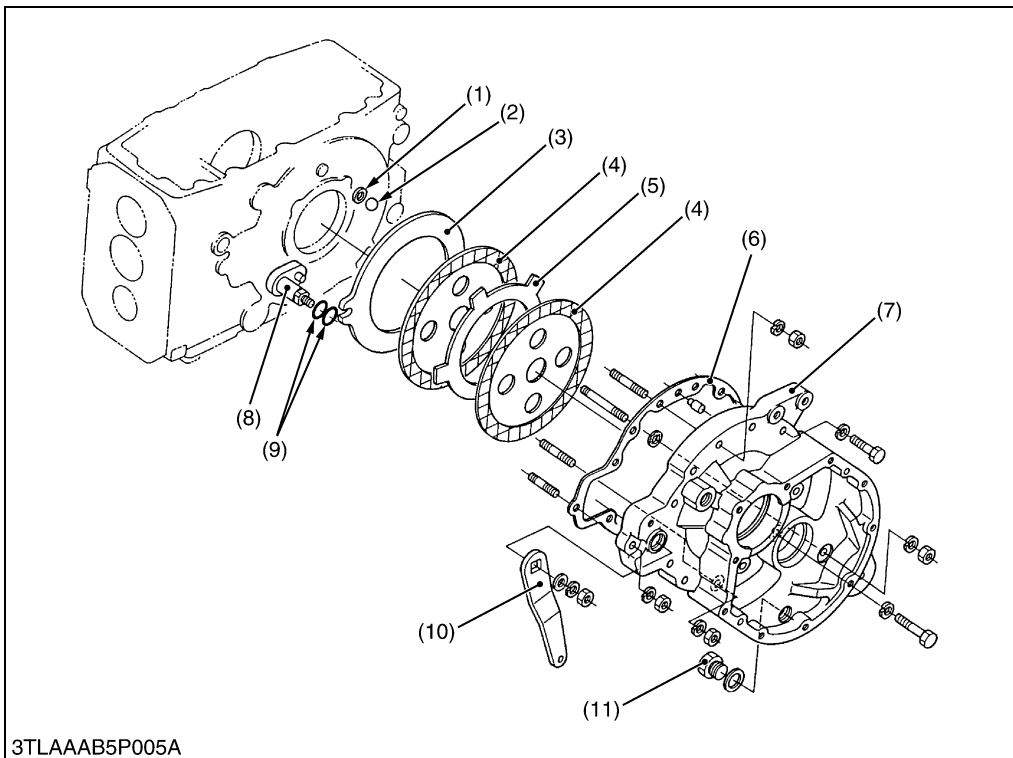
Brake Case

■ It is possible to disassemble as shown in the figure below.

(When reassembling)

- Place the brake discs (4) so that the hole (A) of the second disc should be overlapped 50 % or more.

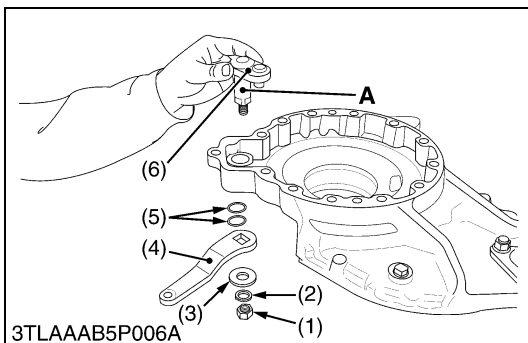
W1014472



- (1) Ball Seat
- (2) Ball
- (3) Cam Plate
- (4) Brake Disc
- (5) Plate
- (6) Gasket
- (7) Brake Case
- (8) Brake Cam
- (9) O-ring
- (10) Brake Cam Lever
- (11) Drain Plug

W1014574

3TLAAB5P005A



Brake Cam

1. Remove the nut (1) on the brake cam (6).
2. Remove the brake cam (6) and brake cam lever (4).

(When reassembling)

- Apply grease to the O-ring (5) and take care not to damage them.
- Apply small amount of grease to the journal **A** to prevent rust problem that leads to lock up.

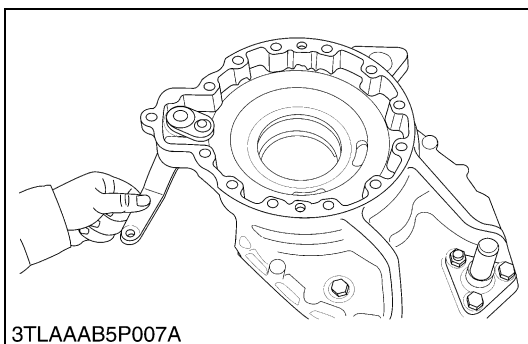
Tightening torque	Brake cam mounting nut	62.8 to 72.5 N-m 6.4 to 7.4 kgf-m 46.3 to 53.5 ft-lbs
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3TLAAB5P006A

- (1) Nut
- (2) Spring Washer
- (3) Plain Washer
- (4) Brake Cam Lever
- (5) O-ring
- (6) Brake Cam

W1014753

[4] SERVICING

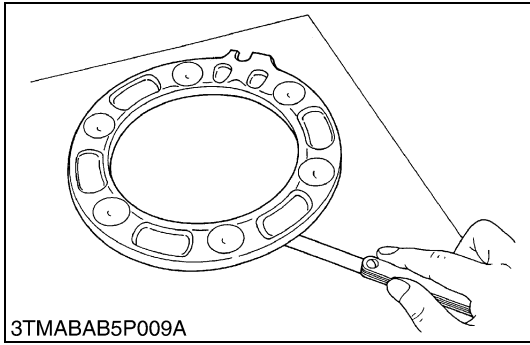


Brake Cam Lever Movement

1. Move the brake cam lever by hand to check the movement.
2. If the movement is heavy, refine the brake cam with sandpaper.

W1015125

3TLAAB5P007A

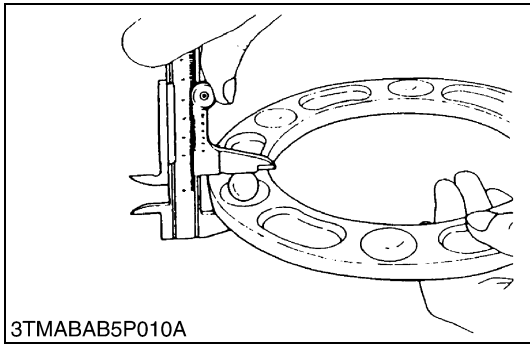


Cam Plate Flatness

1. Place the cam plate on the surface plate.
2. Use a feeler gauge of 0.3 mm (0.012 in.) thick for judgement of the cam plate flatness. Measure the flatness diagonally at more than four locations.
3. If the measurement exceed the allowable limit, replace it.

Cam Plate Flatness	Allowable limit	0.3 mm 0.012 in.
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W1014565

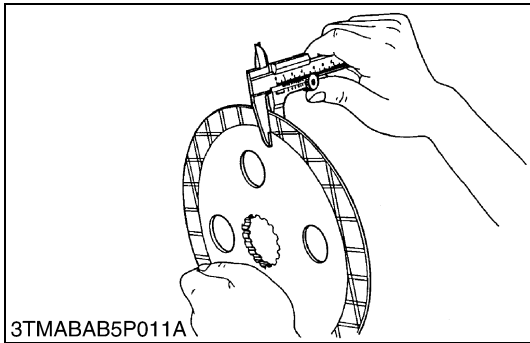


Height of Brake Cam Plate and Ball

1. Measure the dimensions of the brake cam plate with the ball installed.
2. If the measurement is less than the allowable limit, replace the cam plate and balls.
3. Inspect the ball holes of cam plate for uneven wear. If the uneven wear is found, replace it.

Height of brake cam plate and ball	Factory spec.	20.9 to 21.1 mm 0.823 to 0.831 in.
	Allowable limit	20.5 mm 0.807 in.

W1014722



Brake Disc Wear

1. Measure the brake disc thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Brake disc thickness	Factory spec.	4.6 to 4.8 mm 0.181 to 0.189 in.
	Allowable limit	4.2 mm 0.165 in.

W1014853

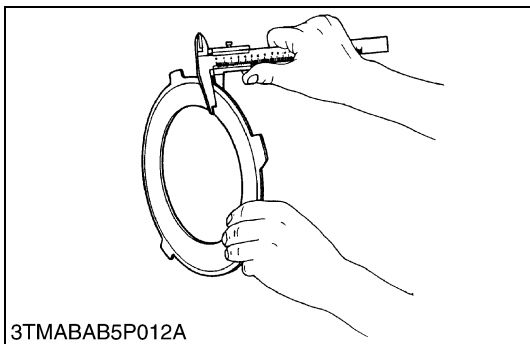


Plate Wear

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

Plate thickness	Factory spec.	2.54 to 2.66 mm 0.1000 to 0.1047 in.
	Allowable limit	2.1 mm 0.083 in.

W1014969

6 FRONT AXLE

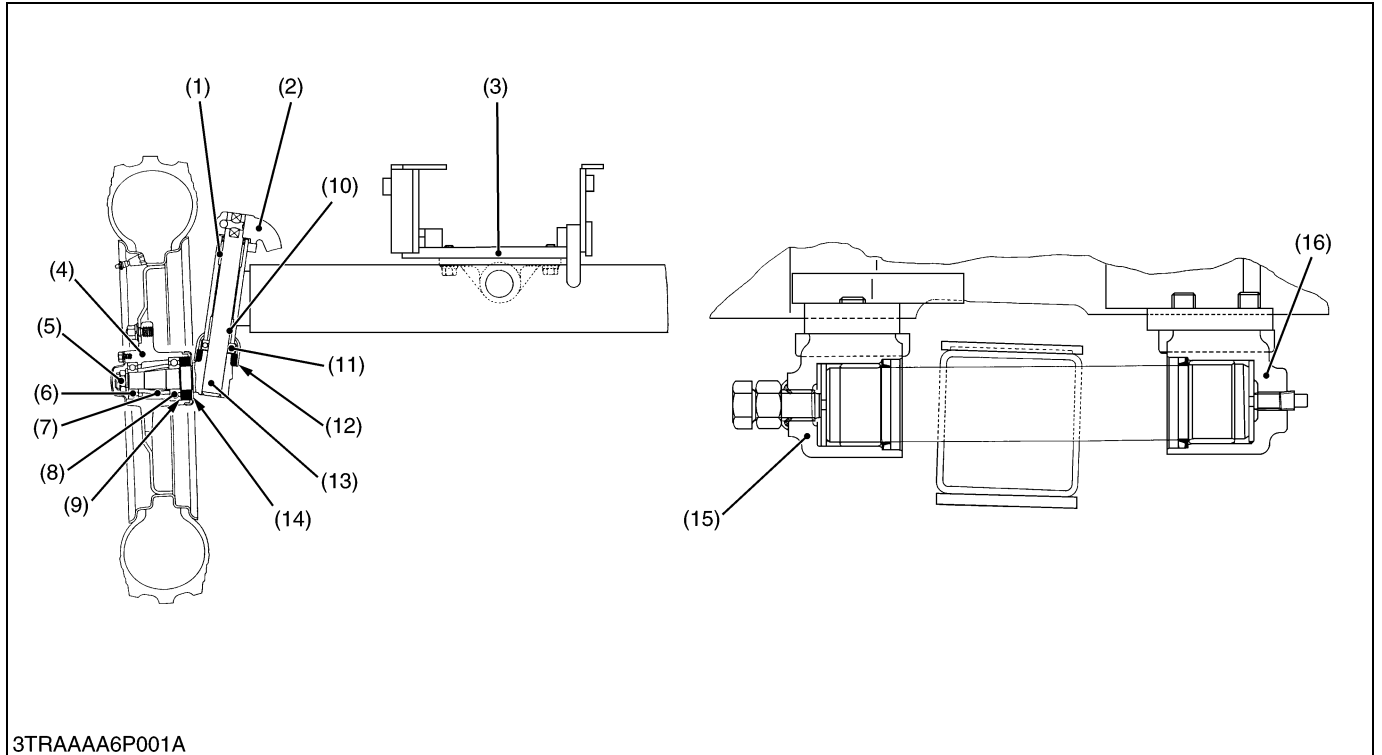
MECHANISM

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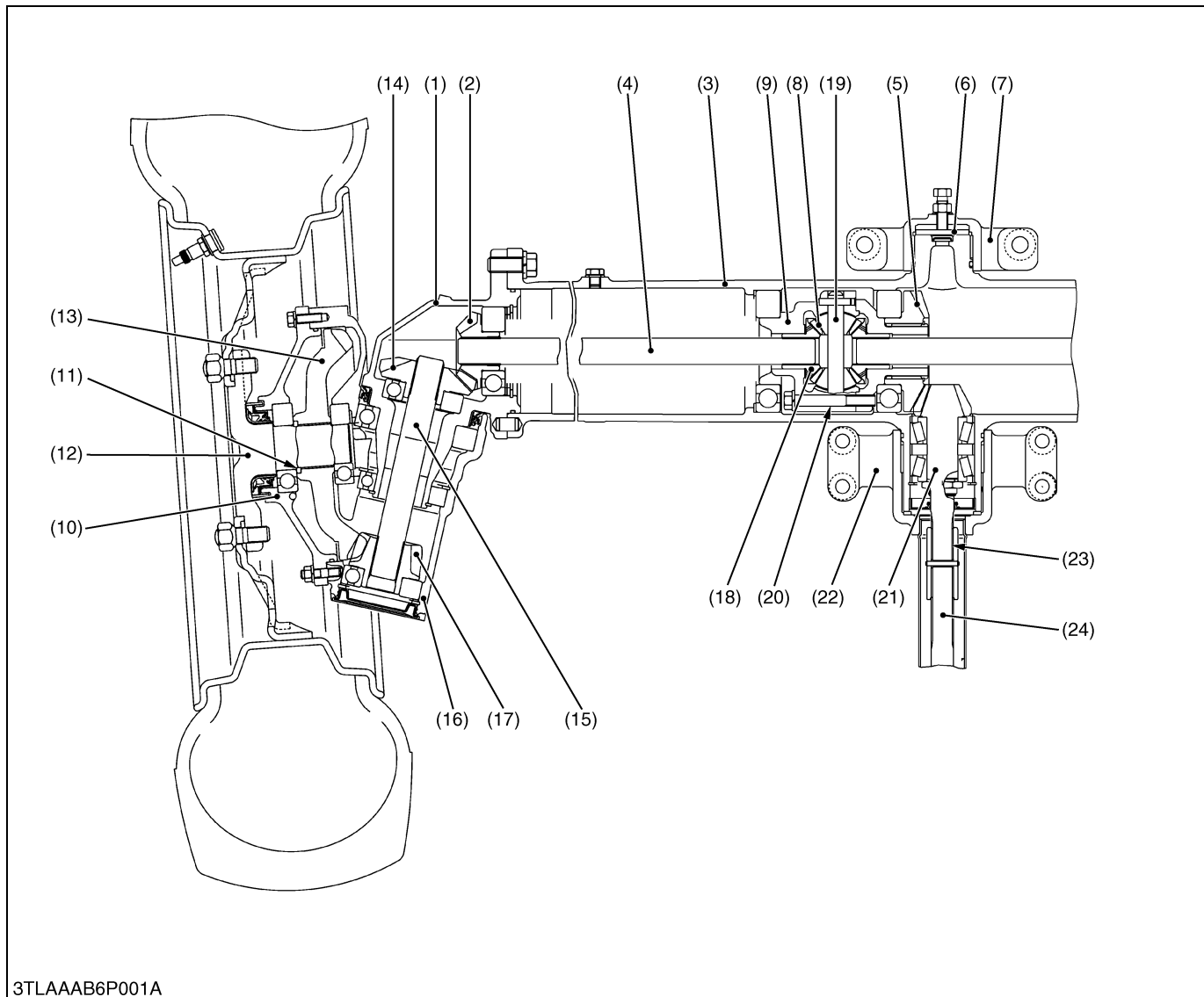
1. STRUCTURE

[1] 2WD TYPE



- | | | | |
|----------------------|------------------|--------------------------|--------------------------------|
| (1) Bushing | (5) Slotted Nut | (9) Oil Seal | (13) Knuckle Shaft |
| (2) Knuckle Arm | (6) Ball Bearing | (10) Bushing | (14) Dust Cover |
| (3) Front Axle Frame | (7) Spacer | (11) Thrust Ball Bearing | (15) Front Axle Bracket, Front |
| (4) Front Wheel Hub | (8) Ball Bearing | (12) Oil Seal | (16) Front Axle Bracket, Rear |

The front axle of the 2WD type is constructed as shown above. The shape of the front axle is relatively simple, and the front axle is supported at its center with the front axle brackets (15), (16) on the front axle frame (3), so that steering operation is stable even on an uneven grounds in a farm field.

[2] 4WD TYPE

- | | | | |
|-----------------------------|-------------------------------|-----------------------------|--------------------------------|
| (1) Bevel Gear Case | (7) Front Axle Bracket, Front | (13) Bevel Gear | (19) Pinion Shaft |
| (2) Bevel Gear | (8) Differential Pinion | (14) Bevel Gear | (20) Differential Assembly |
| (3) Front Axle Case | (9) Differential Case | (15) Bevel Gear Shaft | (21) Spiral Bevel Pinion Shaft |
| (4) Differential Yoke Shaft | (10) Axle Flange | (16) Front Gear Case | (22) Front Axle Bracket, Rear |
| (5) Spiral Bevel Gear | (11) Collar | (17) Bevel Gear | (23) Coupling |
| (6) Collar | (12) Axle | (18) Differential Side Gear | (24) Propeller Shaf |

The front axle of the 4WD type is constructed as shown above. Power is transmitted from the transmission through the propeller shaft (24) and to the spiral bevel pinion shaft (21), then to the spiral bevel gear (5) after that to the differential gear.

The power through the differential is transmitted to the differential yoke shaft (4), and to the bevel gear shaft (15) in the bevel gear case (1).

The revolution is greatly reduced by the bevel gears (17), (13), then the power is transmitted to the axle (12).

The differential system allows each wheel to rotate at a different speed to make turning easier.

SERVICING

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(1) 2WD Type	6-S17
(2) 4WD Type	6-S18

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Wander to Right or Left	Tire pressure uneven	Adjust	G-55
	Improper toe-in adjustment (improper alignment)	Adjust	6-S6
	Clearance between front axle middle boss and front axle shaft bracket bushing excessive [2WD Type]	Replace	6-S17
	Clearance between front axle case boss and front axle bracket (front, rear) bushing excessive [4WD Type]	Replace	6-S22
	Knuckle shaft bushings worn [2WD Type]	Replace	6-S17
	Front axle rocking force too small	Adjust	6-S7
	Front wheel sway excessive	Replace	6-S6
	Tie-rod end loose	Tighten	6-S9
	Air sucked in power steering circuit	Bleed	–
Front Wheels Can Not Be Driven [4WD Type]	Propeller shaft broken	Replace	6-S9
	Front wheel drive gears in transmission broken	Replace	3-S23
	Front differential gear broken	Replace	6-S15
	Shift fork broken	Replace	3-S26
	Coupling displaced	Reassemble	–
Noise [4WD Type]	Gear backlash excessive	Adjust or replace	6-S20
	Oil insufficient	Replenish	6-S8
	Bearings damaged or broken	Replace	–
	Gears damaged or broken	Replace	–
	Spiral bevel pinion shaft turn force improper	Adjust	6-S19

W1014322

2. SERVICING SPECIFICATIONS

2WD TYPE

Item		Factory Specification	Allowable Limit
Front Wheel Alignment	Toe-in	2 to 8 mm 0.08 to 0.32 in.	–
Front Wheel	Axial Sway	Less than 5 mm 0.20 in.	–
Front Axle	Rocking Force	49.0 to 117.7 N 5.0 to 12.0 kgf 11.0 to 26.5 lbs	–
Knuckle Shaft to Bushing	Clearance	0.000 to 0.285 mm 0.00000 to 0.01122 in.	0.4 mm 0.016 in.
Knuckle Shaft	O.D.	27.880 to 27.900 mm 1.09764 to 1.09842 in.	–
Bushing	I.D.	27.900 to 28.165 mm 1.09842 to 1.10886 in.	–
Front Axle Middle Boss to Front Axle Shaft Bracket Bushing	Clearance	0.000 to 0.177 mm 0.00000 to 0.00697 in.	0.3 mm 0.012 in.
Front Axle Middle Boss	O.D.	39.938 to 40.000 mm 1.57236 to 1.57480 in.	–
Bushing	I.D.	40.000 to 40.115 mm 1.57480 to 1.57933 in.	–

W1013874

4WD TYPE

Front Wheel Alignment	Toe-in	2 to 8 mm 0.08 to 0.32 in.	–
Front Wheel	Axial Sway	Less than 5 mm 0.20 in.	–
Front Axle	Rocking Force	49.0 to 117.7 N 5.0 to 12.0 kgf 11.0 to 26.5 lbs	–
Front Axle Case Boss (Front) to Bracket Bushing	Clearance	0.025 to 0.160 mm 0.00098 to 0.00630 in.	0.35 mm 0.0138 in.
Front Axle Case Boss (Front)	O.D.	49.950 to 49.975 mm 1.96653 to 1.96752 in.	–
Bushing	I.D.	50.000 to 50.110 mm 1.96850 to 1.97283 in.	–
Front Axle Case Boss (Rear) to Bracket Bushing	Clearance	0.025 to 0.190 mm 0.00098 to 0.00748 in.	0.35 mm 0.0138 in.
Front Axle Case Boss (Rear)	O.D.	70.000 to 70.035 mm 2.75590 to 2.75728 in.	–
Bushing	I.D.	70.060 to 70.190 mm 2.75826 to 2.76338 in.	–

W1013973

4WD TYPE (Continued)

Item		Factory Specification	Allowable Limit
Differential Case, Differential Case Cover to Differential Side Gear	Clearance	0.050 to 0.151 mm 0.00197 to 0.00594 in.	0.35 mm 0.0138 in.
Differential Case	I.D.	32.000 to 32.064 mm 1.25984 to 1.26228 in.	—
Differential Case Cover	I.D.	32.000 to 32.025 mm 1.25984 to 1.26083 in.	—
Differential Side Gear	O.D.	31.911 to 31.950 mm 1.25634 to 1.25787 in.	—
Pinion Shaft to Differential Pinion	Clearance	0.064 to 0.100 mm 0.00252 to 0.00394 in.	0.25 mm 0.0096 in.
Pinion Shaft	O.D.	13.950 to 13.968 mm 0.54921 to 0.54992 in.	—
Differential Pinion	I.D.	14.032 to 14.050 mm 0.55244 to 0.55315 in.	—
Differential Pinion to Differential Side Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	—
Shim	Thickness	0.4 mm 0.016 in.	—
		0.6 mm 0.024 in.	—
		0.8 mm 0.031 in.	—
		1.0 mm 0.039 in.	—
		1.2 mm 0.047 in.	—
Spiral Bevel Pinion Shaft (Pinion Shaft Only)	Turning Force	98.1 to 117.7 N 10 to 12 kgf 22.0 to 26.5 lbs	—
	Turning Torque	0.98 to 1.18 N·m 0.1 to 0.12 kgf·m 0.72 to 0.89 ft-lbs	—
Spiral Bevel Pinion Shaft to Spiral Bevel Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	—

W1013874

4WD TYPE (Continued)

Item		Factory Specification	Allowable Limit
11T Bevel Gear to 16T Bevel Gear Shim	Backlash	0.15 to 0.35 mm 0.0059 to 0.0138 in.	—
	Thickness	0.8 mm 0.031 in.	—
		1.0 mm 0.039 in.	—
		1.2 mm 0.047 in.	—
11T Bevel Gear to 42T Bevel Gear Shim	Backlash	0.15 to 0.35 mm 0.0059 to 0.0138 in.	—
	Thickness	1.0 mm 0.039 in.	—
		1.2 mm 0.047 in.	—
		1.4 mm 0.055 in.	—
		1.6 mm 0.063 in.	—
		1.8 mm 0.071 in.	—
		2.0 mm 0.079 in.	—
		2.2 mm 0.087 in.	—

W1013874

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-9.)

2WD TYPE

Item	N·m	kgf·m	ft-lbs
Slotted nut of tie-rod end	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Front axle shaft bracket (front) mounting screw	102.9 to 117.7	10.5 to 12.0	75.9 to 86.7
Front axle shaft bracket (rear) mounting screw	77.4 to 90.2	7.9 to 9.2	57.2 to 66.5
Front wheel mounting stud bolt	63.7 to 73.5	6.5 to 7.5	47.0 to 54.0
Front wheel mounting lug nut	137.3	14.0	101.3
Front wheel hub slotted nut	78.5 to 117.7	8.0 to 12.0	57.9 to 86.8
Knuckle arm mounting bolt and nut	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5

W1012736

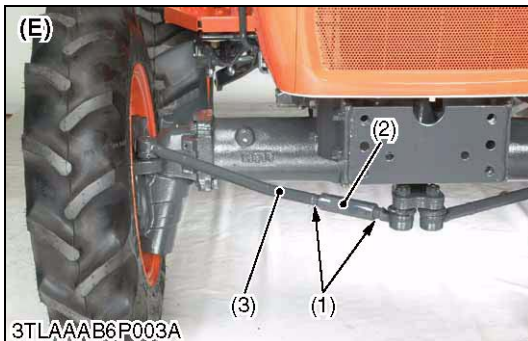
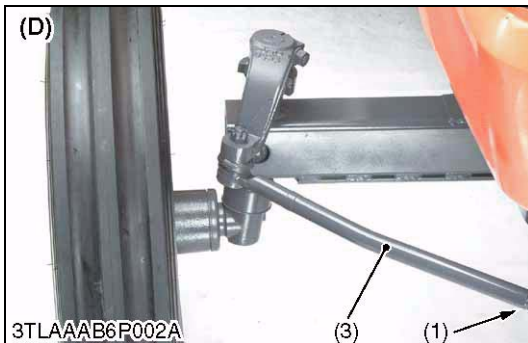
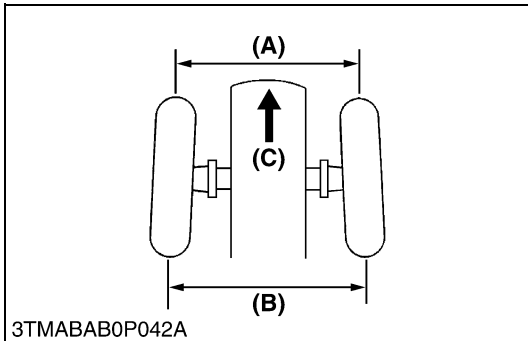
4WD TYPE

Slotted nut of tie-rod end	38.5 to 39.5	3.5 to 4.5	25.3 to 32.5
Front axle shaft bracket (front) mounting screw	240 to 260	24 to 26	173 to 188
Front axle shaft bracket (rear) mounting screw	77.4 to 90.2	10.0 to 12.0	72.3 to 86.7
Front wheel mounting lug nut	137.3	14.0	101.3
Bevel gear case mounting screw	123.5 to 147.0	12.6 to 15.0	91.2 to 108.4
Axle flange mounting screw and nut	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2
Axle flange mounting stud bolt	11.8 to 15.7	1.2 to 1.6	8.7 to 11.5
Differential case cover mounting screw	48.1 to 55.9	4.9 to 5.7	35.4 to 41.2

W1011757

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



Toe-in

1. Park the tractor on the flat place.
2. Inflate the tires to the specified pressure.
3. Turn steering wheel so front wheels are in the straight ahead position.
4. Lower the implement, lock the parking brake and stop the engine.
5. Measure distance between tire beads at front of tire, hub height.
6. Measure distance between tire beads at rear of tire, hub height.
7. Front distance should be 2 to 8 mm (0.08 to 0.32 in.) less than rear distance.
8. If the measurement is not within the factory specifications, adjust by changing the tie-rod length.

Toe-in ((B) - (A))	Factory spec.	2 to 8 mm 0.08 to 0.32 in.
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■ Adjusting

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

■ IMPORTANT

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

- (1) Tie-rod Lock Nut
(2) Turnbuckle
(3) Tie-rod

- (A) Wheel to Wheel Distance at front
(B) Wheel to Wheel Distance at rear
(C) Front
(D) 2WD
(E) 4WD

W1021328

Axial Sway of Front Wheel

1. Jack up the front side of tractor.
2. Set a dial gauge on the outside of rim.
3. Turn the wheel slowly and read the runout of rim.
4. If the runout exceeds the factory specifications, check the bearing, rim, and front wheel hub.

Axial sway of front wheel	Factory spec.	Less than 5.0 mm 0.20 in.
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W102176

**Front Axle Rocking Force [2WD]**

1. Jack up the front side of tractor.
2. Set a spring balance to the front axle flange.
3. Measure the front axle rocking force.
4. If the measurement is not within the factory specifications, adjust with the adjusting screw (1).
5. Tighten the lock nut (2) firmly.

Front axle rocking force	Factory spec.	49.0 to 117.7 N 5.0 to 12.0 kgf 11.0 to 26.5 lbs
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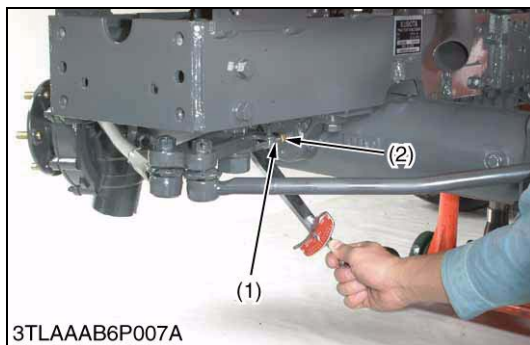
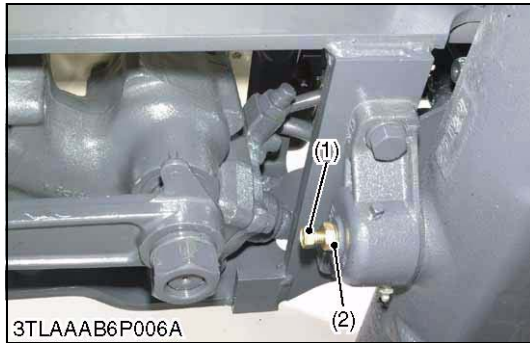
(When reassembling)

Tightening torque	Lock nut	34.3 to 39.2 N·m 3.5 to 4.0 kgf 25.3 to 28.9 ft-lbs
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(1) Adjusting Screw

(2) Lock Nut

W1012289

**Adjusting Front Axle Pivot [4WD]**

1. Jack up the tractor body, then loosen the lock nut (2).
2. Measure the adjusting screw tightening torque.
3. If tightening torque is not within the factory specifications, adjust the adjusting screw (1).
4. After adjustment, tighten the lock nut firmly.

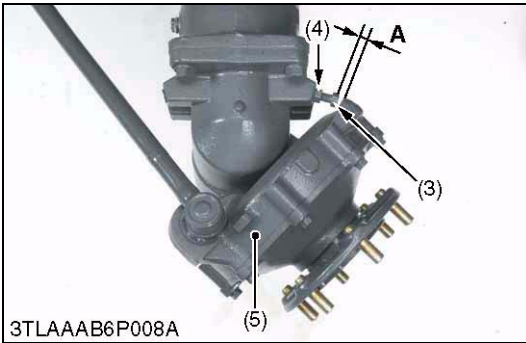
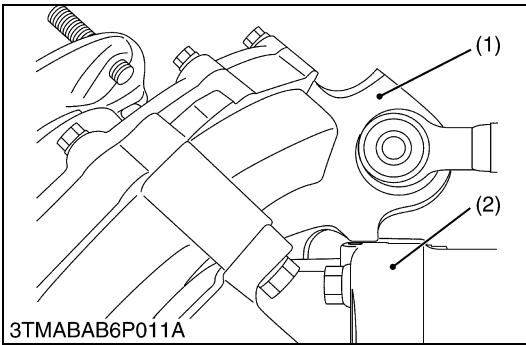
(When reassembling)

Tightening torque	Front axle adjusting screw	19.6 to 29.4 N·m 2.0 to 3.0 kgf 14.5 to 21.7 ft-lbs
	Lock nut	39.2 to 58.8 N·m 4.0 to 6.0 kgf 28.9 to 43.4 ft-lbs

(1) Adjusting Screw

(2) Lock Nut

W1020990



Front Wheel Steering Angle

1. Inflate the tires to the specified pressure.
2. Steer the wheels to the extreme right until the front gear case (1) contacts with the bevel gear case (2) at right hand side of the front axle.
3. If the front gear case (1) can not be contacted with the bevel gear case (2), shorten the length of stopper (3).
4. Keeping the front gear case (1) contact with the bevel gear case (2), make a specified clearance (A) as shown in the lower table.
5. After adjustment, secure the stopper with the lock nut (4).
6. For adjusting the left steering angle, perform the same procedure as mentioned in right steering angle

Clearance (A) between bevel gear case and stopper	Factory spec.	1.0 to 3.0 mm 0.04 to 0.12 in.
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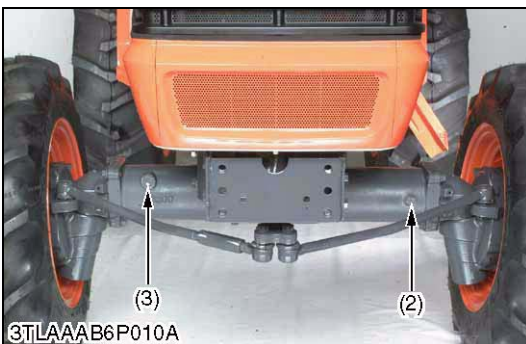
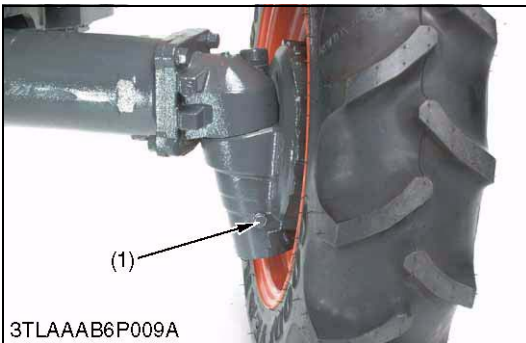
- (1) Front Gear Case
- (2) Bevel Gear Case
- (3) Stopper
- (4) Lock Nut
- (5) Front Gear Case

A : Clearance

W1022987

[2] PREPARATION

(1) Separating Front Axle



Draining Front Axle Case Oil [4WD Type]

1. Place the oil pans underneath the front axle case.
2. Remove the drain plug (1) both sides and filling port plug (3) to drain the oil.
3. After draining, reinstall the drain plugs (1) and filling port plug (3).

(When refilling)

- Remove the filling port plug (3) and check plug (2).
- Fill with the new oil up to the check plug port.
- After filling, reinstall the check plug (2) and filling port plug (3).

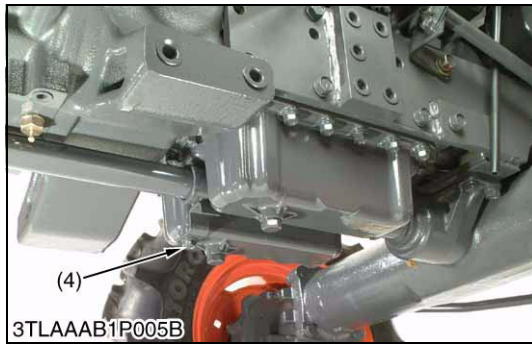
Front axle case oil	Capacity	4.5 L 4.8 U.S.qts 3.9 Imp.qts
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■ IMPORTANT

- Use **KUBOTA SUPER UDT fluid or SAE 80, 90 gear oil.** Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)

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

W1012640



Propeller Shaft (4WD)

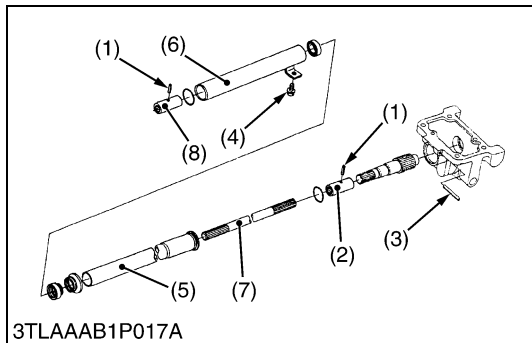
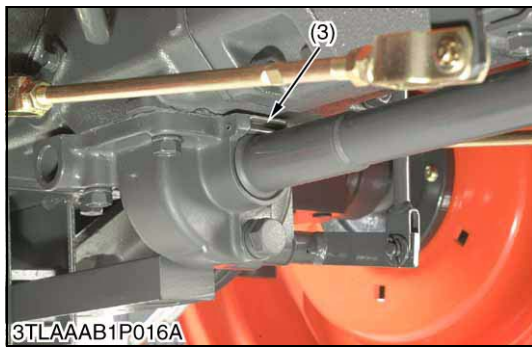
1. Remove the screw (4) then tap out the spring pin (3).
2. Slide the propeller shaft cover 1 (5) to the front and the cover 2 (6) to the rear.
3. Tap out the spring pins (1) and then slide the coupling (2) to the front and coupling (8) to the rear.

(When reassembling)

- Apply grease to the splines of the propeller shaft (7) and pinion shaft.

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

W1017826



Bumper and Tie-rods

1. Remove the bumper.
2. Remove the tie-rods with the tie-rod end lifter.
In this case, take special care not to damage the tie-rod end nut (slotted nut). (It is preferable to replace it with an unrequired nut.)
3. Reinstall the bumper.

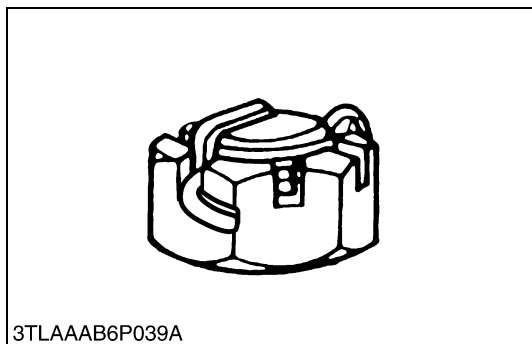
(When reassembling)

Tightening torque	Tie-rod end nut	2WD	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft-lbs
		4WD	38.5 to 39.5 N·m 3.5 to 4.5 kgf·m 25.3 to 32.5 ft-lbs

■ IMPORTANT

- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.

W1013537



**Breather Pipe (4WD Type Only)**

1. Remove the breather pipe (1).

(1) Breather Pipe

W1018055

**Front Axle**

1. Place the disassembling stand under the front axle, and hang up the front bumper by the hoist to support it.
2. Remove the shaft bracket 1 mounting screws and shaft bracket 2 mounting screws.
3. Separate the front axle from the front axle support.
4. Remove the front wheels.

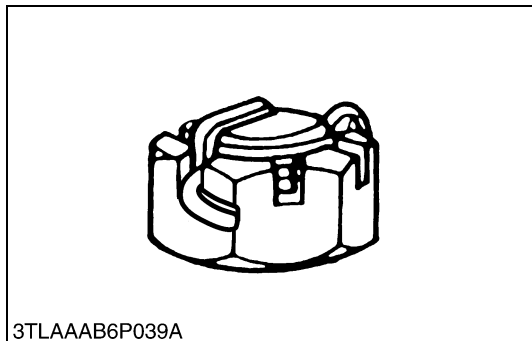
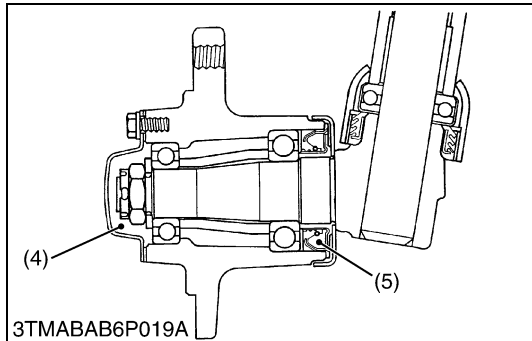
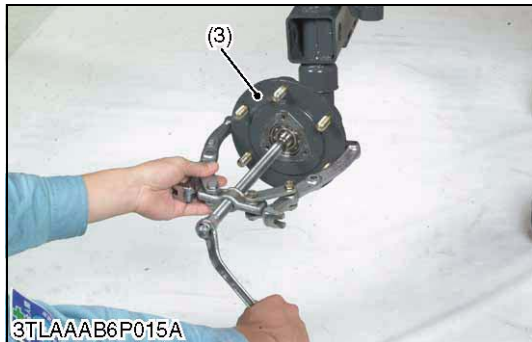
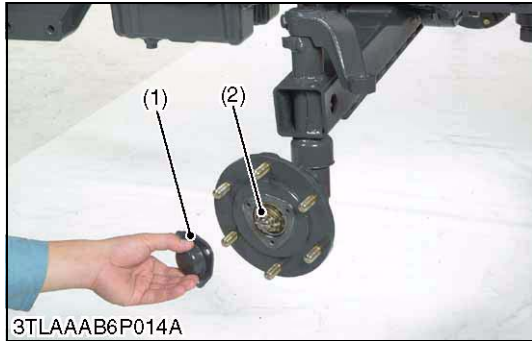
(When reassembling)

Tightening torque	Shaft bracket 1 (front) mounting screws [4WD Type]	240 to 260 N-m 24 to 26 kgf-m 173 to 188 ft-lbs
	Shaft bracket 2 (rear) mounting screws [4WD Type]	77.4 to 90.2 N-m 7.9 to 9.2 kgf-m 57.2 to 66.5 ft-lbs
	Shaft brackets (front) mounting screws [2WD Type]	166 to 196 N-m 17 to 20 kgf-m 122.9 to 144.6 ft-lbs
	Shaft bracket (rear) mounting screws [2WD Type]	102.9 to 117.7 N-m 10.5 to 12.0 kgf-m 75.9 to 86.7 ft-lbs
	Front wheel mounting lug nuts	137.3 N-m 14.0 kgf-m 101.3 ft-lbs
	Front wheel mounting stud bolts	63.7 to 73.5 N-m 6.5 to 7.5 kgf-m 47.0 to 54.2 ft-lbs

W1013808

[3] DISASSEMBLING AND ASSEMBLING

(1) 2WD Type Front Axle



Front Wheel Hub

1. Place the disassembling stand under the transmission case.
2. Remove the tie-rod with the tie-rod end lifter.
3. Remove the front wheel.
4. Remove the front wheel hub cap (1).
5. Draw out the cotter pin.
6. Remove the slotted nut (2).
7. Remove the collar.
8. Remove the front wheel hub (3) with a puller.

(When reassembling)

- Replace cotter pin with a new one.
- Apply grease to the oil seal in the front wheel hub.

■ IMPORTANT

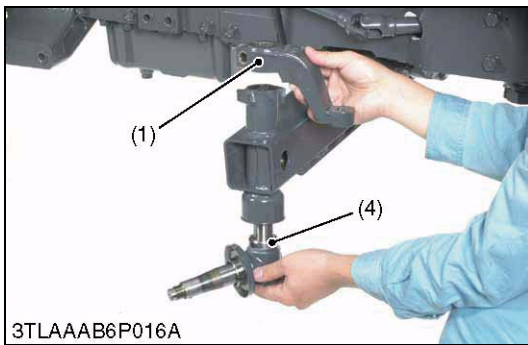
- After tightening the slotted nut to the specified torque, insert a cotter pin and bend it as shown in the figure.
- Pack in the grease to the bearing in the front wheel hub.

Tightening torque	Front wheel hub slotted nut	78.5 to 117.7 N·m 8.0 to 12.0 kgf·m 57.9 to 86.8 ft·lbs
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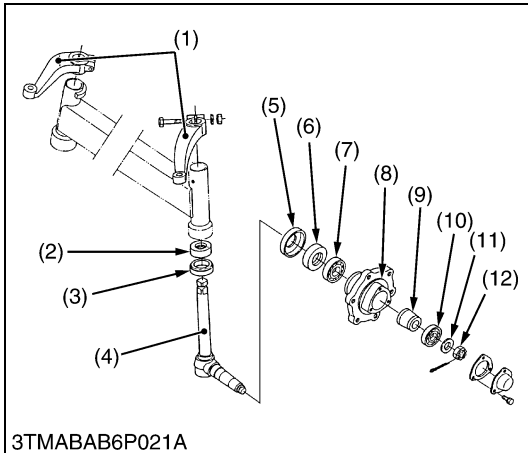
- (1) Front Wheel Hub Cap
(2) Slotted Nut
(3) Front Wheel Hub

- (4) Grease
(5) Oil Seal

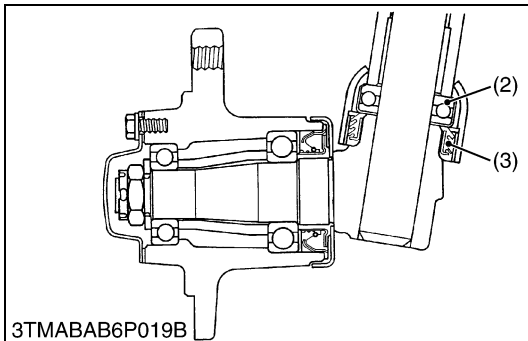
W1014125



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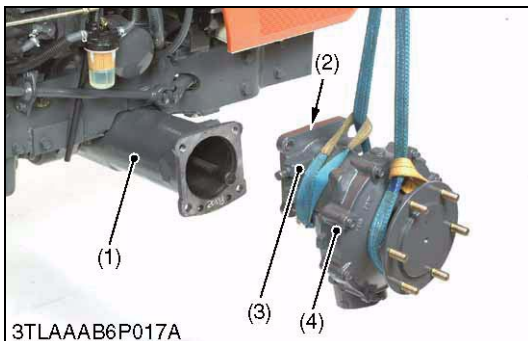


3TMABAB6P021A



3TMABAB6P019B

(2) 4WD Type Front Axle



3TLAAAB6P017A

Knuckle Shaft

1. Remove the knuckle arm (1) and draw out the knuckle shaft (4) from the front axle.

(When reassembling)

- Insert the thrust ball bearing (2) and oil seal (3), noting its direction.
- Apply grease to the oil seals (3), (6).
- Do not interchange right and left knuckle arms.
- When lift the knuckle shaft, the knuckle arms must be mounted so that the clearance between the knuckle arms and front axle is 0.3 to 1.0 mm (0.012 to 0.039 in.).

Tightening torque	Knuckle arm mounting bolt and nut	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 ft·lbs
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- | | |
|-------------------------|---------------------|
| (1) Knuckle Arm | (7) Ball Bearing |
| (2) Thrust Ball Bearing | (8) Front Wheel Hub |
| (3) Oil Seal | (9) Spacer |
| (4) Knuckle Shaft | (10) Ball Bearing |
| (5) Dust Cover | (11) Washer |
| (6) Oil Seal | (12) Slotted Nut |

W1014597

Bevel Gear Case and Front Gear Case

1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (3) and front gear case (4) as a unit from the front axle case (1).

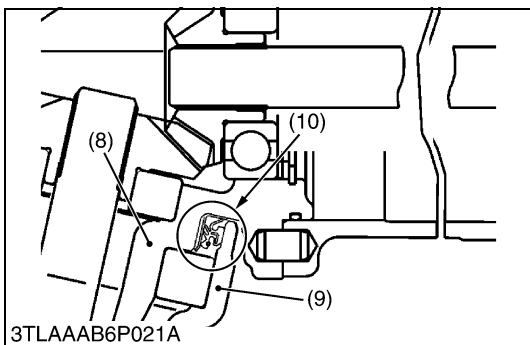
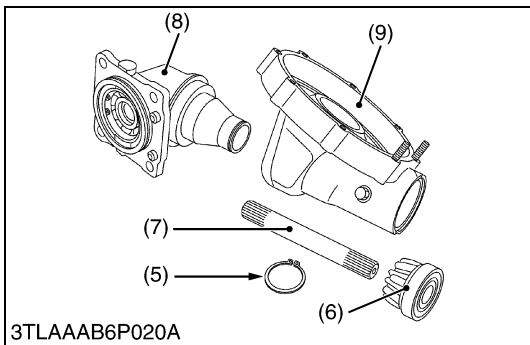
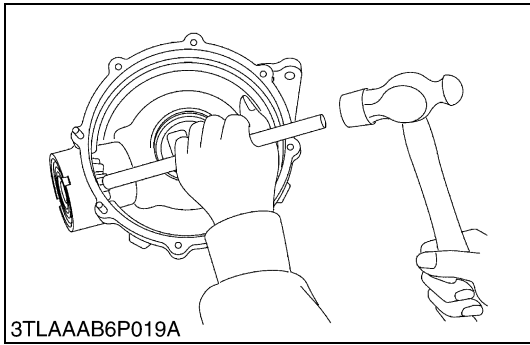
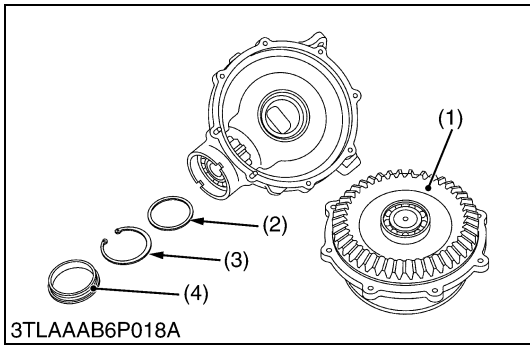
(When reassembling)

- Apply grease to the O-ring (2) and take care not to damage it.
- Do not interchange right and left bevel gear case assemblies and front gear case assemblies.

Tightening torque	Bevel gear case mounting screw	123.5 to 147.0 N·m 12.6 to 15.0 kgf·m 91.2 to 108.4 ft·lbs
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- | | |
|---------------------|---------------------|
| (1) Front Axle Case | (3) Bevel Gear Case |
| (2) O-ring | (4) Front Gear Case |

W1015066



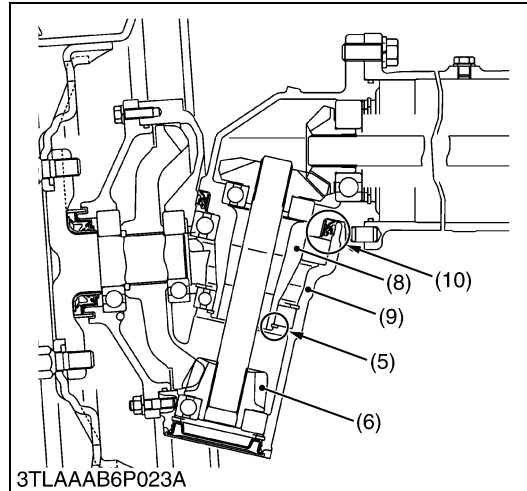
Bevel Gear Case, Axle Flange and Front Gear Case

1. Remove the plug (4).
2. Remove the internal snap ring (3) and shim (2).
3. Remove the axle flange (1).
4. Tap out the bevel gear (6) and ball bearing.
5. Draw out the bevel gear shaft (7).
6. Remove the external snap ring (5).
7. Tap the bevel gear case (8), and separate it from the front gear case (9).

(When reassembling)

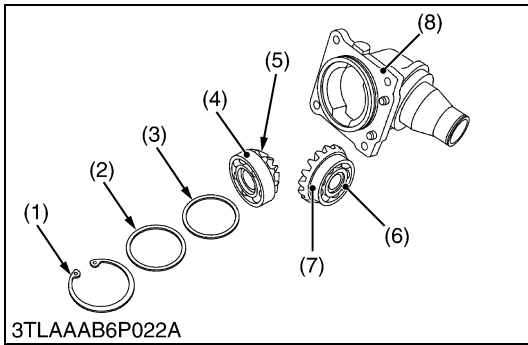
- Apply grease to the O-rings of axle flange (1).
- Tighten the axle flange mounting screws and nuts diagonally in several steps.
- Install the oil seal (10) of bevel gear case, noting its direction as shown in the figure below.

Tightening torque	Axle flange mounting stud bolt	11.8 to 15.7 N·m 1.2 to 1.6 kgf·m 8.7 to 11.5 ft·lbs
	Axle flange mounting screws and nuts	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 ft·lbs



- | | |
|------------------------|----------------------|
| (1) Axle Flange | (6) Bevel Gear |
| (2) Shim | (7) Bevel Gear Shaft |
| (3) Internal Snap Ring | (8) Bevel Gear Case |
| (4) Plug | (9) Front Gear Case |
| (5) External Snap Ring | (10) Oil Seal |

W1015238

**Bevel Gear Case Gears**

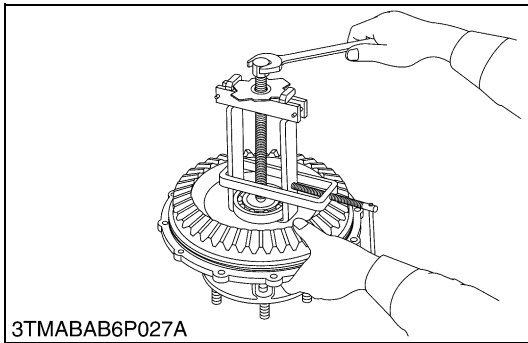
1. Remove the internal snap ring (1).
2. Take out the bevel gears (5), (7) with ball bearings (4), (6), collar (2) and shims (3).

(When reassembling)

- Install the same shims (3) before they are removed.

(1) Internal Snap Ring	(5) Bevel Gear
(2) Collar	(6) Ball Bearing
(3) Shim	(7) Bevel Gear
(4) Ball Bearing	(8) Bevel Gear Case

W1015856

**Axle**

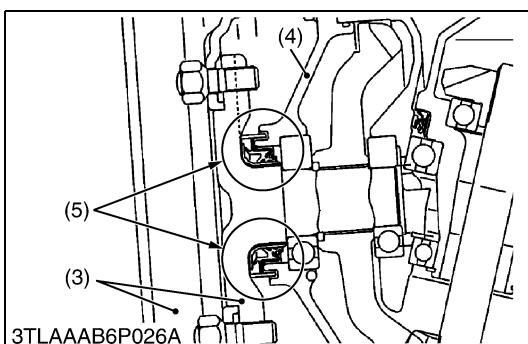
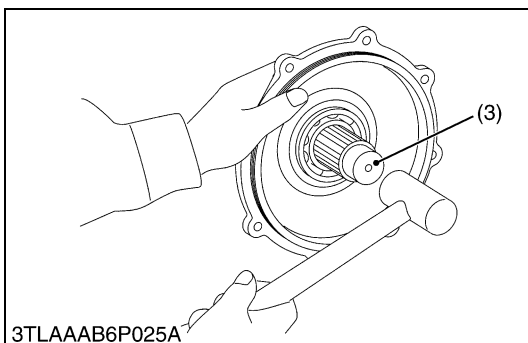
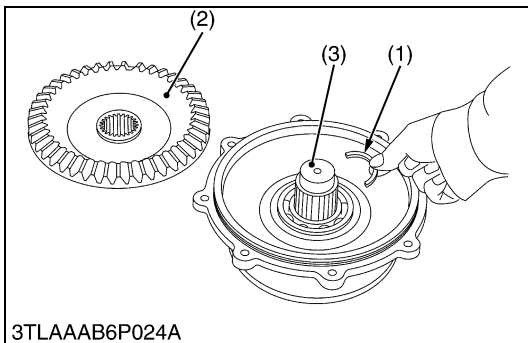
1. Remove the bearing with a special use puller set.
2. Take out the bevel gear (2).
3. Take out the collar (1).
4. Tap out the axle (3).

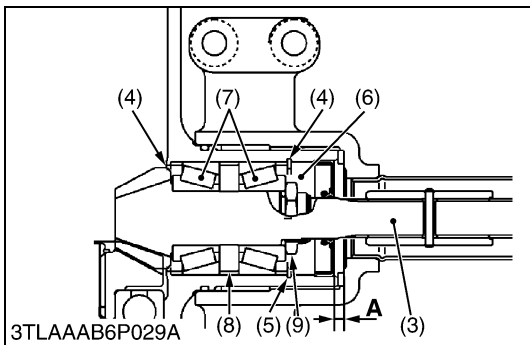
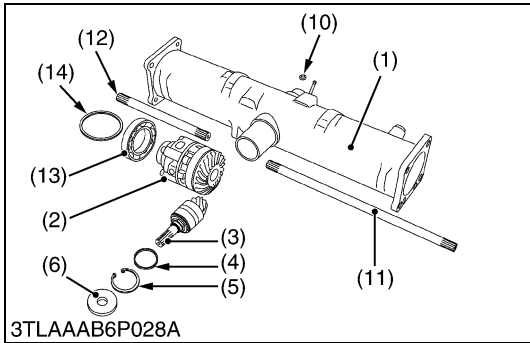
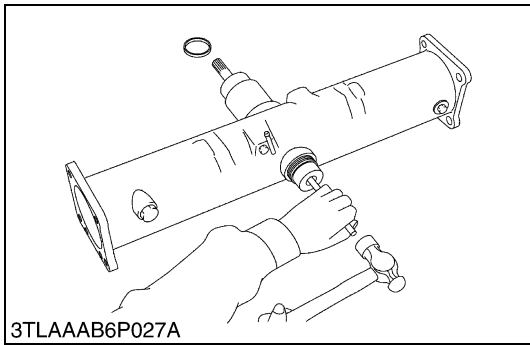
(When reassembling)

- Install the oil seal (5) of axle flange (4), noting its direction as shown in the figure below.

(1) Collar	(4) Axle Flange
(2) Bevel Gear	(5) Oil Seal
(3) Axle	

W1016011





Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Take out the differential yoke shaft (11), (12) both sides.
2. Remove the oil seal (6) and internal snap ring (5).
3. Remove the plug (10), and then tap the spiral bevel pinion shaft (3) by the brass rod and hammer.
4. Take out the differential gear assembly (2), ball bearing (13) and shim (14) from right side of front axle case (1).
5. Remove the stake of lock nut (9), and then remove the lock nut (9).
6. Remove the taper roller bearings (7).

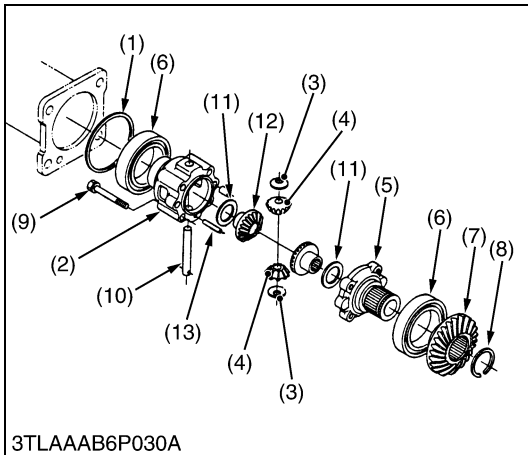
(When reassembling)

- Replace the lock nut (9), oil seal (6) and plug (10) with new ones.
- Apply grease to the oil seal (6).
- Install the same shims and collars before they are removed.
- Install the taper roller bearings correctly, noting their direction, and apply gear oil to them.
- When press-fitting a oil seal (6), observe the dimension "A" described in the figure.
- Stake the lock nut (9) firmly.
- Tighten up the lock nut (9) until the turning force of the spiral bevel pinion shaft reaches the factory specifications

Spiral bevel pinion shaft turning torque	Factory spec.	0.98 to 1.18 N-m 0.1 to 0.12 kgf-m 0.72 to 0.89 ft-lbs
--	---------------	--

- | | |
|--|--|
| <ul style="list-style-type: none"> (1) Front Axle Case (2) Differential Gear Assembly (3) Spiral Bevel Pinion Shaft (4) Adjusting Collar (5) Internal Snap Ring (6) Oil Seal (7) Taper Roller Bearing (8) Collar | <ul style="list-style-type: none"> (9) Lock Nut (10) Plug (11) Differential Yoke Shaft RH (12) Differential Yoke Shaft LH (13) Ball Bearing (14) Shim <p style="text-align: center;">A : 1 mm (0.039 in.)</p> |
|--|--|

W1016385



Differential Gear

1. Remove the differential case cover mounting screws (9) and then take out the differential case cover (5), ball bearing (6) and spiral bevel gear (7) as a unit.
2. Remove the external snap ring (8), and then remove the ball bearing (6) and spiral bevel gear (7) as a unit with a puller.
3. Remove the straight pin (13).
4. Pull out the pinion shaft (10) and take out the differential pinions (4) and differential side gears (12).

■ NOTE

- Arrange the parts to know their original position.

(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gears (12) and differential pinions (4).
- Install the pinion shaft (10) so that the hole on it may align with the hole on differential case (2), and install the straight pin (13).

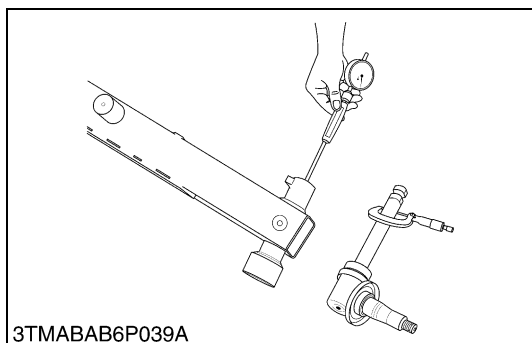
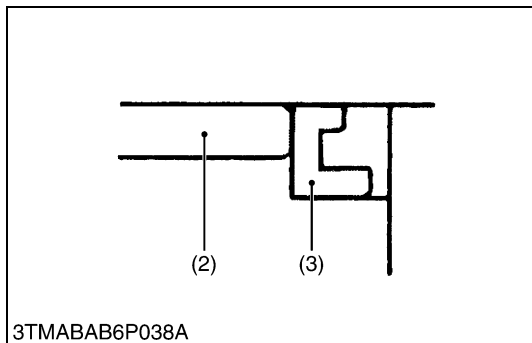
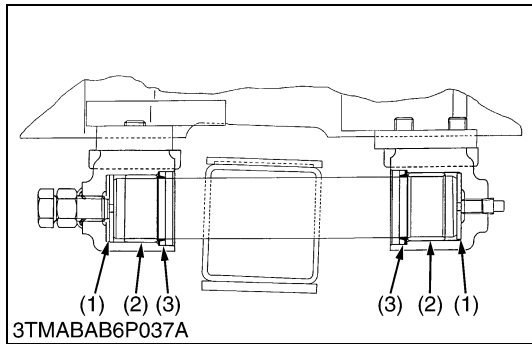
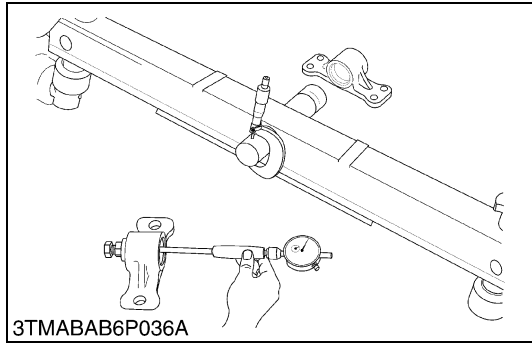
Tightening torque	Differential case cover mounting screw	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 ft-lbs
-------------------	--	---

- | | |
|-----------------------------|-----------------------------|
| (1) Shim | (8) External Snap Ring |
| (2) Differential Case | (9) Screws |
| (3) Thrust Collar | (10) Pinion Shaft |
| (4) Differential Pinion | (11) Shim |
| (5) Differential Case Cover | (12) Differential Side Gear |
| (6) Ball Bearing | (13) Straight Pin |
| (7) Spiral Bevel Gear | |

W1017053

[4] SERVICING

(1) 2WD Type



Clearance between Front Axle Middle Boss and Shaft Bracket Bushing

1. Measure the front axle middle boss O.D. at several points where it contacts with the bushing.
2. Measure the shaft bracket 1 bushing I.D. and bracket 2 bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

(When reassembling)

- Before press-fitting the bushing, install the new thrust collar.
- Install the oil seals, noting their direction. (Refer to figure left.)

■ IMPORTANT

- **After replacing the bushing, be sure to adjust the front axle rocking force. (See page 6-S7.)**

Clearance between front axle middle boss and bushing	Factory spec.	0.000 to 0.177 mm 0.00000 to 0.00697 in.
	Allowable limit	0.3 mm 0.012 in.

Front axle middle boss O.D.	Factory spec.	39.938 to 40.000 mm 1.57236 to 1.57480 in.
	Factory spec.	40.000 to 40.115 mm 1.57480 to 1.57933 in.

- (1) Thrust Collar (2) Bushing (3) Oil Seal

W1017740

Clearance between Knuckle Shaft (Kingpin) and Bushing

1. Measure the shaft O.D. at several points where it contacts with the bushings.
2. Measure the bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bushing.

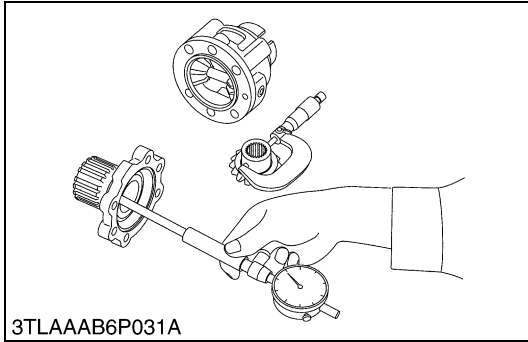
(When reassembling)

- Remove the bushing with a bushing puller.

Clearance between knuckle shaft (kingpin) and bushing	Factory spec.	0.000 to 0.285 mm 0.00000 to 0.01122 in.
	Allowable limit	0.4 mm 0.016 in.

Knuckle shaft O.D.	Factory spec.	27.880 to 27.900 mm 1.09764 to 1.09842 in.
	Factory spec.	27.900 to 28.165 mm 1.09842 to 1.10886 in.

W1017976

(2) 4WD Type

3TLAAB6P031A

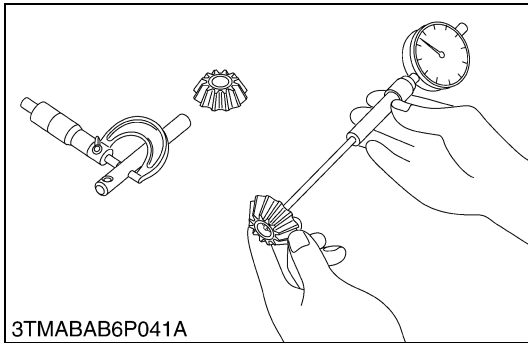
Clearance between Differential Case (Differential Case Cover) and Differential Side Gear

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.	0.050 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.0138 in.

Differential case bore I.D.	Factory spec.	32.000 to 32.064 mm 1.25984 to 1.26228 in.
Differential case cover bore I.D.	Factory spec.	32.000 to 32.025 mm 1.25984 to 1.26083 in.
Differential side gear O.D.	Factory spec.	31.911 to 31.950 mm 1.25634 to 1.25787 in.

W1018154



3TMABAB6P041A

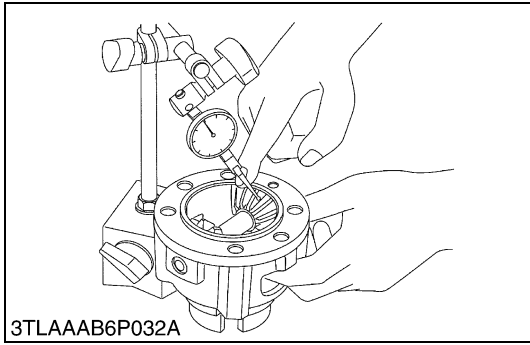
Clearance between Pinion Shaft and Differential Pinion

1. Measure the pinion shaft O.D..
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between pinion shaft and differential pinion	Factory spec.	0.064 to 0.100 mm 0.00252 to 0.00394 in.
	Allowable limit	0.25 mm 0.0096 in.

Pinion shaft O.D.	Factory spec.	13.950 to 13.968 mm 0.54921 to 0.54992 in.
Differential pinion I.D.	Factory spec.	14.032 to 14.050 mm 0.55244 to 0.55315 in.

W1018504



Backlash between Differential Pinon and Differential Side Gear

1. Set a dial gauge (lever type) on a tooth of the differential pinion.
2. Fix the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement exceeds the factory specifications, adjust with the differential side gears shims.

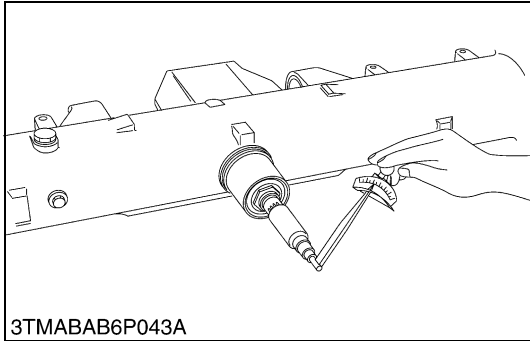
Backlash between differential pinion and differential side gear	Factory spec.	0.1 to 0.3 mm 0.004 to 0.012 in.
---	---------------	-------------------------------------

(Reference)

- Thickness of adjusting shims :

0.4 mm (0.016 in.)	1.0 mm (0.039 in.)
0.6 mm (0.024 in.)	1.2 mm (0.047 in.)
0.8 mm (0.031 in.)	
- Tooth contact : More than 35 %
- Center of tooth contact :
1/3 to 1/2 of the entire width from the small end.

W1018659



Turning Force of Spiral Bevel Pinion Shaft (Pinion Shaft Only)

1. Install the spiral bevel pinion shaft assembly only to the front axle case.
2. Measure the turning torque of spiral bevel pinion shaft.
3. If the turning torque is not within the factory specifications, adjust with the lock nut.
If the turning torque is not able to adjust by lock nut (2), change the thickness of collar (1) and adjust with lock nut (2) again.

(Reference)

- Standard size of collar (1) : 10.0 mm (0.349 in.) of thickness

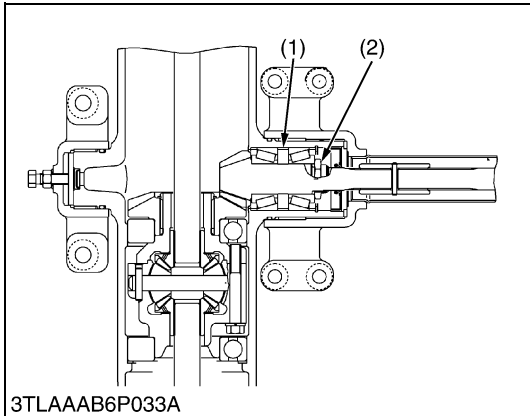
Turning torque of spiral bevel pinion shaft	Factory spec.	0.98 to 1.18 N·m 0.10 to 0.12 Kgf·m 0.72 to 0.87 ft-lbs
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NOTE

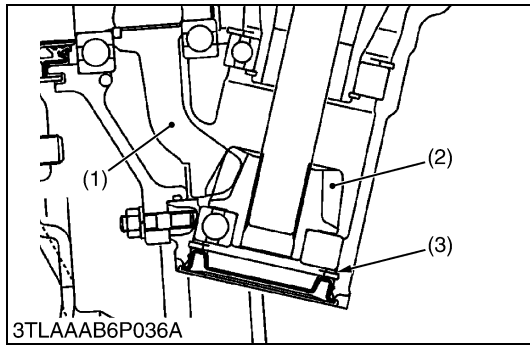
- **After turning torque adjustment, be sure to stake the lock nut.**

(1) Collar

(2) Lock Nut



W1018802



Backlash between 11T Bevel Gear and 42T Bevel Gear

1. Stick a strip of fuse to three spots on the 42T bevel gear (1) with grease.
2. Fix the axle flange and front gear case.
3. Turn the axle.
4. Remove the axle flange from front gear case and measure the thickness of the fuse with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between 11T bevel gear and 42T bevel gear	Factory spec.	0.15 to 0.35 mm 0.0059 to 0.0138 in.
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(Reference)

- Thickness of adjusting shims (3) :

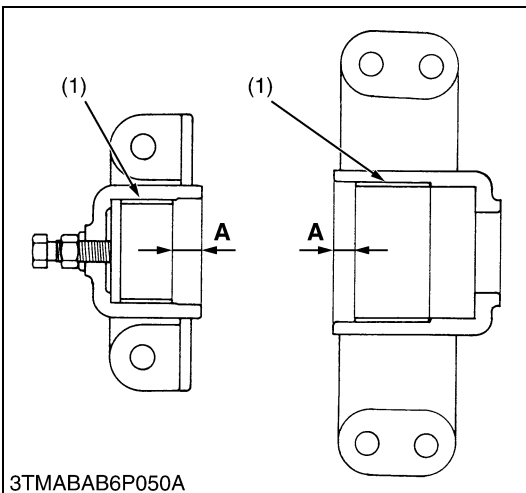
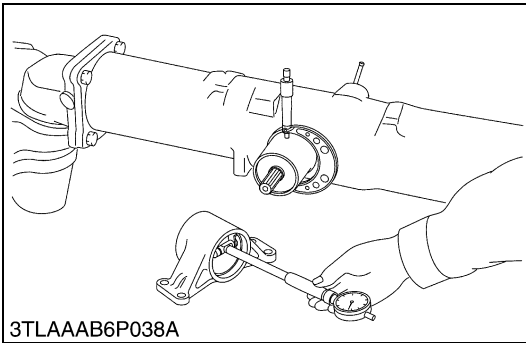
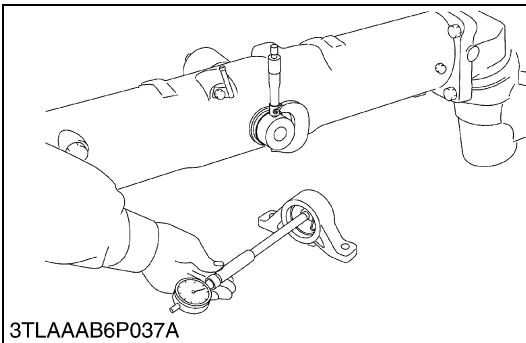
1.0 mm (0.039 in.)	1.8 mm (0.071 in.)
1.2 mm (0.047 in.)	2.0 mm (0.079 in.)
1.4 mm (0.055 in.)	2.2 mm (0.087 in.)
1.6 mm (0.063 in.)	
- Tooth contact : More than 35 %

(1) 42T Bevel Gear

(3) Shim

(2) 11T Bevel Gear

W1019582



Clearance between Front Axle Case Bosses and Bracket Bushings

1. Measure the front axle case bosses O.D. with an outside micrometer.
2. Measure the bracket bushing I.D. with an inside micrometer 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.	0.12 to 0.28 mm 0.00472 to 0.01102 in.
	Allowable limit	0.35 mm 0.0138 in.

Front axle case boss (front) O.D.	Factory spec.	54.945 to 54.975 mm 2.16319 to 2.16437 in.
Bracket bushing (front) I.D.	Factory spec.	55.095 to 55.225 mm 2.16910 to 2.17421 in.

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory spec.	0.025 to 0.190 mm 0.00098 to 0.00748 in.
	Allowable limit	0.35 mm 0.0138 in.

Front axle case boss (rear) O.D.	Factory spec.	70.000 to 70.035 mm 2.75590 to 2.75728 in.
Bracket bushing (rear) I.D.	Factory spec.	70.060 to 70.190 mm 2.75826 to 2.76338 in.

■ Press-fitting Bushing

- When press-fitting a new bushing, observe the dimension described in the figure.

Press-fit depth of bushing (A)	Factory spec.	12 mm 0.47 in.
--------------------------------	---------------	-------------------

■ NOTE

- After replacing the bushing, be sure to adjust the front axle rocking force. (See page 6-S7.)

(1) Bushing

A : Depth of Bushing

W1019812

7 STEERING

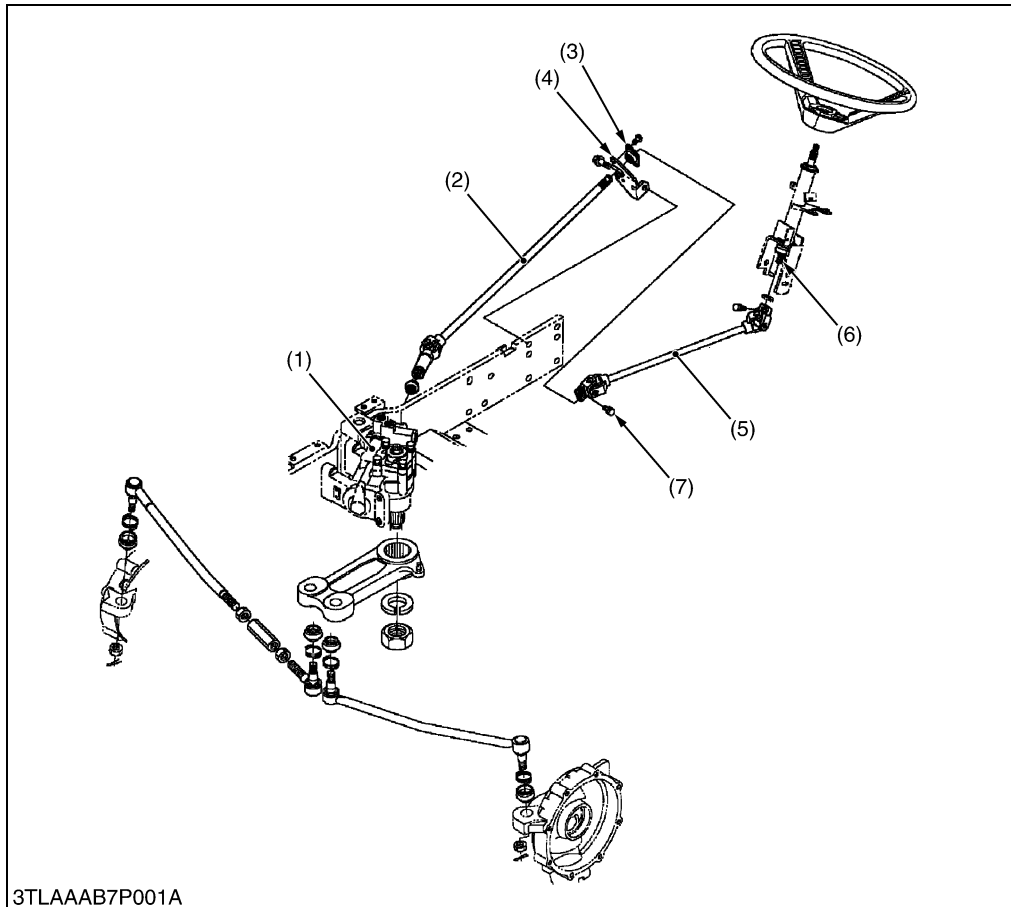
MECHANISM

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1. LUBRICATING SYSTEM	7-M1
[1] LINKAGE.....	7-M1
[2] STEERING GEAR BOX.....	7-M2
(1) Structure	7-M2
(2) Operation	7-M3

1. LUBRICATING SYSTEM

[1] LINKAGE



- (1) Steering Gear Box
- (2) Joint Shaft 2
- (3) Mini-Flange
- (4) Support
- (5) Joint Shaft
- (6) Steering Shaft
- (7) Bolt

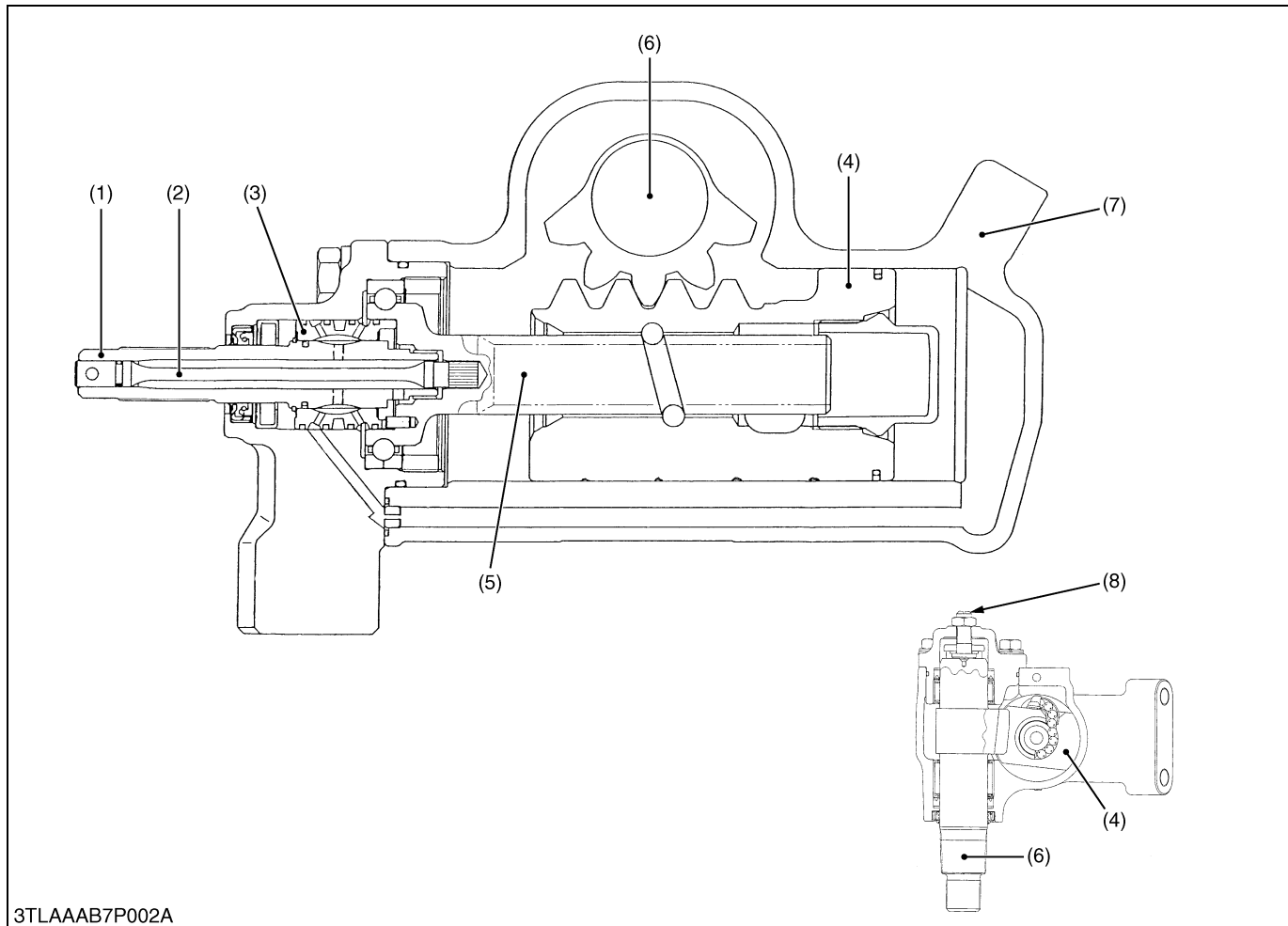
W1012968

3TLAAAB7P001A

The integral type power steering is used on these tractors. This steering system is composed of steering wheel, steering joint shafts, steering gear box and other components shown in the figure.

[2] STEERING GEAR BOX

(1) Structure

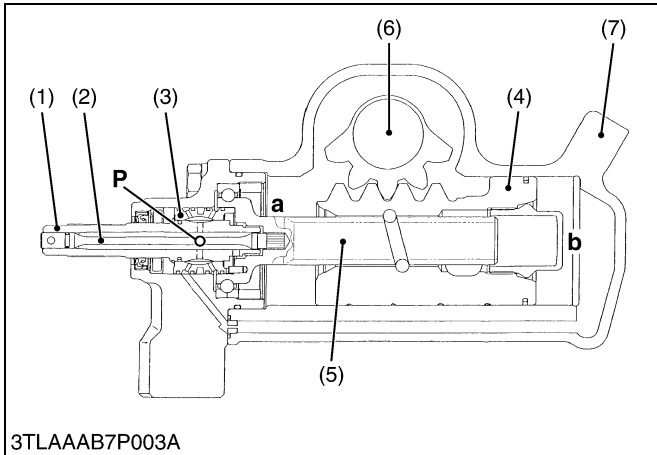


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- | | | | |
|-----------------|--------------|------------------|------------------|
| (1) Input Shaft | (3) Sleeve | (5) Main Shaft | (7) Gear Box |
| (2) Torsion Bar | (4) Ball Nut | (6) Sector Shaft | (8) Adjust Screw |

This integral power steering mechanism consists of the following two major components as shown above: hydraulic control valve and steering force assist hydraulic cylinder. The control valve is housed in the casing and composed of sleeve (3), input shaft (1) and other parts. The hydraulic cylinder, on the other hand, is composed of gear box (7) (cylinder tube), ball nut (4) (piston) and other parts. When the steering wheel is turned, the reaction force from the tires is exerted through the sector shaft (6) onto the main shaft (5). The torsion bar (2) is then twisted to make a gap between the input shaft (1) and sleeve (3). Such gap activates the valve to switch the oil flow direction. The sector shaft's pinion, which comes in mesh with the ball nut's rack, is tapered along the teeth. In this way, the sector shaft (6) that turns by the adjust screw (8) changes the clearance between the rack and pinion, adjusting the play of the steering wheel. (Tighten the adjust screw and the play becomes smaller, and vice versa.)

(2) Operation

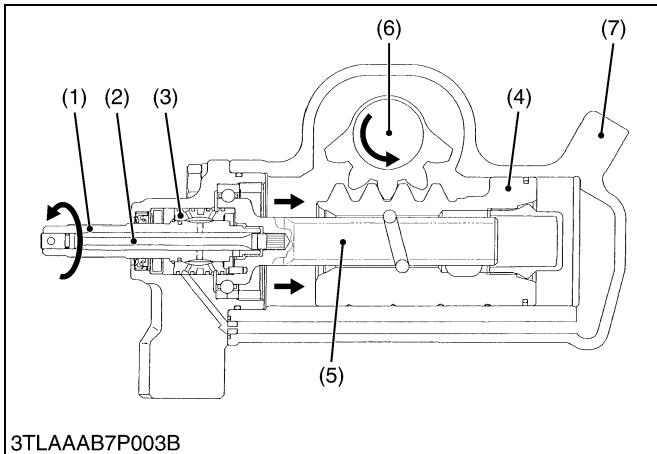


■ Neutral Position

While the steering wheel is not moved, the torsion bar (2) is not twisted. There is no gap between the input shaft (1) and sleeve (3). This makes no pressure difference between the chambers "a" and "b" of the cylinder, which keeps the ball nut (4) and sector shaft (6) in their positions.

- | | |
|------------------|----------------------|
| (1) Input Shaft | a : Chamber |
| (2) Torsion Bar | b : Chamber |
| (3) Sleeve | P : Pump Port |
| (4) Ball Nut | |
| (5) Main Shaft | |
| (6) Sector Shaft | |
| (7) Gear Box | |

W1013776

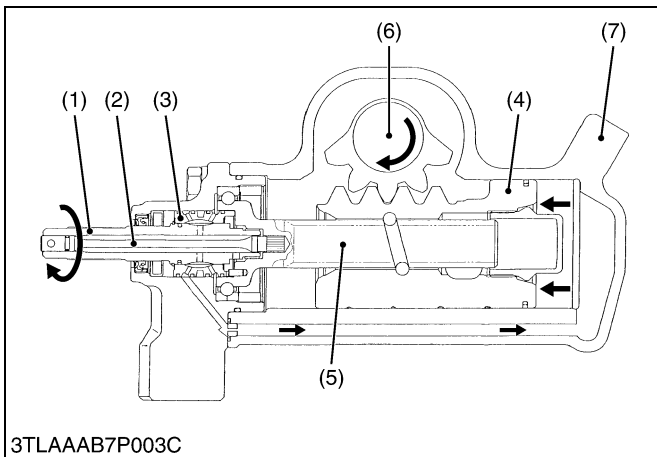


■ Left Turn

When the steering wheel is turned left, the initial friction between the tires and the road surface keeps the ball nut (4) and sector shaft (6) in their positions. The torsion bar (2) alone is twisted to produce a gap between the input shaft (1) and sleeve (3) and to activate the valve. By so doing, the cylinder's chamber "a" comes under high pressure and the ball nut (4) is moved to the right. Finally the sector shaft (6) gets turned to turn the machine to the left.

- | | |
|-----------------|------------------|
| (1) Input Shaft | (5) Main Shaft |
| (2) Torsion Bar | (6) Sector Shaft |
| (3) Sleeve | (7) Gear Box |
| (4) Ball Nut | |

W1013318



■ Right Turn

The operating principle is the same as with the left turn. For the right turn, however, the gap between the input shaft (1) and sleeve (3) is in the direction opposite to that of left turn. By so doing, the cylinder's chamber "b" comes under high pressure and the ball nut (4) is moved to the left. Finally the sector shaft (6) gets turned to turn the machine to the right.

- | | |
|-----------------|------------------|
| (1) Input Shaft | (5) Main Shaft |
| (2) Torsion Bar | (6) Sector Shaft |
| (3) Sleeve | (7) Gear Box |
| (4) Ball Nut | |

W1013440

■ Manual Operation in Case of Hydraulic System Failure

Let's suppose that the hydraulic system gets in trouble due to a defective pump, damaged pipe or the like and that the steering resistance is too high to use the power steering system. In such case, the steering wheel can be in the manual mode. When the steering wheel is turned, the torsion bar is twisted for the valve's stroke and from now on the steering wheel functions in the manual mode. It should be noted that the steering wheel's play becomes larger than that in the power steering mode.

W1013562

SERVICING

CONTENTS

1. TROUBLESHOOTING	7-S1
2. SERVICING SPECIFICATIONS	7-S2
3. TIGHTENING TORQUES	7-S3
4. CHECKING, DISASSEMBLING AND SERVICING.....	7-S4
[1] CHECKING AND ADJUSTING	7-S4
[2] PREPARATION	7-S4
(1) Separating Steering Gear Box	7-S4
[3] DISASSEMBLING AND ASSEMBLING.....	7-S6
[4] SERVICING	7-S8

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Excessive Steering Wheel Play	Backlash between sector gear shaft and rack (piston) too large	Adjust	7-S8
	Steering linkage worn	Replace	–
	Sector gear shaft worn	Replace	7-S6
Tractor Pulls to Right or Left	Tire pressure uneven	Adjust	G-55
	Steering wheel play too small	Adjust	7-S4
	Improper toe-in adjustment	Adjust	6-S6
Front Wheels Vibration	Steering linkage worn	Replace	–
	Improper toe-in adjustment	Adjust	6-S6
Hard Steering	Transmission fluid improper or insufficient	Change	G-7, 15, 16
	Oil leak from pipe joint	Retighten	–
	Hydraulic pump malfunctioning	Replace	8-S7, S13
	Improper relief valve adjustment	Adjust	8-S8
	Relief valve malfunctioning	Replace	7-S8
	Valve housing and sleeve malfunctioning	Replace	7-S6 to S8
	Seals in the steering gear box damaged	Replace	7-S7
	Backlash between sector gear shaft and rack (piston) too small	Adjust	7-S8
Low Operating Pressure	Air in the hydraulic pipes	Air vent	–
	Hydraulic pump malfunctioning	Replace	7-S7, S13
	Improper relief valve adjustment	Adjust	8-S8
	Relief valve malfunctioning	Replace	7-S8
	Seals in the steering gear box damaged	Replace	7-S7
	Rack (piston) malfunctioning	Replace rack (piston) assembly	7-S7
Steering Wheel Does Not Return to Neutral Position	Oil leak from pipe or pipe broken	Replace	–
	Valve housing and sleeve jammed	Repair or replace	7-S6 to S8
Steering Wheel Does Not Return to Neutral Position	Valve housing oil seal damaged	Replace	7-S8
	Steering Force luctuates		
Steering Force luctuates	Insufficient oil	Replenish	–
	Insufficient bleeding	Bleed	–
	Control valve malfunctioning	Replace	7-S7
Noise	Insufficient oil	Replenish	–
	Air sucked in pump from suction circuit	Repair	–
	Pipe deformed	Replace	–

W1018800

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Steering Wheel	Play	20 to 50 mm 0.79 to 1.97 in.	–
Relief Valve Condition • Engine Speed : Approx. 2800 min ⁻¹ (rpm) • Oil Temperature : 45 to 55 °C 113 to 131 °F	Steering Pressure [2WD]	8.3 to 9.3 MPa 85 to 95 kgf/cm ² 1209 to 1651 psi	–
	Steering Pressure [4WD]	11.1 to 12.1 MPa 113 to 123 kgf/cm ² 1607 to 1749 psi	–
Sector Gear and Ball Nut	Backlash	0.3 mm 0.012 in.	–
Valve Housing and Spool	Clearance	0.17 to 0.28 mm 0.0067 to 0.0110 in.	0.4 mm 0.0157 in.
Steering Gear Box and Ball Nut	Clearance	0.035 to 0.08 mm 0.0013 to 0.0031 in.	0.15 mm 0.0059 in.
Ball Nut Assembly	Axial Play	0.02 mm 0.0008 in.	0.04 mm 0.0015 in.

W1013874

3. TIGHTENING TORQUES

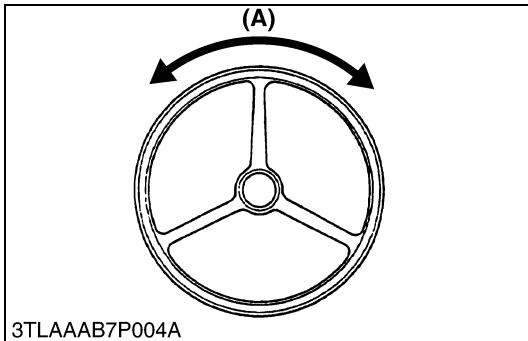
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-9.)

Item	N·m	kgf·m	ft-lbs
Tie-rod end nut [2WD Type]	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Tie-rod end nut [4WD Type]	39.2 to 45.1	4.0 to 4.6	28.9 to 33.3
Steering gear box mounting screw	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5
Power steering delivery joint bolt	34 to 39	3.5 to 4.0	25.3 to 28.9
Pitman arm mounting nut	147 to 196	15.0 to 20.0	108.5 to 144.7
Side cover mounting screw	19.6 to 29.4	2.0 to 3.0	14.5 to 21.7
Valve housing mounting screw	48.0 to 55.0	4.9 to 5.7	35.4 to 41.2
Ball nut assembly lock nut	88.3 to 107.9	9.0 to 11.1	65.1 to 80.3
Relief pressure adjusting screw lock nut	55.8 to 78.4	6.0 to 8.0	43.4 to 57.9

W1012736

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING



Steering Wheel Play

1. Turn the front wheels straight ahead.
2. Rotate the steering wheel lightly by hand, and measure the play **(A)**.
3. If the play **(A)** is not within the factory specifications, turn the adjusting screw (1) to adjust.

Steering wheel play (A)	Factory spec.	20 to 50 mm 0.79 to 1.97 in.
--------------------------------	---------------	---------------------------------

(Adjusting)

- Remove the battery.
- Loosen the lock nut (2) and turn the adjusting screw (1) with a screwdriver to adjust the play **(A)**.
When the adjusting screw (1) is turned clockwise, the play **(A)** decreases.
- After adjustment, fix it with lock nut (2) while holding the adjusting screw (1).

- (1) Adjusting Screw
(2) Lock Nut

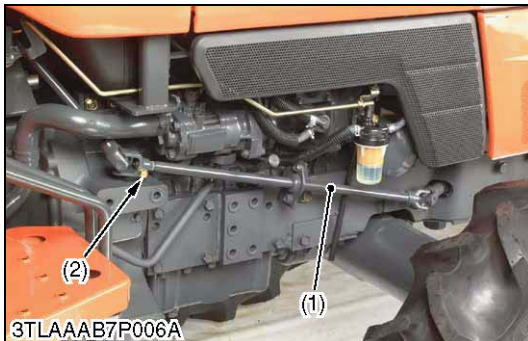
(A) Play

W1019889



[2] PREPARATION

(1) Separating Steering Gear Box



Joint Shaft

1. Remove the support (3) mounting screw.
2. Remove the screw (2).
3. Remove the joint shaft (1).

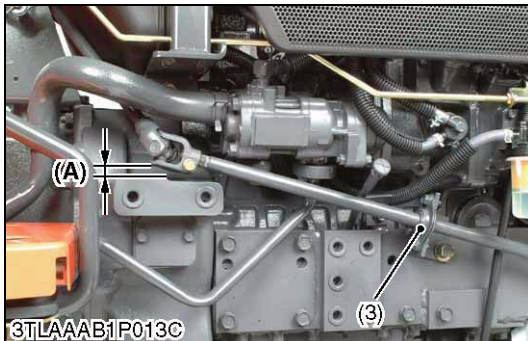
(When reassembling)

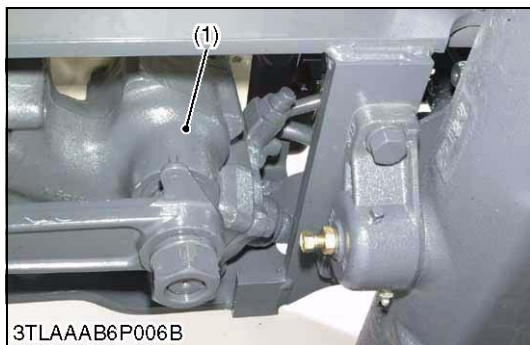
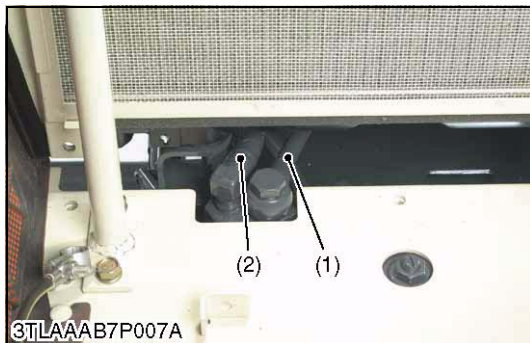
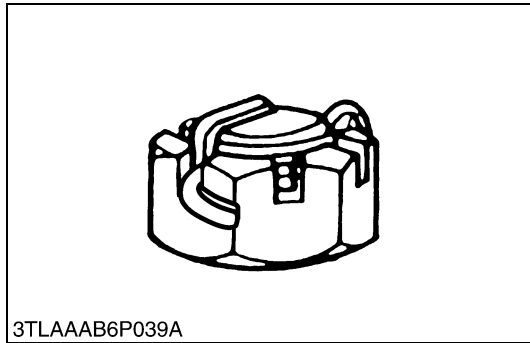
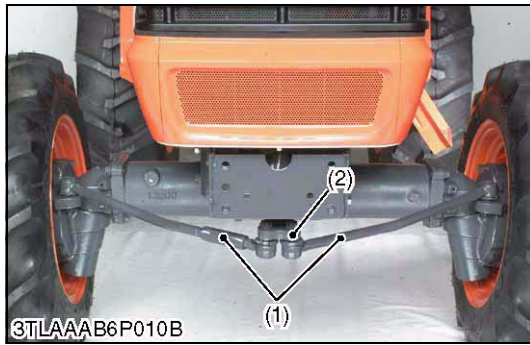
- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.19 in.) between the universal joint and flywheel housing. Then fit the support (3) in position..

- (1) Joint Shaft
(2) Screw
(3) Support

(A) Clearance

W1020253





Bumper and Tie-rods

1. Place the disassembling stand under the transmission case.
2. Remove the bumper.
3. Remove the tie-rods with the tie-rod end lifter.
In this case, take special care not to damage the tie-rod end nut (slotted nut). (It is preferable to replace it with an unrequired nut.)
4. Reinstall the bumper.

(When reassembling)

Tightening torque	Tie-rod end nut	2WD	49.0 to 68.6 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 ft·lbs
		4WD	39.2 to 45.1 N·m 4.0 to 4.5 kgf·m 28.9 to 33.3 ft·lbs

■ IMPORTANT

- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.

(1) Tie-rod

(2) Pitman Arm

W1020549

Delivery Pipe and Return Hose

1. Remove the battery and shutter plate.
2. Disconnect the power steering delivery pipe (1) and return hose (2).

(When reassembling)

Tightening torque	Delivery pipe joint bolt	34 to 39 N·m 3.5 to 4.0 kgf·m 25.3 to 28.9 ft·lbs
-------------------	--------------------------	---

(1) Delivery Pipe

(2) Return Hose

W1020862

Steering Gear Box Assembly

1. Remove the steering gear box mounting screws.
2. Remove the steering gear box (1).

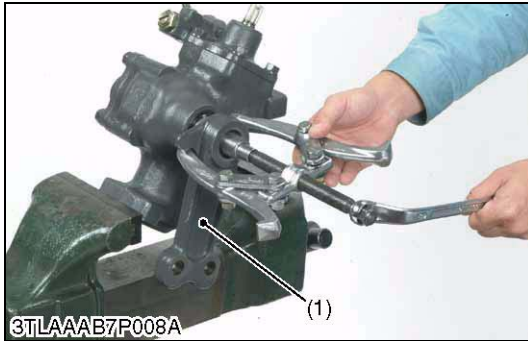
(When reassembling)

Tightening torque	Steering gear box mounting screw	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 57.2 to 66.5 ft·lbs
-------------------	----------------------------------	---

(1) Steering Gear Box

W1020988

[3] DISASSEMBLING AND ASSEMBLING



Pitman Arm

1. Turn the input shaft clockwise and counterclockwise several times to drain oil from gear box.
2. Secure the power steering gear box with a vise.
3. Remove the nut and spring washer.
4. Remove the pitman arm (1) with puller.

(When reassembling)

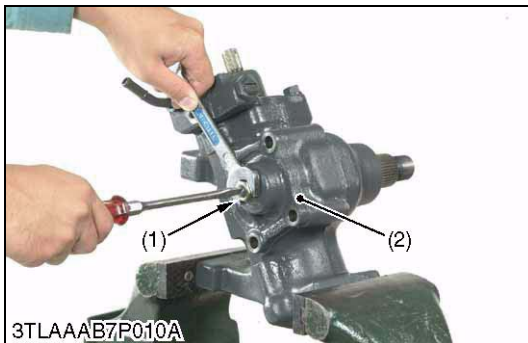
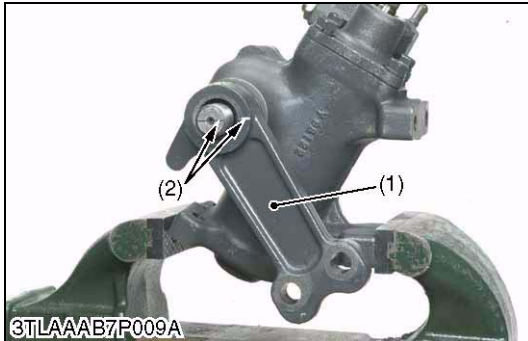
- Install the pitman arm to the sector shaft, aligning their aligning marks (2).

Tightening torque	Pitman arm mounting nut	147 to 196 N·m 15 to 20 kgf·m 108.5 to 144.7 ft·lbs
-------------------	-------------------------	---

(1) Pitman Arm

(2) Aligning Mark

W1021107



Side Cover

1. Loosen the lock nut (1).
2. Remove the side cover mounting screws, turn the adjusting screw clockwise, and remove the side cover (2).

(When reassembling)

Tightening torque	Lock nut	58.8 to 78.4 N·m 6.0 to 8.0 kgf·m 43.4 to 57.9 ft·lbs
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(1) Lock Nut

(2) Side Cover

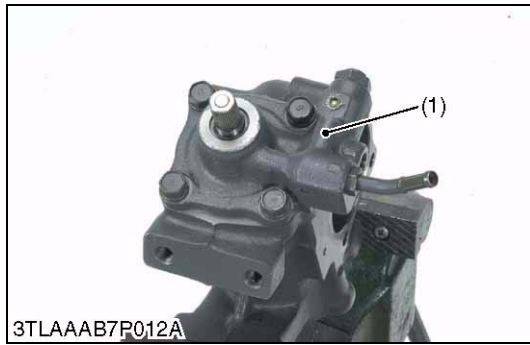
W1021288



Sector Gear Shaft

1. Remove the sector gear shaft (1) from the side cover.
- (1) Sector Gear Shaft

W1021422

**Valve Assembly**

1. Remove the valve mounting screws.
2. Remove the valve assembly (1) and ball nut (2).

(When reassembling)

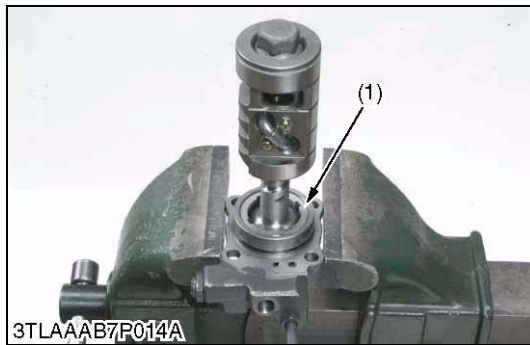
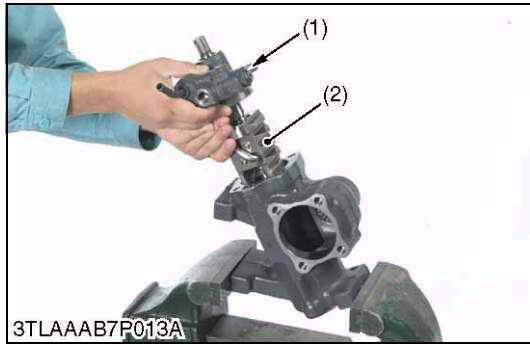
- Apply oil to O-ring and oil seal.

Tightening torque	Valve mounting screw	48.0 to 55.0 N-m 4.9 to 5.7 kgf-m 35.4 to 41.2 ft-lbs
-------------------	----------------------	---

(1) Valve Assembly

(2) Ball Nut

W10215140

**Ball Nut Assembly**

1. Remove the lock nut (1).
2. Take out the ball nut assembly (2).

(When reassembling)

- Apply oil to sleeve.

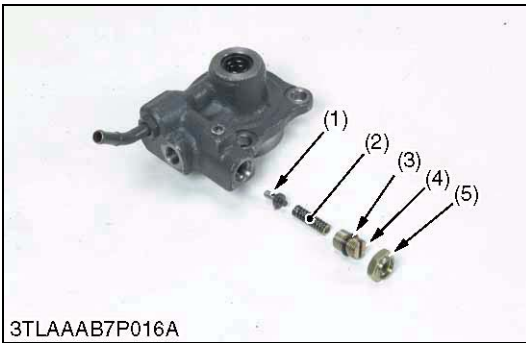
Tightening torque	Lock nut	88.3 to 107.9 N-m 9.0 to 11.1 kgf-m 65.1 to 80.3 ft-lbs
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(1) Lock Nut

(2) Ball Nut Assembly

W10217200





3TLAAAB7P016A

Relief Valve

1. Loosen the lock nut (5) and remove the adjusting screw (4).
2. Take out the spring (2) and poppet (1).

(When reassembling)

- Apply grease to O-ring (3).
- Be sure to adjust the relief valve pressure. (See page 8-S8.)

Tightening torque	Lock nut	49.1 to 78.5 N·m 5.0 to 8.0 kgf·m 36.2 to 57.9 ft·lbs
-------------------	----------	---

- (1) poppet
(2) Spring
(3) O-ring

- (4) Adjusting Screw
(5) Lock Nut

W1021917

[4] SERVICING

3TLAAAB7P017A

Backlash between Sector Gear and Ball Nut

1. Set a dial indicator with its finger on the pitman arm.
2. Move the pitman arm lightly, and measure the pitman arm deflection.
3. If the measurement is not within the factory specifications, adjust the backlash with the adjusting screw.

Backlash between sector gear and ball nut	Factory spec.	0.3 mm 0.012 in.
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W10197750



3TLAAAB7P018A

Clearance between Valve Housing and Sleeve

1. Measure the sleeve O.D. with an outside micrometer.
2. Measure the valve housing I.D. with a caliper gauge.
3. If the clearance exceeds the allowable limit, replace the steering gear box assembly.

Clearance between valve housing and spool	Factory spec.	0.17 to 0.28 mm 0.0067 to 0.0110 in.
	Allowable limit	0.4 mm 0.0157 in.

W10196700



3TLAAAB7P019A

Clearance between Gear Box and Ball Nut

1. Measure the gear box cylinder I.D. with a cylinder gauge.
2. Measure the ball nut O.D. with an outside micrometer.
3. If the clearance exceeds the factory specifications, replace the steering gear box assembly.

Clearance between gear box and ball nut	Factory spec.	0.035 to 0.08 mm 0.0013 to 0.0031 in.
	Allowable limit	0.15 mm 0.0059 in.

W10195610



Axial Play of Ball Nut Assembly

1. Set a dial indicator with its finger on the worm shaft of the ball nut assembly.
2. Move the worm shaft axially and measure the play.
3. If the play exceeds the allowable limit, replace the steering gear box assembly.

NOTE

- **Check ball nut assembly for smooth rotation by holding the ball nut horizontally, and slowly rotating the worm shaft. If rotation is not smooth, replace the steering gear box assembly.**

Axial play of ball nut assembly	Factory spec.	0.02 mm 0.0008 in.
	Allowable limit	0.04 mm 0.0015 in.

W10194270

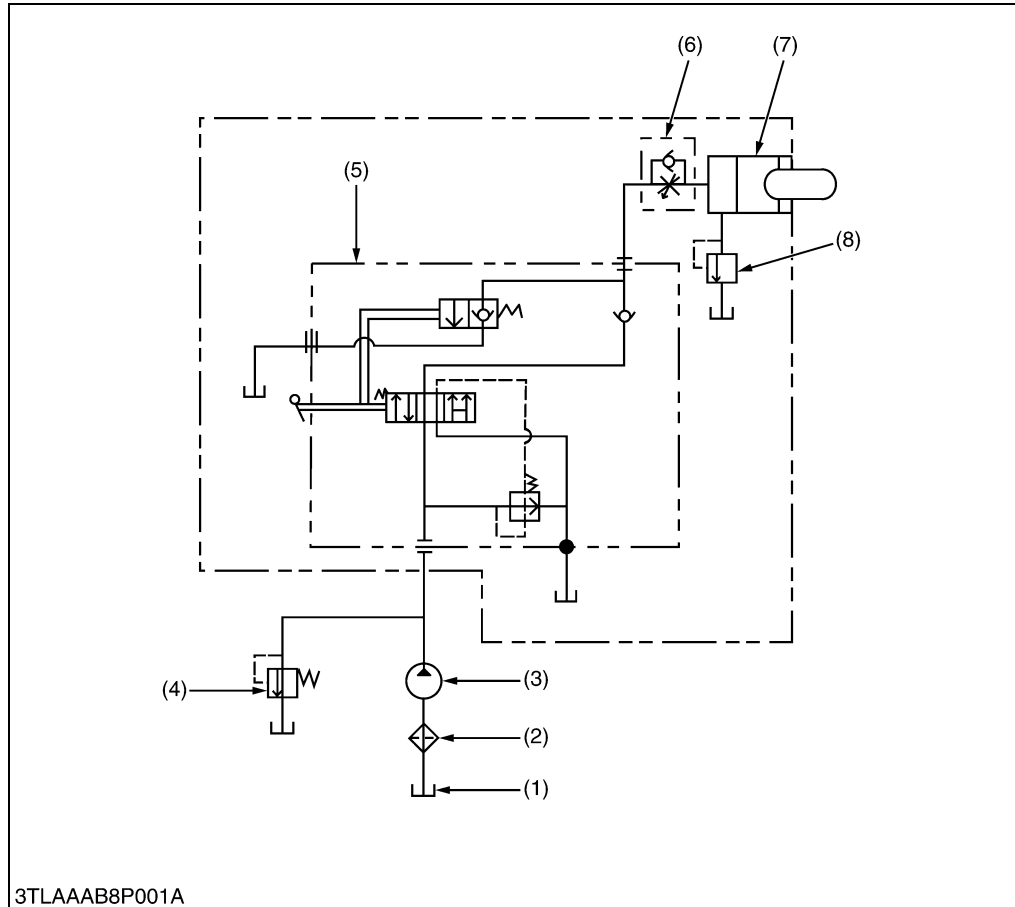
8 HYDRAULIC SYSTEM

MECHANISM

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1. HYDRAULIC CIRCUIT.....	8-M1
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3. LINKAGE MECHANISM.....	8-M3
4. FRONT HYDRAULIC BLOCK.....	8-M5

1. HYDRAULIC CIRCUIT



- (1) Oil Tank
(Transmission Case)
- (2) Oil Strainer
- (3) Hydraulic Pump
- (4) Relief Valve
- (5) Position Control Valve
- (6) Lowering Speed Adjusting Valve
- (7) Hydraulic Cylinder
- (8) Cylinder Safety Valve

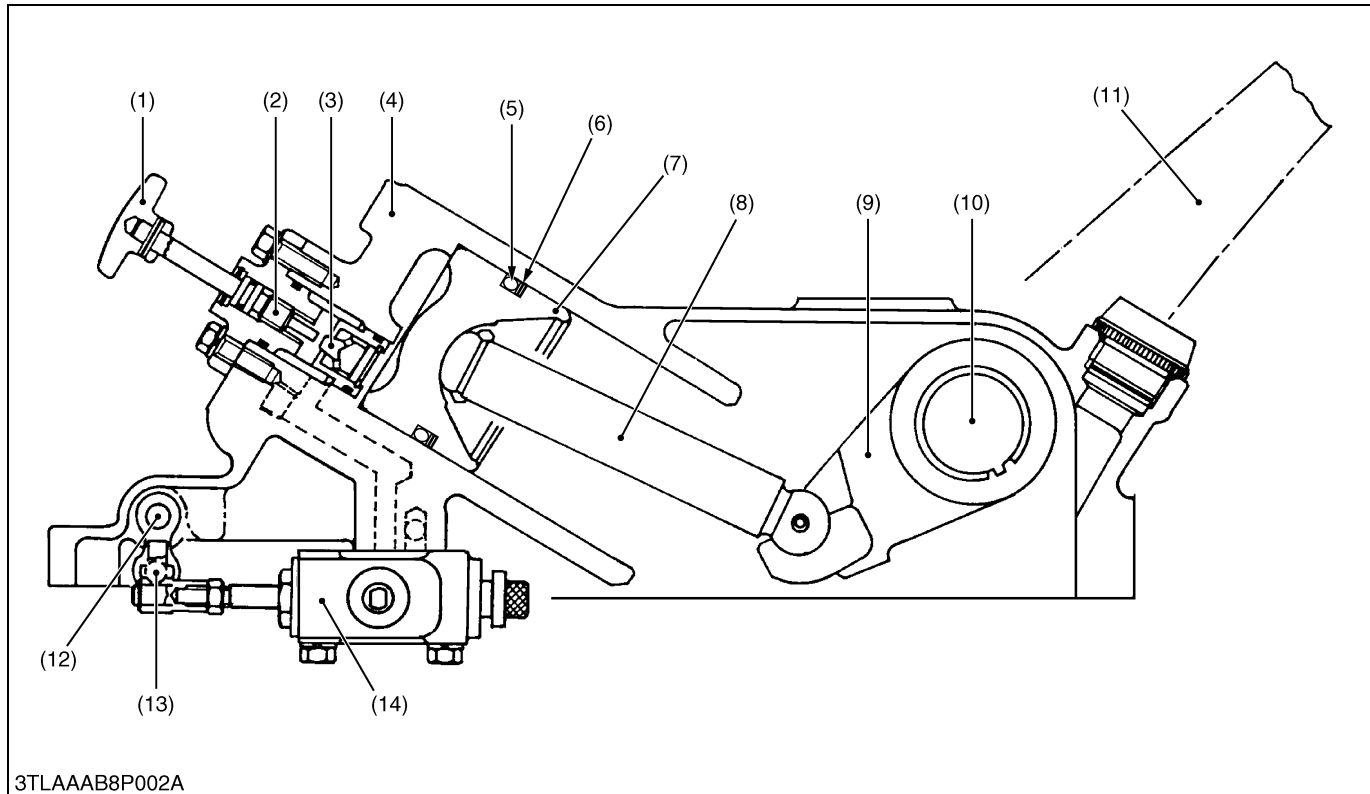
W1013328

3TLAAB8P001A

■ Hydraulic Oil Flow

1. When the engine is started, the hydraulic pump (3) is rotated to draw oil from the transmission case (1) through the suction pipe. Supplied oil is filtered by the oil strainer (2).
 2. Filtered oil is forced out by the hydraulic pump to the position control valve (5) through the delivery pipe.
 3. The position control valve (5) switches the oil flow, and oil is channelled to the hydraulic cylinder (7) for the three-point hydraulic system or returned to the oil tank (transmission case).
- The hydraulic system has a relief valve (4) which restricts the maximum pressure in the circuit.

2. HYDRAULIC CYLINDER



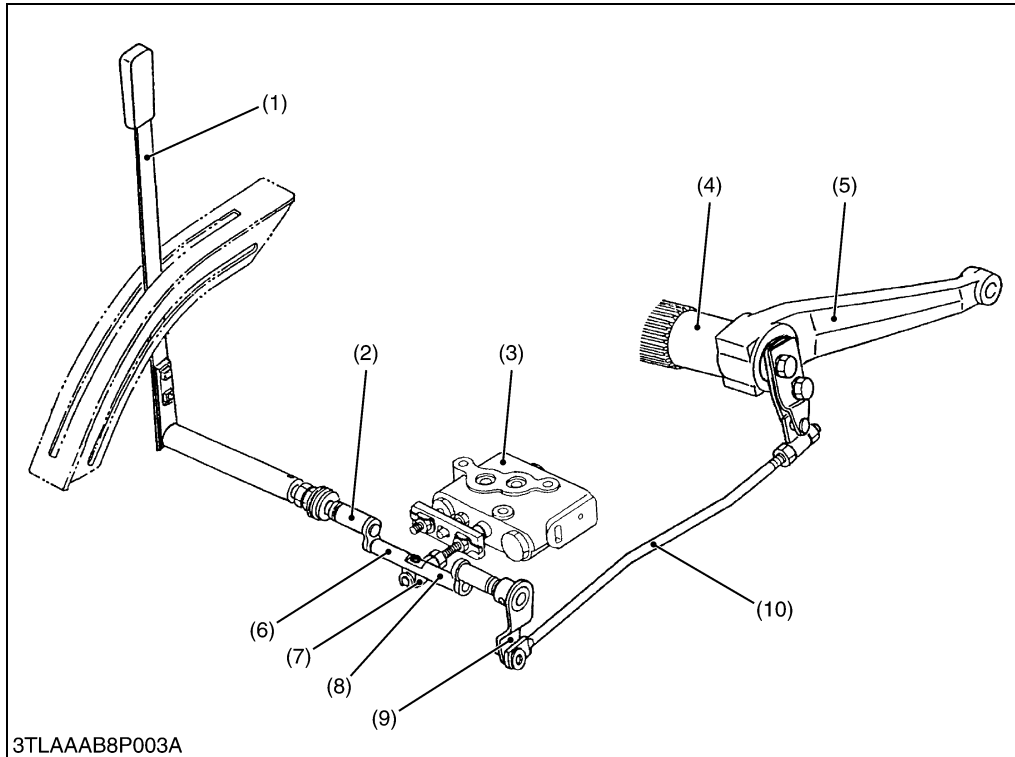
- | | | | |
|------------------------------------|------------------------|--------------------------|-----------------------------|
| (1) Lowering Speed Adjusting Knob | (4) Hydraulic Cylinder | (8) Hydraulic Rod | (12) Position Control Arm |
| (2) Lowering Speed Adjusting Shaft | (5) O-ring | (9) Hydraulic Arm | (13) Spool Drive Lever |
| (3) Lowering Speed Adjusting Valve | (6) Back-up Ring | (10) Hydraulic Arm Shaft | (14) Position Control Valve |
| | (7) Hydraulic Piston | (11) Lift Arm | |

The main components of the hydraulic cylinder are shown in the figure above.

While the lift arm (11) is rising, oil from the hydraulic pump flows into the hydraulic cylinder (4) through the position control valve (14). Then oil pushes the hydraulic piston (7) out.

While the lift arm (11) is lowering, oil in the hydraulic cylinder (4) is discharged to the transmission case through the position control valve (14) by the weight of the implement. At this time, the lowering speed of the implement can be controlled by the lowering speed adjusting valve (3) attached to the hydraulic cylinder (4). Turning the lowering speed adjusting knob (1) clockwise decreases the lowering speed, and counterclockwise increases lowering speed. When the lowering speed adjusting valve (3) is completely closed, the lift arm (11) is held at its position since oil in the hydraulic cylinder (4) is sealed between the hydraulic piston (7) and the position control valve (14).

3. LINKAGE MECHANISM

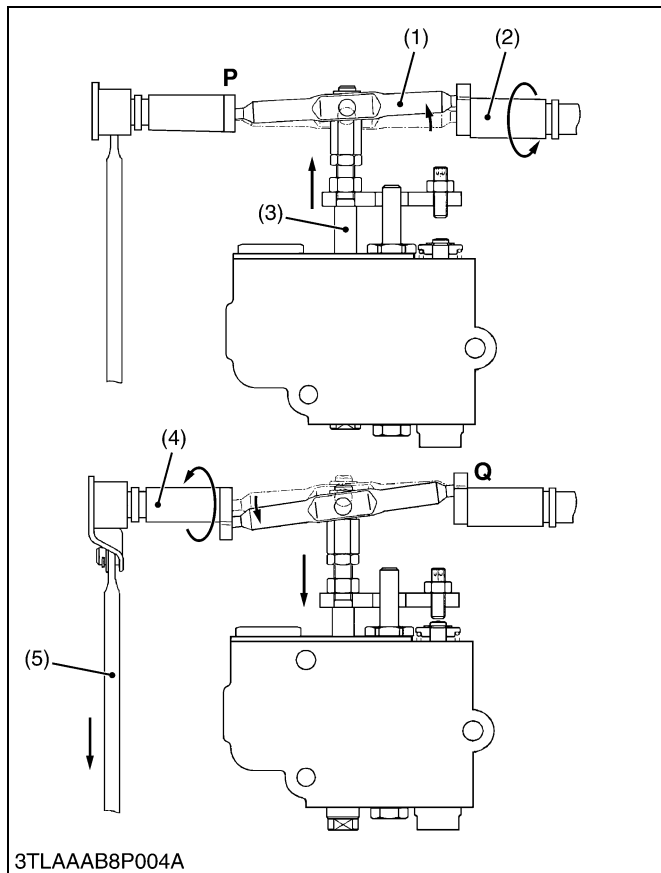


- (1) Position Control Lever
- (2) Control Arm
- (3) Control Valve
- (4) Hydraulic Arm Shaft
- (5) Lift Arm
- (6) Spool Drive Lever
- (7) Spool Joint
- (8) Feedback Lever Shaft
- (9) Feedback Lever
- (10) Position Control Rod

W1012963

Position control is a mechanism to raise or lower the implement attached to the tractor in proportion to the movement of the position control lever (1).

The implement can be positioned at any height by moving the position control lever (1). Fine position adjustment is also easy.

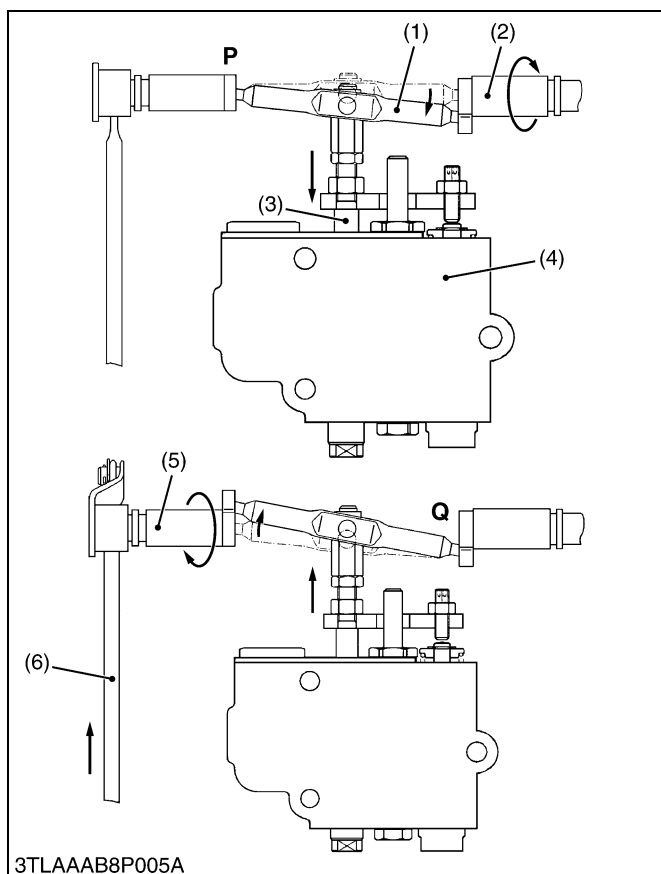


■ Lifting

1. When the position control lever is moved to the **LIFT** position, the control arm (2) rotates to the arrow. Therefore, the spool drive lever (1) moves around the fulcrum **P** and pull the spool (3) opening the **LIFT** circuit.
2. When the lift arm moves upward, the feedback lever shaft (4) is rotated to the arrow, since the position control rod (5) is actuated. Therefore, the spool drive lever (1) moves around the fulcrum **Q** and pushes the spool (3).
3. The lift arm stops when the spool (3) returns to the neutral position.

- | | |
|-----------------------|--------------------------|
| (1) Spool Drive Lever | (4) Feedback Lever Shaft |
| (2) Control Arm | (5) Position Control Rod |
| (3) Spool | |

W1013422



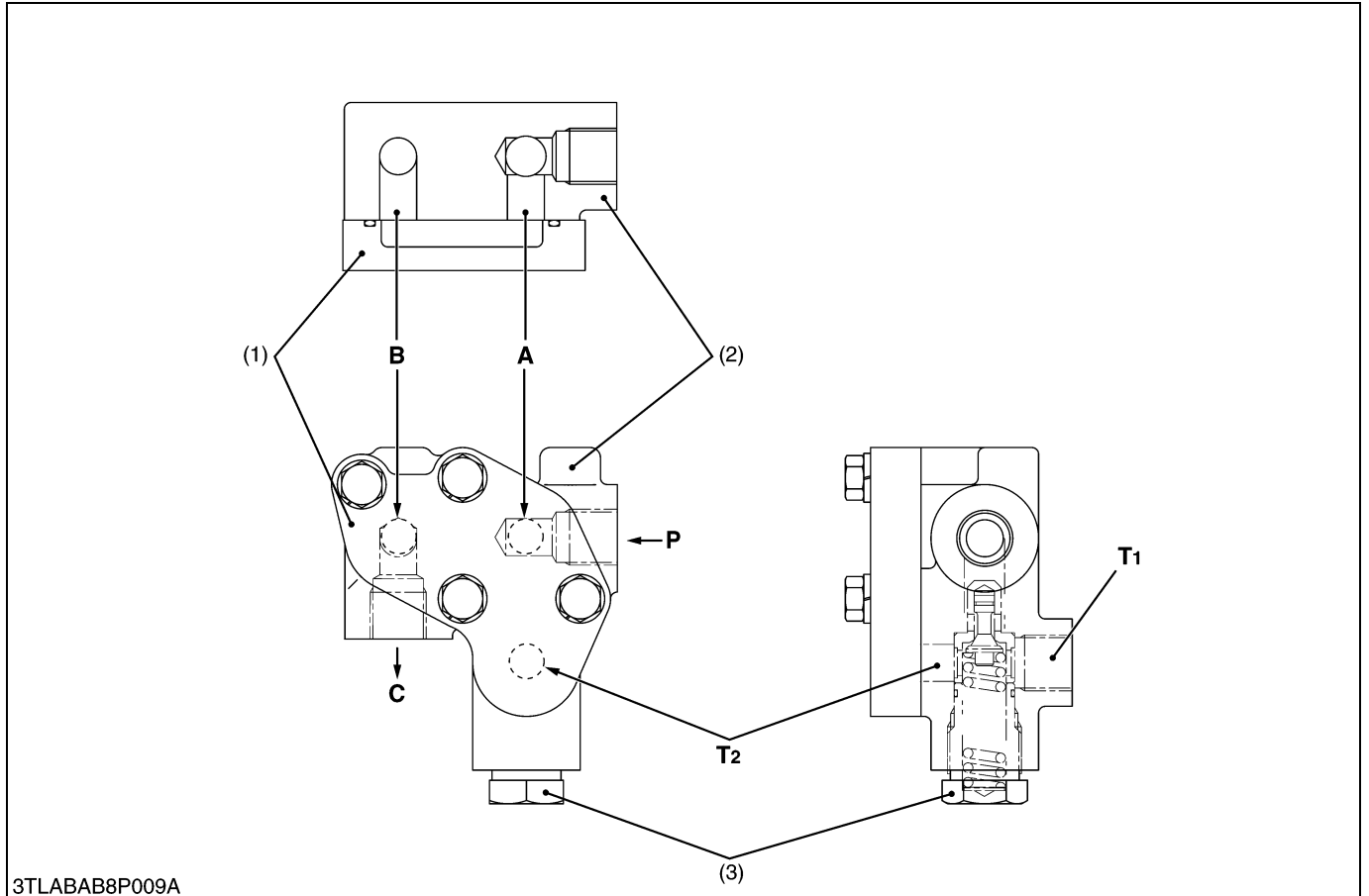
■ Lowering

1. When the position control lever is moved to the **DOWN** position, the control arm (2) rotates to the arrow. Therefore, the spool drive lever (1) moves around the fulcrum **P** and pushes the spool (3) opening the **DOWN** circuit.
2. When the lift arm moves downward, the feedback lever shaft (5) is rotated to the arrow, since the position control rod (6) is actuated. Therefore, the spool drive lever (1) moves around the fulcrum **Q** and pull the spool (3).
3. The lift arm stops when the spool (3) returns to the neutral position.

- | | |
|-----------------------|--------------------------|
| (1) Spool Drive Lever | (4) Valve Body |
| (2) Control Arm | (5) Feedback Lever Shaft |
| (3) Spool | (6) Position Control Rod |

W1013324

4. FRONT HYDRAULIC BLOCK



- (1) Cap
- (2) Front Hydraulic Block
- (3) Relief Valve

A : To Implement Control Valve
B : From Implement Control Valve

C : To Position Control Valve
P : From Hydraulic Pump

T1 :To Transmission Case
T2 :From Implement Control Valve

The front hydraulic block is provided to take power out from the tractor to operate the hydraulic cylinders on the implement, such as front loader, front blade and so on.

SERVICING

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Implement Does Not Rise (Not Noise)	Control linkage improperly adjusted	Adjust	8-S12
	Control linkage improperly assembled or damaged	Repair or replace	8-S12, S20
	Position control valve malfunctioning (unload poppet, spool, poppet 1, 2)	Repair or replace	8-S19
	Relief valve spring weaken or broken	Replace	8-S21
Implement Does Not Rise (Noise)	Hydraulic piston O-ring, cylinder damaged	Replace	8-S17
	Relief valve setting pressure too low	Adjust	8-S11
	Hydraulic pump malfunctioning	Repair or replace	8-S10
Implement Does Not Reach Maximum Height	Position control improperly adjusted	Adjust	8-S12
	Position control valve spool joint 1 improperly adjusted	Adjust	8-S20
	Hydraulic arm shaft, hydraulic arm, lift arm improperly assembled	Adjust	8-S18
Implement Does Not Lower	Control valve malfunctioning (Spool damaged)	Replace	8-S19
	Poppet valve adjusting nut improperly adjusted	Adjust	8-S19, S20
Implement Drops by Weight	Hydraulic cylinder worn or damaged	Replace	8-S23
	Hydraulic piston and O-ring worn or damaged	Replace	8-S19
	Poppet 1 seat surface damaged (control valve)	Replace	8-S19
	Poppet 1 O-ring damaged (control valve)	Replace	8-S19
	Poppet 2 seat surface damaged (control valve)	Replace	8-S19
	Poppet 2 O-ring damaged (control valve)	Replace	8-S19
Implement Hunts (Moves Up and Down)	Poppet 1, poppet 2, poppet 3 seat surface damaged	Replace	8-S19
	Control valve O-rings worn or damaged	Replace	8-S19
Oil Temperature Increases Rapidly	Relief valve operating	Adjust	8-S11
	Hydraulic pump leak or damaged	Replace or repair	8-S10
	Oil leaks from valves	Replace or repair	8-S19
	Gear or bearing damaged in the transmission case	Replace	–

W1014322

2. SERVICING SPECIFICATIONS

POWER STEERING HYDRAULIC PUMP

Item		Factory Specification	Allowable Limit
Hydraulic Pump Condition <ul style="list-style-type: none"> • Engine speed : Approx. 2800 min⁻¹ (rpm) (L2800) Approx. 2700 min⁻¹ (rpm) (L3400) • Rated Pressure : [L2800, L3400] (2WD) 6.9 to 7.9 MPa 70 to 80 kgf/cm² 995 to 1138 psi [L2800, L3400] (4WD) 10.8 to 11.8 MPa 110 to 120 kgf/cm² 1564 to 1707 psi • Oil Temperature : 40 to 60 °C 104 to 140 °F 	Delivery at No Pressure (L2800)	Above 16.1 L/min. 4.25 U.S.gals./min. 3.54 Imp.gals./min.	–
	Delivery at No Pressure (L3400)	Above 15.6 L/min. 4.12 U.S.gals./min. 3.43 Imp.gals./min.	–
	Delivery at Rated Pressure (L2800)	Above 15.0 L/min. 3.96 U.S.gals./min. 3.30 Imp.gals./min.	13.5 L/min. 3.57 U.S.gals./min. 2.97 Imp.gals./min.
	Delivery at Rated Pressure (L3400)	Above 14.5 L/min. 3.83 U.S.gals./min. 3.19 Imp.gals./min.	13.1 L/min. 3.46 U.S.gals./min. 2.88 Imp.gals./min.
Housing Bore	Depth of Scratch	–	0.09 mm 0.0035 in.
Bushing to Gear Shaft	Clearance	0.020 to 0.081 mm 0.0008 to 0.0032 in.	0.15 mm 0.0059 in.
Gear Shaft	O.D.	14.970 to 14.980 mm 0.5894 to 0.5898 in.	–
Bushing	I.D.	15.000 to 15.051 mm 0.5906 to 0.5926 in.	–
Side Plate	Thickness	2.48 to 2.50 mm 0.0976 to 0.0984 in.	2.40 mm 0.0945 in.

W1013874

RELIEF VALVE (POWER STEERING)

Relief Valve Condition <ul style="list-style-type: none"> • Engine Speed : Maximum • Oil Temperature : 50 to 60 °C 122 to 140 °F 	Setting Pressure [2WD]	8.3 to 9.3 MPa 85 to 95 kgf/cm ² 1209 to 1351 psi	–
	Setting Pressure [4WD]	11.1 to 12.1 MPa 113 to 123 kgf/cm ² 1607 to 1749 psi	–

W1013874

THREE POINT SYSTEM HYDRSULIC PUMP

Item		Factory Specification	Allowable Limit
Hydraulic Pump Condition <ul style="list-style-type: none"> • Engine speed : Approx. 2800 min⁻¹ (rpm) (L2800) Approx. 2700 min⁻¹ (rpm) (L3400) • Rated Pressure : (L2808, L3408) 15.7 to 16.2 MPa 160 to 165 kgf/cm² 2276 to 2347 psi • Oil Temperature : 40 to 60 °C 104 to 140 °F 	Delivery at No Pressure (L2800)	Above 26.6 L/min. 7.03 U.S.gals./min. 5.85 Imp.gals./min.	–
	Delivery at No Pressure (L3400)	Above 25.7 L/min. 6.79 U.S.gals./min. 5.65 Imp.gals./min.	–
	Delivery at Rated Pressure (L2800)	Above 24.7 L/min. 6.53 U.S.gals./min. 5.43 Imp.gals./min.	22.2 L/min. 5.86 U.S.gals./min. 4.88 Imp.gals./min.
	Delivery at Rated Pressure (L3400)	Above 23.9 L/min. 6.31 U.S.gals./min. 5.26 Imp.gals./min.	21.5 L/min. 5.68 U.S.gals./min. 4.73 Imp.gals./min.
Housing Bore	Depth of Scratch	–	0.09 mm 0.0035 in.
Bushing to Gear Shaft	Clearance	0.020 to 0.081 mm 0.0008 to 0.0032 in.	0.15 mm 0.0059 in.
Gear Shaft	O.D.	14.970 to 14.980 mm 0.5894 to 0.5898 in.	–
Bushing	I.D.	15.000 to 15.051 mm 0.5906 to 0.5926 in.	–
Side Plate	Thickness	2.48 to 2.50 mm 0.0976 to 0.0984 in.	2.40 mm 0.0945 in.

W1012055

RELIEF VALVE (THREE POINT SYSTEM)

Relief Valve Condition <ul style="list-style-type: none"> • Engine Speed : Maximum • Oil Temperature : 45 to 55 °C 113 to 131 °F 	Setting Pressure	15.7 to 16.2 MPa 160 to 165 kgf/cm ² 2276 to 2347 psi	–
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W1012295

CONTROL LINKAGE

Lift Arm	Free Play (at Maximum Raising Position)	10 to 15 mm 0.39 to 0.58 in.	–
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W1013874

HYDRAULIC CYLINDER

Item		Factory Specification	Allowable Limit
Cylinder Bore	I.D.	75.000 to 75.050 mm 2.9528 to 2.9547 in.	71.150 mm 2.9587 in.
Hydraulic Arm Shaft to Bushing	Clearance (Right)	0.125 to 0.230 mm 0.00492 to 0.00906 in.	0.50 mm 0.0197 in.
	Clearance (Left)	0.125 to 0.220 mm 0.00492 to 0.00866 in.	0.50 mm 0.0197 in.
Hydraulic Arm Shaft	O.D. (Right)	44.920 to 44.950 mm 1.76850 to 1.76968 in.	–
	O.D. (Left)	39.920 to 39.950 mm 1.57165 to 1.57283 in.	–
Bushing	I.D. (Right)	45.0756 to 45.150 mm 1.77460 to 1.77756 in.	–
	I.D. (Right)	40.075 to 40.140 mm 1.57775 to 1.58031 in.	–

W1011871

CYLINDER SAFETY VALVE

Cylinder Safety Valve	Operating Pressure	19.6 to 22.6 MPa 200 to 230 kgf/cm ² 2845 to 3277 psi	–
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W1018648

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-9.)

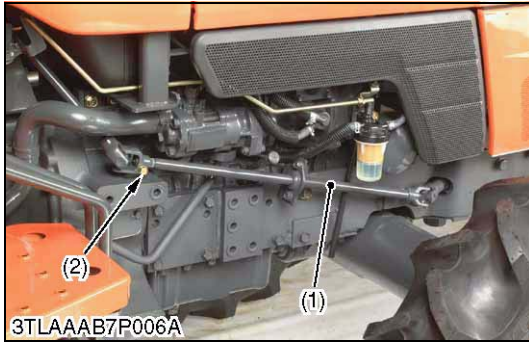
Item	N-m	kgf-m	ft-lbs
Relief valve plug	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Hydraulic pump mounting bolt	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Delivery pipe joint bolt	49.0 to 69.0	5.0 to 7.0	36.1 to 50.6
Pump cove mounting screw	39.2 to 44.1	4.0 to 4.5	28.9 to 32.5
Hydraulic cylinder mounting screw and nut	77.4 to 90.2	7.9 to 9.2	57.1 to 66.5
Relief valve plug	49.0 to 69.0	5.0 to 7.0	36.1 to 50.6
Hydraulic cylinder assembly mounting stud bolt	38.2 to 45.1	3.9 to 4.6	28.2 to 33.3
Position control valve mounting screw	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2
Position control valve seat plug 1 and 2	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Poppet lock nut	3.9 to 6.9	0.4 to 0.7	2.9 to 5.1
Position control valve unload plug	39.2 to 58.5	4.0 to 6.0	28.9 to 43.4

W1012736

4. CHECKING, DISASSEMBLING AND ASSEMBLING

[1] CHECKING AND ADJUSTING

(1) Hydraulic Pump Test Using Flow-meter (Power Steering)



Preparation

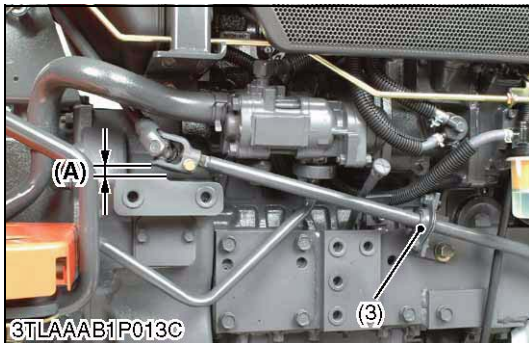
1. Remove the support (3) mounting screw.
2. Remove the screw (2).
3. Remove the joint shaft (1).

(When reassembling)

- Lift the universal joint so that there should be a clearance (A) of more than 5 mm (0.19 in.) between the universal joint and flywheel housing.
Then fit the support (3) in position.

- (1) Joint Shaft
(2) Screw
(3) Support

(A) Clearance



W1012497



Hydraulic Flow Test

■ IMPORTANT

- When using a flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with that flowmeter.
 - Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.
1. Remove the power steering delivery pipe joint bolt and install the adaptor **52** to the pump discharge port.
 2. Connect the hydraulic test hose to the adaptor **52** and flowmeter inlet port.
 3. Connect the other hydraulic test hose to the flowmeter outlet port and to transmission fluid filling plug hole.
 4. Open the flowmeter loading valve completely. (Turn counterclockwise.)
 5. Start the engine and set the engine speed at **2000 to 2200 min⁻¹ (rpm)**.
 6. Slowly close the loading valve to generate pressure approx. **9.8 MPa (100 kgf/cm², 1422 psi)**. Hold in this condition until oil temperature reached approx. **40 °C (104 °F)**
 7. Open the loading valve completely.
 8. Set the engine speed. (Refer to **Condition**.)
 9. Read and note the pump delivery at no pressure.
 10. Slowly close the loading valve to increase pressure (Rated pressure). As the load is increased, engine speed drops, therefore, reset the engine speed.
 11. Read and note the pump delivery at rated pressure.
 12. Open the loading valve completely and stop the engine.
 13. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

Condition

- Engine speed : Approx.2700 min⁻¹ (rpm) (L2800)
Approx.2600 min⁻¹ (rpm) (L3400)
- Rated pressure : [2WD] 8.3 to9.3 MPa
85 to 95 kgf/cm²
1209 to1351 psi
[4WD] 11.1 to 12.1 MPa
113 to 123 kgf/cm²
1607 to 1749 psi
- Oil temperature :40 to 60 °C (104 to 140 °F)

W1018791

Hydraulic Flow Test (Continued)**[L2800]**

Hydraulic pump delivery at no pressure	Factory spec.	Above 16.1 L/min. 4.25 U.S.gals/min. 3.54 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory spec.	Above 15.0 L/min. 3.96 U.S.gals/min. 3.30 Imp.gals/min.
	Allowable limit	13.5 L/min. 3.57 U.S.gals/min. 2.97 Imp.gals/min.

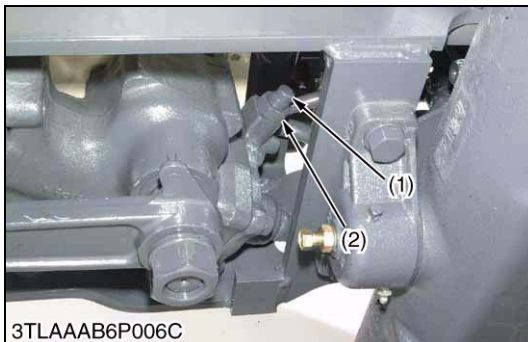
[L3400]

Hydraulic pump delivery at no pressure	Factory spec.	Above 15.6 L/min. 4.12 U.S.gals/min. 3.43 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory spec.	Above 14.5 L/min. 3.83 U.S.gals/min. 3.19 Imp.gals/min.
	Allowable limit	13.1 L/min. 3.46 U.S.gals/min. 2.88 Imp.gals/min.

W1024801

(2) Relief Valve (for Power Steering)

3TLAAB8P007A



3TLAAB6P006C

Relief Valve Setting Pressure

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** and adaptor **58** of relief valve setting pressure tester to the regulator valve, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, adjust the relief valve by the adjusting screw (1), or repair the power steering.

Power steering relief valve setting pressure	Factory spec.	2WD	8.3 to 9.3 MPa 85 to 95 kgf/cm ² 1209 to 1351 psi
		4WD	11.1 to 12.1 MPa 113 to 123 kgf/cm ² 1607 to 1749 psi

(Reference)

- One quarter turn of the adjusting screw (1) changes the relief setting pressure by approx. 1.27 MPa (13 kgf/cm², 185 psi).

Tightening torque	Power steering delivery hose joint bolt	34.0 to 39.0 N-m 3.5 to 4.0 kgf-m 25.3 to 28.9 ft-lbs
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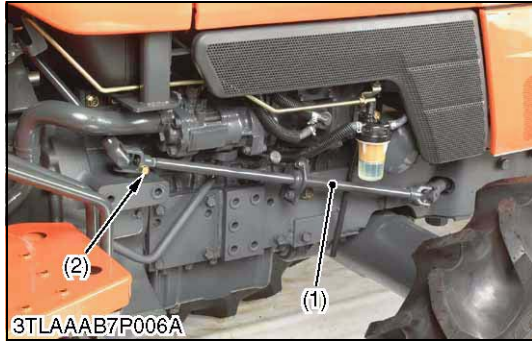
Condition

- Engine speed : Maximum
- Oil temperature : 50 to 60 °C (122 to 140 °F)

(1) Adjusting Screw

(2) Lock Nut

W1022630

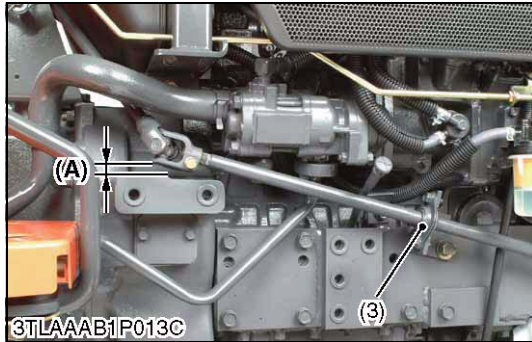
(3) Hydraulic Pump Test Using Flow-meter (Three Point Hydraulic System)**Preparation**

1. Remove the support (3) mounting screw.
2. Remove the screw (2).
3. Remove the joint shaft (1).

(When reassembling)

- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.19 in.) between the universal joint and flywheel housing.
Then fit the support (3) in position.

- (1) Joint Shaft
 (2) Screw
 (3) Support

(A) Clearance

W1019601



3TLAAAB8P008A

Hydraulic Flow Test

■ IMPORTANT

- When using a flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with that flowmeter.
 - Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.
1. Install the pump adaptor (see page G-51) with O-ring to the pump discharge port.
 2. Connect the hydraulic test hose to the adaptor and flowmeter inlet port.
 3. Connect the other hydraulic test hose to the flowmeter outlet port and to transmission fluid filling plug hole.
 4. Open the flowmeter loading valve completely. (Turn counterclockwise.)
 5. Start the engine and set the engine speed at **2000 to 2200 min⁻¹ (rpm)**.
 6. Slowly close the loading valve to generate pressure approx. **14.7 MPa (150 kgf/cm², 2133 psi)**. Hold in this condition until oil temperature reached approx. **40 °C (104 °F)**
 7. Open the loading valve completely.
 8. Set the engine speed. (Refer to **Condition**.)
 9. Read and note the pump delivery at no pressure.
 10. Slowly close the loading valve to increase pressure (Rated pressure). As the load is increased, engine speed drops, therefore, reset the engine speed.
 11. Read and note the pump delivery at rated pressure.
 12. Open the loading valve completely and stop the engine.
 13. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

Condition

- Engine speed : Approx.2800 min⁻¹ (rpm) (L2808)
Approx.2700 min⁻¹ (rpm) (L3408)
- Rated pressure : 15.7 to 16.2 MPa
160 to 165 kgf/cm²
2276 to 2347 psi
- Oil temperature : 40 to 60 °C (104 to 140 °F)

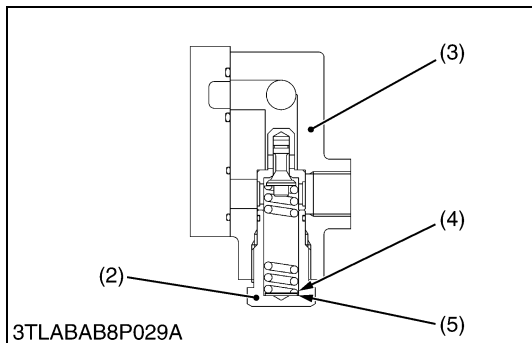
[L2800]

Hydraulic pump delivery at no pressure	Factory spec.	Above 26.6 L/min. 7.03 U.S.gals/min. 5.85 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory spec.	Above 24.7 L/min. 6.53 U.S.gals/min. 5.43 Imp.gals/min.
	Allowable limit	22.2 L/min. 5.86 U.S.gals/min. 4.88 Imp.gals/min.

[L3400]

Hydraulic pump delivery at no pressure	Factory spec.	Above 25.7 L/min. 6.79 U.S.gals/min. 5.65 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory spec.	Above 23.9 L/min. 6.31 U.S.gals/min. 5.26 Imp.gals/min.
	Allowable limit	21.5 L/min. 5.68 U.S.gals/min. 4.73 Imp.gals/min.

W1014546

(4) Relief Valve (for Three Point Hydraulic System)**Relief Valve Setting pressure**

1. Remove the delivery pipe joint bolt from front hydraulic block.
2. Install the adaptor **E**. Then connect the cable and pressure gauge to adaptor **E**.
3. Remove the position control lever stopper (1).
4. Start the engine and set at maximum speed.
5. Move the position control lever all way up to operate the relief valve and read the gauge.
6. If the pressure is not within the factory specifications, remove the relief plug (2) of front hydraulic block (3) and adjust with the adjusting shims (4).
7. After the relief valve setting pressure test, reset the position control lever stopper firmly.

Relief valve setting pressure	Factory spec.	15.7 to 16.2 MPa 160 to 165 kgf/cm ² 2276 to 2347 psi

Condition

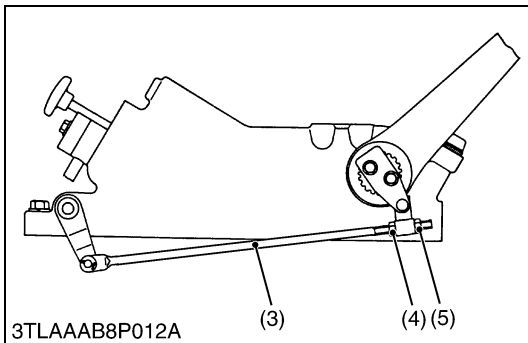
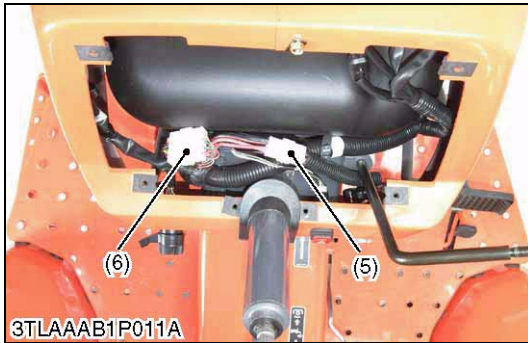
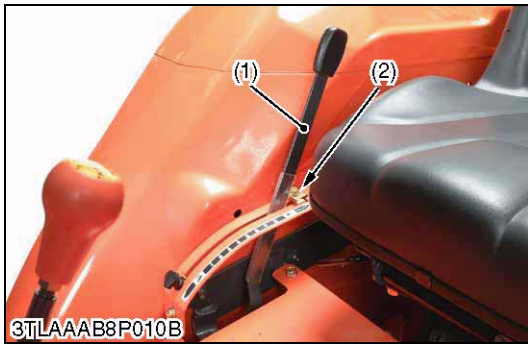
- Engine speed : Maximum
- Oil temperature : 45 to 55 °C
113 to 131 °F

(Reference)

- Thickness of shims (4) :
0.1 mm (0.0039 in.)
0.2 mm (0.0078 in.)
0.4 mm (0.0157 in.)
- Pressure change per 0.1 mm (0.0039 in.) shim :
Approx. 264.8 kPa
2.7 kgf/cm²
38.4 psi

- | | |
|---------------------------|--------------------|
| (1) Stopper | (4) Adjusting Shim |
| (2) Relief Plug | (5) Washer |
| (3) Front Hydraulic Block | |

W1019974



Position Control Feedback Rod Adjustment

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and after warming-up, set the engine speed to idle.
3. Move the position control lever (1) to the uppermost position.
4. While pushing the feedback rod forward, turn the adjusting nut (4) counterclockwise until the relief valve begins to be operated.
5. From the relief valve operating position, turn the adjusting nut (4) clockwise 2 turns.
6. Tighten the lock nut (5).
7. Set the engine speed to maximum.
8. Move the position control lever (1) to the lowest position and uppermost position to check the relief valve does not operate.
9. Set the position control lever (1) to the uppermost position, then move the lift arm to the upper end by hand and measure the free play.
10. If the measurement is not within the factory specifications, adjust the position control feedback rod setting length.

To reduce lift arm free play → Lengthen the position control feedback rod (3).

To increase lift arm free play → Shorten the position control feedback rod (3).

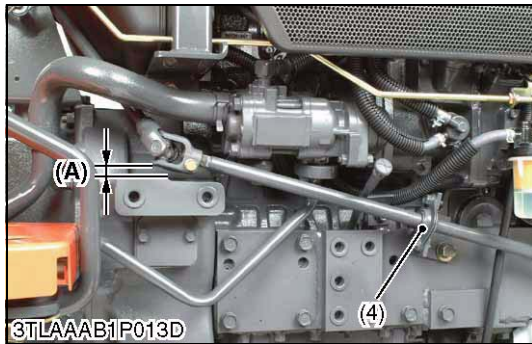
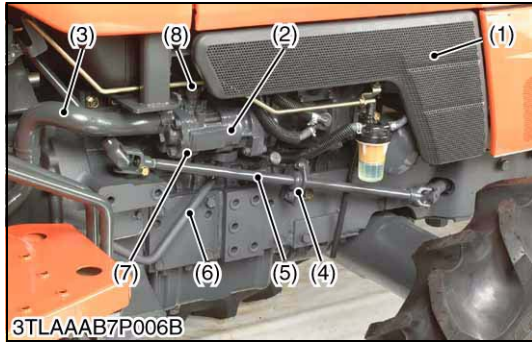
Lift arm free play at maximum raising position	Factory spec.	10 to 15 mm 0.39 to 0.58 in.

- | | |
|-----------------------------------|-------------------|
| (1) Position Control Lever | (4) Adjusting Nut |
| (2) Stopper | (5) Lock Nut |
| (3) Position Control Feedback Rod | |

W1020369

[2] DISASSEMBLING AND ASSEMBLING

(1) Hydraulic Pump (Power Steering)



Hydraulic Pump Assembly

1. Remove the side cover (1).
2. Remove the steering joint shaft (5).
3. Disconnect the suction hose (3).
4. Disconnect the return hose (8).
5. Remove the delivery pipe (6), (7).
6. Remove the hydraulic pump (2).

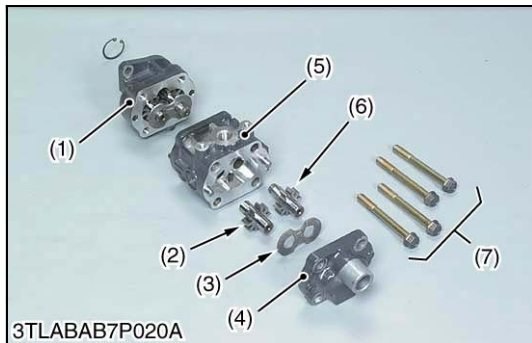
(When reassembling)

- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.19 in.) between the universal joint and flywheel housing.
Then fit the support (4) in position.
- Apply grease to the O-ring and take care not to damage it.

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 36.1 to 50.6 ft-lbs
	Hydraulic pump assembly mounting screw and nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs

- | | |
|--------------------|----------------------|
| (1) Side Cover | (6) Delivery Pipe |
| (2) Hydraulic Pump | (7) Delivery Pipe |
| (3) Suction Hose | (8) Return Hose |
| (4) Support | |
| (5) Joint Shaft | (A) Clearance |

W1018543



Hydraulic Pump Assembly

1. Remove the pump cover mounting screw (7).
2. Remove the drive gear (6), driven gear (2) and side plate (3) from the casing.

(When reassembling)

- Take care no to damage the gasket.
- Align the hole of the pump cover (4) and casing 2 (5).
- Install the side plate, noting its location and direction.
- Install the gears, noting its direction.

Tightening torque	Pump cover mounting screw	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 ft-lbs
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- | | |
|-----------------|----------------|
| (1) Casing 1 | (5) Casing 2 |
| (2) Driven Gear | (6) Drive Gear |
| (3) Side Plate | (7) Screw |
| (4) Pump Cover | |

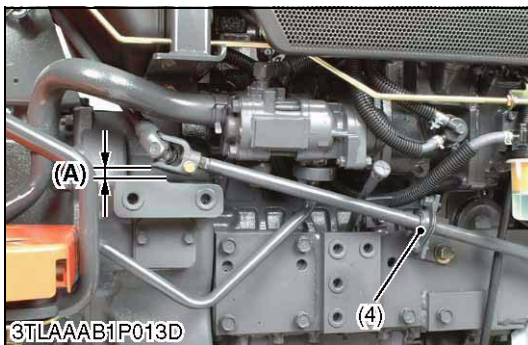
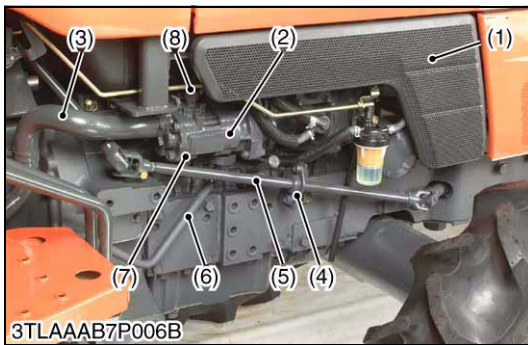
W1016911

Hydraulic Pump Running-in

After reassembly, perform break-in operation in the following manner, and check the pump for abnormality before use. If the pump temperature should rise noticeably during running-in, recheck should be performed.

1. Install the hydraulic pump to the tractor, and mount the suction pipe and delivery pipe securely.
2. Set the engine speed at 1300 to 1500 mm⁻¹ (rpm), and operate the hydraulic pump at no load for about 10 minutes.
3. Set the engine speed at 2000 to 2200 mm⁻¹ (rpm), and with the hydraulic pump applied with 2.94 MPa (30 kgf/cm², 427 psi) to 4.90 MPa (50 kgf/cm², 711 psi) pressure, operate it for approx. 15 minutes.
4. With the engine set to maximum speed, fully turn the steering wheel to the left or right, then actuate the relief valve five times for 25 seconds (one time 5 seconds).

W1017259

(2) Hydraulic Pump (Three point Hydraulic System)**Hydraulic Pump Assembly**

1. Remove the side cover (1).
2. Remove the steering joint shaft (5).
3. Disconnect the suction hose (3).
4. Disconnect the return hose (8).
5. Remove the delivery pipe (6), (7).
6. Remove the hydraulic pump (2).

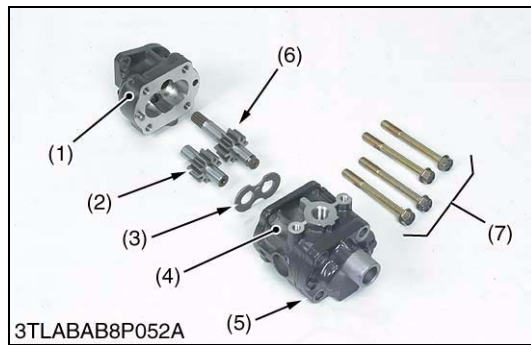
(When reassembling)

- Lift the universal joint so that there should be a clearance (A) of more than 5 mm (0.19 in.) between the universal joint and flywheel housing.
- Then fit the support (4) in position.
- Apply grease to the O-ring and take care not to damage it.

Tightening torque	Delivery pipe joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 36.1 to 50.6 ft-lbs
	Hydraulic pump assembly mounting screw and nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs

- | | |
|--------------------|----------------------|
| (1) Side Cover | (6) Delivery Pipe |
| (2) Hydraulic Pump | (7) Delivery Pipe |
| (3) Suction Hose | (8) Return Hose |
| (4) Support | |
| (5) Joint Shaft | (A) Clearance |

W1021423



Hydraulic Pump Assembly

1. Remove the pump cover mounting screw (7).
2. Remove the drive gear (6), driven gear (2) and side plate (3) from the casing.

(When reassembling)

- Take care no to damage the gasket.
- Align the hole of the pump cover (4) and casing 2 (5).
- Install the side plate, noting its location and direction.
- Install the gears, noting its direction.

Tightening torque	Pump cover mounting screw	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 ft·lbs
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- | | |
|-----------------|----------------|
| (1) Casing 1 | (5) Casing 2 |
| (2) Driven Gear | (6) Drive Gear |
| (3) Side Plate | (7) Screw |
| (4) Pump Cover | |

W1021912

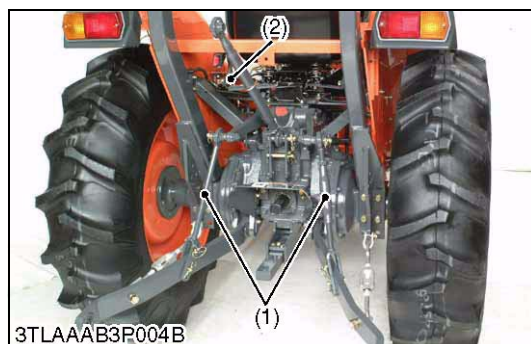
Hydraulic Pump Running-in

After reassembly, perform break-in operation in the following manner, and check the pump for abnormality before use. If the pump temperature should rise noticeably during running-in, recheck should be performed.

1. Install the hydraulic pump to the tractor, and mount the suction pipe and delivery pipe securely.
2. Set the engine speed at 1300 to 1500 mm⁻¹ (rpm), and operate the hydraulic pump at no load for about 10 minutes.
3. Set the engine speed at 2000 to 2200 mm⁻¹ (rpm), and with the hydraulic pump applied with 2.94 MPa (30 kgf/cm², 427 psi) to 4.90 MPa (50 kgf/cm², 711 psi) pressure, operate it for approx. 15 minutes.
4. With the engine set to maximum speed, fully turn the steering wheel to the left or right, then actuate the relief valve five times for 25 seconds (one time 5 seconds).

W1022427

(3) Hydraulic Cylinder

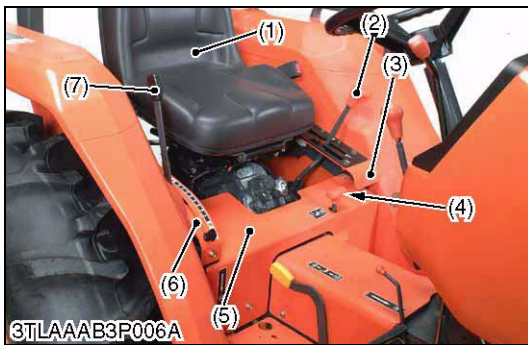


Lift-rod and Battery Negative Cable

1. Remove the lift-rods (1) and top link (2).
2. Disconnect the negative cable.

- | | |
|--------------|--------------|
| (1) Lift-rod | (2) Top Link |
|--------------|--------------|

W1018798

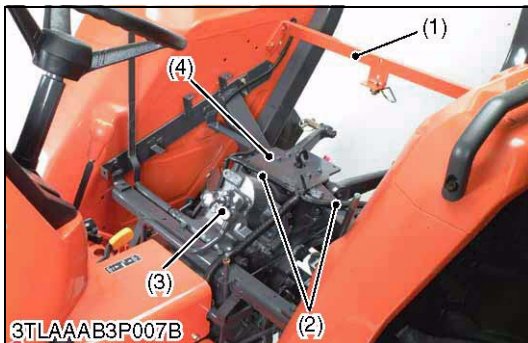


Outer Components

1. Remove the seat (1).
2. Remove the grip (2), (4), (7).
3. Remove the auxiliary change lever guide (3) and position control lever guide (6).
4. Remove the center cover (5).

- | | |
|----------------------------------|----------------------------------|
| (1) Seat | (5) Center Cover |
| (2) Grip | (6) Position Control Lever Guide |
| (3) Auxiliary Change Lever Guide | (7) Grip |
| (4) Grip | |

W1019004



Wirings

1. Disconnect the wirings (2).
2. Remove the fender rear stay (1).
3. Remove the support (4).
4. Remove the delivery pipe joint bolt (3).

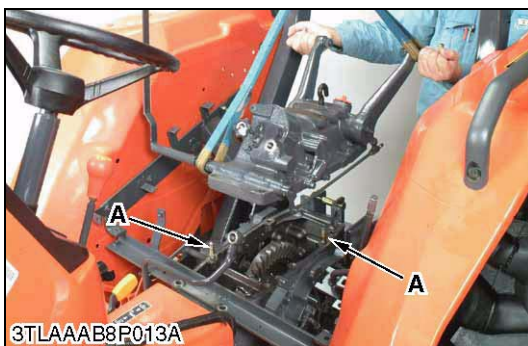
(When reassembling)

- Install the copper washers firmly.

Tightening torque	Delivery pipe joint bolt	39.0 to 49.0 N-m 4.5 to 5.0 kgf-m 32.5 to 36.2 ft-lbs
-------------------	--------------------------	---

- | | |
|----------------------|------------------------------|
| (1) Fender Rear Stay | (3) Delivery Pipe Joint Bolt |
| (2) Wirings | (4) Support |

W1019231



Hydraulic Cylinder

1. Loosen and remove the hydraulic cylinder assembly mounting screws and nuts.
2. Support the hydraulic cylinder assembly with nylon lift strap and hoist, and then take out it.

(When reassembling)

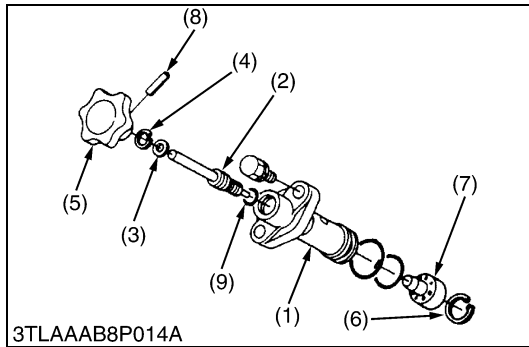
- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.
- When replacing the hydraulic cylinder assembly mounting stud bolts, apply liquid lock (Three Bond 1372 or equivalent) to "A" portion of the stud bolt.

Tightening torque	Hydraulic cylinder assembly mounting stud bolts	34.3 to 49.0 N-m 3.5 to 5.0 kgf-m 25.3 to 36.2 ft-lbs
	Hydraulic cylinder assembly mounting screws and nuts	77.4 to 90.2 N-m 7.9 to 9.2 kgf-m 57.1 to 66.5 ft-lbs

NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod. (See page 8-S12.)

W1019558



Lowering Speed Adjusting Valve

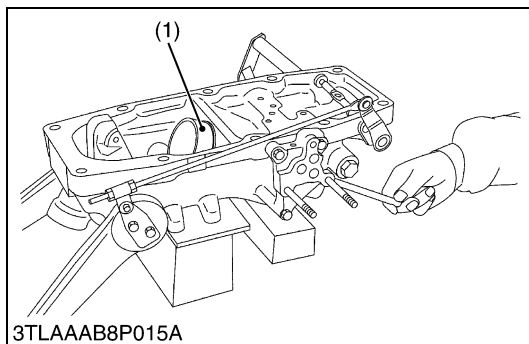
1. Remove the lowering speed adjusting valve from hydraulic cylinder block.
2. Tap out the spring pin (8), and remove the grip (5).
3. Remove the internal snap ring (4), and remove the hydraulic adjusting shaft (2).
4. Remove the internal snap ring (6) and draw out the adjusting collar (7).

(When reassembling)

- Install the hydraulic adjusting shaft (2) and valve body (1), noting O-ring (9).

- | | |
|-------------------------------|------------------------|
| (1) Valve Body | (6) Internal Snap Ring |
| (2) Hydraulic Adjusting Shaft | (7) Adjusting Collar |
| (3) Washer | (8) Spring Pin |
| (4) Internal Snap Ring | (9) O-ring |
| (5) Grip | |

W1019917



Hydraulic Rod and Hydraulic Piston

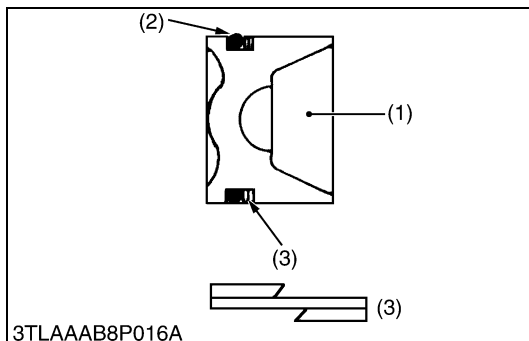
1. Tap out the spring pin.
2. Remove the hydraulic rod.
3. Push out the hydraulic piston (1).

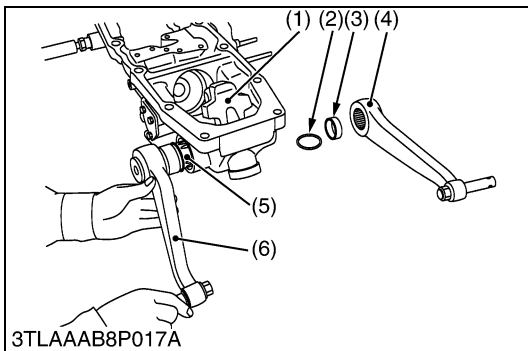
(When reassembling)

- Install the piston, noting O-ring and back-up ring (3). (See figure.)
- Apply grease to the piston bottom contacts with hydraulic rod.
- Apply transmission fluid to the cylinder, and then install the hydraulic piston (1).

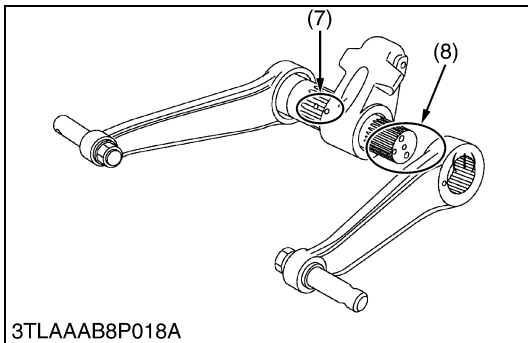
- | | |
|----------------------|------------------|
| (1) Hydraulic Piston | (3) Back-up Ring |
| (2) O-ring | |

W1020199

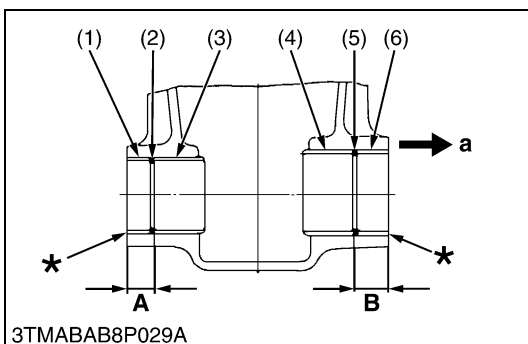




3TLAAB8P017A



3TLAAB8P018A



3TMABAB8P029A

Lift Arm, Hydraulic Arm and Hydraulic Arm Shaft

1. Disconnect the position control rod from feedback lever.
2. Remove the lift arm setting screws.
3. Draw out the hydraulic arm shaft (5) and right lift arm (6) as a unit.
4. Take out the hydraulic arm (1).
5. Remove the collar (3) and O-ring (2).

(When reassembling)

- Align the alignment marks of the hydraulic arm and hydraulic arm shaft (7).
- Align the alignment marks of the lift arm and hydraulic arm shaft (8).
- Apply grease to the right and left bushings of hydraulic cylinder block and O-rings (2)
- Take care not to damage the O-ring (2).

- | | |
|-------------------------|--|
| (1) Hydraulic Arm | (6) Lift Arm (Right) |
| (2) O-ring | (7) Alignment Mark (Hydraulic Arm Shaft and Hydraulic Arm) |
| (3) Collar | (8) Alignment Mark (Hydraulic Arm Shaft and Lift Arm) |
| (4) Lift Arm (Left) | |
| (5) Hydraulic Arm Shaft | |

W1020729

Bushings

1. Remove the bushings right (4) and left side (3).

(When reassembling)

- When press-fitting new bushings (3), (4) with a press-fitting tool (see page G-53) observe the dimensions described in the figure.
- Apply transmission fluid to the hydraulic cylinder boss and bushing.
- Press-fit the bushing so that each seam face upward.

Press-fit location of bushings	Factory spec.	Dimension	21.75 to 22.75 mm
		A	0.856 to 0.895 in.
Press-fit location of bushings	Factory spec.	Dimension	26.50 to 27.50 mm
		B	1.043 to 1.082 in.

- (1) Collar (Left)
- (2) O-ring
- (3) Bushing (Left)
- (4) Bushing (Right)
- (5) O-ring
- (6) Collar (Right)

a : Right Side

*Flush the end of collar with the end of hydraulic cylinder body.

W1024284

(4) Position Control Valve**Position Control Valve**

1. Loosen and remove the position control valve mounting screws.
2. Take out the position control valve (1).

(When reassembling)

- Take care not to damage the O-rings.

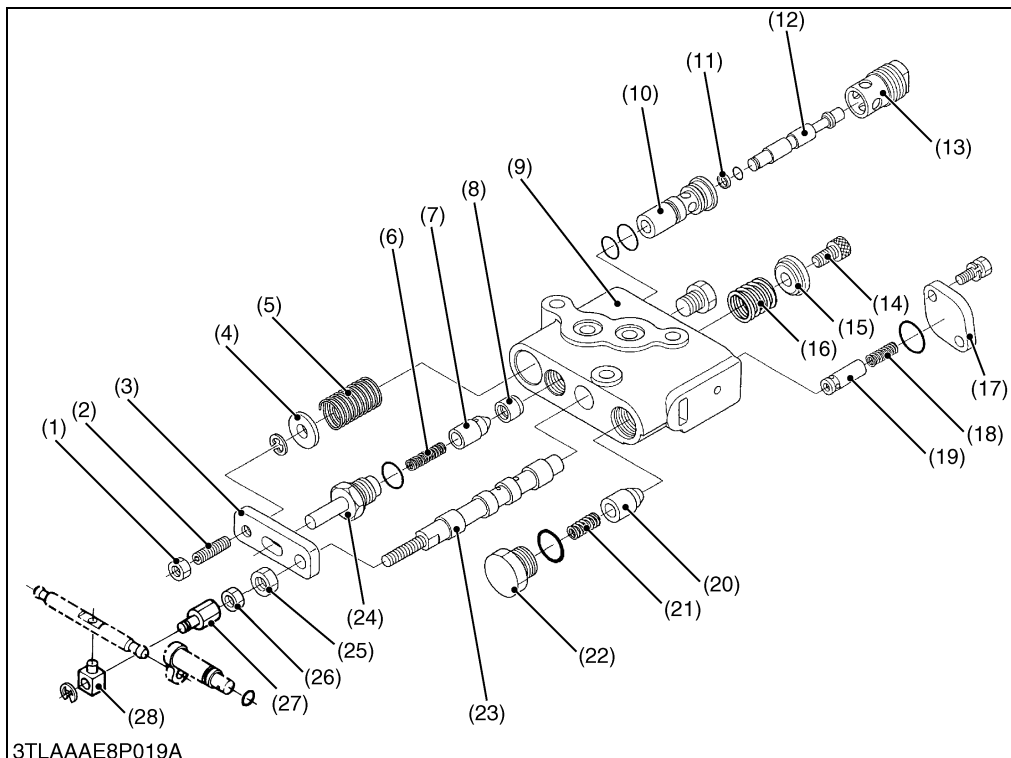
Tightening torque	Position control valve mounting screws	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 ft-lbs
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■ IMPORTANT

- Measure the distance between the spool edge and spool joint 2 edge before disassembling.

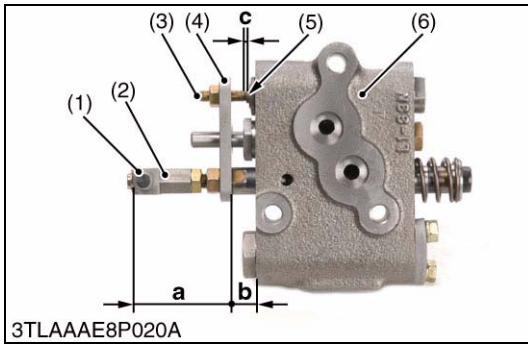
(1) Position Control Valve

W1024698

Disassembling Position Control Valve

- (1) Nut 1
- (2) Set Screw
- (3) Plate 1
- (4) Washer
- (5) Spring
- (6) Spring
- (7) Poppet 1
- (8) Valve Seat
- (9) Valve Body
- (10) Sleeve
- (11) Backup Ring
- (12) Poppet 2
- (13) Plug 1
- (14) Screw
- (15) Spring Holder
- (16) Spring
- (17) Plate 2
- (18) Spring
- (19) Poppet 3
- (20) Unload Poppet
- (21) Spring
- (22) Unload Plug
- (23) Spool
- (24) Plug 2
- (25) Nut
- (26) Lock Nut
- (27) Spool Joint 1
- (28) Spool Joint 2

W1016748



■ IMPORTANT

- Set screw (3) and spool joint 1 (2) are adjusted to very close accuracy. Do not disassemble them unless necessary. If disassembled due to unavoidable reasons, be sure to make the following adjustments before assembling.

■ Spool joint 1 (2)

1. Turn and adjust the spool joint 1 (2) so that the dimension (a) between the spool joint 2 (1) and the plate 1 (4) is 47.0 to 48.0 mm (1.85 to 1.89 in.).
2. After the adjustment, be sure to adjust the position control feedback rod.

■ Set screw (3)

1. Set the dimension (b) between the plate 1 (4) and the valve body to 16.0 mm (0.63 in.).
2. Turn and adjust the set screw (3) so that the clearance (c) between the set screw (3) and the poppet 2 (5) becomes 0.1 to 0.2 mm (0.0039 to 0.0079 in.).

(When reassembling)

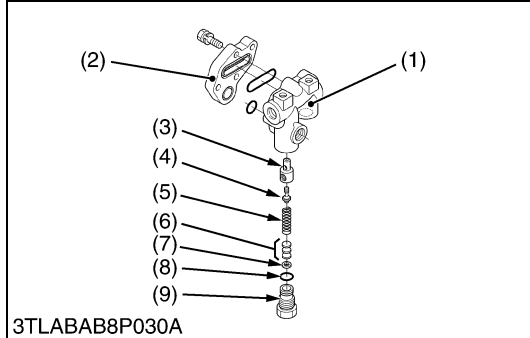
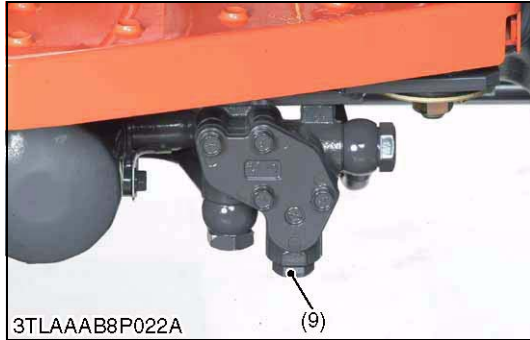
Tightening torque	Plug 1	39.2 to 58.8 N·m 4.0 to 6.0 kgf·m 28.9 to 43.4 ft-lbs
	Plug 2	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 ft-lbs
	Unload plug	39.2 to 58.8 N·m 4.0 to 6.0 kgf·m 28.9 to 43.4 ft-lbs

- (1) Spool Joint 2
- (2) Spool Joint 1
- (3) Set Screw
- (4) Plate 1
- (5) Poppet 2
- (6) Valve Body

a : Dimension
b : Dimension
c : Clearance

W1017128

(5) Relief Valve



Relief Valve

1. Remove the plug (9), and draw out the spring (5) and the poppet (4).
2. Take out the valve seat (3).

(When reassembling)

- Take care not to damage the O-ring.

Tightening torque	Relief valve plug	49.0 to 69.0 N·m 5.0 to 7.0kgf·m 36.1 to 50.6 ft-lbs
-------------------	-------------------	--

■ IMPORTANT

- After disassembling and assembling the relief valve, be sure to adjust the relief valve setting pressure.

- | | |
|---------------------------|--------------------|
| (1) Front Hydraulic Block | (6) Adjusting Shim |
| (2) Cap | (7) Washer |
| (3) Valve Seat | (8) O-ring |
| (4) Poppet | (9) Plug |
| (5) Spring | |

W1022485

[3] SERVICING

(1) Hydraulic Pump (Power Steering)



Housing Bore (Depth of Scratch)

1. Check for the scratch on the interior surface of the housing caused by the gear.
2. If the scratch reaches more than half the area of the interior surface of the housing, replace at pump assembly.
3. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
4. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
------------------	-----------------	-----------------------

(Reference)

- Use a cylinder gauge to measure the housing I.D.

W1014649



Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with an inside micrometer or cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the gear shaft and the bushings as a unit.

Clearance between bushing and gear shaft	Factory spec.	0.020 to 0.081 mm 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory spec.	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory spec.	15.000 to 15.051 mm 0.5906 to 0.5926 in.

W1024771



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.

W1023443

(2) Hydraulic Pump (Three Point System)



Housing Bore (Depth of Scratch)

1. Check for the scratch on the interior surface of the housing caused by the gear.
2. If the scratch reaches more than half the area of the interior surface of the housing, replace at pump assembly.
3. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
4. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
------------------	-----------------	-----------------------

(Reference)

- Use a cylinder gauge to measure the housing I.D.

W1025052



Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with an inside micrometer or cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the gear shaft and the bushings as a unit.

Clearance between bushing and gear shaft	Factory spec.	0.020 to 0.081 mm 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory spec.	14.970 to 14.980 mm 0.5894 to 0.5898 in.
	Factory spec.	15.000 to 15.051 mm 0.5906 to 0.5926 in.

W1025233



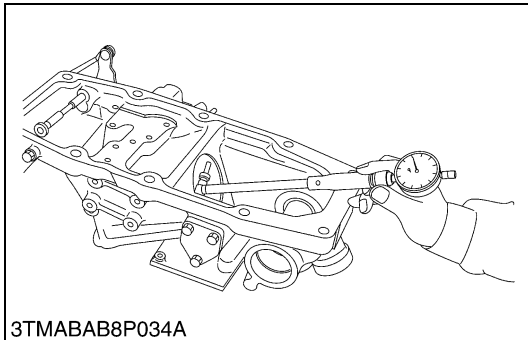
Side Plate Thickness

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.

W1023824

(3) Hydraulic Cylinder

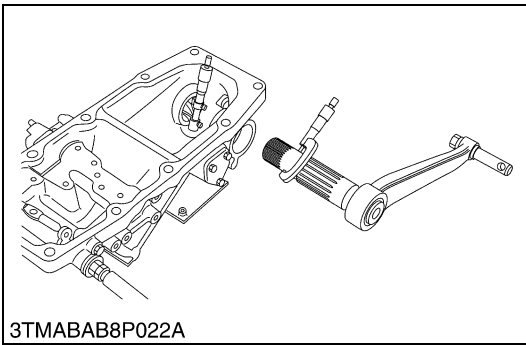


Hydraulic Cylinder Bore

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.

Cylinder I.D.	Factory spec.	75.000 to 75.050 mm 2.9528 to 2.9547 in.
	Allowable limit	75.150 mm 2.9587 in.

W1026023



Clearance between Hydraulic Arm Shaft and Bushing

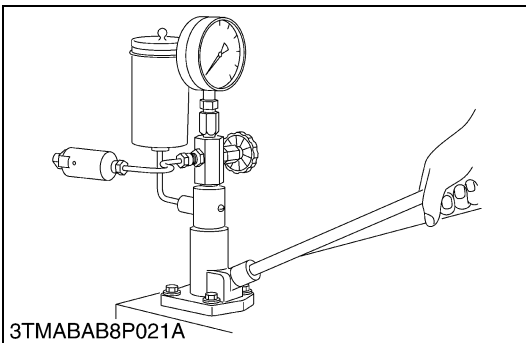
1. Measurement the hydraulic arm shaft O.D. with an outside micrometer.
2. Measurement the bushing I.D. with a cylinder gauge or inside micrometer.
3. If the clearance exceeds the allowable limit. replace.

Clearance between hydraulic arm shaft and bushing	Factory spec.	Right	0.125 to 0.230 mm 0.0049 to 0.0091 in.
		Left	0.125 to 0.220 mm 0.0049 to 0.0087 in.
	Allowable limit	Right	0.50 mm 0.02 in.
		Left	0.50 mm 0.02 in.

Hydraulic arm shaft O.D.	Factory spec.	Right	44.920 to 44.950 mm 1.7685 to 1.7697 in.
		Left	39.920 to 39.950 mm 1.5717 to 1.5728 in.

Bushing I.D. (after press fitted)	Factory spec.	Right	45.075 to 45.150 mm 1.7746 to 1.7776 in.
		Left	40.075 to 40.140 mm 1.5778 to 1.5803 in.

W1026122



Operating Pressure of Cylinder Safety Valve

1. Attach the cylinder safety valve to injection nozzle tester with a safety valve setting adaptor.
2. Measurement the operating pressure of the cylinder safety valve.
3. If the operating pressure is not within the factory specifications, adjust by turning the adjusting screw (1).
4. After adjustment, tighten the lock nut (2) firmly.

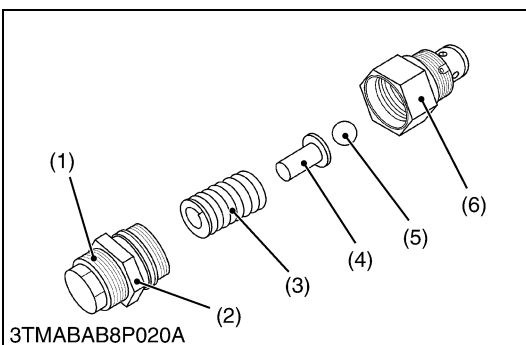
NOTE

- Use specified transmission fluid (See page G-6) to test the operating pressure of the cylinder safety valve.

Cylinder safety valve operating pressure	Factory spec.	19.6 to 22.6 MPa 200 to 230 kgf/cm ² 2845 to 3277 psi
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Tightening torque	Lock nut	58.8 to 78.5 N-m 6.0 to 8.0 kgf-m 43.4 to 57.9 ft-lbs
-------------------	----------	---

- | | |
|---------------------|-------------|
| (1) Adjusting Screw | (4) Seat |
| (2) Lock Nut | (5) Ball |
| (3) Spring | (6) Housing |



W1029814

9 ELECTRICAL SYSTEM

MECHANISM

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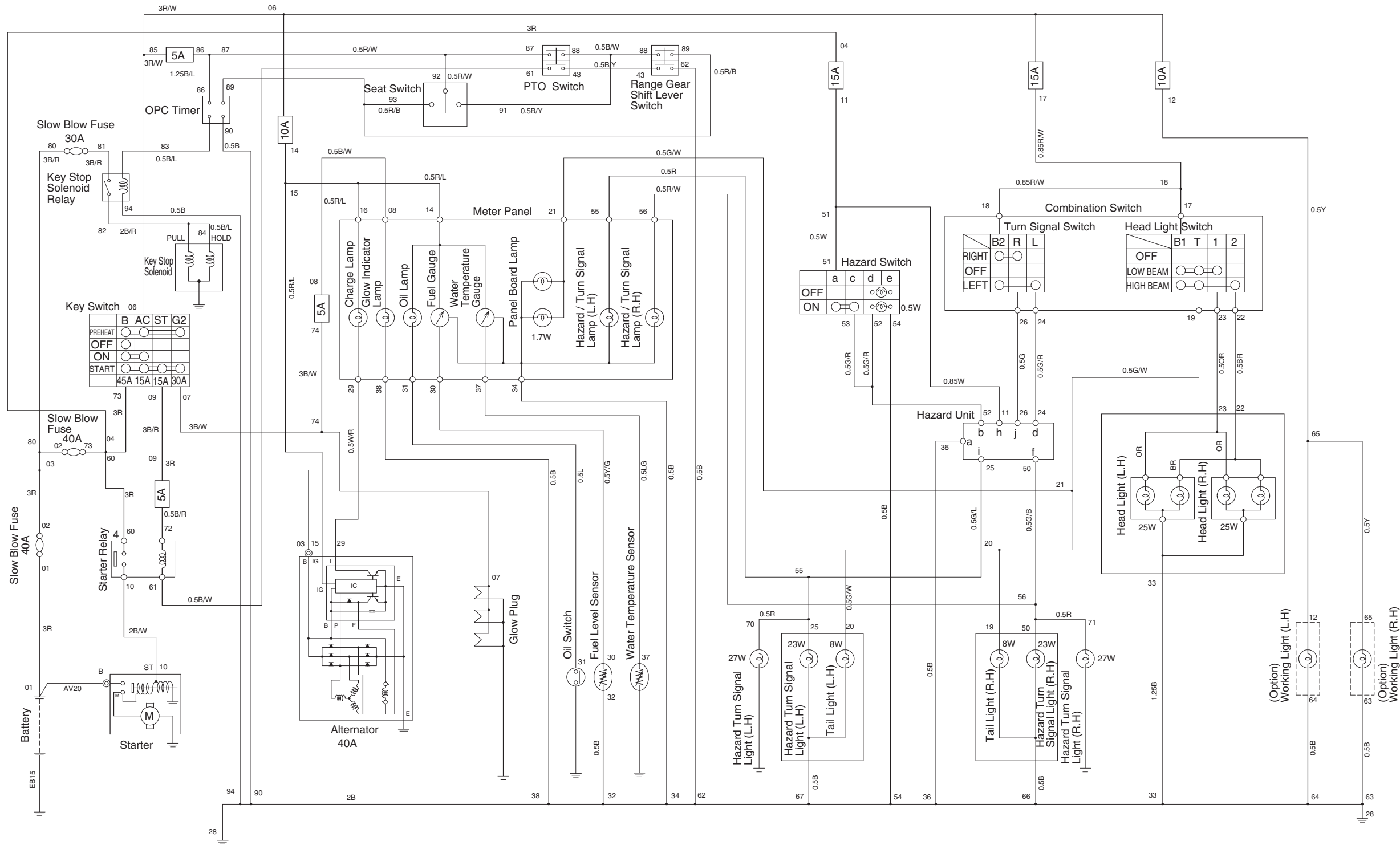
1. WIRING DIAGRAM.....	9-M1
2. OPERATOR PRESENCE CONTROL.....	9-M3

1. WIRING DIAGRAM

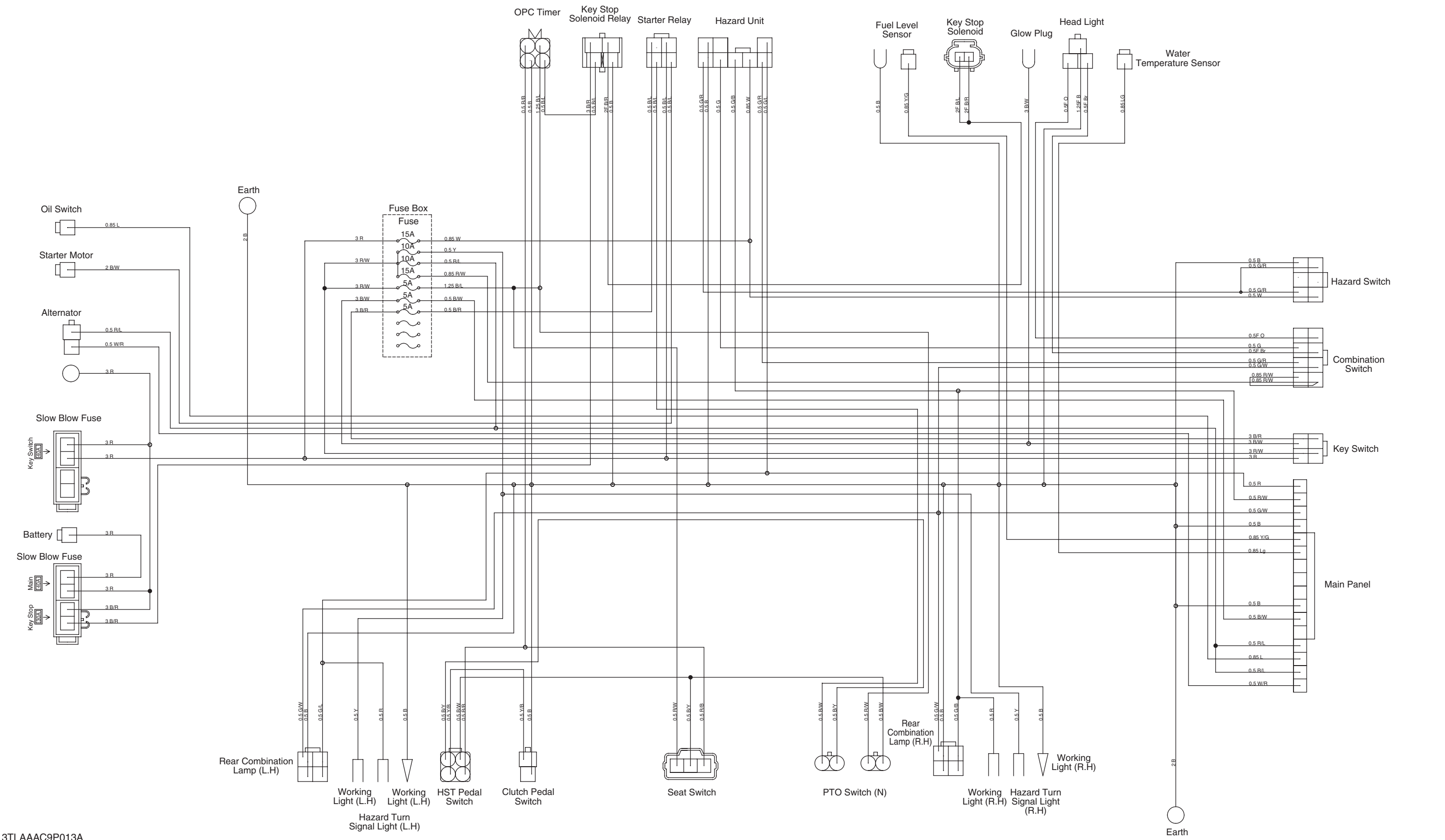
[Manual Transmission Type]

• Color of Wiring

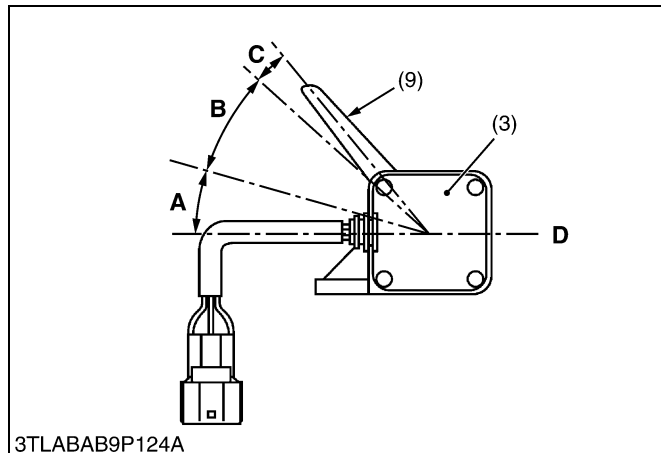
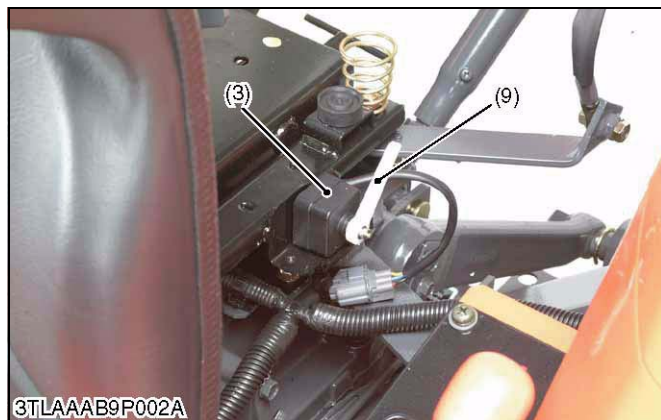
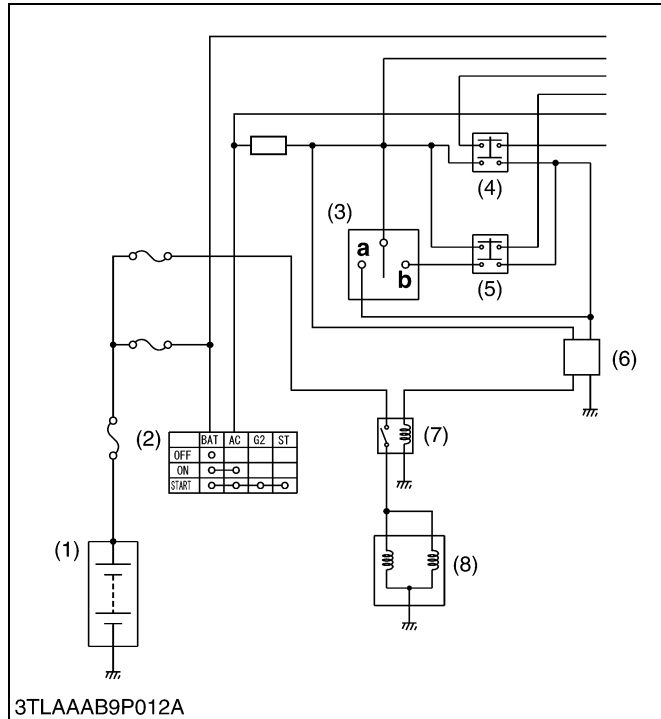
W.....	White
R.....	Red
L.....	Blue
Y.....	Yellow
B.....	Black
G.....	Green
P.....	Pink
Lg.....	Light Green
Br.....	Brown
Or.....	Orange
Sb.....	Sky Blue
WG.....	White / Green
WB.....	White / Black
WR.....	White / Red
WY.....	White / Yellow
WL.....	White / Blue
RW.....	Red / White
RL.....	Red / Blue
RY.....	Red / Yellow
RB.....	Red / Black
RG.....	Red / Green
BW.....	Black / White
BL.....	Black / Blue
BR.....	Black / Red
LY.....	Blue / Yellow
LW.....	Blue / White
LG.....	Blue / Green
LR.....	Blue / Red
LB.....	Blue / Black
LOR.....	Blue / Orange
YG.....	Yellow / Green
YR.....	Yellow / Red
YB.....	Yellow / Black
GR.....	Green / Red
GW.....	Green / White
LgY.....	Light Green / Yellow
LgB.....	Light Green / Black



[HST Type]



2. OPERATOR PRESENCE CONTROL



The tractor equips operator presence control (OPC) system which automatically stops the engine when operator stands from the seat while shifting the PTO lever, shuttle lever or HST pedal.

This system is controlled by the seat switch (3), OPC timer (6), key stop solenoid relay (7), key stop solenoid (8), PTO switch (4) and range gear shift switch (5).

■ Electric Circuit

1. When sitting on the seat in the state of main switch **ON**, the battery voltage passes the seat switch (3) and the OPC timer (6), and maintain the key stop solenoid relay (7).
2. When standing from the operators seat, the circuit from the seat switch (3) to the OPC timer is cut. However, if the levers (or pedal) are set at a neutral position, the circuit from the battery to the key stop solenoid relay (7) is formed with the lever switches (4), (5).
3. When standing from the seat while shifting the levers, the circuit from the battery to the key stop solenoid relay is cut, and the engine is stopped by function of key stop solenoid (8).

■ OPC Timer

After the current supply cuts, the OPC timer (6) adopted for this system has maintained the state of **ON** position for about one second.

■ Seat Switch

The seat switch (3) has two **ON** positions. One is sitting condition, and another is condition of seat lifting.

Therefore, if the engine is started, levers are shifted to neutral, it gets off from the tractor, and the seat is tilted forward, the PTO operation etc. become possible.

- | | |
|-----------------------------|----------------------------------|
| (1) Battery | a : Sitting on the seat |
| (2) Main Switch | b : Lifting the seat |
| (3) Seat Switch | A : Seat Switch is ON |
| (4) PTO Switch | B : Seat Switch is OFF |
| (5) Range Gear Shift Switch | C : Seat Switch is ON |
| (6) OPC Timer | D : Seat Suspension Plate |
| (7) Key Stop Solenoid Relay | |
| (8) Key Stop Solenoid | |
| (9) Sensor Bar | |

W1012717

SERVICING

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(1) Starter	9-S25
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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipment Do Not Operate	Battery discharged or defective	Recharge or replace	9-S8
	Battery positive cable disconnected or improperly connected	Repair or replace	9-S7
	Battery negative cable disconnected or improperly connected	Repair or replace	9-S7
	Slow blow fuse blown	Replace	G-39
Fuse Blown Frequently	Short-circuited	Repair or replace	–

W1014322

BATTERY

Battery Discharges Too Quickly	Battery defective	Recharge or replace	9-S8
	Alternator defective	Repair or replace	9-S23 to S25
	Wiring harness disconnected or improperly connected (between battery positive terminal and regulator B terminal)	Repair or replace	–
	Cooling fan belt slipping	Adjust tension	–

W1013718

STARTING SYSTEM

Starter Motor Does Not Operate	Battery discharged or defective	Recharge or replace	9-S8
	Slow blow fuse blown	Replace	G-39
	Safety switch defective	Replace	9-S10, S11
	Safety switch improperly adjusted	Repair	9-S10, S11
	Wiring harness disconnected or improperly connected (between main switch ST terminal and safety switch between battery positive terminal and starter motor B terminal)	Repair or replace	–
	Starter motor defective	Repair or replace	9-S25 to S27
	OPC timer defective	Replace	9-S12
	Main switch defective	Replace	9-S9, S10

W1013718

CHARGING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Charging Lamp Does Not Light when Main Switch is Turned ON	Fuse blown (10 A)	Replace	G-39
	Wiring harness disconnected or improperly connected (between main AC switch terminal and panel board, between panel board and alternator L terminal)	Repair or replace	–
Charging Lamp Does Not Go OFF When Engine is Running	Short circuit between alternator L terminal lead and chassis	Repair or replace	–
	Alternator defective	Repair or replace	9-S23 to S25

W1013580

LIGHTING SYSTEM

Head Light Does Not Light	Fuse blown (15 A)	Replace	G-39
	Bulb blown	Replace	G-39
	Wiring harness disconnected or improperly connected (between main switch AC terminal and combination switch B1 terminal, between combination switch 1 terminal and head light, between combination switch 2 terminal and head light)	Repair or replace	–
Illumination Light Does Not Light	Fuse blown (15 A)	Replace	G-39
	Bulb blown	Replace	G-39
	Wiring harness disconnected or improperly connected (between combination switch T terminal and panel board)	Repair or replace	–
Tail Light Does Not Light	Fuse blown (15 A)	Replace	G-39
	Wiring harness disconnected or improperly connected (between combination switch T terminal and tail light)	Repair or replace	–

W1013718

LIGHTING SYSTEM (Continued)

Symptom	Probable Cause	Solution	Reference Page
Hazard and Turn Signal Light Does Not Light	Fuse blown (10 A)	Replace	G-39
	Bulb blown	Replace	G-39
	Wiring harness disconnected or improperly connected (between main switch M terminal and hazard unit, between hazard unit and hazard switch C terminal, between hazard unit and turn signal switch R or L terminal, between hazard unit and hazard and turn signal lights)	Repair or replace	–
	Hazard unit defective	Replace	9-S21
	Hazard switch defective	Replace	9-S20
	Combination switch (turn signal switch) defective	Replace	–
Hazard and Turn Signal Indicator Lamp Does Not Light	Bulb blown	Replace	G-39
	Wiring harness disconnected or improperly connected	Repair or replace	–
Hazard and Turn Signal Light Does Not Go ON and OFF	Flasher unit defective	Replace	9-S21
Work Light Does Not Light	Fuse blown (10 A)	Replace	G-39
	Bulb blown	Replace	G-39
	Wiring harness disconnected or improperly connected (between starter motor B terminal and work light)	Repair or replace	–

W1027110

EASY CHECKER

Engine Oil Pressure Lamp Lights Up When Engine Is Running	Engine oil pressure too low	Repair engine	1-S14
	Engine oil insufficient	Replenish	G-14
	Engine oil pressure switch defective	Replace	–
	Short circuit between engine oil pressure switch lead and chassis	Repair	–
	Circuit in hour meter defective	Replace	–
Engine Oil Pressure Lamp Does Not Light When Main Switch Is Turned ON and Engine Is Not Running	Bulb blown	Replace	–
	Engine oil pressure switch defective	Replace	–
	Wiring harness disconnected or improperly connected (between panel board and engine oil pressure switch)	Repair or replace	–
	Circuit in hour meter defective	Replace	–

W1013718

GAUGES

Symptom	Probable Cause	Solution	Reference Page
Fuel Gauge Does Not Function	Fuel lever sensor (tank unit) defective	Replace	9-S21
	Wiring harness disconnected or improperly connected (between panel board and fuel level sensor)	Repair or replace	–
	Circuit in panel board defective	Replace	–
Coolant Temperature Gauge Does Not Function	Coolant temperature gauge defective	Replace	9-S21
	Coolant temperature sensor defective	Replace	9-S21
	Wiring harness disconnected or improperly connected (between panel board and coolant temperature sensor)	Repair or replace	–
	Circuit in panel board defective	Replace	–

W1013718

2. SERVICING SPECIFICATIONS

STARTER MOTOR

Item		Factory Specification	Allowable Limit
Commutator	O.D.	29.0 mm 1.14 in.	28.0 mm 1.10 in.
Mica	Undercut	0.50 to 0.80 mm 0.019 to 0.031 in.	0.20 mm 0.008 in.
Brush	Length	16.0 mm 0.63 in.	12 mm 0.47 in.

W1013874

ALTERNATOR

Brush	Length	10.5 mm 0.413 in.	8.4 mm 0.331 in.
Slip Ring	O.D.	14.4 mm 0.567 in.	14.0 mm 0.551 in.

W1013973

GLOW PLUG

Glow Plug	Resistance	Approx. 0.9 Ω	—
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W1011815

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-9.)

Item	N-m	kgf-m	ft-lbs
Alternator pulley nut	58.3 to 78.9	5.95 to 8.05	43.0 to 58.2
Starter terminal nut	5.9 to 11.8	0.6 to 1.2	4.3 to 8.7

W1012736

4. CHECKING, DISASSEMBLING AND SERVICING



CAUTION

- To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.
- Never remove the battery cap while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are 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] CHECKING AND ADJUSTING

(1) Battery

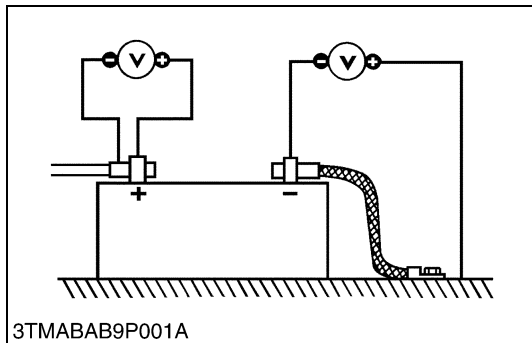


Battery Voltage

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	Reference value	More than 12 V
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W1012562

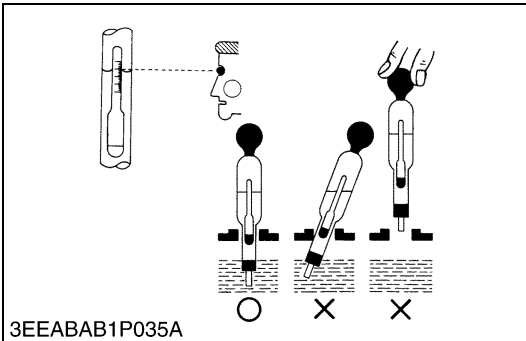
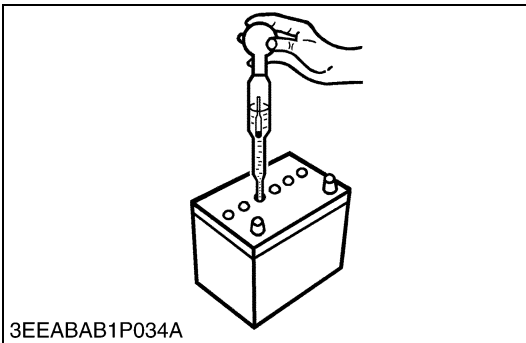


Battery Terminal Connection

1. Turn the main switch on, and turn on the head light.
2. Measure the voltage across the battery's positive terminal post and the cable terminal, and the voltage across the battery's negative terminal post and the chassis.
3. If the measurement exceeds the factory specification, clean the battery terminal posts and cable clamps, and tighten them firmly.

Potential difference	Reference value	Less than 0.1 V
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W1012663



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 decrease of 1 °C (0.0004 with a decrease of 1 °F).

Therefore, using 20 °C (68 °F) as a reference, the specific gravity reading must be corrected by the following formula :

- Specific gravity at 20 °C = Measured value + 0.0007 x (electrolyte temperature - 20 °C)
- Specific gravity at 68 °F = Measured value + 0.0004 x (electrolyte temperature - 68 °F)

Specific Gravity	State of Charge
1.260 Sp. Gr.	100 % Charged
1.230 Sp. Gr.	75 % Charged
1.200 Sp. Gr.	50 % Charged
1.170 Sp. Gr.	25 % Charged
1.140 Sp. Gr.	Very Little Useful Capacity
1.110 Sp. Gr.	Discharged

At an electrolyte temperature of 20 °C (68 °F)

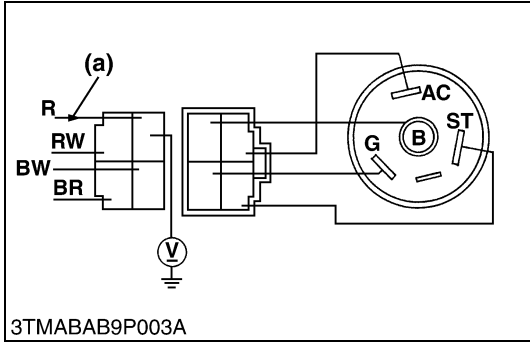
(a) Good

(b) Bad

(c) Bad

W1022849

(2) Main Switch



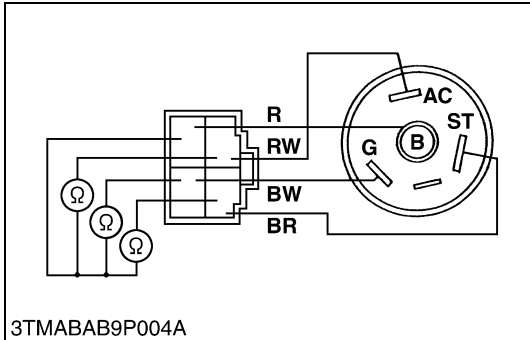
Connector Voltage

1. Measure the voltage with a voltmeter across the connector **B** terminal and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector B terminal – Chassis	Approx. battery voltage
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(a) From Battery Positive Terminal

W102319

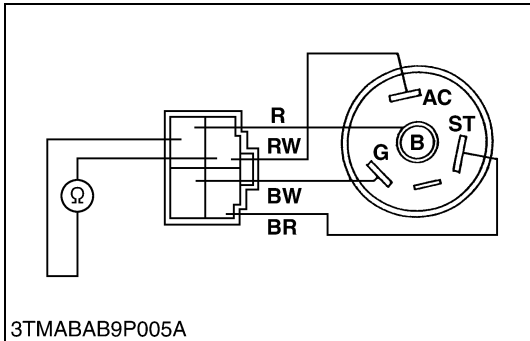


Main Switch Key at OFF Position

1. Turn the main switch off.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **AC** terminal, **B** terminal and **ST** terminal, and **B** terminal and **G** terminal.
3. If infinity is not indicated, the contact of the main switch are faulty.

Resistance	B terminal – AC terminal	Infinity
	B terminal – ST terminal	Infinity
	B terminal – G terminal	Infinity

W1023217

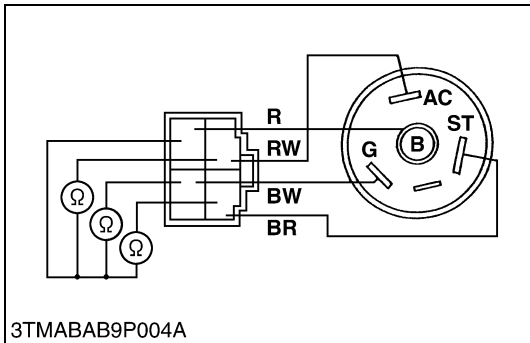


Main Switch Key at ON Position

1. Turn the main switch on.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **AC** terminal.
3. If 0 ohm is not indicated, the **B-AC** contacts of the main switch are faulty.

Resistance	B terminal – AC terminal	0 Ω
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W1024636

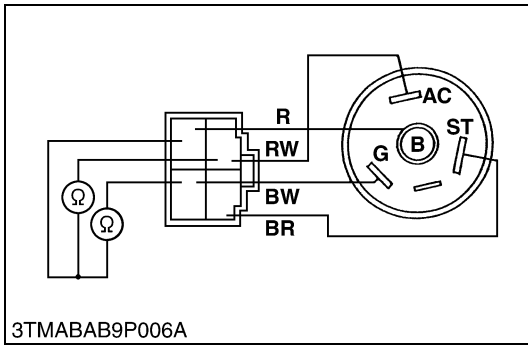


Main Switch Key at START Position

1. Turn and hold the main switch key at the **START** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, and across the **B** terminal and the **AC** terminal, and across the **B** terminal and the **ST** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	B terminal – G terminal	0 Ω
	B terminal – ST terminal	0 Ω
	B terminal – AC terminal	0 Ω

W1025150



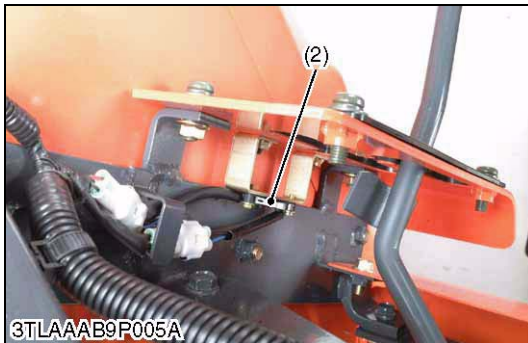
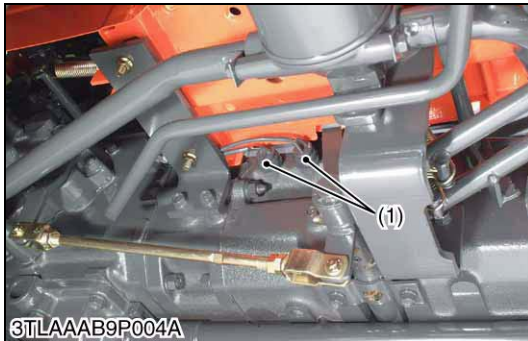
Main Switch Key at PREHEAT Position

1. Turn and hold the main switch key at the **PREHEAT** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, and across the **B** terminal and the **AC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	B terminal – G terminal	0 Ω
	B terminal – AC terminal	0 Ω

W1029974

(3) Safety Switch



Safety Switch Continuity (Manual Transmission Type)

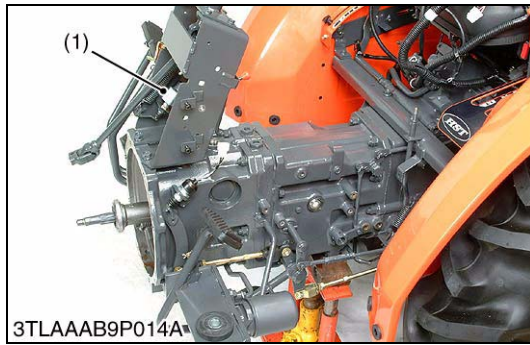
1. Remove the safety switch leads.
2. Connect the circuit tester to the safety switch leads.
3. Measure the resistance between leads.
4. If the safety switch is defective, replace it.

Resistance (Across switch terminal)	When switch is pushed	0 Ω
	When switch is released	Infinity

(1) Safety Switch for PTO Gear Shift Lever

(2) Safety Switch for Range Gear Shift Lever

W1015515

**HST Pedal Switch (HST Type)**

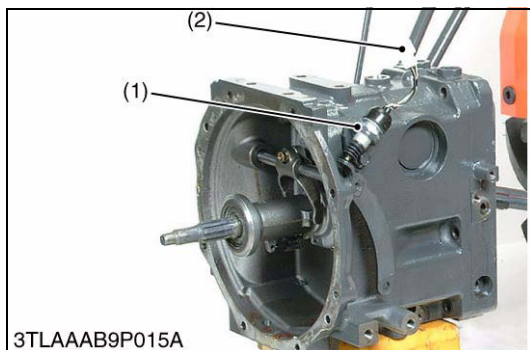
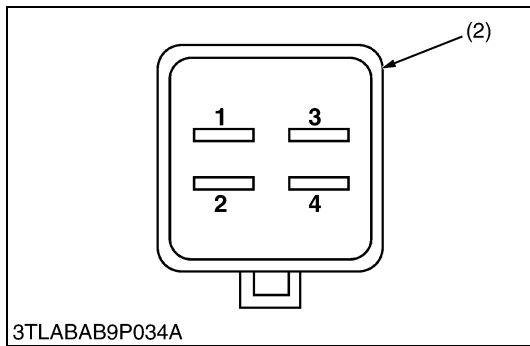
1. Disconnect the HST neutral switch connector.
2. Remove the HST neutral switch (1).
3. Push the switch and measure the resistance between terminal **1** and **2**, and between terminal **3** and **4**.
4. If 0 ohm is not indicated, switch is faulty.

Resistance while pushing the switch	Terminal 1 - 2	0 Ω
	Terminal 3 - 4	

(1) HST Neutral Switch

(2) Connector

W1035499

**Clutch Pedal Switch (HST Type)**

1. Disconnect the clutch pedal switch connector (2).
2. Measure the resistance between connector terminals while pushing the clutch pedal switch.
3. If 0 ohm is not indicated, switch is faulty.

(1) Clutch Pedal Switch

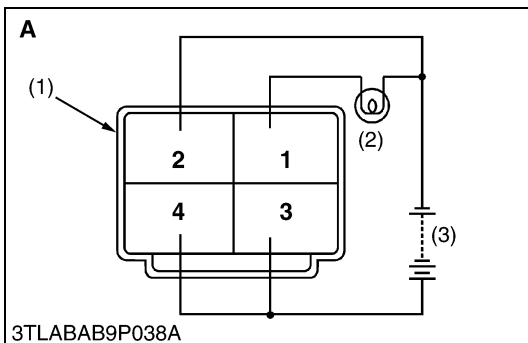
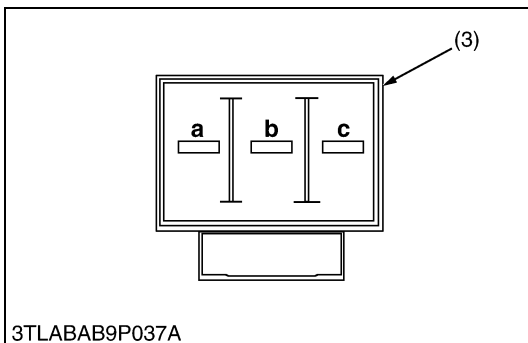
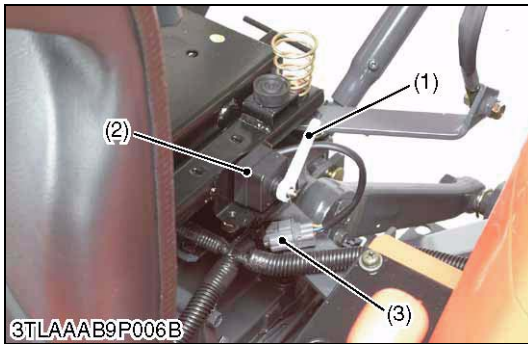
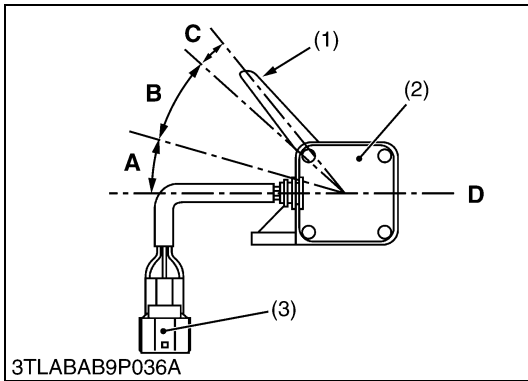
(2) Clutch Pedal Switch Connector

W1035966

(4) Operator Presence Control**Checking System**

1. Sit on operator's seat.
2. Set the parking brake and stop the engine.
3. Shift the range gear shift lever to "**NEUTRAL**" position.
4. Shift the PTO gear shift lever to "**OFF**" position.
5. Fully depress the clutch pedal.
6. Start the engine.
7. Engage the PTO gear shift lever.
8. Stand up. (Do not get off the machine.)
9. The engine must shut off after approximately 1 second.

W1037456



Checking Seat Switch

1. Remove the seat.
2. Disconnect the seat switch connector (3).
3. Change the sensor bar angle (1) and measure the resistance between connector terminals, referring to the table below.
4. If the measurement does not between as table, switch is faulty.

Sensor bar angle	Measuring terminal	Resistance
Approx. 18 ° (Angle A)	a - c	0 Ω
	a - b, b - c	Infinity
Approx. 25 ° (Angle B)	a - b, a - c, b - c	Infinity
Approx. 5 ° (Angle C)	b - c	0 Ω
	a - b, a - c	Infinity

- (1) Sensor Bar
 (2) Seat Switch
 (3) Seat Switch Connector

D : Reference Line (Seat Suspension Plate Line)

W1039923

Checking OPC Timer

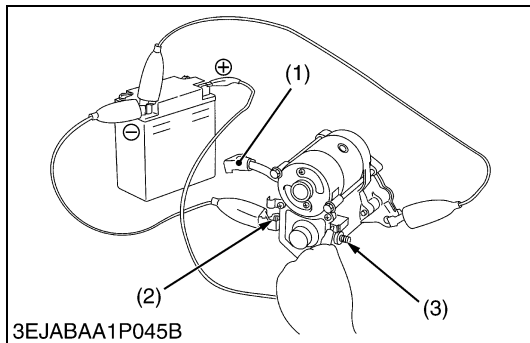
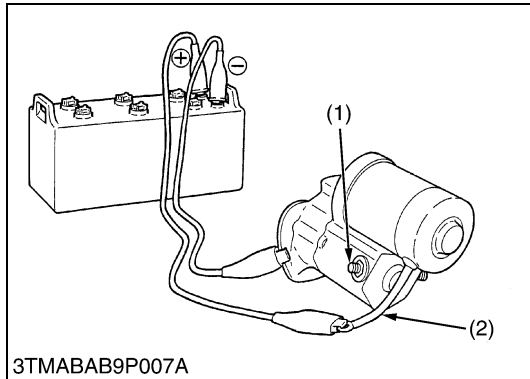
1. Remove the timer. (OPC timer is located behind the panel.)
2. Connect jumper leads across the battery positive terminal and the timer 3 terminal, and across the battery positive terminal and the timer 4 terminal.
3. Connect jumper leads across the battery negative terminal and the timer 2 terminal, and across the battery negative terminal and the bulb terminal.
4. Connect jumper leads across the timer 1 terminal and the bulb terminal.
5. The bulb lights up when disconnecting a jumper lead from the 3 terminal 0.7 to 1.3 seconds late, the timer is proper.

- (1) OPC Timer
 (2) Load (Lamp)
 (3) Battery (12 V)

A : OPC Timer Relay Side Connector
 4A

W1042300

(5) Starter and Starter Relay



Starter Motor B Terminal Voltage

1. Measure the voltage across the **B** terminal and chassis.
2. If the voltage differs from the battery voltage, check the battery's cable.

Voltage	Factory spec.	Approx. battery voltage
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W1013797

Motor Test



- **Secure the starter to prevent it from jumping up and down while testing the motor.**

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter **C** terminal (1).
5. Connect a jumper lead from the connecting lead (2) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter motor housing and the battery negative terminal post.
7. If the motor does not run, check the motor.

(1) C Terminal

(2) Connecting Lead

W1014267

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 (1) from the starter **C** terminal (2).
5. Connect a jumper lead from the starter **S** terminal (3) 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

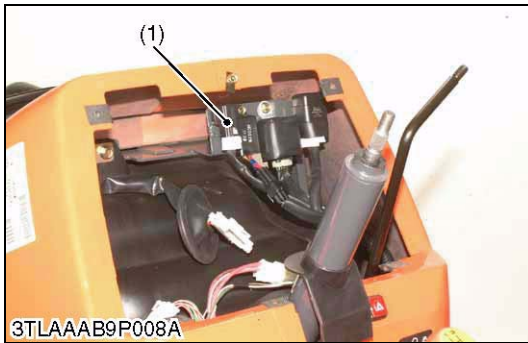
- **This test should be carried out for a short time, about 3 to 5 seconds.**

(1) Connecting Lead

(3) S Terminal

(2) C Terminal

W1014283



3TLAAB9P008A

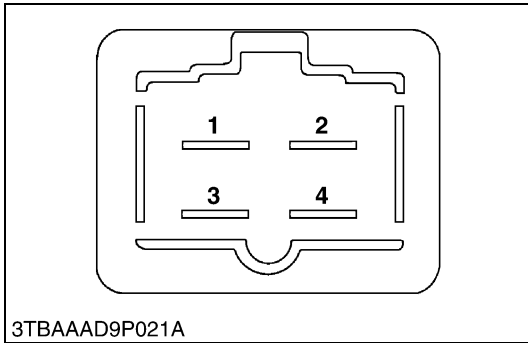
Starter Relay

1. Open the panel board and remove the starter relay.
2. Apply battery voltage between terminal 2 and 4, and check for continuity between terminal 1 and 3.
3. If 0 ohm is not indicated, renew the starter relay.

Resistance	1 terminal – 3 terminal	0 Ω
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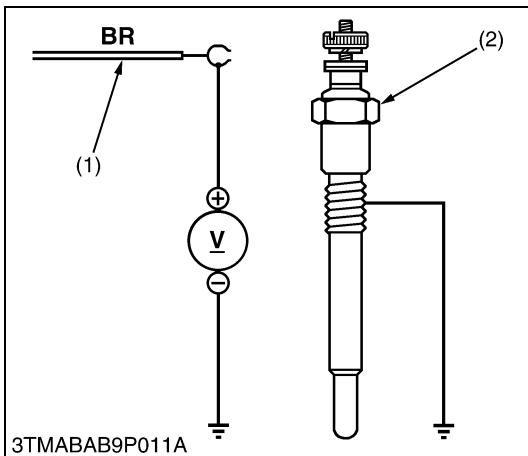
(1) Starter Relay

W1015050



3TBAAAD9P021A

(6) Glow Control System



3TMABAB9P011A

Glow Plug Lead Terminal Voltage

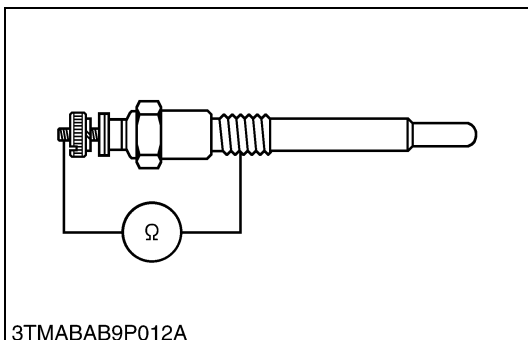
1. Disconnect the wiring lead (1) from the glow plug (2) after turning the main switch off.
2. Turn the main switch key to the "PREHEAT" position, and measure the voltage between the lead terminal and the chassis.
3. Turn the main switch key to the "START" position, and measure the voltage between the lead terminal and the chassis.
4. If the voltage at either position differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage (Lead terminal - Chassis)	Main switch key at "PREHEAT"	Approx. battery voltage
	Main switch key at "START"	Approx. battery voltage

(1) Wiring Lead (Positive)

(2) Glow Plug

W1025885



3TMABAB9P012A

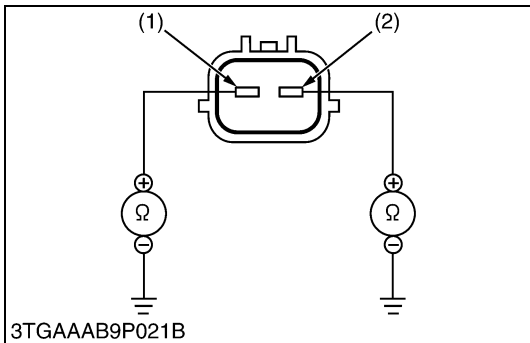
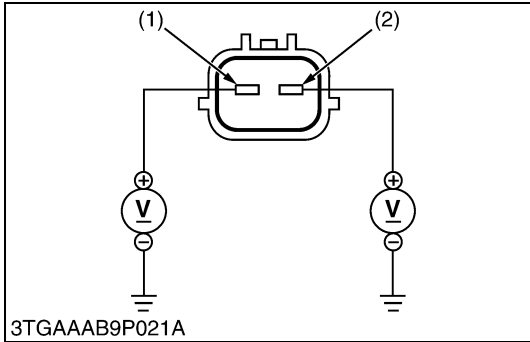
Glow Plug Continuity

1. Disconnect the lead from the glow plugs.
2. Measure the resistance between the glow plug terminal and the chassis.
3. If 0 ohm is indicated, the screw at the tip of the glow plug and the housing are short-circuited.
4. If the factory specification is not indicated, the glow plug is faulty.

Glow plug resistance	Factory spec.	Approx. 0.9 Ω
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W1015115

(7) Engine Stop Solenoid



Connector Voltage

1. Disconnect the **2P** connector from engine stop solenoid.
2. Turn the main switch key to the "ON" position.
3. Measure the voltage between the terminal **1**, terminal **2** and body.
4. If the voltage differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage	Terminal 1 - Body	Approx. battery voltage
	Terminal 2 - Body	

(1) **1** Terminal

(2) **2** Terminal

W1018279

Stop Solenoid Coil

1. Disconnect the **2P** connector from engine stop solenoid.
2. Measure the resistance between the terminal **1**, terminal **2** of engine stop solenoid and body.
3. If resistance differs from the factory specification, the coil is faulty.

Resistance	Terminal 1 - Body	Approx. 0.375 Ω
	Terminal 2 - Body	Approx. 15.6 Ω

(1) Terminal **1** (Pulling Coil)

(2) Terminal **2** (Holding Coil)

W1026651



Glow Relay

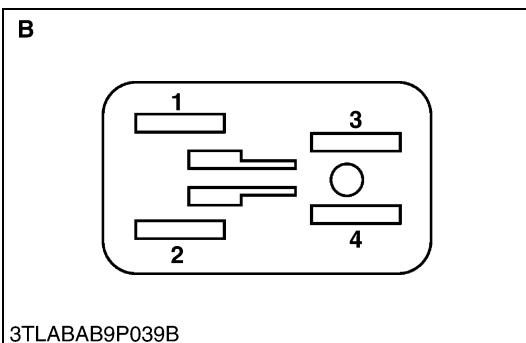
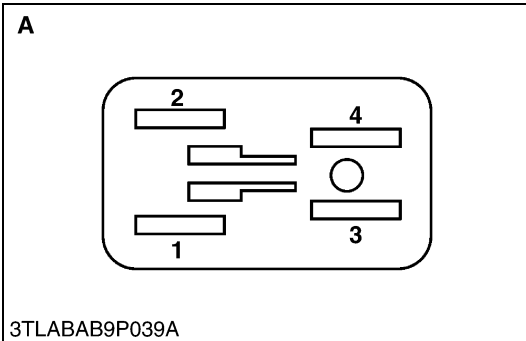
1. Turn the main switch off.
2. Disconnect the **4P** connector from glow relay.
3. Measure the voltage across the terminal **3** (Positive) and chassis (Negative).
4. If the voltage differs from the battery voltage, the wiring harness is faulty.
5. Turn the main switch on.
6. Measure the voltage across the terminal **1** (Positive) and chassis (Negative).
7. If the voltage differs from the battery voltage, the wiring harness is faulty.

(1) Glow Relay

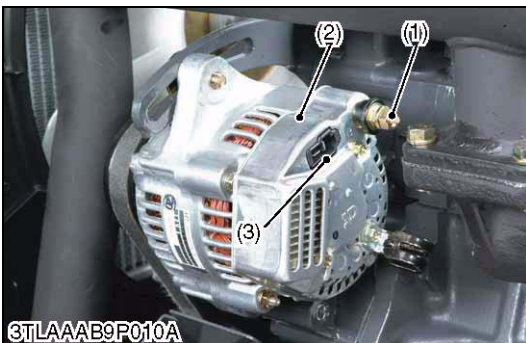
A : Connector of Wire Harness Side

B : Conector of Flow Relay

W1056501



(8) Charging System



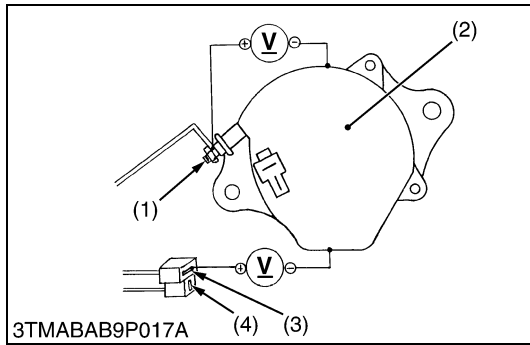
Alternator

1. Disconnect the **2P** connector (3) from alternator after turning the main switch **OFF**.
2. Perform the following checkings.

(1) **B** Terminal
(2) Alternator

(3) **2P** Connector

W1027725

**Connector Voltage**

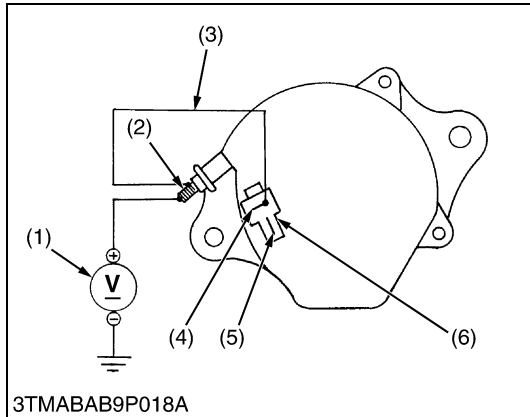
1. Turn the main switch **OFF**. Measure the voltage between the **B** terminal (1) and the chassis.
2. Turn the main switch **ON**. Measure the voltage between the **IG** terminal (3) and the chassis.

Voltage (Main switch at OFF)	B terminal – Chassis	Approx. battery voltage
Voltage (Main switch at ON)	IG terminal – Chassis	Approx. battery voltage

(1) **B** Terminal
(2) Alternator

(3) **IG** Terminal
(4) **L** Terminal

W1047551

**No-Load Test**

1. Connect the **2P** connector (6) to previous positions of the alternator after turning the main switch **OFF**.
2. Connect the jumper lead (3) between **IG** terminal (4) and **B** terminal (2).
3. Start the engine and then set at idling speed.
4. Disconnect the negative cable from the battery.
5. Measure the voltage between the **B** terminal (2) and the chassis.
6. If the measurement is less than the factory specification, disassemble the alternator and check the IC regulator.

Voltage	Factory spec.	More than 14 V
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(Reference)

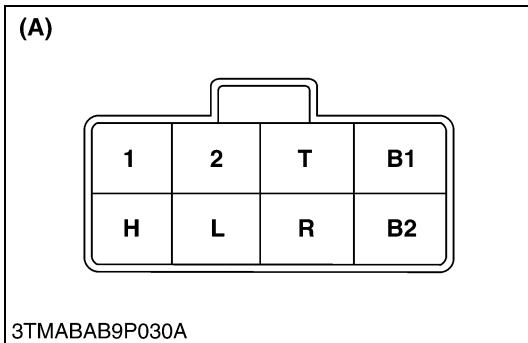
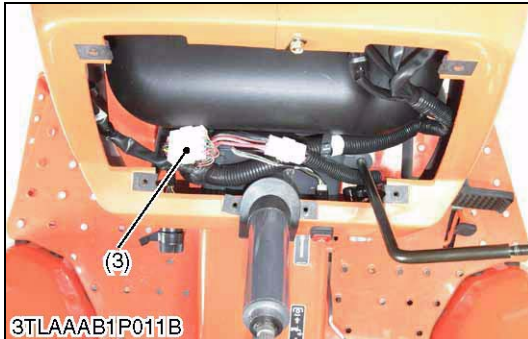
- Once the engine has started, the alternator temperature rises quickly up to an ambient temperature of 70 to 90 °C (158 to 194 °F). As the temperature goes higher than 50 °C (122 °F), the alternator voltage slowly drops; at higher than 100 °C (212 °F), it drops by about 1 V.

(1) Voltmeter
(2) **B** Terminal
(3) Jumper Lead

(4) **IG** Terminal
(5) **L** Terminal
(6) **2P** Terminal

W1018478

(9) Combination Switch



Remove the Combination Switch

1. Remove the panel board (1), and disconnect the combination switch connector **8A** (3) after turning the main switch **OFF** position.
2. Perform the following checkings.

- | | |
|------------------------|--|
| (1) Combination Switch | (2) Combination Switch 8A Connector |
| (2) Panel Board | |

W10207990

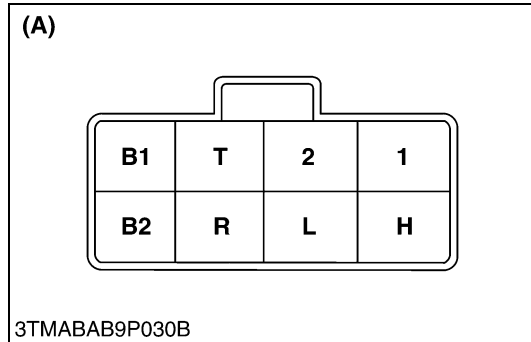
Conector Voltage

1. Disconnect the connector **8A** from the combination switch.
2. Measure the voltage with a voltmeter across the connector **B1** terminal and chassis when the main switch is **OFF** position.
3. If the voltage differs from the battery voltage, the wiring harness is faulty.
4. Measure the voltage with a voltmeter across the connector **B2** terminal and chassis when the main switch is **ON** position.
5. If the voltage differs from the battery voltage, check the wiring harness and main switch.

Voltage	Main switch at "OFF" position	B1 terminal – Chassis	Battery voltage
	Main switch at "ON" position	B2 terminal – Chassis	

(A) Wire Harness Side Connector 8A

W1073019

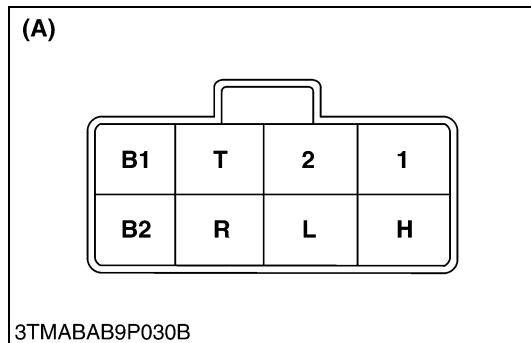
(10) Lighting Switch**Head Light Switch Continuity when Setting Switch at OFF Position**

1. Disconnect the connector **8P** from the combination switch.
2. Set the light switch to the **OFF** position.
3. Measure the resistance with an ohmmeter across the **B1** terminal to the **T** terminal, the **B1** terminal to the **1** terminal and the **B1** terminal to the **2** terminal.
4. If infinity is not indicated, renew the switch.

Resistance (Switch at OFF position)	B1 terminal - T terminal	Infinity
	B1 terminal - 1 terminal	
	B1 terminal - 2 terminal	

(A) Combination Switch Side**Connector 8P**

W1050507

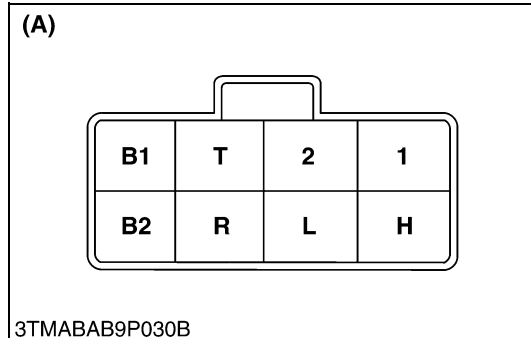
**Head Light Switch Continuity when Setting Switch at ON1 Position**

1. Measure the resistance with an ohmmeter across the **B1** terminal to the **T** terminal and the **B1** terminal to the **1** terminal.
2. If 0 ohm is not indicated, renew the head light switch.

Resistance (Switch at HI-BEAM position)	B1 terminal - T terminal	0 Ω
	B1 terminal - 1 terminal	

(A) Combination Switch Side**Connector 8P**

W1052500

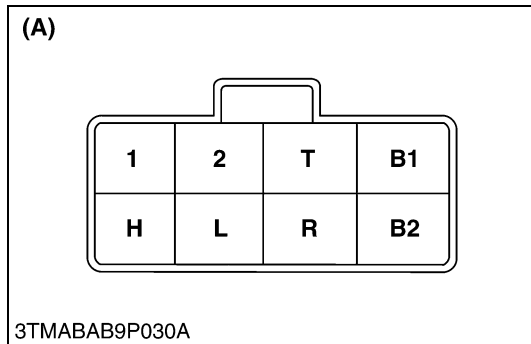
**Head Light Switch Continuity when Setting Switch at ON2 Position**

1. Measure the resistance with an ohmmeter across the **B1** terminal to the **T** terminal and the **B1** terminal to the **2** terminal.
2. If 0 ohm is not indicated, renew the head light switch.

Resistance (Switch at LO-BEAM position)	B1 terminal - T terminal	0 Ω
	B1 terminal - 2 terminal	

(A) Combination Switch Side**Connector 8P**

W1053324

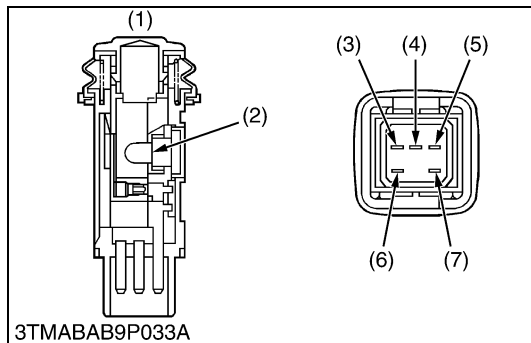
(11) Turn Signal Switch**Connector Voltage**

1. Disconnect the connector **8A** from the combination switch.
2. Measure the voltage with a voltmeter across the connector **B2** terminal and chassis when the main switch is **ON** position.
3. If the voltage differs from the battery voltage, check the wiring harness.

Voltage	Main switch at "ON" position	B2 terminal – Chassis	Battery voltage
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(A) Wire Harness Side Connector 8A

W1053757

(12) Hazard Switch**Hazard Switch Continuity**

1. Measure the resistance with ohmmeter across the **a** terminal and **c** terminal, and across the **d** terminal and **e** terminal.
2. If the measurement is not same as 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) Hazard Switch

(2) Bulb

(3) a Terminal

(4) b terminal

(5) c Terminal

(6) d terminal

(7) e terminal

W1055122

(13) Hazard Unir



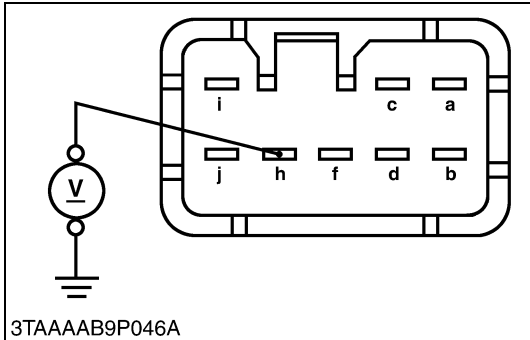
Hazard Unit

1. Disconnect the connector from the hazard unit (1).
2. Measure the voltage with a voltmeter across the **h** terminal and chassis.
3. If the voltage differs from the battery voltage, the wiring harness is faulty.

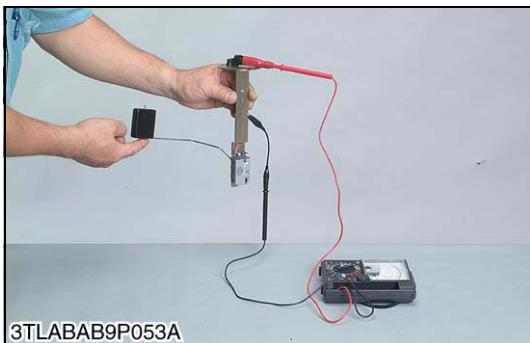
Voltage	h Terminal - Chassis	Approx. battery voltage
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(1) Hazard Unit

W1055871



(14) Fuel Level Sensor



Fuel Level Sensor

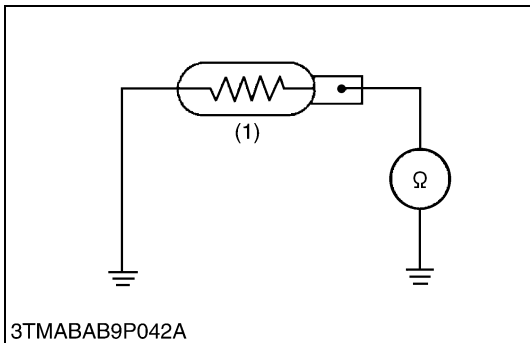
1) Sensor Continuity

1. Remove the fuel level sensor from the fuel tank.
2. Measure the resistance across the sensor terminal and its body.
3. If the reference value 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

W102625330

(15) Coolant Temperature Sensor



Coolant Temperature Sensor Continuity

1. Measure the resistance across the sensor terminal and the chassis.
2. If the measurement is not indicated, the sensor is faulty.

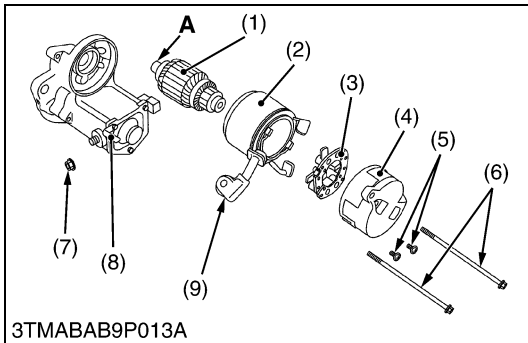
Resistance (Sensor terminal - Chassis)	Factory spec.	Approx. 16 Ω at 120 °C (248 °F) Approx. 50 Ω at 80 °C (176 °F) Approx. 149 Ω at 50 °C (122 °F)
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(1) Coolant Temperature Sensor

W1022725

[2] DISASSEMBLING AND ASSEMBLING

(1) Starter



Disassembling Motor

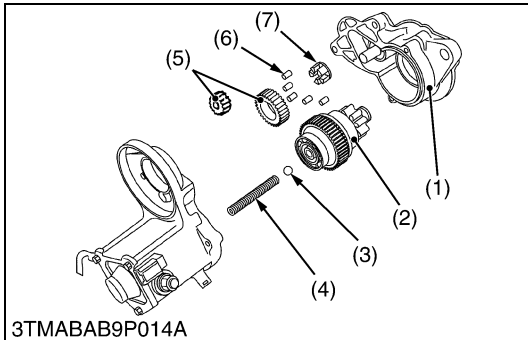
1. Disconnect the connecting lead (9) from the magnet switch (8).
2. Remove the screws (6), and then separate the end frame (4), yoke (2) and armature (1).
3. Remove the two screws (5), and then take out the brush holder (3) from the end frame (4).

(When reassembling)

- Apply grease to the spline teeth (A) of the armature (1).

(1) Armature	(7) Nut
(2) Yoke	(8) Magnet Switch
(3) Brush Holder	(9) Connecting Lead
(4) End Frame	
(5) Screw	
(6) Screw	A : Spline Teeth

W10162880



Disassembling Magnet Switch

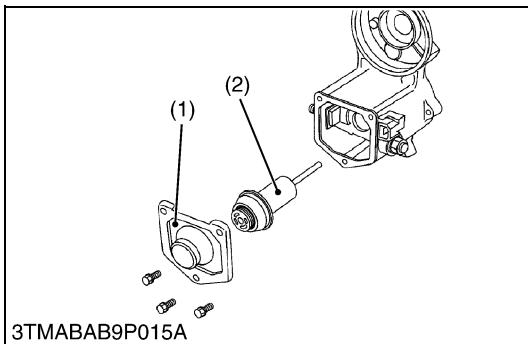
1. Remove the drive end frame (1) mounting screws.
2. Take out the overrunning clutch (2), ball (3), spring (4), gears (5), rollers (6) and retainer (7).

(When reassembling)

- Apply grease to the gear teeth of the gears (5) and overrunning clutch (2), and ball (3).

(1) Drive End Frame	(5) Gear
(2) Overrunning Clutch	(6) Roller
(3) Ball	(7) Retainer
(4) Spring	

W10167280

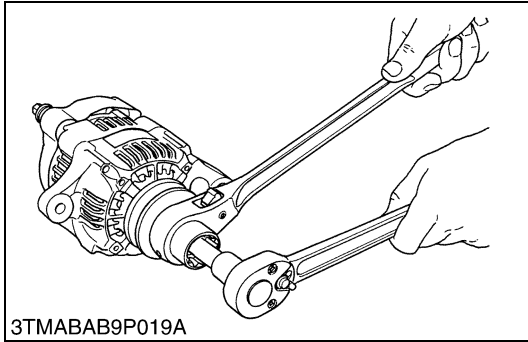


Plunger

1. Remove the end cover (1).
2. Take out the plunger (2).

(1) End Cover	(2) Plunger
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W10168830

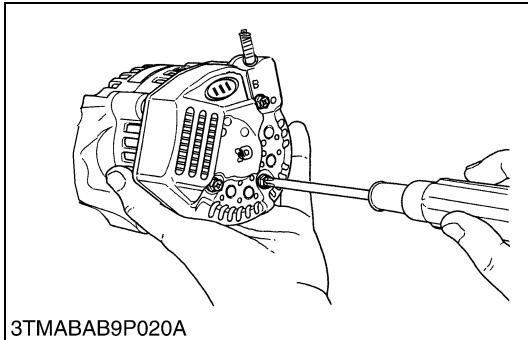
(2) Alternator**Pulley**

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)

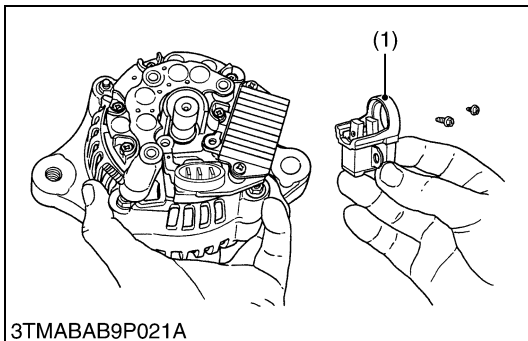
Tightening torque	Pulley nut	58.3 to 78.9 N·m 5.95 to 8.05 kgf·m 43.0 to 58.2 ft-lbs
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W10187280

**Rear End Cover**

1. Unscrew the three rear end cover screws and the **B** terminal nut, and remove the rear end cover.

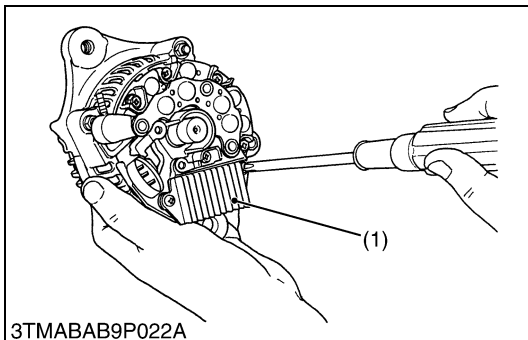
W10189820

**Brush Holder**

1. Unscrew the two screws holding the brush holder, and remove the brush holder (1).

(1) Brush Holder

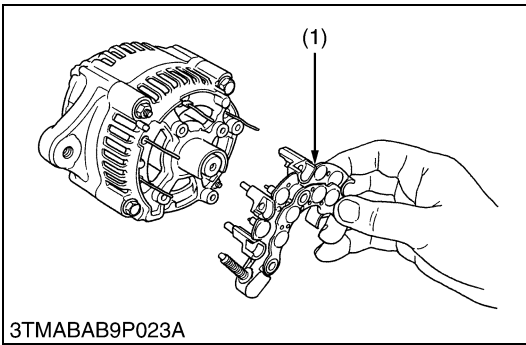
W10190540

**IC Regulator**

1. Unscrew the three screws holding the IC regulator, and remove the IC regulator (1).

(1) IC Regulator

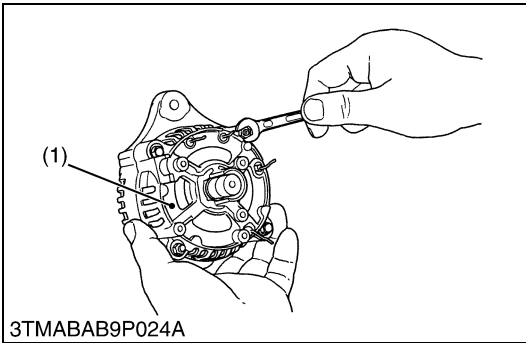
W10191230

**Rectifier**

1. Remove the four screws holding the rectifier and the stator lead wires.
2. Remove the rectifier (1).

(1) Rectifier

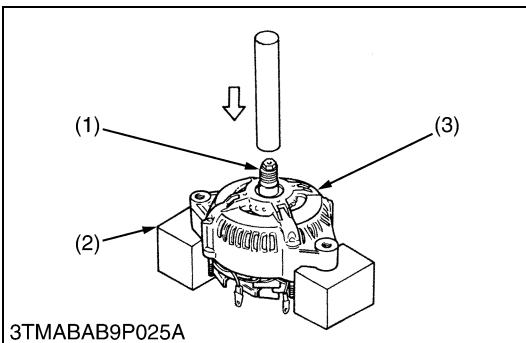
W10191920

**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

**Rotor**

1. Press out the rotor (1) from drive end frame (3).

■ IMPORTANT

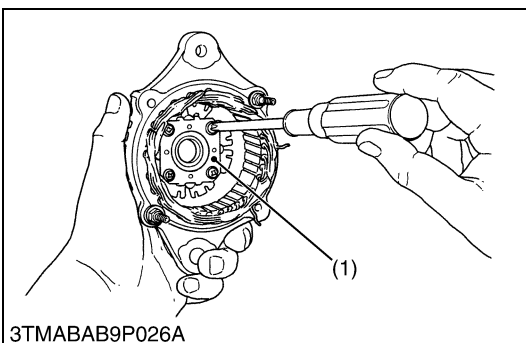
- Take special care not to drop the rotor and damage the slip ring or fan, etc..

(1) Rotor

(3) Drive End Frame

(2) Block

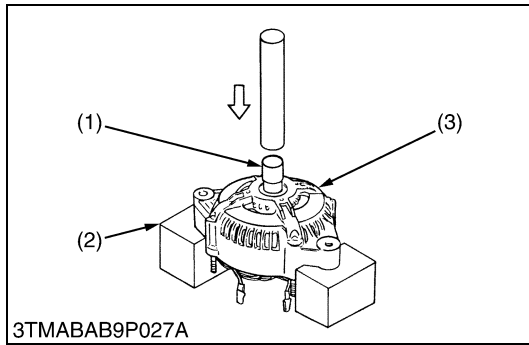
W10194380

**Retainer Plate**

1. Unscrew the four screws holding the retainer plate, and remove the retainer plate (1).

(1) Retainer Plate

W10195420

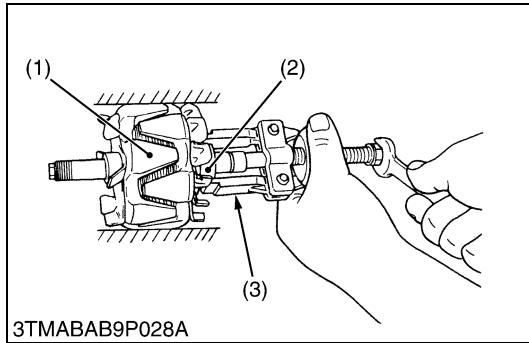
**Bearing on Drive End Side**

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

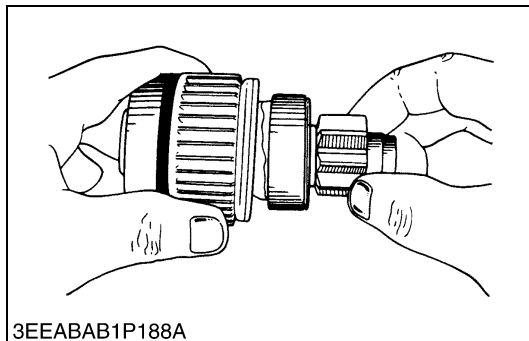
**Bearing at Slip Ring Side**

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

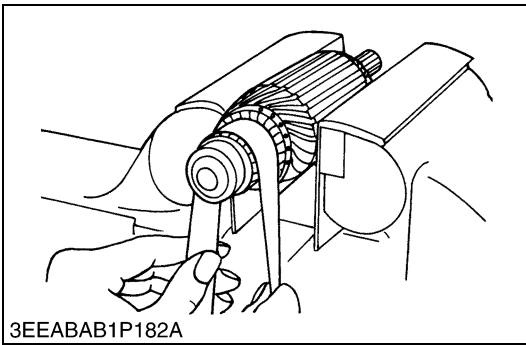
(3) Puller

W10197010

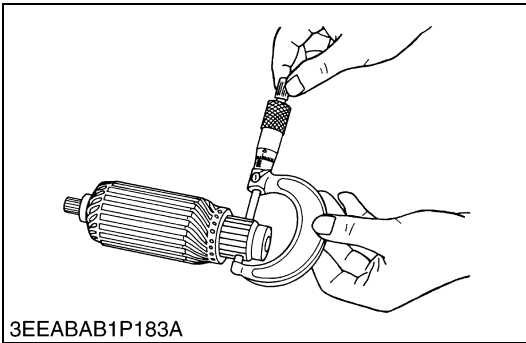
[3] SERVICING**(1) Starter****Overrunning Clutch**

1. Inspect the pinion for wear or damage.
2. If there is any defect, replace the overrunning clutch assembly.
3. Check that the pinion turns freely and smoothly in the overrunning direction and does not slip in the cranking direction.
4. If the pinion slips or does not rotate in the both directions, replace the overrunning clutch assembly.

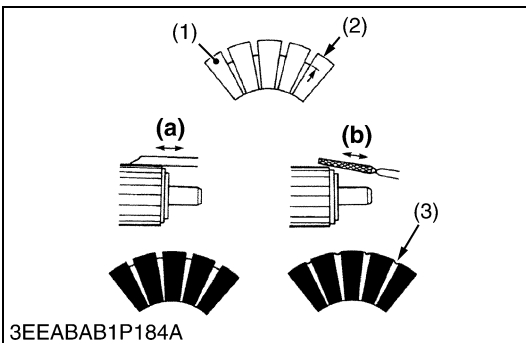
W10169900



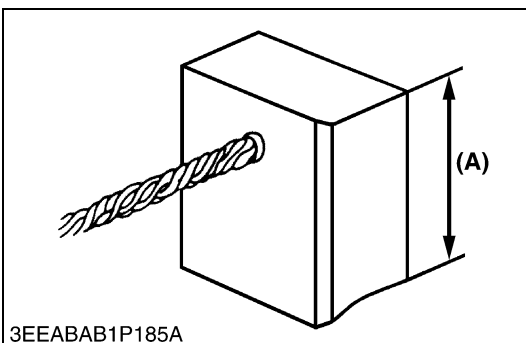
3EEABAB1P182A



3EEABAB1P183A



3EEABAB1P184A



3EEABAB1P185A

Commutator and Mica

1. Check the contact face of the commutator for wear, and grind the commutator with emery paper if it is slightly worn.
2. Measure the commutator O.D. with an outside micrometer at several points.
3. If the minimum O.D. is less than the allowable limit, replace the armature.
4. If the difference of the O.D.'s exceeds the allowable limit, correct the commutator on a lathe to the factory specification.
5. Measure the mica undercut.
6. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.

Commutator O.D.	Factory spec.	30.0 mm 1.181 in.
	Allowable limit	29.0 mm 1.142 in.

Difference of O.D.'s	Factory spec.	Less than 0.02 mm 0.0008 in.
	Allowable limit	0.05 mm 0.0020 in.

Mica undercut	Factory spec.	0.50 to 0.80 mm 0.0197 to 0.0315 in.
	Allowable limit	0.20 mm 0.0079 in.

- (1) Segment
(2) Undercut
(3) Mica

- (a) Correct
(b) Incorrect

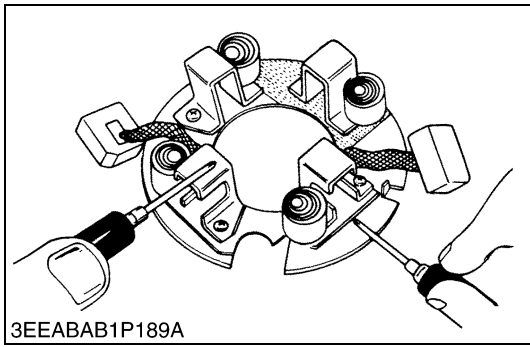
W10170920

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.	15.0 mm 0.591 in.
	Allowable limit	11.0 mm 0.433 in.

W10175440

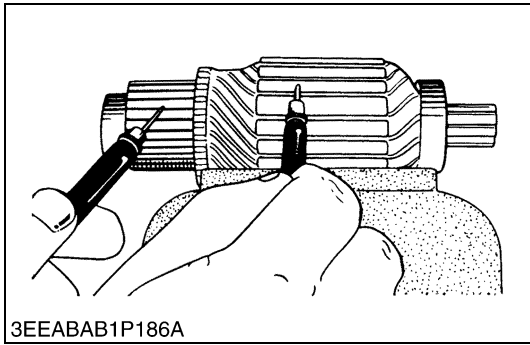


Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

Resistance	Brush holder – Holder support	Infinity
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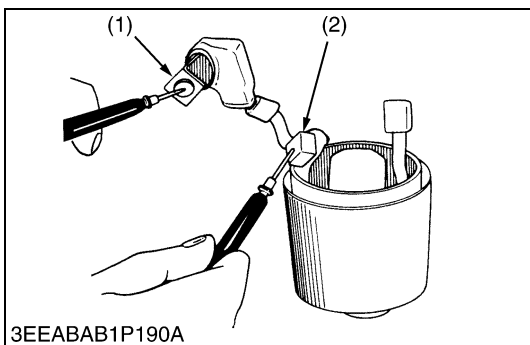
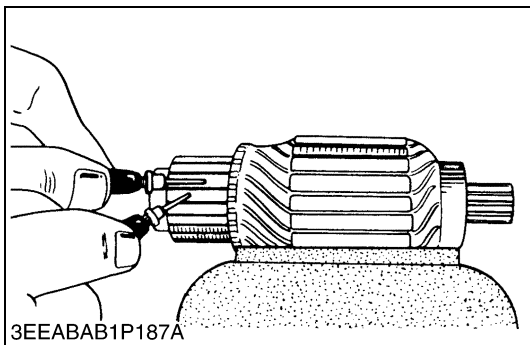
W10176720



Armature Coil

1. Check the continuity across the commutator and armature coil with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

W10177670

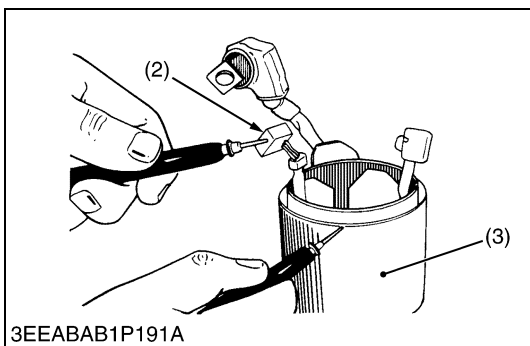


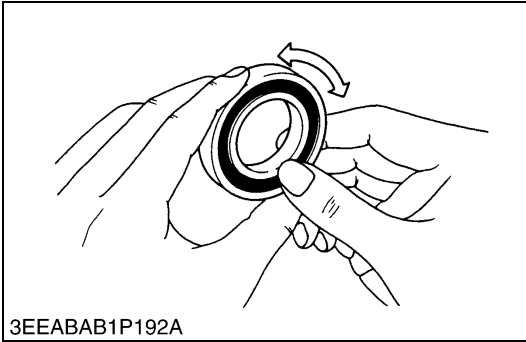
Field Coil

1. Check the continuity across the lead (1) and brush (2) with an ohmmeter.
2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush (2) and yoke (3) with an ohmmeter.
4. If it conducts, replace the yoke assembly.

- (1) Lead
- (2) Brush
- (3) Yoke

W10180150



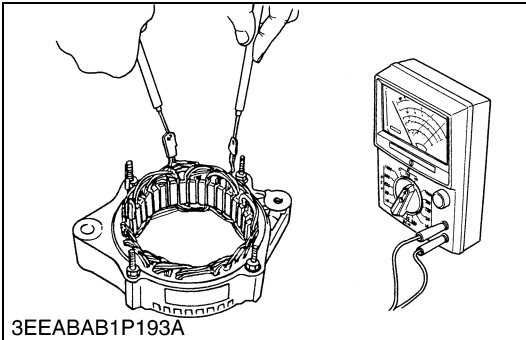
(2) Alternator

3EEABAB1P192A

Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

W10197900



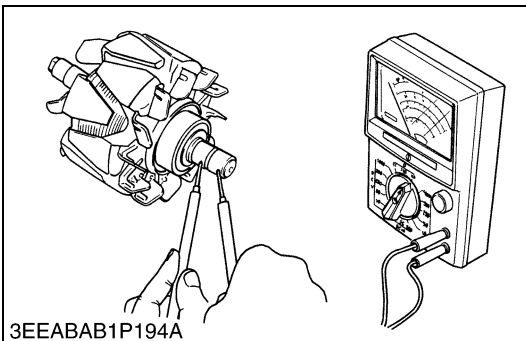
3EEABAB1P193A

Stator

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory spec.	Less than 1.0 Ω
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W10199640



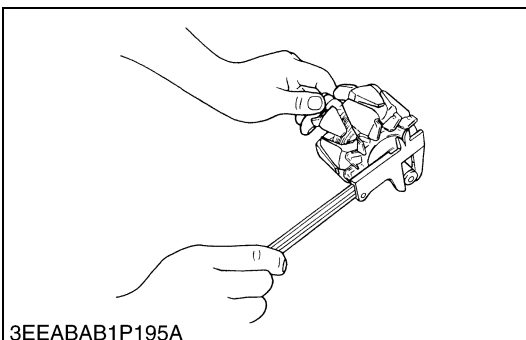
3EEABAB1P194A

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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W10200940



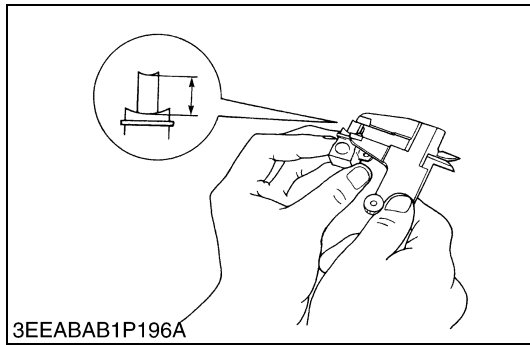
3EEABAB1P195A

Slip Ring

1. Check the slip ring for score.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the allowable limit, replace it.

Slip ring O.D.	Factory spec.	14.4 mm 0.567 in.
	Allowable limit	14.0 mm 0.551 in.

W10202080

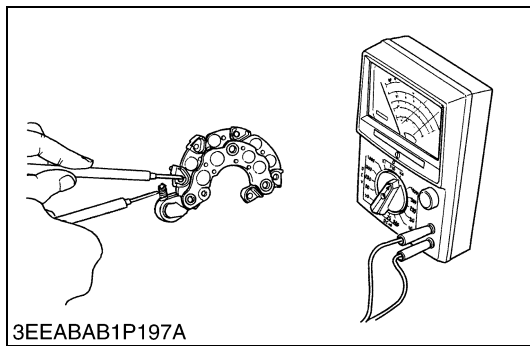


Brush Wear

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



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.

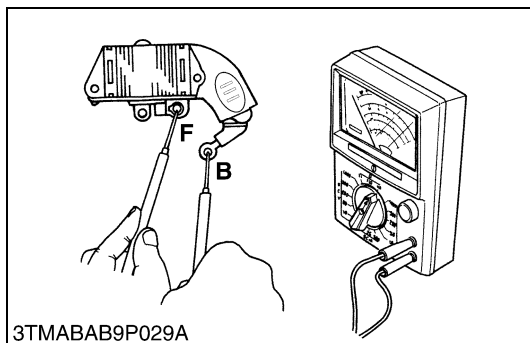
■ IMPORTANT

- 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



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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