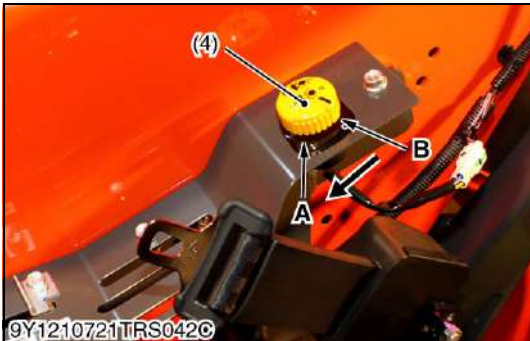
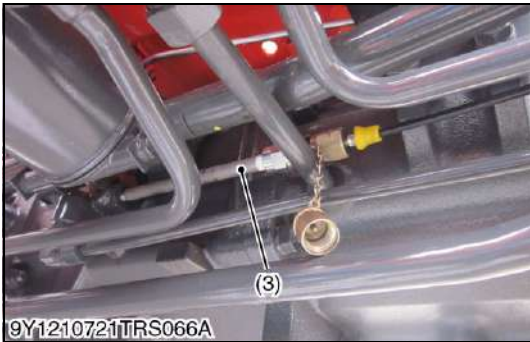
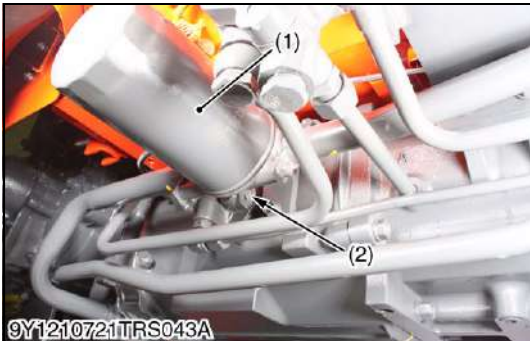


(2) HST Model



PTO Clutch Oil Operating Pressure

- 1. Remove the plug (2) from the PTO clutch solenoid valve.
- 2. Install the adaptor (3) to the PTO clutch solenoid valve.
- 3. Install the hydraulic cable and the gauge to the adaptor (3).
- 4. Start the engine.
- 5. Set the engine revolution to the idling speed.
- 6. Set the PTO clutch control switch (4) to **"ON"** position.
- 7. Measure the PTO clutch oil operation pressure.

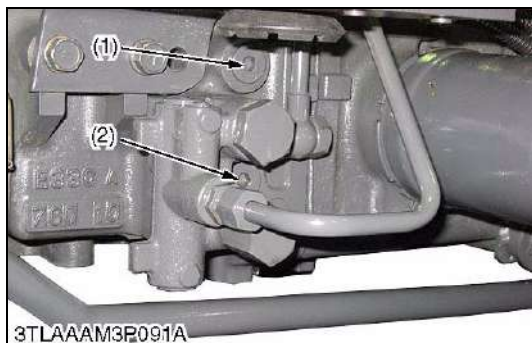
PTO clutch pressure	When PTO clutch control switch is set to "ON" position	2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm ² 335 to 384 psi
	When PTO clutch control switch is set to "OFF" position	No pressure

Condition

- Engine speed:
Idling speed
- Oil temperature:
40 to 60 °C (104 to 140 °F)

- (1) Hydraulic Oil Filter Cartridge **A: ON Position**
- (2) Plug (1/8) **B: OFF Position**
- (3) Adaptor
- (4) PTO Clutch Control Switch

9Y1211012TRS0016US0



Checking High Pressure Relief Valve Pressure

⚠ CAUTION

- When checking, park the machine on flat ground, apply the parking brake.
1. Remove the hex. socket head plug from **P1** or **P2** port. (**P2** is for forward and **P1** is for reverse.)
 2. Assemble adaptor **C** (07916-50371) and threaded joint (07916-50341) with the gasket between them.
 3. Install the assemble adaptor **C** and threaded joint to **P2** (forward) or **P1** (reverse) port.
 4. Install the cable, threaded joint in relief valve set pressure tester and high pressure gauge to threaded joint in order.
 5. Check to see that parking brake is applied.
 6. Operate the engine at maximum speed.
 7. Place the range gear shift lever in **H** position.
 8. Depress the HST pedal, and measure the check and high pressure relief valve pressure.
 9. If the measurement is not within the factory specification, check the check and high pressure relief valve assembly. (See page 3-S90.)

Check and high relief pressure (Oil temperature at 40 to 60 °C (104 to 140 °F))	Factory specification	33.4 to 36.3 MPa 340.0 to 370.0 kgf/cm ² 4836 to 5263 psi
--	-----------------------	--

■ IMPORTANT

- Measure quickly so that the relief valve may not be in operation more than 10 seconds.

■ NOTE

- Be sure to use high pressure gauge with over 40 MPa (400 kgf/cm², 5800 psi).

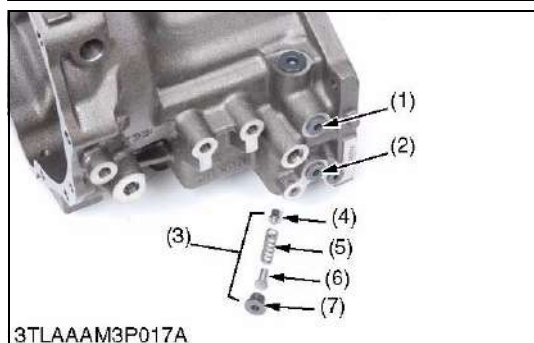
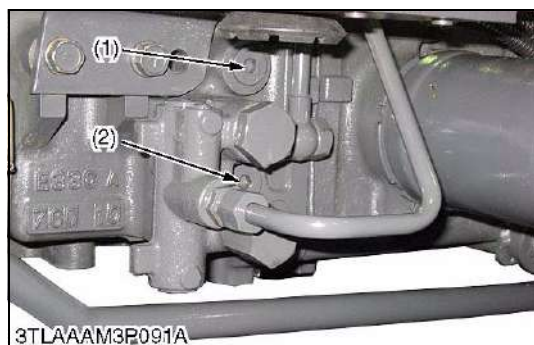
(When reassembling)

- Install the hex. socket head plug to the port with O-ring.

(1) **P1** Port (for Reverse)

(2) **P2** Port (for Forward)

9Y1211012TRS0017US0



Checking Charge Relief Pressure

⚠ CAUTION

- When checking, park the machine on flat ground, apply the parking brake.

■ NOTE

- Use a new transmission oil filter.

- Remove the hex. socket head plug from **P2** (or **P1**) port.
- Assemble adaptor **58** (07916-52391) and thread joint (07916-50341) with the gasket between them.
- Install the assembled adaptor **58** and thread joint to **P2** port.
- Install the cable, thread joint in relief valve set pressure tester and low pressure gauge to threaded joint in order.
- Place the range gear shift lever in neutral.
- Operate the engine at maximum speed.
- Release the HST pedal to set in neutral, and measure the charge pressure.
- If the measurement is not within the factory specifications, check charge relief valve (3) (see page 3-S91.) or adjust with adjusting shim.

■ NOTE

- Adjusting shim is located on between spring guide (6) and plug (7).

(Reference)

- Thickness of adjusting shim:
0.5 mm (0.02 in.) or 0.2 mm (0.008 in.)
- Pressure change per 0.5 mm (0.02 in.) of shim:
Approx. 125 kPa (1.27 kgf/cm², 18.1 psi)

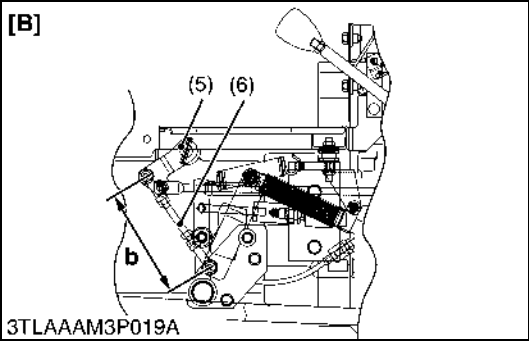
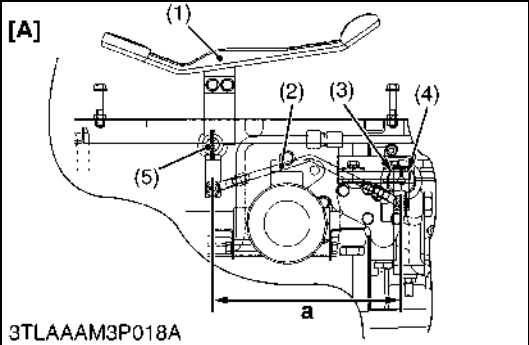
Charge pressure (oil temperature at 50 to 60 °C (122 to 140 °F))	Factory specification	2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm ² 334 to 384 psi
---	-----------------------	--

■ NOTE

- Low pressure gauge is 5 MPa (50 kgf/cm², 711 psi) full scale.

- | | |
|---------------------------|--------------------|
| (1) P1 Port (Reverse) | (5) Spring |
| (2) P2 Port (for Forward) | (6) Spring Guide |
| (3) Charge Relief Valve | (7) Plug (GPF 3/8) |
| (4) Poppet | |

9Y1211012TRS0018US0



Adjusting Neutral

CAUTION

- **Stop the engine when adjusting the HST neutral.**
1. Set the cruise control lever to **"OFF"** position. (HST pedal is in **Neutral** position.)
 2. Check to see that the length a of HST control rod (2) and the length b of neutral rod (6) are specified length.
If not, adjust as follows.
Length **"a"**: 231.2 to 232.2 mm (9.07 to 9.11 in.)
Length **"b"**: 138.5 to 139.5 mm (5.49 to 5.53 in.)
 3. Loosen the hex. head screw (3) to make situation that HST control lever (4) moves freely. Operate the engine for 5 seconds to make sure that the HST is in neutral position.
 4. Tighten the hex. head screw (3) so that the HST control lever (4) does not turn.

NOTE

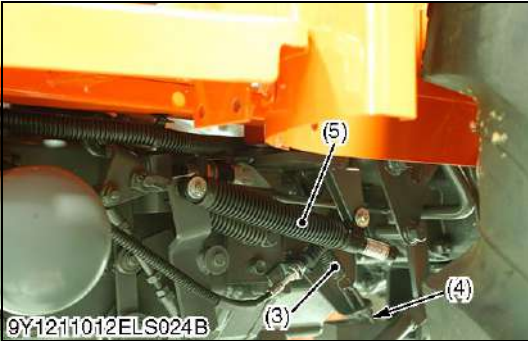
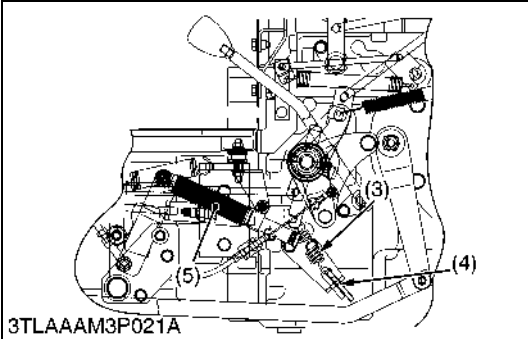
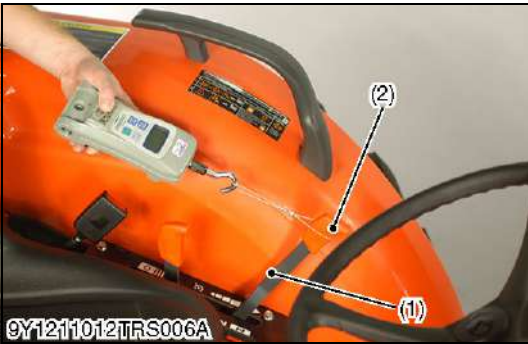
- **Be sure to tighten the hex. head screw with specified torque.**

Tightening torque	HST control lever setting hex. head screw	6.9 to 8.3 N·m 0.7 to 0.85 kgf·m 5.06 to 6.15 lbf·ft
-------------------	--	--

- (1) HST Pedal
- (2) HST Control Rod
- (3) Hex. Head Screw
- (4) HST Control Lever
- (5) Connecting Shaft
- (6) Neutral Rod

- [A] Right Side View**
- [B] Left Side View**
- a: Length of HST Control Rod**
- b: Length of Neutral Rod**

9Y1211012TRS0019US0



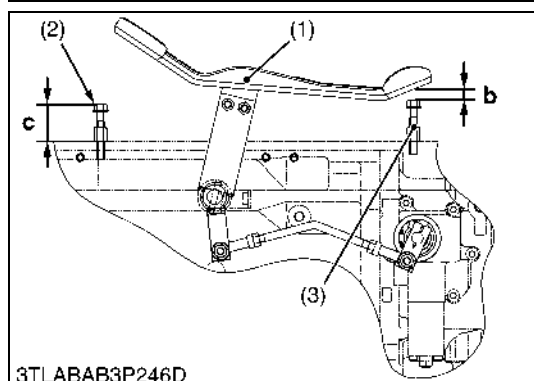
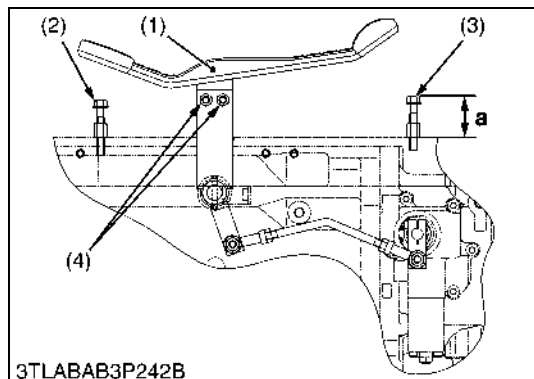
Cruise Lever Operating Force

- 1. Push the cruise control lever (1) into maximum tied position. After that pull it 50 mm (2 in.) back.
- 2. Measure the force needed to move the cruise control lever back into the maximum position at middle of the lever grip (2).
- 3. If the force is not within the factory specifications, loosen the lock nut (4) and adjust the tension of cruise spring (3).
- 4. Retighten the lock nut (4) securely.

Cruise control lever operating force	Factory specification	60 to 100 N 6.2 to 10.1 kgf 14 to 22.4 lbf
--------------------------------------	-----------------------	--

- (1) Cruise Control Lever
- (2) Lever Grip
- (3) Cruise Spring
- (4) Lock Nut
- (5) Damper

9Y1211012TRS0020US0



Cruise Control Linkage and Maximum Travel Speed

⚠ CAUTION

- Stop the engine when adjusting the cruise control linkage and pedal stroke.

■ NOTE

- Be sure to adjust the HST neutral position.
 - Be sure to check whether the "traveling speed coefficient" is suitable for tire size.
1. Loosen the HST pedal mounting screws (4) and tighten the screws (4) while pulling up the front of HST pedal (1).
 2. Adjust the height a of the pedal stopper bolt (Forward) (3) to approx. 25 mm (0.98 in.) from the step.
 3. Operate the tractor actually and make whether the tractor can put on sufficient speed.
 4. Set the cruise control lever to fully forward (Maximum position). HST pedal also tilts.
 5. Measure the clearance b between bottom of HST pedal and tip of pedal stopper bolt (Forward) (3).
 6. If the measurement is not within factory specification, adjust by the cruise adjusting rod (5). (Cruise Linkage Adjustment.)
 7. Shorten the pedal stopper bolt (Reverse) (2) to the position where the length of the bolt is not touched to the HST pedal (1) even if the HST pedal is fully depressed rearward.
 8. Lengthen the length of the pedal stopper bolt (Reverse) (2) gradually with the HST pedal fully depressed rearward to contact to the HST pedal.

(Reference)

- Height "a": 25 mm (0.98 in.)
- Clearance "b": 2 to 6 mm (0.08 to 0.2 in.)
- Height "c": 15 mm (0.59 in.)

- | | |
|----------------------------------|---|
| (1) HST Pedal | a: Stopper Bolt Height (Forward) |
| (2) Pedal Stopper Bolt (Reverse) | b: Clearance between HST pedal and stepper bolt (Forward) |
| (3) Pedal Stopper Bolt (Forward) | c: Stopper Bolt Height (Reverse) |
| (4) HST Pedal Mounting Screw | F: Forward |
| (5) Cruise Adjusting Rod | R: Reverse |

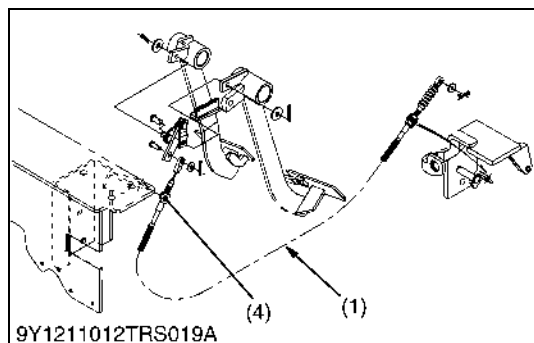
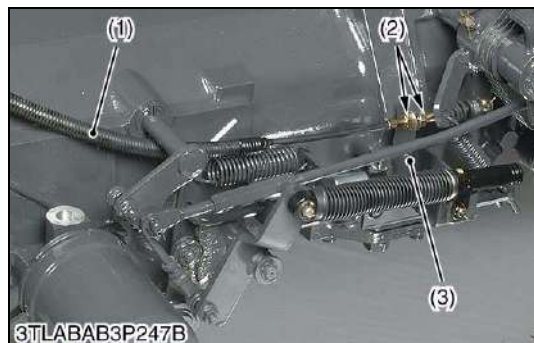
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Adjusting Cruise Control Release Linkage

1. Adjust the brake pedals free travel first.
2. Depress one of the brake pedal to make sure the cruise control is not released. Also depress both the brake pedals coupled together to make sure that the cruise control is released.
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 end position. If not, set by lock nuts (2).
 - Adjust by lock nuts (4) for the center of the threaded portion of the release wire front side to come to the hook position.
 - Make sure whether to move as above-mentioned 2.
 - If not, adjust by lock nuts (4).

- | | |
|---------------------|----------------------|
| (1) Release Wire | (3) Damper Stay |
| (2) Lock Nut (Rear) | (4) Lock Nut (Front) |

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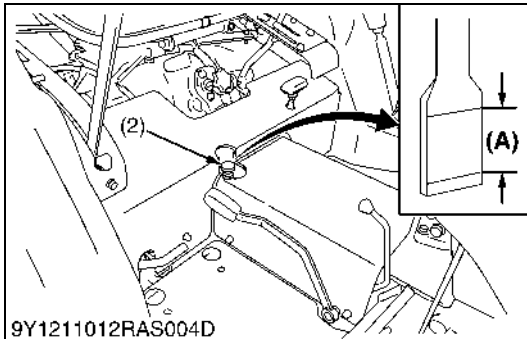
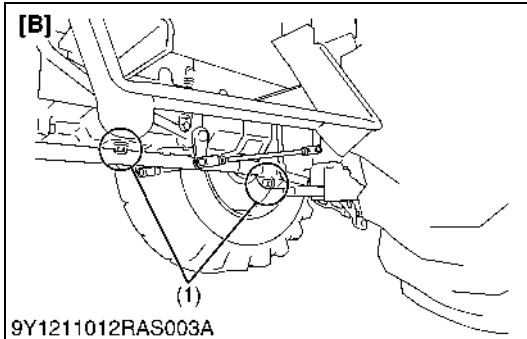
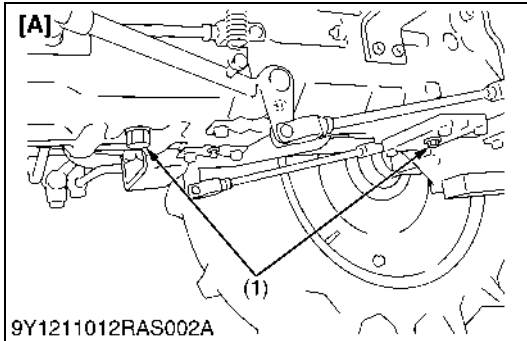
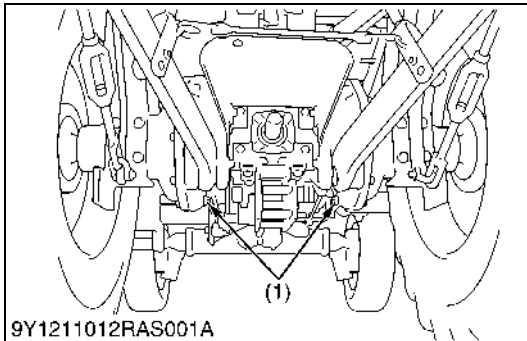


5. DISASSEMBLING AND ASSEMBLING

[1] L3301/L3901

(1) Preparation

[A] Separating Engine and Clutch Housing



Draining Transmission Fluid (L3301/L3901)



CAUTION

To avoid personal injury:

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

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

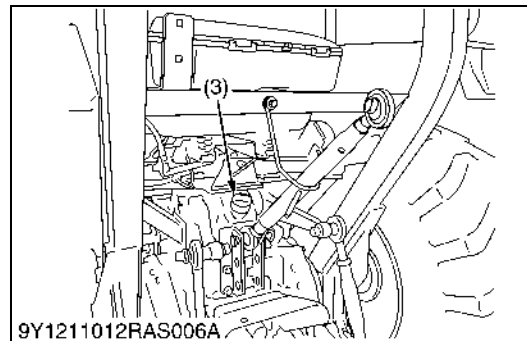
(When reassembling)

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

■ IMPORTANT

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

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



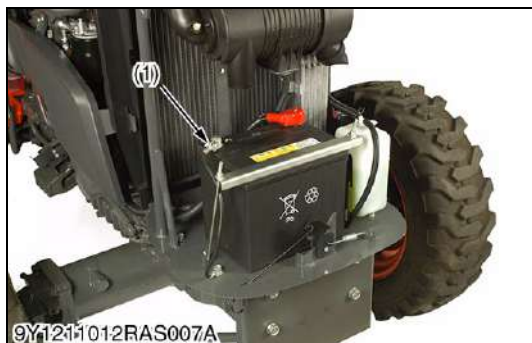
- (1) Drain Plug
(2) Gauge
(3) Oil Inlet Plug

[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

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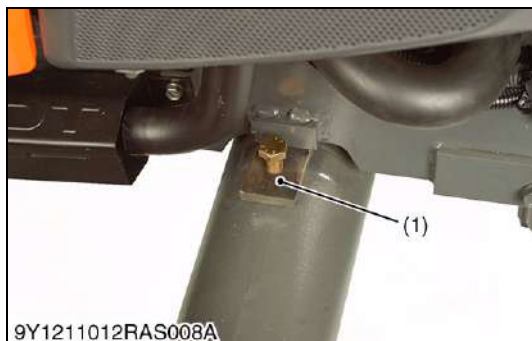


Battery Negative Cable Connector

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

(1) Battery Negative Cable Connector

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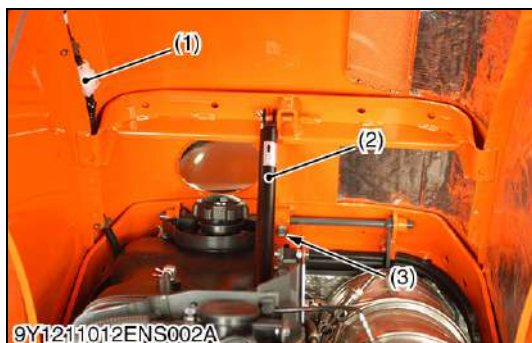


Front Axle Rocking Restrictor

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-94.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0



Bonnet and Side Covers

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

(1) Headlight Connector

(4) Bonnet

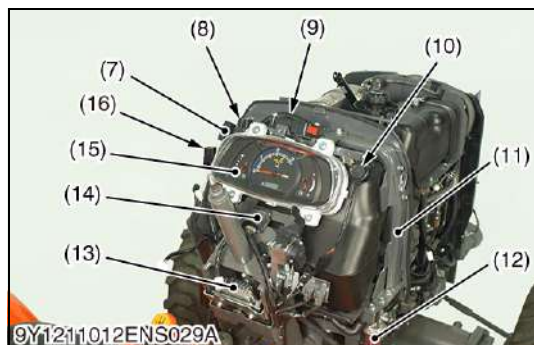
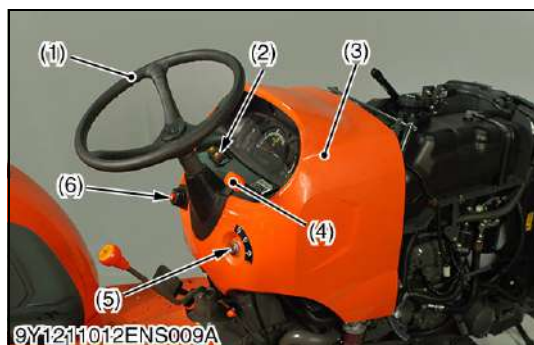
(2) Damper

(5) Side Cover

(3) Bolt

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Steering Wheel and Rear Bonnet

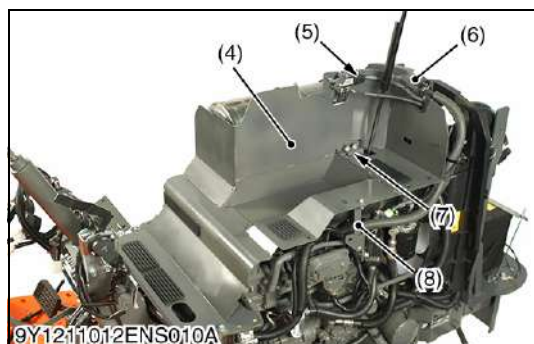
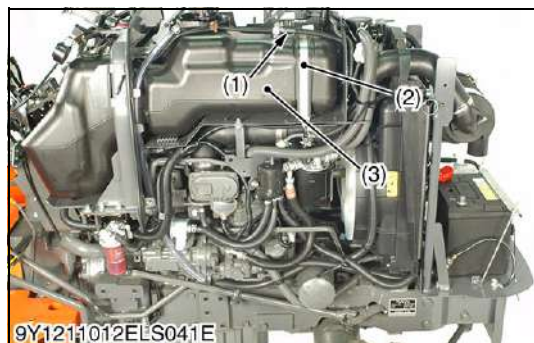
1. Remove the steering wheel (1) with a steering wheel puller.
2. Remove the throttle grip (4).
3. Disconnect the main switch (5).
4. Disconnect the combination switch (6).
5. Disconnect the DPF switches (2).
6. Remove the rear bonnet (3).
7. Remove the meter panel (15).
8. Disconnect the DPF buzzer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

(When reassembling)

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

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

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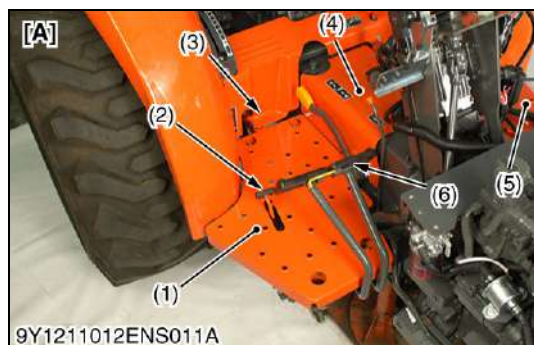


Fuel Tank and Base

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

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

9Y1211012ENS0021US0



Step and Center Cover (L3301/L3901)

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

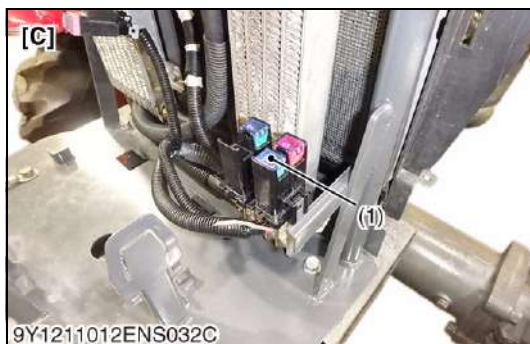
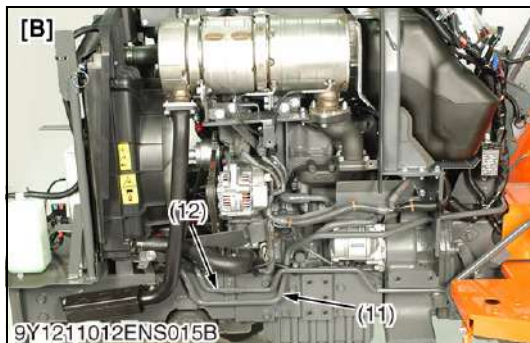
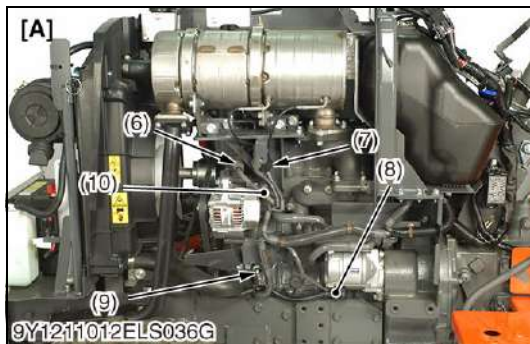
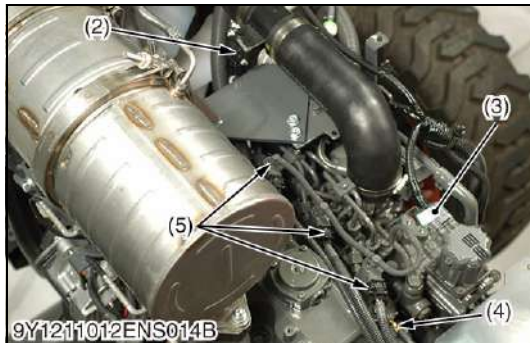
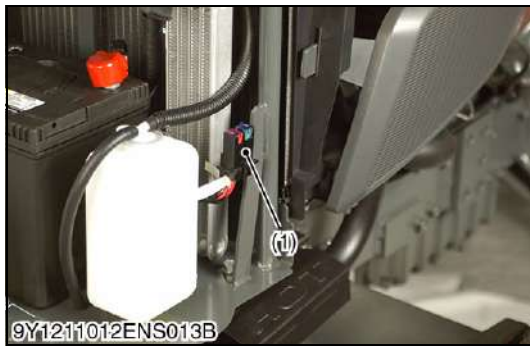
- (1) R.H. Step
 (2) Throttle Pedal
 (3) Differential Lock Lever
 (4) Center Cover
 (5) L.H. Step

- (6) Brake Pedal
 (7) HST Pedal

[A] FW and DW Model

[B] DHW Model

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

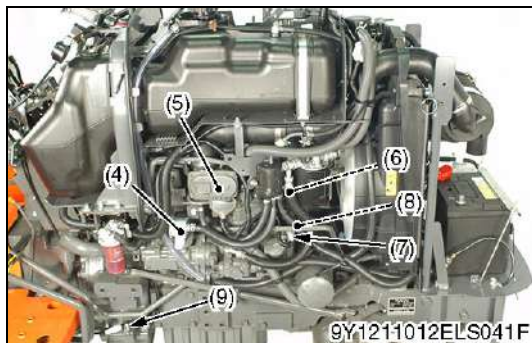
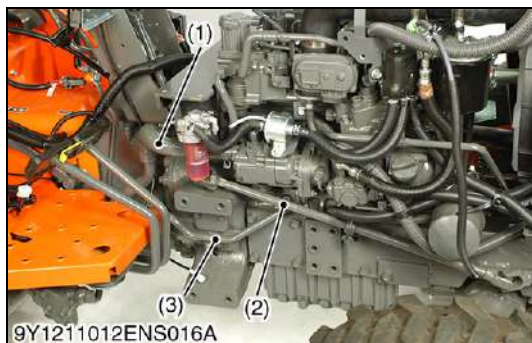
1. Disconnect the connectors of injector (5).
2. Disconnect the glow plug (4).
3. Disconnect the EGR valve (3).
4. Disconnect the air flow sensor (2).
5. Disconnect the rail pressure sensor.
6. Remove the slow blow fuses (1).
7. Disconnect the positive battery cable.
8. Disconnect the water temperature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



Tightening torque	Oil cooler return pipe bolt	92 to 101 N·m 9.0 to 10.0 kgf·m 67 to 73 lbf·ft
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- | | |
|------------------------------|--|
| (1) Slow Blow Fuse | (10) Alternator |
| (2) Air Flow Sensor | (11) Oil Cooler Return Pipe |
| (3) EGR Valve | (12) Power Steering Return Pipe
(L3301/L3901) |
| (4) Glow Plug | |
| (5) Injector | |
| (6) Water Temperature Sensor | [A] FW and DW Model |
| (7) DPF Temperature Sensor | [B] DHW Model |
| (8) Starter | [C] L3301/L3901 |
| (9) Oil Switch | [D] L4701 |

9Y1211012ENS0023US0



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

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

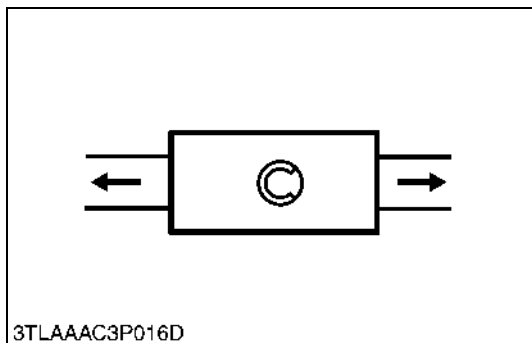
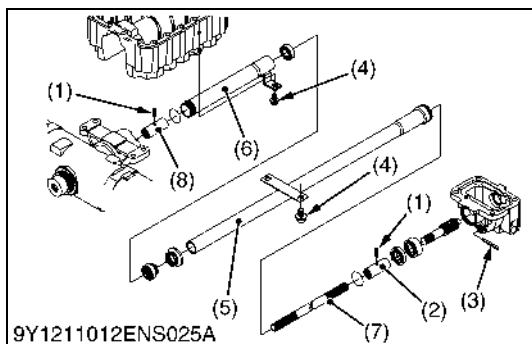
(When reassembling)

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

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

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

9Y1211012ENS0024US0



Propeller Shaft (L3301/L3901)

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

(When reassembling)

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

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

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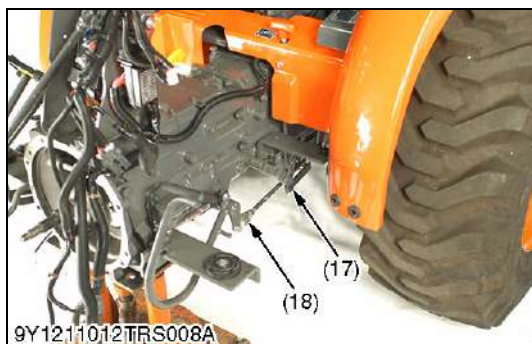
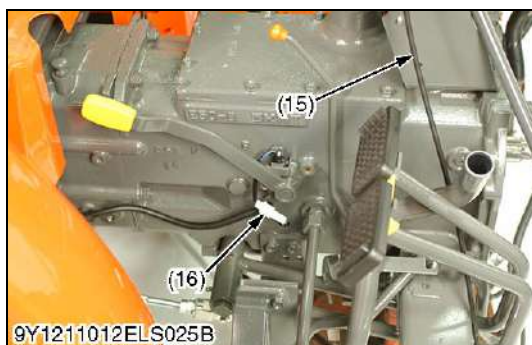
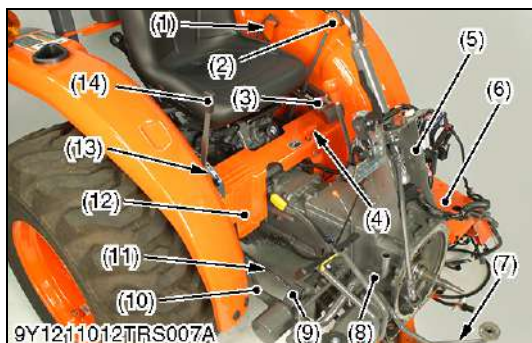
Separating Engine from Clutch Housing Case

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

(When reassembling)

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

9Y1211012ENS0026US0

[B] Separating Clutch Housing Case**Outer Components**

1. Disconnect the throttle cable (15).
2. Remove the steering support (5).
3. Remove the grips (1), (2), and (14).
4. Remove the lever guides (3) and (13).
5. Remove the floor sheet cover (12).
6. Remove the steps (6).
7. Remove the suction pipe 1 (8).
8. Remove the oil filter base (9) with the filter and suction pipe 2 (10).
9. Remove the delivery pipe (7).
10. Remove the brake rods (11) and (18).
11. Remove the shuttle rod (17).
12. Disconnect the PTO safety switch connector (16).

(When reassembling)

- Apply grease to the O-rings and be careful not to damage it.

Tightening torque	Delivery pipe mounting joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
-------------------	-----------------------------------	---

- | | |
|--------------------------------------|----------------------------------|
| (1) Range Gear Shift Lever Grip | (10) Suction Pipe 2 |
| (2) Synchro-shuttle Shift Lever Grip | (11) Brake Rod |
| (3) Lever Guide | (12) Floor Sheet Cover |
| (4) Front Wheel Drive Lever Grip | (13) Lever Guide |
| (5) Steering Support | (14) Position Control Lever Grip |
| (6) Step | (15) Throttle Cable |
| (7) Delivery Pipe | (16) PTO Safety Switch Connector |
| (8) Suction Pipe 1 | (17) Shuttle Rod |
| (9) Oil Filter Base | (18) Brake Rod |

9Y1211012TRS0023US0

Separating Clutch Housing from Transmission Case

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

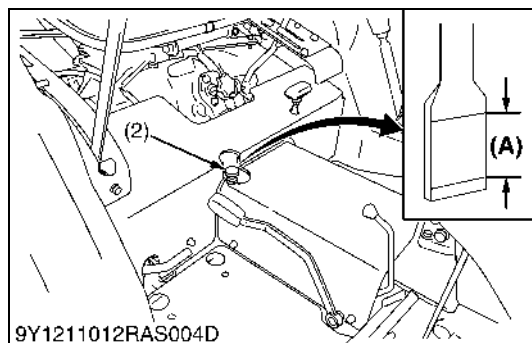
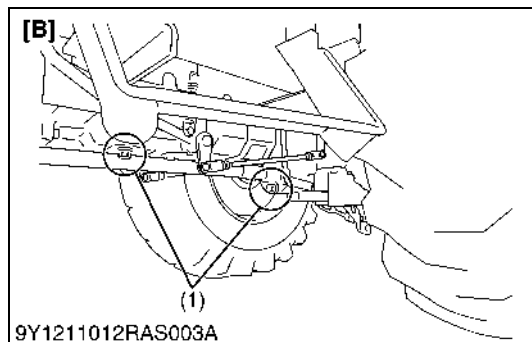
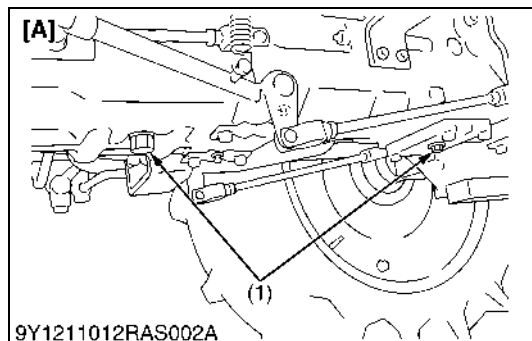
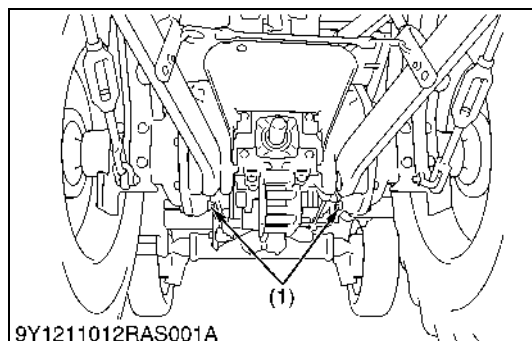
(When reassembling)

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

Tightening torque	Clutch housing and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
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9Y1211012TRS0024US0

[C] Separating Transmission Case



Draining Transmission Fluid (L3301/L3901)



To avoid personal injury:

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

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

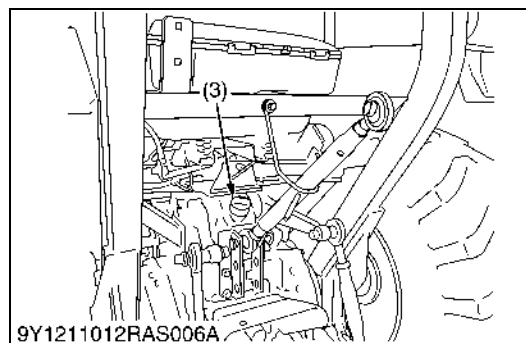
(When reassembling)

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

■ IMPORTANT

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

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



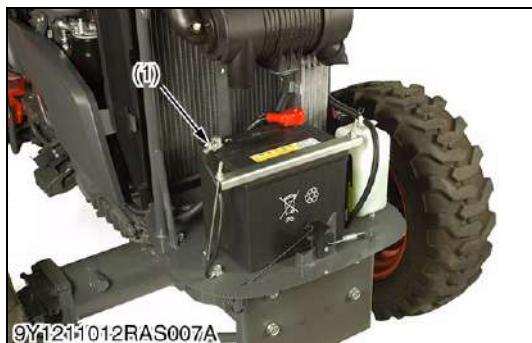
- (1) Drain Plug
(2) Gauge
(3) Oil Inlet Plug

[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

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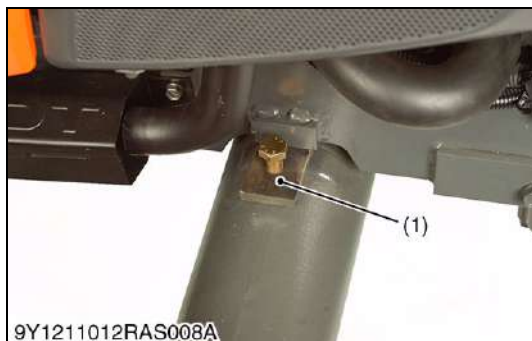


Battery Negative Cable Connector

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

(1) Battery Negative Cable Connector

9Y1211012RAS0005US0

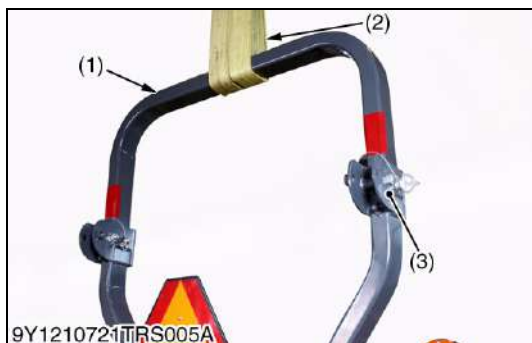


Front Axle Rocking Restrictor

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-94.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0

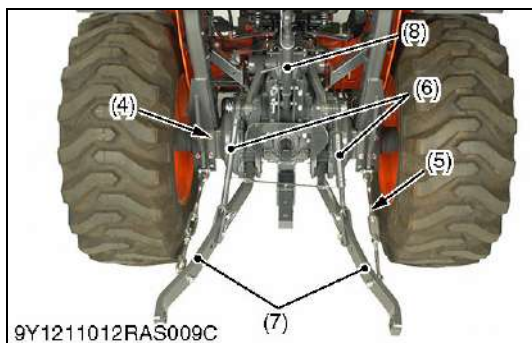


Three Point Linkage and ROPS

1. Secure the ROPS (1) with safety strap (2).
2. Remove the stabilizer joint (5), the top link (8), the lift rods (6) and the lower links (7).
3. Remove ROPS mounting screws (4), and remove the ROPS.

(When reassembling)

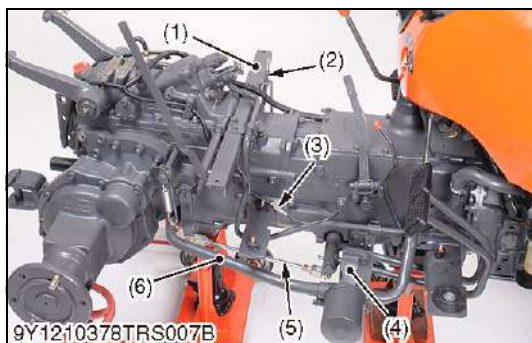
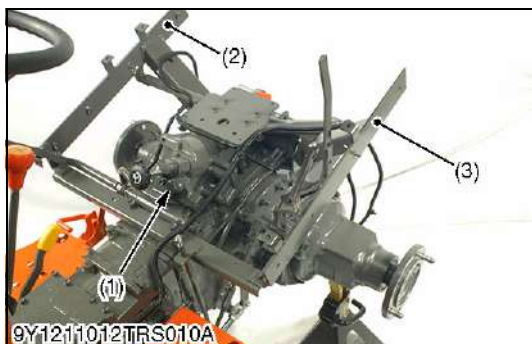
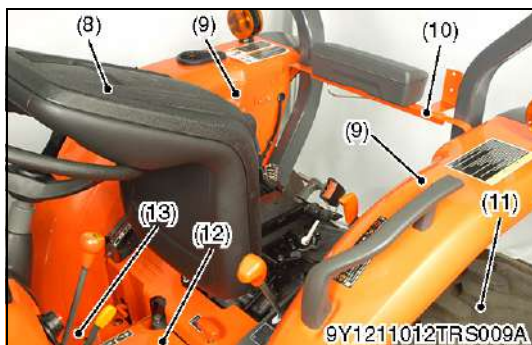
Tightening torque	ROPS mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum screw	118 to 137 N·m 12 to 14 kgf·m 87 to 101 lbf·ft



- (1) ROPS
(2) Safety Strap
(3) ROPS Fulcrum Screw
(4) ROPS Mounting Screw

- (5) Stabilizer Joint
(6) Lift Rod
(7) Lower Link
(8) Top Link

9Y1211012TRS0025US0



Outer Components

1. Place the disassembling stands under the transmission case.
2. Remove the grips (3), (4), and (5).
3. Remove the lever guides (1) and (6).
4. Remove the center cover (12) and floor sheet cover (7).
5. Remove the rear wheels (11).
6. Remove the fender support (10).
7. Remove the fenders (9) and steps (13).
8. Remove the seat assembly (8).

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	215 N·m 22 kgf·m 160 lbf·ft
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- | | |
|--------------------------------------|---------------------|
| (1) Position Control Lever Guide | (8) Seat Assembly |
| (2) Position Control Lever Grip | (9) Fender |
| (3) Range Gear Shift Lever Grip | (10) Fender Support |
| (4) Synchro-shuttle Shift Lever Grip | (11) Rear Wheel |
| (5) Front Wheel Drive Lever Grip | (12) Center Cover |
| (6) Shift Lever Guide | (13) Step |
| (7) Floor Sheet Cover | |

9Y1211012TRS0026US0

Fender Support and Delivery Pipe

1. Remove the fenders supports (2) and (3).
2. Disconnect the delivery pipe (1).

Tightening torque	Delivery pipe mounting joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
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- | | |
|-------------------------|-------------------------|
| (1) Delivery Pipe | (3) Fender Support (LH) |
| (2) Fender Support (RH) | |

9Y1211012TRS0027US0

Suction Pipe and Brake Rods

1. Remove the R.H. and L.H. brake rods (5).
2. Remove the oil filter base (4) with the filter and suction pipe (6).
3. Disconnect the PTO safety switch connector (3).
4. Remove the front wheel drive lever (2).
5. Remove the fender support (1).

- | | |
|---------------------------------|---------------------|
| (1) Fender Stay | (4) Oil Filter Base |
| (2) Front Wheel Drive Lever | (5) Brake Rod |
| (3) PTO Safety Switch Connector | (6) Suction Pipe |

9Y1211012TRS0028US0

Front Wheel Drive Case

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

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to both faces of the gasket that is to be installed between the front drive case and the transmission case.

- (1) Front Wheel Drive Case

9Y1211012TRS0029US0



Separating Transmission Case and Clutch Housing

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

(When reassembling)

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

Tightening torque	Clutch housing and transmission case mounting nut	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
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9Y1211012TRS0030US0



Hydraulic Cylinder

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

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.

Tightening torque	Hydraulic cylinder assembly mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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■ NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod. (See page 8-S15.)

9Y1211012TRS0031US0



Rear Axle Case

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

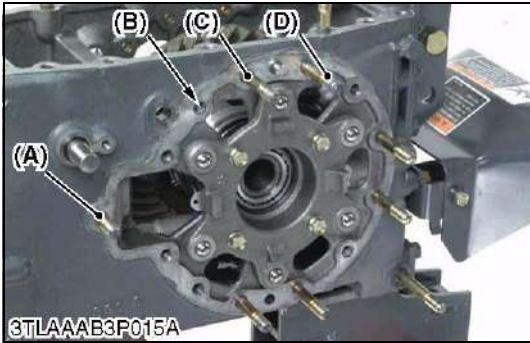
(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting screw and nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
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(1) Rear Axle Case

9Y1211012TRS0032US0



Brake Case

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

(When reassembling)

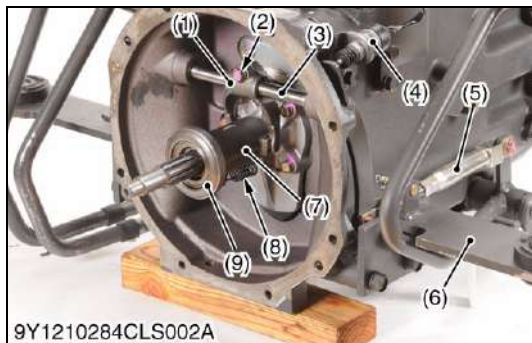
- Apply grease to the brake ball seats. (Do not apply grease excessively.).
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.
- Apply liquid lock (Three Bond 1324 or equivalent) to (A), (B), (C), (D) portions of the stud bolts, RH and LH.

Tightening torque	Brake case mounting stud bolt	35 to 49 N·m 3.5 to 5.0 kgf·m 26 to 36 lbf·ft
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9Y1211012TRS0033US0

(2) Disassembling and Assembling (Manual Transmission Model)

[A] Clutch Housing Case



Release Hub and Clutch Lever

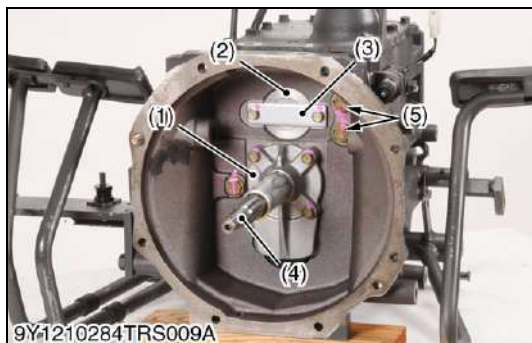
1. Remove the safety switch (4).
2. Remove the step brackets (6).
3. Disconnect the clutch rod (5) from clutch lever (3).
4. Remove the release fork (1) mounting screw (2).
5. Draw out the clutch lever (3) to remove the release fork (1).
6. Remove the hub return spring (8).
7. Remove the release bearing (9) and release hub (7) as a unit.

(When reassembling)

- Make sure the direction of the release fork (1) is correct.
- Inject grease to the release hub (7).
- Be sure to set the hub return spring (8).

- | | |
|-------------------|-----------------------|
| (1) Release Fork | (6) Step Bracket |
| (2) Screw | (7) Release Hub |
| (3) Clutch Lever | (8) Hub Return Spring |
| (4) Safety Switch | (9) Release Bearing |
| (5) Clutch Rod | |

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Main Shaft Case

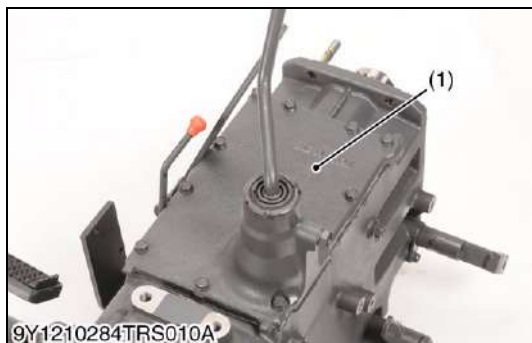
1. Remove the main shaft case (1).
2. Remove the stopper plate (3).
3. Remove the screws (5).

(When reassembling)

- Apply grease to the O-ring and install it to the clutch housing.
- After reassembling the main shaft case, check that the main shaft (4) rotate respectively and that they have a little axial play.

- | | |
|---------------------|----------------|
| (1) Main Shaft Case | (4) Main Shaft |
| (2) Bearing Cover | (5) Screw |
| (3) Stopper Plate | |

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Shift Base and Cover

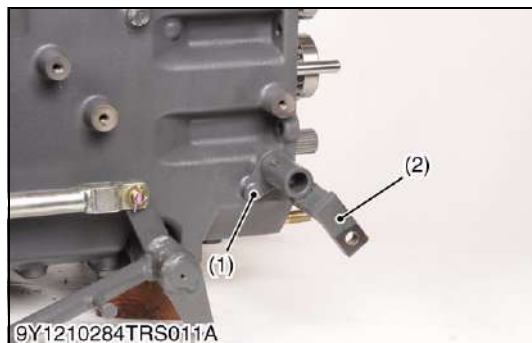
1. Remove the speed change cover (1).

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of speed change cover and clutch housing.

- | |
|------------------------|
| (1) Speed Change Cover |
|------------------------|

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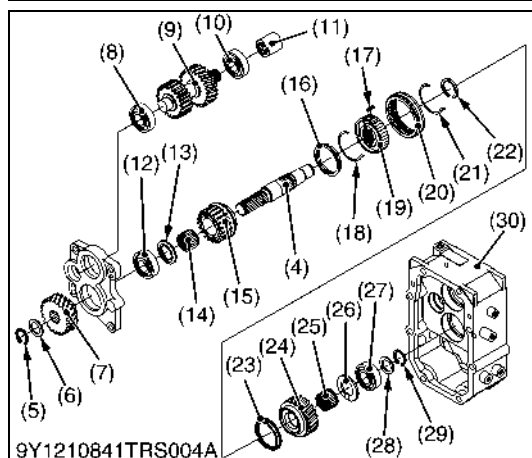
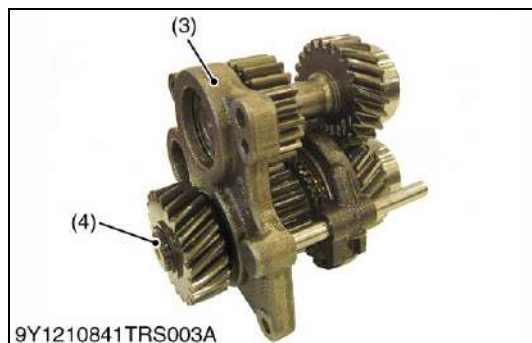
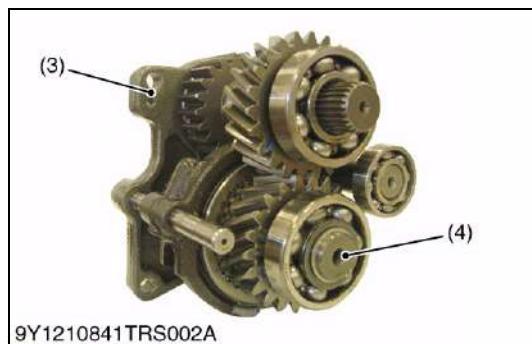
Synchro-shuttle Gear Assembly

1. Remove the shuttle lever stopper screw (1).
2. Remove the bearing holder (3) with synchro-shuttle assembly.

(When reassembling)

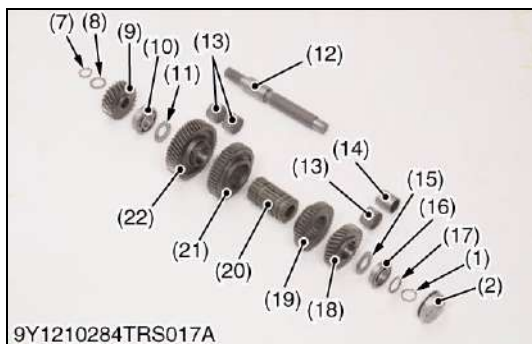
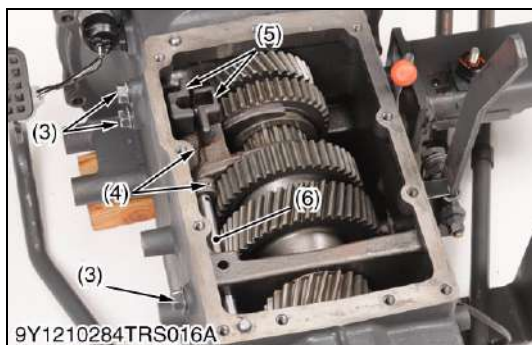
- Reinstall the synchronizer keys (17) in the key grooves of the synchronizer rings (16) firmly.

Tightening torque	Bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
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- | | |
|---------------------------------------|--------------------------|
| (1) Screw | (16) Synchronizer Ring |
| (2) Shuttle Lever Arm | (17) Synchronizer Key |
| (3) Bearing Holder | (18) Syncho Key Spring |
| (4) Shuttle Shaft | (19) Shuttle Coupling |
| (5) External Circlip | (20) Shuttler Shifter |
| (6) Shuttle Washer | (21) Syncho Key Spring |
| (7) 22T Gear | (22) External Circlip 32 |
| (8) Ball Bearing | (23) Synchronizer Ring |
| (9) 22T-23T Shuttle Gear Shaft | (24) 22T Gear |
| (10) Ball Bearing | (25) Needle Bearing |
| (11) Coupling | (26) Thrust Collar |
| (12) Ball Bearing | (27) Ball Bearing |
| (13) Thrust Collar | (28) Washer |
| (14) Needle Bearing | (29) External Circlip |
| (15) 21T Gear | (30) Mid Case |

9Y1211012TRS0037US0



Counter Shaft

1. Remove the bearing cover (2).
2. Screw down the two M6 screws in to bearing cover and pull it out.
3. Remove the screws (3) and remove the springs and balls.
4. Tap out the spring pins (4).
5. Draw out the fork rod (6) to the front and remove the shift fork (5).
6. Remove the external snap ring (1).
7. Tap out the counter shaft (12) to the rear.

NOTE

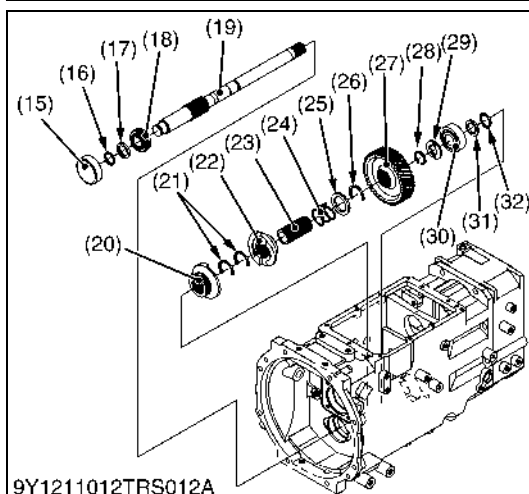
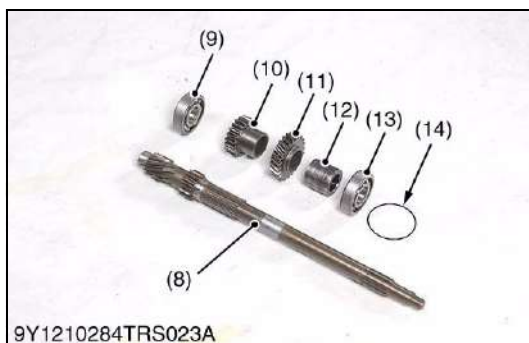
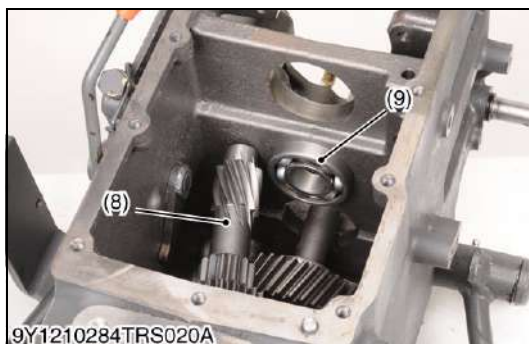
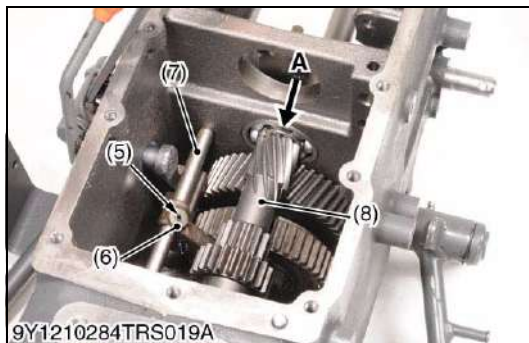
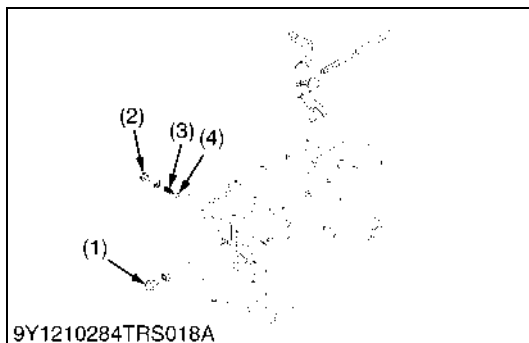
- When drawing out the counter shaft, remove the following parts one by one: thrust collar (15), 32T gear (18), 39T gear (19), 45T shift gear (21), 45T gear (22) and thrust collar (11).

(When reassembling)

- Apply molybdenum disulfide (Three Bond 1091 or equivalent) to the inner circumferential surface of the spline boss.
- Point the oil groove side of thrust collars (11), (15) towards the gear side.
- Apply small amount of grease for the O-ring.

- | | |
|------------------------|---------------------|
| (1) External Snap Ring | (12) Counter Shaft |
| (2) Bearing Cover | (13) Needle Bearing |
| (3) Screw | (14) Spline Boss |
| (4) Spring Pin | (15) Thrust Collar |
| (5) Shift Fork | (16) Ball Bearing |
| (6) Fork Rod | (17) Thrust Collar |
| (7) External Snap Ring | (18) 32T Gear |
| (8) Thrust Collar | (19) 39T Gear |
| (9) 23T Gear | (20) Spline Boss |
| (10) Ball Bearing | (21) 45T Shift Gear |
| (11) Thrust Collar | (22) 45T Gear |

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Main Shaft and PTO Counter Shaft

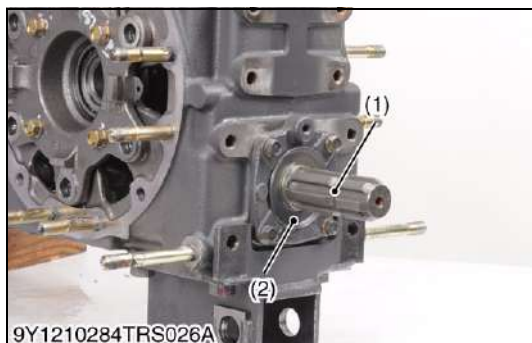
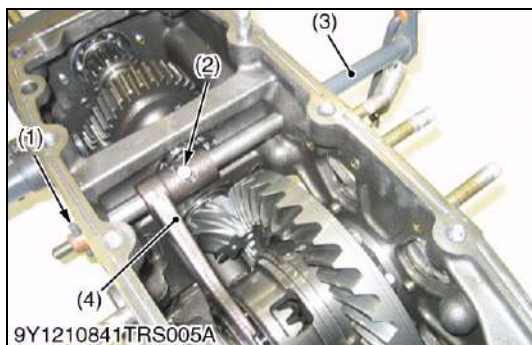
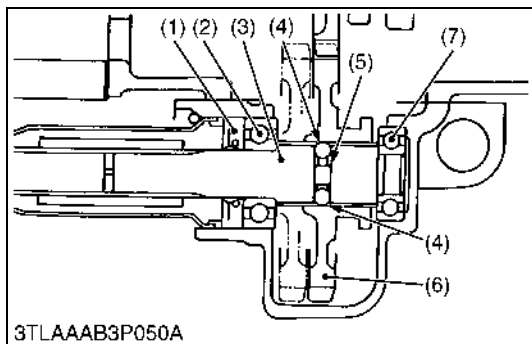
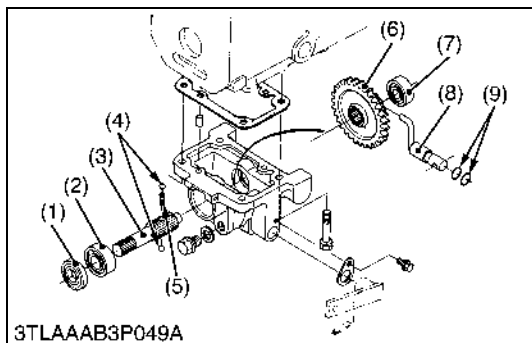
1. Remove the screws (1), (2) and remove the spring (3) and ball (4).
2. Tap out the spring pin (5).
3. Draw out the fork rod (7) to front.
4. Remove the shift fork (6).
5. Remove the bearing cover (15).
6. Remove external circlip (32).
7. Tap in PTO counter shaft (19) to front side.
8. Remove bearing (9).
9. Tap out main shaft (8) to rear side.
10. Remove external snap ring (16).
11. Tap out PTO counter shaft (19) to rear and remove 45T gear (27).

(When reassembling)

- Be careful not damage or lose ball (4) and spring (3).
- Apply molydeum disulfide (Three Bond 1091 or equivalent) to the inner circumferential surface of spline boss (23).
- Point the oil groove side of thrust collar (29) towards the spline boss.
- Bearing cover (15) should be replaced with new one.

- | | |
|-------------------------|------------------------|
| (1) Screw | (17) Collar |
| (2) Screw | (18) Bearing |
| (3) Spring | (19) PTO Counter Shaft |
| (4) Ball | (20) PTO Clutch Cam 1 |
| (5) Spring Pin | (21) Circlip |
| (6) Shift Fork | (22) PTO Clutch Cam 2 |
| (7) Fork Rod | (23) Spline Boss |
| (8) Main Shaft | (24) Spring |
| (9) Bearing | (25) Washer |
| (10) 21T Gear | (26) Circlip |
| (11) 23T Gear | (27) 45T Gear |
| (12) Collar | (28) Circlip |
| (13) Bearing | (29) Thrust Collar |
| (14) O-ring | (30) Ball Bearing |
| (15) Bearing Cover | (31) Washer |
| (16) External Snap Ring | (32) External Circlip |

9Y1211012TRS0039US0

[B] Transmission Case**Front Drive Case**

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

(When reassembling)

- Replace the oil seal (1) with new one and apply grease to its inside.
- Apply liquid gasket (Three Bond 1206C or equivalent) to both faces of the gasket that is to be installed between the front drive case and the transmission case.

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

9Y1211012TRS0040US0

Differential Lock

1. Remove the clevis pin (2).
2. Remove the spring pin (1).
3. Draw out the differential lock fork shaft (3).
4. Remove the shift fork (4).

- | | |
|----------------|----------------|
| (1) Spring Pin | (3) Fork Shaft |
| (2) Clevis Pin | (4) Shift Fork |

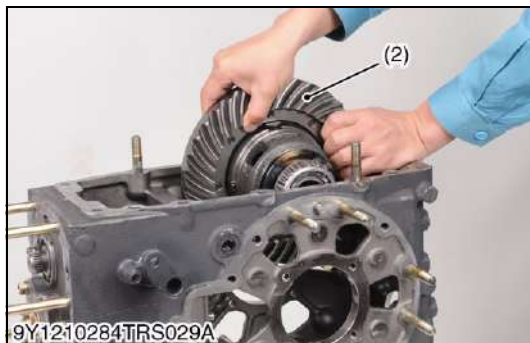
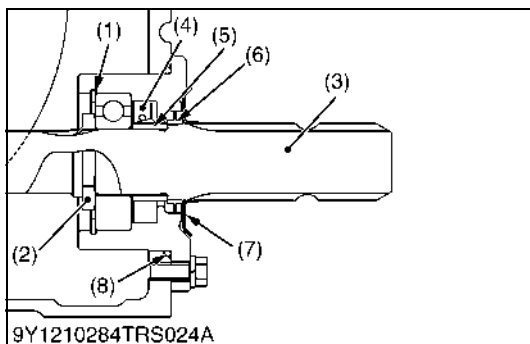
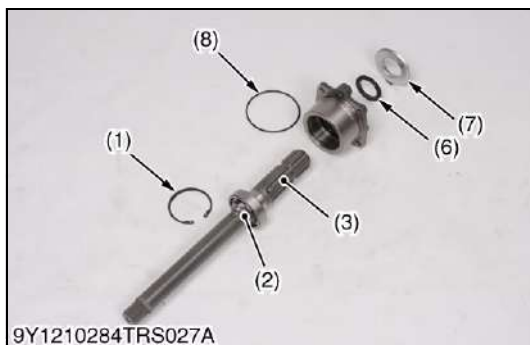
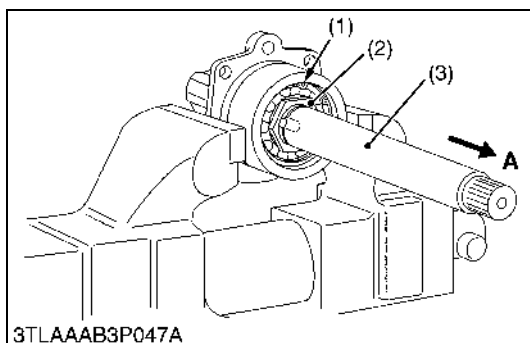
9Y1211012TRS0041US0

PTO Bearing Case

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

- | | |
|---------------|----------------------|
| (1) PTO Shaft | (2) PTO Bearing Case |
|---------------|----------------------|

9Y1211012TRS0042US0



PTO Shaft

1. Remove the internal snap ring (1).
2. Tap out the PTO shaft (3) to the front "A".

(When reassembling)

- In the staking nut (2) was removed, replace a new one, and after tightening it to the specified torque, be sure to stake it firmly.
- Install the slinger (6) firmly.
- After applying liquid gasket (Three Bond 1141 or equivalent) to joint face of the collar (5), and insert the collar to PTO shaft.
- Apply grease to oil seal (4) and install it, noting its direction.

Tightening torque	PTO shaft staking nut	147 to 196 N·m 15.0 to 20.0 kgf·m 109 to 144 lbf·ft
-------------------	-----------------------	---

- | | |
|------------------------|--------------------|
| (1) Internal Snap Ring | (5) Collar |
| (2) Staking Nut | (6) Slinger |
| (3) PTO Shaft | (7) Oil Seal Cover |
| (4) Oil Seal | (8) O-ring |

9Y1211012TRS0043US0

Differential Gear Assembly

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

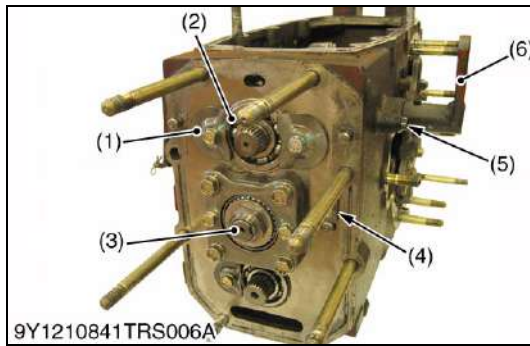
(When reassembling)

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

Tightening torque	Differential bearing case mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	--	---

- | | |
|-------------------------------|--------------------------------|
| (1) Differential Bearing Case | (2) Differential Gear Assembly |
|-------------------------------|--------------------------------|

9Y1211012TRS0044US0

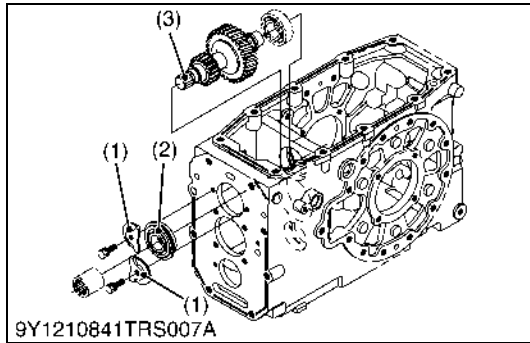
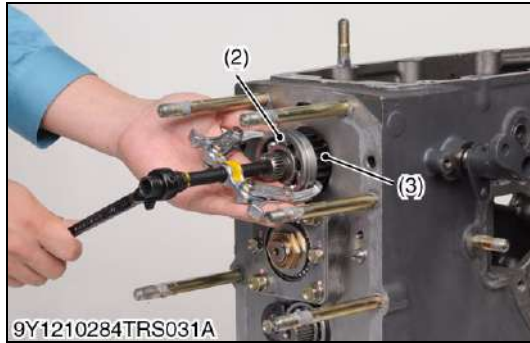


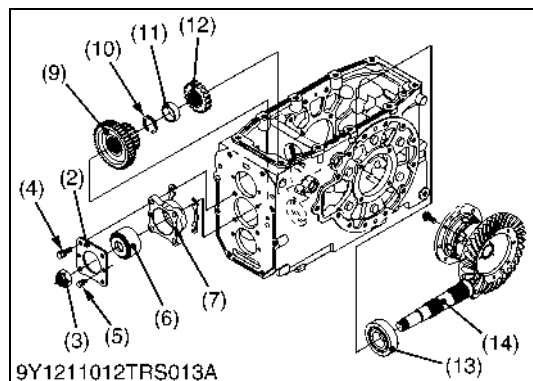
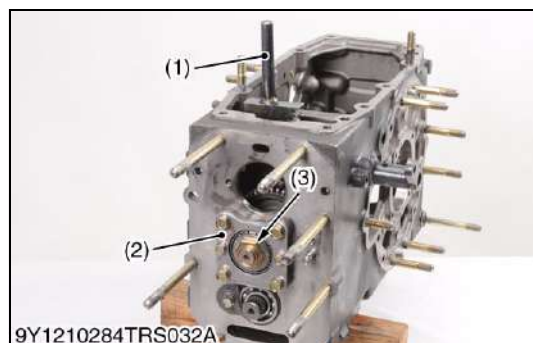
Range Gear Shaft

1. Remove the bearing stoppers (1), shift fork rod stopper (4) and stopper screw (5).
2. Slide the shift arm (6) to outside.
3. Remove the bearing (2) with puller.
4. Remove the **18T-31T** range gear shaft (3).

- | | |
|-------------------------------------|----------------------------|
| (1) Bearing Stopper | (4) Shift Fork Rod Stopper |
| (2) Bearing | (5) Stopper Screw |
| (3) 18T-31T Range Gear Shaft | (6) Shift Arm |

9Y1211012TRS0045US0





Pinion Shaft

1. Remove the lock nut (3).
2. Remove the pinion bearing cover (2), shim (8) and taper roller bearing (6).
3. Move the **6T** pinion shaft assembly backward and then remove the **42T** gear and the **6T** pinion shaft (14) assembly.

(When reassembling)

- Make sure of the number of shims (8).
- Replace the lock nut (3) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

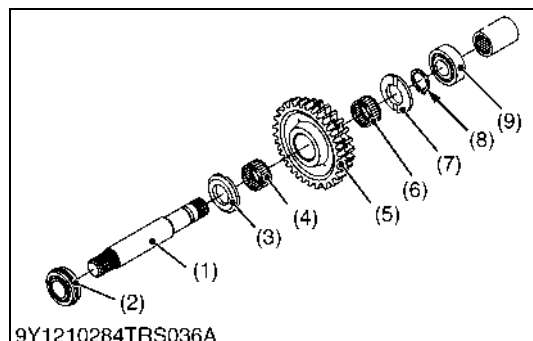
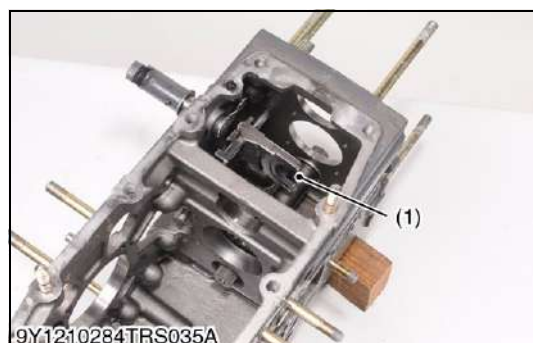
■ NOTE

- To ensure that the taper roller bearing has been properly installed, a running test is performed after mounting. The spiral bevel pinion shaft is first rotated by hand, and if no problems are observed, a low speed, no load power test is performed.
- Then assembling the differential gear, check the turning torque.

Tightening torque	Spiral bevel pinion shaft lock nut	147 to 196 N·m 15.0 to 20.0 kgf·m 109 to 144 lbf·ft
	Pinion bearing cover mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft

- | | |
|--------------------------|-------------------------------|
| (1) Gear Stopper | (8) Shims |
| (2) Pinion Bearing Cover | (9) 42T-19T Slide Gear |
| (3) Lock Nut | (10) External Circlip |
| (4) Sems Bolt | (11) Collar |
| (5) Bolt | (12) 18T Gear |
| (6) Taper Roller Bearing | (13) Roller Bearing |
| (7) Bearing Case | (14) 6T Pinion shaft |

9Y1211012TRS0046US0



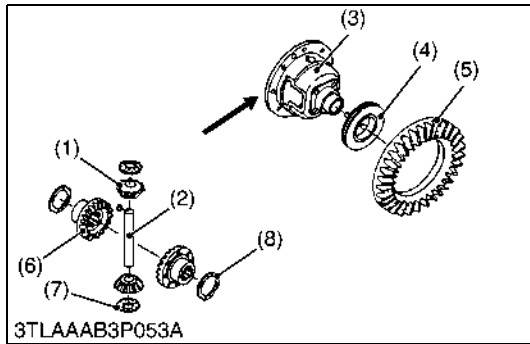
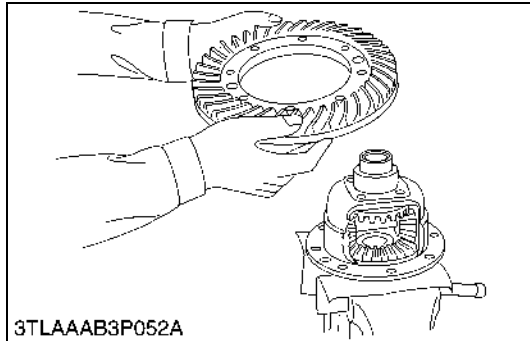
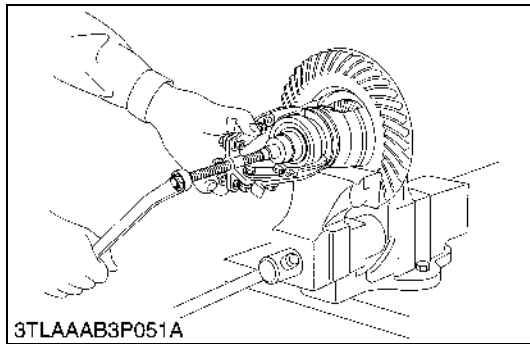
PTO Drive Shaft

1. Tap the PTO drive shaft (1) to front side.
2. Remove the bearing (2).
3. Remove the PTO drive shaft (1).
4. Remove the bearing (9).
5. Remove the external snap ring (8).
6. Remove the **34T- 25T** gear (5).

- | | |
|--------------------------|------------------------|
| (1) PTO Drive Shaft | (6) Needle Bearing |
| (2) Bearing | (7) Thrust Collar |
| (3) Thrust Collar | (8) External Snap Ring |
| (4) Needle Bearing | (9) Bearing |
| (5) 34T- 25T Gear | |

9Y1211012TRS0047US0

[C] Differential Gear Assembly



Bearing and Differential Lock Shifter

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

9Y1211012TRS0048US0

Spiral Bevel Gear

1. Remove the spiral bevel gear.

(When reassembling)

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

Tightening torque	Spiral bevel gear UBS screw	69 to 88 N·m 7.0 to 9.0 kgf·m 51 to 65 lbf·ft
-------------------	-----------------------------	---

9Y1211012TRS0049US0

Differential Pinion and Differential Side Gear

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

■ NOTE

- Arrange the parts to know their original position.

(When reassembling)

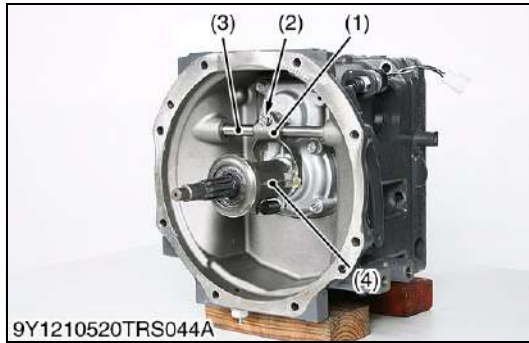
- Check the thrust and bearing surface of both differential side gears (6). If they are worn or damaged, bores in the differential case may also be damaged.
- Check the differential pinions (1) and pinion shaft (2) for excessive wear. If these parts are damaged or excessively worn, also replace parts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

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

9Y1211012TRS0050US0

(3) Disassembling and Assembling (HST Model)

[A] Clutch Housing Case



Clutch Lever, Release Fork and Release Bearing

1. Remove the release fork mounting screws (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the release bearing and release hub (4) together.

(When reassembling)

- Apply grease to the sliding surface of the clutch release hub.
- Apply grease to the clutch lever.

Tightening torque	Release fork mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
-------------------	-----------------------------	---

- | | |
|---------------------------------|------------------|
| (1) Release Fork | (3) Clutch Lever |
| (2) Release Fork Mounting Screw | (4) Release Hub |

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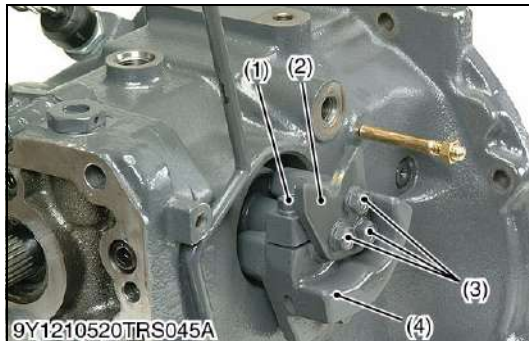


Plate and Neutral Holder

1. Remove the plate mounting screws (3) and plate (2).
2. Remove the neutral holder mounting screw (1) and neutral holder (4).

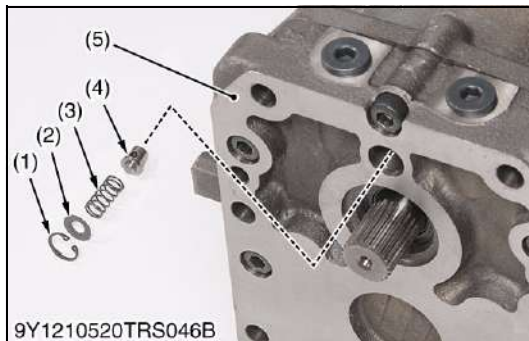
(When reassembling)

- Be sure to adjust the HST neutral position. (See page 3-S16.)

Tightening torque	Plate mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Neutral holder mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

- | | |
|-----------------------------------|--------------------------|
| (1) Neutral Holder Mounting Screw | (3) Plate Mounting Screw |
| (2) Plate | (4) Neutral Holder |

9Y1211012TRS0052US0



Case Relief Valve

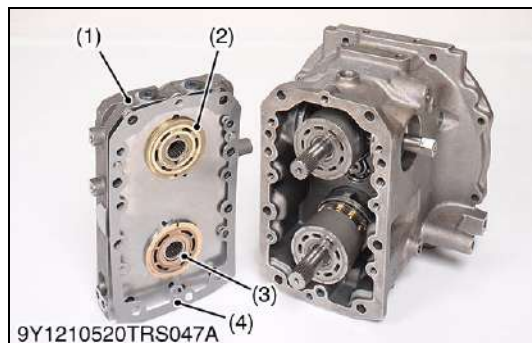
1. Remove the internal cir-clip (1).
2. Remove the holder (2), spring (3) and valve poppet (4).

(When reassembling)

- Apply hydrostatic transmission oil to the poppet before reassembling.

- | | |
|-----------------------|------------------|
| (1) Internal Cir-clip | (4) Valve Poppet |
| (2) Holder | (5) Port Block |
| (3) Spring | |

9Y1211012TRS0053US0



Port Block

1. Remove the port block mounting hex. head screws.
2. Pull and remove the port block (1) from clutch housing.

(When reassembling)

- Install port block (1) with valve plates (2), (3) and new gasket (4) in place.

■ NOTE

- Valve plates (2), (3) may stick to the port block but they are not fixed. Be careful not to drop them. And these valve plates are not interchangeable.

Tightening torque	Port block mounting hex. socket screw	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
-------------------	---------------------------------------	---

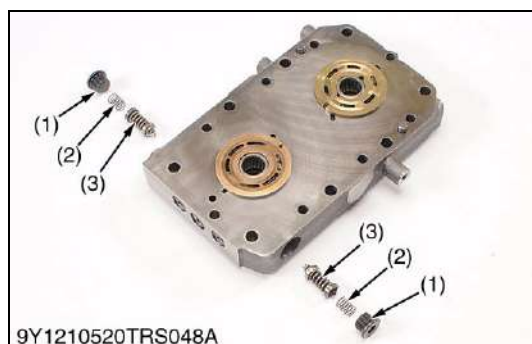
(1) Port Block

(3) Valve Plate (Motor)

(2) Valve Plate (Pump)

(4) Gasket

9Y1211012TRS0054US0



Check and High Pressure Relief Valve

1. Remove the hex. head plug (1) and remove the spring (2) and relief valve assembly (3).

(When reassembling)

- When replacing the valves, check and adjust the setting pressure (see page 3-S14).

■ NOTE

- Be careful not to damage the O-ring on the hex. head plug.

Tightening torque	Hex. head plug	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft
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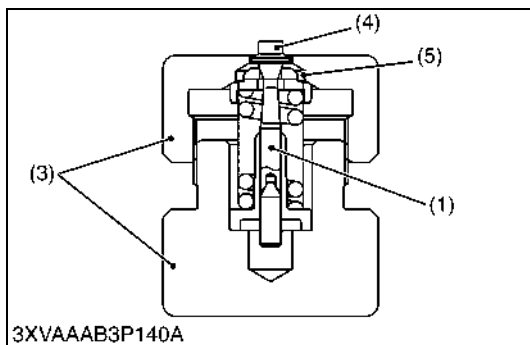
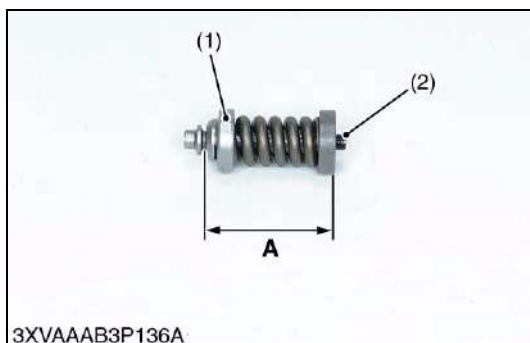
(1) Hex. Head Plug

(3) Check and High Pressure Relief

(2) Spring

Valve

9Y1211012TRS0055US0



Readjustment of Relief Valve (When the HST does not work due to its loose hexagon socket head screw)

■ IMPORTANT

- The KUBOTA does not recommend the readjustment of relief valve. And KUBOTA will recommend the exhaust with genuine parts.
- As the HST may be damaged if the pressure is set to higher by mistake, be careful when adjusting it.

■ NOTE

- The relief pressure is set in between 33.4 to 36.2 MPa (340 to 370 kgf/cm², 4840 to 5260 psi) when shipped from the factory. But, for the purpose of after-sales services, as it is impossible to reset the pressure precisely as set in the factory, its setting range is defined as a slightly wider range between 31.4 to 35.3 MPa (320 to 360 kgf/cm², 4560 to 5120 psi).

1. Measure the pre-adjustment distance "A".
2. Compress the spring of the relief valve with a relief valve assembling tool (3). (See page G-97.)
3. Then, find the distance "A" by turning the poppet (4) with a screwdriver.

Reference: The distance "A" changes by about 1.5 mm (0.02 in.) per one turn of the poppet (4).

4. Repeat the same operation a few times to find the distance "A" as it is difficult to acquire at the first time.
5. After finding the distance "A", hold the setscrew (6) to a vice and fasten the hexagon socket head screw (2) with specified torque.

On this occasion, use a copper plate, etc. for the vice jaws not to damage the setscrew (6).

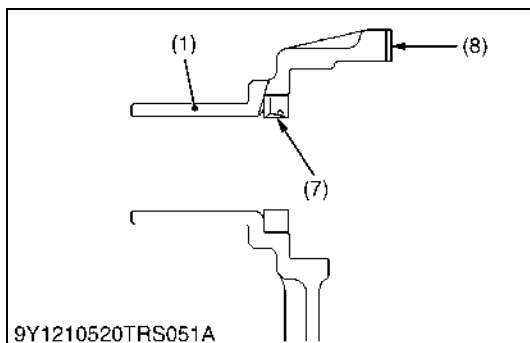
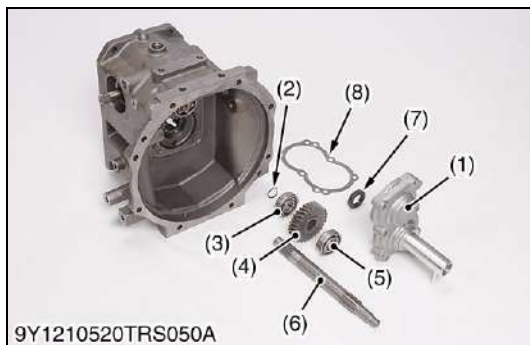
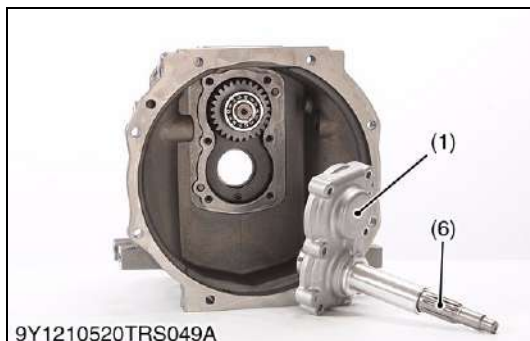
6. Install the relief valve in the HST.
7. Check the relief pressure as indicated in page 3-S14.
8. If the relief pressure does not fall within the readjustment pressure range, repeat the processes of the above item 1 onward.

Reference: The pressure changes by 1.5 MPa (15 kgf/cm², 210 psi) per 0.1 mm (0.004 in.) in distance "A".

Tightening torque	Hex. socket head screw	25 to 29 N·m
		2.5 to 3.0 kgf·m 18 to 21 lbf·ft
Relief valve readjusting pressure	Factory specification	33.4 to 36.2 MPa
		340 to 370 kgf/cm ² 4840 to 5260 psi
Distance "A"	Reference value	37.90 to 38.00 mm
		1.493 to 1.496 in.

- | | |
|----------------------------------|----------------|
| (1) Relief Valve Assembly | (4) Poppet |
| (2) Hexagon Socket Head Screw | (5) Valve Seat |
| (3) Relief Valve Assembling Tool | (6) Setscrew |

9Y1211012TRS0056US0



Shaft Case, Input Shaft and Gear

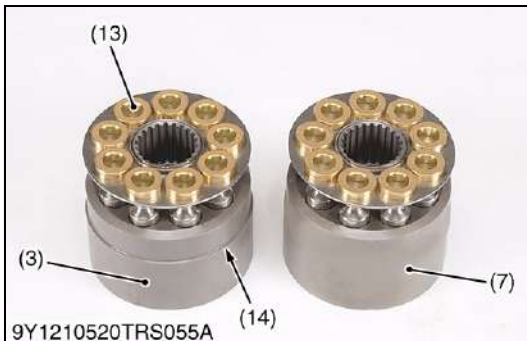
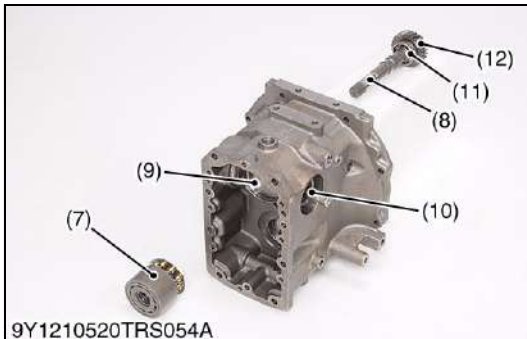
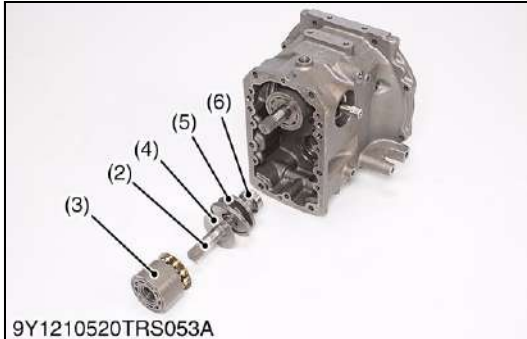
1. Remove the shaft case mounting screws.
2. Screw down the two M6 screws into the shaft case (1).
3. Remove the shaft case (1) with the input shaft assembly.
4. Separate the input shaft assembly with shaft case (1).
5. Remove the external cir-clip (2).
6. Remove the bearings (3), (5) with a bearing puller and 28T gear (4).

(When reassembling)

- Install the shaft case (1) the new gasket (8) in the place.
- Install the oil seal (7) as shown in the figure, noting its direction.
- Apply grease to the oil seal (7).

- | | |
|-----------------------|-----------------|
| (1) Shaft Case | (5) Bearing |
| (2) External Cir-clip | (6) Input Shaft |
| (3) Bearing | (7) Oil Seal |
| (4) 28T Gear | (8) Gasket |

9Y1211012TRS0057US0



Cylinder Block Assemblies

1. Remove the motor swashplate setting hex. head screw (1).
2. Remove the motor cylinder block assembly (3) with a motor shaft (2).
3. Remove the pump cylinder block assembly (7) and pump shaft (8).

(When reassembling)

- Apply clean hydrostatic transmission oil to cylinder block.
- When installing the swashplate to clutch housing, be sure to align the hole of swashplate and straight pin.

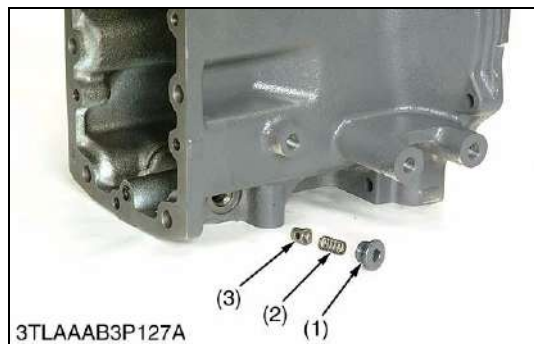
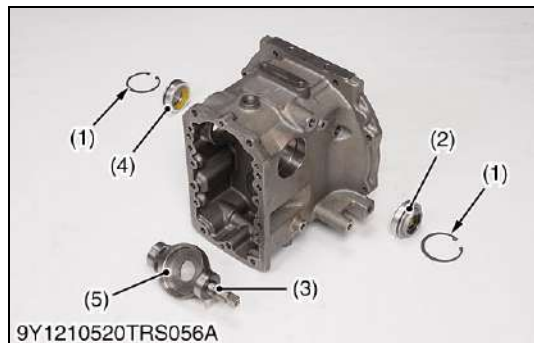
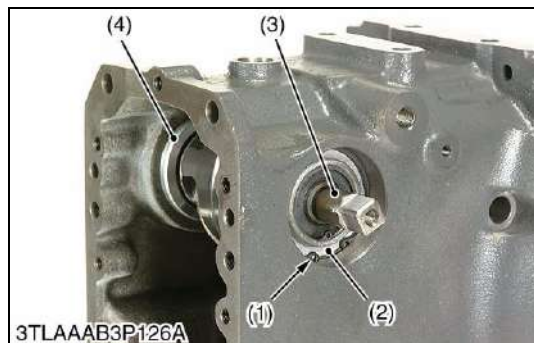
■ NOTE

- **Be careful not to damage the surface of cylinder block, pistons.**
- **Do not interchange pistons between pump and motor cylinder block.**

Tightening torque	Swashplate mounting hex. head screw	29 to 35 N·m 2.9 to 3.6 kgf·m 21 to 26 lbf·ft
-------------------	-------------------------------------	---

- | | |
|--|----------------------------|
| (1) Swashplate setting hex. head Screw | (8) Pump Shaft |
| (2) Output Shaft (Motor) | (9) Thrust Plate |
| (3) Motor cylinder Block Assembly | (10) Trunnion |
| (4) Thrust Plate | (11) Bearing |
| (5) Swashplate | (12) 27T Gear |
| (6) Bearing | (13) Piston |
| (7) Pump Cylinder Block Assembly | (14) Identification Groove |

9Y1211012TRS0058US0



Trunnion

1. Remove the internal cir-clip (1) both side.
2. Remove the cover (2) and (4).
3. Remove the trunnion (3).

(When reassembling)

- Apply transmission oil to the O-ring.

■ NOTE

- Be careful not to damage the O-ring with cover (4).

- | | |
|-----------------------|------------------|
| (1) Internal Cir-clip | (4) Cover |
| (2) Cover | (5) Thrust Plate |
| (3) Trunnion | |

9Y1211012TRS0059US0

Charge Relief Valve

1. Remove the hex. head plug (1).
2. Remove the spring (2) and valve poppet (3).

(When reassembling)

- When replacing the valves, check and adjust the setting pressure. (See page 3-S15.)

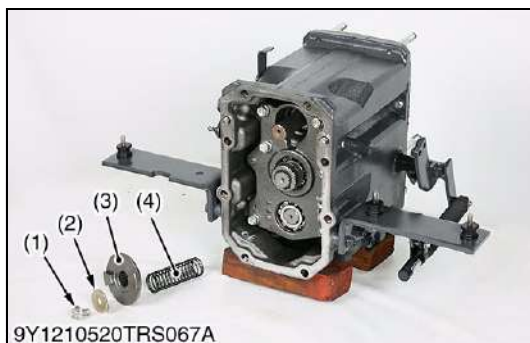
■ NOTE

- Be careful not to damage the O-ring.

Tightening torque	Hex. head plug	31 to 37 N·m
		3.1 to 3.8 kgf·m
		23 to 27 lbf·ft

- | | |
|--------------------|------------------|
| (1) Hex. Head Plug | (3) Valve Poppet |
| (2) Spring | |

9Y1211012TRS0060US0

[B] Mid Case**PTO Clutch**

1. Remove the PTO clutch mounting screw (1).
2. Remove the washer (2), clutch cam (3) and spring (4).

(When reassembling)

Tightening torque	Clutch cam mounting screw	61 to 70 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
-------------------	---------------------------	---

- | | |
|------------|----------------|
| (1) Screw | (3) Clutch Cam |
| (2) Washer | (4) Spring |

9Y1211012TRS0061US0

**Bearing Holder**

1. Remove the bearing holder mount screws.
2. Jack up the bearing holder (1) by using the two jack screws then remove the bearing holder (1).

(When reassembling)

- Tap in the bearing holder (1) with plastic hammer until contact to mid case and then tighten the screws to specified torque.

Tightening torque	Bearing holder mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-------------------------------	---

- (1) Bearing Holder

A: Hole for Jack Screw

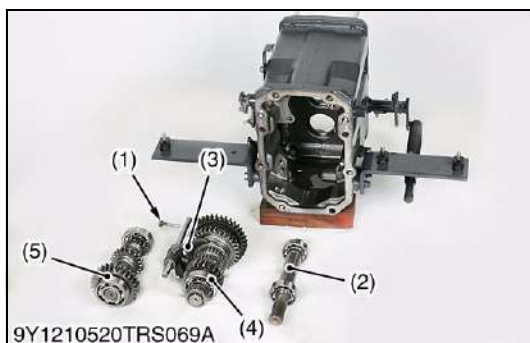
9Y1211012TRS0062US0

**Gears and Shafts**

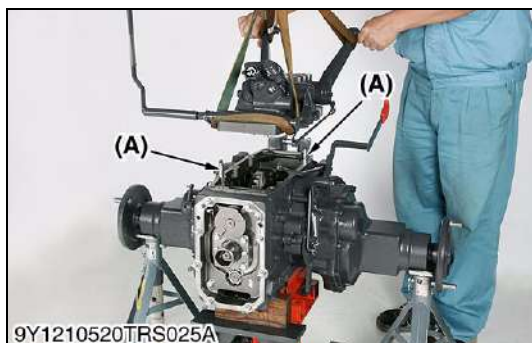
1. Remove the screw (1).
2. Tap out the PTO counter shaft (2).
3. Remove the shift fork (3) and sub shaft assembly (4).
4. Remove the 13T gear shaft assembly (5).

- | | |
|-----------------------|-----------------------------|
| (1) Screw | (4) Sub Shaft Assembly |
| (2) PTO Counter Shaft | (5) 13T Gear Shaft Assembly |
| (3) Shift Fork | |

9Y1211012TRS0063US0



[C] Transmission Case



Hydraulic Cylinder Assembly

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

(When reassembling)

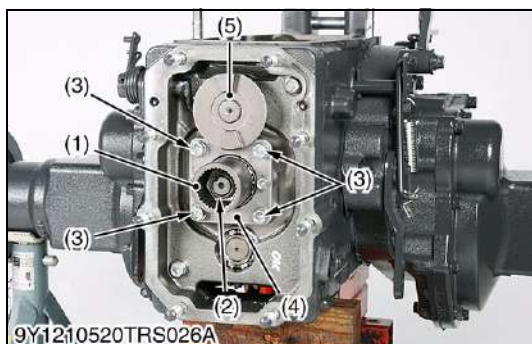
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.
- When replacing the hydraulic cylinder assembly mounting stud bolts, apply liquid lock (Three Bond 1324 or equivalent) to (A) portion of the stud bolt.

Tightening torque	Hydraulic cylinder assembly mounting screws and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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■ NOTE

- **Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control rod. (See page 8-S15.)**

9Y1211012TRS0064US0



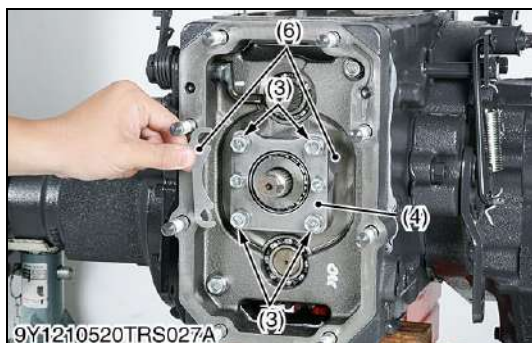
PTO Clutch and Pinion Bearing Holder

1. Remove the coupling (1) and the PTO clutch cam (5).
2. Remove the screws (3) and pinion bearing holder assembly (4).
3. Remove the lock nut (2).

(When reassembling)

- Make sure of the number of shims in the pinion bearing holder.
- Replace the lock nut (2) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

Tightening torque	Lock nut	150 to 190 N·m 15 to 20 kgf·m 110 to 140 lbf·ft
	Pinion bearing holder mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft



- | | |
|----------------------------------|------------------------------------|
| (1) Coupling (Pinion Shaft) | (4) Pinion Bearing Holder Assembly |
| (2) Lock Nut | (5) PTO Clutch Cam |
| (3) Screw (Pinion Bearing Cover) | (6) Shim |

9Y1211012TRS0065US0



Gear and Shaft Assembly

1. Remove the spacer mounting screws.
2. Separate the spacer (1) from the transmission case.
3. Remove the 16T gear shaft assembly (2).
4. remove the pinion shaft assembly (3) and PTO drive shaft assembly (4).

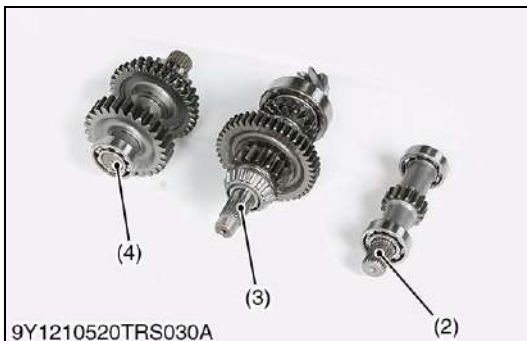
(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint faces of spacer and transmission case.

Tightening torque	Spacer mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	-----------------------	---

- | | |
|-----------------------------|------------------------------|
| (1) Spacer | (3) Pinion Shaft Assembly |
| (2) 16T Gear Shaft Assembly | (4) PTO Drive Shaft Assembly |

9Y1211012TRS0066US0



Rear Axle Case

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

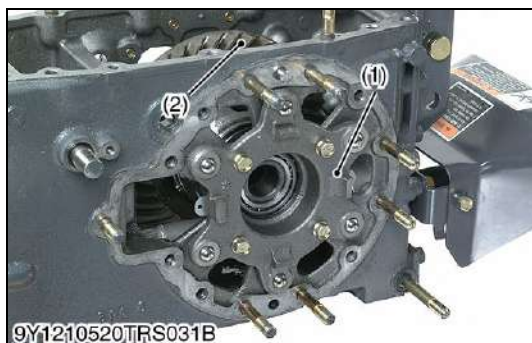
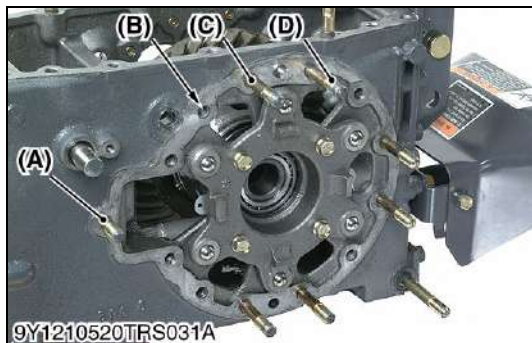
(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting screws and nuts	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	---	---

- (1) Rear Axle Case

9Y1211012TRS0067US0



Brake Case

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

(When reassembling)

- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.
- Apply liquid lock (Three Bond 1324 or equivalent) to (A), (B), (C), (D) portions of the stud bolts, R.H. and L.H..

Tightening torque	Brake case mounting stud bolts	39 to 45 N·m 3.5 to 5.0 kgf·m 26 to 36 lbf·ft
-------------------	--------------------------------	---

9Y1211012TRS0068US0

Differential Lock

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

- (1) Clevis Pin
(2) Fork Shaft

- (3) Shift Fork

9Y1211012TRS0069US0

Differential Gear Assembly

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

(When reassembling)

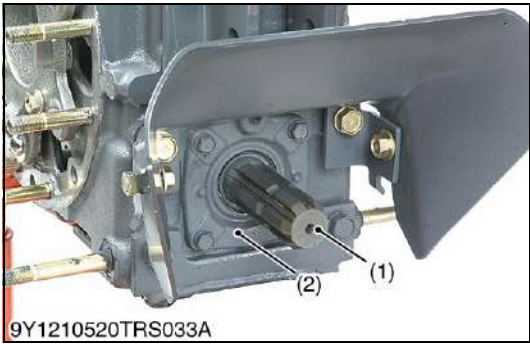
- Use same number of shim as before disassembling.
- Replace the left and right bearing cases on the same sides as before.
- Apply grease to ball and ball seats.

Tightening torque	Differential bearing case mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
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- (1) Differential Bearing Case

- (2) Differential Gear Assembly

9Y1211012TRS0070US0

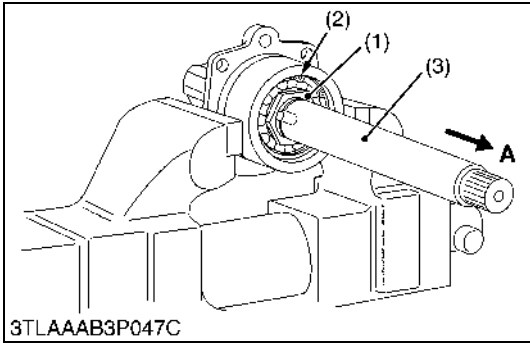


PTO Bearing Case

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

(1) PTO Shaft (2) PTO Bearing Case

9Y1211012TRS0071US0



PTO Shaft

- 1. Remove the internal cir-clip (2).
- 2. Tap out the PTO shaft (6) to the front "A".

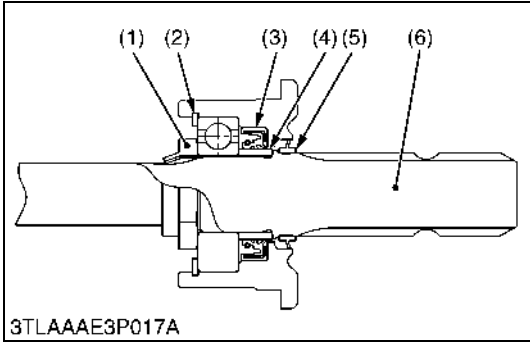
(When reassembling)

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

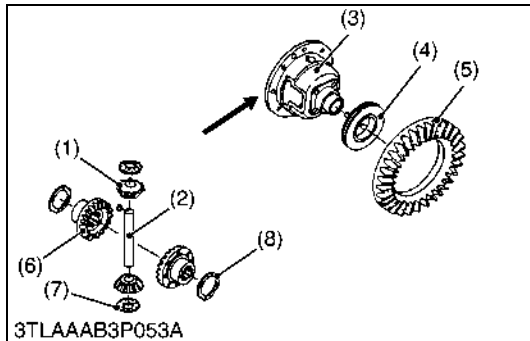
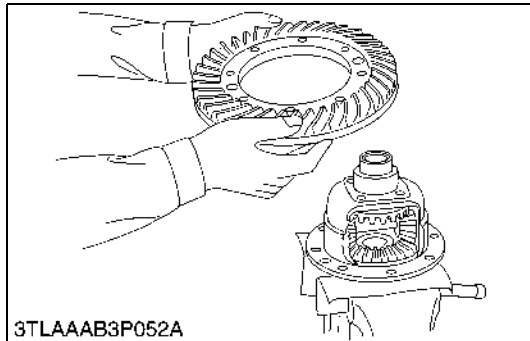
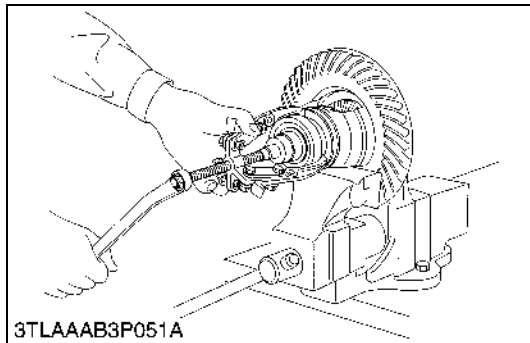
Tightening torque	Lock nut	150 to 190 N·m
		15 to 20 kgf·m
		110 to 140 lbf·ft

(1) Lock Nut (4) Collar
(2) Internal Cir-clip (5) Slinger
(3) Oil Seal (6) PTO Shaft

9Y1211012TRS0072US0



[D] Differential Gear Assembly



Bearing and Differential Lock Shifter

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

9Y1211012TRS0048US0

Spiral Bevel Gear

1. Remove the spiral bevel gear.

(When reassembling)

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

Tightening torque	Spiral bevel gear UBS screw	69 to 88 N·m 7.0 to 9.0 kgf·m 51 to 65 lbf·ft
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9Y1211012TRS0049US0

Differential Pinion and Differential Side Gear

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

■ NOTE

- Arrange the parts to know their original position.

(When reassembling)

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

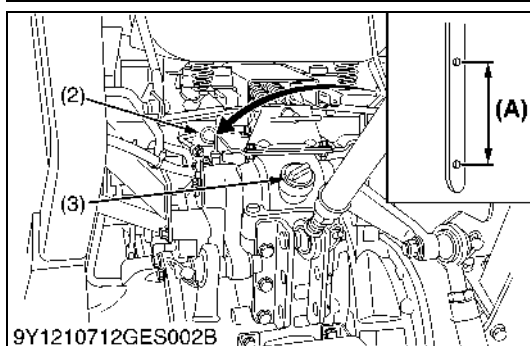
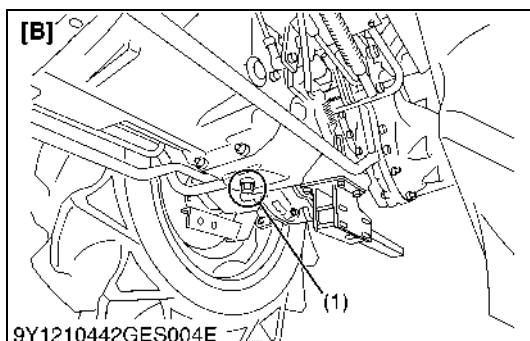
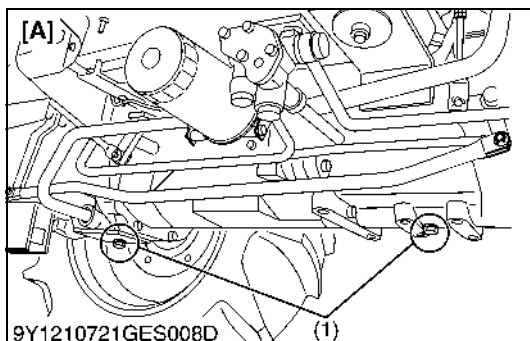
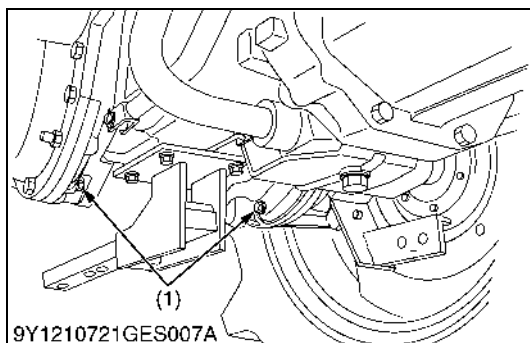
- | | |
|-------------------------------|-----------------------------------|
| (1) Differential Pinion | (5) Spiral Bevel Gear |
| (2) Differential Pinion Shaft | (6) Differential Side Gear |
| (3) Differential Case | (7) Differential Pinion Washer |
| (4) Differential Lock Shifter | (8) Differential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

9Y1211012TRS0050US0

[2] L4701

(1) Preparation

[A] Separating Engine and Clutch Housing Case



Draining Transmission Fluid (L4701)



CAUTION

To avoid personal injury:

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

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

(When reassembling)

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

■ IMPORTANT

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

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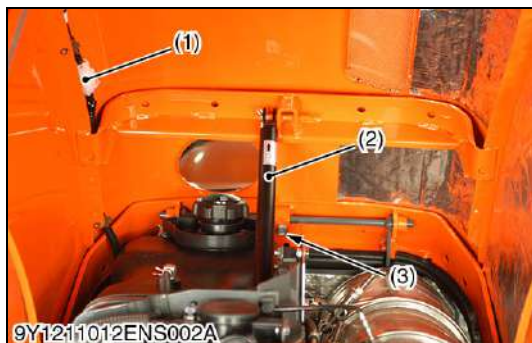
- (1) Drain Plug
(2) Gauge
(3) Oil Inlet Plug

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0004US0



Bonnet and Side Covers

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

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

9Y1211012TRS0073US0

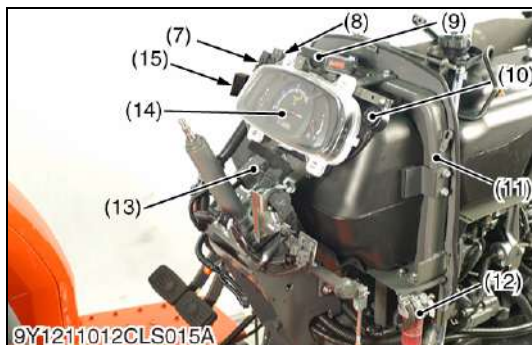
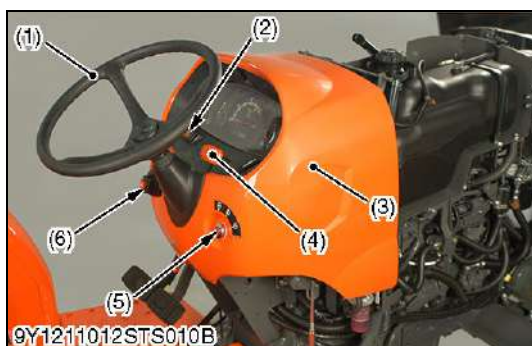


Rear Bonnet and Stay

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

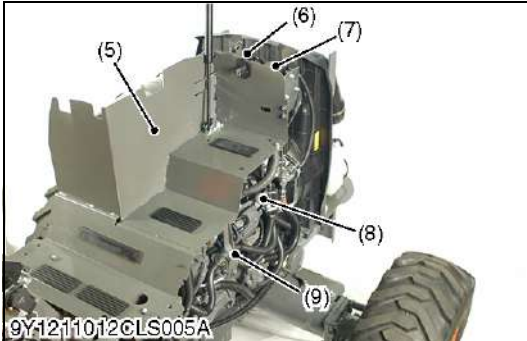
(When reassembling)

Tightening torque	Steering wheel mounting nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
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- | | |
|------------------------|-----------------------|
| (1) Steering Wheel | (9) ECU |
| (2) DPF Switch | (10) DPF Alarm |
| (3) Rear Bonnet | (11) Rear Bonnet Stay |
| (4) Throttle Grip | (12) Separator |
| (5) Main Switch | (13) Flasher Unit |
| (6) Combination Switch | (14) Meter Panel |
| (7) Glow Plug Relay | (15) CCV Heater Relay |
| (8) Starter Relay | |

9Y1211012CLS0007US0

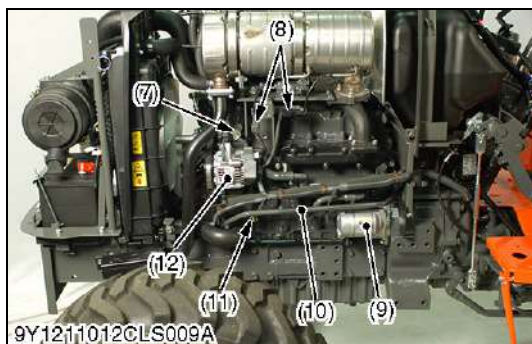
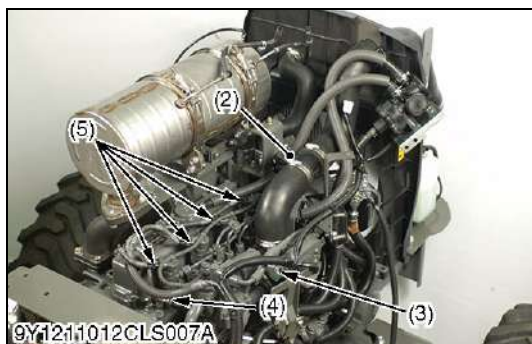
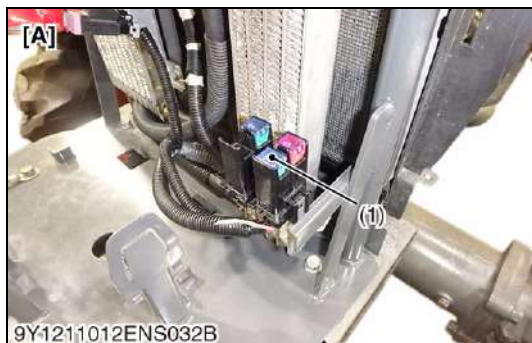


Fuel Tank and Base

1. Disconnect the fuel sensor (4).
2. Disconnect the fuel return line (1).
3. Remove the fuel tank band (2).
4. Remove the fuel tank (3).
5. Disconnect the connector and hoses from the differential pressure sensor (6).
6. Disconnect the oil separator (7) from the fuel tank base.
7. Disconnect the fuel reserve tank bracket (8) from the fuel tank base.
8. Disconnect the fuel pump bracket (9) from the fuel tank base.
9. Remove the fuel tank base (5).

- | | |
|----------------------|----------------------------------|
| (1) Fuel Return Line | (6) Differential Pressure Sensor |
| (2) Fuel Tank Band | (7) Oil Separator |
| (3) Fuel Tank | (8) Fuel Reserve Tank Bracket |
| (4) Fuel Sensor | (9) Fuel Pump Bracket |
| (5) Fuel Tank Base | |

9Y1211012CLS0020US0



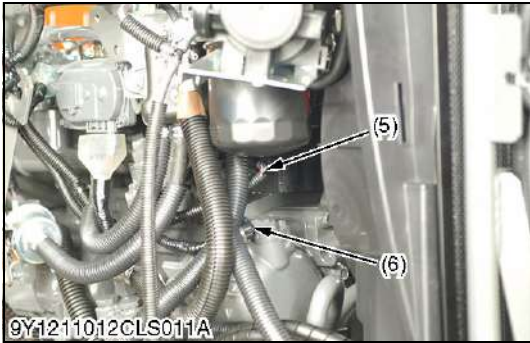
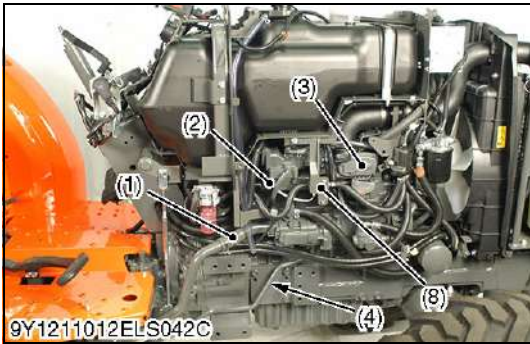
Hydraulic Pipes and Electrical Wiring (Under Fuel Tank Base and Left Side)

1. Disconnect the injector connectors (5).
2. Disconnect the glow plug (4).
3. Disconnect the EGR valve (3) connector.
4. Disconnect the air flow sensor (2) connector.
5. Disconnect the rail pressure sensor (6) connector.
6. Remove the slow blow fuses (1).
7. Disconnect the coolant temperature sensor (7) connector.
8. Disconnect the DPF temperature sensors (8).
9. Disconnect the alternator (12).
10. Disconnect the starter (9).
11. Disconnect the oil switch (11).
12. Remove the HST return pipe (10).

Tightening torque	HST return pipe bolt	79.2 to 88.2 N·m 8.1 to 9.0 kgf·m 58.4 to 65.1 lbf·ft
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- | | |
|--------------------------------|------------------------|
| (1) Slow Blow Fuse | (9) Starter |
| (2) Air Flow Sensor | (10) HST Return Pipe |
| (3) EGR Valve | (11) Oil Switch |
| (4) Glow Plug | (12) Alternator |
| (5) Injector Connector | (13) HST Return Pipe |
| (6) Rail Pressure Sensor | |
| (7) Coolant Temperature Sensor | [A] L3301/L3901 |
| (8) DPF Temperature Sensor | [B] L4701 |

9Y1211012CLS0008US0



Hydraulic Pipes and Electrical Wiring (Right Side)

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

(When reassembling)

Tightening torque	Delivery pipe mounting screw	18 to 20 N·m 1.8 to 2.0 kgf·m 13 to 15 lbf·ft
	Delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft

- (1) Suction Hose

(2) EGR Valve

(3) Intake Throttle Valve

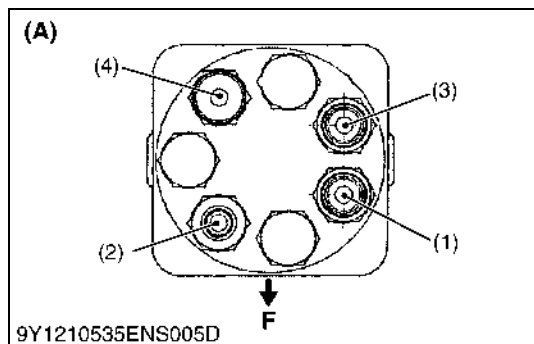
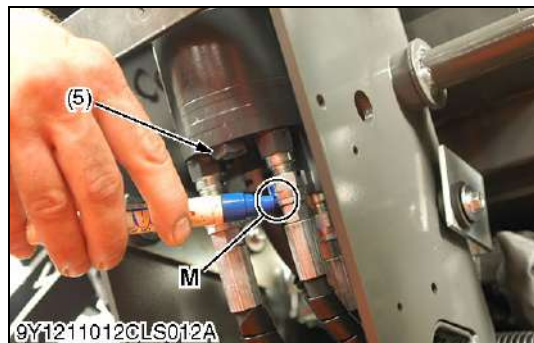
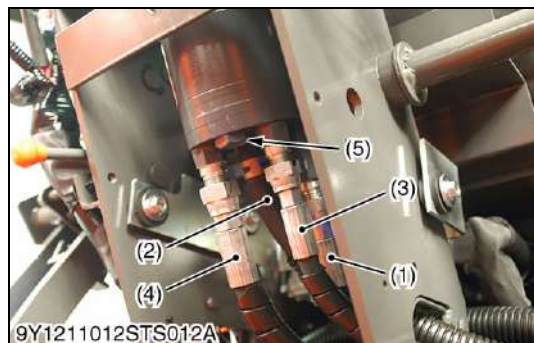
(4) Delivery Pipe
- (5) Rail Pressure Sensor

(6) Camshaft Position Sensor

(7) Crankshaft Position Sensor

(8) Fuel Pump

9Y1211012CLS0009US0



Power Steering Controller Hoses

1. Since identification tapes are not installed to the hoses, mark the hoses as shown in the picture.
2. After marking, disconnect the left delivery hose (3) and the right delivery hose (1).

Tightening torque	Main delivery hose retaining nut	46.6 to 50.9 N·m 4.8 to 5.2 kgf·m 35 to 37 lbf·ft
	Turning delivery hoses retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

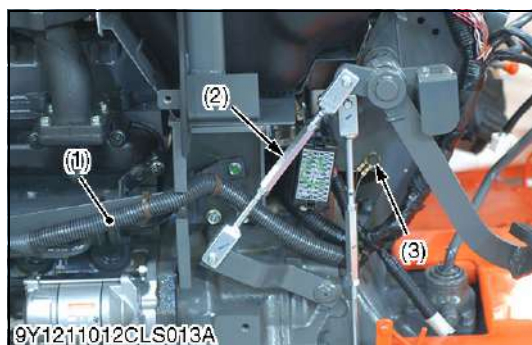
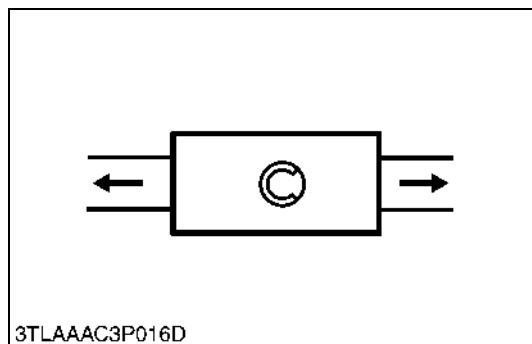
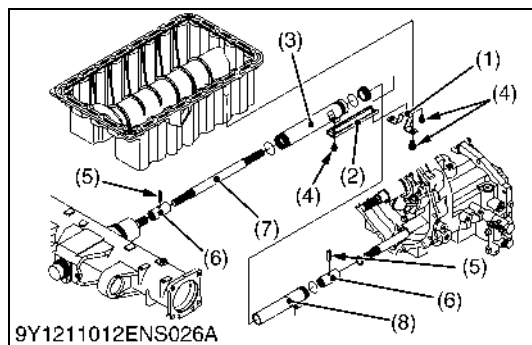
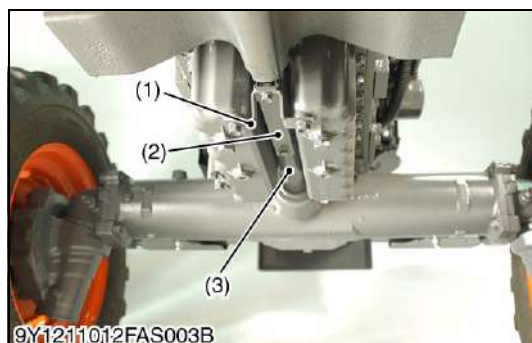
- (1) Delivery Hose (R.H.)
- (2) Return Hose
- (3) Delivery Hose (L.H.)
- (4) Main Delivery Hose
- (5) Plug

(A) Steering controller viewing from the bottom side

F: Front

M: Marking

9Y1211012CLS0010US0



Propeller Shaft (L4701)

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

(When reassembling)

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

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

9Y1211012ENS0025US0

Separating Engine from Clutch Housing

1. Disconnect the clutch rod (2).
2. Place the disassembling stands under the engine and clutch housing case.
3. Remove the engine and clutch housing mounting screws and nuts.
4. Separate the engine and clutch housing.

(When reassembling)

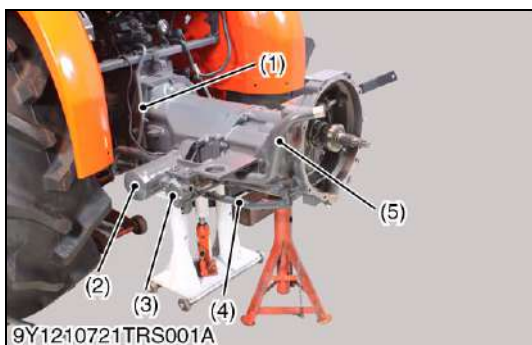
- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the engine and clutch housing.
- Install the ground cable to the steering support securely.

Tightening torque	Engine and clutch housing mounting bolt and nut [L3301/L3901]	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Engine and clutch housing mounting bolt and nut [L4701]	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft

- | | |
|-------------------------|------------------|
| (1) Main Wiring Harness | (3) Ground Cable |
| (2) Clutch Rod | |

9Y1211012CLS0011US0

[B] Separating Clutch Housing and Mid Case



Outer Components

1. Remove the mounting bolts and the steering support (1).
2. Disconnect the differential lock pedal.
3. Remove the step (2) and the main wiring harness.

(1) Steering Support

(2) Step

9Y1211012TRS0074US0

Suction Pipe and Hydraulic Block

1. Remove the suction pipe (5).
2. Remove the hydraulic block (3).
3. Remove 3P delivery pipe (1).
4. Remove the brake connecting rod R.H. (4) and L.H..

(When reassembling)

- Apply grease to the O-rings.

Tightening torque	3P delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 lbf·ft
	3P delivery pipe mounting M8 bolt	23.5 to 24.7 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) 3P Delivery Pipe

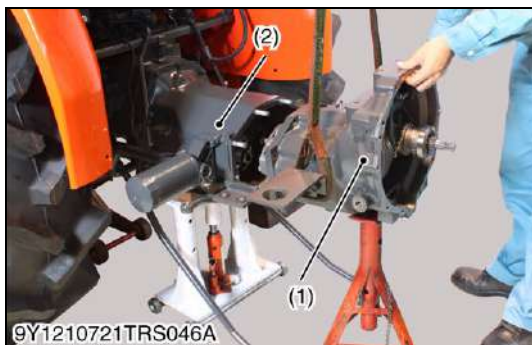
(4) Brake Connecting Rod (R.H.)

(2) Oil Filter

(5) Suction Pipe

(3) Hydraulic Block

9Y1211012TRS0075US0



Separating Clutch Housing Case from Mid Case

1. Loosen and remove the screws and the nuts securing the clutch housing case (1) to mid case (2).
2. Separate the clutch housing case (1) from the mid case (2).

(When reassembling)

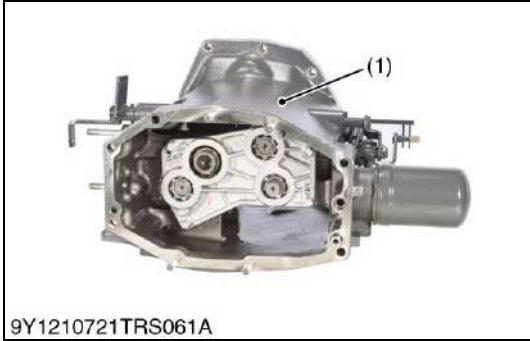
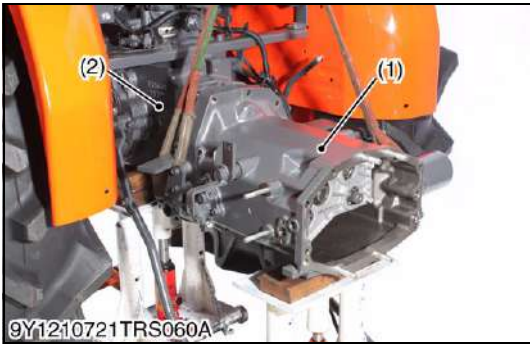
- Replace the gasket with a new one.

Tightening torque	Clutch housing case and mid case mounting screw and nut	102.9 to 117.6 N·m 10.5 to 12.0 kgf·m 75.9 to 86.8 lbf·ft
-------------------	---	---

(1) Clutch Housing Case

(2) Mid Case

9Y1211012TRS0076US0



Separating Mid Case from Transmission Case

1. Loosen and remove screws and nuts securing mid case (1) to transmission case (2).
2. Separate mid case from transmission case (2).

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of mid case and transmission case after eliminate water, oil and stuck liquid gasket.

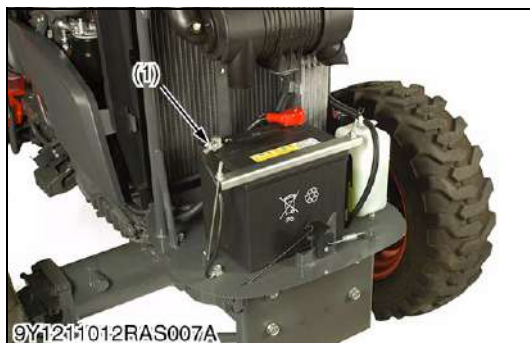
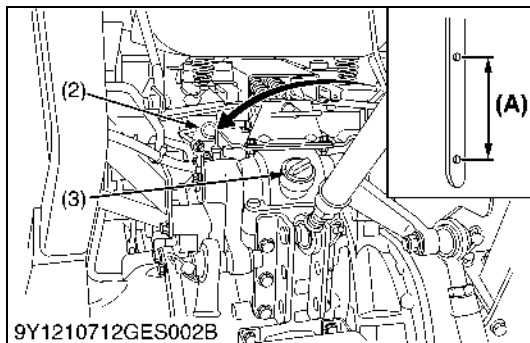
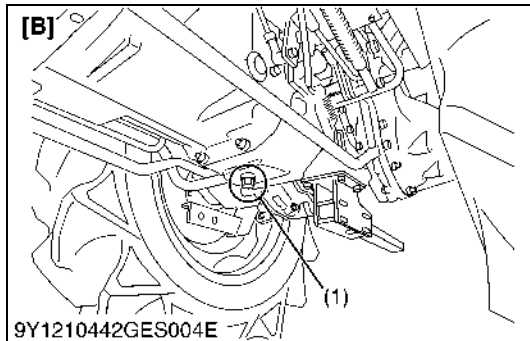
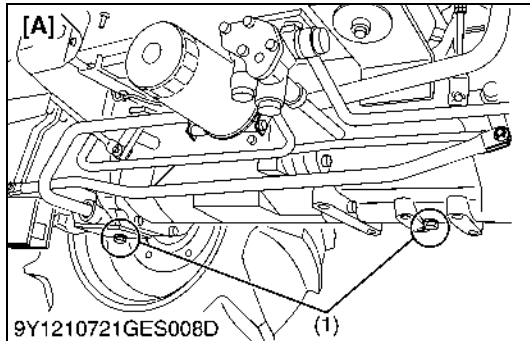
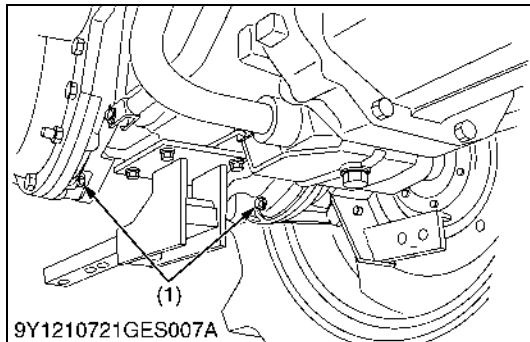
Tightening torque	Clutch housing case and mid case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting stud bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 28.9 to 36.2 lbf·ft

(1) Mid Case

(2) Transmission Case

9Y1211012TRS0177US0

[C] Separating Transmission Case



Draining Transmission Fluid (L4701)



CAUTION

To avoid personal injury:

- Be sure to stop the engine before changing the oil filter cartridge.
 - Allow engine to cool down sufficiently, oil can be hot and can burn.
1. Remove the drain plugs (1) at the bottom of the transmission case and drain the oil completely into the oil pan.
 2. After draining reinstall the drain plugs.

(When reassembling)

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

■ IMPORTANT

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

Transmission fluid	Capacity	40.0 L 10.6 U.S.gals 8.8 Imp.gals
--------------------	----------	---

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

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0004US0

Battery Negative Cable

1. Open the bonnet and disconnect the battery negative cable from the battery.

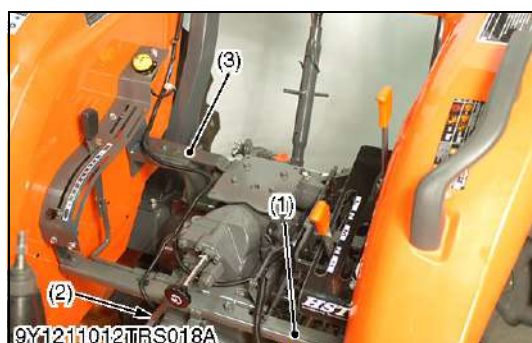
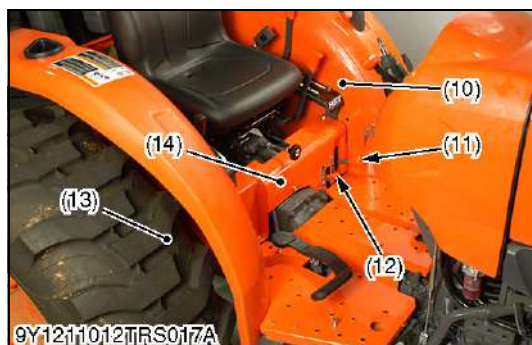
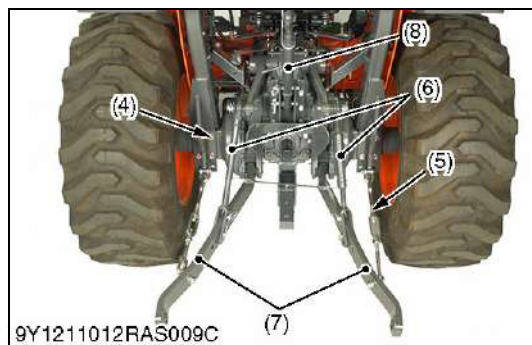
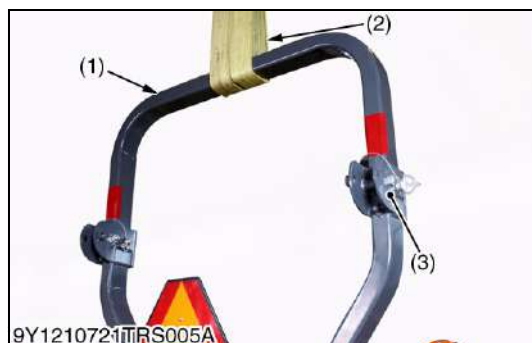
(When reassembling)

■ NOTE

- When connecting the battery cords, connect the battery positive cable first.

- (1) Battery Negative Cable Connector

9Y1211012TRS0081US0



Three Point Linkage and ROPS

1. Secure the ROPS (1) with safety strap (2).
2. Remove the stabilizer joint (5), the top link (8), the lift rods (6) and the lower links (7).
3. Remove ROPS mounting screws (4), and remove the ROPS.

(When reassembling)

Tightening torque	ROPS mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum screw	118 to 137 N·m 12 to 14 kgf·m 87 to 101 lbf·ft

- | | |
|-------------------------|----------------------|
| (1) ROPS | (5) Stabilizer Joint |
| (2) Safety Strap | (6) Lift Rod |
| (3) ROPS Fulcrum Screw | (7) Lower Link |
| (4) ROPS Mounting Screw | (8) Top Link |

9Y1211012TRS0025US0

Outer Components

1. Place the disassembling stands under the transmission case.
2. Remove the seat assembly (9).
3. Remove the grips (3), (4), (7), and (11).
4. Disconnect the PTO switch (8).
5. Remove the lever guides (5) and (6).
6. Disconnect the combination lamps (2).
7. Disconnect the differential lock lever (12).
8. Remove the center cover (14).
9. Remove the rear wheels (13).
10. Remove the fender support (1).
11. Remove the fenders (10).

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	196.0 to 225.0 N·m 20.0 to 23.0 kgf·m 144.6 to 166.0 lbf·ft
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- | | |
|--------------------------------------|-----------------------------------|
| (1) Fender Support | (8) PTO Switch |
| (2) Combination Lamp | (9) Seat Assembly |
| (3) Range Gear Shift Lever Grip | (10) Fender |
| (4) Synchro-shuttle Shift Lever Grip | (11) Front Wheel Drive Lever Grip |
| (5) Shift Lever Guide | (12) Differential Lock Lever |
| (6) Position Control Lever Guide | (13) Rear Wheel |
| (7) Position Control Lever Grip | (14) Center Cover |

9Y1211012TRS0082US0

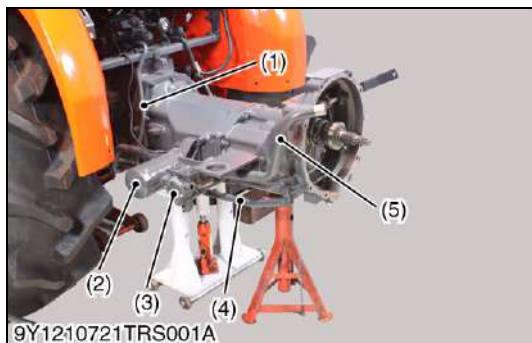
Fender Support and Delivery Pipe

1. Disconnect the delivery pipe (2).
2. Remove the fender stay (1).
3. Remove the R.H. (3) and L.H. fender supports.

Tightening torque	3P Delivery pipe mounting M8 bolt	23.5 to 24.7 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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- | | |
|-------------------|-------------------------|
| (1) Fender Stay | (3) Fender Support R.H. |
| (2) Delivery Pipe | |

9Y1211012TRS0083US0



Suction Pipe and Hydraulic Block

1. Remove the suction pipe (5).
2. Remove the hydraulic block (3).
3. Remove **3P** delivery pipe (1).
4. Remove the brake connecting rod R.H. (4) and L.H..

(When reassembling)

- Apply grease to the O-rings.

Tightening torque	3P delivery pipe joint bolt	49.0 to 69.0 N·m 5.0 to 7.0 kgf·m 36.2 to 50.6 lbf·ft
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- (1) **3P** Delivery Pipe
(2) Oil Filter
(3) Hydraulic Block

- (4) Brake Connecting Rod (R.H.)
(5) Suction Pipe

9Y1211012TRS0084US0



Front Wheel Drive Case

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

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to both faces of the gasket that is to be installed between the front drive case and the transmission case.

- (1) Front Wheel Drive Case

9Y1211012TRS0029US0



Hydraulic Cylinder

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

(When reassembling)

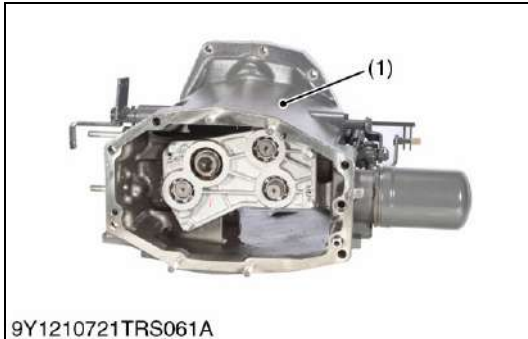
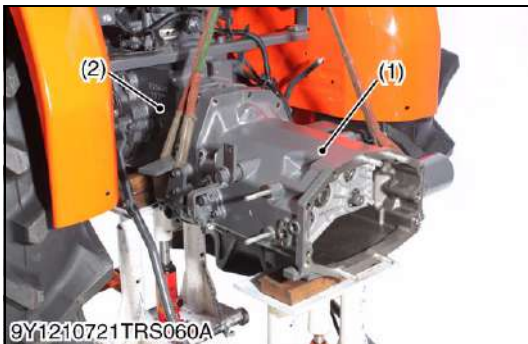
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket.

Tightening torque	Hydraulic cylinder assembly mounting screws and nuts	77.4 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 lbf·ft
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■ **NOTE**

- **Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the position control feedback rod. (See page 8-S16.)**

9Y1211012TRS0086US0



Separating Mid Case from Transmission Case

1. Loosen and remove screws and nuts securing mid case (1) to transmission case (2).
2. Separate mid case from transmission case (2).

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of mid case and transmission case after eliminate water, oil and stuck liquid gasket.

Tightening torque	Clutch housing case and mid case mounting screw and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Mid case and transmission case mounting stud bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 28.9 to 36.2 lbf·ft

(1) Mid Case

(2) Transmission Case

9Y1211012TRS0177US0

Rear Axle Case

1. Place the support stand under the rear axle case.
2. Loosen and remove the rear axle case mounting screws and nuts.
3. Support the rear axle case with nylon lift strap and hoist.
4. Separate the rear axle case from brake case.

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to the joint face of the rear axle case and the brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting M10 nuts	60.8 to 70.5 N·m 6.2 to 7.2 kgf·m 44.9 to 52.1 lbf·ft
	Rear axle case mounting M12 bolts and nuts	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft

9Y1211012TRS0087US0



Brake Case

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

(When reassembling)

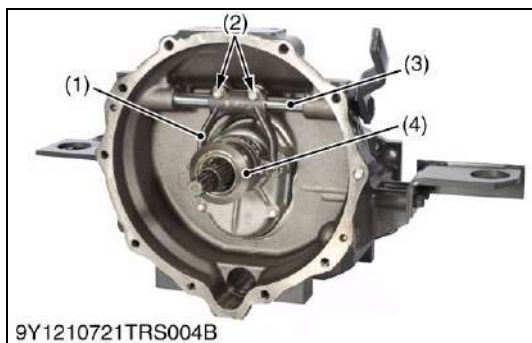
- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminate the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.

Tightening torque	Brake case mounting stud bolts	38.2 to 45.1 N·m 3.9 to 4.6 kgf·m 28.2 to 33.3 lbf·ft
	Brake case mounting screws and nuts	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft
	Brake case lever mounting screw	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft

9Y1211012TRS0088US0

(2) Disassembling and Assembling (Manual Transmission Model)

[A] Clutch Housing Case



Clutch Lever, Release Fork and Release Bearing

1. Remove the release fork mounting screws (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the release bearing (4) together with release holder.

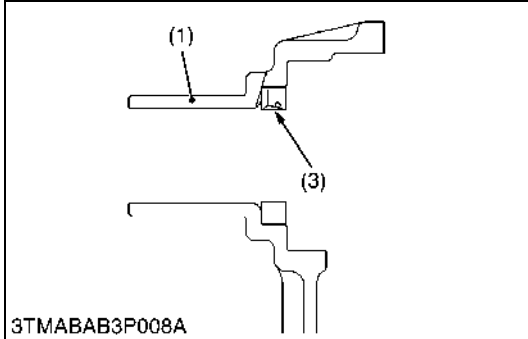
(When reassembling)

- Apply grease to the sliding surface of the clutch release hub.
- Apply grease to the clutch lever.

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

- (1) Release Fork (3) Clutch Lever
(2) Release Fork Mounting Screw (4) Release Bearing

9Y1211012TRS0089US0



Shaft Case

1. Remove the shaft case mounting screws.
2. Remove the shaft case (1) by using jack screw M6.

(When reassembling)

- Replace the gasket with a new one.

(When replacing oil seal in shaft case)

- Install the oil seal (3) as shown in the figure, noting its direction.
- Apply grease to the oil seal (3).

Tightening torque	Shaft case mounting screw	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
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- (1) Shaft Case (3) Oil Seal
(2) Jack Screw M6

9Y1211012TRS0090US0

24T Gear Shaft and 27T Gear

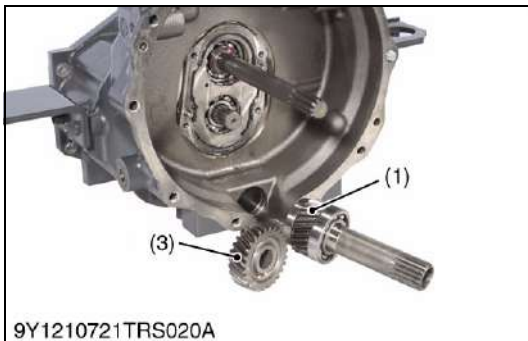
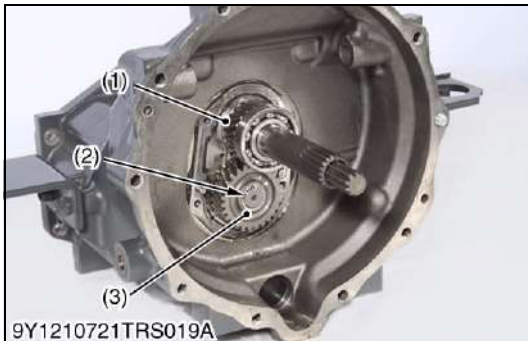
1. Remove the 24T gear shaft (1).
2. Remove the external snap ring (2) and 27T gear (3).

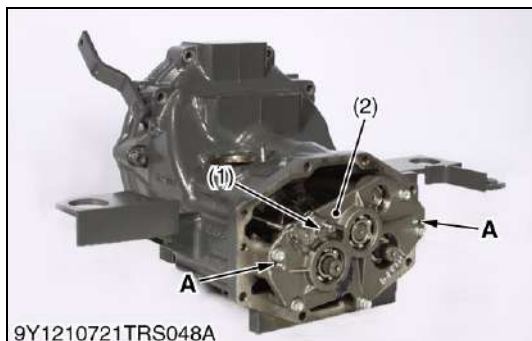
(When reassembling)

- Install the parts to the original positions.

- (1) 24T Gear Shaft (3) 27T Gear
(2) External Snap Ring

9Y1211012TRS0091US0





Clutch Housing Bearing Holder

1. Remove clutch housing bearing holder (2) mounting screws.
2. Remove three interlock balls (4) after removing stopper screw (1).
3. Pull out clutch housing bearing holder (2) by using two jack screws (6) M8 to the hole "A".

NOTE

- Be careful not to fly out interlock balls (4) and springs (5) when pull out bearing holder (2).

(When reassembling)

- Install three interlock balls (4) with a small amount of grease to clutch housing bearing holder (2) after setting the shift forks and shift rods to neutral position.

Tightening torque	Clutch housing bearing holder mounting screws	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
	Stopper screw	34.3 to 44.1 N·m 3.5 to 4.5 kgf·m 25.3 to 32.6 lbf·ft

(1) Stopper Screw

(2) Clutch Housing Bearing Holder

(3) Shift Lock Ball

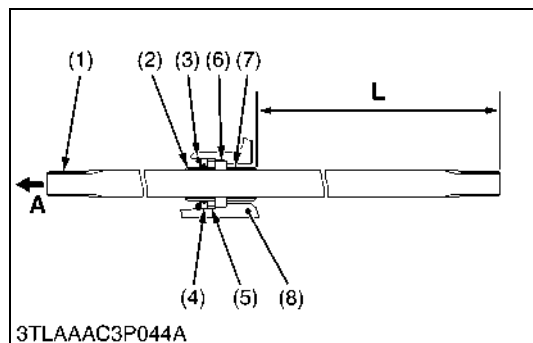
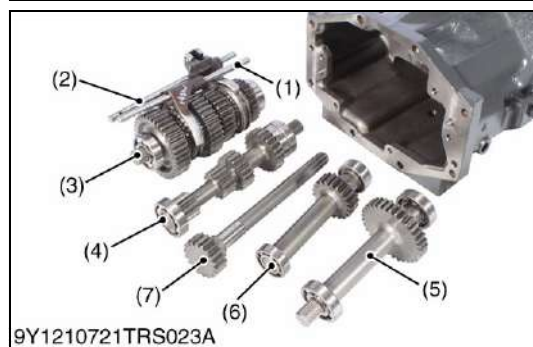
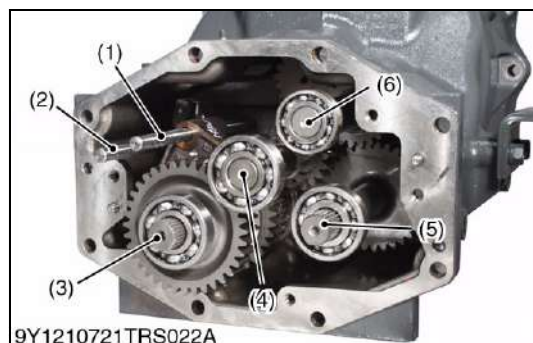
(4) Interlock Ball

(5) Spring

(6) Jack Screw

A: Portion to use jack screw

9Y1211012TRS0092US0



Gear Shaft Assemblies

1. Remove shift fork assembly (1), (2) together with main gear shaft assembly (3).
2. Remove counter gear shaft assembly (4), the PTO counter gear shaft assembly (5), the PTO gear shaft assembly (6), and then the main shaft (7).

■ NOTE

- To easily remove the gear shaft assembly, tap lightly a tool, through small holes from front inside wall of clutch housing.

- | | |
|---------------------------------|-------------------------------------|
| (1) Shift Fork Assembly (1-2) | (5) PTO Counter Gear Shaft Assembly |
| (2) Shift Fork Assembly (3-4) | (6) PTO Gear Shaft Assembly |
| (3) Main Gear Shaft Assembly | (7) Main Shaft |
| (4) Counter Gear Shaft Assembly | |

9Y1211012TRS0093US0

Front Axle Drive Shaft (4WD)

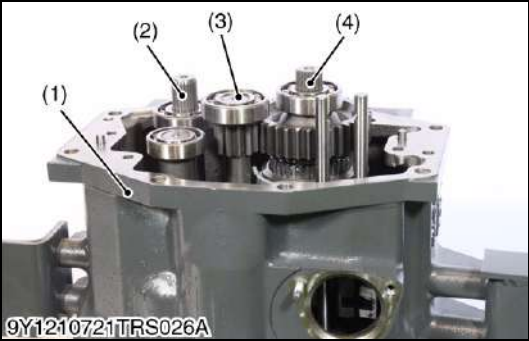
1. Pull out the front axle drive shaft (1) from the rear.

(When reassembling)

- Install the bearing (6), the spacer (5), the oil seal (4) and the internal snap ring to the clutch housing (8).
- Install the sleeve (7) to the front propeller shaft with dimension shown on the figure, then install the front propeller shaft from the rear.
- Install the sleeve (2) by using a rear propeller shaft tool.

- | | |
|----------------------------|------------------------------------|
| (1) Front Axle Drive Shaft | (7) Sleeve |
| (2) Sleeve | (8) Clutch Housing |
| (3) Internal Snap Ring | |
| (4) Oil Seal | A: To Front Propeller Shaft |
| (5) Spacer | L: 538 mm (21.182 in.) |
| (6) Bearing | |

9Y1211012TRS0094US0



Assembling Shafts to Clutch Housing Case

- 1. Turn the clutch housing case vertical.
- 2. Assemble all shafts to the clutch housing case.
- 3. Install the rear cover.
- 4. Tighten the rear cover mounting bolts to the tightening torque.

Tightening torque	Release fork mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
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- (1) Clutch Housing Case

(2) PTO Counter Gear Shaft

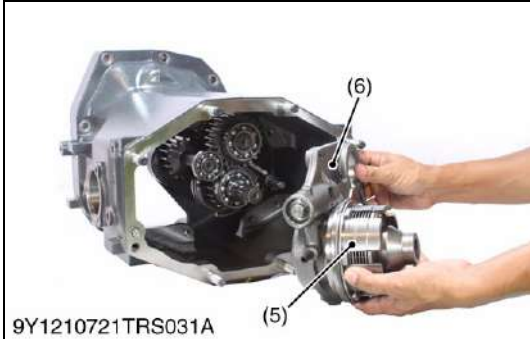
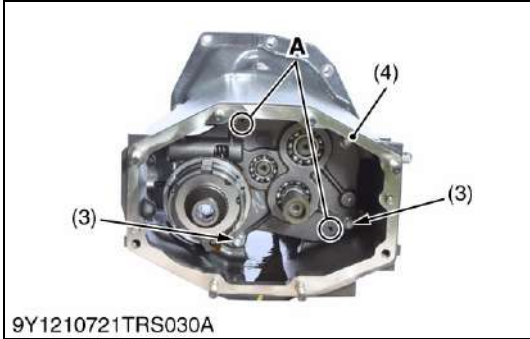
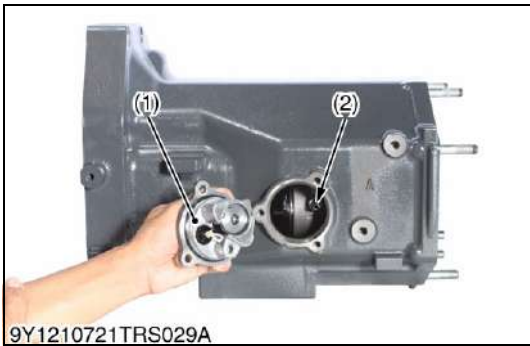
(3) Counter Gear Shaft

(4) Main Gear Shaft

(5) Clutch Housing Bearing Holder

9Y1211012TRS0095US0

[B] Mid Case



PTO Clutch Valve and PTO Clutch Holder

- 1. Remove PTO clutch valve (1).
- 2. Remove PTO clutch holder (6) together with PTO clutch pack (5) by using two jack screw M8 to the holes "A" of the PTO clutch holder (6).
- 3. Tap out other shafts

(When reassembling)

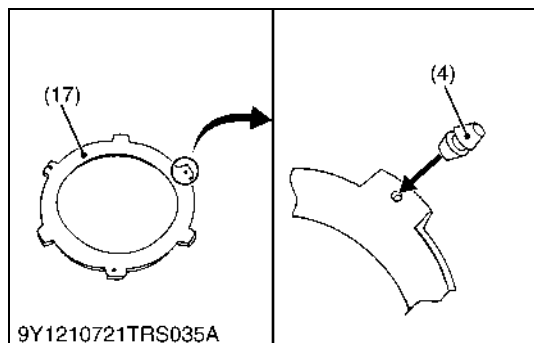
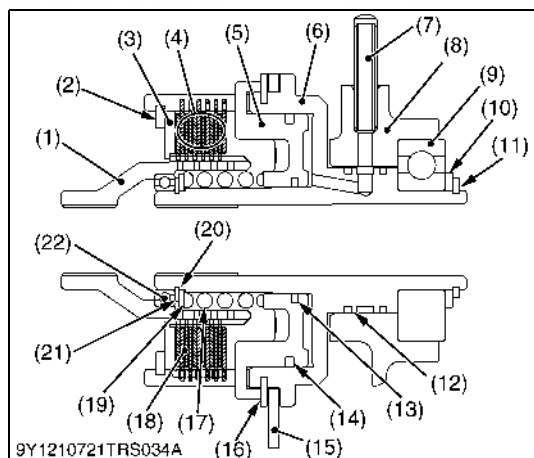
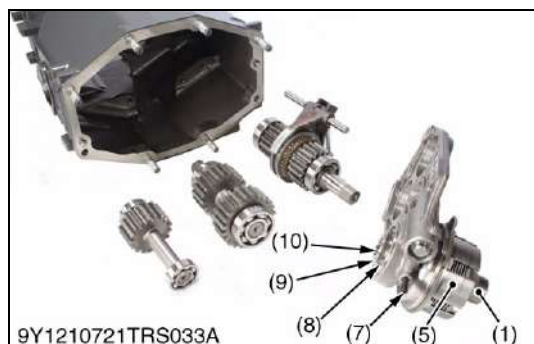
- Apply a small amount of transmission fluid to the O-ring.
- Install oil pipe (2) to the side hole of PTO clutch holder (6) firmly.

Tightening torque	PTO clutch valve mounting screw	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft
	PTO clutch holder mounting screw	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft

- (1) PTO Clutch Valve
- (2) Oil Pipe
- (3) Bolt (M8)
- (4) Mid Case

- (5) PTO Clutch Pack
- (6) PTO Clutch Holder

A: Portion to Use Jack Bolt (M 8)
9Y1211012TRS0096US0



Removing Clutch Hub, Clutch Disks and Clutch Plates

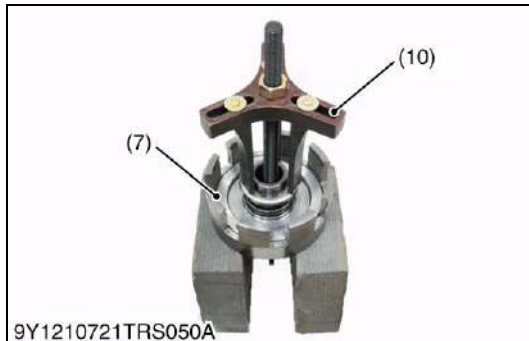
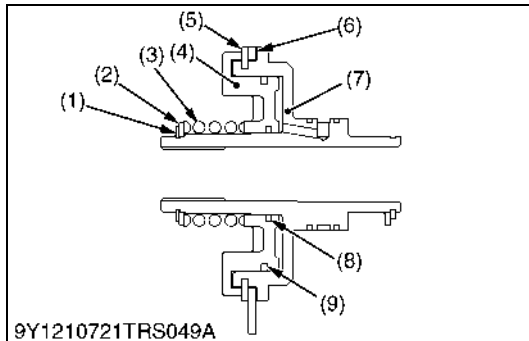
1. Remove the snap ring (2) and the back plate (3).
2. Remove the clutch hub (1), the plates (17) and the disks (18) from the PTO clutch case (6).
3. Remove the cir-clip (11). Remove the hydraulic pipe (7) from the bearing case (8).

(When reassembling)

- Install the clutch disks (18) and plates (17) mutually.
- Do not confuse the back plate (3) and the plates (17). The back plate (3) is thicker than the plates (17).
- Assemble the rubbers (4) portion of the plates (17) are same positions while assembling them.
- Replace the seal ring (12) with new one.

- | | |
|---------------------|-------------------|
| (1) Clutch Hub | (12) Seal Ring |
| (2) Snap Ring | (13) Inner D-ring |
| (3) Back Plate | (14) Outer D-ring |
| (4) Rubber | (15) Brake Disk |
| (5) Piston | (16) Brake Plate |
| (6) PTO Clutch Case | (17) Plate |
| (7) Hydraulic Pipe | (18) Disk |
| (8) Bearing Case | (19) Washer |
| (9) Ball Bearing | (20) Snap Ring |
| (10) Plate | (21) Shim |
| (11) Cir-clip | (22) Ball Bearing |

9Y1211012TRS0097US0



Removing Piston and PTO Brake Disk

1. Depress the return spring (3) by using a jig (10).
2. Remove the cir-clip (1) from the PTO clutch case (7).
3. Remove the piston (4).
4. Remove the brake plate (5) and the brake disk (6).

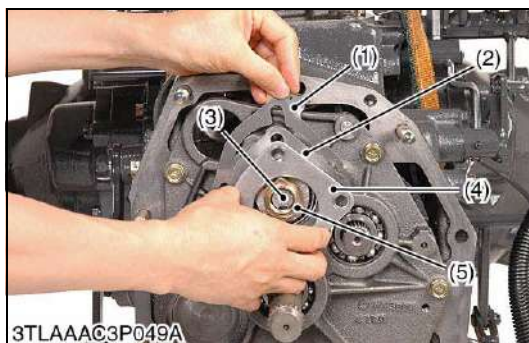
(When reassembling)

- Replace the inner D-ring with a new one.
- Replace the outer D-ring with a new one.

- | | |
|-------------------|------------------|
| (1) Cir-clip | (6) Brake Disk |
| (2) Washer | (7) Clutch Case |
| (3) Return Spring | (8) Inner D-ring |
| (4) Piston | (9) Outer D-ring |
| (5) Brake Plate | (10) Jig |

9Y1211012TRS0098US0

[C] Transmission Case



Pinion Bearing Cover

1. Remove the stake of lock nut (5).
2. Fix the 37T-22T gear by pinion locking tool (Code No. 07916-52311) and remove the lock nut (5).
3. Remove the pinion bearing case mounting screws.
4. Remove the pinion bearing cover (4) and shims (1).

(When reassembling)

- Make sure of the number of shims in the pinion bearing case.
- Replace the lock nut (5) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

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

- | | |
|------------------------------------|--------------------------|
| (1) Shim | (4) Pinion Bearing Cover |
| (2) Pinion Bearing Case | (5) Lock Nut |
| (3) Spiral Bevel Pinion Gear Shaft | |

9Y1211012TRS0099US0



Transmission Bearing Holder

1. Remove spring pin (2) holding hi-shift fork rod (3) to transmission bearing holder (1).
2. Remove transmission bearing holder by using 2 jack screws M8 (4).

(1) Transmission Bearing Holder
(2) Spring Pin

(3) Hi-Shift Fork Rod
(4) Jack Screws M8

9Y1211012TRS0100US0



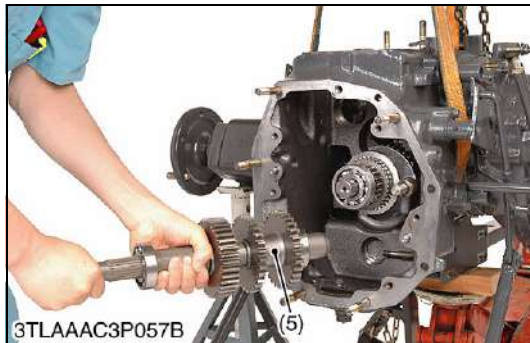
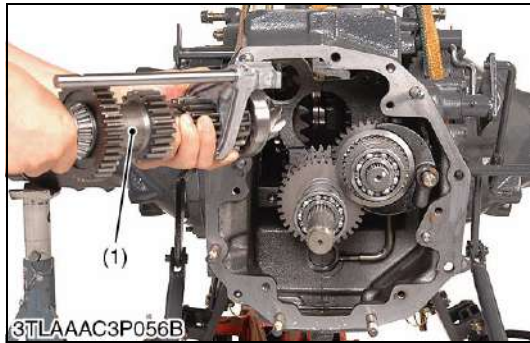
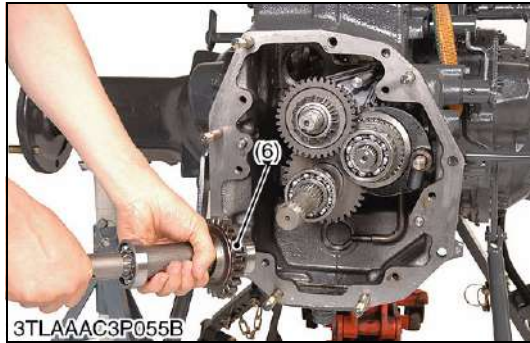


Shaft Assemblies

1. Remove front wheel drive gear shaft assembly (6).
2. Remove pinion gear shaft assembly (1).
3. Remove PTO gear shaft assembly (5).

- | | |
|-----------------------------------|---|
| (1) Pinion Gear Shaft Assembly | (5) PTO Gear Shaft Assembly |
| (2) Hi-Lo Gear Shift Fork Rod | (6) Front Wheel Drive Gear Shaft Assembly |
| (3) Hi-Lo Gear Shaft Assembly | |
| (4) Front Wheel Drive Shift Lever | |

(To be continued)

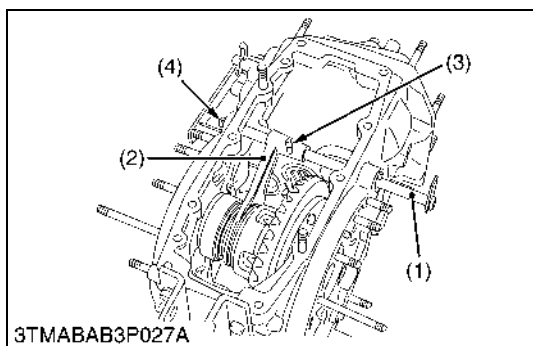
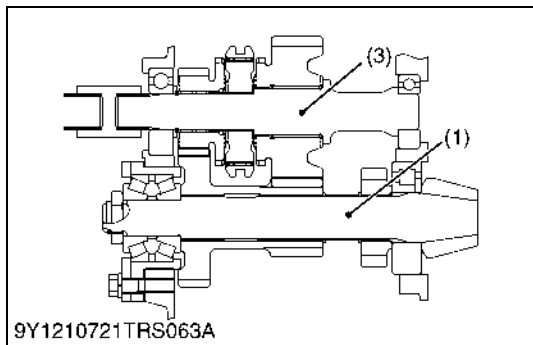


(Continued)

4. Remove the Hi-Lo gear shaft assembly (3).
5. Remove the Hi-Lo gear fork rod (2) and the front wheel drive shift lever (4).

- | | |
|--------------------------------|-----------------------------------|
| (1) Pinion Gear Shaft Assembly | (3) Hi-Lo Gear Shaft Assembly |
| (2) Hi-Lo Gear Shift Fork Rod | (4) Front Wheel Drive Shift Lever |

9Y1211012TRS0101US0

**Differential Lock Shift Fork**

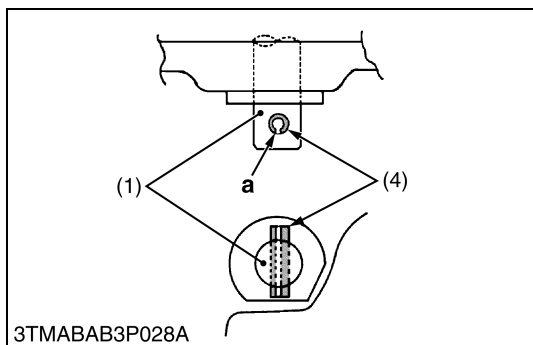
1. Tap out the left side spring pin (4).
2. Remove the cotter pin and remove the clevis pin (3).
3. Draw out the differential lock fork shaft (1) and remove the differential lock shift fork (2).

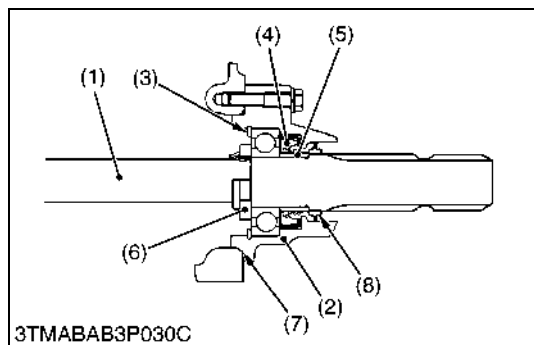
(When reassembling)

- Apply grease to the left and right oil seals on the transmission case.
- Insert the clevis pin (3) from the top and install the washer and cotter pin.
- Tap in the spring pin (4) so that its split portion a may face outward as shown in the figure.

- | | |
|----------------------------------|-------------------------|
| (1) Differential Lock Fork Shaft | a: Split Portion |
| (2) Differential Lock Shift Fork | |
| (3) Clevis Pin | |
| (4) Spring Pin | |

9Y1211012TRS0102US0





PTO Shaft

1. Remove the PTO shaft cover.
2. Remove the bearing case mounting screws, and draw out the PTO shaft (1) with bearing case (2).
3. Remove the internal snap ring (3).
4. Tap out the PTO shaft (1) to the front.

(When reassembling)

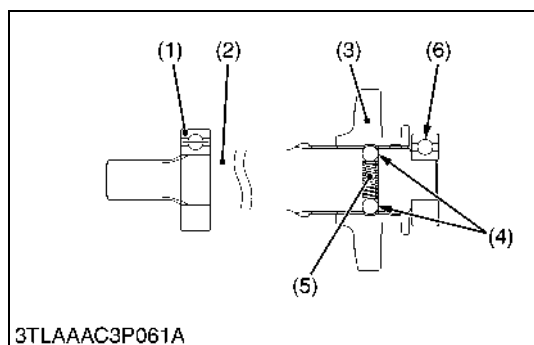
■ NOTE

- If the lock nut (6) was removed, replace it with a new one. After replacing, be sure to stake it firmly.
- Install the slinger (8) firmly.
- Apply grease to the oil seal (4) and install it, noting its direction.

Tightening torque	Lock nut	147 to 196 N·m 15 to 20 kgf·m 109 to 145 lbf·ft
	Bearing case mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft

- | | |
|------------------------|---------------------|
| (1) PTO Shaft | (5) Oil Seal Collar |
| (2) Bearing Case | (6) Lock Nut |
| (3) Internal Snap Ring | (7) O-ring |
| (4) Oil Seal | (8) Slinger |

9Y1211012TRS0103US0



Front Wheel Drive Shaft

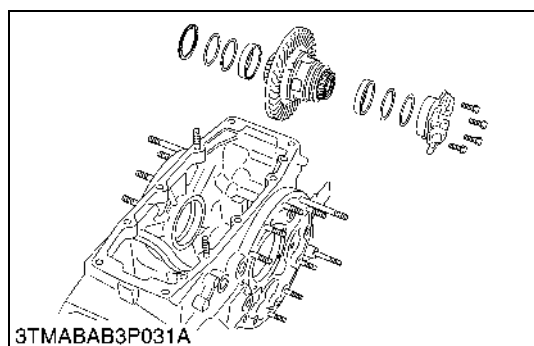
1. Remove the ball bearing (6).
2. Remove the 24T shifter gear (3), balls and spring (5).

■ NOTE

- Be careful not to fly out the balls (4) and spring (5) when takeout the 24T shifter gear (3).

- | | |
|-----------------------------|------------------|
| (1) Ball Bearing | (4) Ball |
| (2) Front Wheel Drive Shaft | (5) Spring |
| (3) 24T Shifter Gear | (6) Ball Bearing |

9Y1211012TRS0104US0



Differential Gear Assembly

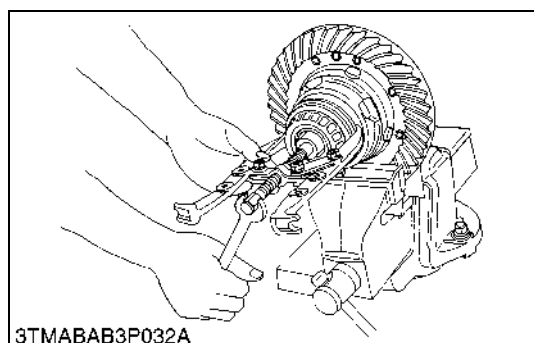
1. Remove the differential support, noting the number of left shims.
2. Remove the differential gear assembly, noting the number of right shims.

(When reassembling)

- Check the spiral bevel gear for wear or damage. If it is no longer serviceable, replace it. Then, also replace the spiral bevel pinion.
- Use same number of shims as before disassembling.

Tightening torque	Differential support mounting screw	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
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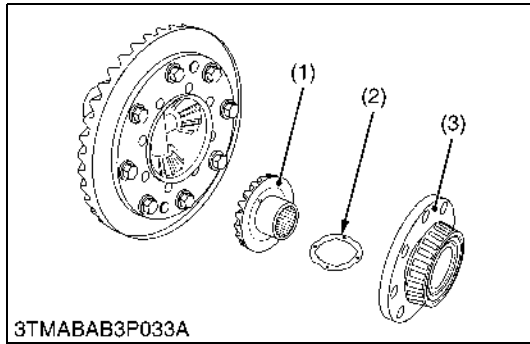
9Y1211012TRS0105US0



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.

9Y1211012TRS0106US0



Differential Case Cover and Differential Side Gear

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

(When reassembling)

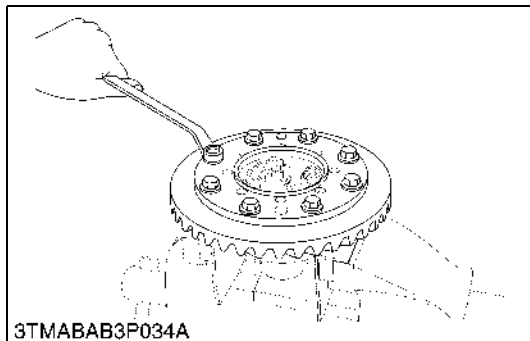
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gear boss.

Tightening torque	Differential case cover mounting screw	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
-------------------	--	---

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

- (3) Differential Case Cover

9Y1211012TRS0107US0



Spiral Bevel Gear

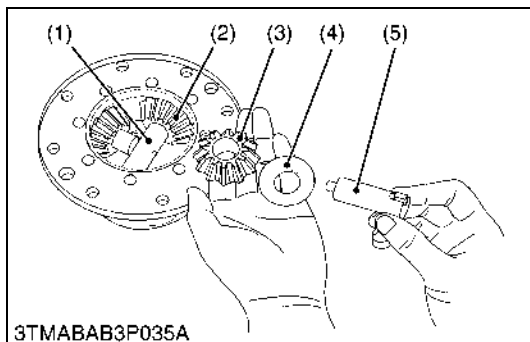
1. Remove the spiral bevel gear.

(When reassembling)

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

Tightening torque	Spiral bevel gear UBS screw	68.6 to 88.3 N·m 7.0 to 9.0 kgf·m 50.6 to 65.1 lbf·ft
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9Y1211012TRS0108US0



Differential Pinion Shaft and Differential Pinion

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

■ NOTE

- Arrange the parts to note their original position.

(When reassembling)

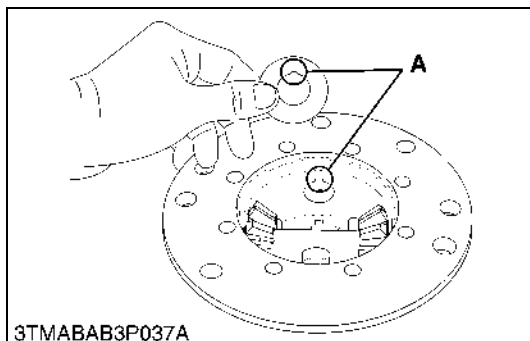
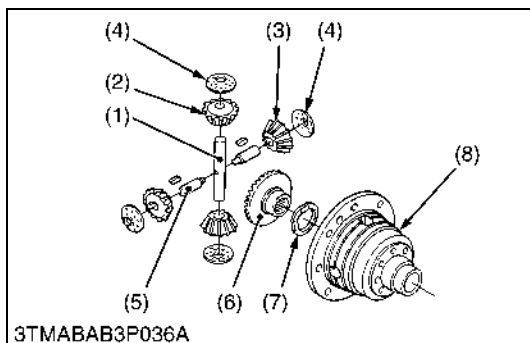
- Check the differential pinions (2) and (3), and pinion shaft (1) and (5) for excessive wear. If these parts are damaged or excessively worn, replace the parts they are in mesh with, or they slide on.
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of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

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

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

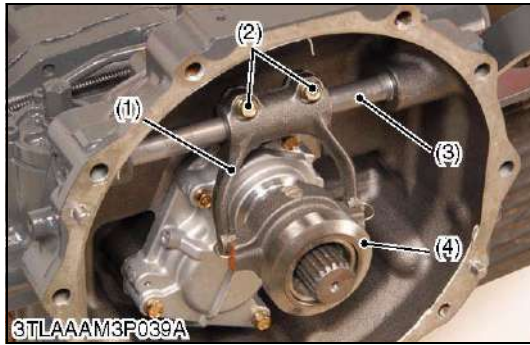
A: Fit Groove

9Y1211012TRS0109US0



(3) Disassembling and Assembling (HST Model)

[A] HST Housing Case



Clutch Lever, Release Fork and Release Bearing

1. Remove the release fork mounting bolts (2).
2. Draw out the clutch lever (3) to remove the release fork (1).
3. Remove the release bearing and the release hub (4) together.

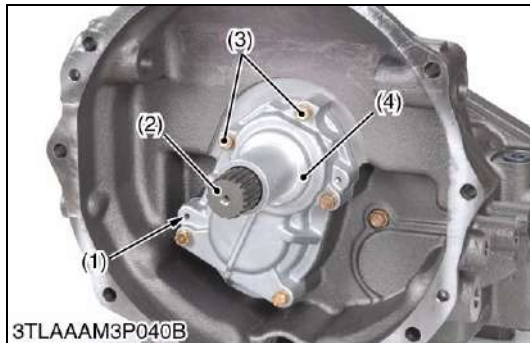
(When reassembling)

- Apply grease to the sliding surface of the clutch release hub.
- Apply grease to the clutch lever.

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

- | | |
|--------------------------------|------------------|
| (1) Release Fork | (3) Clutch Lever |
| (2) Release Fork Mounting Bolt | (4) Release Hub |

9Y1211012TRS0110US0



Input Shaft Case, Input Gear Shaft and HST Gear

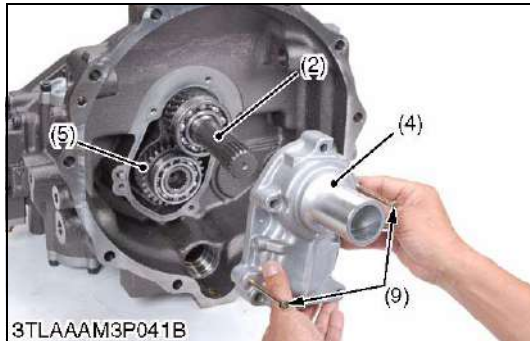
1. Remove the shaft case mounting bolts (3).
2. Screw down the two M6 screw into the bolt hole (1) of the input shaft case (4) and pull it out.
3. Remove the input shaft case (4).
4. Remove the 23T input gear shaft (2).

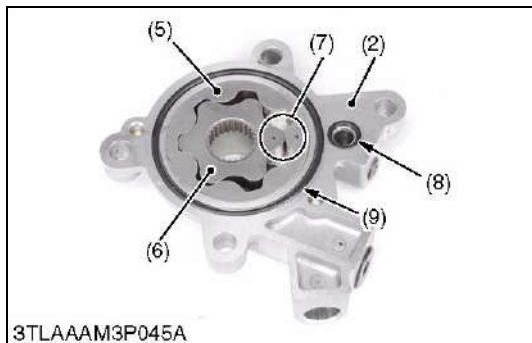
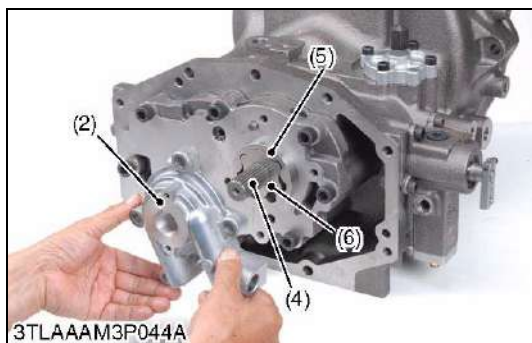
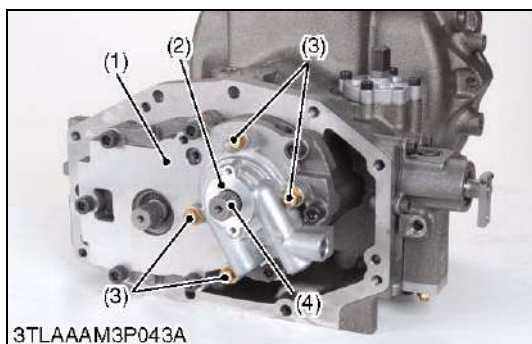
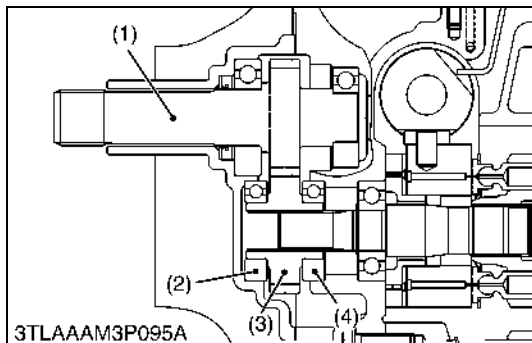
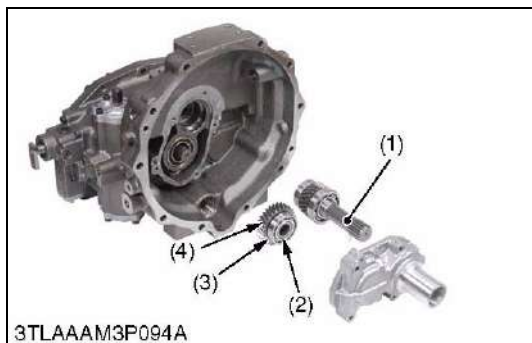
(When reassembling)

- Be sure to install the gasket between the shaft case and the HST housing case.
- Do not damage the oil seal using the vinyl tape to the 23T input gear shaft.
- Apply grease to the oil seal.

- | | |
|--------------------------|--------------------|
| (1) Bolt Hole | (6) HST Pump Shaft |
| (2) 23T Input Gear Shaft | (7) Vinyl Tape |
| (3) Bolt | (8) Oil Seal |
| (4) Input Shaft Case | (9) Jack Bolt |
| (5) 27T HST Gear | |

9Y1211012TRS0111US0





HST Gear and Bearing

1. Remove the 27T HST gear (3) with the bearings (2), (4) from the HST housing case.
2. Remove the ball bearing (2) and the bearing (4) from the 27T HST gear (3).

NOTE

- Since the size of the ball bearing (2) and the bearing (4) is same, identify the difference as shown in the figure.
- The bearing installed in front of the 27T HST gear is a standard ball bearing. The bearing install at the 27T HST gear rear side is a bearing with the brown plastic retainer.

(When reassembling)

- Install the bearings (2), (4) to the 27T HST gear (3).
- Install the 27T HST gear (3) with the bearings (2), (4) to the HST housing case.

- (1) 23T Input Gear Shaft
(2) Ball Bearing (08101-06007)

- (3) 27T HST Gear
(4) Bearing (6007RSH2, 36920-40091, Brown Plastic Retainer)

9Y1211012TRS0112US0

Charge Pump

1. Remove the charge pump mounting bolts (3).
2. Remove the charge pump case (2).
3. Remove the rotors (5), (6) from the charge pump case (2).

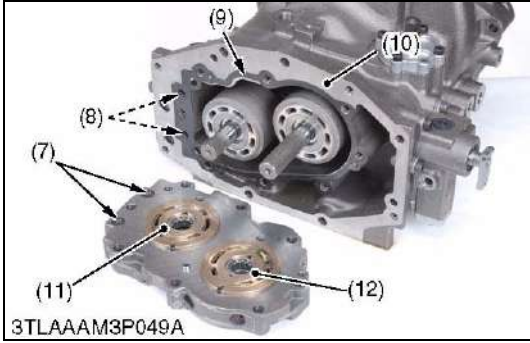
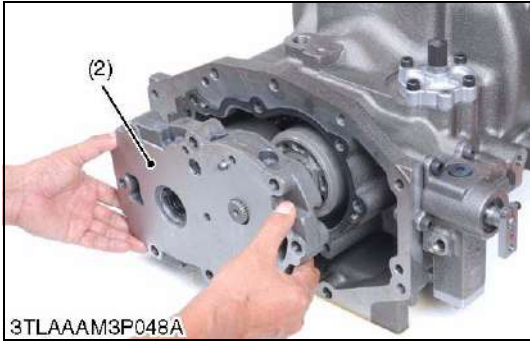
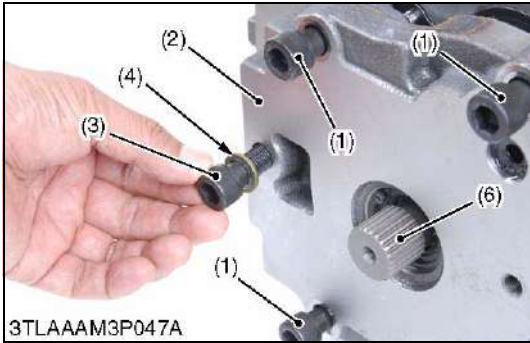
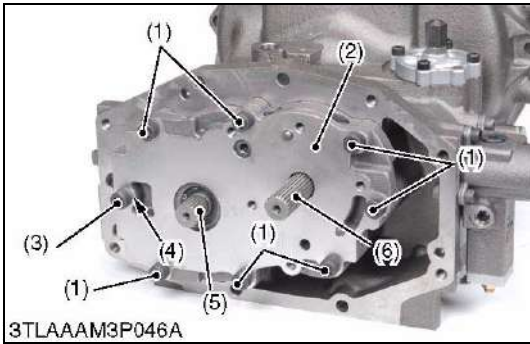
(When reassembling)

- Align the alignment mark of the rotors.
- Check the O-rings for damage.

Tightening torque	Charge pump case mounting bolt (M10)	48 to 56 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
-------------------	--------------------------------------	---

- (1) Port Block Cover
(2) Charge Pump Case
(3) Bolt
(4) HST Pump Shaft
(5) Outer Rotor
(6) Inner Rotor
(7) Alignment Mark
(8) O-ring
(9) O-ring

9Y1211012TRS0113US0



Port Block

1. Remove the port block mounting hex. head screws (1).
2. Pull and remove the port block (2).
3. Remove the gasket between port block (2) and the HST housing case (10).

(When reassembling)

- Install the washer with rubber to the original position. Do not damage the washer with rubber.
- Install the O-ring to the original positions.

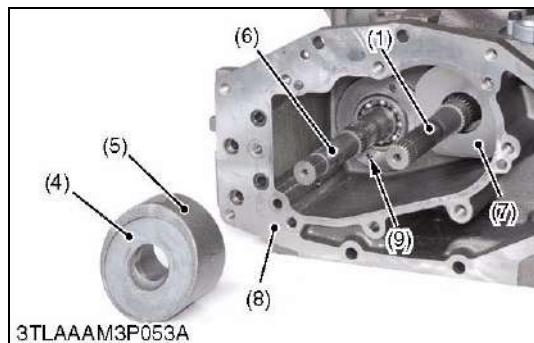
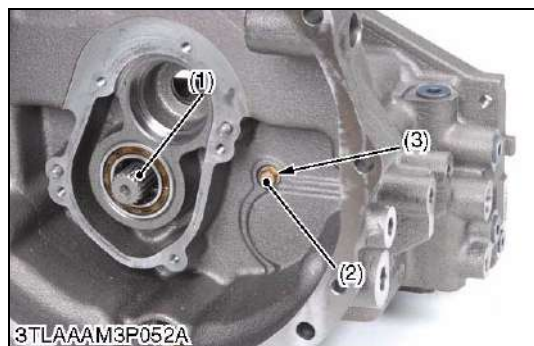
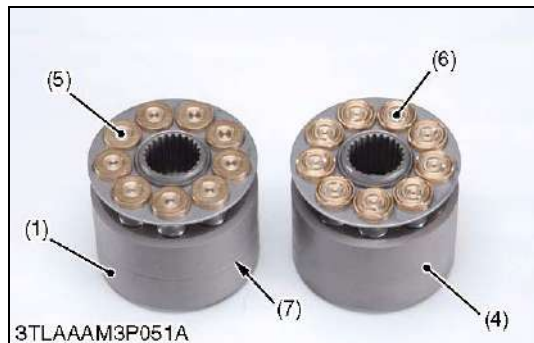
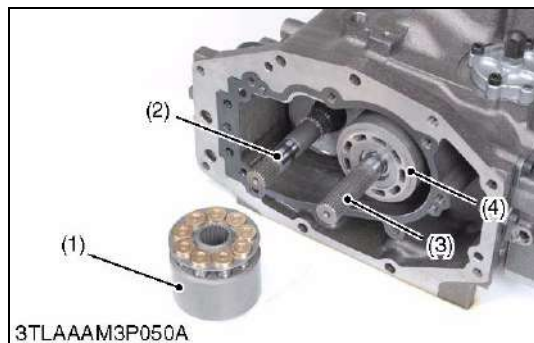
■ IMPORTANT

- **Valve plates (11), (12) may stick to the port block (2), but they are not fixed. Be careful not to drop them.**
- And these valve plates (11), (12) are not interchangeable.**

Tightening torque	Port block mounting hex. head screw (without seal washer)	103 to 118 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Port block mounting hex. head screw (with seal washer)	31 to 36 N·m 3.2 to 3.7 kgf·m 23.1 to 26.8 lbf·ft

- | | |
|---|--------------------------|
| (1) Hex. Head Screw (without Seal Washer) | (6) Pump Shaft |
| (2) Port Block | (7) O-ring |
| (3) Hex. Head Screw (with Seal Washer) | (8) O-ring |
| (4) Seal Washer | (9) Gasket |
| (5) Motor Shaft | (10) HST Housing Case |
| | (11) Valve Plate (Motor) |
| | (12) Valve Plate (Pump) |

9Y1211012TRS0114US0



Cylinder Block Assemblies

1. Remove the cylinder block assemblies (1), (4) with pistons (5), (6).

(When reassembling)

- Apply clean transmission oil to cylinder blocks.

■ NOTE

- Be careful not to damage the surface of the cylinder blocks and the pistons.
- Do not interchange the pistons between the pump and the motor cylinder block.

- (1) Cylinder Block (Motor)
(2) Motor Shaft
(3) Pump Shaft
(4) Cylinder Block (Pump)

- (5) Piston (Motor)
(6) Piston (Pump)
(7) Identification Groove (Motor)

9Y1211012TRS0115US0

Motor Shaft

1. Remove the motor swashplate setting bolt (2).
2. Remove the motor swashplate from the motor shaft (6).
3. Remove the motor shaft (6) with the ball bearing from the HST housing case (8).

(When reassembling)

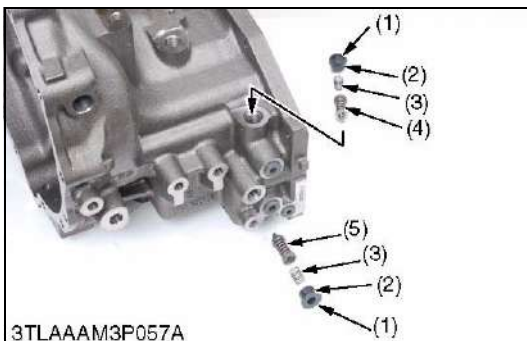
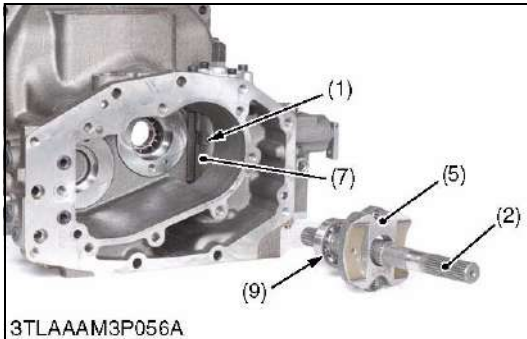
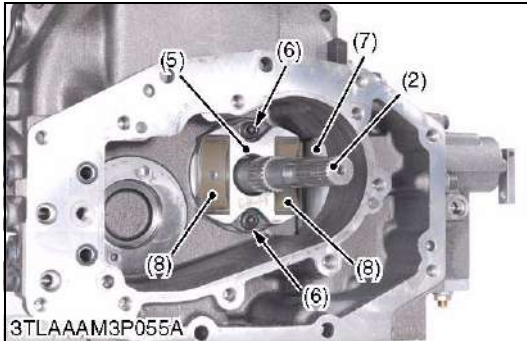
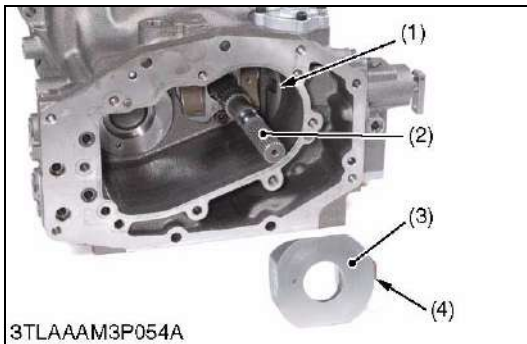
- Be sure to install the thrust plate to the swashplate.
- When installing the swashplate to the HST housing case, be sure to align the straight pin of the swashplate and the hole of the HST housing case.
- Don't damage the seal washer.

Tightening torque	Swashplate setting bolt	24 to 28 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 lbf·ft
-------------------	-------------------------	---

- (1) Pump Shaft
(2) Bolt
(3) Seal Washer
(4) Thrust Plate
(5) Swashplate (Motor)

- (6) Motor Shaft
(7) Swashplate (Pump)
(8) HST Housing Case
(9) Hole (for Straight Pin)

9Y1211012TRS0116US0



Swashplate and Pump Shaft

1. Remove the swashplate (3) from the pump shaft (2).
2. Remove the cradle bearing bracket mounting hex. head screws (6).
3. Tap the pump shaft (2) with a plastic hammer slightly to slide out it with cradle bearing bracket (5) and the ball bearing (9) to the rear side.

(When reassembling)

- Tighten the cradle bearing bracket mounting hex. head screws to the specified tightening torque.
- Place the swashplate (3) to the pump shaft (2), and align the slot guide (4) of the swashplate (3) and the groove (1) of the servo piston (7).
- Apply clean transmission oil to the surface of the swashplate (3) and the cradle bearing (8).

Tightening torque	Cradle bearing bracket mounting hex. head screw	61 to 71 N·m 6.2 to 7.2 kgf·m 44.8 to 52.1 lbf·ft
-------------------	---	---

- | | |
|----------------------------|---|
| (1) Groove | (6) Cradle Bearing Bracket Mounting Hex. Head Screw |
| (2) Pump Shaft | (7) Servo Piston |
| (3) Swashplate (Pump) | (8) Cradle Bearing |
| (4) Slot Guide | (9) Ball Bearing |
| (5) Cradle Bearing Bracket | |

9Y1211012TRS0117US0

Check and High Pressure Relief Valve

1. Remove the hex. head plug (1) and remove the spring (3) and the relief valve assembly (4), (5).

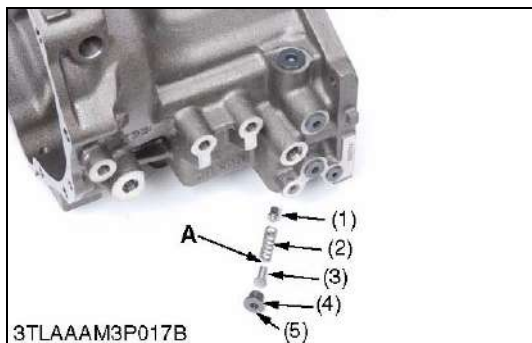
(When reassembling)

- Be careful not to damage O-ring on the plug (1).

Tightening torque	Check and high pressure relief valve hex. head plug (G1/2)	59 to 78 N·m 6.0 to 8.0 kgf·m 43.4 to 57.9 lbf·ft
-------------------	--	---

- | | |
|---------------------------|---|
| (1) Hex. Head Plug (G1/2) | (4) Check and High Pressure Relief Valve Assembly (Reverse) |
| (2) O-ring | (5) Check and High Pressure Relief Valve Assembly (Forward) |
| (3) Spring | |

9Y1211012TRS0118US0



Charge Relief Valve

1. Remove the hex. head plug (5).
2. Remove the spring guide (3), the shim (if installed), the spring (2) and the valve poppet (1).

NOTE

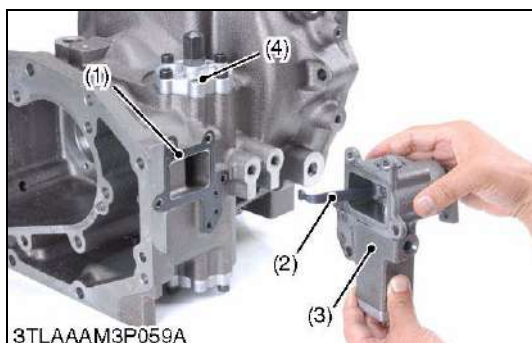
- Install the valve component, noting the number of the shims in the charge relief valve.
- Be careful not to damage O-ring.
- When replacing the charge relief valve, check and adjust the charge relief valve setting pressure. (See page 3-S22.)

Tightening torque	Charge relief valve hex. head plug (G3/8)	49 to 59 N·m 5.0 to 6.0 kgf·m 36.2 to 43.4 lbf·ft
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- (1) Poppet
(2) Spring
(3) Spring Guide

- (4) O-ring
(5) Plug (GPF 3/8)
A: Shim (If Shim is Installed)

9Y1211012TRS0119US0



Servo Regulator Assembly

1. Remove the regulator mounting hex. head screws.
2. Remove the servo regulator assembly (3) from the HST housing case.

(When reassembling)

- Place a new gasket on the HST housing case.
- Align the feedback lever (2) of the servo regulator and the groove of the servo piston securely. And install the servo regulator assembly (3) to the HST housing case.

NOTE

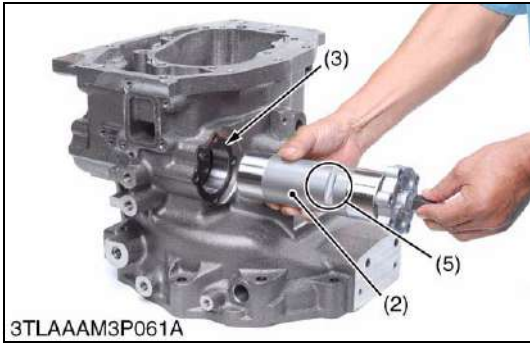
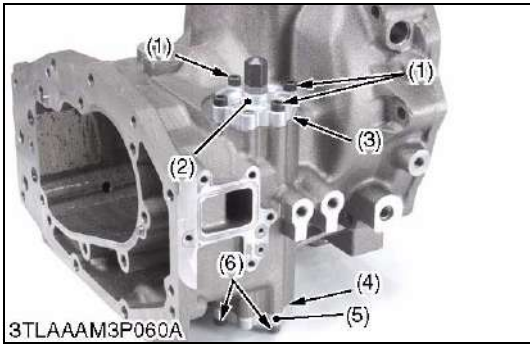
- Since the servo regulator assembly has been factory adjusted, do not disassemble the servo regulator assembly.

Tightening torque	Servo regulator assembly mounting hex. head screw (M8)	29 to 34 N·m 3.0 to 3.5 kgf·m 21.7 to 25.3 lbf·ft
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- (1) Gasket
(2) Feedback Lever

- (3) Servo Regulator Assembly
(4) Servo Piston

9Y1211012TRS0120US0



Servo Piston Assembly

1. Remove the servo piston assembly mounting hex. head screws (1).
2. Remove the servo piston under cover mounting hex. head screws (6).
3. Remove the servo piston assembly (2).

(When reassembling)

NOTE

- Be careful not to do damage the surface of servo piston.
- Place the gaskets (3), (4) between the servo piston assembly and the HST housing case.

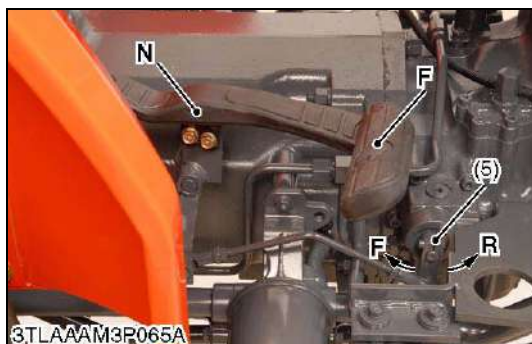
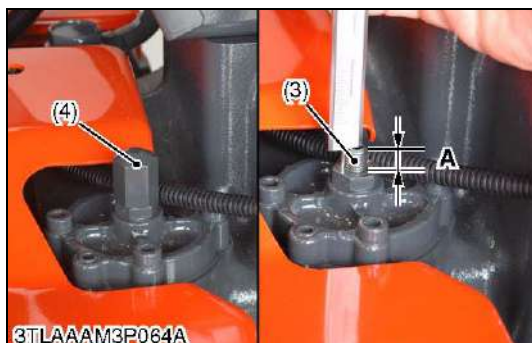
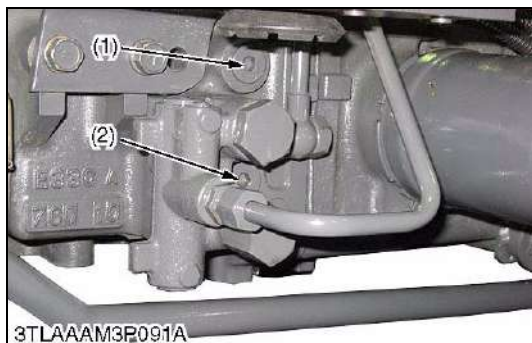
IMPORTANT

- When disassembling the servo piston, be sure to adjust the neutral position of the HST, following to "Adjusting Neutra" on page 3-S23.

Tightening torque	Servo piston and under cover mounting hex. head screw (M10)	61 to 71 N·m 6.2 to 7.2 kgf·m 44.7 to 52.1 lbf·ft
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- | | |
|---|---|
| (1) Servo Piston Mounting Hex. Head Screw (M10) | (4) Gasket |
| (2) Servo Piston Assembly | (5) Servo Piston Under Cover |
| (3) Gasket | (6) Servo Piston Under Cover Mounting Hex. Head Screw (M10) |

9Y1211012TRS0121US0



Checking and Adjusting HST Neutral Position

⚠ CAUTION

- Park the tractor on a flat place and keep all the levers at "Neutral" position.
 - Jack up the tractor rear axle and set the front drive lever to "2WD" position.
1. Remove the hex. head plug from the HST housing case.
 2. Install the adaptor C (PT3/8) (07916-50371) and the thread joint (07916-50341) to the check port of the HST housing case.
 3. Start the engine and measure the low and the high HST charge pressure.
 4. If any of the servo piston parts has been replaced, readjust the HST neutral position, referring to the dimension "A" of the servo piston adjusting screw (3).
 5. Start the engine and measure the low and the high charge pressures. Then adjust the piston neutral position so that the low-side pressure and the high-side pressure one be the same. Measure the charge pressure will setting the engine revolution at MAX. Move the servo valve lever (5) and watch the rear tires' movement to ensure the neutral positioning.
 6. Finally lock the servo piston adjusting nut.

Charge pressure (Oil temperature 50 to 60 °C (122 to 140 °F))	Factory specification	2.3 to 2.6 MPa 23.5 to 27.0 kgf/cm ² 334 to 384 psi
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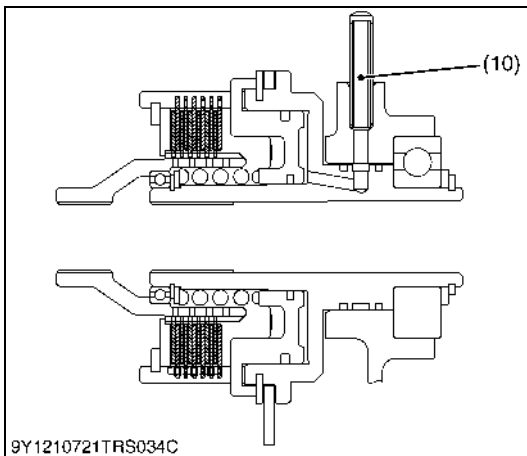
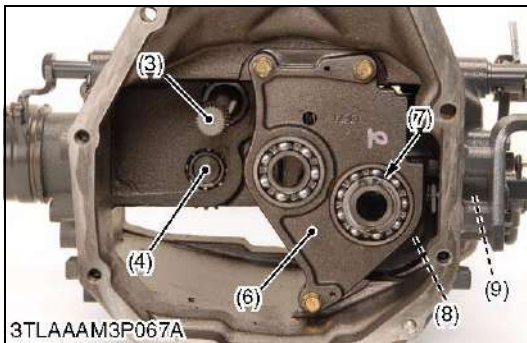
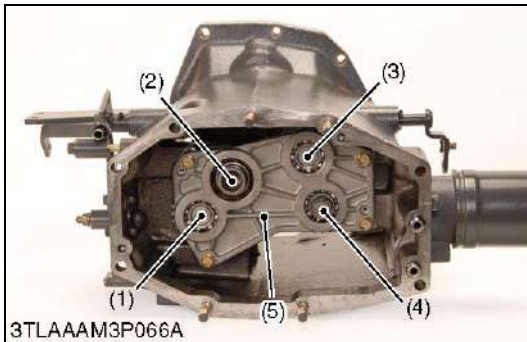
(Reference)

- Dimension "A": 10.55 mm (0.415 in.)

- (1) Hex. Head Plug (Reverse)
- (2) Hex. Head Plug (Forward)
- (3) Adjusting Screw
- (4) Adjusting Screw Cap
- (5) Servo Valve Lever

- F: Forward**
N: Neutral
R: Reverse
A: Adjusting screw height

9Y1211012TRS0122US0

[B] Mid Case**Mid Case Bearing Holder and Gear Shafts**

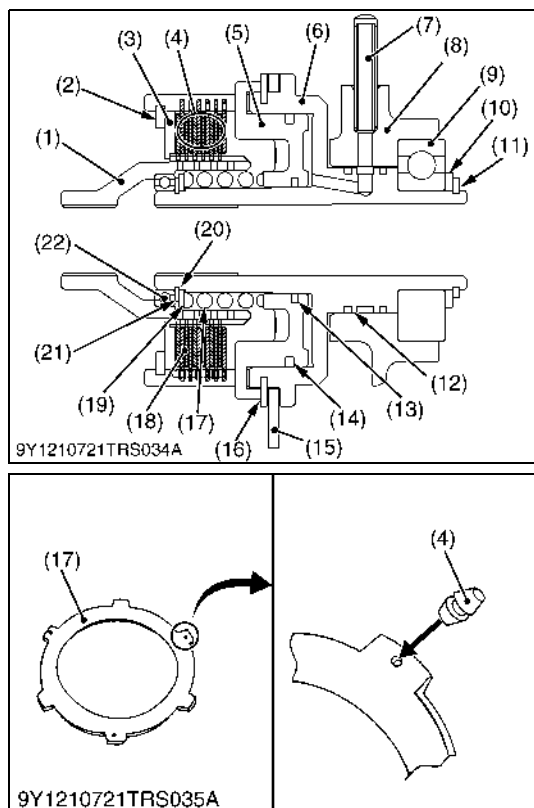
1. Remove the bearing holder mounting bolts.
2. Remove the mid case bearing holder (5).
3. Remove the shafts (1), (2), (3), (4).
4. Remove the PTO clutch valve (9) from the mid case.
5. Remove the independent PTO bearing holder mounting bolts.
6. Remove the independent PTO clutch bearing holder (6) with PTO clutch pack (8).

(When reassembling)

- Replace the oil pipe with a new one.

- | | |
|-----------------------------|-------------------------------|
| (1) 25T PTO Counter Shaft | (6) PTO Clutch Bearing Holder |
| (2) 15T PTO Gear Shaft | (7) Bearing |
| (3) 18T Counter Shaft | (8) PTO Clutch Pack |
| (4) 25T Gear Shaft | (9) PTO Clutch Valve |
| (5) Mid Case Bearing Holder | (10) Oil Pipe |

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Disassembling PTO Clutch Assembly

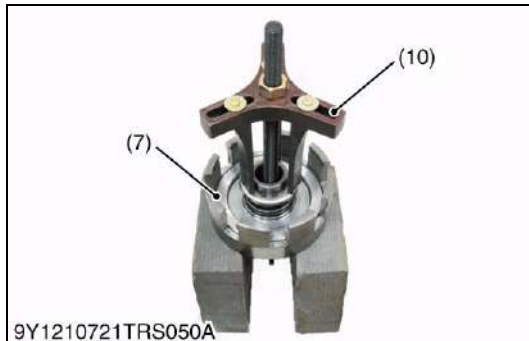
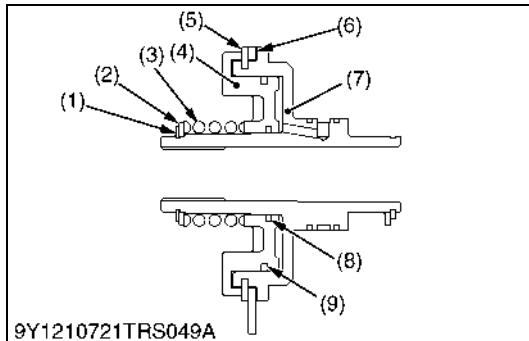
1. Remove the snap ring (2) and the back plate (3).
2. Remove the clutch hub (1), the plates (17) and the disks (18) from the PTO clutch case (6).
3. Remove the cir-clip (11).
4. Remove the hydraulic pipe (7) from the bearing case (8).

(When reassembling)

- Install the clutch disks (18) and plates (17) mutually.
- Do not confuse the back plate (3) and the plates (17). The back plate (3) is thicker than the plates (17).
- Assemble the rubbers (4) portion of the plates (17) are same positions while assembling them.
- Replace the seal ring with new one.

- | | |
|---------------------|-------------------|
| (1) Clutch Hub | (12) Seal Ring |
| (2) Snap Ring | (13) Inner D-ring |
| (3) Back Plate | (14) Outer D-ring |
| (4) Rubber | (15) Brake disk |
| (5) Piston | (16) Brake plate |
| (6) PTO Clutch Case | (17) Plate |
| (7) Hydraulic Pipe | (18) Disk |
| (8) Bearing Case | (19) Washer |
| (9) Ball Bearing | (20) Snap Ring |
| (10) Plate | (21) Shim |
| (11) Cir-clip | (22) Ball Bearing |

9Y1211012TRS0124US0



Removing Piston and PTO Brake Disk

1. Depress the return spring (3) by using a jig (10).
2. Remove the cir-clip (1) from the PTO clutch case (7).
3. Remove the piston (4).
4. Remove the brake plate (5) and the brake disk (6).

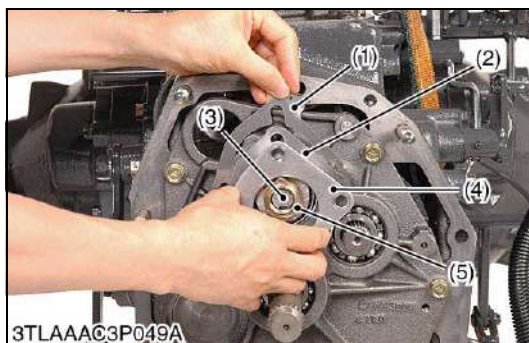
(When reassembling)

- Replace the inner D-ring with a new one.
- Replace the outer D-ring with a new one.

- | | |
|-------------------|------------------|
| (1) Cir-clip | (6) Brake Disk |
| (2) Washer | (7) Clutch Case |
| (3) Return Spring | (8) Inner D-ring |
| (4) Piston | (9) Outer D-ring |
| (5) Brake Plate | (10) Jig |

9Y1211012TRS0098US0

[C] Transmission Case



Pinion Bearing Cover

1. Remove the stake of lock nut (5).
2. Fix the 37T-22T gear by pinion locking tool (Code No. 07916-52311) and remove the lock nut (5).
3. Remove the pinion bearing case mounting screws.
4. Remove the pinion bearing cover (4) and shims (1).

(When reassembling)

- Make sure of the number of shims in the pinion bearing case.
- Replace the lock nut (5) with a new one, and stake the lock nut firmly after installing the parts on the shaft.

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

- | | |
|------------------------------------|--------------------------|
| (1) Shim | (4) Pinion Bearing Cover |
| (2) Pinion Bearing Case | (5) Lock Nut |
| (3) Spiral Bevel Pinion Gear Shaft | |

9Y1211012TRS0099US0



Transmission Bearing Holder

1. Remove spring pin (2) holding hi-shift fork rod (3) to transmission bearing holder (1).
2. Remove transmission bearing holder by using 2 jack screws M8 (4).

(1) Transmission Bearing Holder
(2) Spring Pin

(3) Hi-Shift Fork Rod
(4) Jack Screws M8

9Y1211012TRS0100US0



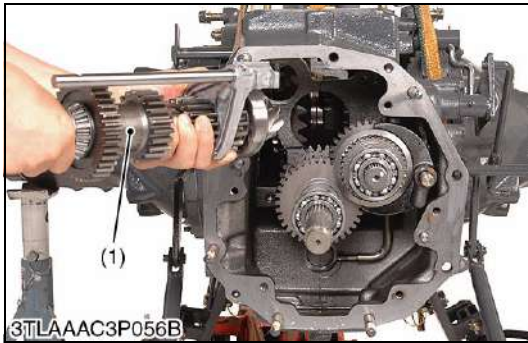
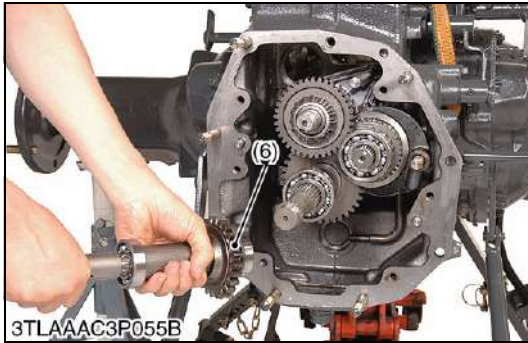


Shaft Assemblies

1. Remove front wheel drive gear shaft assembly (6).
2. Remove pinion gear shaft assembly (1).
3. Remove PTO gear shaft assembly (5).

- | | |
|-----------------------------------|---|
| (1) Pinion Gear Shaft Assembly | (5) PTO Gear Shaft Assembly |
| (2) Hi-Lo Gear Shift Fork Rod | (6) Front Wheel Drive Gear Shaft Assembly |
| (3) Hi-Lo Gear Shaft Assembly | |
| (4) Front Wheel Drive Shift Lever | |

(To be continued)

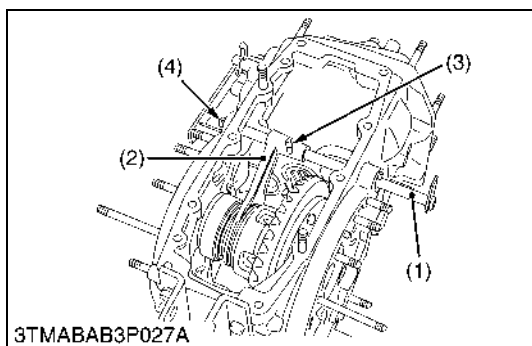
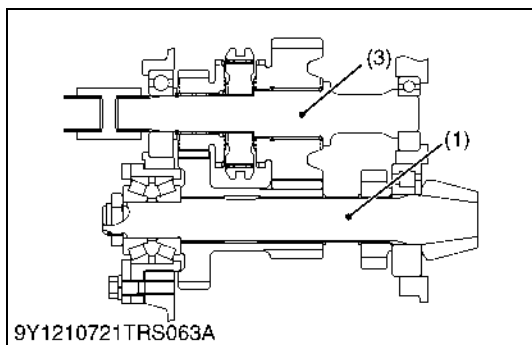


(Continued)

4. Remove the Hi-Lo gear shaft assembly (3).
5. Remove the Hi-Lo gear fork rod (2) and the front wheel drive shift lever (4).

- | | |
|--------------------------------|-----------------------------------|
| (1) Pinion Gear Shaft Assembly | (3) Hi-Lo Gear Shaft Assembly |
| (2) Hi-Lo Gear Shift Fork Rod | (4) Front Wheel Drive Shift Lever |

9Y1211012TRS0101US0

**Differential Lock Shift Fork**

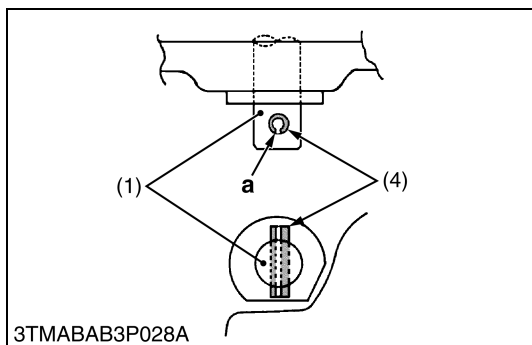
1. Tap out the left side spring pin (4).
2. Remove the cotter pin and remove the clevis pin (3).
3. Draw out the differential lock fork shaft (1) and remove the differential lock shift fork (2).

(When reassembling)

- Apply grease to the left and right oil seals on the transmission case.
- Insert the clevis pin (3) from the top and install the washer and cotter pin.
- Tap in the spring pin (4) so that its split portion a may face outward as shown in the figure.

- | | |
|----------------------------------|-------------------------|
| (1) Differential Lock Fork Shaft | a: Split Portion |
| (2) Differential Lock Shift Fork | |
| (3) Clevis Pin | |
| (4) Spring Pin | |

9Y1211012TRS0102US0

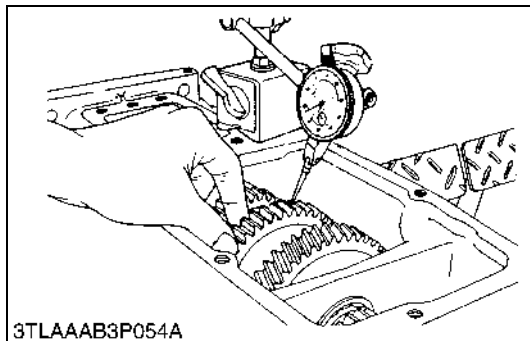


6. SERVICING

[1] L3301/L3901

(1) Clutch Housing Case

[A] Manual Transmission Model

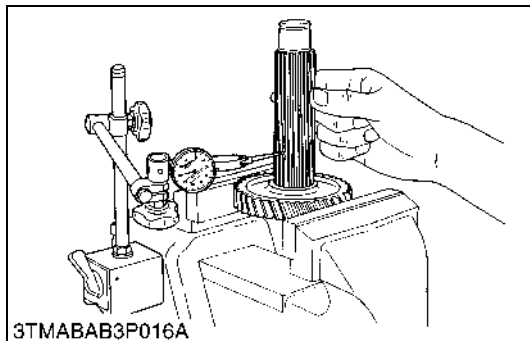


Gear Backlash

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

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0

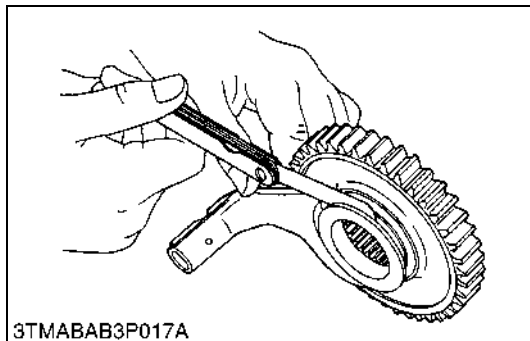


Clearance between Gear and Spline

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

Clearance between gear and spline	Factory specification	0.030 to 0.078 mm 0.0012 to 0.0030 in.
	Allowable limit	0.2 mm 0.008 in.

9Y1211012TRS0130US0

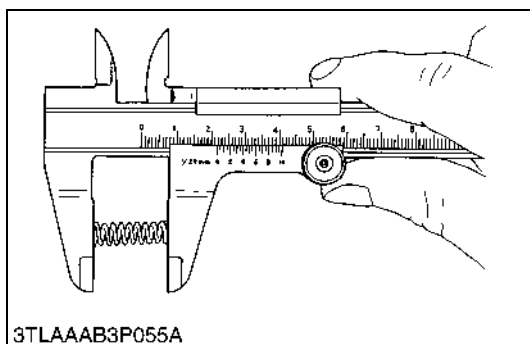


Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

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

Clearance between shift fork and shift gear groove	Factory specification	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.
Clearance between shift fork and shifter groove	Factory specification	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

9Y1211012TRS0131US0

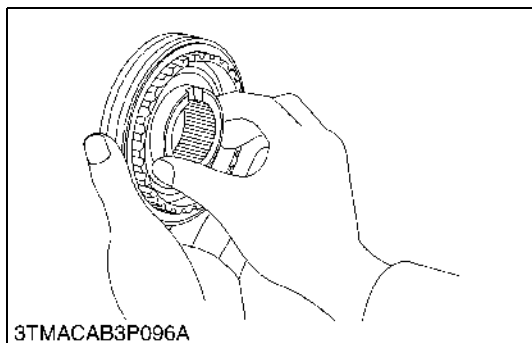


Free Length of the Shift Fork Spring

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

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

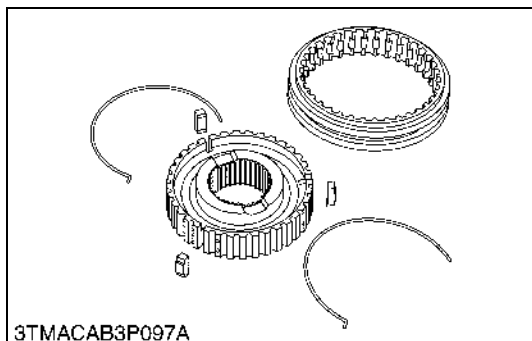
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Checking Contact between Coupling and Shifter

1. Check to see if there is flaw or wear on the spline of the coupling and shifter, and the key groove on the coupling.
2. Engage the shifter with the coupling, and check that they slide smoothly.
3. Similarly, check that there is any flaw or wear on the gear splines.
4. If there is any problem, replace them.

9Y1211012TRS0133US0



Flaw on synchronizer Key and Spring

1. Check the projection in the center of the synchronizer key for wear.
2. Check the spring for fatigue or wear on the area where the spring contacts with the keys.
3. If there is any problem, replace them.

9Y1211012TRS0134US0

[B] HST Model



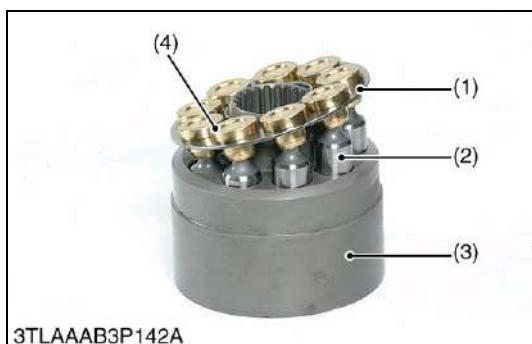
Pump Shaft and Motor Shaft

1. Check the oil seal surface (3).
2. If the pump shaft (1) and motor shaft (2) are rough or groove, replace them.

(1) Pump Shaft
(2) Motor Shaft

(3) Oil Seal Surface

9Y1211012TRS0135US0



Cylinder Block Bore and Pistons

1. Lift the pistons gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace cylinder block assembly.
4. Check the slipper (4) for flatness.
5. If rounded, replace.

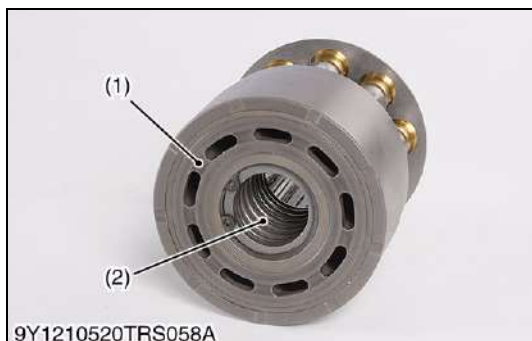
■ IMPORTANT

- Do not interchange pistons between pump and motor cylinder block.

(1) Retainer Plate
(2) Piston

(3) Cylinder Block
(4) Piston Slipper

9Y1211012TRS0136US0



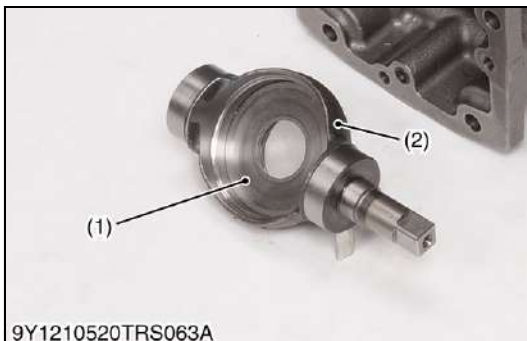
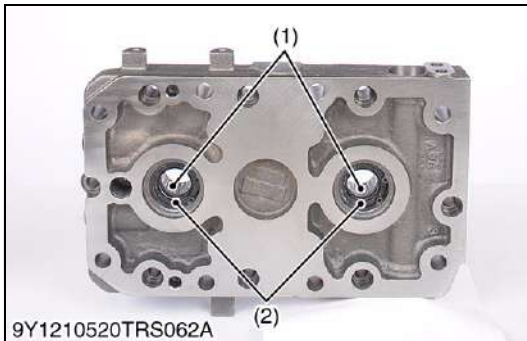
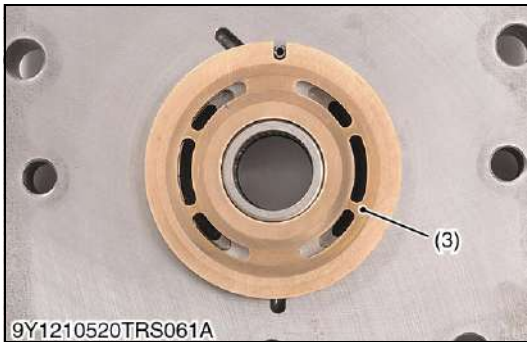
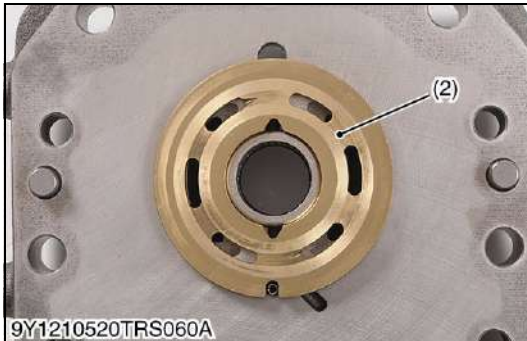
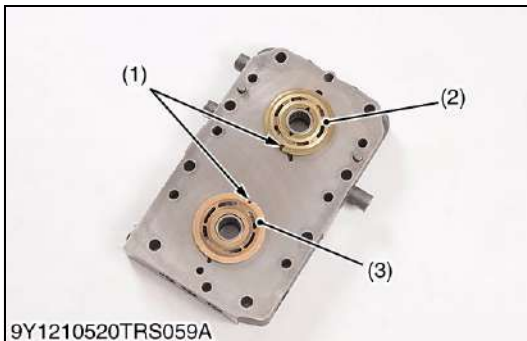
Cylinder Block Face

1. Check the polished face (1) of cylinder block for scoring.
2. If scored, replace cylinder block assembly.
3. Check the spring (2) for breakage.
4. If broken, replace cylinder block assembly.

(1) Polished Face

(2) Spring

9Y1211012TRS0137US0



Valve Plate

1. Check the engagement of the valve plate (2), (3) and the anchor pin (1).
2. Pushing the valve plate against the anchor pin, lift it to remove.
3. Check the valve plate for foreign particles.
4. Clean the valve plate and dry with compressed air.
5. Check the valve plate for scratches, wear and erosion. (Operate a finger nail across the valve plate surface. If worn, it will be felt.)
6. If worn or scored, replace.

NOTE

- After checking, coat them with transmission oil.
- Valve plates are not interchangeable.

- (1) Anchor Pin
(2) Valve Plate (Pump Side)

- (3) Valve Plate (Motor Side)

9Y1211012TRS0138US0

Oil Seals and Bearing for Shaft

1. Remove the internal snap ring and check the oil seals (2) for damage.
2. Check the bearings (1) for wear.
3. If the bearings are worn, replace.

NOTE

- After checking, coat the bearing with transmission oil and the oil seal lip with grease.

- (1) Needle Bearing

- (2) Oil Seal

9Y1211012TRS0139US0

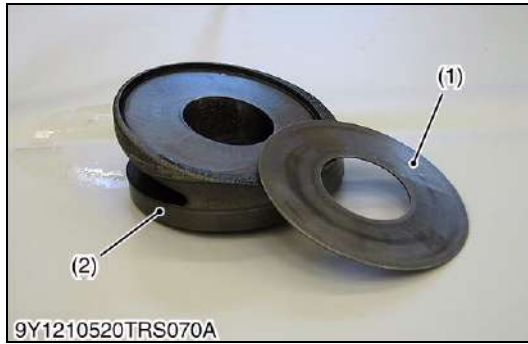
Thrust Plate and Trunnion

1. Check the piston contact face of the thrust plate (1), and the thrust plate contact face of trunnion (2) for scratches and excessive wear.
2. If the thrust plate (1) and the trunnion (2) are worn and scored, replace them.

- (1) Thrust Plate

- (2) Trunnion

9Y1211012TRS0140US0



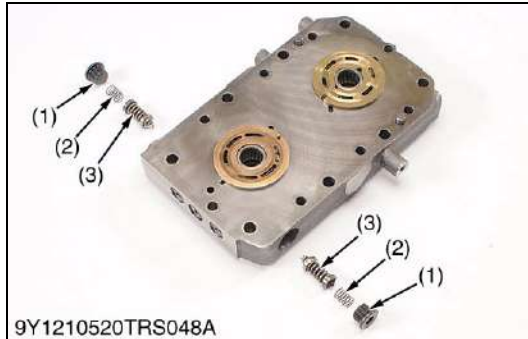
Thrust Plate and Swashplate

1. Check the piston contact face of the thrust plate (1), and the thrust plate contact face of the swashplate (2) for scratches and excessive wear.
2. If the thrust plate (1) and the swashplate (2) are worn and scored, replace them.

(1) Thrust Plate

(2) Swashplate

9Y1211012TRS0141US0



Check and High Pressure Relief Valve

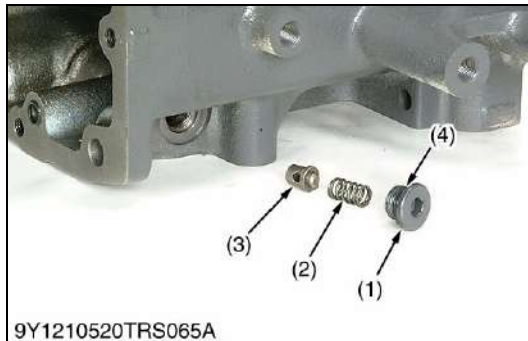
1. Check the spring (2) and check and high pressure relief valve (3) for scratches and damage.
2. Check the valve seal in the port block cover for damage.
3. If anything is unusual, replace the check and high pressure relief valve as an assembly.

(1) Hex. Head Plug

(3) Check and High Pressure Relief Valve

(2) Spring

9Y1211012TRS0142US0



Charge Relief Valve

1. Check the plug (1), O-ring (4), the spring (2) and the valve poppet (3) for scratches, damage and breakage.
2. If anything is unusual, replace it.

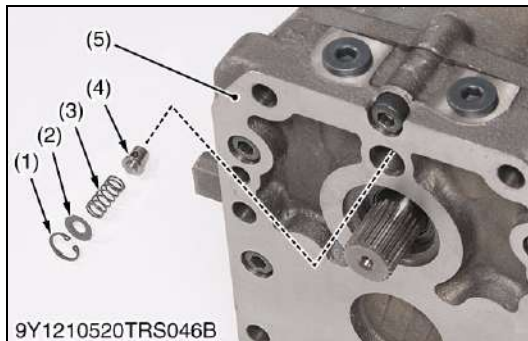
(1) Plug

(3) Valve Poppet

(2) Spring

(4) O-ring

9Y1211012TRS0143US0



Case Relief Valve

1. Check the spring (3) and the poppet (4) for scratches, damage and breakage.
2. If anything is unusual, replace it.

(1) Internal Cir-clip

(4) Valve Poppet

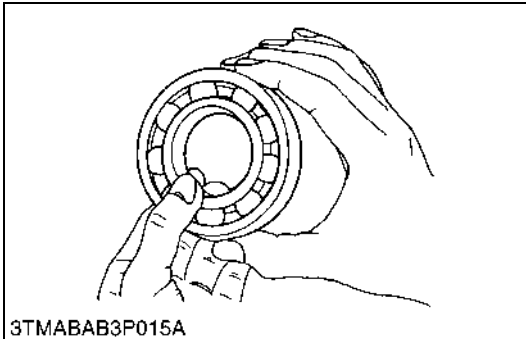
(2) Holder

(5) Port Block

(3) Spring

9Y1211012TRS0144US0

(2) Transmission Case

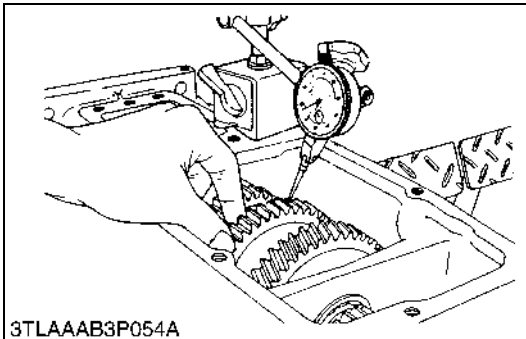


3TMABAB3P015A

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 problem, replace it.

9Y1211012TRS0145US0



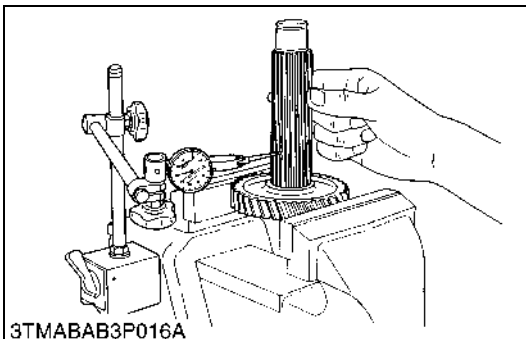
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Gear Backlash

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

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0



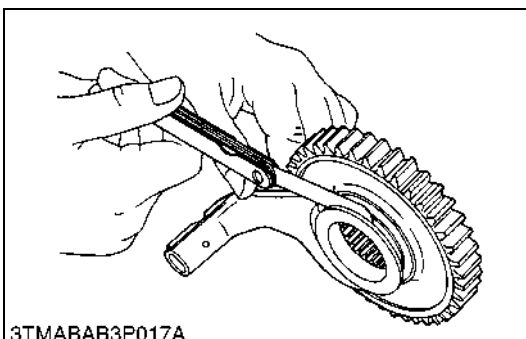
3TMABAB3P016A

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 specification	0.030 to 0.078 mm 0.0012 to 0.0030 in.
	Allowable limit	0.2 mm 0.008 in.

9Y1211012TRS0130US0



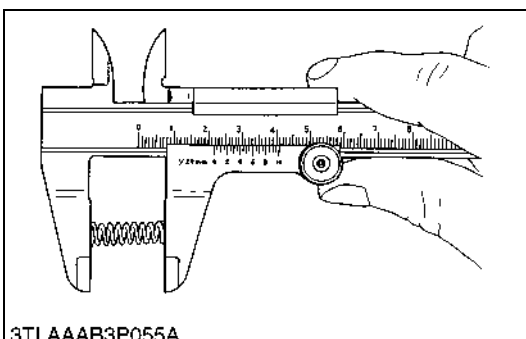
3TMABAB3P017A

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 specification	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

9Y1211012TRS0148US0



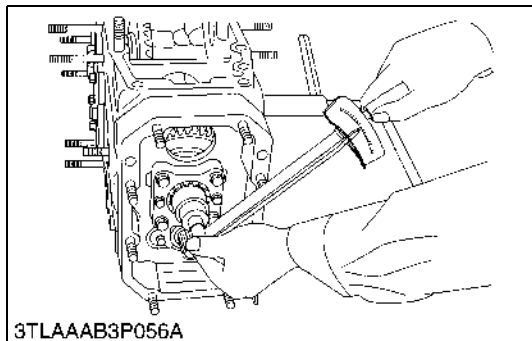
3TLAAAB3P055A

Free Length of the Shift Fork Spring

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

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

9Y1211012TRS0132US0

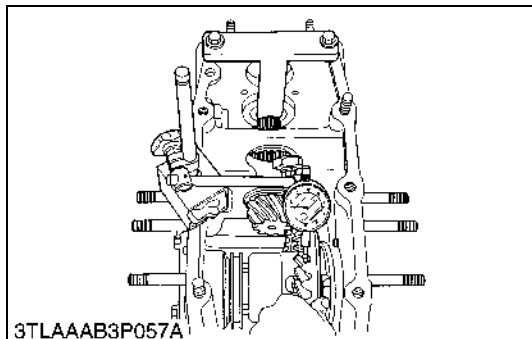


Spiral Bevel Pinion Turning Torque (with Differential Gear)

1. Grip the spiral bevel pinion nut with a torque wrench and measure the turning torque.
2. If the turning torque is not within the factory specifications, check the differential gear turning force, backlash and tooth contact again.

Differential gear rotating torque (Combined)	Factory specification	3.9 to 6.3 N·m 0.40 to 0.6 kgf·m 2.9 to 4.6 lbf·ft
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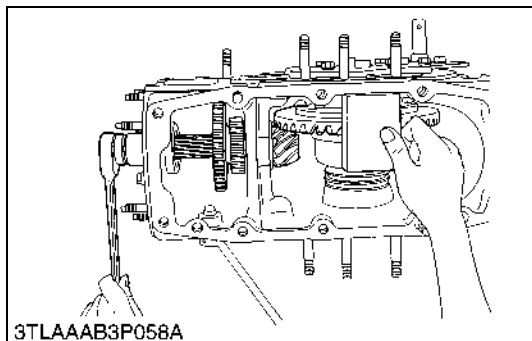
9Y1211012TRS0150US0



Backlash and Tooth Contact between Bevel Gear and 6T Spiral Bevel Pinion

1. Set the dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the 6T spiral bevel pinion and moving the bevel gear by hand.
3. If the backlash exceeds the factory specification, decrease the number of shims at right bearing case (right) and insert the removed shims to the left bearing case (left).
If the backlash is less than the factory specification, decrease the number of shims at left bearing case (left) and insert the removed shims to the right bearing case (right).
4. Adjust the backlash properly by repeating the above procedures.

Backlash between spiral bevel gear and 8T spiral bevel pinion	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
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5. Apply red lead lightly over several teeth at three positions equally spaced on the bevel gear.
6. Turn the 6T spiral bevel pinion while pressing a wooden piece against the periphery of the bevel gear.
7. Check the tooth contact. If not proper, adjust according to the instructions below.

(Reference)

- Thickness of differential side shims:
0.1 mm (0.004 in.)
0.2 mm (0.007 in.)
0.5 mm (0.02 in.)
- Thickness of spiral bevel pinion shims:
0.1 mm (0.004 in.)
0.2 mm (0.007 in.)
0.5 mm (0.02 in.)

9Y1211012TRS0151US0

(A)



3TLAAAB3P059A

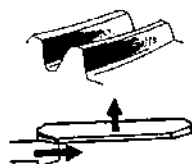
Proper Contact

More than 35 % red lead contact area on the gear tooth surface.
The center of tooth contact at 1/3 of the entire width from the small end.

(A) Proper Contact

9Y1211012TRS0152US0

(B)



(C)



3TLAAAB3P060A

Heel Contact and Tip Contact

Replace the adjusting shim with thicker one to move the bevel pinion shaft forward.

And place the left side shim to the right to move the bevel gear rightward.

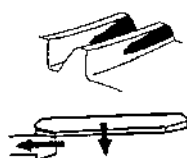
Repeat above until the proper tooth contact and backlash are achieved.

(B) Heel Contact

(C) Tip Contact

9Y1211012TRS0153US0

(D)



(E)



3TLAAAB3P061A

Toe Contact and Base Contact

Replace adjusting shim with thicker one to move the bevel pinion shaft forward.

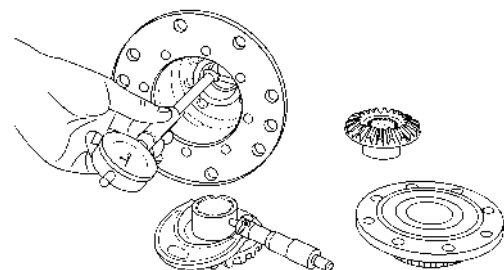
And place the right side shim to the left to move the bevel gear leftward.

Repeat above until the proper tooth contact and backlash are achieved.

(D) Toe Contact

(E) Base Contact

9Y1211012TRS0154US0



3TMABAB3P046A

Clearance between Differential Case Bore (Differential Case Cover Bore) and Differential Side Gear Boss

1. Measure the bore I.D. of the differential case and differential case cover.
2. Measure the differential side gear boss O.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

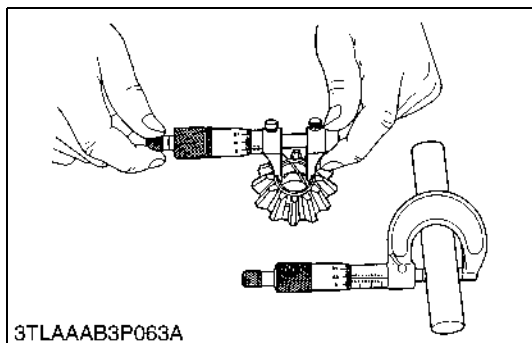
Clearance between differential case bore and differential side gear boss	Factory specification	0.0500 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case bore I.D.	Factory specification	40.500 to 40.562 mm 1.5945 to 1.5969 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

Clearance between differential case cover bore and differential side gear boss	Factory specification	0.090 to 0.169 mm 0.00355 to 0.00665 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case cover bore I.D.	Factory specification	40.540 to 40.580 mm 1.5961 to 1.5976 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

9Y1211012TRS0155US0



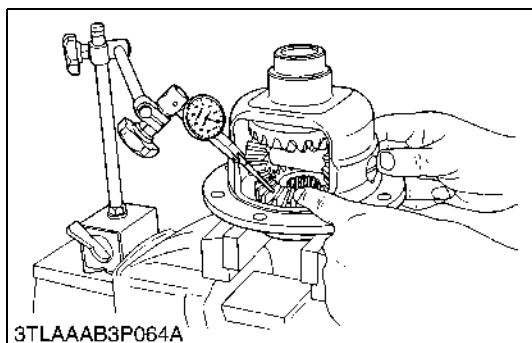
Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceed the allowable limit, replace them.

Clearance between differential pinion shaft and differential pinion	Factory specification	0.0800 to 0.122 mm 0.00315 to 0.00480 in.
	Allowable limit	0.25 mm 0.0098 in.

Differential pinion shaft O.D.	Factory specification	19.959 to 19.980 mm 0.78579 to 0.78661 in.
Differential pinion I.D.	Factory specification	20.060 to 20.081 mm 0.78977 to 0.79059 in.

9Y1211012TRS0156US0



Backlash between Differential Pinion and Differential Side Gear

1. Secure the differential case in a vise.
2. Set a dial indicator (lever type) on the tooth of the differential side gear.
3. Hold the differential pinion and move the differential side gear to measure the backlash.
4. If the measurement exceeds the allowable limit, adjust with the differential side gear washer.

Backlash between differential pinion and differential side gear	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

(Reference)

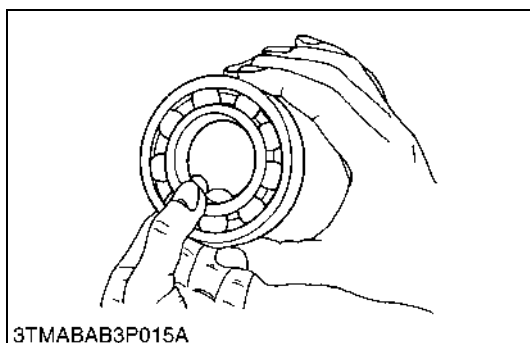
- Thickness of differential side gear washers:
 - 1.5 mm (0.059 in.)
 - 1.6 mm (0.062 in.)
 - 1.7 mm (0.067 in.)
 - 1.8 mm (0.071 in.)
 - 2.0 mm (0.074 in.)

9Y1211012TRS0157US0

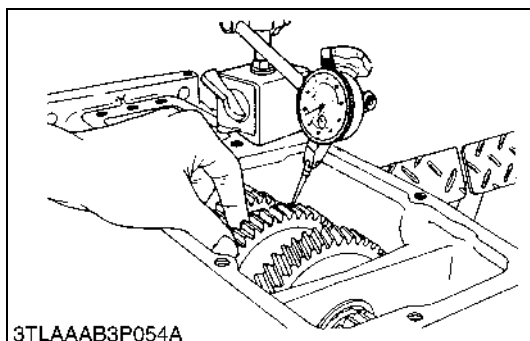
[2] L4701

(1) Clutch Housing Case

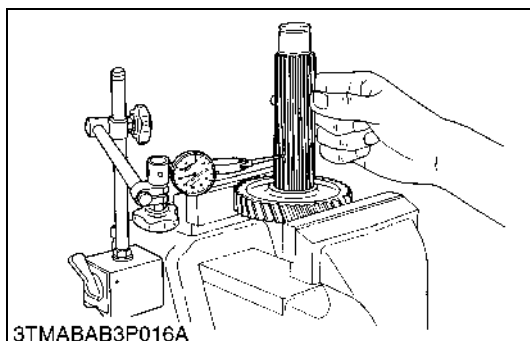
[A] Manual Transmission Model



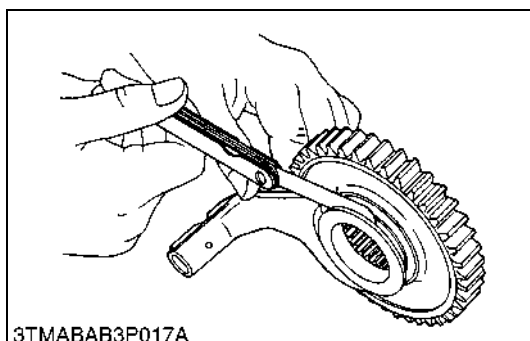
3TMABAB3P015A



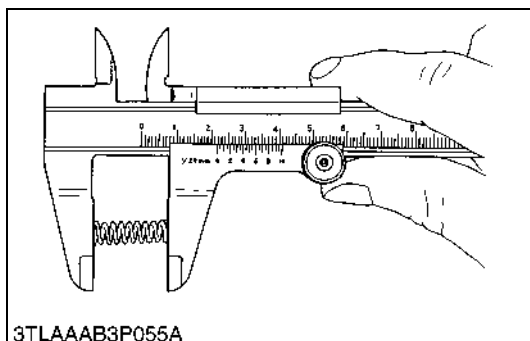
3TLAAB3P054A



3TMABAB3P016A



3TMABAB3P017A



3TLAAB3P055A

Checking Bearing

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

9Y1211012TRS0145US0

Gear Backlash

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

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0

Clearance between Gear and Spline

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

Clearance between gear and spline	Factory specification	0.030 to 0.078 mm 0.0012 to 0.0030 in.
	Allowable limit	0.2 mm 0.008 in.

9Y1211012TRS0130US0

Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

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

Clearance between shift fork and shift gear groove	Factory specification	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

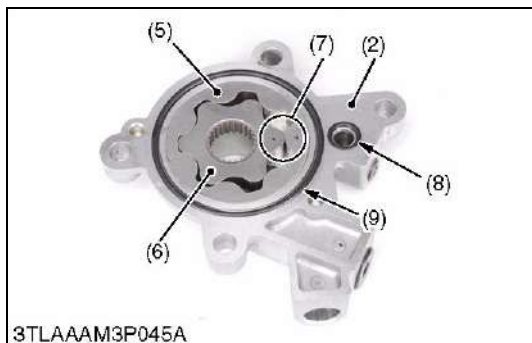
9Y1211012TRS0148US0

Free Length of the Shift Fork Spring

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

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

9Y1211012TRS0132US0

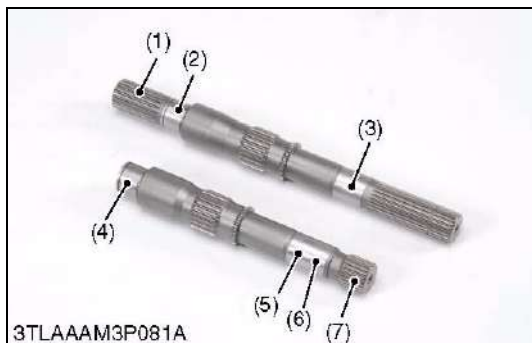
[B] HST Model**Charge Pump**

1. Check the charge pump case (3), the inner rotor (2) and the outer rotor (1) for scratches and wear.
2. If scratch or wear are found, replace the charge pump as an assembly.

(1) Outer Rotor
(2) Inner Rotor

(3) Charge Pump Case
(4) O-ring

9Y1211012TRS0158US0

**Pump Shaft and Motor Shaft**

1. Check the bearing surface (2), (3), (4), (5) and the oil seal surface (6).
2. If the shaft (1), (7) is rough or groove, replace it.

(1) Pump Shaft
(2) Ball Bearing Surface
(3) Needle Bearing Surface
(4) Ball Bearing Surface

(5) Needle Bearing Surface
(6) Oil Seal Surface
(7) Motor Shaft

9Y1211012TRS0159US0

**Cylinder Block Bore and Pistons**

1. Lift the pistons (2) gently with the retainer plate (1).
2. Check the pistons for their free movement in the cylinder block bores.
3. If the piston or the cylinder block bore is scored, replace the cylinder block assembly.

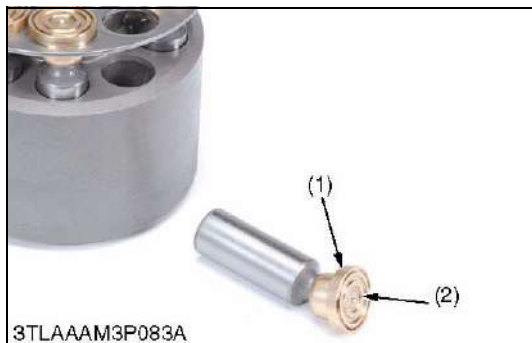
■ IMPORTANT

- Do not interchange the pistons between the pump cylinder block and the motor cylinder block.

(1) Retainer Plate
(2) Piston

(3) Cylinder Block

9Y1211012TRS0160US0

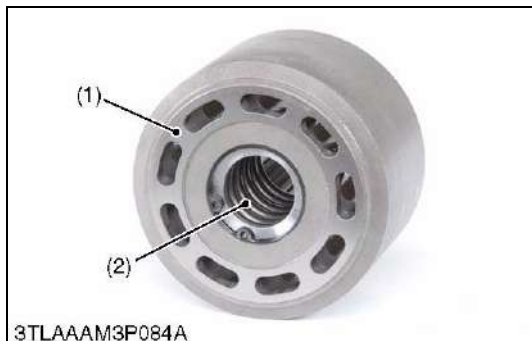
**Piston Slipper**

1. Check the piston slipper (1) for flatness.
2. If the slipper is rounded, replace the cylinder block assembly.
3. Check the lubricant hole (2) for clogging.

(1) Piston Slipper

(2) Lubricant Hole

9Y1211012TRS0161US0

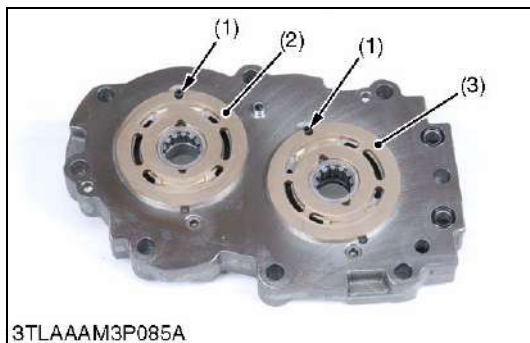
**Cylinder Block Face**

1. Check the polished face (1) of cylinder block for scoring.
2. If the polished face (1) is scored, replace the cylinder block assembly.
3. Check the spring (2) for breakage.
4. If the spring (2) is broken, replace the cylinder block assembly.

(1) Polished Face

(2) Spring

9Y1211012TRS0162US0



Valve Plate

1. Check the engagement of the valve plate (2), (3) and the anchor pins (1).
2. Pushing the valve plate (2), (3) against the anchor pins (1), remove the valve plate (2), (3).
3. Check the valve plate (2), (3) for foreign particles.
4. Clean the valve plate (2), (3) and dry with compressed air.
5. Check the valve plate (2), (3) for scratches, wear and erosion. Operate a finger nail across the valve plate surface. If the surface is worn, it will be felt.
6. If the valve plate (2), (3) is worn or scored, replace the valve plate (2), (3).

(1) Anchor Pin
(2) Valve Plate (Pump)

(3) Valve Plate (Motor)

9Y1211012TRS0163US0



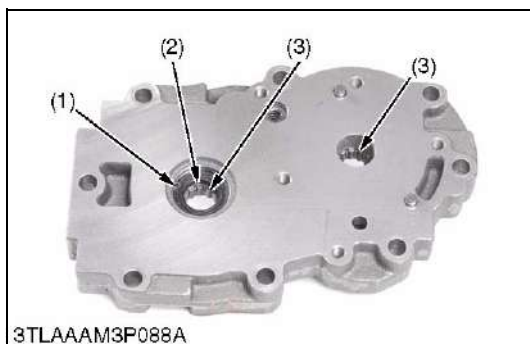
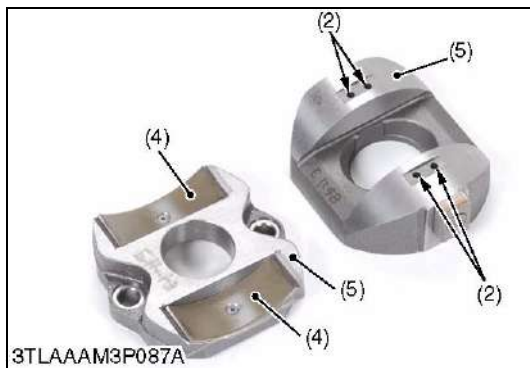
Thrust Plate, Swashplate and Cradle Bearing

1. Check the piston contact face of the thrust plate (1), the swashplate (3) for scratches and excessive wear.
2. Check the holes (2) of swashplate (3) for clogged.
3. If the thrust plate (1) and the swashplate (3) is worn and scored, replace it. If the holes (2) are clogged, clean them.
4. Check the surface of the cradle bearing (4) for scratches and excessive wear.
5. If the cradle bearing (4) is worn or scored, replace it.

(1) Thrust Plate
(2) Hole
(3) Swashplate

(4) Cradle Bearing
(5) Cradle Bearing Bracket

9Y1211012TRS0164US0



Oil Seals and Needle Bearing for Shaft

1. Remove the needle bearing (3) for wear. If the needle bearing (3) is worn, replace it.
2. Remove the oil seal (2) for damage. If the oil seal is damaged, replace it.

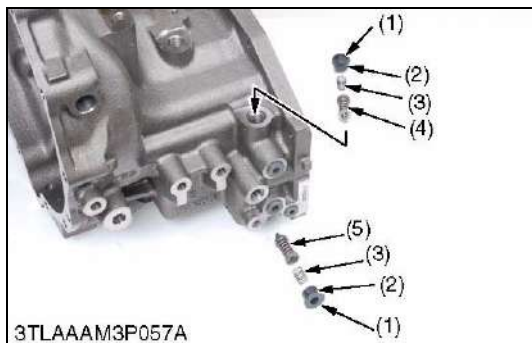
■ NOTE

- After checking, coat the bearing with transmission oil and the oil seal lip with grease.

(1) Internal Cir-clip
(2) Oil Seal

(3) Needle Bearing

9Y1211012TRS0165US0

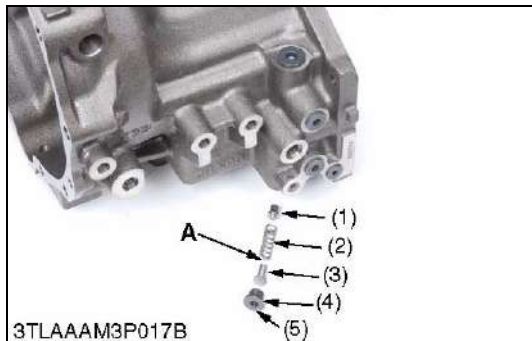


Check and High Pressure Relief Valve

1. Check the valve plug (1) and the valve (4), (5) for scratches and damage.
2. Check the spring (3) for damage.
3. If anything is unusual, replace the check and high pressure relief valve as an assembly.

- | | |
|----------------|--|
| (1) Valve Plug | (4) Check and High Pressure Relief Valve (Reverse) |
| (2) O-ring | (5) Check and High Pressure Relief Valve (Forward) |
| (3) Spring | |

9Y1211012TRS0166US0



Charge Relief Valve

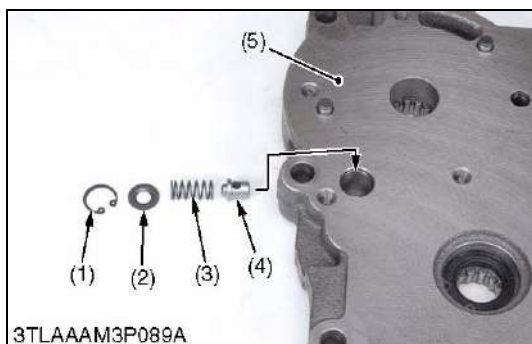
1. Check the spring guide (3), the spring (2) and the valve poppet (1) for scratches, damage and breakage.
2. If anything is unusual, replace it.

■ NOTE

- When re-installing the charge relief valve, never change the number of shims.
- Adjusting shims are located at between the spring guide and the spring.
- When replacing with a new one, be sure to check and adjust the charge relief.

- | | |
|------------------|---------------------------------------|
| (1) Valve Poppet | (4) O-ring |
| (2) Spring | (5) Plug |
| (3) Spring Guide | A: Shim (If shim is installed) |

9Y1211012TRS0167US0



Case Relief Valve

1. Check the spring (3) and the poppet (4) for scratches, damage and breakage.
2. If anything is unusual, replace it.

- | | |
|-----------------------|------------------|
| (1) Internal Cir-clip | (4) Valve Poppet |
| (2) Holder | (5) Port Block |
| (3) Spring | |

9Y1211012TRS0168US0



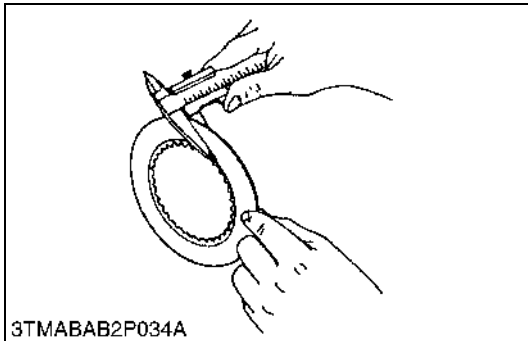
Servo Piston

1. Check the surface of the servo piston (1) for scratches and excessive wear.
2. If the surface of the servo piston (1) is worn or scored, replace the servo piston as an assembly.

- (1) Servo Piston

9Y1211012TRS0169US0

(2) Mid Case

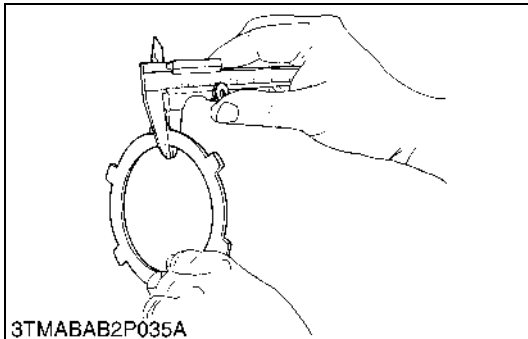


Clutch Disc Wear

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

Clutch disc wear	Factory specification	1.70 to 1.90 mm 0.067 to 0.075 in.
	Allowable limit	1.55 mm 0.061 in.

9Y1211012TRS0170US0

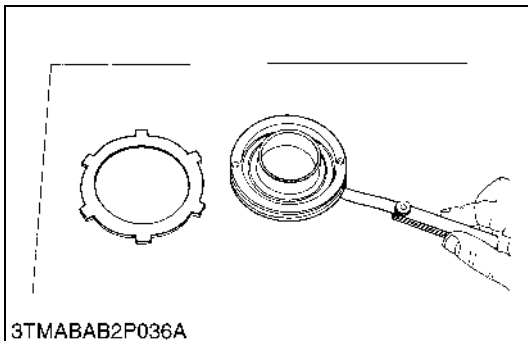


PTO Steel Plate Wear

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

PTO steel plate wear	Factory specification	1.15 to 1.25 mm 0.045 to 0.049 in.
	Allowable limit	1.10 mm 0.043 in.

9Y1211012TRS0171US0

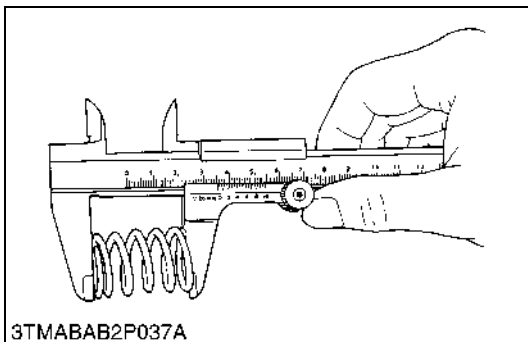


Flatness of PTO Piston and PTO Steel Plate

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

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

9Y1211012TRS0172US0

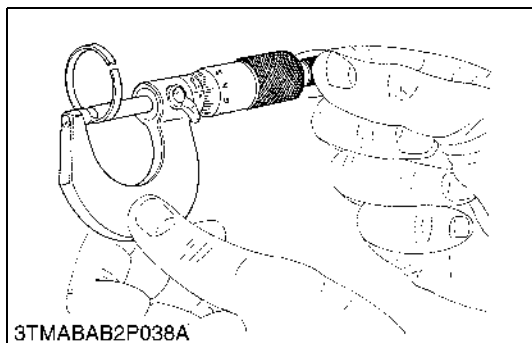


Piston Return Spring Free Length

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

PTO return spring free length	Factory specification	42.5 to 43.5 mm 1.67 to 1.71 in.
	Allowable limit	38.3 mm 1.51 in.

9Y1211012TRS0173US0



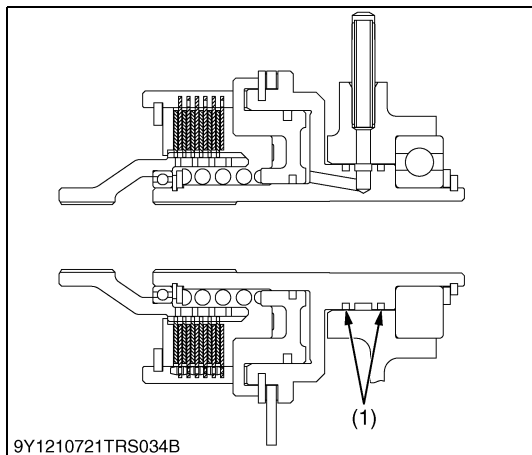
Thickness of Seal Ring

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

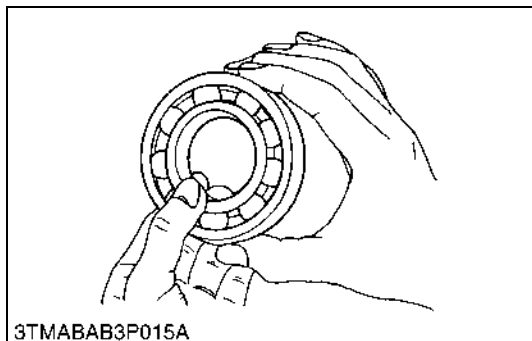
Thickness of seal ring	Factory specification	2.45 to 2.50 mm 0.096 to 0.098 in.
	Allowable limit	2.0 mm 0.079 in.

(1) Seal Ring

9Y1211012TRS0174US0



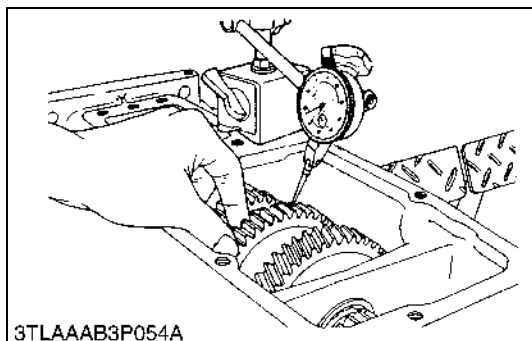
(3) Transmission Case



Checking Bearing

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

9Y1211012TRS0145US0

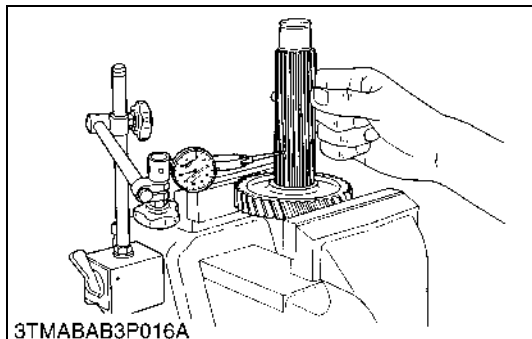


Gear Backlash

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

Gear backlash	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012TRS0129US0

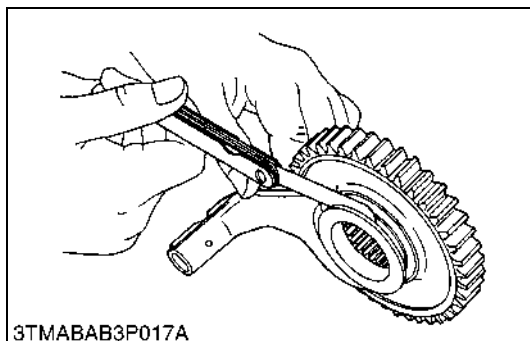


Clearance between Gear and Spline

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

Clearance between gear and spline	Factory specification	0.030 to 0.078 mm 0.0012 to 0.0030 in.
	Allowable limit	0.2 mm 0.008 in.

9Y1211012TRS0130US0

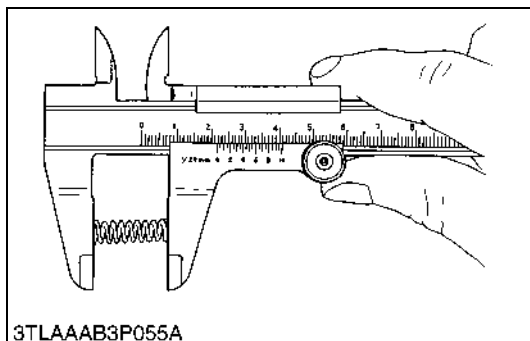


Clearance between Shift Fork and Shift Gear Groove or Shifter Groove

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

Clearance between shift fork and shift gear groove	Factory specification	0.15 to 0.40 mm 0.0059 to 0.015 in.
	Allowable limit	0.6 mm 0.02 in.

9Y1211012TRS0148US0

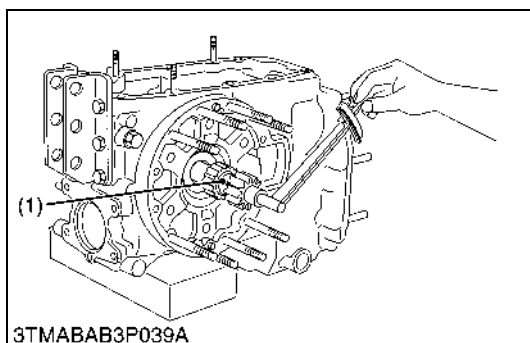


Free Length of the Shift Fork Spring

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

Free length of the shift fork spring	Factory specification	22 mm 0.87 in.
	Allowable limit	20 mm 0.79 in.

9Y1211012TRS0132US0



Spiral Bevel Gear Turning Torque

■ NOTE

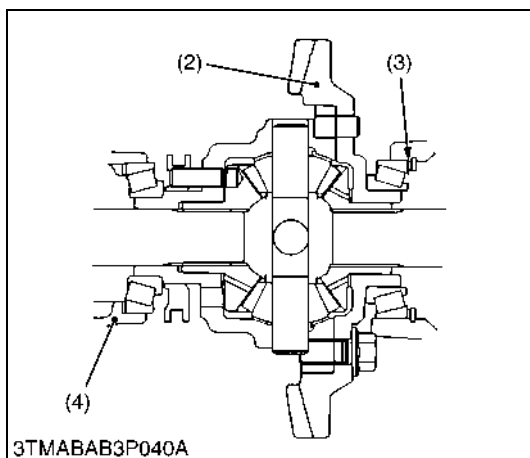
- It is necessary to adjust the spiral bevel gear turning torque, when replacing the differential gears, transmission case or other relative parts.
1. Assemble the differential gears to transmission case. At this time, install the some shims (3) to the spiral bevel gear side.
 2. Check the turning torque by using turning torque tool (1).
Turning Torque Tool: Weld socket on a brake shaft
 3. Add or reduce the thickness of shims (3) to make the specified turning torque.
 4. After getting the specified turning torque, divide the thickness of shims to left and right side.
 5. Assemble the transmission case and adjust the backlash and tooth contact with spiral bevel pinion.

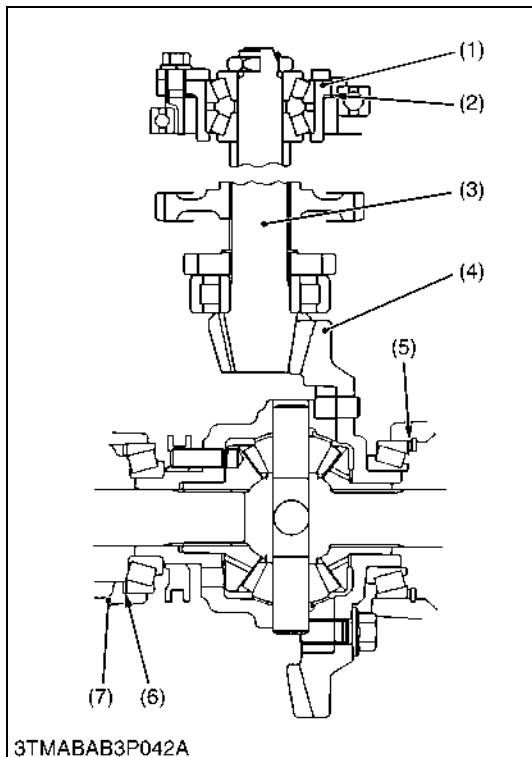
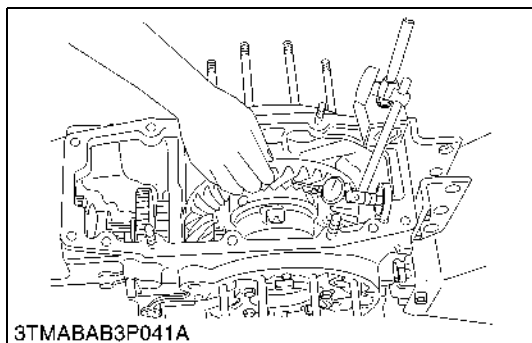
Tightening torque	37T spiral bevel gear	3.92 to 6.37 N·m 0.40 to 0.65 kgf·m 2.89 to 4.70 lbf·ft
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- (1) Turning Torque Tool
(2) 37T Spiral Bevel Gear

- (3) Adjusting Shim
(4) Differential Support

9Y1211012TRS0175US0





Backlash and Tooth Contact between Spiral Bevel Gear and Spiral Bevel Pinion Shaft

1. Set the dial indicator (lever type) with its finger on the tooth surface.
2. Measure the backlash by fixing the spiral bevel pinion shaft (3) and moving the spiral bevel gear (4) by hand.
3. When the backlash is too large, decrease the number of shims (5) in the side of the spiral bevel gear, and insert the shims (6) of the same thickness as the removed ones to the opposite side. When the backlash is too small, do the opposite way of exceed backlash.
4. Adjust the backlash properly by repeating the above procedure.
5. Apply red lead lightly over several teeth at three positions equally spaced on the spiral bevel gear.
6. Turn the spiral bevel pinion shaft, while pressing a wooden piece against the periphery on the spiral bevel gear.
7. Check the tooth contact. If not proper, adjust according to the instructions next page.

Backlash between spiral bevel gear and spiral bevel pinion shaft	Factory specification	0.15 to 0.30 mm 0.006 to 0.012 in.
	Allowable limit	0.4 mm 0.016 in.

(Reference)

- Thickness of shims (2):
0.1 mm (0.004 in.)
0.2 mm (0.008 in.)
0.5 mm (0.020 in.)
- Thickness of shims (5):
0.3 mm (0.012 in.)
0.4 mm (0.016 in.)
0.6 mm (0.024 in.)
0.8 mm (0.031 in.)
1.0 mm (0.039 in.)
1.2 mm (0.047 in.)
1.4 mm (0.055 in.)

- (1) Pinion Bearing Case
(2) Shim
(3) Spiral Bevel Pinion Shaft
(4) Spiral Bevel Gear

- (5) Shim
(6) Shim
(7) Differential Support

9Y1211012TRS0176US0

(A)



3TLAAB3P059A

Proper Contact

More than 35 % red lead contact area on the gear tooth surface.
The center of tooth contact at 1/3 of the entire width from the small end.

(A) Proper Contact

9Y1211012TRS0152US0

(B)

(C)



3TLAAB3P060A

Heel Contact and Tip Contact

Replace the adjusting shim with thicker one to move the bevel pinion shaft forward.

And place the left side shim to the right to move the bevel gear rightward.

Repeat above until the proper tooth contact and backlash are achieved.

(B) Heel Contact

(C) Tip Contact

9Y1211012TRS0153US0

(D)

(E)



3TLAAB3P061A

Toe Contact and Base Contact

Replace adjusting shim with thicker one to move the bevel pinion shaft forward.

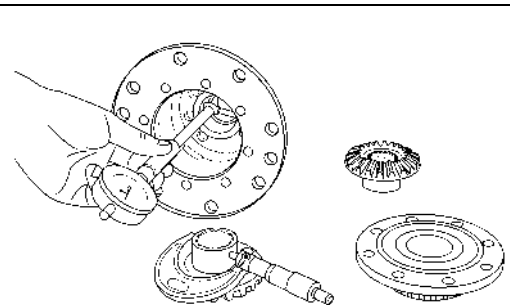
And place the right side shim to the left to move the bevel gear leftward.

Repeat above until the proper tooth contact and backlash are achieved.

(D) Toe Contact

(E) Base Contact

9Y1211012TRS0154US0



3TMABAB3P046A

Clearance between Differential Case Bore (Differential Case Cover Bore) and Differential Side Gear Boss

1. Measure the bore I.D. of the differential case and differential case cover.
2. Measure the differential side gear boss O.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

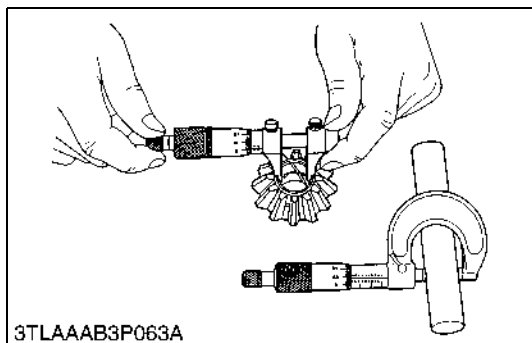
Clearance between differential case bore and differential side gear boss	Factory specification	0.0500 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case bore I.D.	Factory specification	40.500 to 40.562 mm 1.5945 to 1.5969 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

Clearance between differential case cover bore and differential side gear boss	Factory specification	0.090 to 0.169 mm 0.00355 to 0.00665 in.
	Allowable limit	0.35 mm 0.014 in.

Differential case cover bore I.D.	Factory specification	40.540 to 40.580 mm 1.5961 to 1.5976 in.
Differential side gear boss O.D.	Factory specification	40.411 to 40.450 mm 1.5910 to 1.5925 in.

9Y1211012TRS0155US0



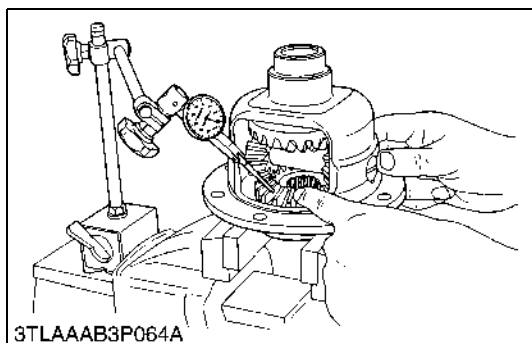
Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D.
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceed the allowable limit, replace them.

Clearance between differential pinion shaft and differential pinion	Factory specification	0.0800 to 0.122 mm 0.00315 to 0.00480 in.
	Allowable limit	0.25 mm 0.0098 in.

Differential pinion shaft O.D.	Factory specification	19.959 to 19.980 mm 0.78579 to 0.78661 in.
Differential pinion I.D.	Factory specification	20.060 to 20.081 mm 0.78977 to 0.79059 in.

9Y1211012TRS0156US0



Backlash between Differential Pinion and Differential Side Gear

1. Secure the differential case in a vise.
2. Set a dial indicator (lever type) on the tooth of the differential side gear.
3. Hold the differential pinion and move the differential side gear to measure the backlash.
4. If the measurement exceeds the allowable limit, adjust with the differential side gear washer.

Backlash between differential pinion and differential side gear	Factory specification	0.15 to 0.30 mm 0.0059 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

(Reference)

- Thickness of differential side gear washers:
 - 1.5 mm (0.059 in.)
 - 1.6 mm (0.062 in.)
 - 1.7 mm (0.067 in.)
 - 1.8 mm (0.071 in.)
 - 2.0 mm (0.074 in.)

9Y1211012TRS0157US0

4 REAR AXLE

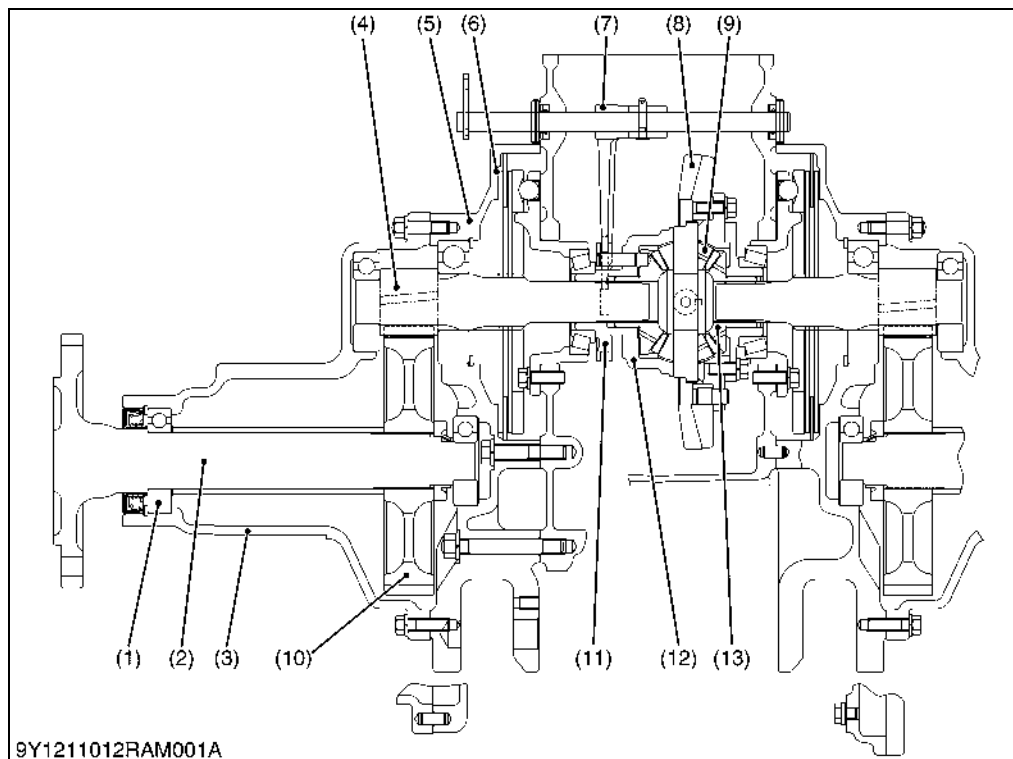
MECHANISM

CONTENTS

1. STRUCTURE.....	4-M1
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1. STRUCTURE

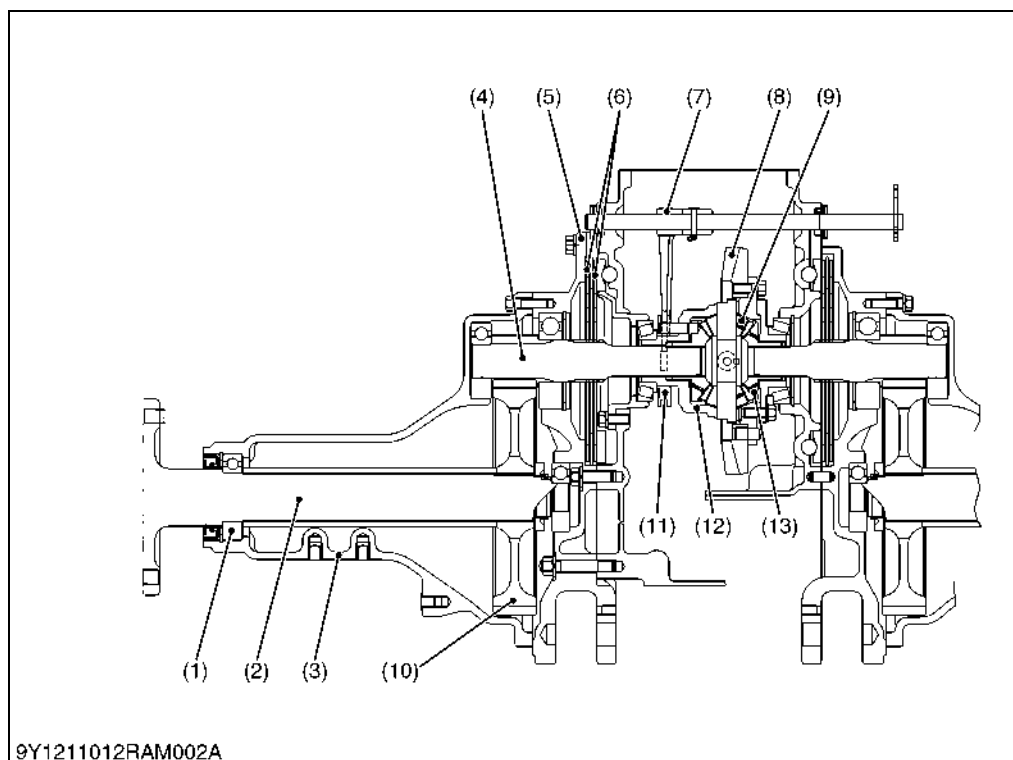
L3301/L3901



- (1) Ball Bearing
- (2) Rear Axle
- (3) Rear Axle Case
- (4) Differential Gear Shaft
- (5) Brake Case
- (6) Brake Disc
- (7) Differential Lock Shift Fork
- (8) 39T Bevel Gear
- (9) Differential Pinion
- (10) Final Gear
- (11) Differential Lock Shifter
- (12) Differential Case
- (13) Differential Side Gear

9Y1211012RAM0001US0

L4701



- (1) Ball Bearing
- (2) Rear Axle
- (3) Rear Axle Case
- (4) Differential Gear Shaft
- (5) Brake Case
- (6) Brake Disc
- (7) Differential Lock Shift Fork
- (8) 39T Bevel Gear
- (9) Differential Pinion
- (10) Final Gear
- (11) Differential Lock Shifter
- (12) Differential Case
- (13) Differential Side Gear

9Y1211012RAM0002US0

The final gear (10) is final reduction mechanism which further reduces the speed of rotation. The direction of power transmitted from the engine is changed by the differential gears.

The rear axle (2) is the final transmission mechanism which transmits the power from the transmission to the rear wheels. The rotation speed is reduced by the final gear (10) as explained above.

The rear axle (2) is the semi-floating type with the ball bearing (1) between the rear axle (2) and rear axle case (3), which support the rear wheel load besides transmitting power to the rear wheel. The rear axle (2) also support the weight of the tractor.

SERVICING

CONTENTS

- 1. TROUBLESHOOTING.....4-S1
- 2. TIGHTENING TORQUES.....4-S2
- 3. DISASSEMBLING AND ASSEMBLING4-S3
 - [1] SEPARATING REAR AXLE CASE4-S3
 - [2] DISASSEMBLING REAR AXLE4-S8
- 4. SERVICING.....4-S9

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	—
	Bearing worn	Replace	4-S9
	Insufficient or improper type of transmission fluid used	Fill or change	G-37, G-64
Noise while Turning	Differential gear shaft and final gear worn or damaged	Replace	4-S8

9Y1211012RAS0001US0

2. TIGHTENING TORQUES

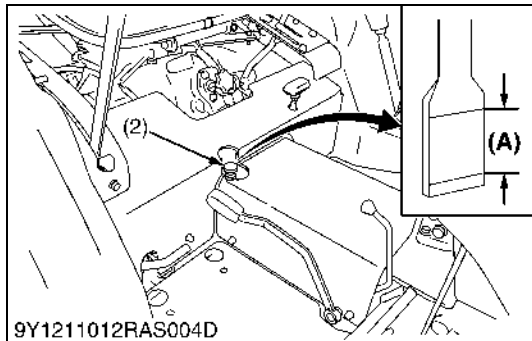
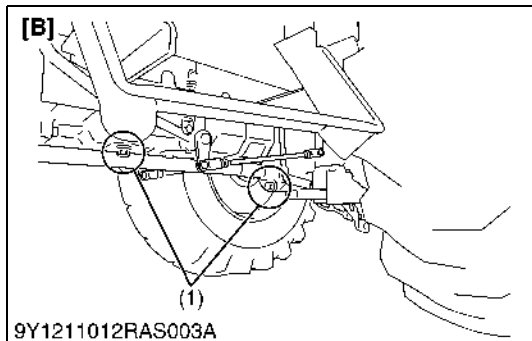
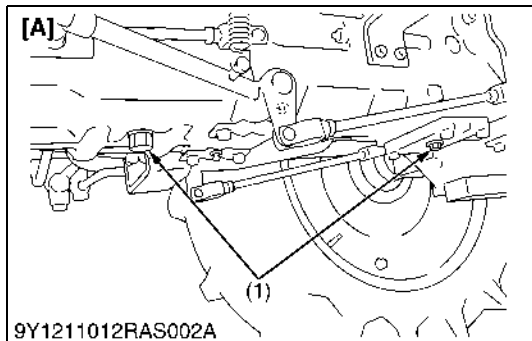
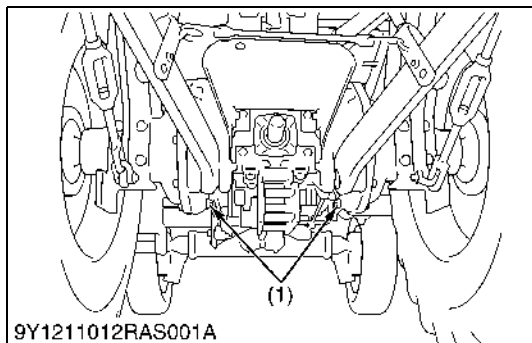
Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-13.)

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting screw and nut	197 to 225	20.0 to 23.0	145 to 166
ROPS lower frame mounting screw	167 to 196	17.0 to 20.0	123 to 144
ROPS fulcrum bolt and nut	118 to 137	12.0 to 14.0	86.8 to 101
Rear axle case mounting M10 bolts	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6	6.2 to 7.2	45 to 52
Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2	7.91 to 9.19	57.2 to 66.5
Lock nut	200 to 240	20 to 25	150 to 180

9Y1211012RAS0002US0

3. DISASSEMBLING AND ASSEMBLING

[1] SEPARATING REAR AXLE CASE



Draining Transmission Fluid (L3301/L3901)



CAUTION
To avoid personal injury:

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

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

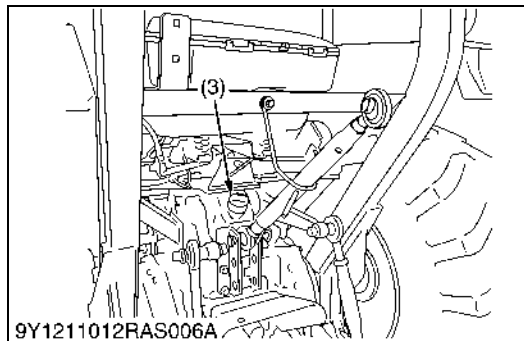
(When reassembling)

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

■ IMPORTANT

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

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



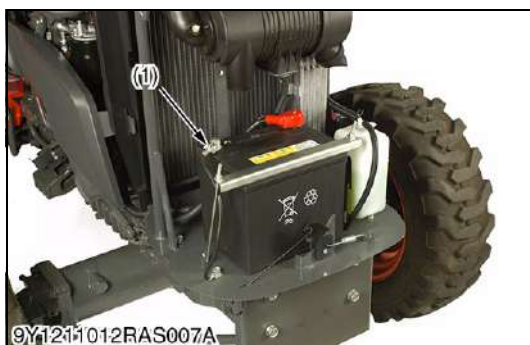
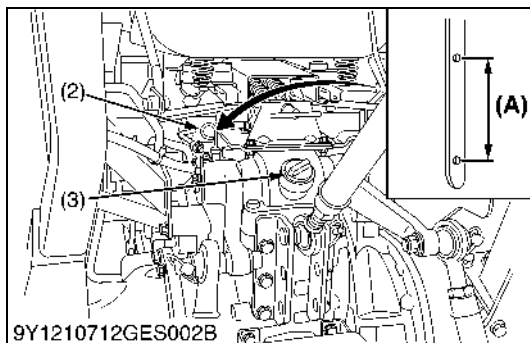
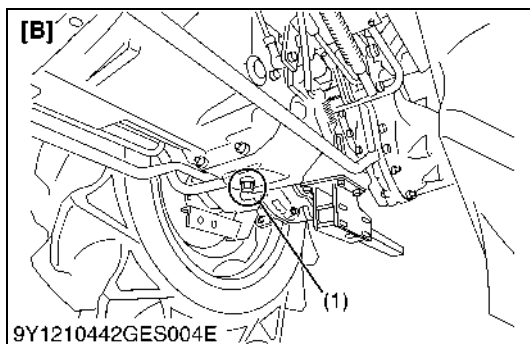
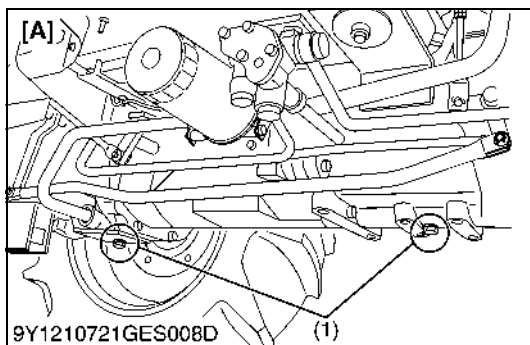
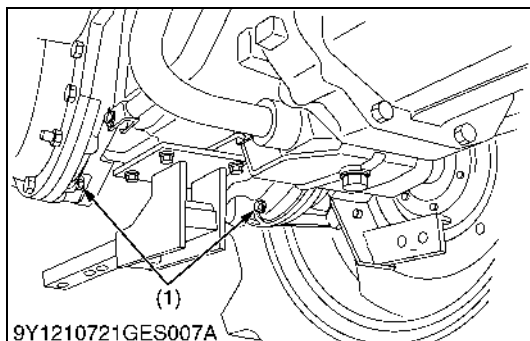
- (1) Drain Plug
(2) Gauge
(3) Oil Inlet Plug

[A] 2WD Model

[B] 4WD Model

(A) Oil level is acceptable within this range.

9Y1211012RAS0003US0



Draining Transmission Fluid (L4701)

CAUTION

To avoid personal injury:

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

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

(When reassembling)

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

IMPORTANT

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

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

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

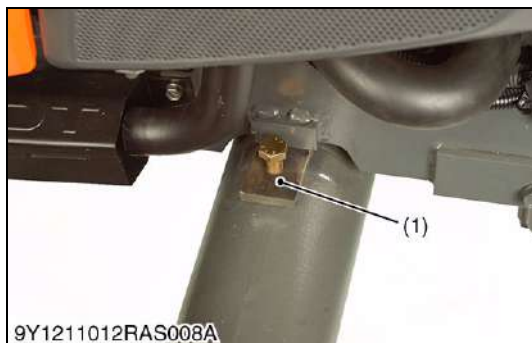
9Y1211012RAS0004US0

Battery Negative Cable Connector

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

- (1) Battery Negative Cable Connector

9Y1211012RAS0005US0

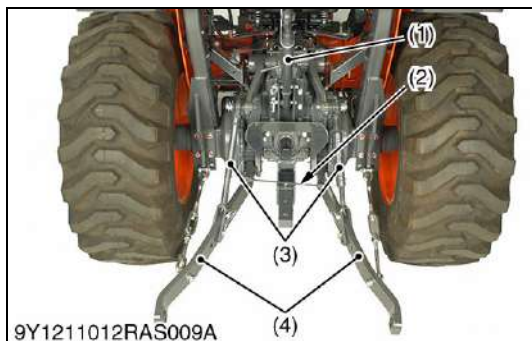


Front Axle Rocking Restrictor

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-94.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0



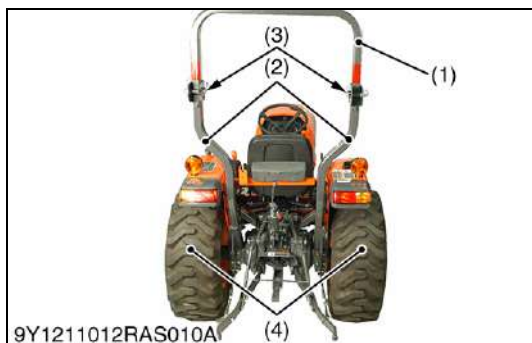
Three Point Linkage

1. Remove top link (1).
2. Remove rubber spring (2), lift rod (3) and lower link (4).

(1) Top Link
(2) Rubber Spring

(3) Lift Rod
(4) Lower Link

9Y1211012RAS0007US0



ROPS and Rear Wheel

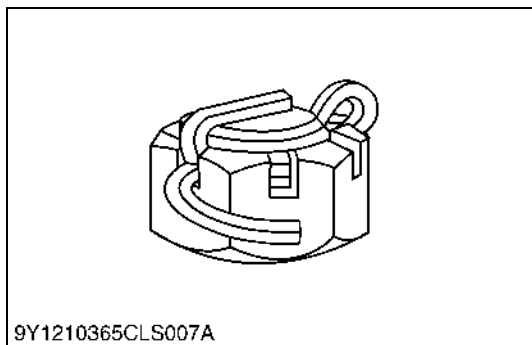
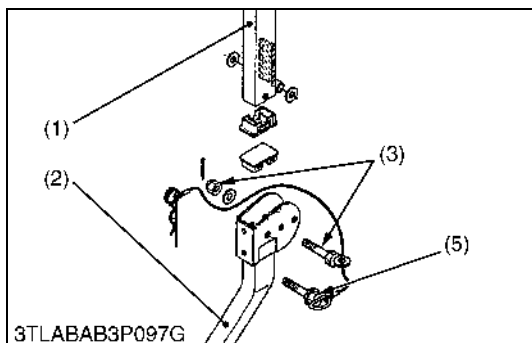
1. Place the disassembling stand under the transmission case.
2. Remove the ROPS upper frame (1).
3. Remove the ROPS lower frame (2).
4. Loosen and remove the rear wheel mounting bolts and nuts.
5. Remove the rear wheel (4).

(When reassembling)

- After tighten the ROPS lower frame mounting bolt and nut, install the cotter pin as shown in the figure.
- Tighten the ROPS upper frame mounting bolts and nuts so that the ROPS upper frame (1) does not fall down when the ROPS upper frame (1) is set at horizontal.

■ NOTE

- Do not firmly tighten all upper frame mounting bolts until most components are attached.

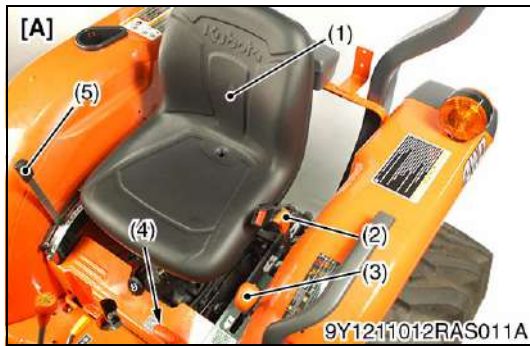


Tightening torque	Rear wheel mounting bolt and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	ROPS lower frame mounting bolt	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum bolt and nut	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft

(1) ROPS Upper Frame
(2) ROPS Lower Frame
(3) ROPS Fulcrum Bolt and Nut

(4) Rear Wheel
(5) Lock Bolt

9Y1211012RAS0008US0



Seat

1. Remove the seat (1).
2. Remove the grips (2) to (6).
3. Remove the PTO switch (7).
4. Remove the PTO switch (8) and the PTO wire (9).

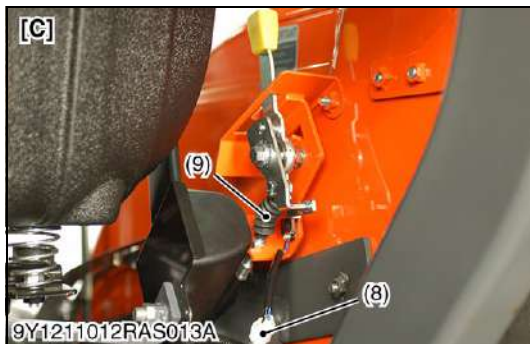
- | | |
|------------------------------------|------------------------------|
| (1) Seat | (8) PTO Switch |
| (2) Grip (Range Gear Shift Lever) | (L3301/L3901 HST Model Only) |
| (3) Grip (Shuttle Shift Lever) | (9) PTO Wire |
| (4) Grip (Front Wheel Drive Lever) | (L3301/L3901 HST Model Only) |
| (5) Grip (Position Control Lever) | |
| (6) Grip | |
| (Cruise Control Lever: OPTION) | |
| (7) PTO Switch (L4701 Only) | |

[A]: Manual Transmission Model

[B]: HST Model

[C]: L3301/L3901 HST Model

9Y1211012RAS0009US0

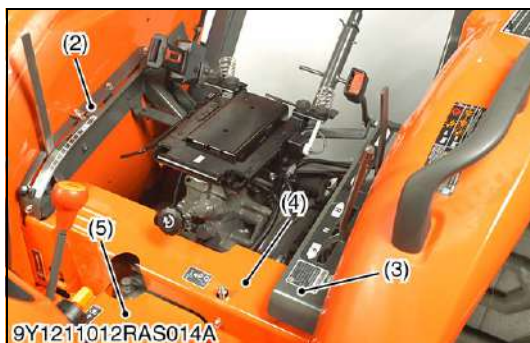


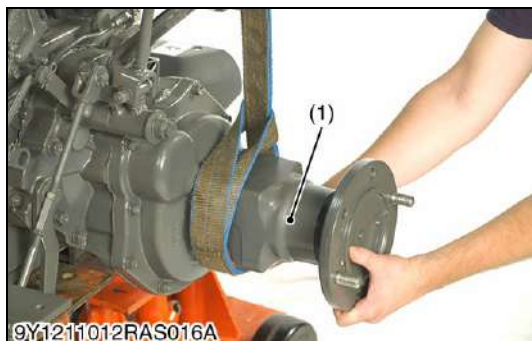
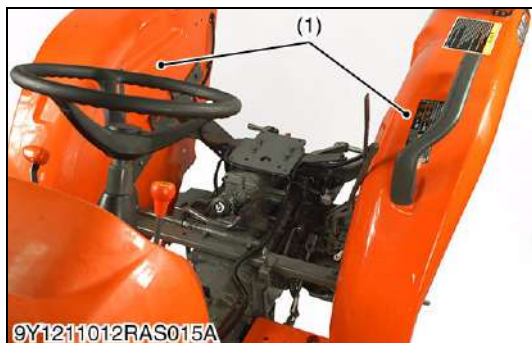
Lever Guide

1. Disconnect seat switch connector (1).
2. Remove the position control lever guide (2).
3. Remove the lever guide (3).
4. Remove the floor seat cover (4).
5. Remove the center cover (5).

- | | |
|----------------------------------|-------------------------------------|
| (1) Seat Switch Connector | (4) Floor Seat Cover |
| (2) Position Control Lever Guide | (5) Center Cover (L3301/L3901 Only) |
| (3) Lever Guide | |

9Y1211012RAS0010US0





Fender

1. Remove the fenders (1).

(1) Fender

9Y1211012RAS0011US0

Rear Axle Case

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

(When reassembling)

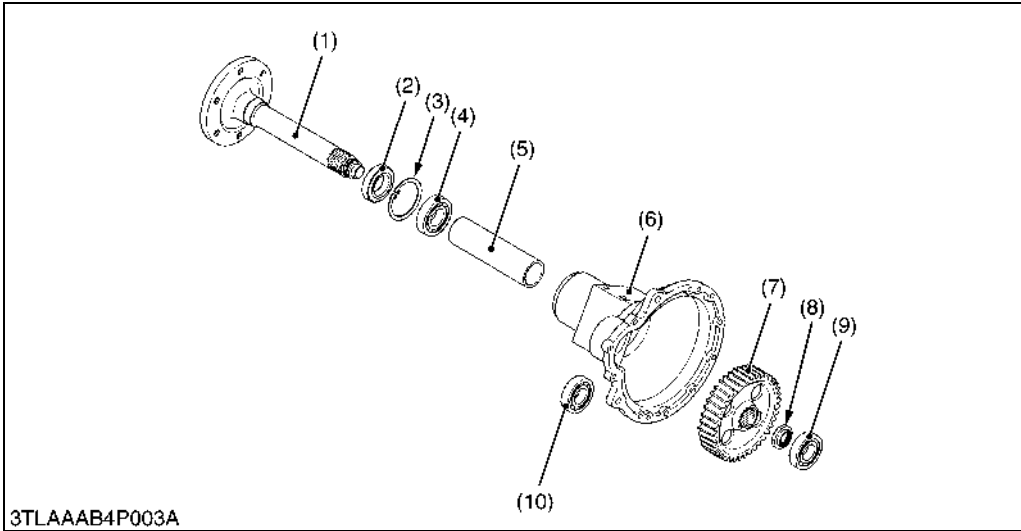
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting M10 bolts	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
	Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft

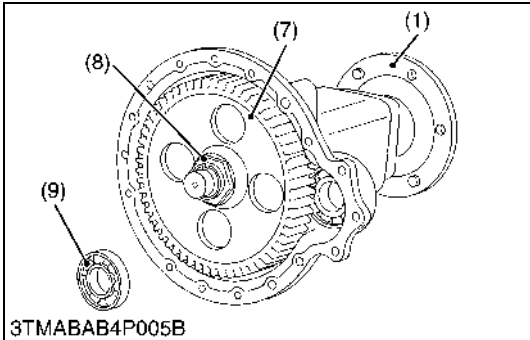
(1) Rear Axle Case

9Y1211012RAS0012US0

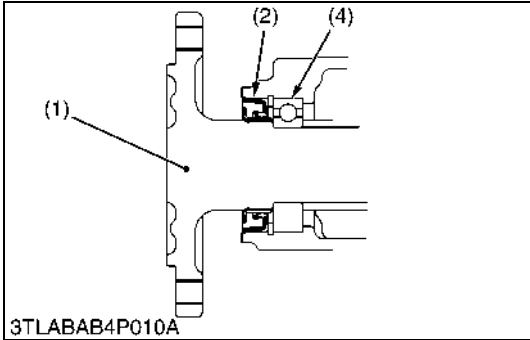
[2] DISASSEMBLING REAR AXLE



- (1) Rear Axle
- (2) Oil Seal
- (3) Internal Snap Ring
- (4) Ball Bearing
- (5) Spacer
- (6) Rear Axle Case
- (7) Gear
- (8) Lock Nut
- (9) Ball Bearing
- (10) Ball Bearing



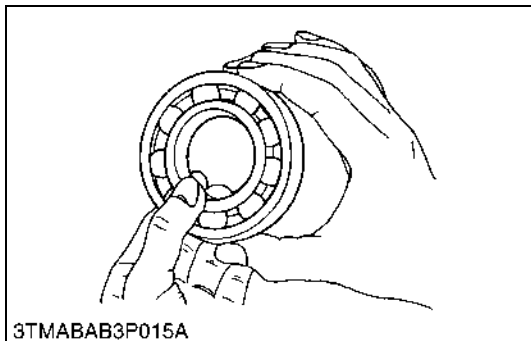
1. Remove the ball bearing (9) with a puller.
 2. Remove the stake of lock nut (8).
 3. Secure the rear axle (1) in a vise and remove the lock nut.
 4. Remove the gear (7) and spacer (5).
 5. Tap out the rear axle (1).
- (When reassembling)**
- Apply grease to the oil seal (2) and install it.
 - Replace the lock nut with new one, and after tightening it to specified torque, stake it firmly.
 - Assemble the oil seal (2) with correct direction. (See figure on the left.)



Tightening torque	Lock nut	200 to 240 N·m 20 to 25 kgf·m 150 to 180 lbf·ft
-------------------	----------	---

9Y1211012RAS0013US0

4. SERVICING



Checking Bearing

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

9Y1211012RAS0014US0

5 BRAKES

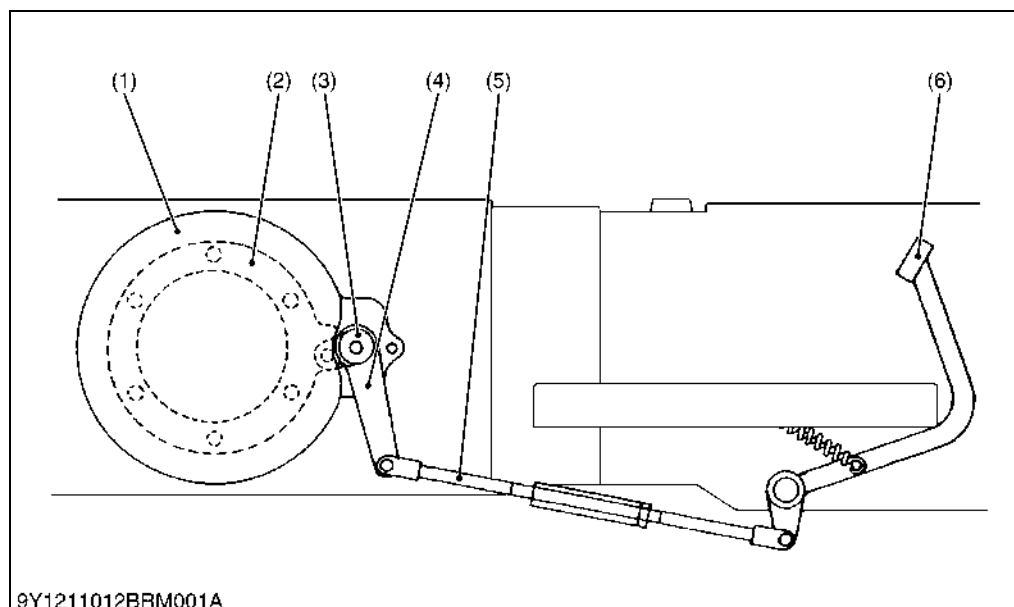
MECHANISM

CONTENTS

1. STRUCTURE.....	5-M1
2. OPERATION.....	5-M2

1. STRUCTURE

L3301/L3901

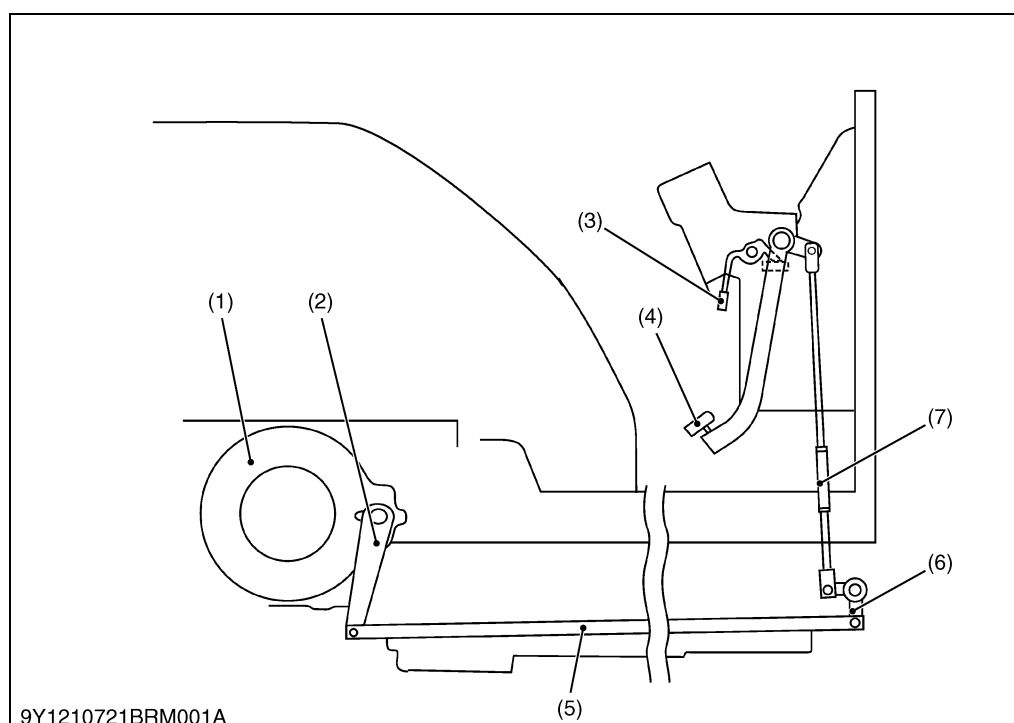


- (1) Brake Case
- (2) Cam Plate
- (3) Brake Cam
- (4) Brake Cam Lever
- (5) Brake Rod
- (6) Brake Pedal

9Y1211012BRM0001US0

9Y1211012BRM001A

L4701



- (1) Brake Case
- (2) Brake Cam Lever
- (3) Parking Brake Lever
- (4) Brake Pedal
- (5) Brake Rod
- (6) Brake Lever Link
- (7) Turnbuckle

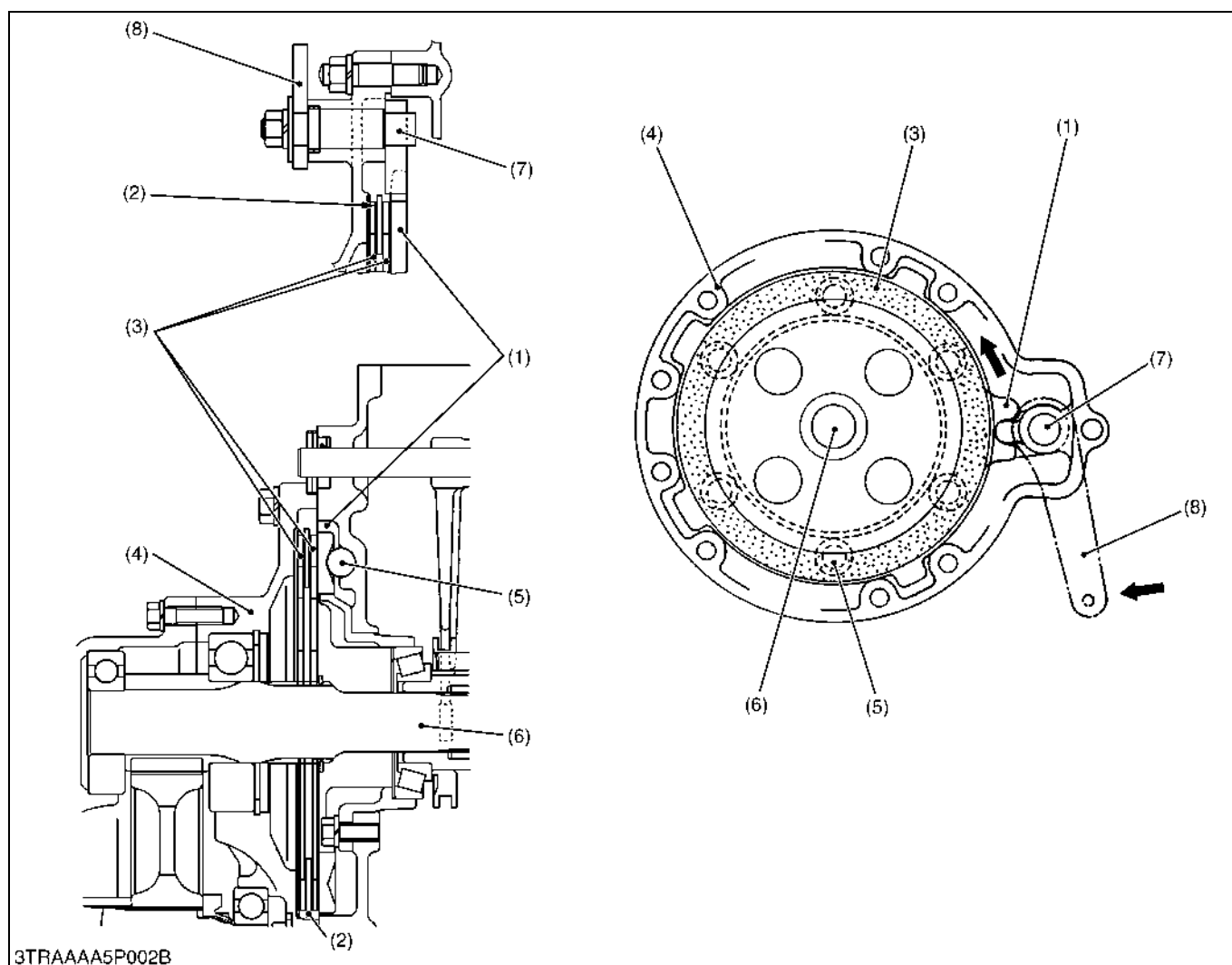
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Independent mechanical wet disc brakes are used for the right and left traveling brakes. They are operated by the brake pedals through the mechanical linkages.

The parking brake is a mechanical type which is designed to actuate the traveling brakes. Pulling the parking brake lever (3) results in the same state as that obtained when the brake pedals are pressed.

9Y1211012BRM0003US0

2. OPERATION



- | | | | |
|-----------------|----------------|--|---------------------|
| (1) Cam Plate | (4) Brake Case | (6) Brake Shaft
(Differential Gear Shaft) | (7) Brake Cam |
| (2) Steel Plate | (5) Steel Ball | | (8) Brake Cam Lever |
| (3) Brake Disc | | | |

The brake body is incorporated in the brake case (4) filled with transmission oil and is designed to brake when the brake disc (3) splined with the differential gear shaft (6) is pressed against the cam plate (1) by means of the cam mechanism incorporating steel balls (5).

For greater braking force, two brake discs are provided at the right and left sides respectively, and the steel plate (2) fixed to the brake case is arranged between the brake discs.

During Braking

When the brake pedal is pressed, the linkage causes the brake cam lever (8) and brake cam (7) to turn into the direction of arrow shown in the above figure.

Therefore, the cam plate (1) also moves the direction of arrow. At this time, since the cam plate (1) rides on the steel balls (5) set in the grooves of the transmission case to press the brake disc (3), the differential gear shaft (6) is braked by the frictional force generated by the cam plate (1) and brake disc (3).

9Y1211012BRM0004US0

SERVICING

CONTENTS

1. TROUBLESHOOTING.....	5-S1
2. SERVICING SPECIFICATIONS	5-S2
3. TIGHTENING TORQUES.....	5-S3
4. CHECKING AND ADJUSTING	5-S4
5. DISASSEMBLING AND ASSEMBLING	5-S5
[1] SEPARATING BRAKE CASE	5-S5
[2] DISASSEMBLING THE BRAKE CASE	5-S11
6. SERVICING	5-S12

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Uneven Braking Force	Brake pedal play unevenly adjusted	Adjust	5-S4
	Brake disc worn	Replace	5-S11, 5-S12
	Cam plate warped	Replace	5-S11, 5-S12
Brake Drags	Too little free play in the brake pedals	Adjust	5-S4
	Ball holes of cam plate for uneven wear	Replace	5-S11, 5-S12
	Brake pedal return spring weaken or broken	Replace	—
	Brake cam rusted	Repair	—
Poor Braking Force	Too much free play in the brake pedals	Adjust	5-S4
	Brake disc worn	Replace	5-S11, 5-S12
	Cam plate warped	Replace	5-S11, 5-S12
	Brake cam or lever damaged	Replace	5-S11

9Y1211012BRS0001US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Brake Pedal	Free Travel	15 to 20 mm 0.6 to 0.8 in.	—
Cam Plate	Flatness	—	0.3 mm 0.01 in.
Cam Plate and Ball	Height	20.9 to 21.1 mm 0.823 to 0.830 in.	20.5 mm 0.807 in.
Brake Disc	Thickness	4.60 to 4.80 mm 0.182 to 0.188 in.	4.2 mm 0.17 in.
Plate	Thickness	2.54 to 2.66 mm 0.100 to 0.104 in.	2.1 mm 0.083 in.

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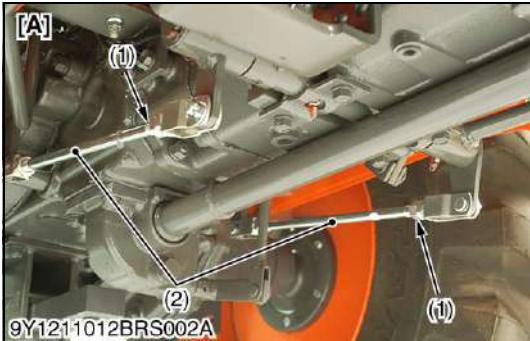
3. TIGHTENING TORQUES

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

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting screw and nut	197 to 225	20.0 to 23.0	145 to 166
ROPS lower frame mounting screw	167 to 196	17.0 to 20.0	123 to 144
ROPS fulcrum bolt and nut	118 to 137	12.0 to 20.0	86.8 to 101
Rear axle case mounting M10 bolts	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9	4.9 to 5.7	36 to 41
Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6	6.2 to 7.2	45 to 52
Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2	7.91 to 9.19	57.2 to 66.5
Brake case mounting stud bolt (L3301/L3901)	35 to 49	3.5 to 5.0	26 to 36
Brake case mounting stud bolt (L4701 only)	38.2 to 45.1	3.9 to 4.6	28.2 to 33.3
Brake case mounting screws and nuts (L4701 only)	77.5 to 90.2	7.91 to 9.19	57.2 to 66.5
Brake case lever mounting screw (L4701 only)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5

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4. CHECKING AND ADJUSTING



Brake Pedal Free Travel



CAUTION

- Stop the engine and remove the key, then chock the wheel before checking brake pedals.
1. Release the parking brake.
 2. Slightly depress the brake pedals and measure free travel "C" at top of pedal stroke.
 3. If the measurement is not within the factory specifications, loosen the lock nuts (1) and turn the brake rods (2) to adjust the rod length within the factory specifications.
 4. Retighten the lock nut (1).

Brake pedal free travel "C"	Factory specification	15 to 20 mm 0.6 to 0.8 in.
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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 (0.2 in.).
- After checking brake pedal free travel, be sure to engage the parking brake lock fully and check to see that the brake pedals are securely locked.

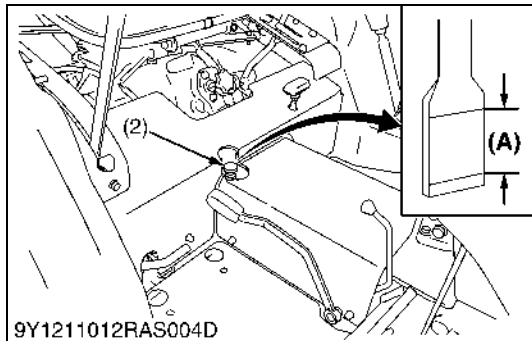
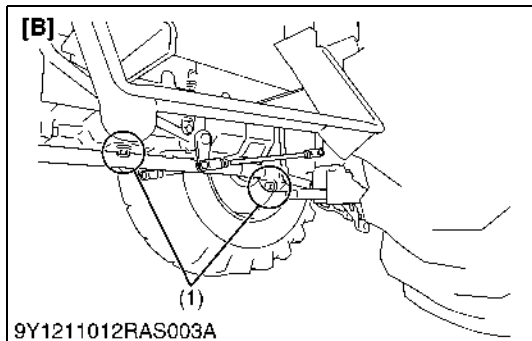
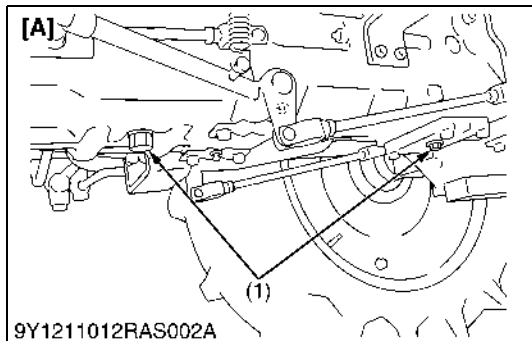
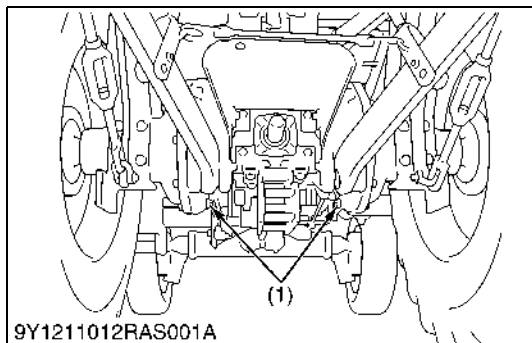
- (1) Lock Nut
(2) Brake Rod

- [A] L3301/L3901
[B] L4701 HST
C: Free Travel

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5. DISASSEMBLING AND ASSEMBLING

[1] SEPARATING BRAKE CASE



Draining Transmission Fluid (L3301/L3901)



CAUTION
To avoid personal injury:

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

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

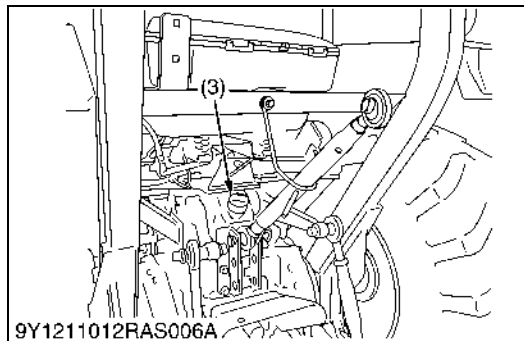
(When reassembling)

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

IMPORTANT

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

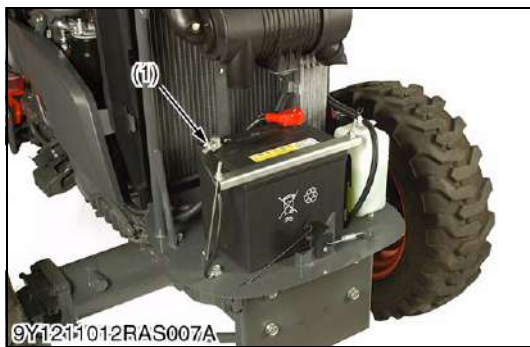
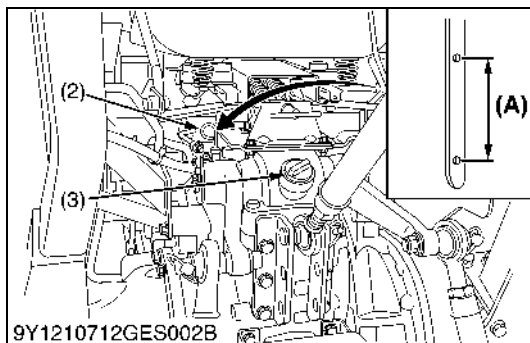
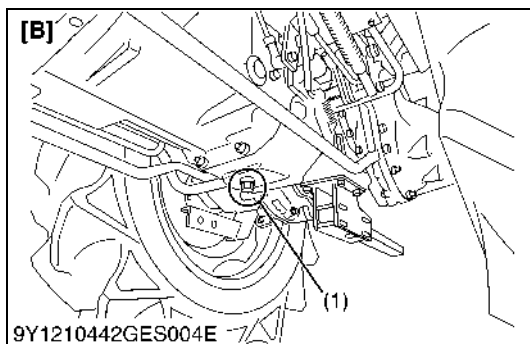
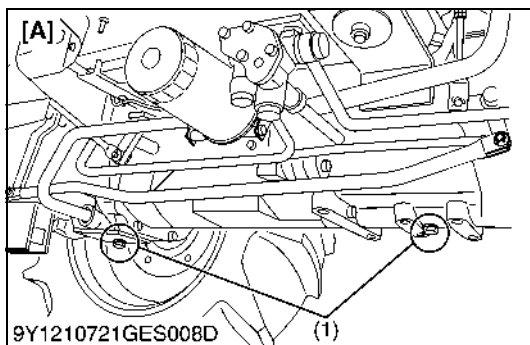
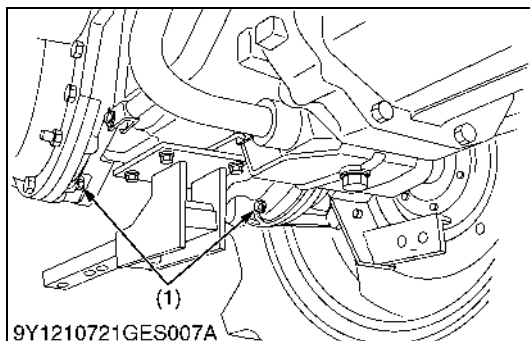
Transmission fluid	Capacity	2WD	28.0 L 7.4 U.S.gals 6.1 Imp.gals
		4WD	28.5 L 7.5 U.S.gals 6.2 Imp.gals
		HST	23.5 L 6.2 U.S.gals 5.2 Imp.gals



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

- [A] 2WD Model
[B] 4WD Model
(A) Oil level is acceptable within this range.

9Y1211012RAS0003US0



Draining Transmission Fluid (L4701)

CAUTION

To avoid personal injury:

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

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

(When reassembling)

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

IMPORTANT

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

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

[A] Manual Transmission Model

[B] HST Model

(A) Oil level is acceptable within this range.

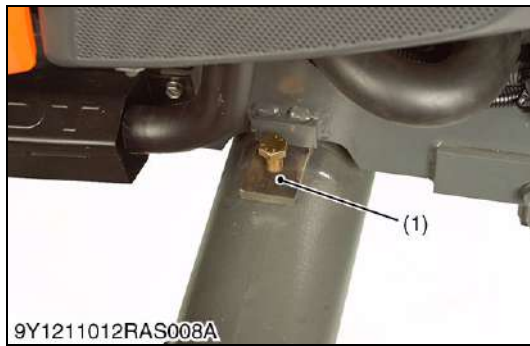
9Y1211012RAS0004US0

Battery Negative Cable Connector

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

- (1) Battery Negative Cable Connector

9Y1211012RAS0005US0

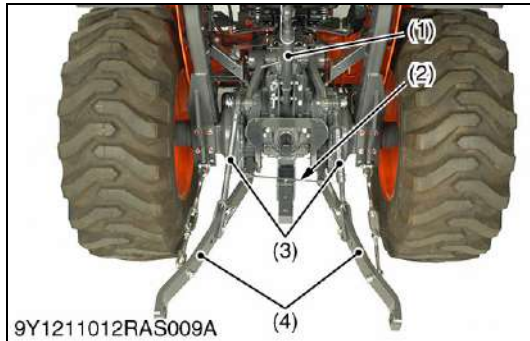


Front Axle Rocking Restrictor

1. Install the front axle rocking restrictor (1) (refer to "SPECIAL TOOLS" (see page G-94.)) to the front axle bracket and chock wheels.

(1) Front Axle Rocking Restrictor

9Y1211012RAS0006US0



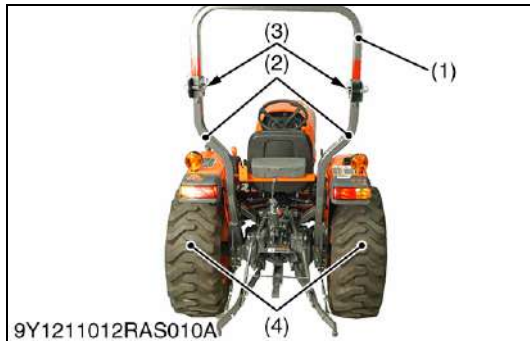
Three Point Linkage

1. Remove top link (1).
2. Remove rubber spring (2), lift rod (3) and lower link (4).

(1) Top Link
(2) Rubber Spring

(3) Lift Rod
(4) Lower Link

9Y1211012RAS0007US0



ROPS and Rear Wheel

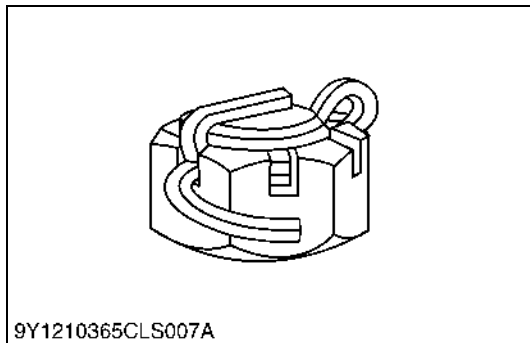
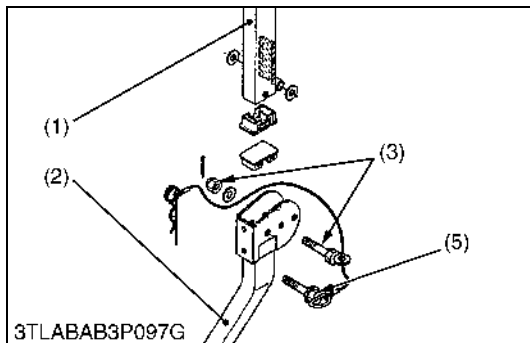
1. Place the disassembling stand under the transmission case.
2. Remove the ROPS upper frame (1).
3. Remove the ROPS lower frame (2).
4. Loosen and remove the rear wheel mounting bolts and nuts.
5. Remove the rear wheel (4).

(When reassembling)

- After tighten the ROPS lower frame mounting bolt and nut, install the cotter pin as shown in the figure.
- Tighten the ROPS upper frame mounting bolts and nuts so that the ROPS upper frame (1) does not fall down when the ROPS upper frame (1) is set at horizontal.

■ NOTE

- Do not firmly tighten all upper frame mounting bolts until most components are attached.



Tightening torque	Rear wheel mounting bolt and nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	ROPS lower frame mounting bolt	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	ROPS fulcrum bolt and nut	118 to 137 N·m 12.0 to 14.0 kgf·m 86.8 to 101 lbf·ft

(1) ROPS Upper Frame
(2) ROPS Lower Frame
(3) ROPS Fulcrum Bolt and Nut

(4) Rear Wheel
(5) Lock Bolt

9Y1211012RAS0008US0



Seat

1. Remove the seat (1).
2. Remove the grips (2) to (6).
3. Remove the PTO switch (7).
4. Remove the PTO switch (8) and the PTO wire (9).

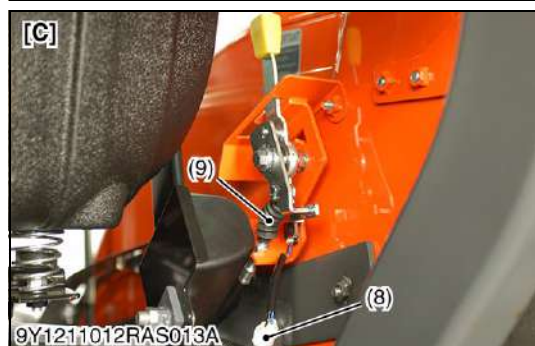
- | | |
|------------------------------------|------------------------------|
| (1) Seat | (8) PTO Switch |
| (2) Grip (Range Gear Shift Lever) | (L3301/L3901 HST Model Only) |
| (3) Grip (Shuttle Shift Lever) | (9) PTO Wire |
| (4) Grip (Front Wheel Drive Lever) | (L3301/L3901 HST Model Only) |
| (5) Grip (Position Control Lever) | |
| (6) Grip | |
| (Cruise Control Lever: OPTION) | |
| (7) PTO Switch (L4701 Only) | |

[A]: Manual Transmission Model

[B]: HST Model

[C]: L3301/L3901 HST Model

9Y1211012RAS0009US0

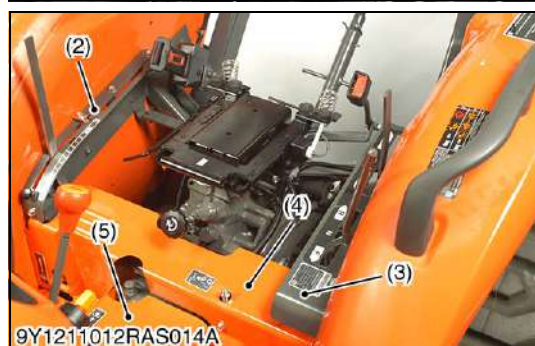


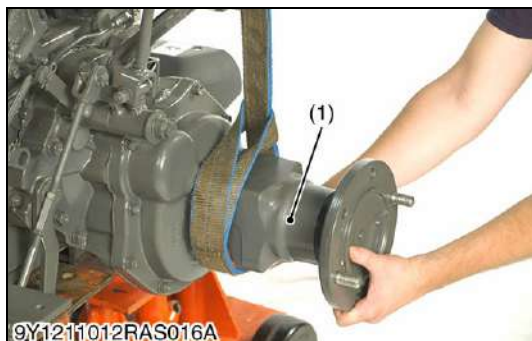
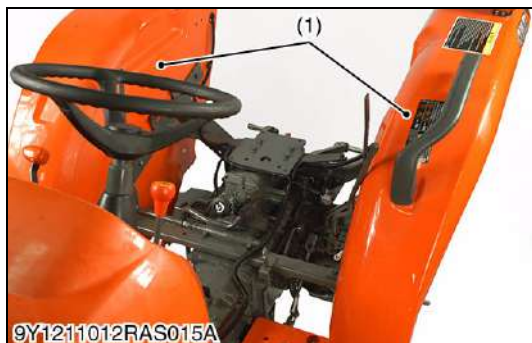
Lever Guide

1. Disconnect seat switch connector (1).
2. Remove the position control lever guide (2).
3. Remove the lever guide (3).
4. Remove the floor seat cover (4).
5. Remove the center cover (5).

- | | |
|----------------------------------|-------------------------------------|
| (1) Seat Switch Connector | (4) Floor Seat Cover |
| (2) Position Control Lever Guide | (5) Center Cover (L3301/L3901 Only) |
| (3) Lever Guide | |

9Y1211012RAS0010US0





Fender

1. Remove the fenders (1).

(1) Fender

9Y1211012RAS0011US0

Rear Axle Case

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

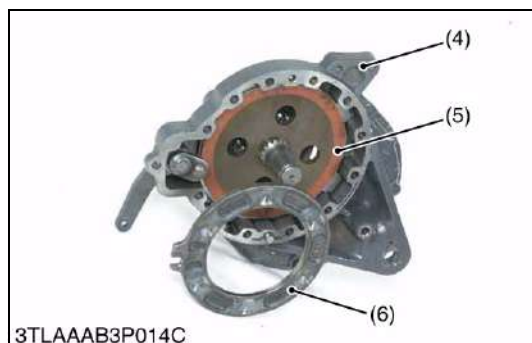
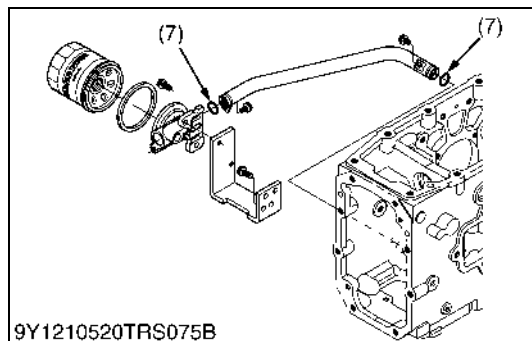
(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the rear axle case and brake case, after eliminating the water, oil and stuck liquid gasket.

Tightening torque	Rear axle case mounting M10 bolts	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L3301/L3901)	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear axle case mounting M10 nuts (L4701)	60.8 to 70.6 N·m 6.2 to 7.2 kgf·m 45 to 52 lbf·ft
	Rear axle case mounting M12 bolts and nuts (L4701 only)	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft

(1) Rear Axle Case

9Y1211012RAS0012US0



Brake Case (L3301/L3901)

1. Remove the suction pipe (1).
2. Remove the brake rod (2).
3. Separate the brake case (4), tapping the brake cam lever (3).

(When reassembling)

- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminating the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate around the four protrusions on the differential bearing case.
- Apply thread locker (Three Bond 1324 or equivalent) to the stud bolts.

■ NOTE

- Be careful not to damage the O-rings (7).
- If the O-rings (7) are damaged, change them.
- Be sure to check there are 6 balls one side.

Tightening torque	Brake case mounting stud bolt	35 to 49 N·m 3.5 to 5.0 kgf·m 26 to 36 lbf·ft
-------------------	-------------------------------	---

- | | |
|---------------------|----------------|
| (1) Suction Pipe | (5) Brake Disc |
| (2) Brake Rod | (6) Cam Plate |
| (3) Brake Cam Lever | (7) O-ring |
| (4) Brake Case | |

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Brake Case (L4701)

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

(When reassembling)

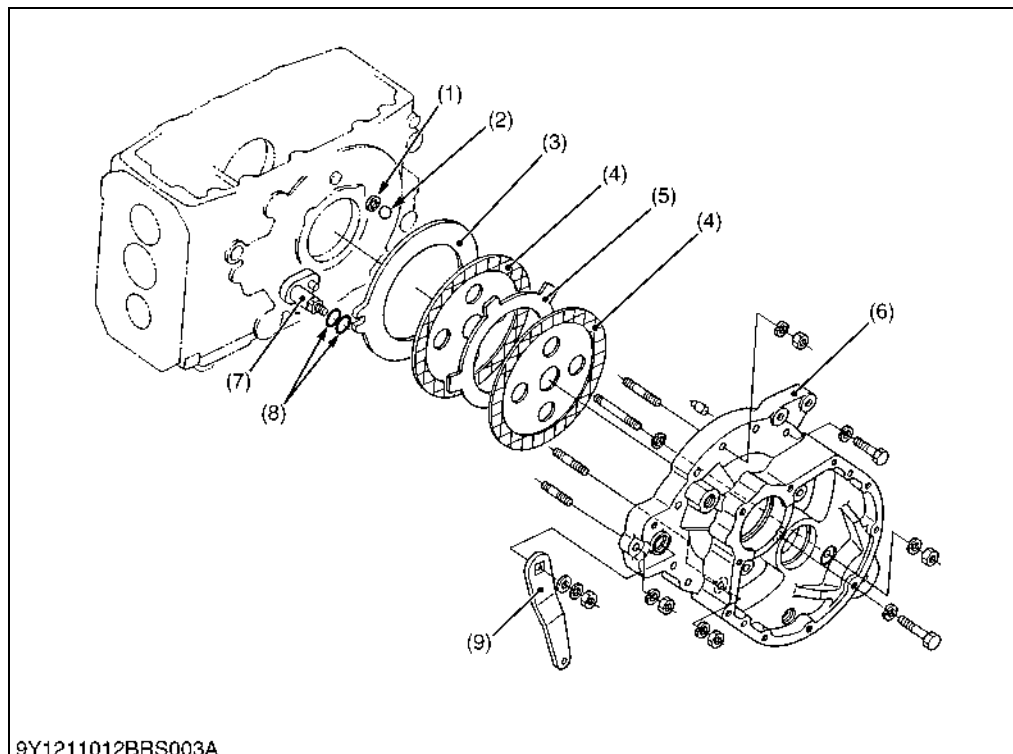
- Apply grease to the brake ball seats. (Do not grease excessively.)
- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the brake case and transmission case, after eliminate the water, oil and stuck liquid gasket.
- Before installing the brake case to the transmission case, install the cam plate to the transmission case.

Tightening torque	Brake case mounting stud bolts	38.2 to 45.1 N·m 3.9 to 4.6 kgf·m 28.2 to 33.3 lbf·ft
	Brake case mounting screws and nuts	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft
	Brake case lever mounting screw	62.8 to 72.5 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 lbf·ft

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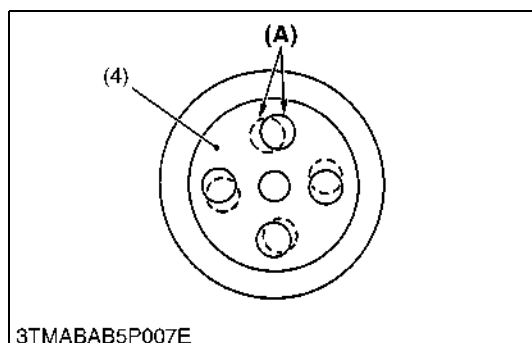
[2] DISASSEMBLING THE BRAKE CASE

Brake Case



- (1) Ball Seat
- (2) Ball
- (3) Cam Plate
- (4) Brake Disc
- (5) Plate
- (6) Brake Case
- (7) Brake Cam
- (8) O-ring
- (9) Brake Cam Lever

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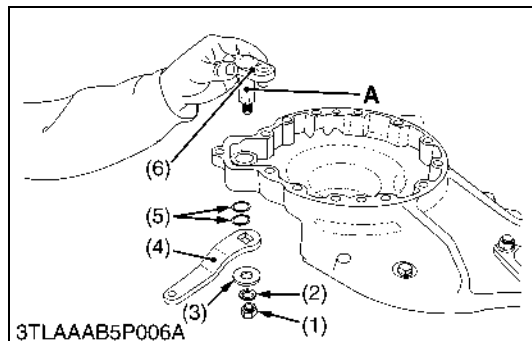


3TMABAB5P007E

■ It is possible to disassemble as shown in the figure above.
(When reassembling)

- Place the brake discs (4) so that the hole (A) of the second disc should be overlapped 50 % or more.

9Y1211012BRS0007US0



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Brake Cam

1. Remove the nut (1) on the brake cam (6).
2. Remove the brake cam (6) and brake cam lever (4).

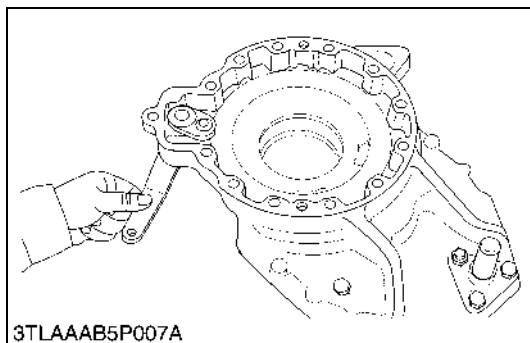
(When reassembling)

- Apply grease to the O-ring (5) and be careful not to damage them.
- Apply small amount of grease to the journal "A" to prevent rust problem that leads to lock up.

- | | |
|-------------------|---------------------|
| (1) Nut | (4) Brake Cam Lever |
| (2) Spring Washer | (5) O-ring |
| (3) Plain Washer | (6) Brake Cam |

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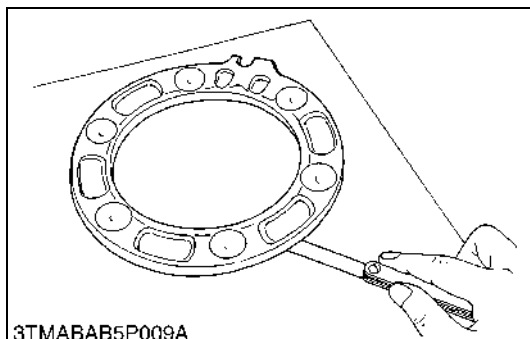
6. SERVICING



Brake Cam Lever Movement

1. Move the brake cam lever by hand to check the movement.
2. If the movement is heavy, refine the brake cam with sandpaper.

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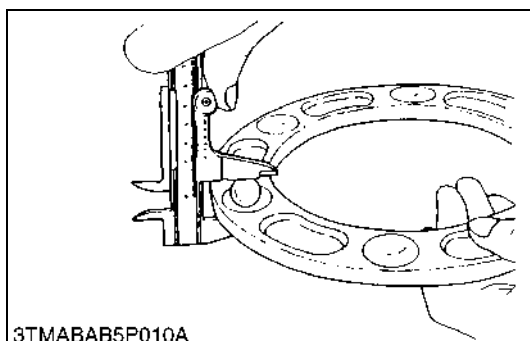


Cam Plate Flatness

1. Place the cam plate on the surface plate.
2. Use a feeler gauge of 0.3 mm (0.012 in.) thick for judgement of the cam plate flatness. Measure the flatness diagonally at more than four locations.
3. If the measurement exceed the allowable limit, replace it.

Cam Plate Flatness	Allowable limit	0.3 mm 0.01 in.
--------------------	-----------------	--------------------

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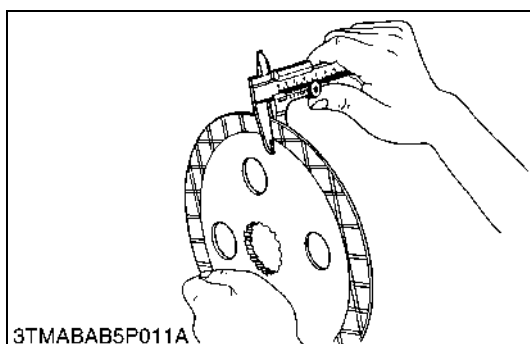


Height of Brake Cam Plate and Ball

1. Measure the dimensions of the brake cam plate with the ball installed.
2. If the measurement is less than the allowable limit, replace the cam plate and balls.
3. Inspect the ball holes of cam plate for uneven wear. If the uneven wear is found, replace it.

Height of brake cam plate and ball	Factory specification	20.9 to 21.1 mm 0.823 to 0.830 in.
	Allowable limit	20.5 mm 0.807 in.

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Brake Disc Wear

1. Measure the brake disc thickness with vernier calipers.
2. If the measurement is less than the allowable limit, replace it.

Brake disc thickness	Factory specification	4.60 to 4.80 mm 0.182 to 0.188 in.
	Allowable limit	4.2 mm 0.17 in.

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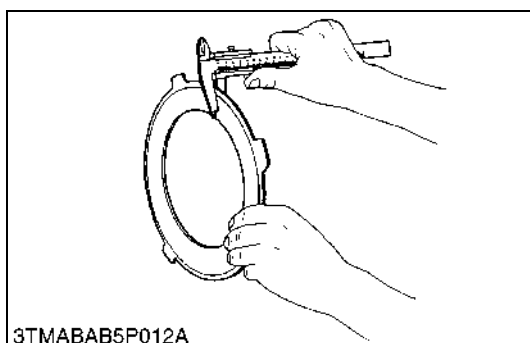


Plate Wear

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

Plate thickness	Factory specification	2.54 to 2.66 mm 0.100 to 0.104 in.
	Allowable limit	2.1 mm 0.083 in.

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6 FRONT AXLE

MECHANISM

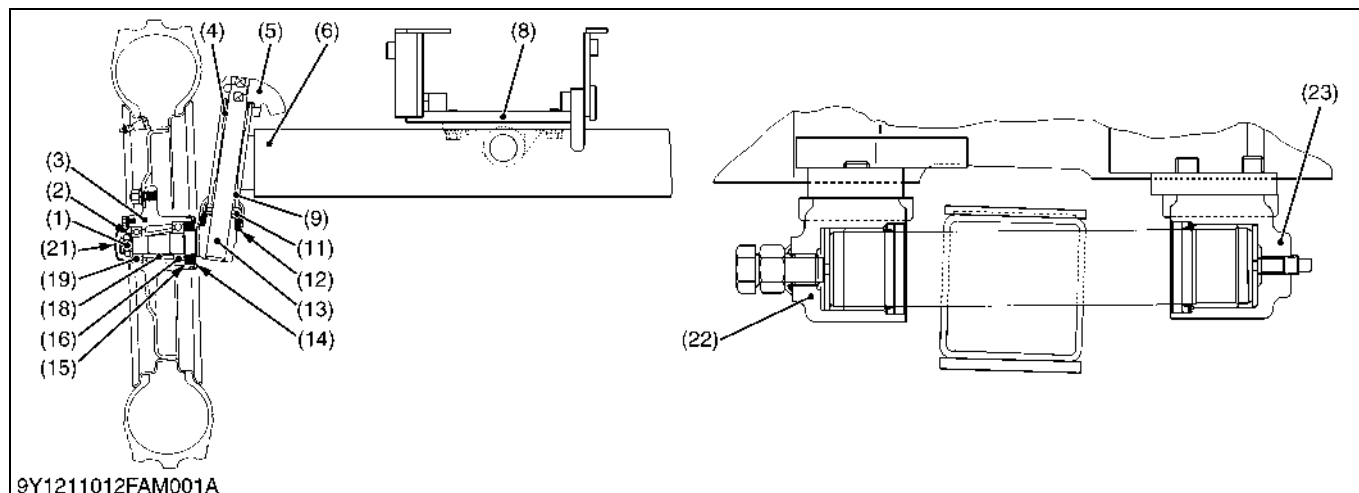
CONTENTS

1. STRUCTURE.....	6-M1
[1] 2WD Model.....	6-M1
[2] 4WD Model.....	6-M2

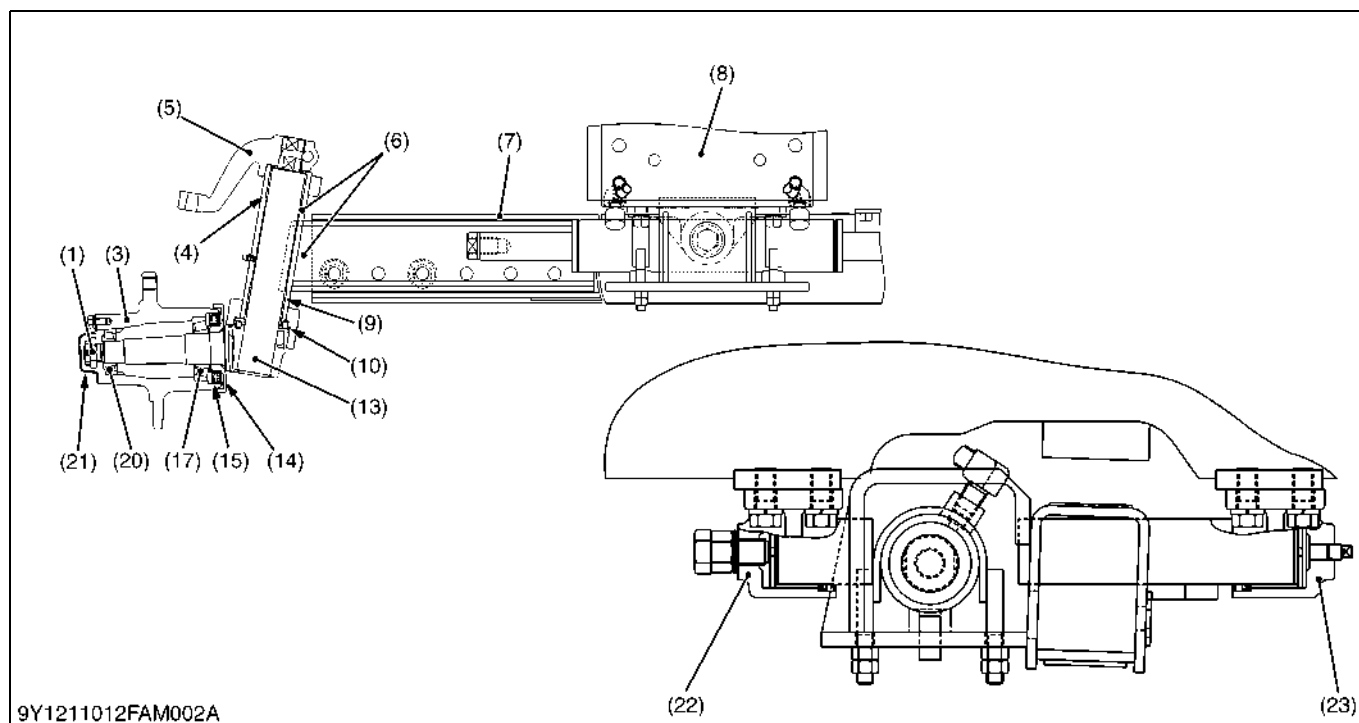
1. STRUCTURE

[1] 2WD Model

L3301/L3901



L4701

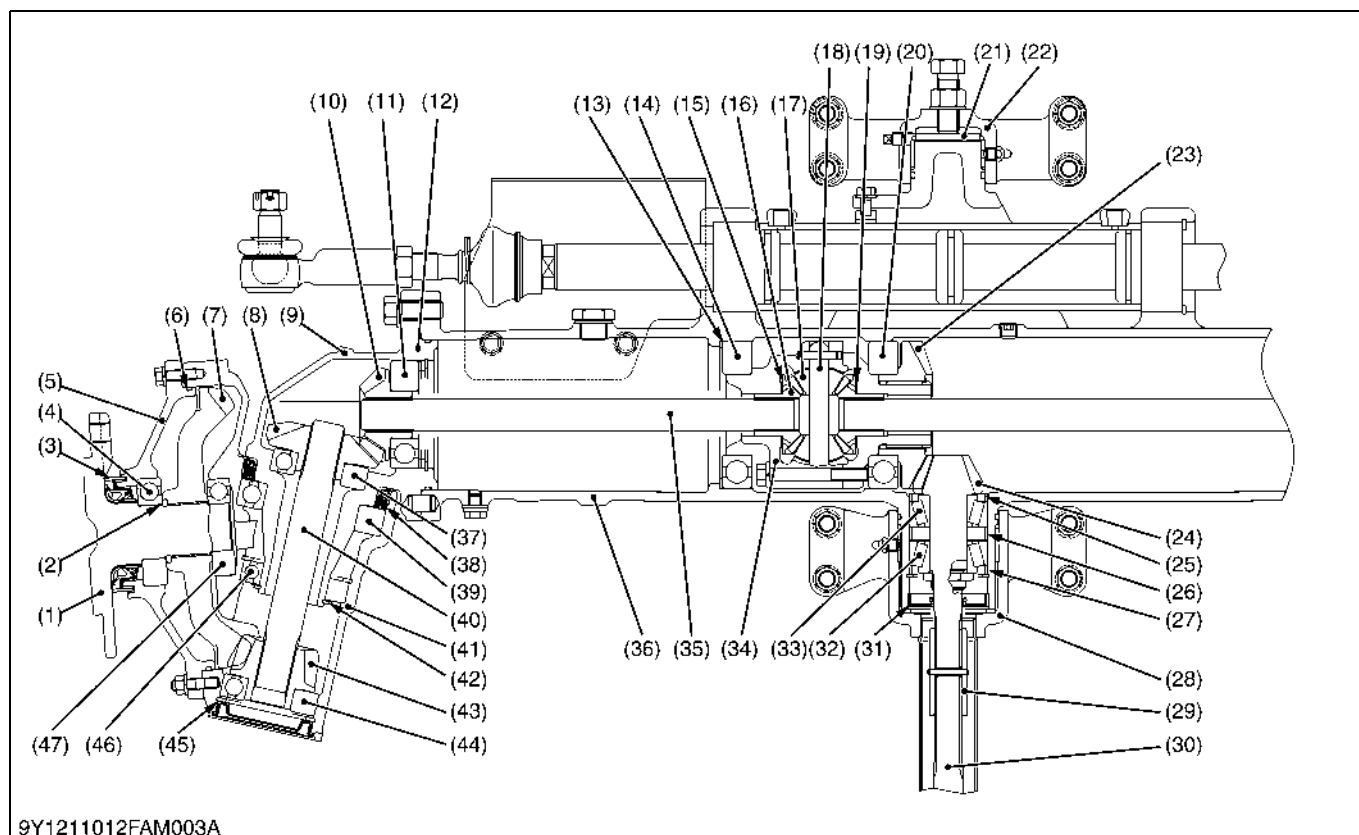


- | | | | |
|------------------------|--------------------------|---------------------------|--------------------------------------|
| (1) Slotted Nut | (8) Front Axle Frame | (14) Dust Cover | (20) Taper Roller Bearing |
| (2) Plain Washer | (9) Bushing | (15) Oil Seal | (21) Front Wheel Cap |
| (3) Front Wheel Hub | (10) Thrust Collar | (16) Ball Bearing | (22) Front Axle Bracket (Front Side) |
| (4) Bushing | (11) Thrust Ball Bearing | (17) Taper Roller Bearing | (23) Front Axle Bracket (Rear Side) |
| (5) Knuckle Arm | (12) Oil Seal | (18) Spacer | |
| (6) Front Axle | (13) Knuckle Shaft | (19) Ball Bearing | |
| (7) Front Axle, Middle | | | |

The front axle of the 2WD model is constructed as shown above. The shape of the front axle is relatively simple, and the axle is supported at its center with front axle bracket (22), (23) on the front axle frame (8), so that steering operation is stable even on an uneven grounds in a farm field.

2WD model of L4701 can change its front tread in 5 stages.

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[2] 4WD Model

- | | | | |
|----------------------|--------------------------------|-------------------------------|-----------------------|
| (1) Front Axle | (13) Shim | (25) Collar | (37) Ball Bearing |
| (2) Collar | (14) Ball Bearing | (26) Collar | (38) Oil Seal |
| (3) Oil Seal | (15) Shim | (27) Collar | (39) Ball Bearing |
| (4) Ball Bearing | (16) Differential Side Gear | (28) Front Axle Bracket, Rear | (40) Bevel Gear Shaft |
| (5) Front Axle Cover | (17) Differential Pinion | (29) Coupling | (41) Front Gear Case |
| (6) O-Ring | (18) Differential Pinion Shaft | (30) Propeller Shaft | (42) Shim |
| (7) Bevel Gear | (19) Shim | (31) Oil Seal | (43) Bevel Gear |
| (8) Bevel Gear | (20) Ball Bearing | (32) Taper Roller Bearing | (44) Ball Bearing |
| (9) Bevel Gear Case | (21) Thrust Ball Bearing | (33) Taper Roller Bearing | (45) Shim |
| (10) Bevel Gear Case | (22) Front Axle Bracket, Front | (34) Differential Case | (46) Ball Bearing |
| (11) Ball Bearing | (23) Spiral Bevel Gear | (35) Differential Yoke Shaft | (47) Ball Bearing |
| (12) Shim | (24) Spiral Bevel Pinion Shaft | (36) Front Axle Case | |

The front axle of the 4WD model is constructed as shown above. Power is transmitted from the transmission through the propeller shaft (30) and to the spiral bevel pinion shaft (24), then to the spiral bevel gear (23) after that to the differential gear.

The power through the differential is transmitted to the differential yoke shaft (35), and to the bevel gear shaft (40) in the bevel gear case (9).

The revolution is greatly reduced by the bevel gears (7), (43), then the power is transmitted to the axle (1).

The differential system allows each wheel to rotate at a different speed to make turning easier.

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SERVICING

CONTENTS

1. TROUBLESHOOTING.....	6-S1
2. SERVICING SPECIFICATIONS	6-S2
3. TIGHTENING TORQUES.....	6-S5
4. CHECKING AND ADJUSTING	6-S6
5. DISASSEMBLING AND ASSEMBLING	6-S9
[1] L3301/L3901.....	6-S9
(1) Separating Front Axle from Front Axle Frame.....	6-S9
(2) Disassembling Front Axle.....	6-S12
[2] L4701.....	6-S17
(1) Separating Front Axle from Front Axle Frame.....	6-S17
(2) Disassembling Front Axle.....	6-S19
6. SERVICING.....	6-S26
[1] 2WD MODEL.....	6-S26
[2] 4WD MODEL.....	6-S28

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Front Wheels Wander to Right or Left	Tire pressure uneven	Adjust	G-98
	Improper toe-in adjustment (improper alignment)	Adjust	6-S6
	Clearance between front axle middle boss and front axle shaft bracket bushing excessive [2WD]	Replace	6-S26
	Clearance between front axle case boss and front axle bracket (front, rear) bushing excessive [4WD]	Replace	6-S32
	Knuckle shaft bushings worn [2WD]	Replace	6-S27
	Front axle rocking force too small	Adjust	6-S7, 6-S7
	Front wheel sway excessive	Replace	6-S7
	Tie-rod end loose	Tighten	6-S10, 6-S19, 6-S21
	Air sucked in power steering circuit	Bleed	7-S10
Front Wheels Can Not Be Driven [4WD]	Propeller shaft broken	Replace	6-S9, 6-S17
	Front wheel drive gears in transmission broken	Replace	3-S36, 3-S43, 3-S71
	Front differential gear broken	Replace	6-S16, 6-S24
	Shift fork broken	Replace	3-S36, 3-S43, 3-S71
	Coupling displaced	Reassemble	6-S9, 6-S17
Noise [4WD]	Gear backlash excessive	Adjust or replace	6-S29, 6-S30, 6-S30, 6-S31
	Oil insufficient	Fill	G-40, G-67
	Bearings damaged or broken	Replace	–
	Gears damaged or broken	Replace	–
	Spiral bevel pinion shaft turn force improper	Adjust	6-S29

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2. SERVICING SPECIFICATIONS

[2WD]

Item		Factory Specification	Allowable Limit	
Toe-in		2 to 8 mm 0.08 to 0.31 in.	—	
Front Wheel	Axial Sway	Less than 5.0 mm 0.20 in.	—	
Front Axle	Rocking Force	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft	—	
Front Axle Middle Boss to Front Axle Shaft Bracket Bushing	Clearance	0.015 to 0.177 mm 0.0006 to 0.00696 in.	0.3 mm 0.01 in.	
• Front Axle Middle Boss	O.D.	39.938 to 40.000 mm 1.5724 to 1.5748 in.	—	
• Bushing	I.D.	40.015 to 40.115 mm 1.5754 to 1.5793 in.	—	
Knuckle Shaft (Kingpin) to Bushing	Clearance (L3301/L3901)	0 to 0.285 mm 0 to 0.0112 in.	0.4 mm 0.02 in.	
	Clearance (L4701)	0 to 190 mm 0 to 0.007482 in.	0.4 mm 0.02 in.	
	• Knuckle Shaft	O.D. (L3301/L3901)	27.880 to 27.900 mm 1.0977 to 1.0984 in.	—
		O.D. (L4701)	37.975 to 38.000 mm 1.4951 to 1.4960 in.	—
	• Bushing	I.D. (L3301/L3901)	27.900 to 28.165 mm 1.0985 to 1.1088 in.	—
		I.D. (L4701)	38.000 to 38.165 mm 1.4961 to 1.15025 in.	—
Steering Cylinder	I.D.	55.000 to 55.074 mm 2.1654 to 2.1682 in.	55.100 mm 2.1693 in.	
Rod to Bushing	Clearance	0.00900 to 0.127 mm 0.000355 to 0.00500 in.	0.135 mm 0.00531 in.	

[4WD]

Item		Factory Specification	Allowable Limit
Toe-in		2 to 8 mm 0.08 to 0.3 in.	—
Front Wheel	Axial Sway	Less than 5.0 mm 0.20 in.	—
Front Axle	Rocking Force	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft	—
Bevel Gear Case to Stopper	Clearance	2.0 mm 0.079 in.	—
Spiral Bevel Pinion Shaft	Turning Torque	0.98 to 1.1 N·m 0.10 to 0.12 kgf·m 0.73 to 0.86 lbf·ft	—
Differential Case, Differential Case Cover to Differential Side Gear	Clearance	0.0500 to 0.151 mm 0.00197 to 0.00594 in.	0.20 mm 0.079 in.
• Differential Case	I.D.	32.000 to 32.062 mm 1.25984 to 1.26228 in.	—
• Differential Case Cover	I.D.	32.000 to 32.025 mm 1.25984 to 1.26083 in.	—
• Differential Side Gear	O.D.	31.911 to 31.950 mm 1.25634 to 1.25787 in.	—
Pinion Shaft to Differential Pinion	Clearance	0.064 to 0.100 mm 0.00252 to 0.00394 in.	0.25 mm 0.0096 in.
• Pinion Shaft	O.D.	13.950 to 13.968 mm 0.54922 to 0.54992 in.	—
• Differential Pinion	I.D.	14.032 to 14.050 mm 0.55244 to 0.55315 in.	—
Differential Pinion to Differential Side Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.01 in.	0.4 mm 0.016 in.
Spiral Bevel Pinion Shaft to Spiral Bevel Gear	Backlash	0.1 to 0.3 mm 0.004 to 0.012 in.	—
11T Bevel Gear to 16T Bevel Gear	Backlash	0.15 to 0.35 mm 0.006 to 0.012 in.	0.6 mm 0.024 in.
11T Bevel Gear to 42T Bevel Gear.	Backlash	0.15 to 0.35 mm 0.006 to 0.012 in.	0.6 mm 0.024 in.
Front Axle Case Boss (Front) to Bracket Bushing (Front)	Clearance	0.120 to 0.275 mm 0.00472 to 0.01083 in.	0.50 mm 0.01969 in.
• Front Axle Case Boss (Front)	O.D.	49.950 to 49.975 mm 1.96653 to 1.96752 in.	—
• Bushing	I.D.	50.095 to 50.225 mm 1.97224 to 1.97736 in.	—

Item		Factory Specification	Allowable Limit
Front Axle Case Boss (Rear) to Bracket Bushing	Clearance	0.100 to 0.292 mm 0.00394 to 0.01150 in.	1.0 mm 0.03937 in.
• Front Axle Case Boss (Rear)	O.D.	69.970 to 70.000 mm 2.75472 to 2.75590 in.	–
• Bushing	I.D.	70.100 to 70.262 mm 2.75984 to 2.76622 in.	–
Steering Cylinder	I.D.	55.000 to 55.074 mm 2.1654 to 2.1682 in.	55.100 mm 2.1693 in.
Rod to Bushing	Clearance	0.00900 to 0.127 mm 0.000355 to 0.00500 in.	0.135 mm 0.00531 in.

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3. TIGHTENING TORQUES

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

[2WD]

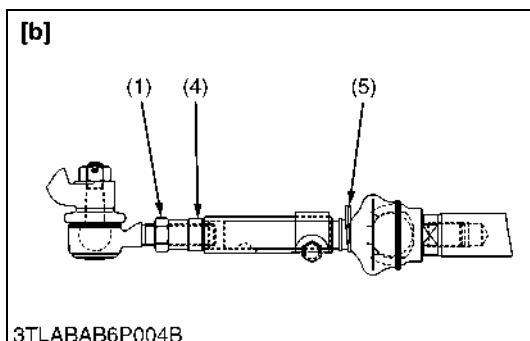
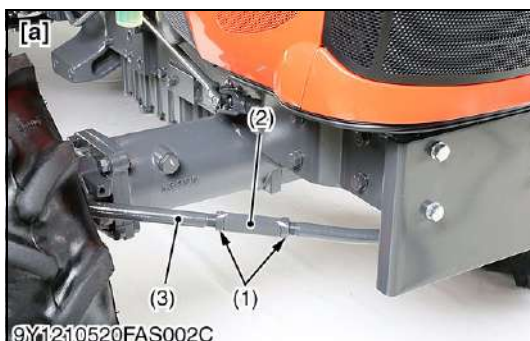
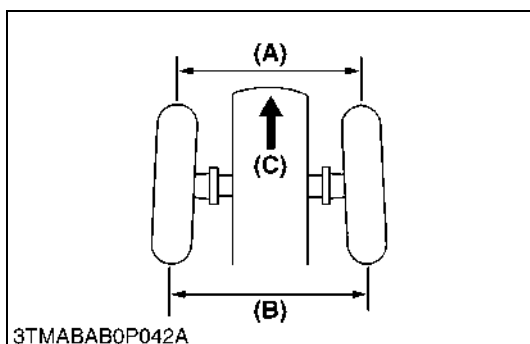
Item	N·m	kgf·m	lbf·ft
Tie-rod lock nut (L3301/L3901)	112.7 to 122.5	11.5 to 12.5	83.2 to 90.4
Tie-rod lock nut (L4701)	83.3 to 88.2	8.5 to 9.0	62 to 65
Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27	2.4 to 2.7	17 to 19
Lock nut (front axle rocking force) [L4701]	98 to 147	10.0 to 14.9	72.3 to 108
Tie-rod end nut (L3301/L3901)	49 to 68	5.0 to 7.0	37 to 50
Tie-rod end nut (L4701)	35 to 44	3.5 to 4.5	26 to 32
Shaft brackets (front) mounting bolt	166 to 196	17.0 to 20.0	123 to 144
Shaft bracket (rear) mounting bolt	103 to 118	10.5 to 12.0	76.0 to 86.7
Front wheel mounting lug nuts (L3301/L3901)	137	14.0	101
Front wheel mounting stud bolt (L4701)	64 to 73	6.5 to 7.5	47 to 54
Front wheel hub slotted nut	49 to 68	5.0 to 7.0	37 to 50
Front wheel hub slotted nut	29.4 to 39.2	3.0 to 4.0	21.7 to 28.9
Knuckle arm mounting bolt and nut	77.5 to 90.2	7.91 to 9.19	57.2 to 66.5
Outer front axle mounting bolt and nut	124 to 147	12.6 to 15.0	91.1 to 108

[4WD]

Item	N·m	kgf·m	lbf·ft
Tie-rod lock nut (L4701)	166.7 to 196.1	17.0 to 20.0	123 to 144
Front axle adjusting bolt	49 to 117	5.00 to 12.0	36.2 to 86.7
Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27	2.4 to 2.7	17 to 19
Lock nut (front axle rocking force) [L4701]	98 to 147	10.0 to 14.9	72.3 to 108
Tie-rod end nut	35 to 44	3.5 to 4.5	26 to 32
Shaft bracket (front) mounting bolt	240 to 260	24.5 to 26.5	177 to 181
Shaft bracket (rear) mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Front wheel mounting lug nuts	137	14.0	101
Axle flange mounting stud bolt	12 to 15	1.2 to 1.6	8.7 to 11
Axle flange mounting screws and nuts	24 to 27	2.4 to 2.8	18 to 20
Power steering hose retaining nut	24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Front wheel mounting nut	124 to 147	12.6 to 15.0	92 to 108
Bracket mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Bracket mounting nut	78 to 90	7.9 to 9.2	58 to 66
Bevel gear case mounting screw	166.7 to 196.1	17.0 to 20.0	122.9 to 144.6
Axle flange mounting bolts and nuts [L3301/L3901]	23.6 to 27.5	2.4 to 2.8	18 to 20
Axle flange mounting bolts [L4701]	29.4 to 34.3	3.0 to 3.5	22 to 25
Axle flange mounting nuts [L4701]	23.6 to 27.5	2.4 to 2.8	18 to 20
Tie-rod joint and steering cylinder mounting screw	166.7 to 196.1	17.0 to 20.0	122.9 to 144.6
Cylinder set bolt	16 to 17	1.6 to 1.8	12 to 13
Differential case cover mounting screw	48.0 to 58.8	4.9 to 6.0	35.4 to 43.4

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4. CHECKING AND ADJUSTING



Toe-in

1. Park the tractor on the flat place.
2. Inflate the tires to the specified pressure.
3. Turn steering wheel so front wheels are in the straight ahead position.
4. Lower the implement, lock the parking brake and stop the engine.
5. Measure distance between tire beads at front of tire, hub height.
6. Measure distance between tire beads at rear of tire, hub height.
7. Front distance should be 2 to 8 mm (0.08 to 0.3 in.) less than rear distance.
8. If the measurement is not within the factory specifications, adjust by changing the tie-rod length.

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

■ Adjusting (L3301/L3901)

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

■ Adjusting (L4701)

[2WD]

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

[4WD]

1. Loosen the tie-rod lock nut (1).
2. Turn the tie-rod joint (4) to adjust the tie-rod length until proper toe-in measurement is obtained.

Tightening torque	Tie-rod lock nut	L3301/L3901		112.7 to 122.5 N·m 11.5 to 12.5 kgf·m 83.2 to 90.4 lbf·ft
		L4701	2WD Model	83.3 to 88.2 N·m 8.5 to 9.0 kgf·m 62 to 65 lbf·ft
			4WD Model	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft

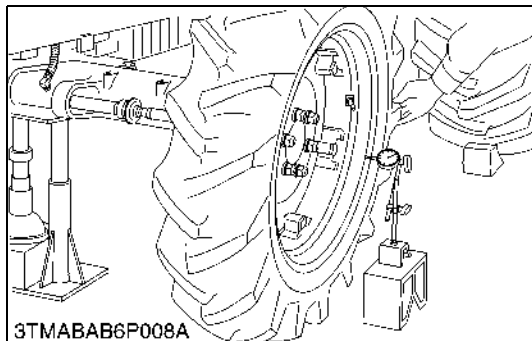
■ IMPORTANT

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

- (1) Tie-rod Lock Nut
- (2) Turnbuckle
- (3) Tie-rod
- (4) Tie-rod Joint
- (5) Snap Ring

- [A] Wheel to Wheel Distance at front
[B] Wheel to Wheel Distance at rear
[C] Front
[a] L3301/L3901
[b] L4701 2WD Model
[c] L4701 4WD Model

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Axial Sway of Front Wheel

1. Jack up the front side of tractor.
2. Set a dial gauge on the outside of rim.
3. Turn the wheel slowly and read the runout of rim.
4. If the runout exceeds the factory specifications, check the bearing, rim, and front wheel hub.

Axial sway of front wheel	Factory specification	Less than 5.0 mm 0.20 in.
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Front Axle Rocking Force [2WD]

1. Jack up the front side of tractor.
2. Set a spring balance to the front axle flange.
3. Measure the front axle rocking force.
4. If the measurement is not within the factory specifications, adjust with the adjusting screw (1).
5. Tighten the lock nut (2) firmly.

Front axle rocking force	Factory specification	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft
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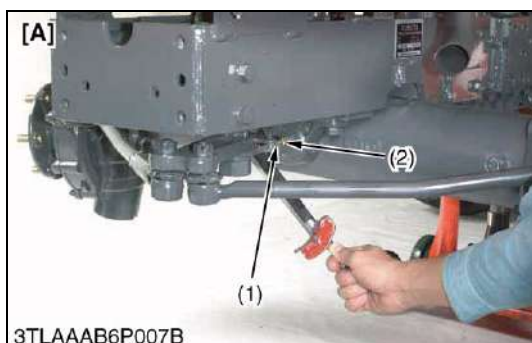
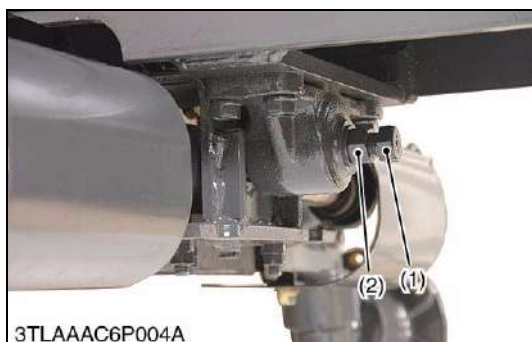
(When reassembling)

Tightening torque	Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27 N·m 2.4 to 2.7 kgf·m 17 to 19 lbf·ft
	Lock Nut (front axle rocking force) [L4701]	98 to 147 N·m 10.0 to 14.9 kgf·m 72.3 to 108 lbf·ft

(1) Adjusting Screw

(2) Lock Nut

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Adjusting Front Axle Pivot [4WD]

1. Jack up the tractor body, then loosen the lock nut (2).
2. Measure the adjusting screw tightening torque.
3. If tightening torque is not within the factory specifications, adjust the adjusting bolt (1).
4. After adjustment, tighten the lock nut (2) firmly.

Front axle rocking force	Factory specification	49 to 196 N·m 5.0 to 20.0 kgf·m 11 to 44 lbf·ft
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(When reassembling)

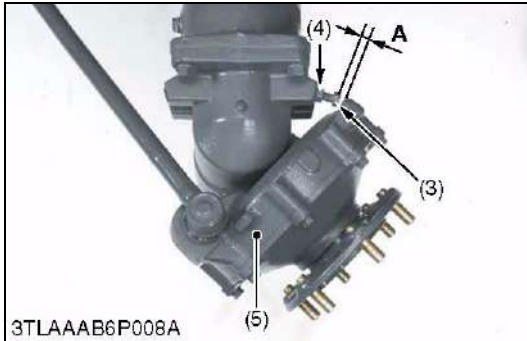
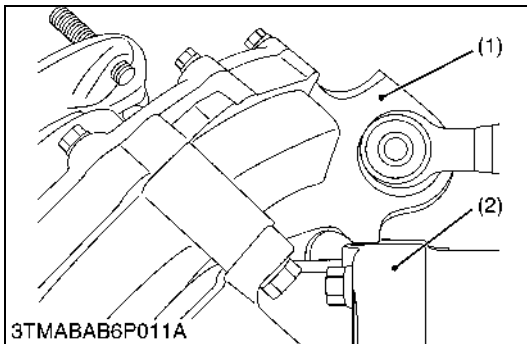
Tightening torque	Front axle rocking force adjusting bolt [L3301/L3901]	23 to 27 N·m 2.4 to 2.7 kgf·m 17 to 19 lbf·ft
	Lock Nut (front axle rocking force) [L4701]	98 to 147 N·m 10.0 to 14.9 kgf·m 72.3 to 108 lbf·ft

(1) Adjusting Bolt

(2) Lock Nut

[A] L3301/L3901**[B] L4701**

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Front Wheel Steering Angle [4WD]

1. Inflate the tires to the specified pressure.
2. Steer the wheels to the extreme right until the front gear case (1) contacts with the bevel gear case (2) at right hand side of the front axle.
3. If the front gear case (1) can not be contacted with the bevel gear case (2), shorten the length of stopper (3).
4. Keeping the front gear case (1) contact with the bevel gear case (2), make a specified clearance "A" as shown in the lower table.
5. After adjustment, secure the stopper with the lock nut (4).
6. For adjusting the left steering angle, perform the same procedure as mentioned in right steering angle.

Clearance "A" between bevel gear case and stopper	Factory specification	2.0 mm 0.079 in.
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- (1) Front Gear Case
- (2) Bevel Gear Case
- (3) Stopper
- (4) Lock Nut
- (5) Front Gear Case

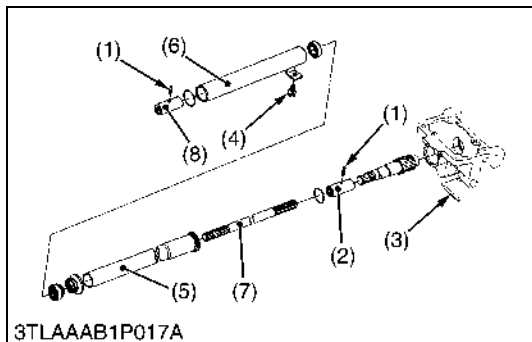
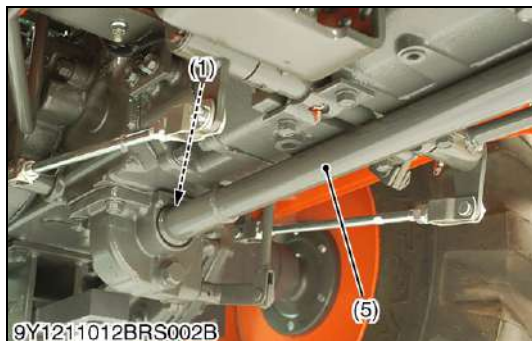
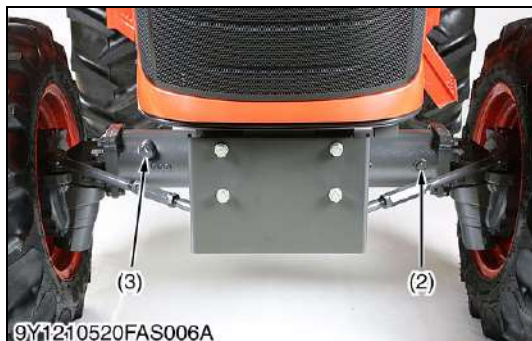
A: Clearance

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5. DISASSEMBLING AND ASSEMBLING

[1] L3301/L3901

(1) Separating Front Axle from Front Axle Frame



Draining Front Axle Case Oil [4WD]

1. Place the oil pans underneath the front axle case.
2. Remove the drain plug (1) both sides and filling port plug (3) to drain the oil.
3. After draining, reinstall the drain plugs (1) and filling port plug (3).

(When refilling)

- Remove the filling port plug (3) and check plug (2).
- Fill with the new oil up to the check plug port.
- After filling, reinstall the check plug (2) and filling port plug (3).

Front axle case oil	Capacity	4.5 L 4.8 U.S.qts 4.0 Imp.qts
---------------------	----------	-------------------------------------

■ IMPORTANT

- Use KUBOTA SUPER UDT-2 fluid or SAE 80, 90 gear oil. Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-10.

- (1) Drain Plug
(2) Check Plug

- (3) Filling Port Plug

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Propeller Shaft [4WD]

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

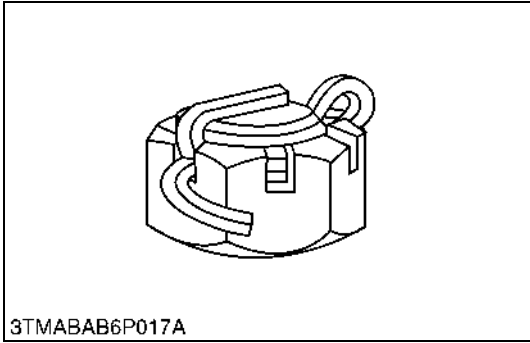
(When reassembling)

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

- (1) Spring Pin
(2) Coupling
(3) Spring Pin
(4) Screw

- (5) Propeller Shaft Cover 1
(6) Propeller Shaft Cover 2
(7) Propeller Shaft
(8) Coupling

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Bumper and Tie-rods

- 1. Remove the bumper.
- 2. Remove the tie-rods with the tie-rod end lifter.
In this case, take special care not to damage the tie-rod end nut (slotted nut). (It is preferable to replace it with an unrequired nut.)
- 3. Reinstall the bumper.

Tightening torque	Tie-rod end nut	2WD (L3301/L3901)	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
		2WD (L4701)	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft
		4WD	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft

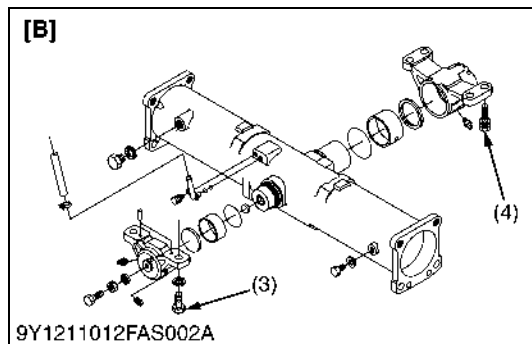
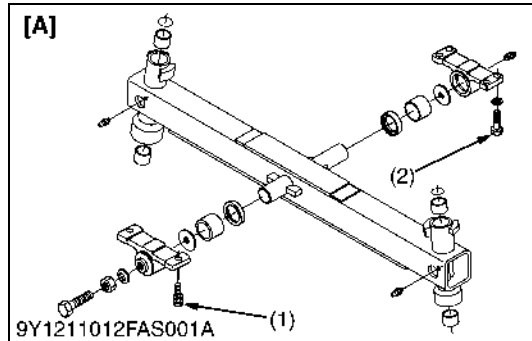
■ IMPORTANT

- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.

[A] 2WD

[B] 4WD

9Y1211012FAS0011US0



Front Axle Assembly

1. Place the disassembling stand under the front axle, and hang up the front bumper by the hoist to support it.
2. Remove the shaft bracket 1 mounting screws and shaft bracket 2 mounting screws.
3. Separate the front axle from the front axle support.
4. Remove the front wheels.

(When reassembling)

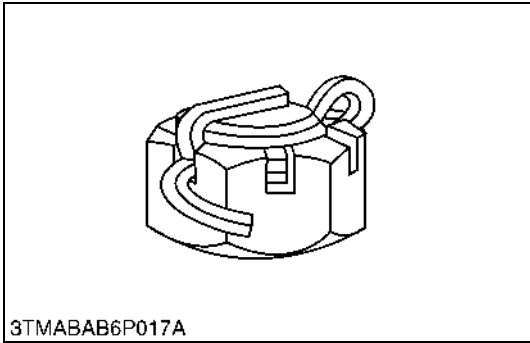
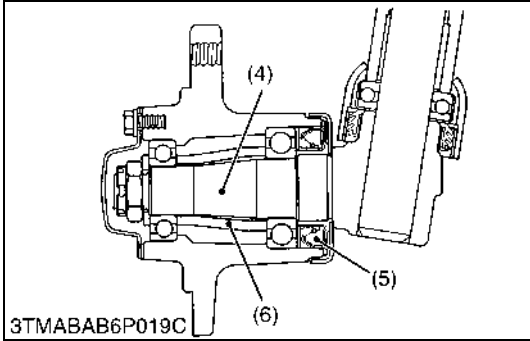
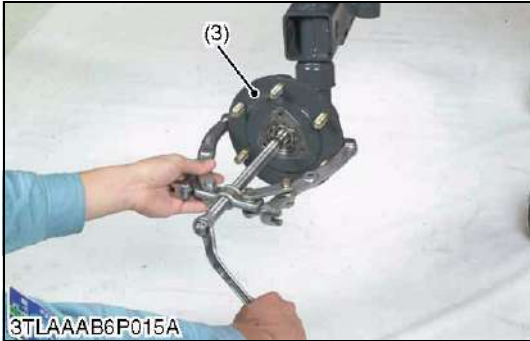
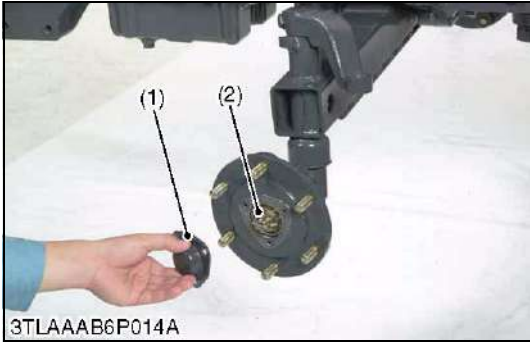
- Apply thread locker (Three Bond 1324 or equivalent) to shaft bracket (front) mounting bolt (3).
- When implant stud bolt, be sure to set flat end face of stud bolt toward front axle.
- Apply thread locker (Three Bond 1324 or equivalent) to stud bolt implant side.

Tightening torque	Shaft bracket (front) mounting bolt [2WD]	166 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Shaft bracket (rear) mounting bolt [2WD]	103 to 118 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft
	Shaft bracket (front) mounting bolt [4WD]	240 to 260 N·m 24.5 to 26.5 kgf·m 177 to 191 lbf·ft
	Shaft bracket (rear) mounting bolt [4WD]	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Front wheel mounting lug nut	137 N·m 14.0 kgf·m 101 lbf·ft
	Front wheel mounting stud bolt [2WD]	64 to 73 N·m 6.5 to 7.5 kgf·m 47 to 54 lbf·ft

- (1) Shaft Bracket (Front) Mounting Bolt [A] 2WD Model
[B] 4WD Model
- (2) Shaft Bracket (Rear) Mounting Bolt [2WD]
- (3) Shaft Bracket (Front) Mounting Bolt [4WD]
- (4) Shaft Bracket (Rear) Mounting Bolt [4WD]

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(2) Disassembling Front Axle
[A] 2WD Model



Front Wheel Hub

1. Remove the front wheel hub cap (1).
2. Draw out the cotter pin.
3. Remove the slotted nut (2).
4. Remove the collar.
5. Remove the front wheel hub (3) with a puller.

(When reassembling)

- Replace cotter pin with a new one.
- Fill grease in the clearance between knuckle arm shaft (4) and spacer (6).
- Be sure to attach oil seal (5) pointing lip face outside.

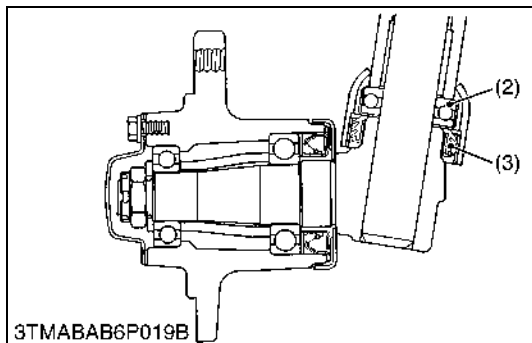
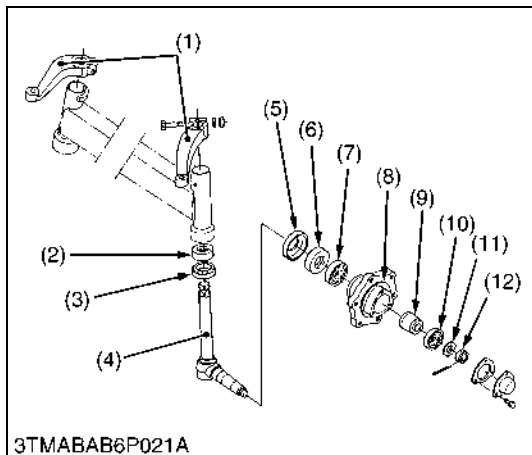
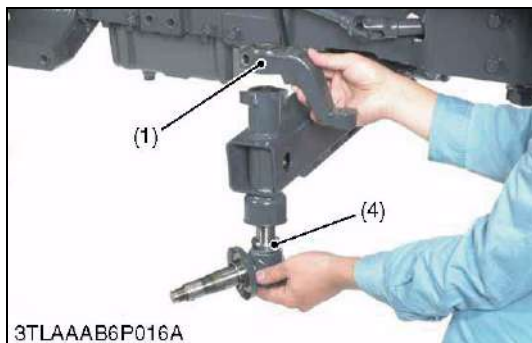
■ IMPORTANT

- **After tightening the slotted nut to the specified torque, insert a cotter pin and bend it as shown in the figure.**

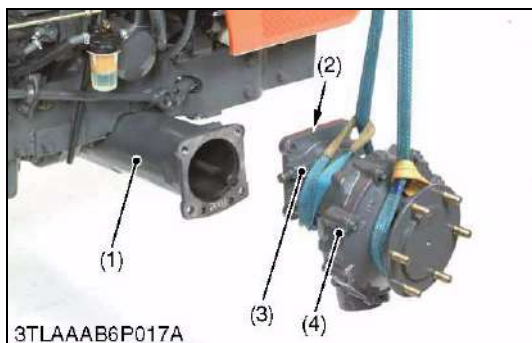
Tightening torque	Front wheel hub slotted nut	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
-------------------	-----------------------------	---

- | | |
|-------------------------|-----------------------|
| (1) Front Wheel Hub Cap | (4) Knuckle Arm Shaft |
| (2) Slotted Nut | (5) Oil Seal |
| (3) Front Wheel Hub | (6) Spacer |

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[B] 4WD Model



Knuckle Shaft

1. Remove the knuckle arm (1) and draw out the knuckle shaft (4) from the front axle.

(When reassembling)

- Insert the thrust ball bearing (2) and oil seal (3), noting its direction.
- Apply grease to the oil seals (3), (6).
- Do not interchange right and left knuckle arms.
- When lift the knuckle shaft, the knuckle arms must be mounted so that the clearance between the knuckle arms and front axle is 0.30 to 1.0 mm (0.012 to 0.039 in.).
- After reassembling, be sure to lubricate grease from grease fitting.

Tightening torque	Knuckle arm mounting bolt and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
-------------------	-----------------------------------	---

- | | |
|-------------------------|---------------------|
| (1) Knuckle Arm | (7) Ball Bearing |
| (2) Thrust Ball Bearing | (8) Front Wheel Hub |
| (3) Oil Seal | (9) Spacer |
| (4) Knuckle Shaft | (10) Ball Bearing |
| (5) Dust Cover | (11) Washer |
| (6) Oil Seal | (12) Slotted Nut |

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Bevel Gear Case and Front Gear Case

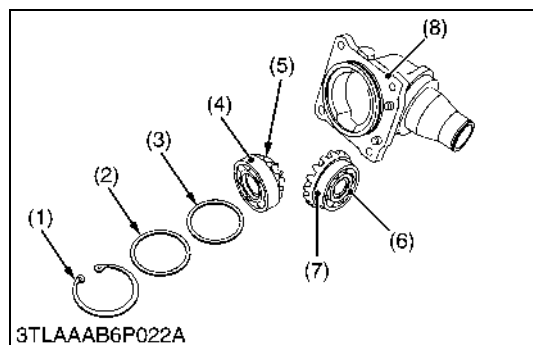
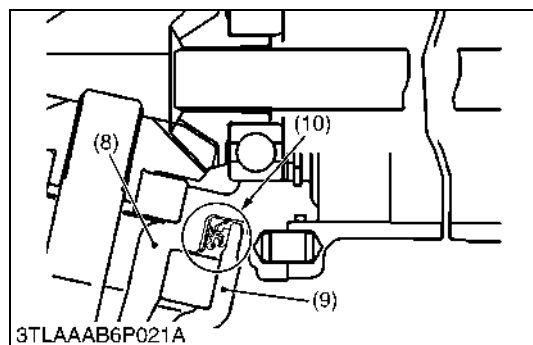
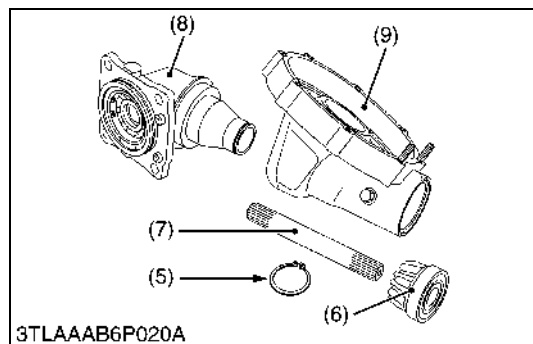
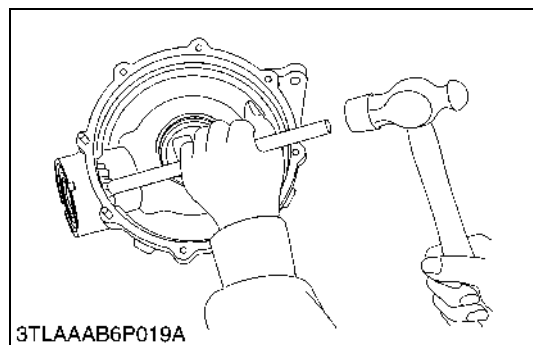
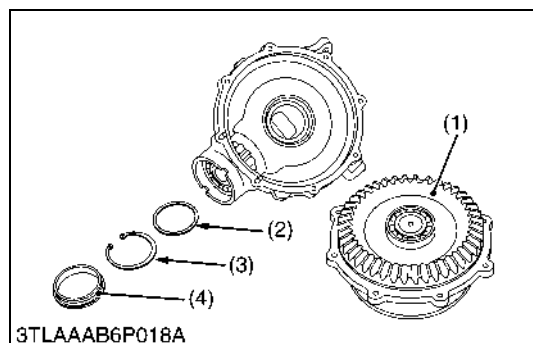
1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (3) and front gear case (4) as a unit from the front axle case (1).

(When reassembling)

- Apply grease to the O-ring (2) and be careful not to damage it.
- Do not interchange right and left bevel gear case assemblies and front gear case assemblies.

- | | |
|---------------------|---------------------|
| (1) Front Axle Case | (3) Bevel Gear Case |
| (2) O-ring | (4) Front Gear Case |

9Y1211012FAS0015US0



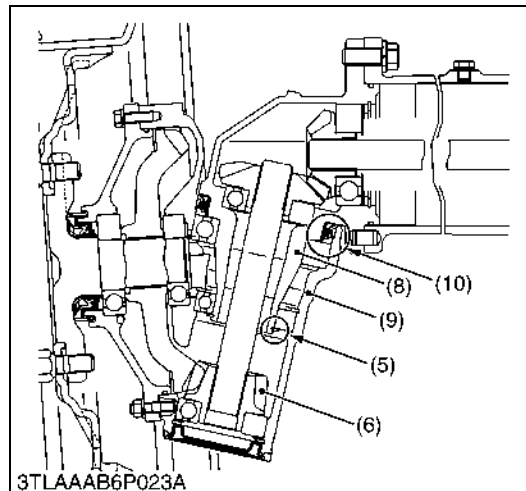
Bevel Gear Case, Axle Flange and Front Gear Case

1. Remove the plug (4).
2. Remove the internal snap ring (3) and shim (2).
3. Remove the axle flange (1).
4. Tap out the bevel gear (6) and ball bearing.
5. Draw out the bevel gear shaft (7).
6. Remove the external snap ring (5).
7. Tap the bevel gear case (8), and separate it from the front gear case (9).

(When reassembling)

- Apply grease to the O-rings of axle flange (1).
- Tighten the axle flange mounting screws and nuts diagonally in several steps.
- Install the oil seal (10) of bevel gear case, noting its direction as shown in the figure below.

Tightening torque	Axle flange mounting stud bolt	12 to 15 N·m 1.2 to 1.6 kgf·m 8.7 to 11 lbf·ft
	Axle flange mounting bolts and nuts	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft



- | | |
|------------------------|----------------------|
| (1) Axle Flange | (6) Bevel Gear |
| (2) Shim | (7) Bevel Gear Shaft |
| (3) Internal Snap Ring | (8) Bevel Gear Case |
| (4) Plug | (9) Front Gear Case |
| (5) External Snap Ring | (10) Oil Seal |

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Bevel Gear Case Gears

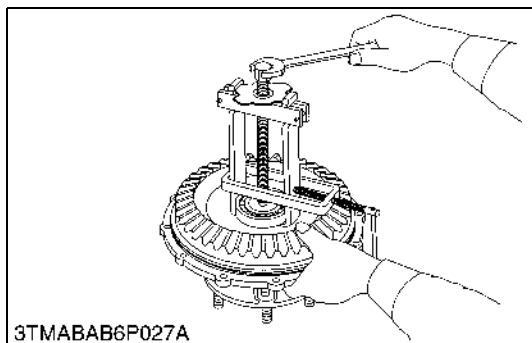
1. Remove the internal snap ring (1).
2. Remove the bevel gears (5), (7) with ball bearings (4), (6), collar (2) and shims (3).

(When reassembling)

- Install the same shims (3) have same thickness as before disassembling.

- | | |
|------------------------|---------------------|
| (1) Internal Snap Ring | (5) Bevel Gear |
| (2) Collar | (6) Ball Bearing |
| (3) Shim | (7) Bevel Gear |
| (4) Ball Bearing | (8) Bevel Gear Case |

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Axle

1. Remove the bearing with a special use puller set.
2. Remove the bevel gear (2).
3. Remove out the collar (1).
4. Tap out the axle (3).

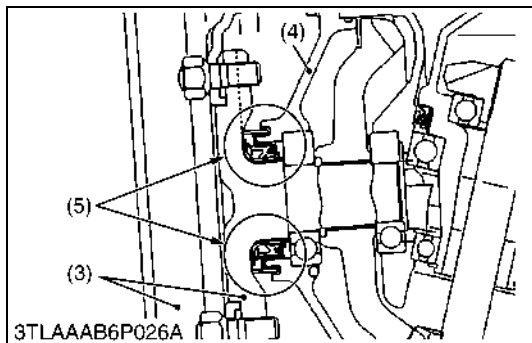
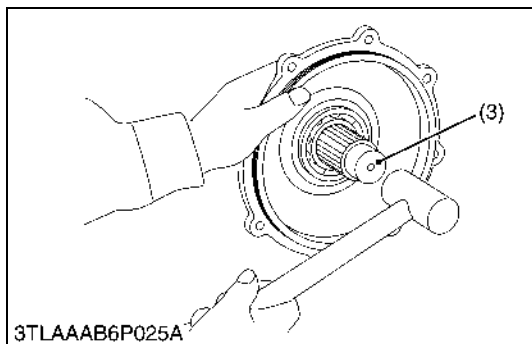
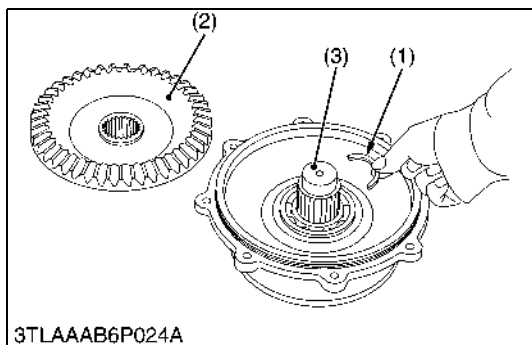
(When reassembling)

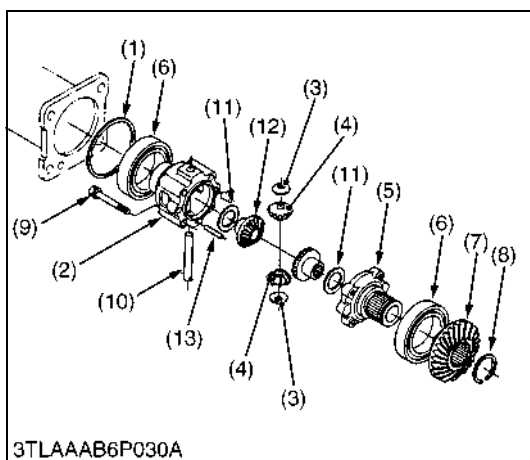
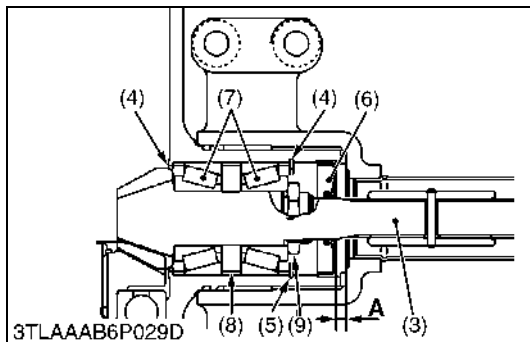
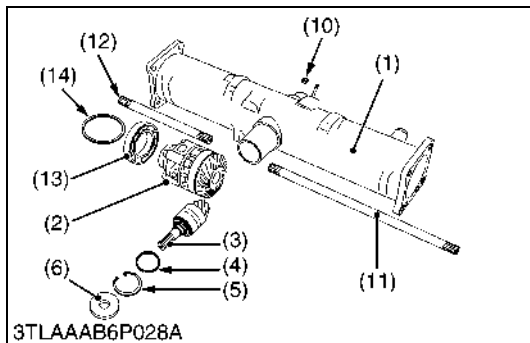
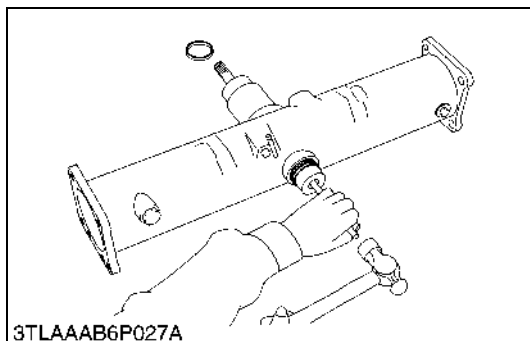
- Install the oil seal (5) of axle flange (4), noting its direction as shown in the figure below.

- (1) Collar
(2) Bevel Gear
(3) Axle

- (4) Axle Flange
(5) Oil Seal

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Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Remove the differential yoke shaft (11), (12) both sides.
2. Remove the oil seal (6) and internal snap ring (5).
3. Remove the plug (10), and then tap out the spiral bevel pinion shaft (3) by the brass rod and hammer.
4. Remove the differential gear assembly (2), ball bearing (13) and shim (14) from right side of front axle case (1).
5. Remove the stake of lock nut (9), and then remove the lock nut (9).
6. Remove the taper roller bearings (7).

(When reassembling)

- Replace the lock nut (9), oil seal (6) and plug (10) with new ones.
- Apply grease to the oil seal (6).
- Install the same shims and collars before they are removed.
- Install the taper roller bearings correctly, noting their direction, and apply gear oil to them.
- When press-fitting a oil seal (6), observe the dimension "A" described in the figure.
- Stake the lock nut (9) firmly.
- Tighten up the lock nut (9) until the turning force of the spiral bevel pinion shaft reaches the factory specifications.

Turning torque of spiral bevel pinion shaft	Factory specification	0.98 to 1.1 N·m 0.10 to 0.12 kgf·m 0.73 to 0.86 lbf·ft
---	-----------------------	--

- | | |
|--------------------------------|-----------------------------------|
| (1) Front Axle Case | (9) Lock Nut |
| (2) Differential Gear Assembly | (10) Plug |
| (3) Spiral Bevel Pinion Shaft | (11) Differential Yoke Shaft R.H. |
| (4) Adjusting Collar | (12) Differential Yoke Shaft L.H. |
| (5) Internal Snap Ring | (13) Ball Bearing |
| (6) Oil Seal | (14) Shim |
| (7) Taper Roller Bearing | |
| (8) Collar | |

A: 1 mm (0.04 in.)

9Y1211012FAS0019US0

Differential Gear

1. Remove the differential case cover mounting screws (9) and then remove the differential case cover (5), ball bearing (6) and spiral bevel gear (7) as a unit.
2. Remove the external snap ring (8), and then remove the ball bearing (6) and spiral bevel gear (7) as a unit with a puller.
3. Remove the straight pin (13).
4. Pull out the pinion shaft (10) and remove the differential pinions (4) and differential side gears (12).

■ NOTE

- Arrange the parts to know their original position.

(When reassembling)

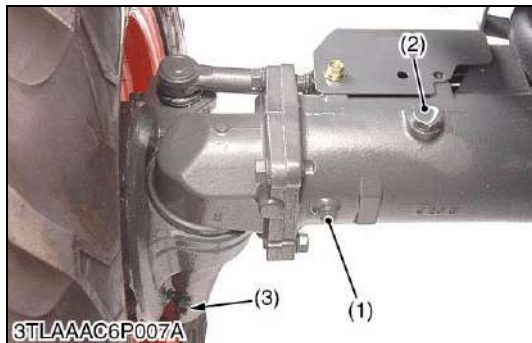
- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gears (12) and differential pinions (4).
- Install the pinion shaft (10) so that the hole on it may align with the hole on differential case (2), and install the straight pin (13).

- | | |
|-----------------------------|-----------------------------|
| (1) Shim | (8) External Snap Ring |
| (2) Differential Case | (9) Screws |
| (3) Thrust Collar | (10) Pinion Shaft |
| (4) Differential Pinion | (11) Shim |
| (5) Differential Case Cover | (12) Differential Side Gear |
| (6) Ball Bearing | (13) Straight Pin |
| (7) Spiral Bevel Gear | |

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[2] L4701

(1) Separating Front Axle from Front Axle Frame



Draining Front Axle Case Oil [4WD]

1. Place the oil pans underneath the front axle case.
2. Remove the drain plug (3) both sides and filling port plug (2) to drain the oil.
3. After draining, reinstall the drain plugs (3) and filling port plug (2).

(When refilling)

- Remove the filling port plug (2) and right and left check plugs (1).
- Fill with the new oil up to the check plug port.
- After filling, reinstall the filling port plug (2) and the check plug (1).

Front axle case oil	Capacity	6.5 L 6.9 U.S.qts 5.7 Imp.qts
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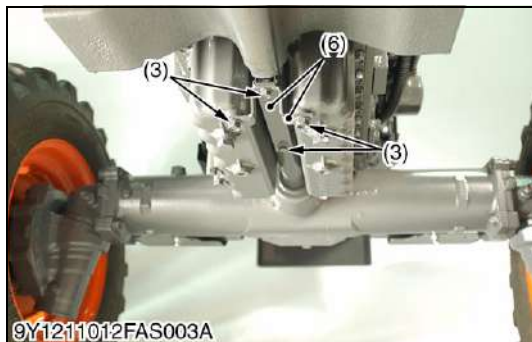
■ IMPORTANT

- Use **KUBOTA SUPER UDT-2 fluid or SAE 80, 90 gear oil.** Refer to "LUBRICANTS, FUEL AND COOLANT" on page G-11.

- (1) Check Plug
(2) Filling Port Plug

- (3) Drain Plug

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Propeller Shaft (4WD Model Only)

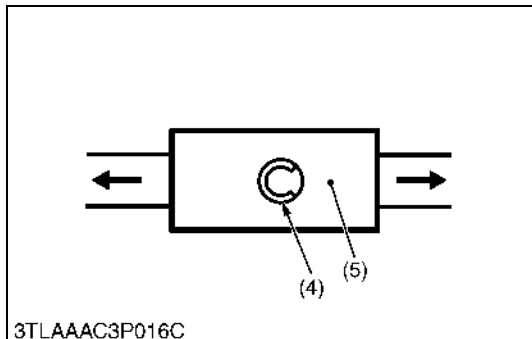
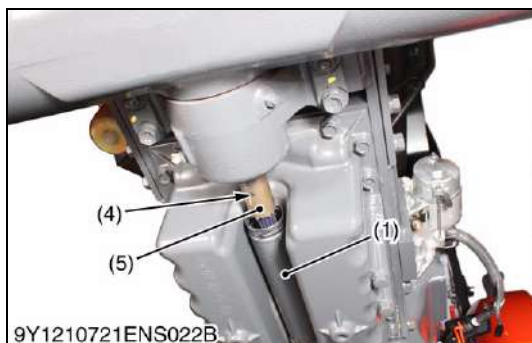
1. Remove bolts (3) and remove holder (6).
2. Slide propeller shaft front cover (2) and propeller shaft rear cover (1).
3. Tap out spring pins (4).
4. Slide coupling (5) and remove propeller shaft together with propeller shaft cover.

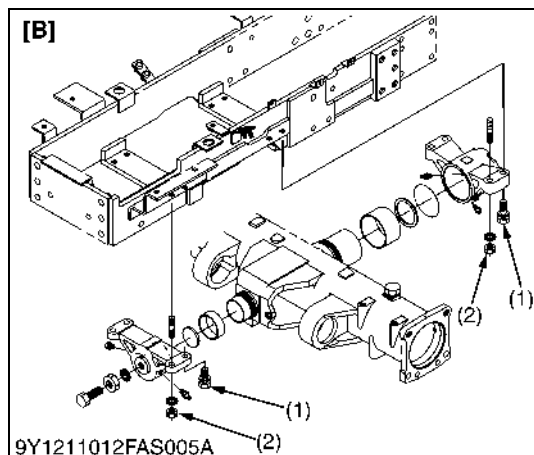
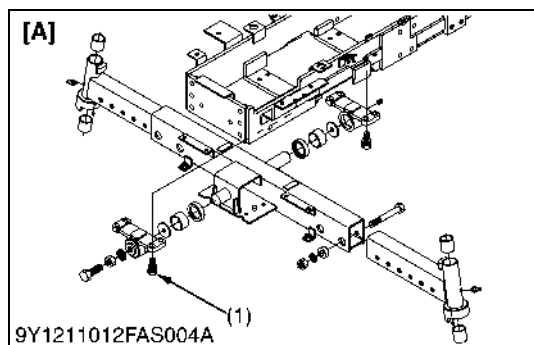
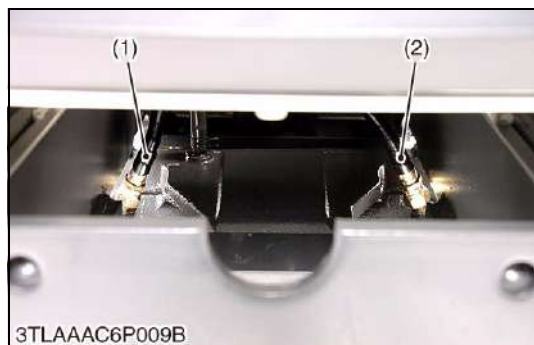
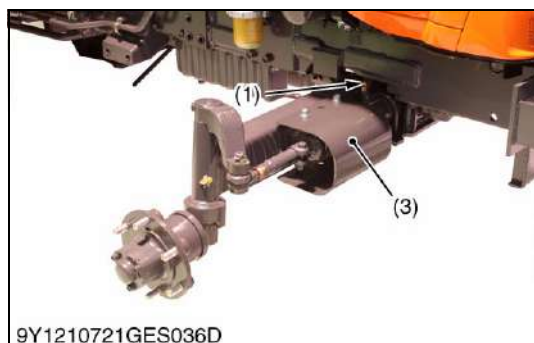
(When reassembling)

- Apply grease to splines of propeller shaft.
- Tap in spring pin (4) as shown in figure.

- (1) Propeller Shaft Rear Cover
(2) Propeller Shaft Front Cover
(3) Bolt
(4) Spring Pin
(5) Coupling
(6) Holder

9Y1211012FAS0022US0





Power Steering Hoses

1. Remove cylinder covers (3).
2. Disconnect power steering hoses (1), (2) from steering cylinder.

(When reassembling)

- When connecting power steering hoses, hold joint with wrench not to turn the joint and tighten hoses.

Tightening torque	Power steering hose retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18.1 to 21.7 lbf·ft
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(1) Power Steering Hose, R.H.

(3) Cylinder Cover

(2) Power Steering Hose, L.H.

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Front Axle Assembly

1. Check the front axle and engine are securely mounted on the disassembling stand.
2. Loosen the front wheel mounting nuts.
3. Lift the front axle and remove the front wheels.
4. Remove the bracket (front) mounting screws and nuts.
5. Remove the bracket (rear) mounting screws and nuts.
6. Separate the front axle from front axle bracket.

(When reassembling)

■ IMPORTANT

- Be sure to adjust the front axle rocking force. (See page 6-S7 and 6-S7.)

Tightening torque	Front wheel mounting nut	124 to 147 N·m 12.6 to 15.0 kgf·m 92 to 108 lbf·ft
	Bracket mounting bolt	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Bracket mounting nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Bracket Mounting Bolt

(2) Bracket mounting Nut

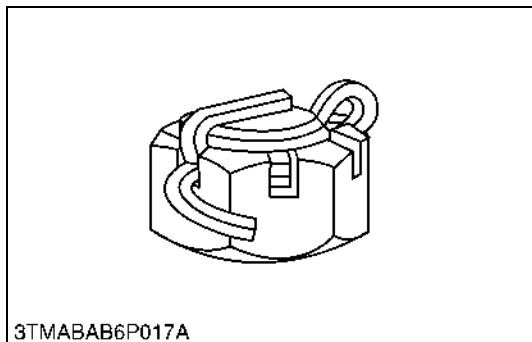
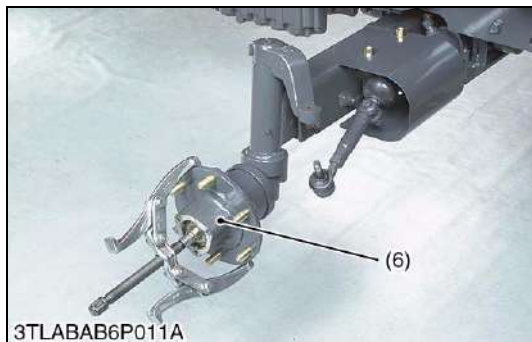
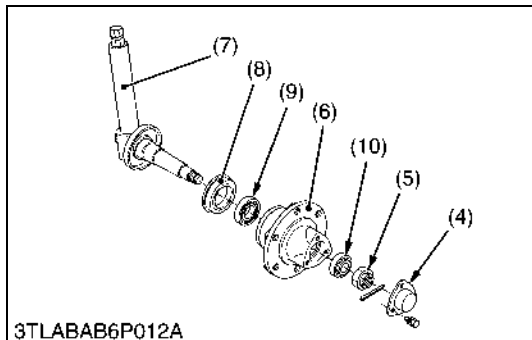
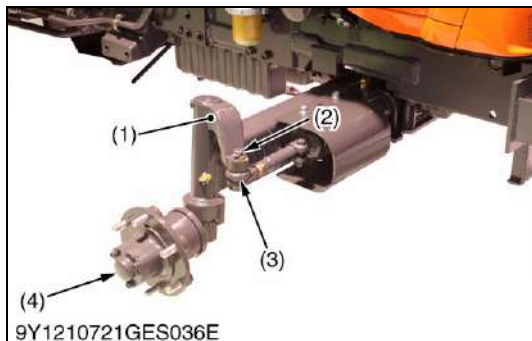
[A] 2WD Model

[B] 4WD Model

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(2) Disassembling Front Axle

[A] 2WD Model



Front Wheel Hub

1. Remove the cotter pin and remove the slotted nut (2).
2. Disconnect the knuckle arm (1) and tie-rod end (3).
3. Remove the front wheel cap (4).
4. Draw out the cotter pin.
5. Remove the slotted nut (5).
6. Remove the collar.
7. Remove the front wheel hub (6) with a puller.

(When reassembling)

- Replace cotter pin with a new one.
- Apply grease to the oil seal (8) in the front wheel hub.

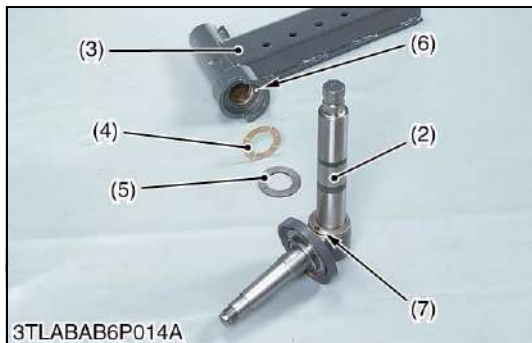
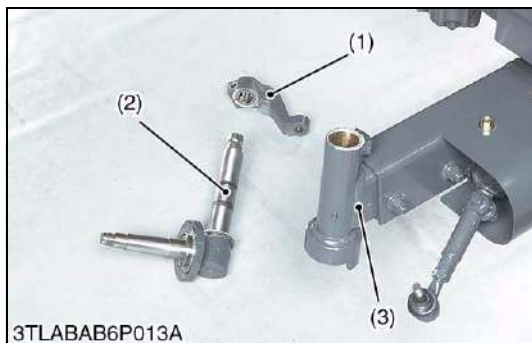
■ IMPORTANT

- After tightening the slotted nut to the specified torque, insert a cotter pin and bend it as shown in the figure.
- Pack in the grease to the bearing in the front wheel hub.
- Apply liquid gasket (Three Bond 1206C or equivalent) to the front wheel hub.

Tightening torque	Front wheel hub slotted nut	29.4 to 39.2 N·m 3.0 to 4.0 kgf·m 21.7 to 28.9 lbf·ft
	Tie-rod end nut	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 28.9 to 36.2 lbf·ft

- | | |
|---------------------------------|---------------------------|
| (1) Knuckle Arm | (6) Front Wheel Hub |
| (2) Tie-rod End Slotted Nut | (7) Knuckle Shaft |
| (3) Tie-rod End | (8) Oil Seal |
| (4) Front Wheel Cap | (9) Taper Roller Bearing |
| (5) Front Wheel Hub Slotted Nut | (10) Taper Roller Bearing |

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Knuckle Shaft and Outer Front Axle

1. Remove the knuckle arm (1) and draw out the knuckle shaft (2) from the front axle.
2. Remove the outer front axle (3).

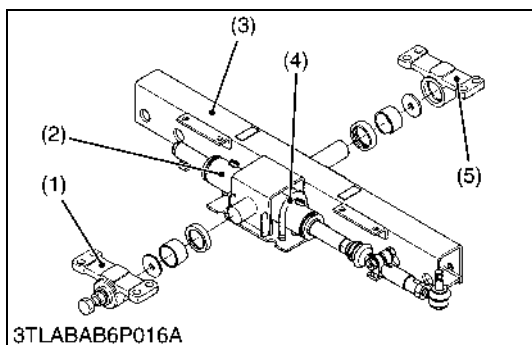
(When reassembling)

- Apply grease to the knuckle shaft (2) and thrust collar (4), (5).
- Do not interchange right and left knuckle arms.
- Be sure to install the thrust collars (4), (5) so that groove side is downward.
- Be sure to align the hole of thrust collars (4), (5) and knock pin (6), (7).
- A large size thrust collar (5) must be lower side.

Tightening torque	Knuckle arm mounting bolt and nut	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft
	Outer front axle mounting bolt and nut	123 to 147 N·m 12.6 to 15.0 kgf·m 91.1 to 108.5 lbf·ft

- | | |
|----------------------|-------------------|
| (1) Knuckle Arm | (5) Thrust Collar |
| (2) Knuckle Shaft | (6) Knock Pin |
| (3) Outer Front Axle | (7) Knock Pin |
| (4) Thrust Collar | |

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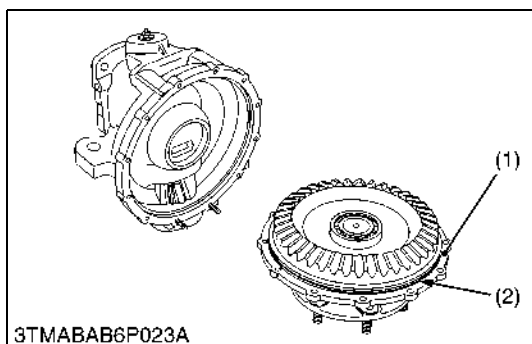
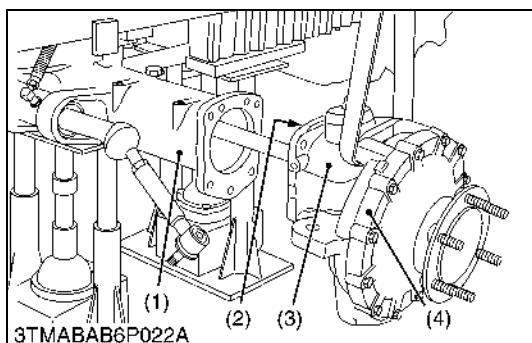
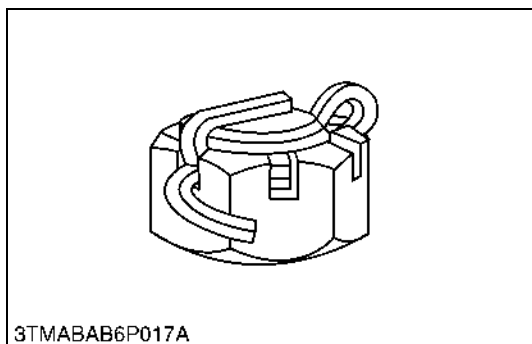
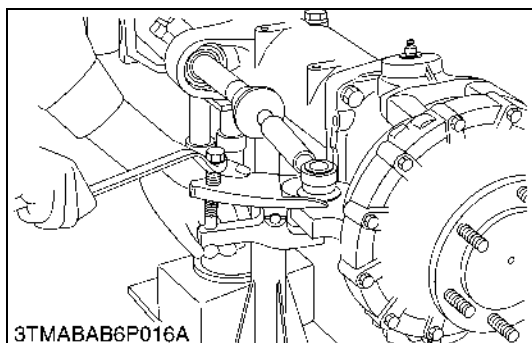


Steering Cylinder

1. Remove the clamps (4) and remove the steering cylinder (2).

- | | |
|-----------------------|-------------------|
| (1) Bracket, Front | (4) Clamp |
| (2) Steering Cylinder | (5) Bracket, Rear |
| (3) Middle Front Axle | |

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[B] 4WD Model**Tie-rods**

1. Pull out the cotter pin and remove the tie-rod end slotted nuts.
2. Remove the tie-rod with a tie-rod end lifter.

(When reassembling)

- After tightening the tie-rod end nut to the specified torques, install a cotter pin as shown in the figure left.

Tightening torque	Tie-rod end nut	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft
-------------------	-----------------	---

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Bevel Gear Case and Front Gear Case

1. Remove the bevel gear case mounting screws.
2. Remove the bevel gear case (3) and front gear case (4) as a unit from the front axle case (1).

(When reassembling)

- Apply grease to the O-ring (2) and be careful not to damage it.
- Do not interchange right and left bevel gear case assemblies.

Tightening torque	Bevel gear case mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 122.9 to 144.6 lbf·ft
-------------------	--------------------------------	---

(1) Front Axle Case

(2) O-ring

(3) Bevel Gear Case

(4) Front Gear Case

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Axle Flange and Front Gear Case

1. Remove the axle flange mounting bolts and nuts.
2. Remove the axle flange (1).

(When reassembling)

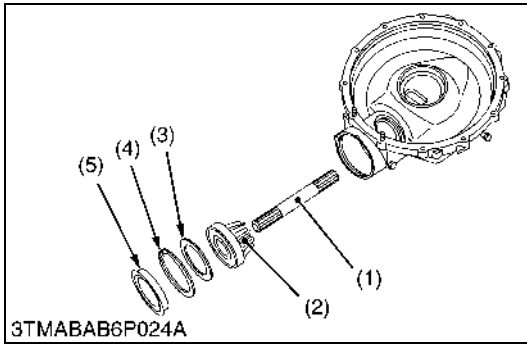
- Apply grease to the O-ring (2) of axle flange.
- Tighten the axle flange mounting bolts and nuts diagonally in several steps.

Tightening torque	Axle flange mounting bolts and nuts [L3301/L3901]	23.6 to 27.5 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Axle flange mounting bolts [L4701]	29.4 to 34.3 N·m 3.0 to 3.5 kgf·m 22 to 25 lbf·ft
	Axle flange mounting nuts [L4701]	23.6 to 27.5 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

(1) Axle Flange

(2) O-ring

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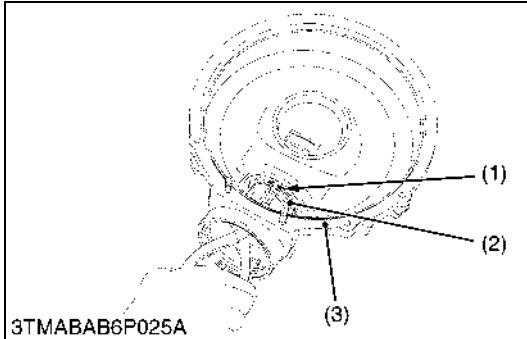


Bevel Gear and Bevel Gear Shaft

1. Remove the plug (5).
2. Remove the internal snap ring (4) and shim (3).
3. Tap out the bevel gear (2) with ball bearing.
4. Draw out the bevel gear shaft (1).

- | | |
|----------------------|------------------------|
| (1) Bevel Gear Shaft | (4) Internal Snap Ring |
| (2) Bevel Gear | (5) Plug |
| (3) Shim | |

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Bevel Gear Case Gears

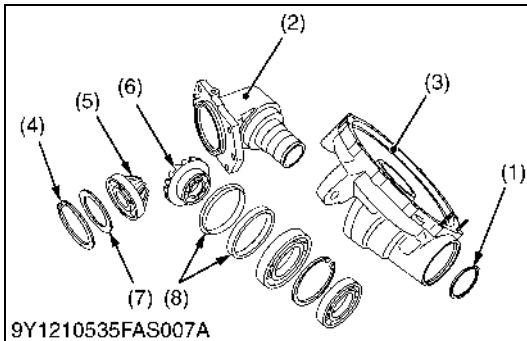
1. Remove the external snap ring (1).
2. Tap the bevel gear case (2) and separate it from the front gear case (3).
3. Remove the internal snap ring (4).
4. Remove the bevel gears (5), (6) with ball bearings, and shims (7).

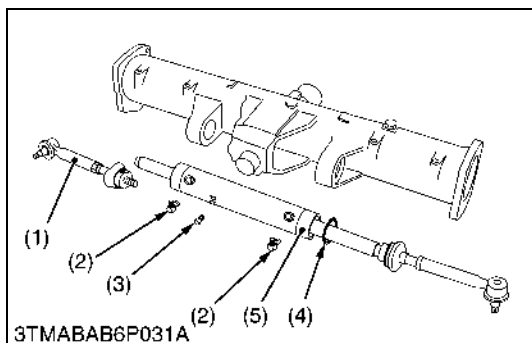
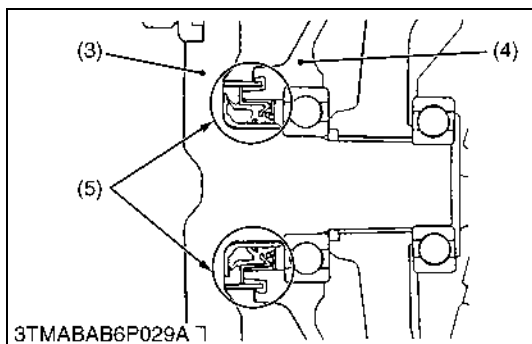
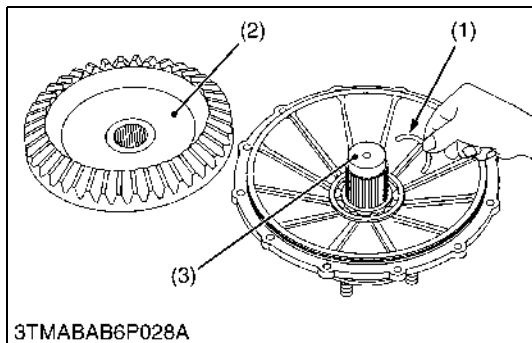
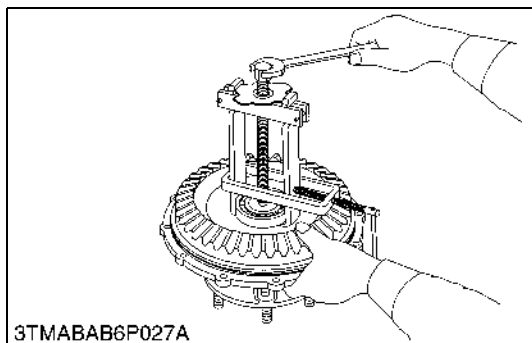
(When reassembling)

- Install the shims (7) to their original position.
- Install the oil seal (8) of bevel gear case, noting its direction.

- | | |
|------------------------|----------------|
| (1) External Snap Ring | (5) Bevel Gear |
| (2) Bevel Gear Case | (6) Bevel Gear |
| (3) Front Gear Case | (7) Shim |
| (4) Internal Snap Ring | (8) Oil Seal |

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Axle

1. Remove the bearing with a special use puller set.
2. Remove the bevel gear (2).
3. Remove the collar (1).
4. Tap out the axle (3).

(When reassembling)

- Install the oil seal (5) of axle flange (4), noting its direction as shown in the figure below.
- Be sure to insert collar (1) into groove.

- | | |
|----------------|-----------------|
| (1) Collar | (4) Axle Flange |
| (2) Bevel Gear | (5) Oil Seal |
| (3) Axle | |

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Steering Cylinder

1. Remove the tie-rod joint (1) (right side).
2. Remove the cylinder set screw (3).
3. Remove the joints (2) from steering cylinder.
4. Remove the internal snap ring (4).
5. Draw out the steering cylinder (5).

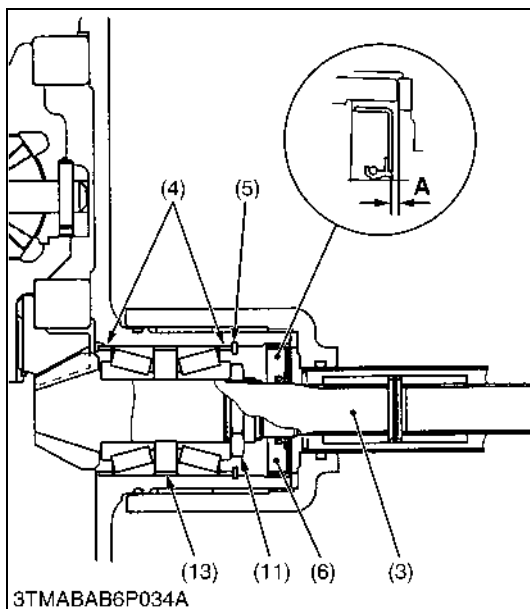
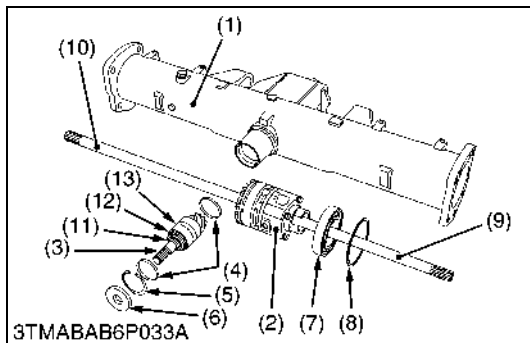
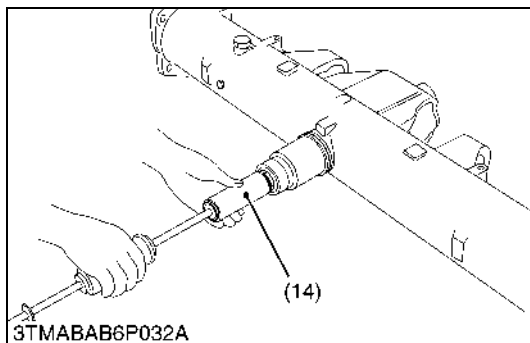
(When reassembling)

- Apply thread locker (Three Bond 1324 or equivalent) to the tie-rod joint.
- Wind seal tape on cylinder side of joint (2).

Tightening torque	Tie-rod joint and steering cylinder mounting screw	166.7 to 196.1 N·m 17.0 to 20.0 kgf·m 122.9 to 144.6 lbf·ft
	Cylinder set bolt	16 to 17 N·m 1.6 to 1.8 kgf·m 12 to 13 lbf·ft

- | | |
|------------------------|------------------------|
| (1) Tie-rod Joint | (4) Internal Snap Ring |
| (2) Joint | (5) Steering Cylinder |
| (3) Cylinder Set Screw | |

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Spiral Bevel Pinion Shaft and Differential Gear Assembly

1. Remove the differential yoke shaft (9), (10) both sides.
2. Remove the oil seal (6) and internal snap ring (5).
3. Remove the collar (4).
4. Remove the spiral bevel pinion shaft (3) by the pinion shaft remover (14).
5. Remove the differential gear assembly (2), ball bearing (7) and shim (8) from left side of front axle case (1).
6. Remove the stake of lock nut (11), and then remove the lock nut (11).
7. Remove the taper roller bearings (12).

(When reassembling)

- Replace the lock nut (11) and oil seal (6) with new ones.
- Apply grease to the oil seal (6).
- Install the shims and collars to their original position.
- Install the taper roller bearings correctly, noting their direction, and apply gear oil to them.
- Tighten up the lock nut (11) until the turning force of the spiral bevel pinion shaft reaches the factory specifications.
- When press-fitting the oil seal (6), observe the dimension "A" described in the figure.

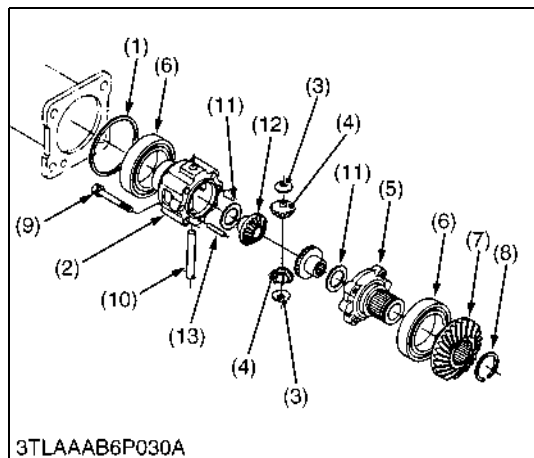
■ IMPORTANT

- **After adjusting the turning torque stake the lock nut (11) firmly.**

Turning torque of spiral bevel pinion shaft	Factory specification	0.98 to 1.18 N·m 0.10 to 0.12 kgf·m 0.72 to 0.89 lbf·ft
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- | | |
|----------------------------------|---------------------------------------|
| (1) Front Axle Case | (10) Differential Yoke Shaft L.H. |
| (2) Differential Gear Assembly | (11) Lock Nut |
| (3) Spiral Bevel Pinion Shaft | (12) Taper Roller Bearing |
| (4) Adjusting Collar | (13) Collar |
| (5) Internal Snap Ring | (14) Pinion Shaft Remover |
| (6) Oil Seal | |
| (7) Ball Bearing | A: Dimension, 1 mm (0.039 in.) |
| (8) Shim | |
| (9) Differential Yoke Shaft R.H. | |

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Differential Gear

1. Remove the differential case cover mounting screws (9) and then remove the differential case cover (5), ball bearing (6) and spiral bevel gear (7) as a unit.
2. Remove the external snap ring (8), and then remove the ball bearing (6) and spiral bevel gear (7) as a unit with a puller.
3. Remove the straight pin (13).
4. Pull out the pinion shaft (10) and remove the differential pinions (4) and differential side gears (12).

(When reassembling)

- Apply molybdenum disulfide (Three Bond 1901 or equivalent) to the inner circumferential surface of the differential side gears (12) and the differential pinions (4).

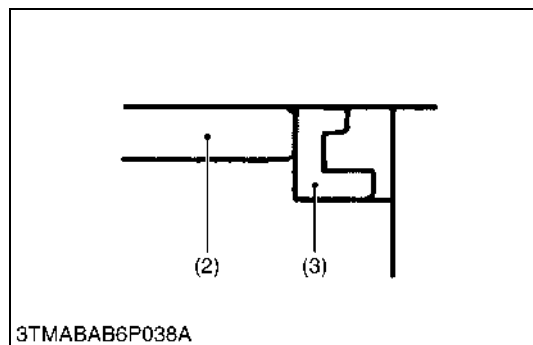
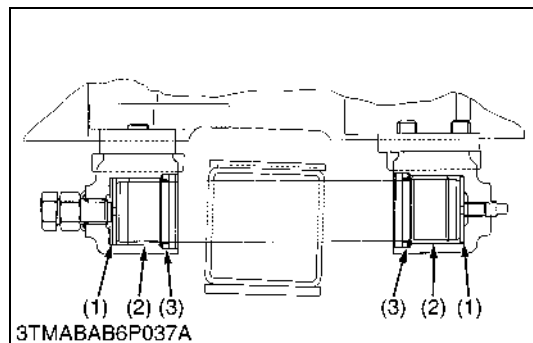
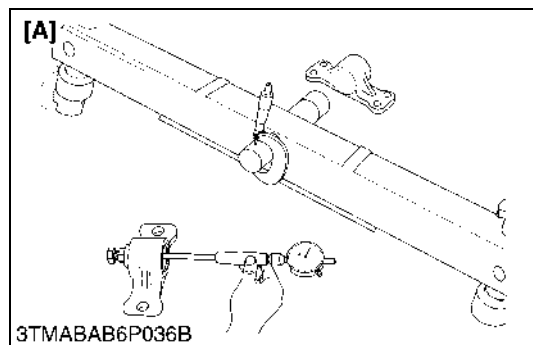
Tightening torque	Differential case cover mounting screw	48.0 to 58.8 N·m 4.9 to 6.0 kgf·m 35.4 to 43.4 lbf·ft
-------------------	--	---

- | | |
|-----------------------------|---|
| (1) Shim | (8) External Snap Ring |
| (2) Differential Case | (9) Differential Case Cover Mounting Screws |
| (3) Thrust Collar | (10) Pinion Shaft |
| (4) Differential Pinion | (11) Shim |
| (5) Differential Case Cover | (12) Differential Side Gear |
| (6) Ball Bearing | (13) Straight Pin |
| (7) Spiral Bevel Gear | |

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6. SERVICING

[1] 2WD MODEL



Clearance between Front Axle Middle Boss and Shaft Bracket Bushing

1. Measure the front axle middle boss O.D. at several points where it contacts with the bushing.
2. Measure the shaft bracket 1 bushing I.D. and bracket 2 bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

(When reassembling)

- Before press-fitting the bushing, install the new thrust collar.
- Install the oil seals, noting their direction. (Refer to figure.)

■ IMPORTANT

- **After replacing the bushing, be sure to adjust the front axle rocking force. (See page 6-S7.)**

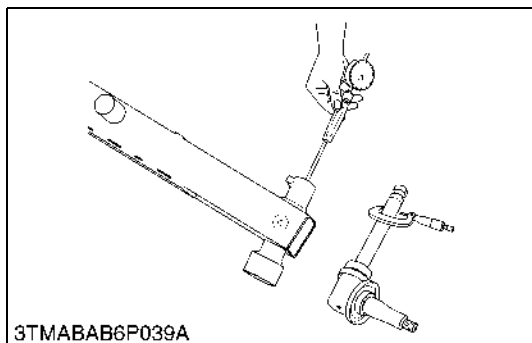
Clearance between front axle middle boss and bushing	Factory specification	0.015 to 0.177 mm 0.0006 to 0.00696 in.
	Allowable limit	0.3 mm 0.01 in.
Front axle middle boss O.D.	Factory specification	39.938 to 40.000 mm 1.5724 to 1.5748 in.
Bushing I.D.	Factory specification	40.015 to 40.115 mm 1.5754 to 1.5793 in.

- (1) Thrust Collar
- (2) Bushing
- (3) Oil Seal

[A] L3301/L3901

[B] L4701

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Clearance between Knuckle Shaft (Kingpin) and Bushing

1. Measure the shaft O.D. at several points where it contacts with the bushings.
2. Measure the bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bushing.

(When reassembling)

- Remove the bushing with a bushing puller.

Clearance between knuckle shaft (kingpin) and bushing	Factory specification	L3301/ L3901	0 to 0.285 mm 0 to 0.0112 in.
	Allowable limit		0.4 mm 0.02 in.
	Factory specification	L4701	0 to 0.190 mm 0 to 0.00748 in.
	Allowable limit		0.4 mm 0.02 in.

Knuckle shaft O.D.	Factory specification	L3301/ L3901	27.880 to 27.900 mm 1.0977 to 1.0984 in.
			27.900 to 28.165 mm 1.0985 to 1.1088 in.
Bushing I.D.		L4701	37.975 to 38.000 mm 1.4951 to 1.4960 in.
			38.000 to 38.165 mm 1.4961 to 1.15025 in.

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Steering Cylinder I.D.

1. Measure the steering cylinder I.D. with a cylinder gauge.
2. If the cylinder I.D. exceed the allowable limit, replace the cylinder tube.

Steering cylinder I.D.	Factory specification	55.000 to 55.074 mm 2.1654 to 2.1682 in.
	Allowable limit	55.100 mm 2.1693 in.

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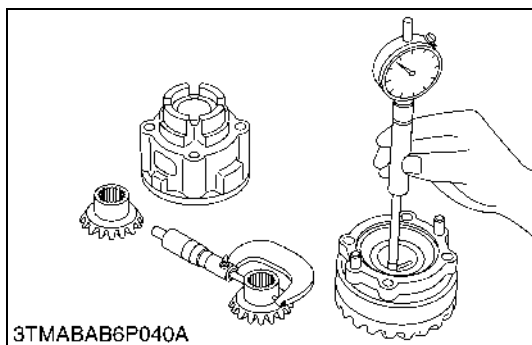
Clearance between Rod and Bushing

1. Measure the bushing I.D. with a cylinder gauge.
2. Measure the rod O.D. with a outside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace as a unit.

Clearance between rod and bushing	Factory specification	0.00900 to 0.127 mm 0.000355 to 0.00500 in.
	Allowable limit	0.135 mm 0.00531 in.

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[2] 4WD MODEL



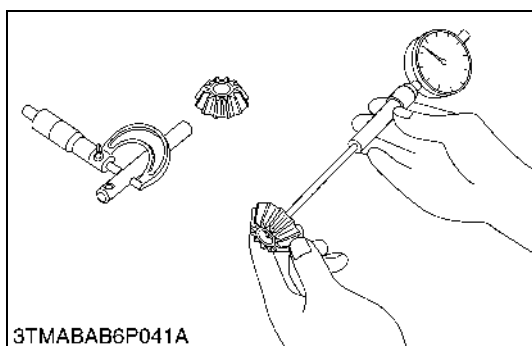
Clearance between Differential Case (Differential Case Cover) and Differential Side Gear

1. Measure the differential side gear O.D..
2. Measure the differential case bore I.D. and calculate the clearance.
3. Measure the differential case cover bore I.D. and calculate the clearance.
4. If the clearance exceeds the allowable limit, replace damaged parts.

Clearance between differential case (differential case cover) and differential side gear	Factory specification	0.050 to 0.151 mm 0.00197 to 0.00594 in.
	Allowable limit	0.20 mm 0.0079 in.

Differential case bore I.D.	Factory specification	32.000 to 32.062 mm 1.25984 to 1.26228 in.
Differential case cover bore I.D.	Factory specification	32.000 to 32.025 mm 1.25984 to 1.26083 in.
Differential side gear O.D.	Factory specification	31.911 to 31.950 mm 1.25634 to 1.25787 in.

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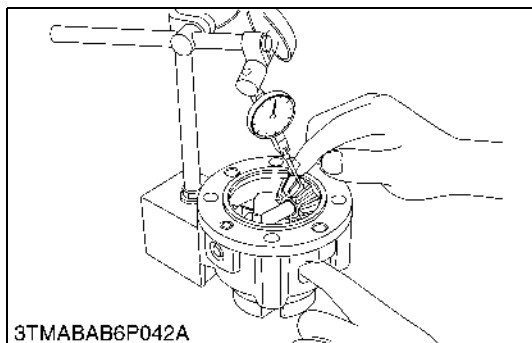
Clearance between Pinion Shaft and Differential Pinion

1. Measure the pinion shaft O.D..
2. Measure the differential pinion I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace damaged parts.

Clearance between pinion shaft and differential pinion	Factory specification	0.064 to 0.100 mm 0.00252 to 0.00394 in.
	Allowable limit	0.25 mm 0.0096 in.

Pinion shaft O.D.	Factory specification	13.950 to 13.968 mm 0.54921 to 0.54992 in.
Differential pinion I.D.	Factory specification	14.032 to 14.050 mm 0.55244 to 0.55315 in.

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Backlash between Differential Pinion and Differential Side Gear

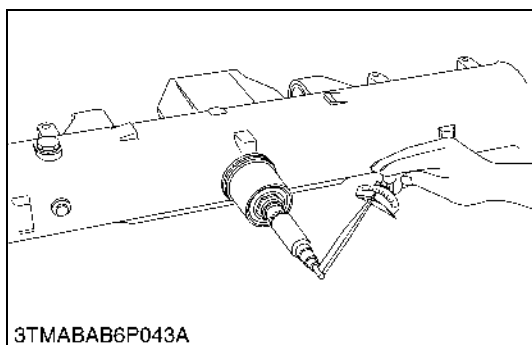
1. Set a dial gauge (lever type) on a tooth of the differential pinion.
2. Fix the differential side gear and move the differential pinion to measure the backlash.
3. If the measurement exceeds the factory specifications, adjust with the differential side gears shims.

Backlash between differential pinion and differential side gear	Factory specification	0.1 to 0.3 mm 0.004 to 0.012 in.
	Allowable limit	0.4 mm 0.016 in.

(Reference)

- Thickness of adjusting shims:
0.4 mm (0.016 in.)
0.6 mm (0.024 in.)
0.8 mm (0.031 in.)
1.0 mm (0.039 in.)
1.2 mm (0.047 in.)
- Tooth contact:
More than 35 %
- Center of tooth contact:
1/3 to 1/2 of the entire width from the small end.

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Turning Force of Spiral Bevel Pinion Shaft (Pinion Shaft Only)

1. Install the spiral bevel pinion shaft assembly only to the front axle case.
2. Measure the turning torque of spiral bevel pinion shaft.
3. If the turning torque is not within the factory specifications, adjust with the lock nut.
If the turning torque can not be adjusted by the lock nut (2), change the thickness of the collar (1) and adjust with the lock nut (2) again.

(Reference)

- Standard size of collar (1):
10.0 mm (0.349 in.) of thickness

Turning torque of spiral bevel pinion shaft	Factory specification	0.98 to 1.18 N·m 0.10 to 0.12 kgf·m 0.72 to 0.87 lbf·ft
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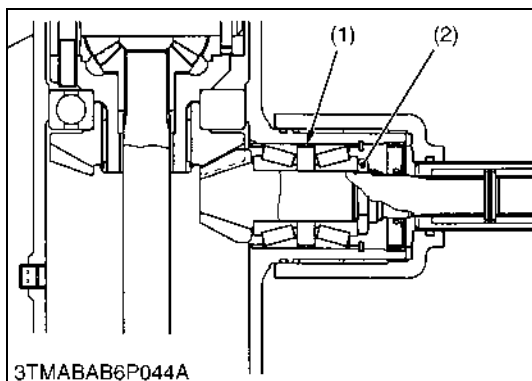
■ NOTE

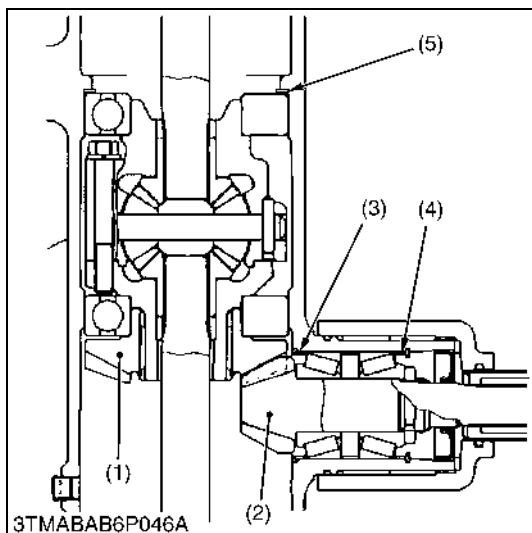
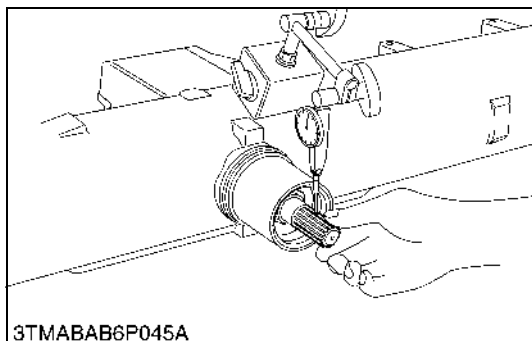
- After turning torque adjustment, be sure to stake the lock nut.

(1) Collar

(2) Lock Nut

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Backlash between Spiral Bevel Pinion Shaft and Spiral Bevel Gear

1. Set a dial gauge (lever type) with its finger on the spline of spiral bevel pinion shaft.
2. Measure the backlash by moving the spiral bevel pinion shaft by hand lightly.
3. If the backlash is not within the factory specifications, change the adjusting collars (3), (4).
For example, when the backlash is too large, change the collar (3) to thinner one and change the collar (4) to thicker one. At this time, if the collar (3) is thinned by 1 mm, the collar (4) must be thickened by 1 mm.
4. Adjust the backlash properly by repeating the above procedures.

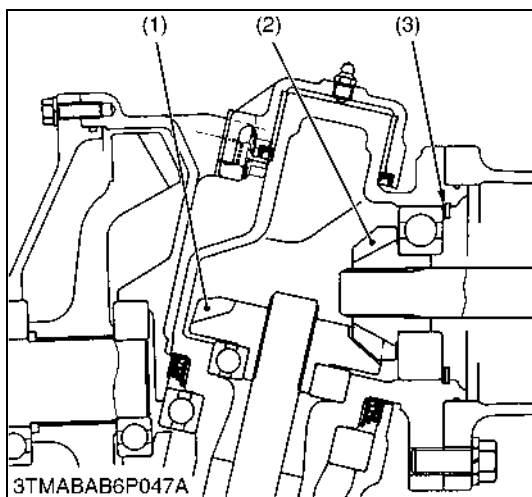
(Reference)

- Standard size of adjusting collar (3), (4):
6.0 mm (0.236 in.) of thickness (total 12.0 mm)
- Standard size of adjusting shim (5):
2.0 mm (0.079 in.) of thickness
- Tooth Contact:
More than 35 %
- Center of tooth contact:
1/3 to 1/2 of the entire width from the small end.

Backlash between spiral bevel pinion shaft and spiral bevel gear	Factory specification	0.1 to 0.3 mm 0.004 to 0.012 in.
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- (1) Spiral Bevel Gear (4) Adjusting Collar
(2) Spiral Bevel Pinion Shaft (5) Shim
(3) Adjusting Collar

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Backlash between 11T Bevel Gear and 16T Bevel Gear

1. Stick plastigauge or wire of solder on the bevel gear (1) with grease.
2. Fix the front axle case, bevel gear case and front gear case.
3. Turn the axle.
4. Remove the bevel gear case from front axle case and measure the thickness of the plastigauge with scale.
5. If the backlash is not within the factory specifications, adjust with shim (3).

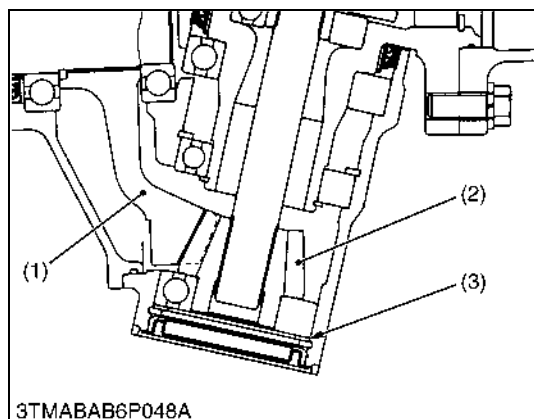
Backlash between bevel gear (2) and bevel gear	Factory specification	0.15 to 0.30 mm 0.006 to 0.012 in.
	Allowable limit	0.6 mm 0.024 in.

(Reference)

- Thickness of adjusting shims:
0.4 mm (0.031 in.)
0.6 mm (0.024 in.)
0.8 mm (0.031 in.)
1.0 mm (0.039 in.)
1.2 mm (0.047 in.)
- Tooth contact:
More than 35 %
- Center of tooth contact:
1/3 to 1/2 of the entire width from the small end.

- (1) Bevel Gear (3) Shim
(2) Bevel Gear

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Backlash between 11T Bevel Gear and 42T Bevel Gear

1. Place plastigauge or wire of solder to three spots on the 42T bevel gear (1) with grease.
2. Fix the axle flange and front gear case.
3. Turn the axle.
4. Remove the axle flange from front gear case and measure the thickness of the plastigauge with scale.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between bevel gear (2) and bevel gear (1)	Factory specification	0.15 to 0.30 mm 0.006 to 0.012 in.
	Allowable limit	0.6 mm 0.024 in.

(Reference)

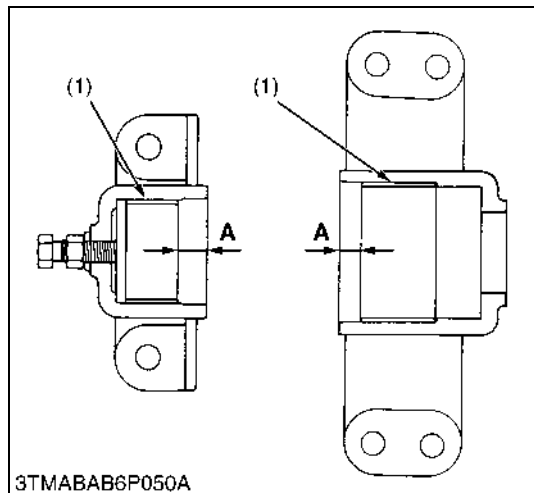
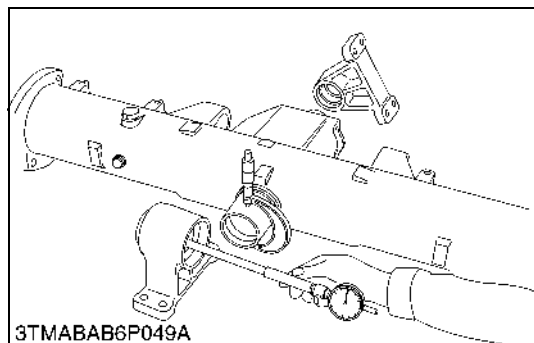
- Thickness of adjusting shims:
 - 1.0 mm (0.039 in.)
 - 1.2 mm (0.047 in.)
 - 1.4 mm (0.055 in.)
 - 1.6 mm (0.063 in.)
 - 1.8 mm (0.071 in.)
 - 2.0 mm (0.079 in.)
 - 2.2 mm (0.087 in.)
- Tooth contact:
 - More than 10 %
- Center of tooth contact:
 - 1/10 to 1/5 of the entire width from the small end.

(1) Bevel Gear

(3) Shim

(2) Bevel Gear

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Clearance between Front Axle Case Bosses and Bracket Bushings

1. Measure the front axle case bosses O.D. with an outside micrometer.
2. Measure the bracket bushing I.D. and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bracket bushing.

Clearance between front axle case boss (front) and bracket bushing (front)	Factory specification	0.120 to 0.275 mm 0.00472 to 0.01083 in.
	Allowable limit	0.50 mm 0.01969 in.

Front axle case boss (front) O.D.	Factory specification	49.950 to 49.975 mm 1.96653 to 1.96752 in.
Bracket bushing (front) I.D.	Factory specification	50.095 to 50.225 mm 1.97224 to 1.97736 in.

Clearance between front axle case boss (rear) and bracket bushing (rear)	Factory specification	0.100 to 0.292 mm 0.00394 to 0.01150 in.
	Allowable limit	1.0 mm 0.03937 in.

Front axle case boss (rear) O.D.	Factory specification	69.970 to 70.000 mm 2.75472 to 2.75590 in.
Bracket bushing (rear) I.D.	Factory specification	70.100 to 70.262 mm 2.75984 to 2.76622 in.

■ Press-fitting Bushing

- When press-fitting a new bushing, observe the dimension described in the figure.

Press-fit depth of bushing "A"	Reference value	12.0 to 13.0 mm 0.47 to 0.51 in.
--------------------------------	-----------------	-------------------------------------

■ NOTE

- After replacing the bushing, be sure to adjust the front axle rocking force. (See page 6-S7.)

(1) Bushing

A: Depth of Bushing

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Steering Cylinder I.D.

1. Measure the steering cylinder I.D. with a cylinder gauge.
2. If the cylinder I.D. exceed the allowable limit, replace the cylinder tube.

Steering cylinder I.D.	Factory specification	55.000 to 55.074 mm 2.1654 to 2.1682 in.
	Allowable limit	55.100 mm 2.1693 in.

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Clearance between Rod and Bushing

1. Measure the bushing I.D. with a cylinder gauge.
2. Measure the rod O.D. with a outside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace as a unit.

Clearance between rod and bushing	Factory specification	0.00900 to 0.127 mm 0.000355 to 0.00500 in.
	Allowable limit	0.135 mm 0.00531 in.

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7 STEERING

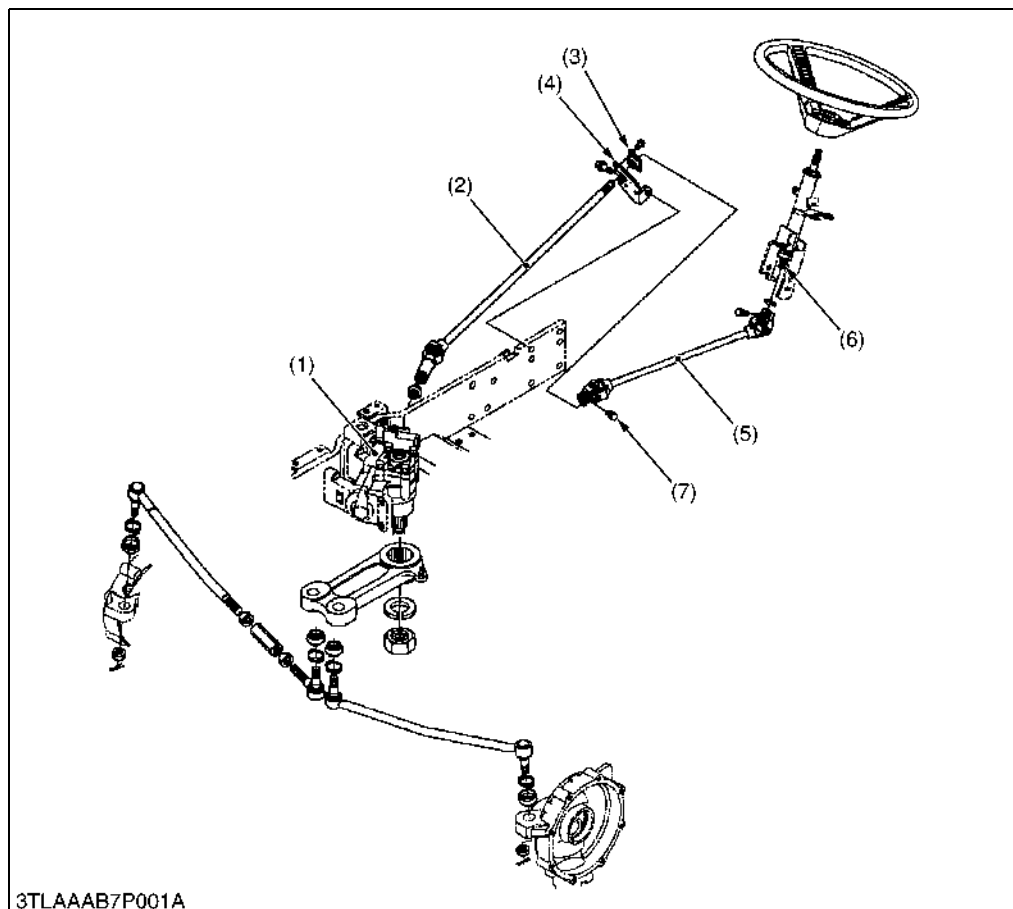
MECHANISM

CONTENTS

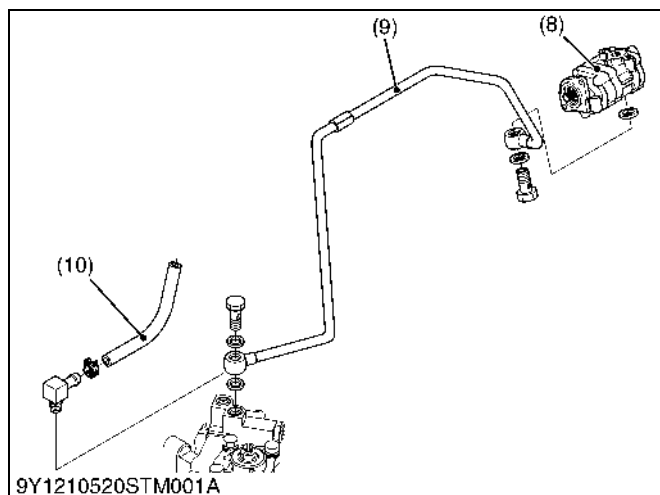
1. STRUCTURE (L3301/L3901)	7-M1
[1] LINKAGE	7-M1
[2] HYDRAULIC CIRCUIT	7-M2
[3] HYDRAULIC PUMP	7-M2
[4] STEERING GEAR BOX	7-M3
(1) STRUCTURE	7-M3
(2) OPERATION	7-M4
2. STRUCTURE (L4701)	7-M5
[1] LINKAGE	7-M5
[2] HYDRAULIC CIRCUIT	7-M6
[3] HYDRAULIC PUMP	7-M6
[4] STEERING CONTROLLER.....	7-M7
(1) Control Valve	7-M7
(2) Metering Device (Gerotor).....	7-M7
(3) Oil Flow.....	7-M8
[5] STEERING CYLINDER	7-M10

1. STRUCTURE (L3301/L3901)

[1] LINKAGE



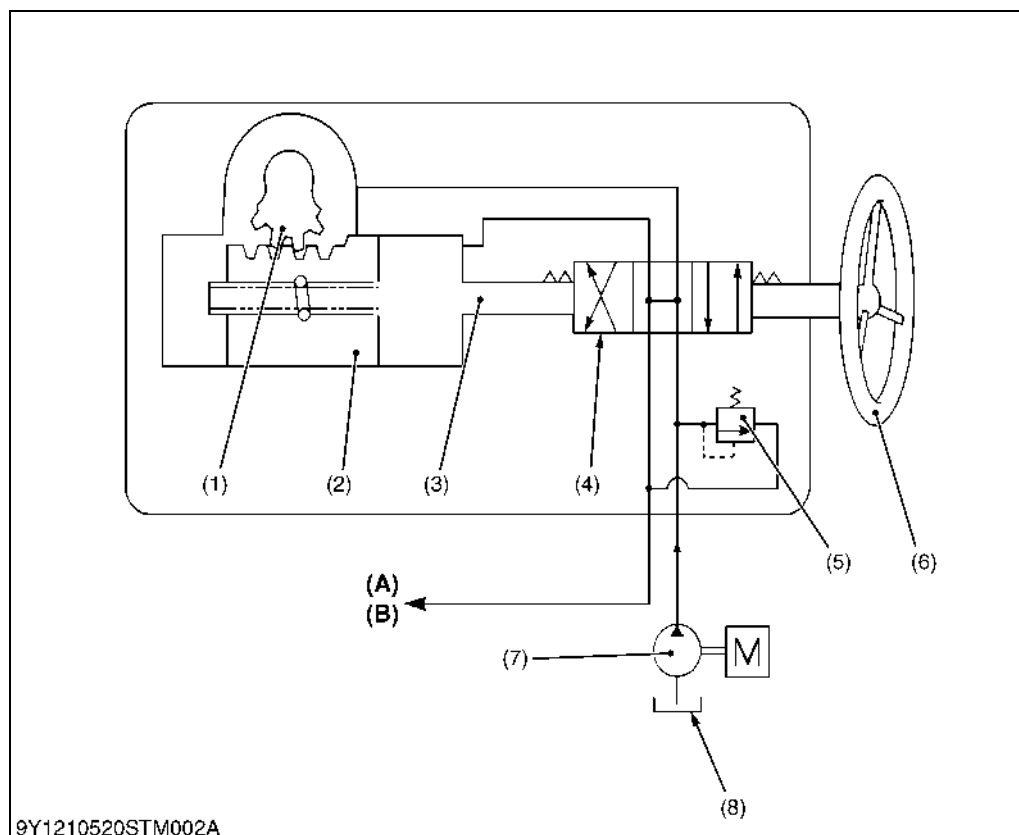
- (1) Power Steering Controller (Steering Gear Box)
- (2) Joint Shaft 2
- (3) Mini-Flange
- (4) Support
- (5) Joint Shaft
- (6) Steering Shaft
- (7) Bolt
- (8) Hydraulic Pump
- (9) Delivery Pipe
- (10) Return Hose (Manual Transmission Model)
HST Delivery Pipe (HST Model)



The integral type power steering is used on these models. This steering system consists of steering wheel, steering joint shafts, steering gear box and other components shown in the figure.

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[2] HYDRAULIC CIRCUIT



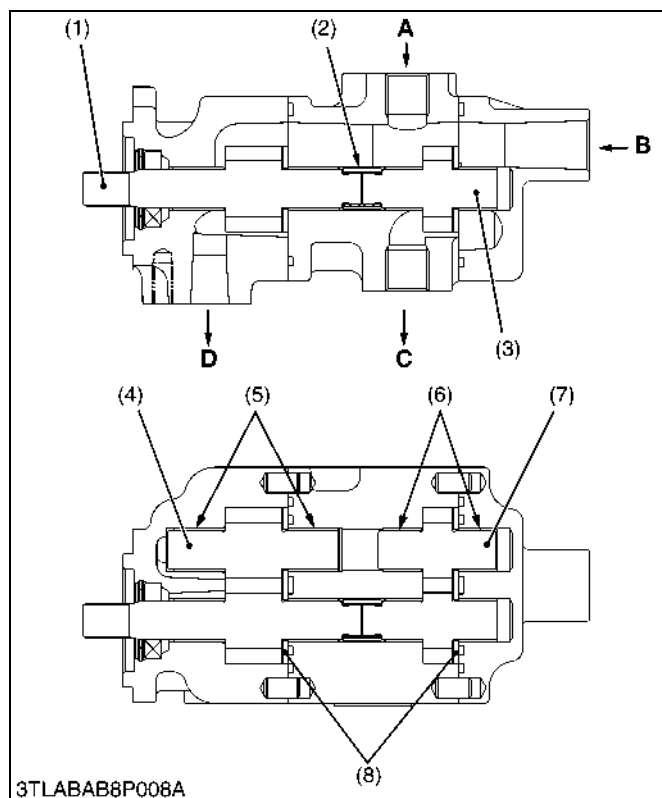
- (1) Sector Shaft
- (2) Ball Nut (Piston)
- (3) Worm Shaft
- (4) Control Valve
- (5) Relief Valve
- (6) Steering Wheel
- (7) Hydraulic Pump
- (8) Transmission Case

- (A) To Hydraulic Pump
(Manual Transmission Model)
- (B) To HST Unit (HST Model)

Control valve (4) is main part of Integral type power steering. Oil sent from hydraulic pump (7) flows in gear case through control valve (4) and moves ball nut (piston) (2).

9Y1211012STM0002US0

[3] HYDRAULIC PUMP



The gear type hydraulic pump is adopted for these models. This pump is called as tandem type and composed two pair of gears, side plates, bushings and other components as shown in the figure.

The hydraulic pump pressurize oil from transmission case through oil filter and send the oil to power steering circuit and main hydraulic circuit.

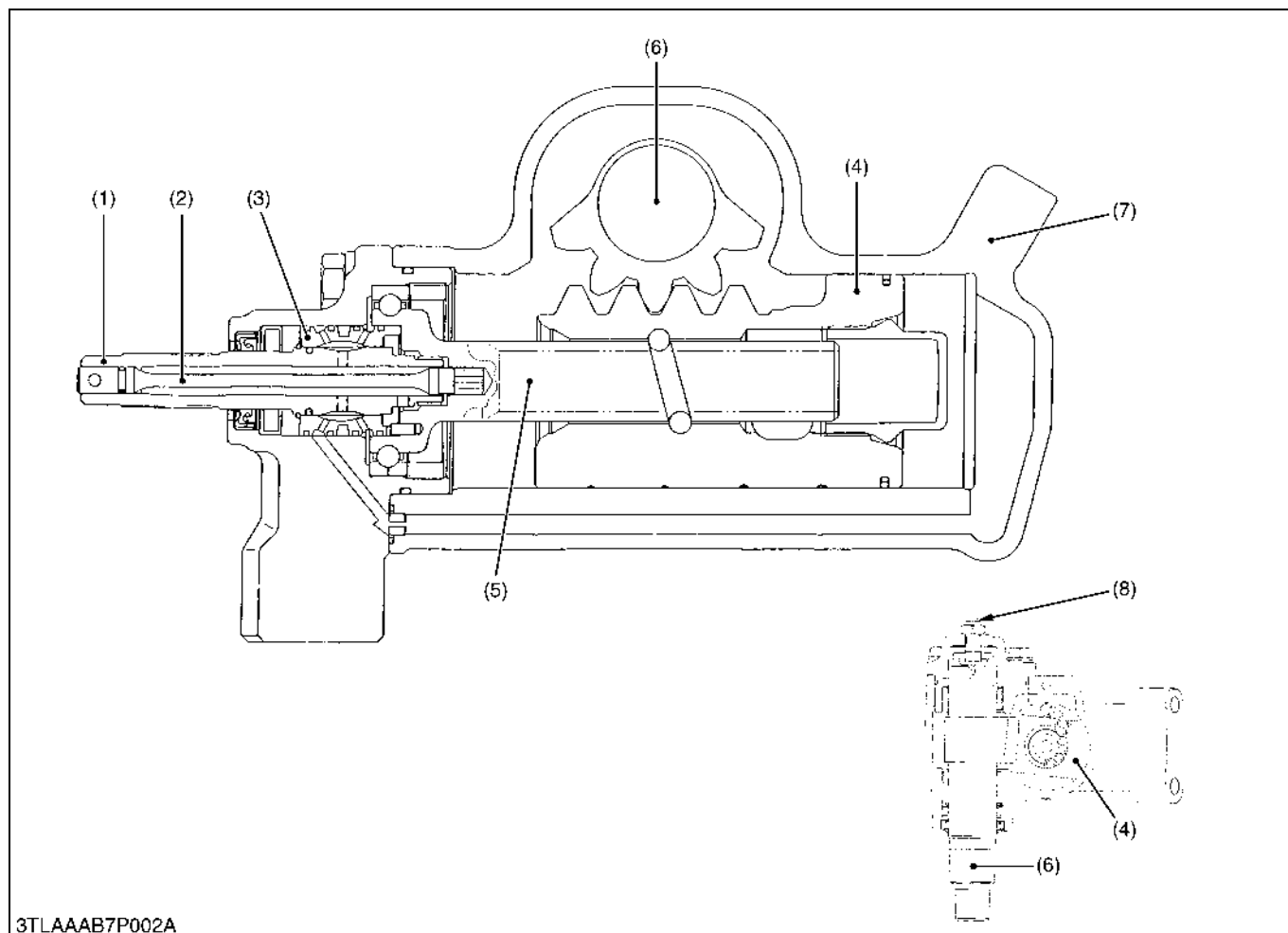
- (1) Drive Gear 1
- (2) Coupling
- (3) Drive Gear 2
- (4) Driven Gear 1
- (5) Bushing
- (6) Bushing
- (7) Driven Gear 2
- (8) Side Plate

- A: From Power Steering Controller**
- B: From Transmission Case**
- C: To Power Steering Controller**
- D: To Main Hydraulic Circuit**

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[4] STEERING GEAR BOX

(1) STRUCTURE



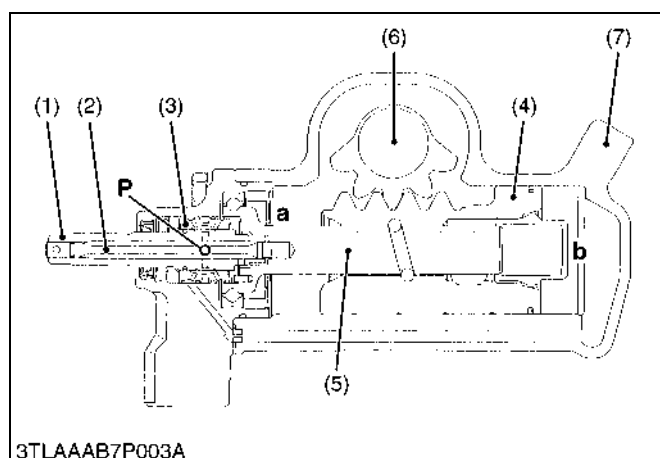
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- | | | | |
|-----------------|--------------|------------------|------------------|
| (1) Input Shaft | (3) Sleeve | (5) Main Shaft | (7) Gear Box |
| (2) Torsion Bar | (4) Ball Nut | (6) Sector Shaft | (8) Adjust Screw |

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 consists of sleeve (3), input shaft (1) and other parts. The hydraulic cylinder, on the other hand, consists of gear box (7) (cylinder tube), ball nut (4) (piston) and other parts. When the steering wheel is turned, the reaction force from the tires is exerted through the sector shaft (6) onto the main shaft (5). The torsion bar (2) is then twisted to make a gap between the input shaft (1) and sleeve (3). Such gap activates the valve to switch the oil flow direction. The sector shaft's pinion, which comes in mesh with the ball nut's rack, is tapered along the teeth. In this way, the sector shaft (6) that turns by the adjust screw (8) changes the clearance between the rack and pinion, adjusting the play of the steering wheel. (Tighten the adjust screw and the play becomes smaller, and vice versa.)

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(2) OPERATION

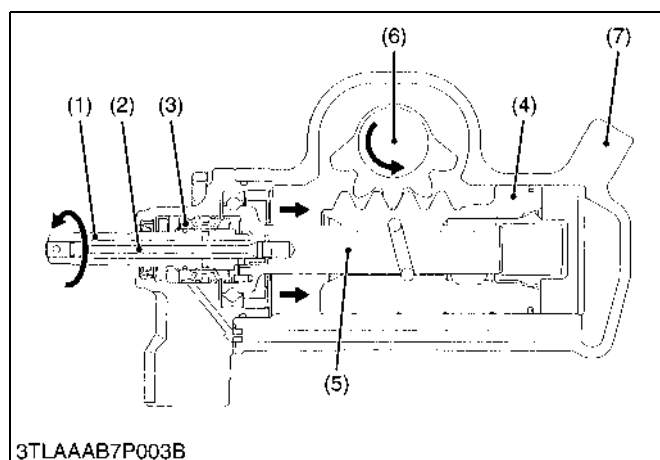


Neutral Position

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 | |

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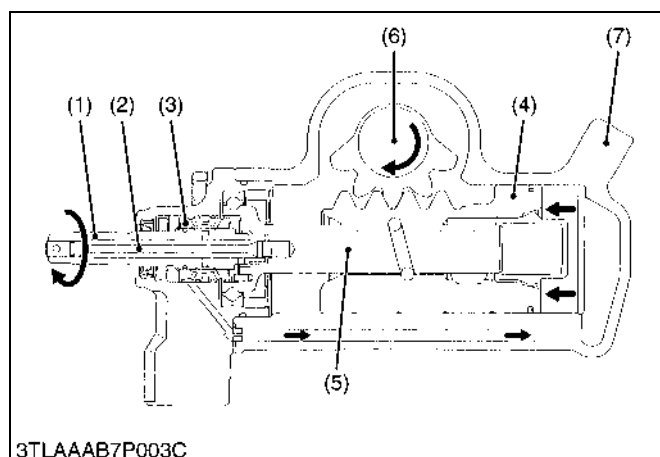


Left Turn

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 | |

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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 | |

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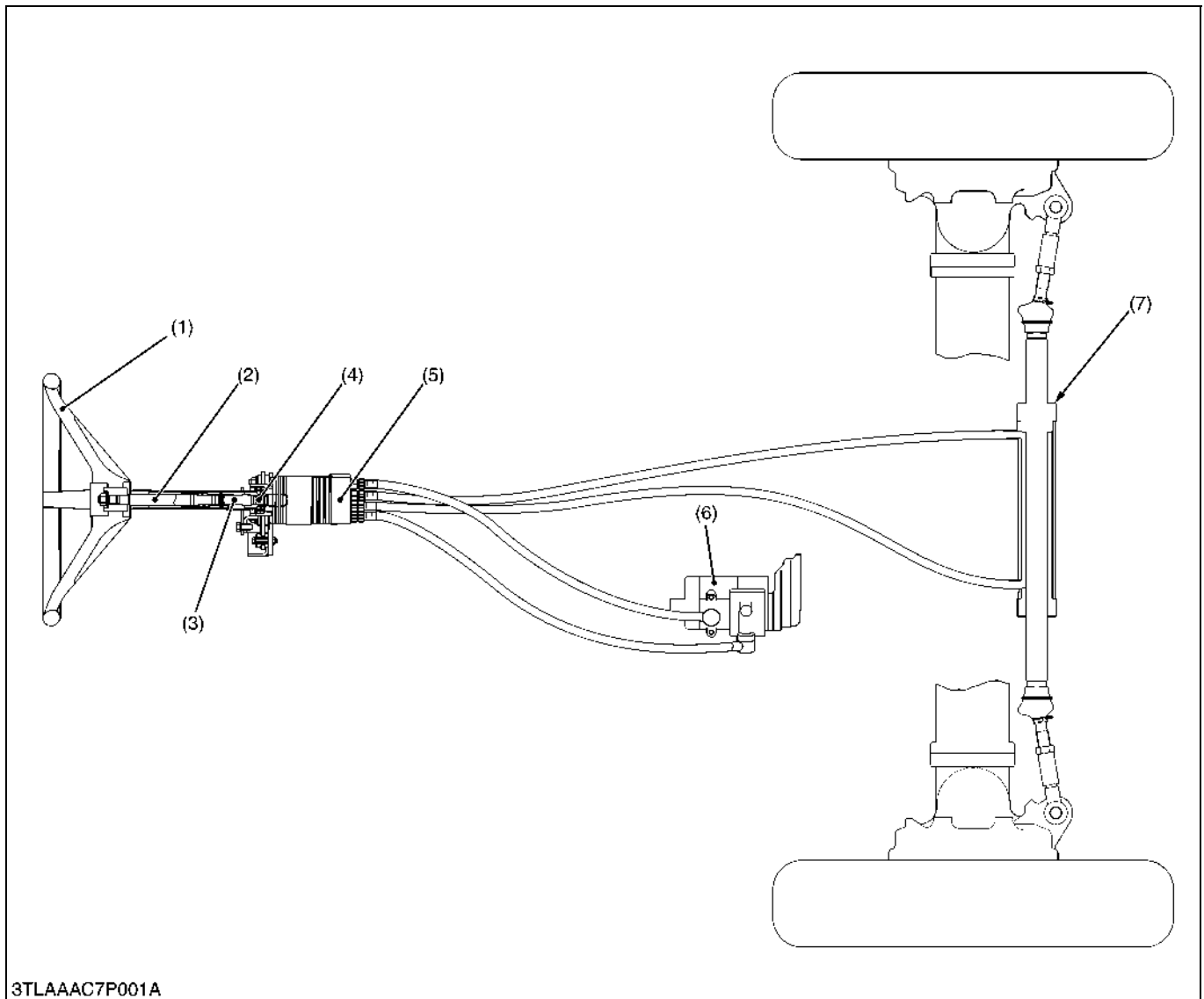
Manual Operation in Case of Hydraulic System Failure

Let's suppose that the hydraulic system gets in trouble due to a damaged pump, damaged pipe or the like and that the steering resistance is too high to use the power steering system. In such case, the steering wheel can be in the manual mode. When the steering wheel is turned, the torsion bar is twisted for the valve's stroke and from now on the steering wheel functions in the manual mode. It should be noted that the steering wheel's play becomes larger than that in the power steering mode.

9Y1211012STM0008US0

2. STRUCTURE (L4701)

[1] LINKAGE



(1) Steering Wheel
(2) Steering Shaft 1

(3) Steering Shaft 2
(4) Joint Shaft 2

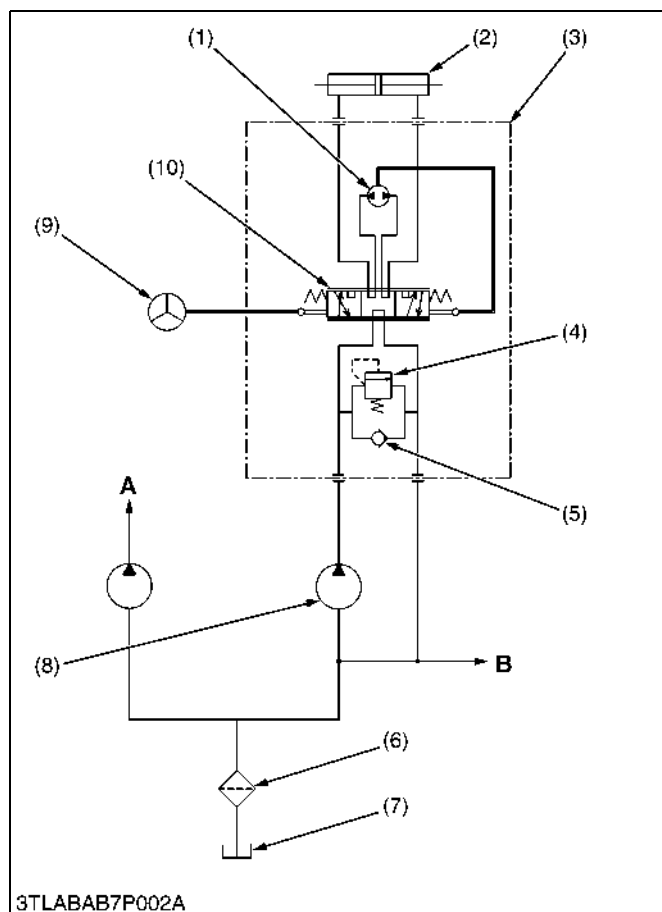
(5) Steering Controller
(6) Hydraulic Pump

(7) Steering Cylinder

Full hydrostatic type power steering is used on this model. The steering system consists of steering wheel, steering controller, steering cylinder and other components shown in the figure.

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[2] HYDRAULIC CIRCUIT



When the engine starts, the hydraulic pump (8) pressurize oil from transmission case (7) through oil filter (6) and send the oil, to the steering controller (3).

The oil which has entered steering controller (3) is directed to control valve (10).

When the steering wheel is turned, control valve (10) operates and send oil through gerotor (1) to steering cylinder (2). The cylinder rod of steering cylinder (2) moves the direction of front wheels.

Return oil from steering cylinder (2) passes through control valve (10) and is sent to the PTO clutch valve.

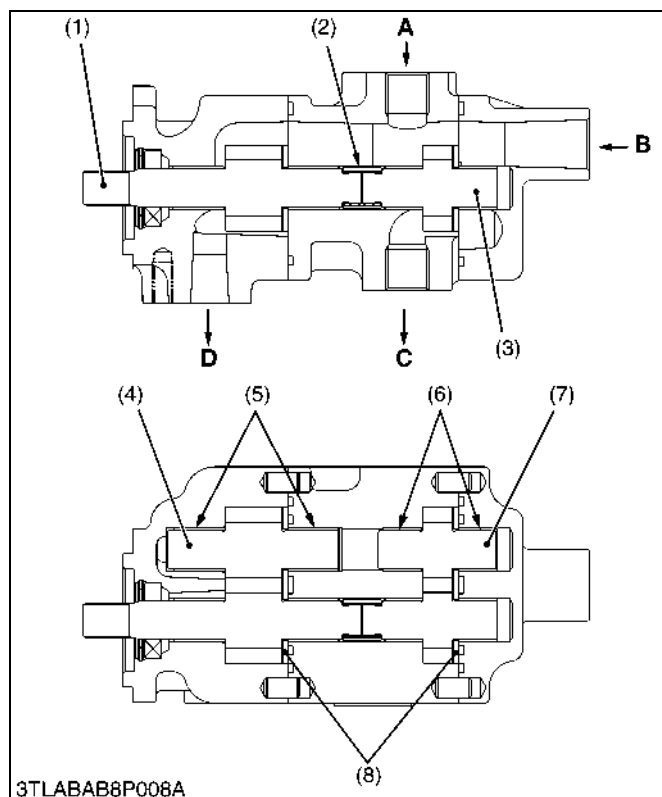
When the engine is not operating, and the steering wheel is turned, gerotor (1) rotates to supply oil to steering cylinder (2). Thus the direction of front wheel can be controlled manually.

- | | |
|-------------------------|--------------------|
| (1) Gerotor | (8) Hydraulic Pump |
| (2) Steering Cylinder | (9) Steering Wheel |
| (3) Steering Controller | (10) Control Valve |
| (4) Relief Valve | |
| (5) Check Valve | |
| (6) Oil Filter | |
| (7) Transmission Case | |

A: To Three Point Hydraulic System and Others
B: To PTO Clutch Valve

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[3] HYDRAULIC PUMP



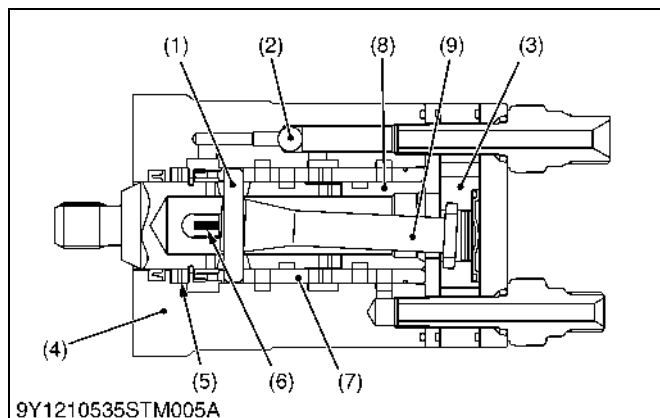
The gear type hydraulic pump is adopted for these models. This pump is called as tandem type and composed two pair of gears, side plates, bushings and other components as shown in the figure.

The hydraulic pump pressurize oil from transmission case through oil filter and send the oil to power steering circuit and main hydraulic circuit.

- | | |
|-------------------|--|
| (1) Drive Gear 1 | A: From Power Steering Controller |
| (2) Coupling | B: From Transmission Case |
| (3) Drive Gear 2 | C: To Power Steering Controller |
| (4) Driven Gear 1 | D: To Main Hydraulic Circuit |
| (5) Bushing | |
| (6) Bushing | |
| (7) Driven Gear 2 | |
| (8) Side Plate | |

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[4] STEERING CONTROLLER



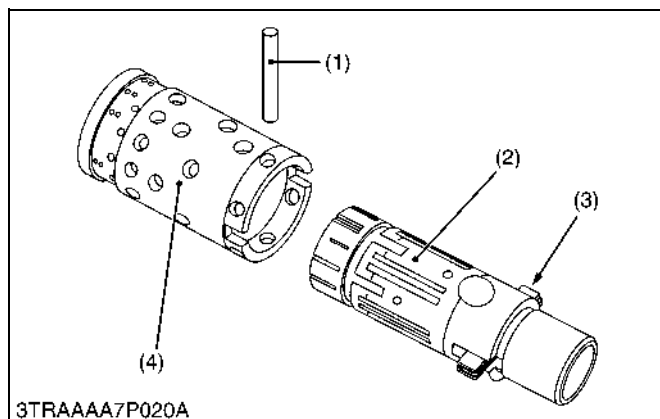
The steering controller mainly consists of a control valve, a metering device and a relief valve.

The metering device comprises a set of special gears called "**Gerotor**".

- | | |
|----------------------|----------------------|
| (1) Dowel Pin | (6) Centering Spring |
| (2) Check Valve | (7) Sleeve |
| (3) Gerotor | (8) Spool |
| (4) Housing | (9) Centering Spring |
| (5) Bearing Assembly | |

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(1) Control Valve



The control valve is a rotating spool type. When the steering wheel is not turned, the valve is kept in the neutral position by the centering spring (3).

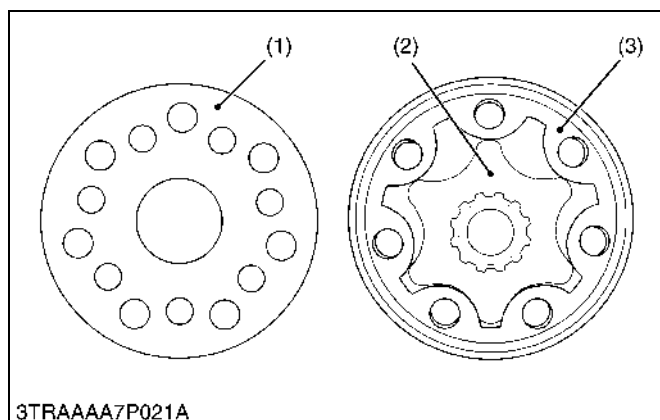
Then, the oil flow from the hydraulic pump to the steering cylinder and from the steering cylinder to the transmission case is stopped. Oil from the hydraulic pump is sent to the transmission case through the control valve.

When the steering wheel is turned clockwise or counterclockwise, the control valve, together with the gerotor, changes the direction of oil flow to the steering cylinder according to the direction, the steering wheel was turned.

- | | |
|---------------|----------------------|
| (1) Dowel Pin | (3) Centering Spring |
| (2) Spool | (4) Sleeve |

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(2) Metering Device (Gerotor)



All oil sent from the hydraulic pump to the steering cylinder, passes through the metering device (Gerotor). Namely, when the rotor is drive, three chambers suck in oil due to volumetric change in the pump chambers formed between the rotor (2) and the stator (3), while oil is discharged from other three chambers. On the other hand, rotation of the steering wheel is directly transmitted to the rotor through the steering shaft, spool, drive shaft, etc..

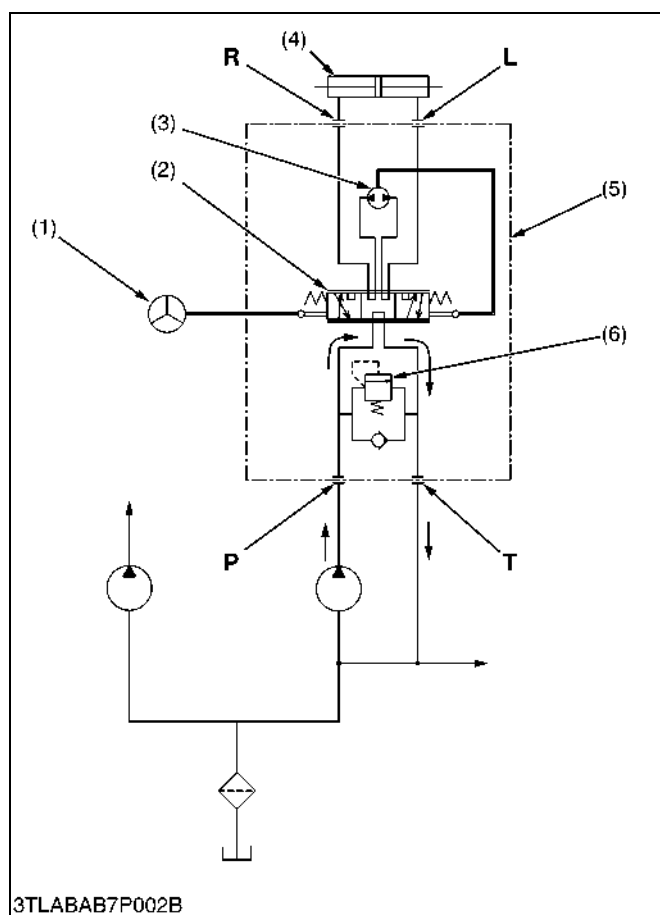
Accordingly, the gerotor serves to supply the steering cylinder with oil, amount of which corresponds to the rotation of the steering wheel. The wheels are thus turned by the angle corresponding to the rotation of the steering wheel.

When the engine stops or the hydraulic pump malfunctions, the gerotor functions as a manual trochoid pump, which makes manual steering possible.

- | | |
|-----------------|------------|
| (1) Drive Plate | (3) Stator |
| (2) Rotor | |

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(3) Oil Flow



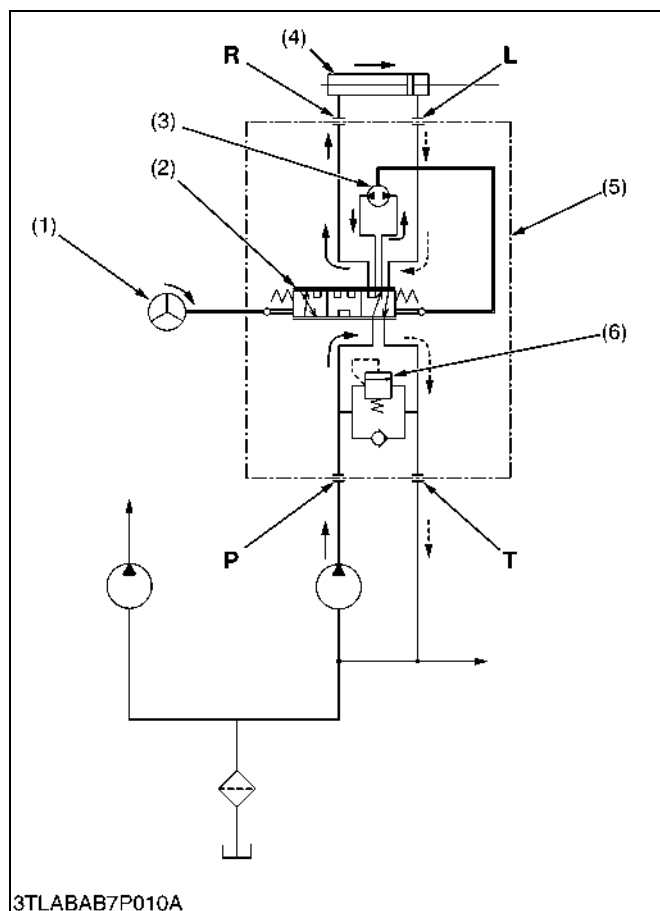
Neutral Position

When the steering wheel (1) is not being turned, valve plate (2) is held in the neutral position by centering spring. Under this condition, an oil passage is formed between **P** port (from pump) and **T** port (to transmission case) in the control valve, and all oil from the hydraulic pump flows to **T** port.

- (1) Steering Wheel
- (2) Valve Plate
- (3) Gerotor
- (4) Steering Cylinder
- (5) Steering Controller
- (6) Relief Valve

P: Pump Port
T: Tank Port
R: Cylinder Port R
L: Cylinder Port L

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Right Turn

When the steering wheel is turned to the right, the action is transmitted through the drive plate, gerotor, and drive link to the control valve. Valve plate (2) then rotates to the right on manifolds, located on the opposite faces of the valve plate (2). Thus, the **P** port passage in the control valve is connected with gerotor (3).

The stator of gerotor (3) turns by the amount corresponding to the turn of the steering wheel (1), and the gerotor performs the metering function and lets oil through it, the amount of which corresponds to the turn of the steering wheel (1).

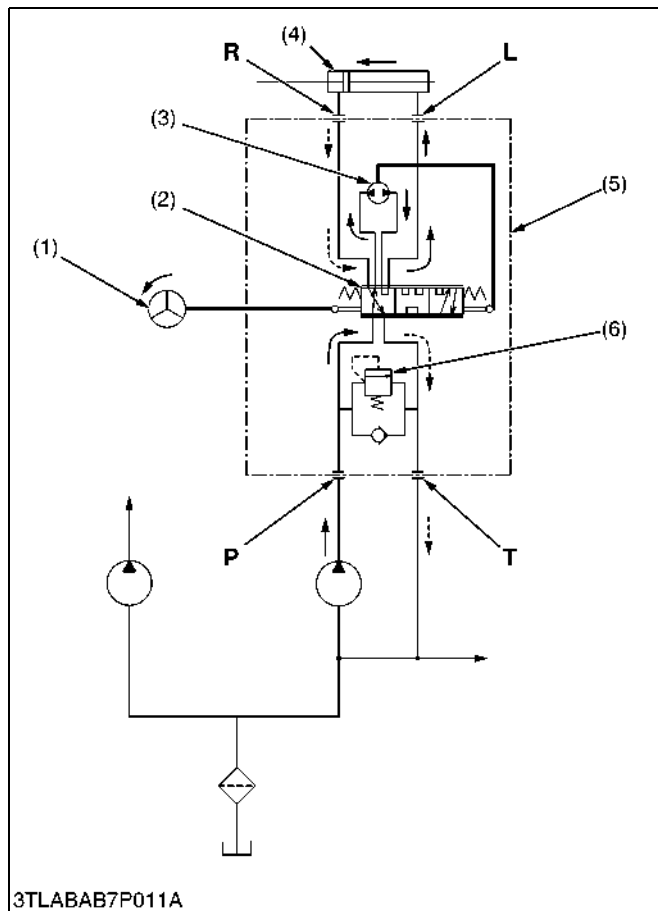
The oil which has passed through gerotor (3) flows back to the control valve, in which it is directed to cylinder port **R** to operate steering cylinder (4). Consequently, the front wheels are moved to the right through the angle corresponding to the amount of the oil.

When steering cylinder (4) operates, oil returning to cylinder port **L** flows back to the transmission case through the passage connected to **T** port in the control valve.

- (1) Steering Wheel
- (2) Valve Plate
- (3) Gerotor
- (4) Steering Cylinder
- (5) Steering Controller
- (6) Relief Valve

P: Pump Port
T: Tank Port
R: Cylinder Port R
L: Cylinder Port L

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Left Turn

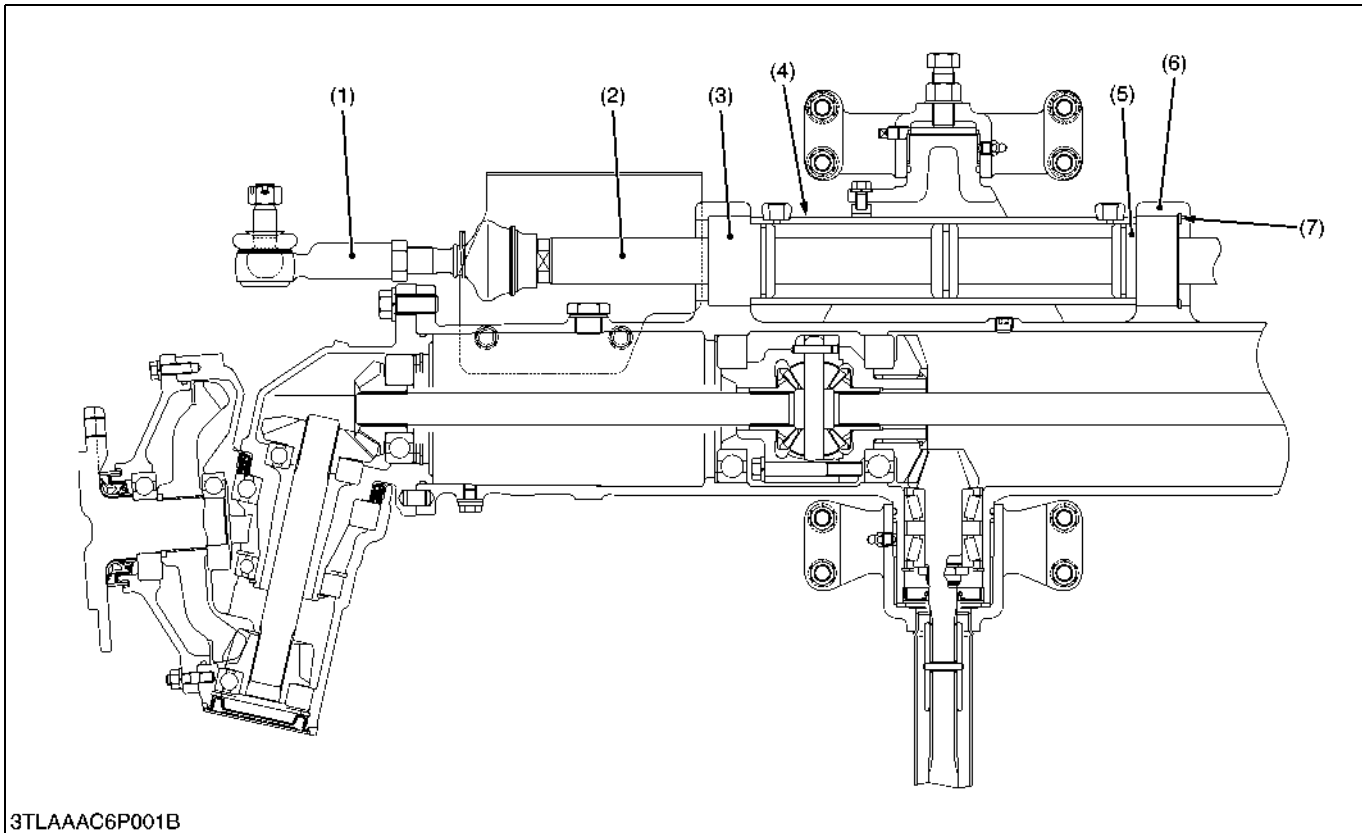
The steering system operates in the same way at a left-turn as well, except that oil flows into and out of steering cylinder in the directions opposite to those at a right-turn.

- (1) Steering Wheel
- (2) Valve Plate
- (3) Gerotor
- (4) Steering Cylinder
- (5) Steering Controller
- (6) Relief Valve

P: Pump Port
T: Tank Port
R: Cylinder Port R
L: Cylinder Port L

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[5] STEERING CYLINDER



3TLAAAC6P001B

- | | | | |
|----------------|-------------------|---------------------|------------------------|
| (1) Tie-rod | (3) Head Cover | (5) Head Cover | (7) Internal Snap Ring |
| (2) Piston Rod | (4) Cylinder Tube | (6) Front Axle Case | |

The steering cylinder is a single piston both rod double-acting type. This steering cylinder is installed parallel to the front axle and connected to tie-rods. (The above figure is shown for 4 wheel drive model. Refer to TRACTOR MECHANISM workshop manual for 2 wheel drive model.)

The tie-rods connected to both bevel gear cases guarantee an equal steering movement to both front wheels.

The steering cylinder provides force in both directions. Depending on turning direction of the steering wheel, pressure oil enters at one end of the cylinder to extend, or at the other end to retract to operate front wheels of the tractor.

9Y1211012STM0018US0

SERVICING

CONTENTS

1. TROUBLESHOOTING.....	7-S1
[1] L3301/L3901.....	7-S1
[2] L4701.....	7-S2
2. SERVICING SPECIFICATIONS.....	7-S3
3. TIGHTENING TORQUES.....	7-S5
4. CHECKING AND ADJUSTING.....	7-S6
[1] STEERING WHEEL PLAY (L3301/L3901).....	7-S6
[2] HYDRAULIC PUMP TEST USING FLOW-METER (POWER STEERING).....	7-S6
[3] RELIEF VALVE.....	7-S9
(1) L3301/L3901.....	7-S9
(2) L4701.....	7-S10
[4] BLEEDING.....	7-S10
5. DISASSEMBLING AND ASSEMBLING.....	7-S11
[1] L3301/L3901.....	7-S11
(1) Hydraulic Pump.....	7-S11
(2) Separating Steering Gear Box.....	7-S11
(3) Disassembling Steering Gear Box.....	7-S14
[2] L4701.....	7-S16
(1) Hydraulic Pump.....	7-S16
(2) Steering Controller.....	7-S18
6. SERVICING.....	7-S20
[1] L3301/L3901.....	7-S20
(1) Hydraulic Pump.....	7-S20
(2) Steering Gear Box.....	7-S21
[2] L4701.....	7-S22
(1) Hydraulic Pump.....	7-S22

1. TROUBLESHOOTING

[1] L3301/L3901

Symptom	Probable Cause	Solution	Reference Page
Excessive Steering Wheel Play	Improper wheel play adjustment	Adjust	7-S6
	Backlash between sector gear shaft and rack (piston) too large	Adjust	7-S21
	Steering linkage worn	Replace	–
	Sector gear shaft worn	Replace	7-S14
Tractor Pulls to Right or Left	Tire pressure uneven	Adjust	G-98
	Steering wheel play too small	Adjust	7-S6
	Improper toe-in adjustment	Adjust	G-35
Front Wheels Vibration	Steering linkage worn	Replace	–
	Improper toe-in adjustment	Adjust	G-35
Hard Steering	Transmission fluid improper or insufficient	Change	G-37
	Oil leak from pipe joint	Retighten	–
	Hydraulic pump malfunctioning	Replace	7-S11
	Improper relief valve adjustment	Adjust	7-S9
	Relief valve malfunctioning	Replace	7-S15
	Valve housing and sleeve malfunctioning	Replace	7-S15
	Seals in the steering gear box damaged	Replace	7-S15
	Backlash between sector gear shaft and rack (piston) too small	Adjust	7-S6
	Air in the hydraulic pipes	Air vent	7-S10
Low Operating Pressure	Hydraulic pump malfunctioning	Replace	7-S11
	Improper relief valve adjustment	Adjust	7-S9
	Relief valve malfunctioning	Replace	7-S15
	Seals in the steering gear box damaged	Replace	7-S15
	Rack (piston) malfunctioning	Replace rack (piston) assembly	7-S15
	Oil leak from pipe or pipe broken	Replace	–
Steering Wheel Does Not Return to Neutral Position	Valve housing and sleeve jammed	Repair or replace	7-S15
	Valve housing oil seal damaged	Replace	7-S15
Steering Force Fluctuates	Insufficient oil	Fill	G-37, G-65
	Insufficient bleeding	Bleed	7-S10
	Control valve malfunctioning	Replace	7-S15
Noise	Insufficient oil	Fill	G-37, G-65
	Air sucked in pump from suction circuit	Repair	7-S10
	Pipe deformed	Replace	–

9Y1211012STS0001US0

[2] L4701

Symptom	Probable Cause	Solution	Reference Page
Tractor Can Not Be Steered	Steering controller broken	Replace	7-S19
	Pipe broken	Replace	7-S19
Front Wheels Vibration	Improper toe-in adjustment	Adjust	G-63
	Air in the hydraulic system	Bleed	7-S10
	Improperly mounted wheels	Change Wheels	–
	Tie-rod end loose or worn	Retighten or replace	6-S19, 6-S21
	Front wheel hub bearing worn	Replace	6-S19
	Clearance between front axle center pivots and bracket bushing excessive	Replace	6-S24
	Steering controller malfunctioning	Replace	7-S19
Hard Steering	Hydraulic pump malfunctioning	Replace	7-S16, 7-S17
	Overload	–	–
	Transmission fluid improper or insufficient	Change or fill	G-65
	Oil leak from pipe joint	Retighten	7-S16, 7-S17
	Insufficient tire pressure	Inflate	G-98
	Steering controller malfunctioning	Replace	7-S19
	Relief valve malfunctioning	Replace	7-S10
Steering Force Fluctuates	Air sucked in pump due to leaking or missing of oil	Fill or bleed	G-65, 7-S10
	Air sucked in pump from suction circuit	Bleed	7-S10
Excessive Steering Wheel Free Play	Steering controller malfunctioning	Replace	7-S19
Front Wheels Wander to Right or Left	Air sucked in pump due to leak of oil	Fill or bleed	G-65, 7-S10
	Air sucked in pump from suction circuit	Repair	7-S10
	Tire pressure uneven	Inflate	G-98
	Insufficient bleeding	Bleed	7-S10
	Improper toe-in adjustment	Adjust	G-63
	Clearance between front axle center pivots and brackets bushings excessive	Replace	6-S24
	Tie-rod end loose or worn	Retighten or replace	6-S19, 6-S21
Noise	Steering controller malfunctioning	Replace	7-S19
	Air sucked in pump due to lack of oil	Fill or bleed	G-65, 7-S10
	Air sucked in pump from suction circuit	Repair	7-S10
Wheel are Turned to a Direction Opposite to Steering Direction	Pipe deformed	Replace	–
	Power steering hoses are connected in reverse	Reconnect steering hoses	7-S19

2. SERVICING SPECIFICATIONS

STEERING WHEEL PLAY

Item		Factory Specification	Allowable Limit
Steering Wheel [L3301/L3901]	Play	20 to 50 mm 0.79 to 1.9 in.	—

POWER STEERING

Item		Factory Specification	Allowable Limit
Hydraulic Pump [L3301/L3901] Condition - Engine Speed: approx. 2700 min⁻¹ (rpm) - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure	Above 14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 14.1 L/min. 3.72 U.S.gals/min. 3.10 U.S.gals/min.	11.9 L/min. 3.14 U.S.gals/min. 2.62 Imp.gals/min.
Hydraulic Pump [L4701] Condition - Engine Speed: approx. 2600 min⁻¹ (rpm) - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure	Above 17.7 L/min. 4.68 U.S.gals/min. 3.89 Imp.gals/min.	—
	Delivery at Rated Pressure ⁷	Above 17.4 L/min. 4.60 U.S.gals/min. 3.83 Imp.gals/min.	14.6 L/min. 3.86 U.S.gals/min. 3.21 Imp.gals/min.

RELIEF VALVE

Item		Factory Specification	Allowable Limit
Relief Valve [L3301] Condition - Engine Speed: Maximum - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Steering Pressure [2WD]	8.3 to 9.3 MPa 85 to 95 kgf/cm ² 1200 to 1300 psi	—
	Steering Pressure [4WD]	11.4 to 12.4 MPa 116 to 126 kgf/cm ² 1650 to 1790 psi	—
Relief Valve [L3901] Condition - Engine Speed: Maximum - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Steering Pressure [2WD]	8.1 to 9.1 MPa 83 to 93 kgf/cm ² 1200 to 1300 psi	—
	Steering Pressure [4WD]	11.1 to 12.1 MPa 113 to 123 kgf/cm ² 1610 to 1740 psi	—
Relief Valve [L4701] Condition - Engine Speed: Maximum - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Steering Pressure [2WD]	8.0 to 9.0 MPa 81 to 91 kgf/cm ² 1200 to 1300 psi	—
	Steering Pressure [4WD]	10.7 to 11.7 MPa 109 to 119 kgf/cm ² 1550 to 1690 psi	—

HYDRAULIC PUMP

Item		Factory Specification	Allowable Limit
Housing Bore	Depth of scratch	0.09 mm 0.0035 in.	—
Bushing to Gear Shaft	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.

STEERING GEAR BOX

Item		Factory Specification	Allowable Limit
Sector Gear to Ball Nut	Clearance	0.3 mm 0.01 in.	—
Valve Housing to Spool	Clearance	0.17 to 0.28 mm 0.0067 to 0.011 in.	0.04 mm 0.02 in.
Steering Gear Box and Ball Nut	Clearance	0.035 to 0.080 mm 0.0014 to 0.0031 in.	0.15 mm 0.0059 in.
Ball Nut Assembly	Axial Play	0.02 mm 0.0008 in.	0.04 mm 0.001 in.

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3. TIGHTENING TORQUES

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

[L3301/L3901]

Item	N·m	kgf·m	lbf·ft
Joint shaft bolt	23.5 to 27.4	2.4 to 2.8	18 to 20
Power steering delivery pipe joint bolt	49 to 68	5.0 to 7.0	37 to 50
PS relief pressure adjusting screw lock nut	33 to 46	3.4 to 4.6	25 to 33
Delivery pipe (power steering) joint screw	49 to 68	5.0 to 7.0	37 to 50
Hydraulic pump assembly mounting screw and nut	24 to 27	2.4 to 2.8	18 to 20
Delivery pipe (3-point hitch) mounting bolt	24 to 27	2.4 to 2.8	18 to 20
Tie-rod end nut (2WD)	49 to 68	5.0 to 7.0	37 to 50
Tie-rod end nut (4WD)	35 to 44	3.5 to 4.5	26 to 32
Oil cooler hose clamp	2.0 to 2.4	0.20 to 0.25	1.5 to 1.8
Delivery pipe joint bolt	40 to 49	4.0 to 5.0	29 to 36
Return pipe retaining nut	30 to 49	3.0 to 5.0	22 to 36
Steering gear box mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Pitman arm mounting nut	147 to 196	15.0 to 20.0	109 to 144
Lock nut (Side cover)	59 to 78	6.0 to 8.0	44 to 57
Side cover mounting screw	20 to 29	2.0 to 3.0	15 to 21
Valve housing mounting screw	48 to 55	4.9 to 5.7	36 to 41
Lock nut (Ball nut assembly)	88.3 to 107	9.0 to 11.0	65.1 to 79.5
Lock nut (Relief valve)	49 to 78	5.0 to 8.0	37 to 57

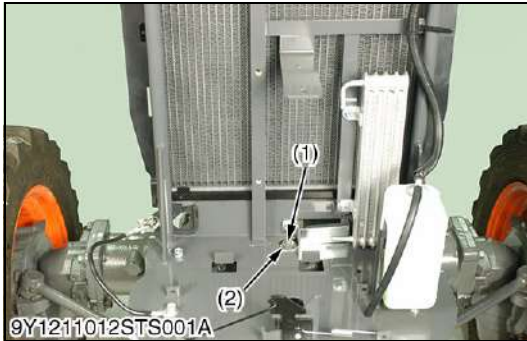
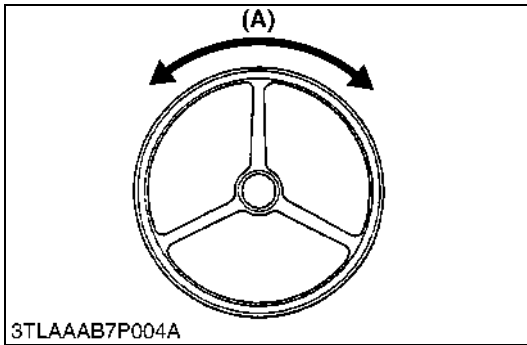
[L4701]

Item	N·m	kgf·m	lbf·ft
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
Delivery pipe (PTO) joint bolt	34.3 to 39.2	3.5 to 4.0	26 to 28
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
Delivery pipe (regulator) joint bolt	39.2 to 49.0	4.0 to 5.0	29 to 36
Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6	1.8 to 2.1	13 to 15
Regulator valve mounting screws	17.6 to 20.6	1.8 to 2.1	13 to 15
Hydraulic pump assembly mounting screw and nut	24 to 27	2.4 to 2.8	18 to 20
Pump cover mounting screw	40 to 44	4.0 to 4.5	29 to 32
Steering wheel nut	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear bonnet mounting bolt	4 to 5	0.4 to 0.6	3 to 4
Main delivery hose retaining nut	46.6 to 50.9	4.8 to 5.2	35 to 37
Delivery hose retaining nut	24.5 to 29.4	2.5 to 3.0	18 to 21
Steering controller mounting nut	23.5 to 27.5	2.4 to 2.8	17.3 to 20.3

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4. CHECKING AND ADJUSTING

[1] STEERING WHEEL PLAY (L3301/L3901)



Steering Wheel Play

1. Turn the front wheels straight ahead.
2. Rotate the steering wheel lightly by hand, and measure the play **(A)**.
3. If the play **(A)** is not within the factory specifications, turn the adjusting screw (1) to adjust.

Steering wheel play (A)	Factory specification	20 to 50 mm 0.79 to 1.9 in.
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(Adjusting)

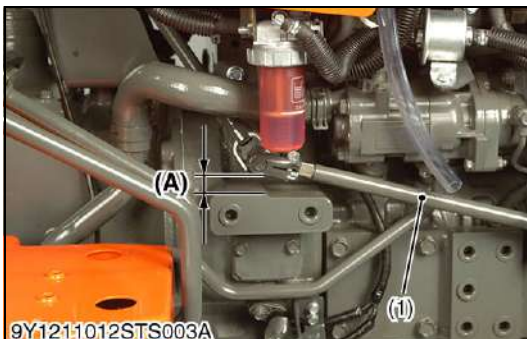
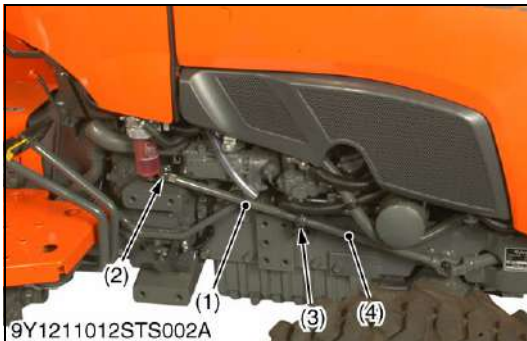
- Remove the battery.
- Loosen the lock nut (2) and turn the adjusting screw (1) with a screwdriver to adjust the play **(A)**.
When the adjusting screw (1) is turned clockwise, the play **(A)** decreases.
- After adjustment, fix it with lock nut (2) while holding the adjusting screw (1).

- (1) Adjusting Screw
(2) Lock Nut

(A) Play

9Y1211012STS0005US0

[2] HYDRAULIC PUMP TEST USING FLOW-METER (POWER STEERING)



Preparation (L3301/L3901 Only)

1. Remove the bolt (2), (4).
2. Remove the joint shaft (1).

(When reassembling)

- Lift the joint shaft (1) so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the joint shaft (1) and flywheel housing.
Then fit the support (3) in position.
- Be sure to insert the bolt (2) into cut-out of joint shaft (1).
- Apply grease to spline part of joint shaft (1).

Tightening torque	Bolt (Joint shaft)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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- (1) Joint Shaft
(2) Bolt (Joint Shaft)
(3) Support
(4) Bolt (Support)

(A) Clearance

9Y1211012STS0006US0



Hydraulic Flow Test

■ IMPORTANT

- When using a flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with that flowmeter.
 - Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.
1. Remove the power steering delivery pipe or delivery hose joint bolt and install the pump adaptor **2** to the pump discharge port.
 2. Connect the hydraulic test hose to the pump adaptor **2** and flowmeter inlet port.
 3. Connect the other hydraulic test hose to the flowmeter outlet port and to transmission fluid filling plug hole.
 4. Open the flowmeter loading valve completely. (Turn counterclockwise.)
 5. Start the engine and set the engine speed at 2000 to 2200 min⁻¹ (rpm).
 6. Slowly close the loading valve to generate pressure approx. 9.81 MPa (100 kgf/cm², 1420 psi). Hold in this condition until oil temperature reached approx. 40 °C (104 °F).
 7. Open the loading valve completely.
 8. Set the engine speed. (Refer to **Condition**.)
 9. Read and note the pump delivery at no pressure.
 10. Slowly close the loading valve to increase pressure (Rated pressure). As the load is increased, engine speed drops, therefore, reset the engine speed.
 11. Read and note the pump delivery at rated pressure.
 12. Open the loading valve completely and stop the engine.
 13. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

(When reassembling)

- Install the copper washers firmly.

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft

Condition

- Engine speed:
 - [L3301/L3901]**
approx. 2700 min⁻¹ (rpm)
 - [L4701]**
approx. 2600 min⁻¹ (rpm)
- Rated pressure:
 - [L3301/L3901]**
11.1 to 12.0 MPa (113 to 123 kgf/cm², 1640 to 1740 psi)
 - [L4701]**
10.7 to 11.7 MPa (109 to 119 kgf/cm², 1552 to 1697 psi)
- Oil temperature:
40 to 60 °C (104 to 140 °F)

[A] L3301/L3901

[B] L4701

(To be continued)

(Continued)**[L3301/L3901]**

Hydraulic pump delivery at no pressure	Factory specification	Above 14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 14.1 L/min. 3.72 U.S.gals/min. 3.10 U.S.gals/min.
	Allowable limit	11.9 L/min. 3.14 U.S.gals/min. 2.62 Imp.gals/min.

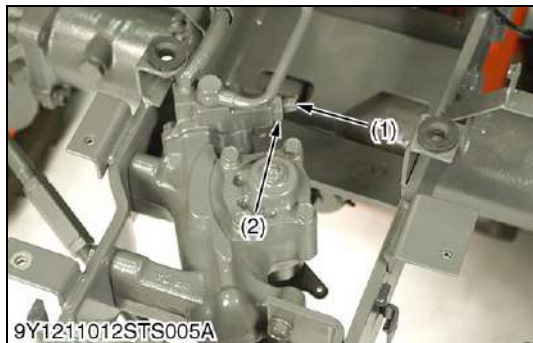
[L4701]

Hydraulic pump delivery at no pressure	Factory specification	Above 17.7 L/min. 4.68 U.S.gals/min. 3.89 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 17.4 L/min. 4.60 U.S.gals/min. 3.83 Imp.gals/min.
	Allowable limit	14.6 L/min. 3.86 U.S.gals/min. 3.21 Imp.gals/min.

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[3] RELIEF VALVE

(1) L3301/L3901



Relief Valve Setting Pressure

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, and adjust relief valve setting pressure by turning adjusting screw (1).

[L3301]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.3 to 9.3 MPa 85 to 95 kgf/cm ² 1200 to 1300 psi
		4WD	11.4 to 12.4 MPa 116 to 126 kgf/cm ² 1650 to 1790 psi

[L3901]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.1 to 9.1 MPa 83 to 93 kgf/cm ² 1200 to 1300 psi
		4WD	11.1 to 12.1 MPa 113 to 123 kgf/cm ² 1610 to 1740 psi

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	PS relief pressure adjusting screw lock nut	33 to 46 N·m 3.4 to 4.6 kgf·m 25 to 33 lbf·ft

Condition

- Engine speed:
Maximum
- Oil temperature:
40 to 60 °C (104 to 140 °F)

(Reference)

- Setting pressure change approx. 1.27 MPa (13 kgf/cm², 180 psi) per adjusting screw 1/4 turn.
- When turn the adjusting screw clockwise, setting pressure increase.

(1) Adjusting Screw

(2) PS Relief Pressure Adjusting Screw
Lock Nut

9Y1211012STS0008US0

(2) L4701**Relief Valve Setting Pressure**

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, or replace the power steering controller.

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.0 to 9.0 MPa 81 to 91 kgf/cm ² 1200 to 1300 psi
		4WD	10.7 to 11.7 MPa 109 to 119 kgf/cm ² 1550 to 1690 psi

Tightening torque	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
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Condition

- Engine speed:
Maximum
- Oil temperature:
40 to 60 °C (104 to 140 °F)

[A] Manual Transmission Model

[B] HST Model

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[4] BLEEDING

If disassembling hydraulic pipe for power steering, power steering hoses or hydraulic pump, operation of bleeding (air bent) is needed.

The procedure is below.

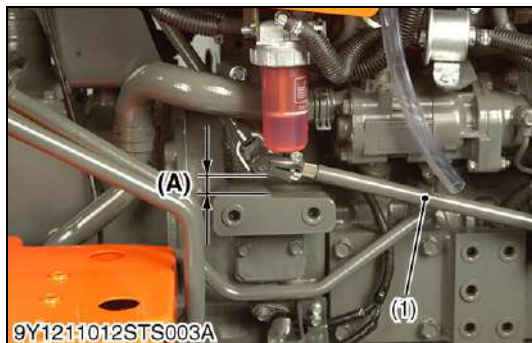
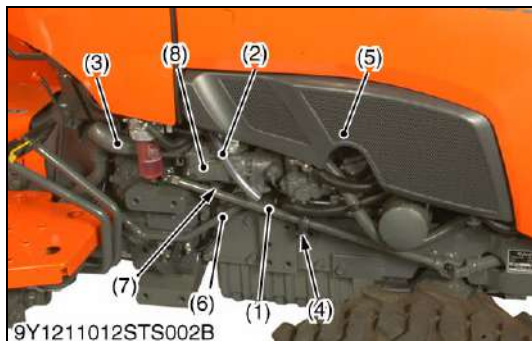
1. START THE ENGINE.
2. Turn the steering wheel slowly in both directions all the way alternately several times and stop the engine.

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5. DISASSEMBLING AND ASSEMBLING

[1] L3301/L3901

(1) Hydraulic Pump



Hydraulic Pump Assembly

1. Remove the side cover (5).
2. Remove the steering joint shaft (1).
3. Disconnect the suction hose (3).
4. Disconnect the return hose (8).
5. Remove the delivery pipe (6), (7).
6. Remove the hydraulic pump (2).

(When reassembling)

- Lift the universal joint so that there should be a clearance (A) of more than 5 mm (0.2 in.) between the universal joint and flywheel housing.
- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Delivery pipe (power steering) joint screw	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

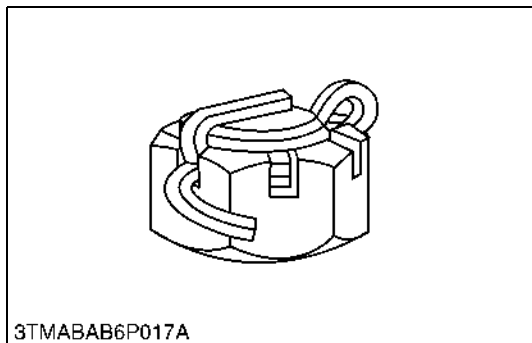
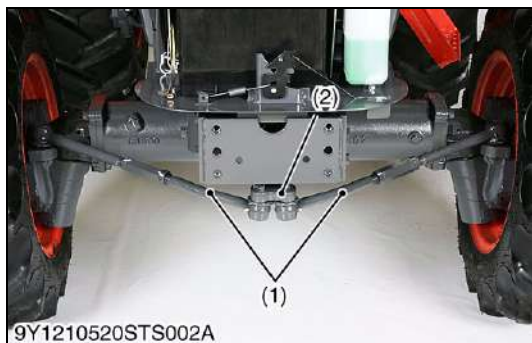
- (1) Joint Shaft
(2) Hydraulic Pump
(3) Suction Hose
(4) Support
(5) Side Cover

- (6) Delivery Pipe (3-point Hitch)
(7) Delivery Pipe (Power Steering)
(8) Return Hose

(A) Clearance

9Y1211012STS0011US0

(2) Separating Steering Gear Box



Bumper and Tie-rods

1. Place the disassembling stand under the transmission case.
2. Remove the bumper.
3. Remove the tie-rods with the tie-rod end lifter from pitman arm (2).
In this case, take special case not to damage the tie-rod end nut (slotted nut). (It is preferable to replace it with an unrequired nut.).
4. Reinstall the bumper.

Tightening torque	Tie-rod end nut	2WD	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
		4WD	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft

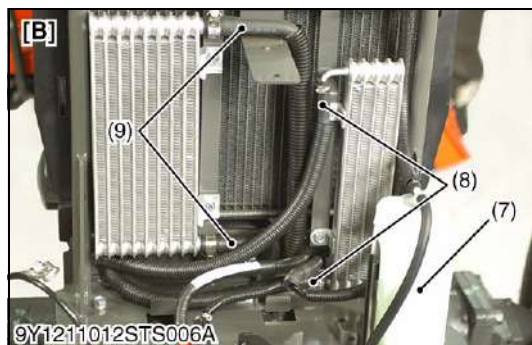
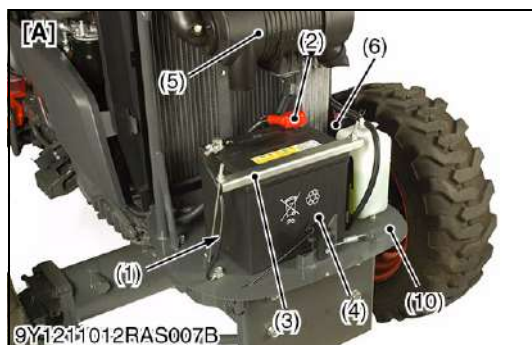
■ IMPORTANT

- After tightening the tie-rod end nut to the specified torque, install a cotter pin as shown in the figure left.

- (1) Tie-rod

- (2) Pitman Arm

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Reserve Tank, Battery and Front Support

1. Remove battery negative cable (1).
2. Disconnect battery plus connector (2).
3. Remove battery stay (3).
4. Remove battery (4).
5. Remove air cleaner assembly (5).
6. Remove slow blow fuse boxes (6).
7. Disconnect reserve tank hoses and remove reserve tank (7).
8. Disconnect fuel cooler hoses (8) from fuel cooler.
9. Disconnect oil cooler hoses (9) from oil cooler.
10. Remove front support (10).

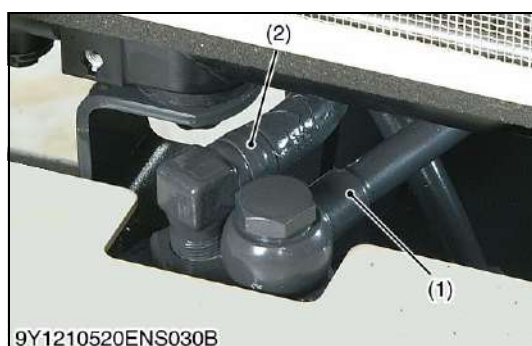
(When reassembling)

Tightening torque	Oil cooler hose clamp	2.0 to 2.4 N·m 0.20 to 0.25 kgf·m 1.5 to 1.8 lbf·ft
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- | | |
|----------------------------|----------------------|
| (1) Battery Negative Cable | (8) Fuel Cooler Hose |
| (2) Battery Plus Connector | (9) Oil Cooler Hose |
| (3) Battery Stay | (10) Front Support |
| (4) Battery | |
| (5) Air Cleaner Assembly | |
| (6) Slow Blow Fuse Box | |
| (7) Reserve Tank | |

[A] Manual Transmission Model
[B] HST Model

9Y1211012STS0013US0



Delivery Pipe and Return Hose [Manual Transmission Model]

1. Disconnect the power steering delivery pipe (1) and return hose (2).

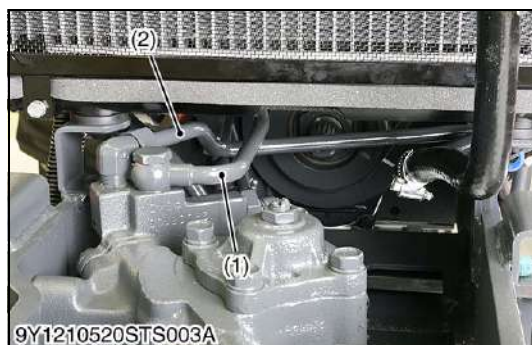
(When reassembling)

- Install the new copper washers to the delivery pipe joint screw securely.
- Wind seal tape on joint elbow part of return hose (2).

Tightening torque	Delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
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- | | |
|-------------------|-----------------|
| (1) Delivery Pipe | (2) Return Hose |
|-------------------|-----------------|

9Y1211012STS0014US0



Delivery Pipe [HST Model]

1. Disconnect the return pipe (2).
2. Remove the joint screw and disconnect the delivery pipe (1).

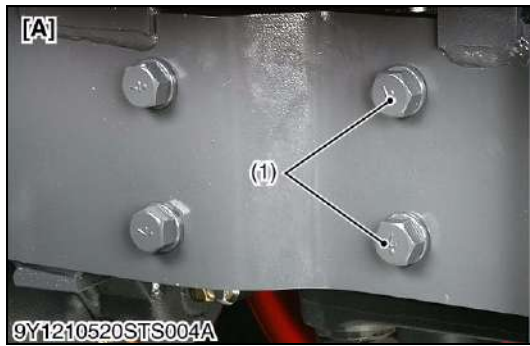
(When reassembling)

- Install the new copper washers to the delivery pipe joint screw securely.

Tightening torque	Delivery pipe joint bolt	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Return pipe retaining nut	30 to 49 N·m 3.0 to 5.0 kgf·m 22 to 36 lbf·ft

- | | |
|-------------------|-----------------|
| (1) Delivery Pipe | (2) Return Pipe |
|-------------------|-----------------|

9Y1211012STS0015US0



Steering Gear Box Assembly

1. Remove the bolts (1).
2. Remove the steering gear box (2).

(When reassembling)

Tightening torque	Steering gear box mounting bolt	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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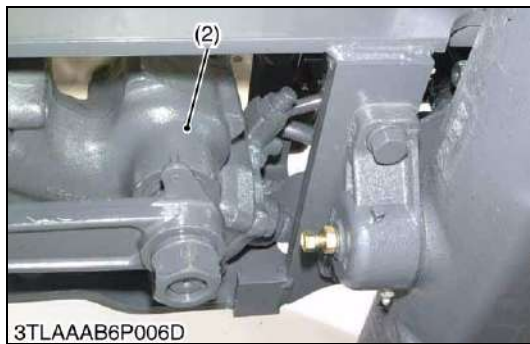
(1) Steering Gear Box Mounting Bolt

[A] Right Side

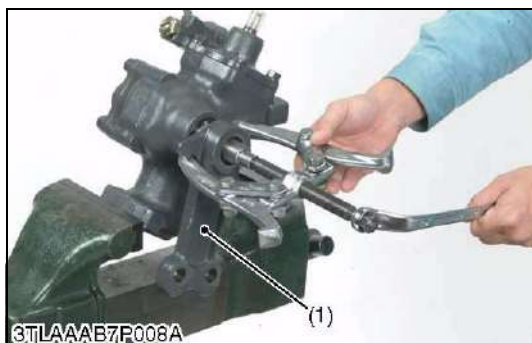
(2) Steering Gear Box

[B] Left Side

9Y1211012STS0016US0



(3) Disassembling Steering Gear Box



Pitman Arm

1. Turn the input shaft clockwise and counterclockwise several times to drain oil from gear box.
2. Secure the power steering gear box with a vise.
3. Remove the nut and spring washer.
4. Remove the pitman arm (1) with puller.

(When reassembling)

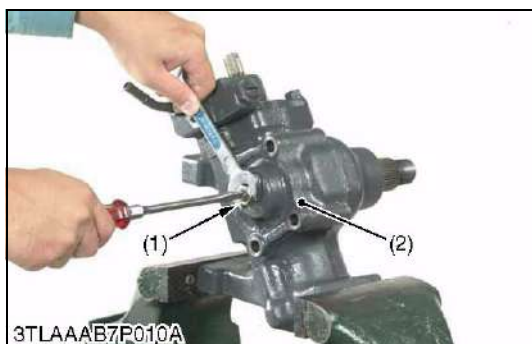
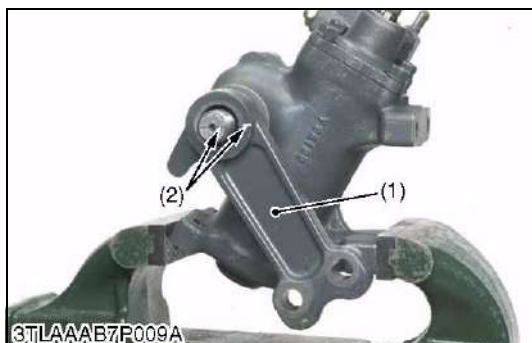
- Install the pitman arm to the sector shaft, aligning their aligning marks (2).

Tightening torque	Pitman arm mounting nut	147 to 196 N·m 15.0 to 20.0 kgf·m 109 to 144 lbf·ft
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(1) Pitman Arm

(2) Aligning Mark

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Side Cover

1. Loosen the lock nut (1).
2. Remove the side cover mounting screws, turn the adjusting screw clockwise, and remove the side cover (2).

(When reassembling)

Tightening torque	Lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft
	Side cover mounting screw	20 to 29 N·m 2.0 to 3.0 kgf·m 15 to 21 lbf·ft

(1) Lock Nut

(2) Side Cover

9Y1211012STS0018US0

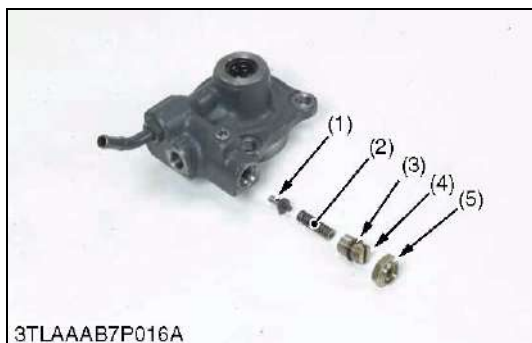


Sector Gear Shaft

1. Remove the sector gear shaft (1) from the side cover.

(1) Sector Gear Shaft

9Y1211012STS0019US0



Valve Assembly

1. Remove the valve housing mounting screws.
2. Remove the valve assembly (1) and ball nut (2).

(When reassembling)

- Apply oil to O-ring and oil seal.

Tightening torque	Valve housing mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
-------------------	------------------------------	---

(1) Valve Assembly

(2) Ball Nut

9Y1211012STS0020US0

Ball Nut Assembly

1. Remove the lock nut (1).
2. Remove the ball nut assembly (2).

(When reassembling)

- Apply oil to sleeve.

Tightening torque	Lock nut	88.3 to 107 N·m 9.0 to 11.0 kgf·m 65.1 to 79.5 lbf·ft
-------------------	----------	---

(1) Lock Nut

(2) Ball Nut Assembly

9Y1211012STS0021US0

Relief Valve

1. Loosen the lock nut (5) and remove the adjusting screw (4).
2. Remove the spring (2) and poppet (1).

(When reassembling)

- Apply grease to O-ring (3).
- Be sure to adjust the relief valve pressure. (See page 7-S9.)

Tightening torque	Lock nut	49 to 78 N·m 5.0 to 8.0 kgf·m 37 to 57 lbf·ft
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(1) Poppet

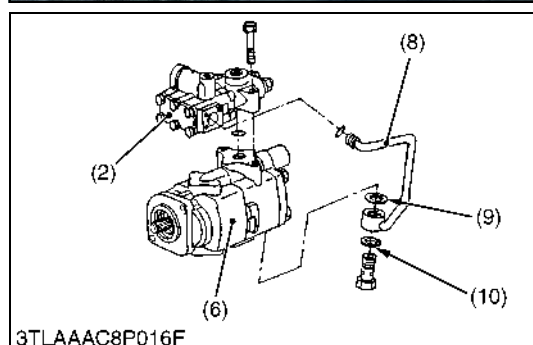
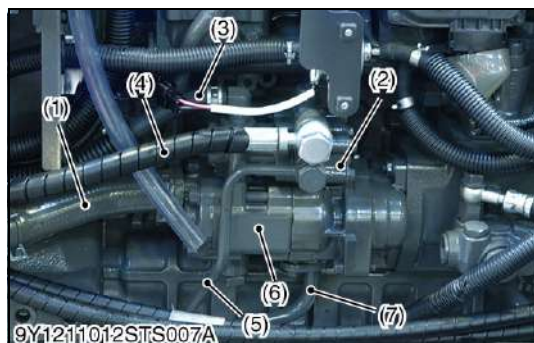
(4) Adjusting Screw

(2) Spring

(5) Lock Nut

(3) O-ring

9Y1211012STS0022US0

[2] L4701**(1) Hydraulic Pump****[A] Manual Transmission Model****Preparation**

1. Remove the side cover (R.H.).
2. Disconnect the delivery pipe (PTO) (5), power steering delivery hose (4) and power steering return hose (3) from the regulator valve (2).
3. Remove the delivery pipe (regulator) (8).
4. Disconnect the delivery pipe (3-point hitch) (7) from the hydraulic pump (6).
5. Disconnect the suction hose (1).

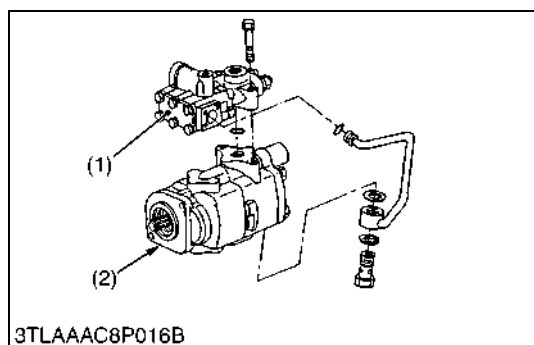
(When reassembling)

- Apply grease to the O-rings and be careful not to damage them.
- Be sure to wrap a seal tape to thread part of power steering return hose (3).
- There are 2 types of washer for power steering delivery hose. Thicker one should be attached engine side.

Tightening torque	Delivery pipe (PTO) joint bolt	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
	Delivery pipe (regulator) joint bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- | | |
|----------------------------------|-----------------------------------|
| (1) Suction Hose | (6) Hydraulic Pump |
| (2) Regulator Valve | (7) Delivery Pipe (3-point Hitch) |
| (3) Power Steering Return Hose | (8) Delivery Pipe (Regulator) |
| (4) Power Steering Delivery Hose | (9) Copper Washer |
| (5) Delivery Pipe (PTO) | (10) Copper Washer (Thicker) |

9Y1211012STS0023US0

**Regulator Valve and Hydraulic Pump Assembly**

1. Loosen and remove the regulator valve mounting screws.
2. Remove the regulator valve (1).
3. Loosen and remove the hydraulic pump assembly mounting screws and nuts, then remove the hydraulic pump assembly.

(When reassembling)

- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Regulator valve mounting screws	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

- | | |
|---------------------|-----------------------------|
| (1) Regulator Valve | (2) Hydraulic Pump Assembly |
|---------------------|-----------------------------|

9Y1211012STS0024US0

[B] HST Model**Hydraulic Pump Assembly**

1. Remove the side cover.
2. Disconnect the suction hose (1).
3. Disconnect the power steering return hose (2).
4. Disconnect the delivery pipe (3-point hitch) (3).
5. Disconnect the power steering delivery hose (4).
6. Remove the hydraulic pump (5).

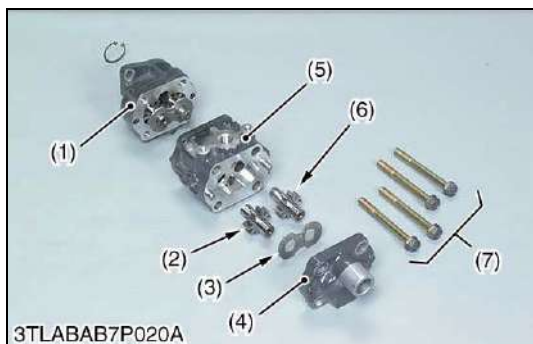
(When reassembling)

- Apply grease to the O-ring and be careful not to damage it.
- Be sure to wrap a seal tape to thread part of power steering return hose (2).

Tightening torque	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- | | |
|-----------------------------------|----------------------------------|
| (1) Suction Hose | (4) Power Steering Delivery Hose |
| (2) Power Steering Return Hose | (5) Hydraulic Pump |
| (3) Delivery Pipe (3-point Hitch) | |

9Y1211012STS0025US0

**Hydraulic Pump Assembly**

1. Remove the pump cover mounting screw (7).
2. Remove the drive gear (6), driven gear (2) and side plate (3) from the casing.

(When reassembling)

- Be careful no to damage the gasket.
- Align the hole of the pump cover (4) and casing 2 (5).
- Install the side plate, noting its location and direction.
- Install the gears, noting its direction.

Tightening torque	Pump cover mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
-------------------	---------------------------	---

- | | |
|-----------------|----------------|
| (1) Casing 1 | (5) Casing 2 |
| (2) Driven Gear | (6) Drive Gear |
| (3) Side Plate | (7) Screw |
| (4) Pump Cover | |

9Y1211012STS0026US0

Hydraulic Pump Running-in

After reassembly, perform break-in operation in the following manner, and check the pump for abnormality before use. If the pump temperature should rise noticeably during running-in, recheck should be performed.

1. Install the hydraulic pump to the tractor, and mount the suction pipe and delivery pipe securely.
2. Set the engine speed at 1300 to 1500 mm⁻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 2.9 MPa (30 kgf/cm², 430 psi) to 4.9 MPa (50 kgf/cm², 710 psi) pressure, operate it for approx. 15 minutes.
4. With the engine set to maximum speed, fully turn the steering wheel to the left or right, then actuate the relief valve five times for 25 seconds (one time 5 seconds).

9Y1211012STS0027US0

(2) Steering Controller



Battery Negative Cable Terminal

- 1. Open the bonnet.
 - 2. Disconnect the battery negative cable terminal connector (1).
- (1) Battery Negative Terminal Connector

9Y1211012STS0035US0



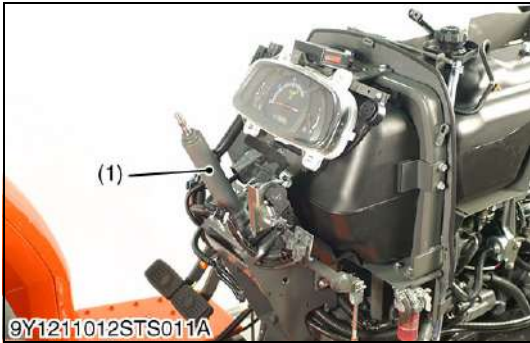
Steering Wheel and Rear Bonnet

- 1. Remove steering wheel cap (1).
- 2. Remove steering wheel nut (5).Remove steering wheel (2) with steering puller.
- 3. Remove the throttle grip (3).
- 4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

- (1) Steering Wheel Cap
- (2) Steering Wheel
- (3) Throttle Grip
- (4) Rear Bonnet
- (5) Steering Wheel Nut

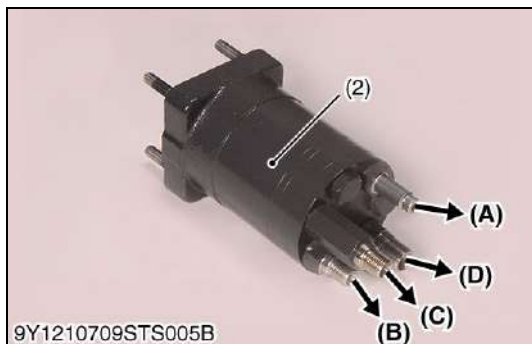
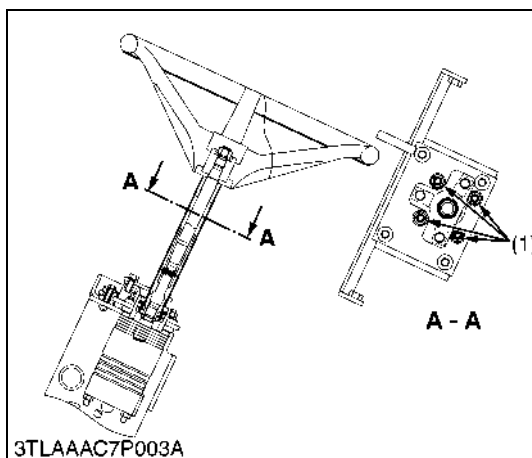
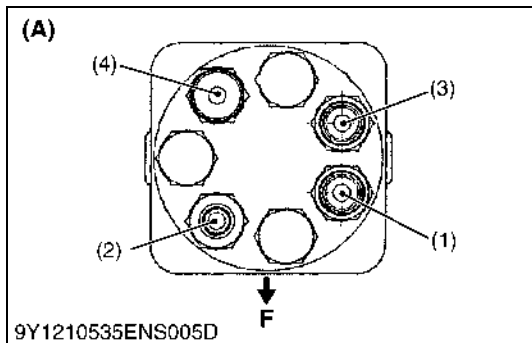
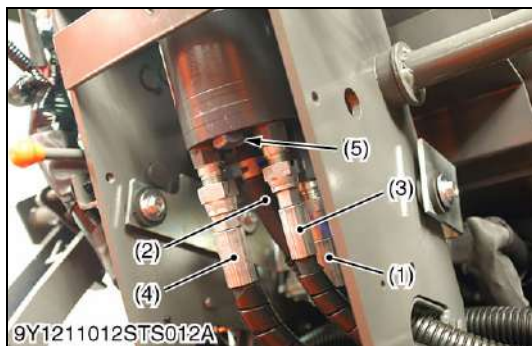
9Y1211012STS0036US0



Steering Post Assembly

- 1. Remove steering post assembly (1).
- (1) Steering Post Assembly

9Y1211012STS0037US0



Power Steering Controller Hoses

1. Mark the hoses to identify which port the hoses are connected shown in figure.
2. Remove the hoses.

(When reassembling)

- Be sure to connect the both delivery hoses to original position.

Tightening torque	Main delivery hose retaining nut	46.6 to 50.9 N·m 4.8 to 5.2 kgf·m 35 to 37 lbf·ft
	Delivery hose retaining nut	24.5 to 29.4 N·m 2.5 to 3.0 kgf·m 18 to 21 lbf·ft

- (1) Delivery Hose (R.H.)
- (2) Return Hose
- (3) Delivery Hose (L.H.)
- (4) Main Delivery Hose
- (5) Plug

(A) Steering Controller View From the Bottom Side

F: Front

9Y1211012STS0038US0

Steering Controller Assembly

1. Remove steering controller mounting nuts (1) and then remove steering controller assembly.

(When reassembling)

Tightening torque	Steering controller mounting nut	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.3 to 20.3 lbf·ft
-------------------	----------------------------------	---

- (1) Steering Controller Mounting Nut
- (2) Steering Controller

A: Upper View

(A) Connected to return hose

(B) Connected to right turning delivery hose

(C) Connected to left turning delivery hose

(D) Connected to main hose

9Y1211012STS0039US0

6. SERVICING

[1] L3301/L3901

(1) Hydraulic Pump



3TLABAB7P021A

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.
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(Reference)

- Use a cylinder gauge to measure the housing I.D.

9Y1211012STS0028US0



3TLABAB7P022A

Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with an inside micrometer or cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the gear shaft and the bushings as a unit.

Clearance between bushing and gear shaft	Factory specification	0.020 to 0.081 mm 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory specification	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory specification	15.000 to 15.051 mm 0.5906 to 0.5926 in.

9Y1211012STS0029US0



3TLABAB7P023A

Side Plate Thickness

1. Measure the side plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Side plate thickness	Factory specification	2.48 to 2.50 mm 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

9Y1211012STS0030US0

(2) Steering Gear Box



Backlash between Sector Gear and Ball Nut

1. Set a dial indicator with its finger on the pitman arm.
2. Move the pitman arm lightly, and measure the pitman arm deflection.
3. If the measurement is not within the factory specifications, adjust the backlash with the adjusting screw.

Backlash between sector gear and ball nut	Factory specification	0.3 mm 0.01 in.
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9Y1211012STS0031US0



Clearance between Valve Housing and Sleeve

1. Measure the sleeve O.D. with an outside micrometer.
2. Measure the valve housing I.D. with a caliper gauge.
3. If the clearance exceeds the allowable limit, replace the steering gear box assembly.

Clearance between valve housing and spool	Factory specification	0.17 to 0.28 mm 0.0067 to 0.011 in.
	Allowable limit	0.4 mm 0.02 in.

9Y1211012STS0032US0



Clearance between Gear Box and Ball Nut

1. Measure the gear box cylinder I.D. with a cylinder gauge.
2. Measure the ball nut O.D. with an outside micrometer.
3. If the clearance exceeds the factory specifications, replace the steering gear box assembly.

Clearance between gear box and ball nut	Factory specification	0.035 to 0.080 mm 0.0014 to 0.0031 in.
	Allowable limit	0.15 mm 0.0059 in.

9Y1211012STS0033US0



Axial Play of Ball Nut Assembly

1. Set a dial indicator with its finger on the worm shaft of the ball nut assembly.
2. Move the worm shaft axially and measure the play.
3. If the play exceeds the allowable limit, replace the steering gear box assembly.

■ NOTE

- Check ball nut assembly for smooth rotation by holding the ball nut horizontally, and slowly rotating the worm shaft. If rotation is not smooth, replace the steering gear box assembly.

Axial play of ball nut assembly	Factory specification	0.02 mm 0.0008 in.
	Allowable limit	0.04 mm 0.001 in.

9Y1211012STS0034US0

[2] L4701

(1) Hydraulic Pump



Housing Bore (Depth of Scratch)

1. Check for the scratch on the interior surface of the housing caused by the gear.
2. If the scratch reaches more than half the area of the interior surface of the housing, replace at pump assembly.
3. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
4. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
------------------	-----------------	-----------------------

(Reference)

- Use a cylinder gauge to measure the housing I.D.

9Y1211012STS0028US0



Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with an inside micrometer or cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the gear shaft and the bushings as a unit.

Clearance between bushing and gear shaft	Factory specification	0.020 to 0.081 mm 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory specification	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory specification	15.000 to 15.051 mm 0.5906 to 0.5926 in.

9Y1211012STS0029US0



Side Plate Thickness

1. Measure the side plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Side plate thickness	Factory specification	2.48 to 2.50 mm 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

9Y1211012STS0030US0

8 HYDRAULIC SYSTEM

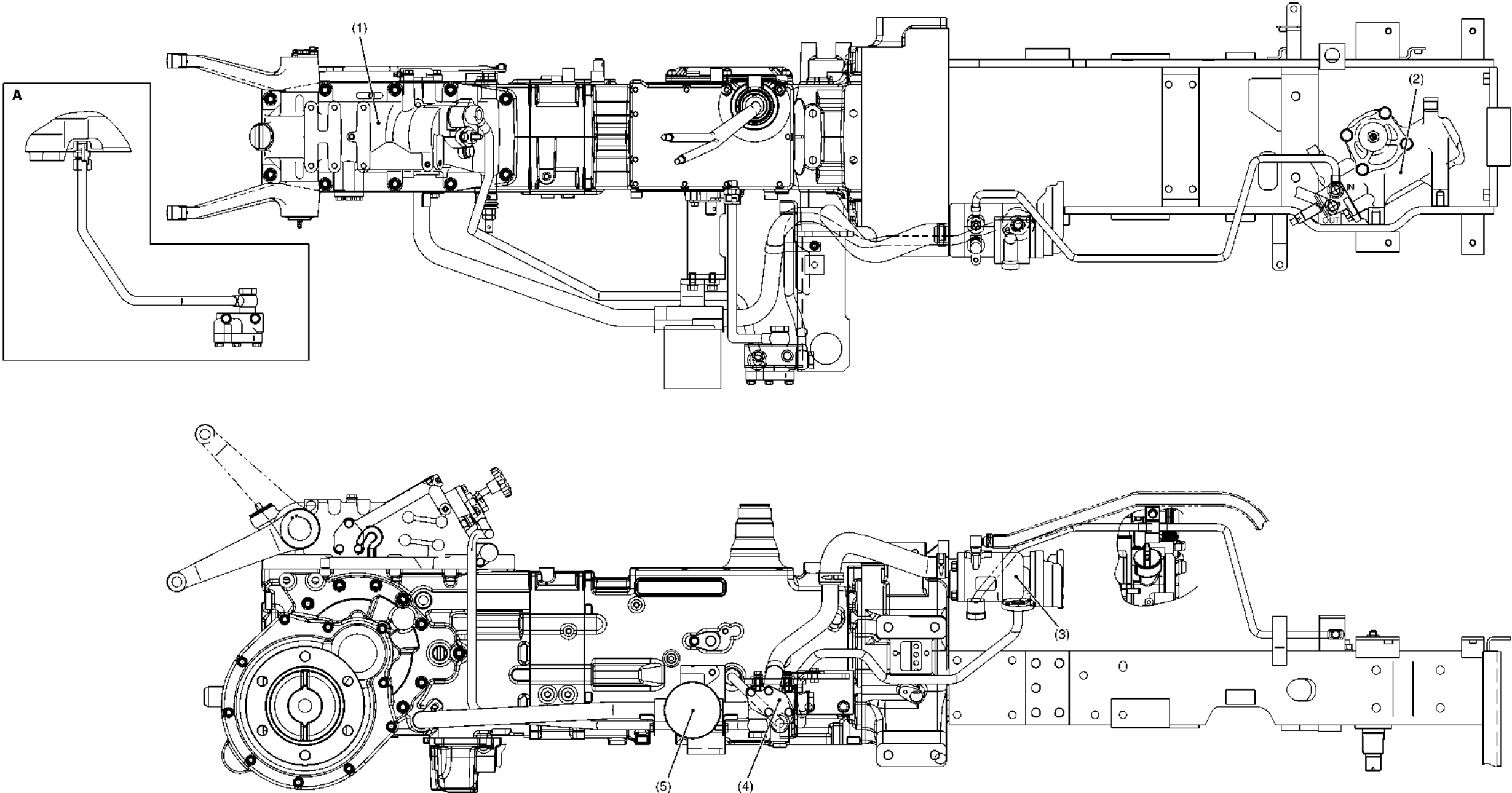
MECHANISM

CONTENTS

1. STRUCTURE.....	8-M1
[1] L3301/L3901.....	8-M1
[2] L4701.....	8-M2
(1) Manual Transmission Model.....	8-M2
(2) HST Model.....	8-M3
2. HYDRAULIC CIRCUIT	8-M4
[1] L3301/L3901.....	8-M4
(1) Manual Transmission Model.....	8-M4
(2) HST Model.....	8-M5
[2] L4701.....	8-M6
(1) Manual Transmission Model.....	8-M6
(2) HST Model.....	8-M7
3. THREE POINT HITCH HYDRAULIC SYSTEM.....	8-M8
[1] THREE POINT HITCH HYDRAULIC CIRCUIT	8-M8
[2] HYDRAULIC CYLINDER.....	8-M9
[3] LINKAGE MECHANISM	8-M10
[4] POSITION CONTROL VALVE	8-M12
[5] HYDRAULIC PUMP	8-M14
[6] SAFETY VALVE	8-M14
4. FRONT HYDRAULIC BLOCK	8-M15
[1] STRUCTURE	8-M15
[2] HYDRAULIC CIRCUIT	8-M15
[3] RELIEF VALVE	8-M16

1. STRUCTURE

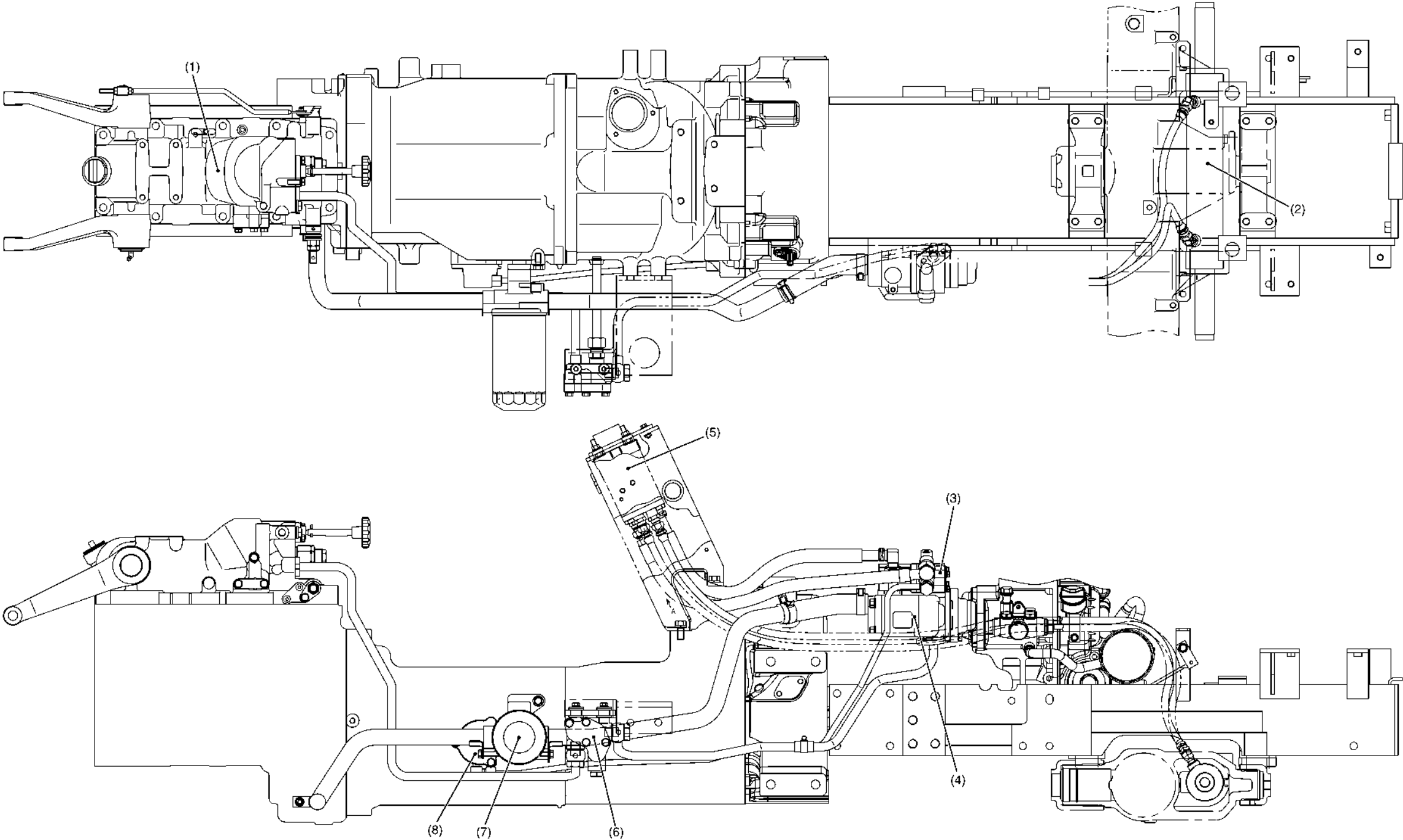
[1] L3301/L3901



9Y1211012HYT001A

(1) Hydraulic Block (2) Power Steering Controller (3) Hydraulic Pump (4) Front Hydraulic Block (5) Hydraulic Oil Filter A: HST Model

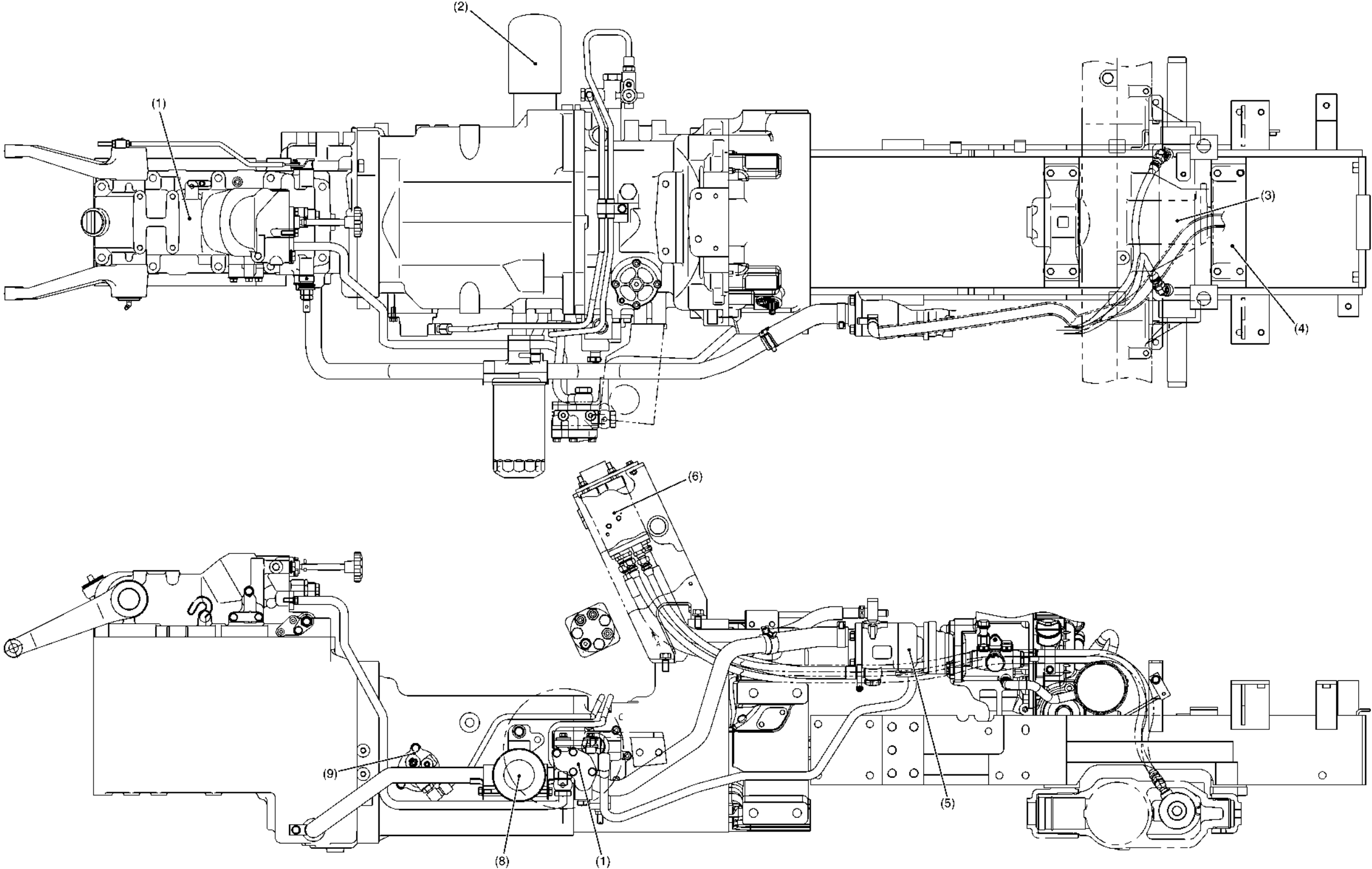
[2] L4701
(1) Manual Transmission Model



9Y1211012HYT002A

- | | | | | | |
|-----------------------------|---------------------|-------------------------------|---------------------------|--------------------------|----------------------|
| (1) Hydraulic Block | (3) Regulator Valve | (5) Power Steering Controller | (6) Front Hydraulic Block | (7) Hydraulic Oil Filter | (8) PTO Clutch Valve |
| (2) Power Steering Cylinder | (4) Hydraulic Pump | | | | |

(2) HST Model



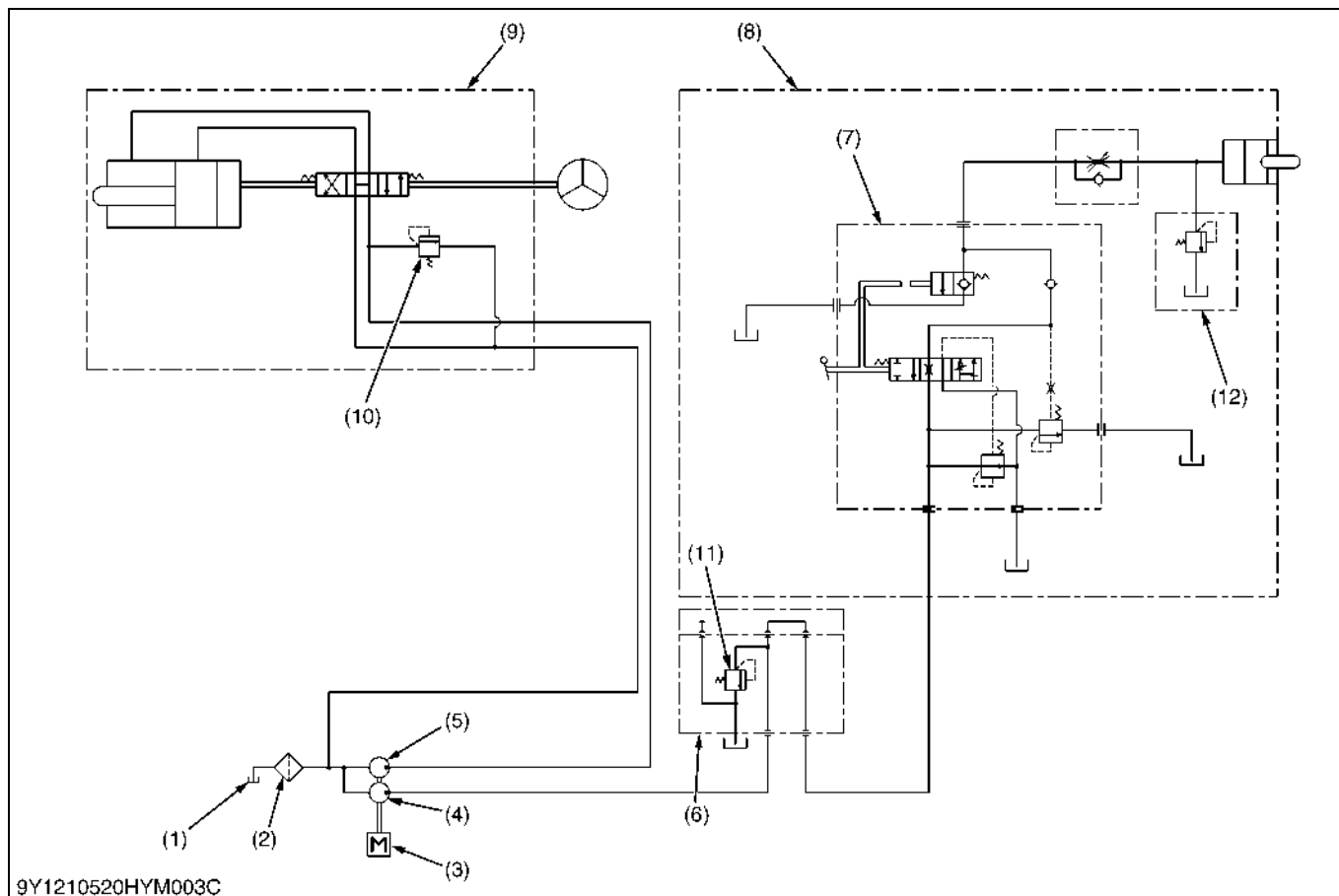
9Y1211012HYT003A

- (1) Hydraulic Block
- (2) Hydraulic Oil Filter (HST)
- (3) Power Steering Cylinder
- (4) Oil Cooler
- (5) Hydraulic Pump
- (6) Power Steering Controller
- (7) Front Hydraulic Block
- (8) Hydraulic Oil Filter
- (9) PTO Clutch Valve

2. HYDRAULIC CIRCUIT

[1] L3301/L3901

(1) Manual Transmission Model



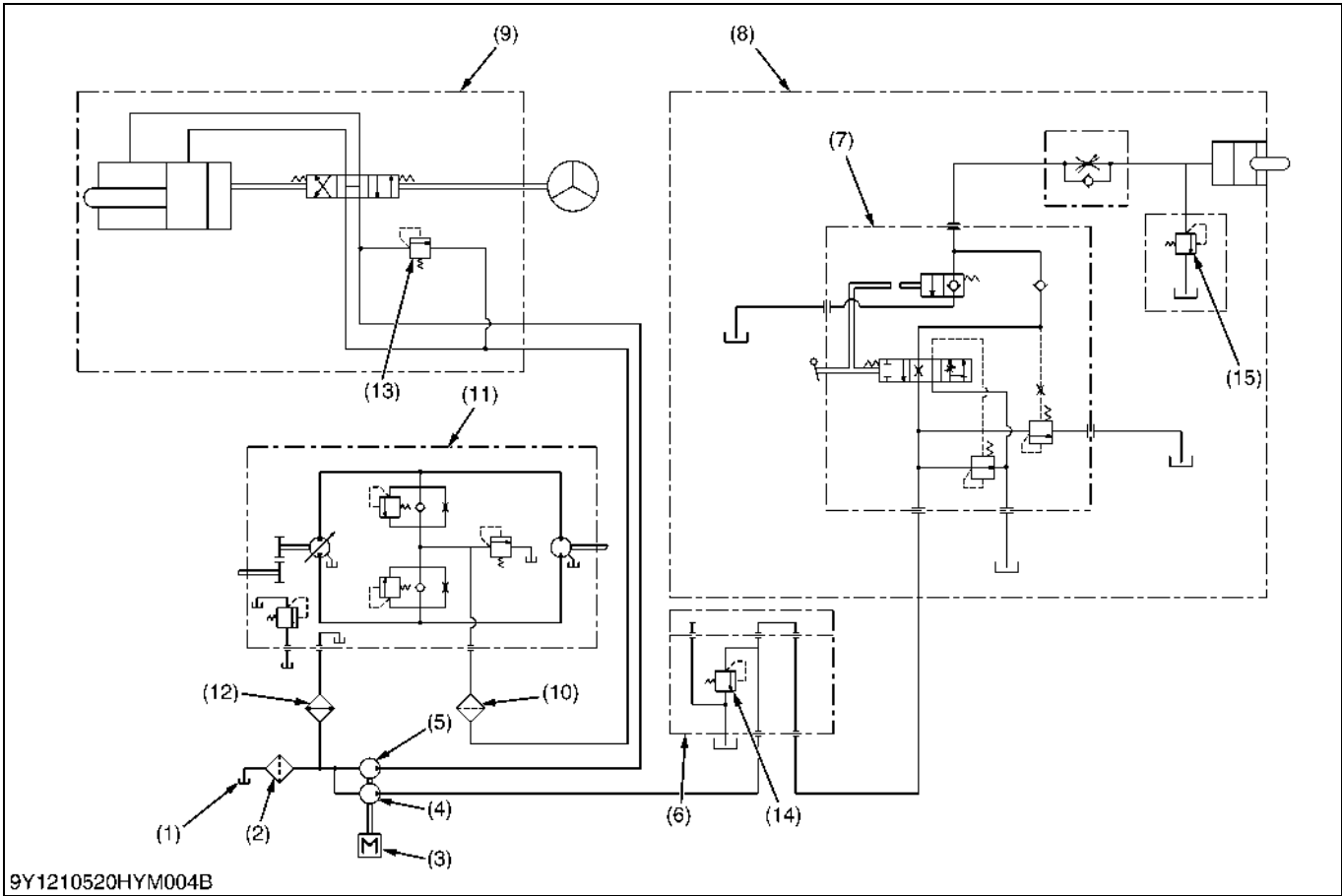
- | | | | |
|----------------------------------|--|-------------------------------|---------------------------------------|
| (1) Oil Tank (Transmission Case) | (4) Hydraulic Pump (Three Point Hitch) | (6) Front Hydraulic Block | (10) Relief Valve (Power Steering) |
| (2) Hydraulic Oil Filter | (5) Hydraulic Pump (Power Steering) | (7) Position Control Valve | (11) Relief Valve (Three Point Hitch) |
| (3) Engine | | (8) Hydraulic Cylinder Block | (12) Cylinder Safety Valve |
| | | (9) Power Steering Controller | |

Specification of Hydraulic Parts

(4)	Above. 16.5 L/min. (4.36 U.S.gals/min., 3.63 Imp.gals/min.)	(11)	15.7 to 16.7 MPa (160 to 170 kgf/cm ² , 2280 to 2410 psi)
(5)	Above. 27.2 L/min. (7.19 U.S.gals/min., 5.98 Imp.gals/min.)	(12)	19.7 to 22.5 MPa (200 to 230 kgf/cm ² , 2850 to 3270 psi)
(10)	[L3301] 2WD Model: 8.3 to 9.3 MPa (85 to 95 kgf/cm ² , 1200 to 1300 psi) 4WD Model: 11.4 to 12.4 MPa (116 to 126 kgf/cm ² , 1650 to 1790 psi)		
	[L3901] 2WD Model: 8.1 to 9.1 MPa (83 to 93 kgf/cm ² , 1200 to 1300 psi) 4WD Model: 11.1 to 12.1 MPa (113 to 123 kgf/cm ² , 1610 to 1740 psi)		

9Y1211012HYM0001US0

(2) HST Model



- (1) Oil Tank (Transmission Case)

(2) Hydraulic Oil Filter

(3) Engine

(4) Hydraulic Pump (Three Point Hitch)
- (5) Hydraulic Pump (Power Steering)

(6) Front Hydraulic Block

(7) Position Control Valve

(8) Hydraulic Cylinder Block
- (9) Power Steering Controller

(10) Hydraulic Oil Filter (HST)

(11) HST Unit

(12) Oil Cooler
- (13) Relief Valve (Power Steering)

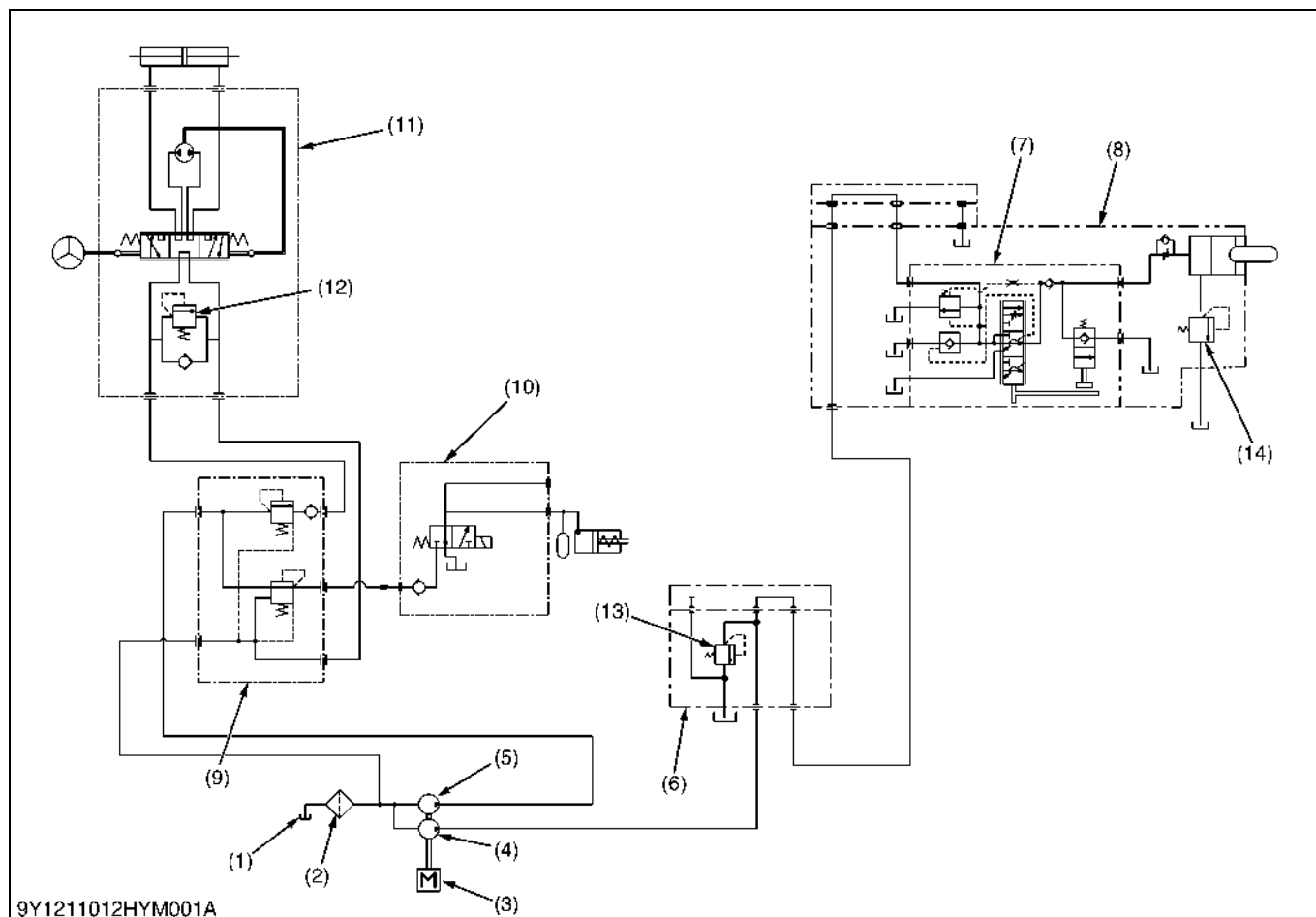
(14) Relief Valve (Three Point Hitch)

(15) Cylinder Safety Valve

Specification of Hydraulic Parts

(4)	Above. 27.2 L/min. (7.19 U.S.gals/min., 5.98 Imp.gals/min.)	(14)	15.7 to 16.7 MPa (160 to 170 kgf/cm ² , 2280 to 2410 psi)
(5)	Above. 16.5 L/min. (4.36 U.S.gals/min., 3.63 Imp.gals/min.)	(15)	19.7 to 22.5 MPa (200 to 230 kgf/cm ² , 2850 to 3270 psi)
(13)	[L3301] 11.4 to 12.4 MPa (116 to 126 kgf/cm ² , 1650 to 1790 psi)		
	[L3901] 11.1 to 12.1 MPa (113 to 123 kgf/cm ² , 1610 to 1740 psi)		

9Y1211012HYM0002US0

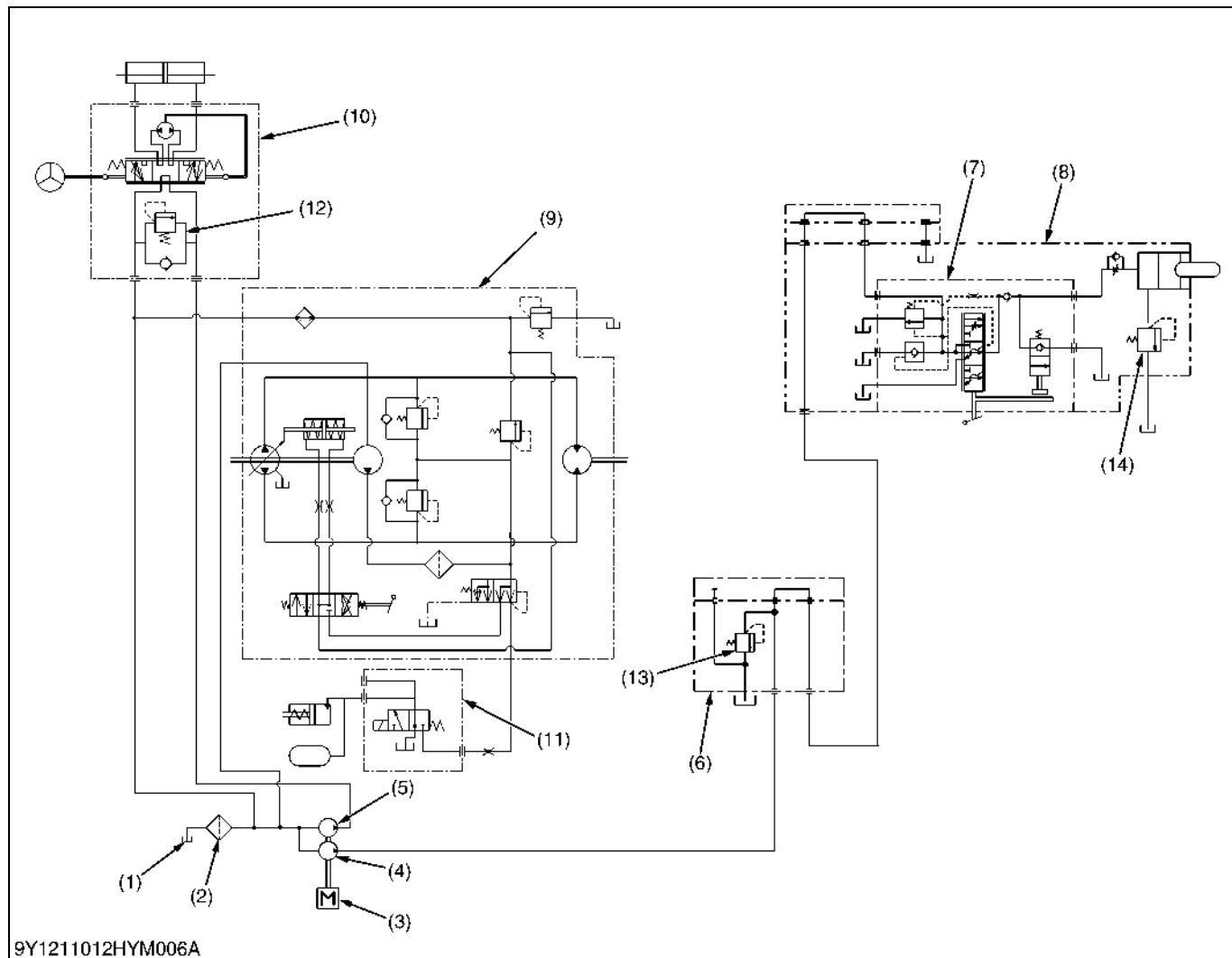
[2] L4701**(1) Manual Transmission Model**

- | | | | |
|--|-------------------------------------|------------------------------------|---------------------------------------|
| (1) Oil Tank (Transmission Case) | (5) Hydraulic Pump (Power Steering) | (9) Regulator Valve | (13) Relief Valve (Three Point Hitch) |
| (2) Hydraulic Oil Filter | (6) Front Hydraulic Block | (10) PTO Clutch Valve | (14) Cylinder Safety Valve |
| (3) Engine | (7) Position Control Valve | (11) Power Steering Controller | |
| (4) Hydraulic Pump (Three Point Hitch) | (8) Hydraulic Cylinder Block | (12) Relief Valve (Power Steering) | |

Specification of Hydraulic Parts

(4)	Above. 26.2 L/min. (6.92 U.S.gals/min., 5.76 Imp.gals/min.)	(13)	17.1 to 18.1 MPa (174 to 185 kgf/cm ² , 2480 to 2630 psi)
(5)	Above. 15.9 L/min. (4.20 U.S.gals/min., 3.50 Imp.gals/min.)	(14)	19.7 to 22.5 MPa (200 to 230 kgf/cm ² , 2850 to 3270 psi)
(12)	2WD Model: 8.0 to 9.0 MPa (81 to 91 kgf/cm ² , 1200 to 1300 psi) 4WD Model: 10.7 to 11.7 MPa (109 to 119 kgf/cm ² , 1550 to 1690 psi)		

9Y1211012HYM0003US0

(2) HST Model

- | | | | |
|--|-------------------------------------|--------------------------------|---------------------------------------|
| (1) Oil Tank (Transmission Case) | (5) Hydraulic Pump (Power Steering) | (8) Hydraulic Cylinder | (12) Relief Valve (Power Steering) |
| (2) Hydraulic Oil Filter | (6) Front Hydraulic Block | (9) HST Unit | (13) Relief Valve (Three Point Hitch) |
| (3) Engine | (7) Power Steering Controller | (10) Power Steering Controller | (14) Cylinder Safety Valve |
| (4) Hydraulic Pump (Three Point hitch) | | (11) PTO Clutch Valve | |

Specification of Hydraulic Parts

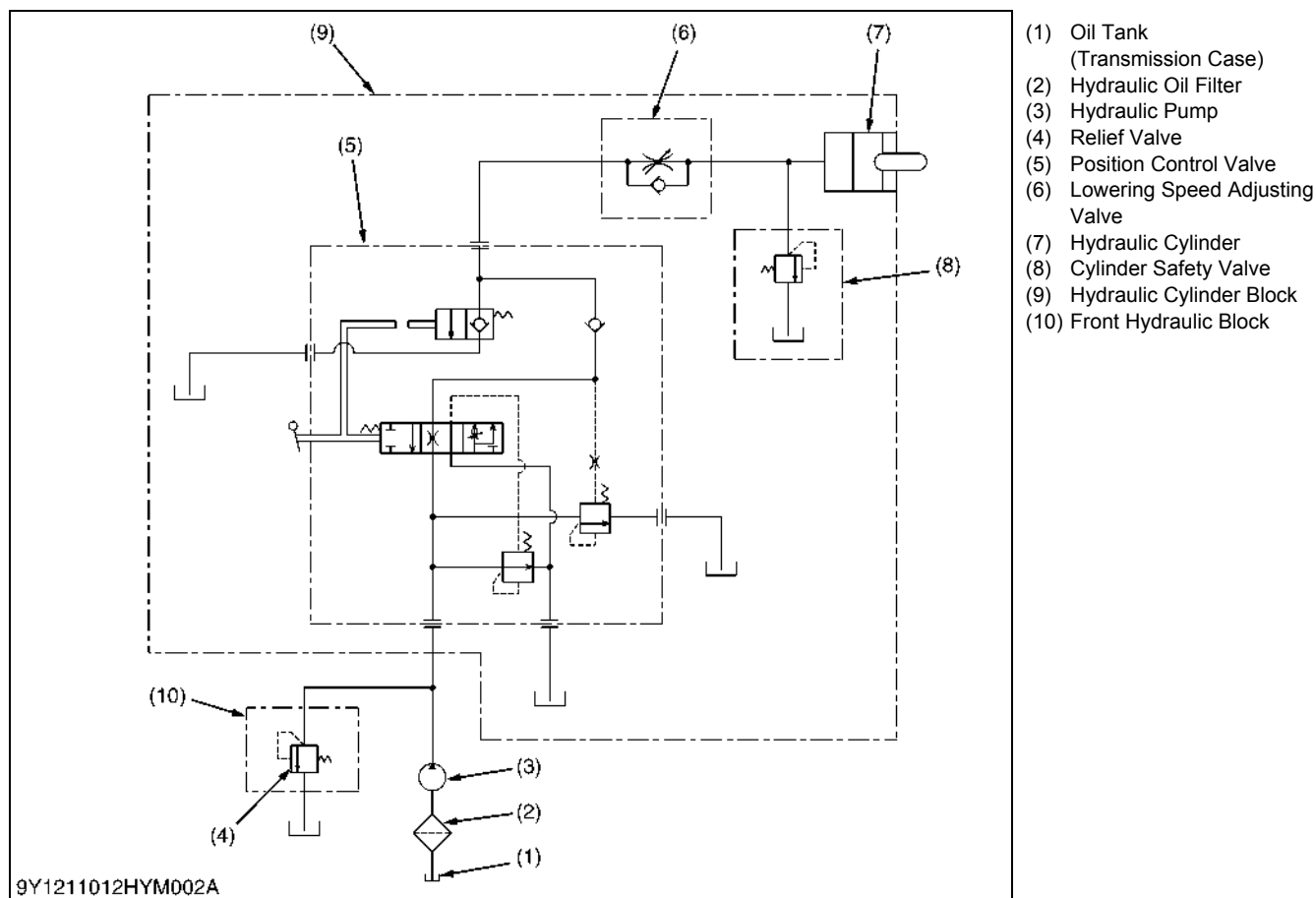
(4)	Above. 26.2 L/min. (6.92 U.S.gals/min., 5.76 Imp.gals/min.)	(13)	17.1 to 18.1 MPa (174 to 185 kgf/cm ² , 2480 to 2630 psi)
(5)	Above. 15.9 L/min. (4.20 U.S.gals/min., 3.50 Imp.gals/min.)	(14)	19.7 to 22.5 MPa (200 to 230 kgf/cm ² , 2850 to 3270 psi)
(12)	2WD Model: 8.0 to 9.0 MPa (81 to 91 kgf/cm ² , 1200 to 1300 psi) 4WD Model: 10.7 to 11.7 MPa (109 to 119 kgf/cm ² , 1550 to 1690 psi)		

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3. THREE POINT HITCH HYDRAULIC SYSTEM

[1] THREE POINT HITCH HYDRAULIC CIRCUIT

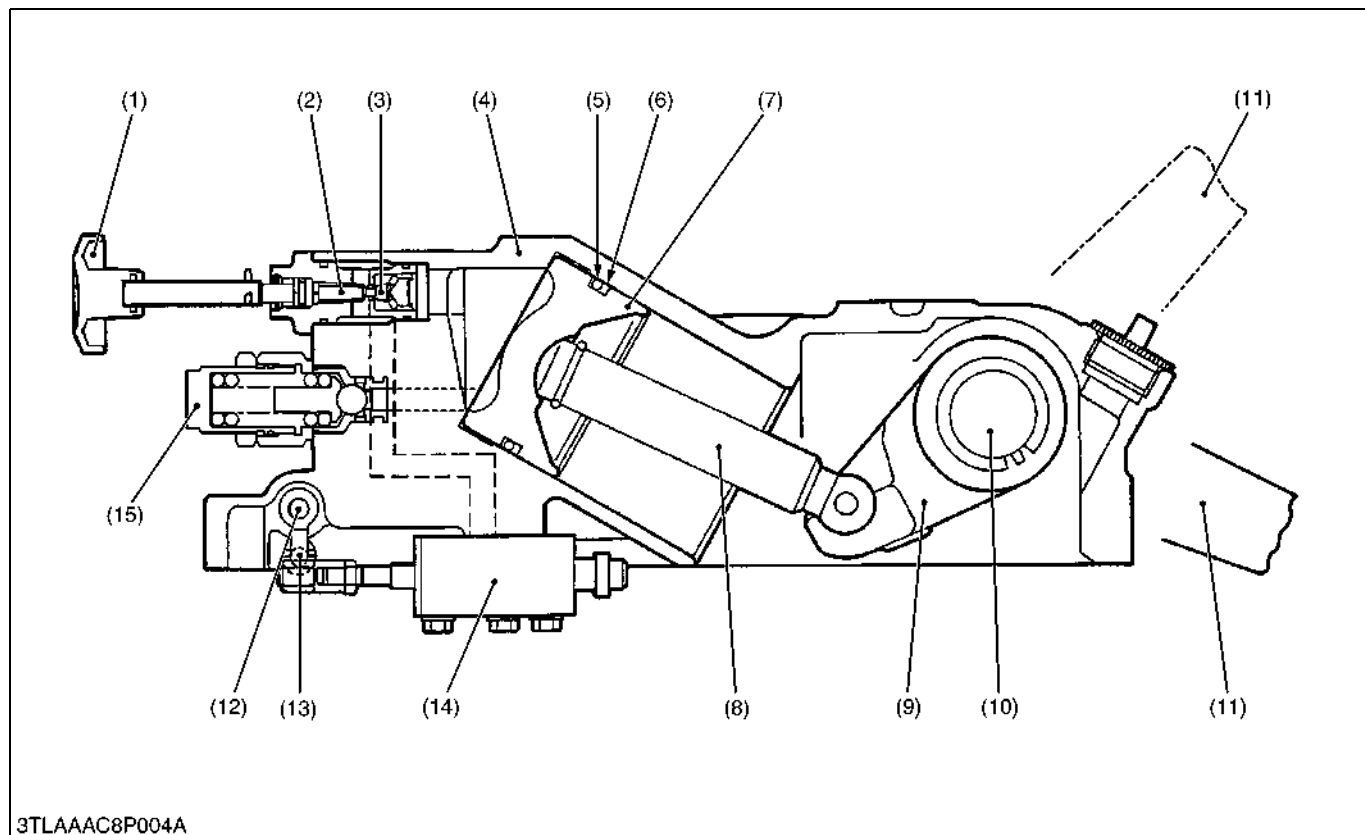
Hydraulic Oil Flow



1. When the engine is started, the hydraulic pump (3) is rotated to draw oil from the transmission case (1) through the suction pipe. Supplied oil is filtered by the hydraulic oil filter (2).
 2. Filtered oil is forced out by the hydraulic pump to the position control valve (5) through the delivery pipe.
 3. The position control valve (5) switches the oil flow, and oil is channelled to the hydraulic cylinder (7) for the three-point hydraulic system or returned to the oil tank (1).
- The hydraulic system has a relief valve (4) which restricts the maximum pressure in the circuit.

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[2] HYDRAULIC CYLINDER



- | | | | |
|------------------------------------|------------------------|--------------------------|-----------------------------|
| (1) Lowering Speed Adjusting Knob | (4) Hydraulic Cylinder | (8) Hydraulic Rod | (12) Position Control Arm |
| (2) Lowering Speed Adjusting Shaft | (5) O-ring | (9) Hydraulic Arm | (13) Spool Drive Lever |
| (3) Lowering Speed Adjusting Valve | (6) Back-up Ring | (10) Hydraulic Arm Shaft | (14) Position Control Valve |
| | (7) Hydraulic Piston | (11) Lift Arm | (15) Cylinder Safety Valve |

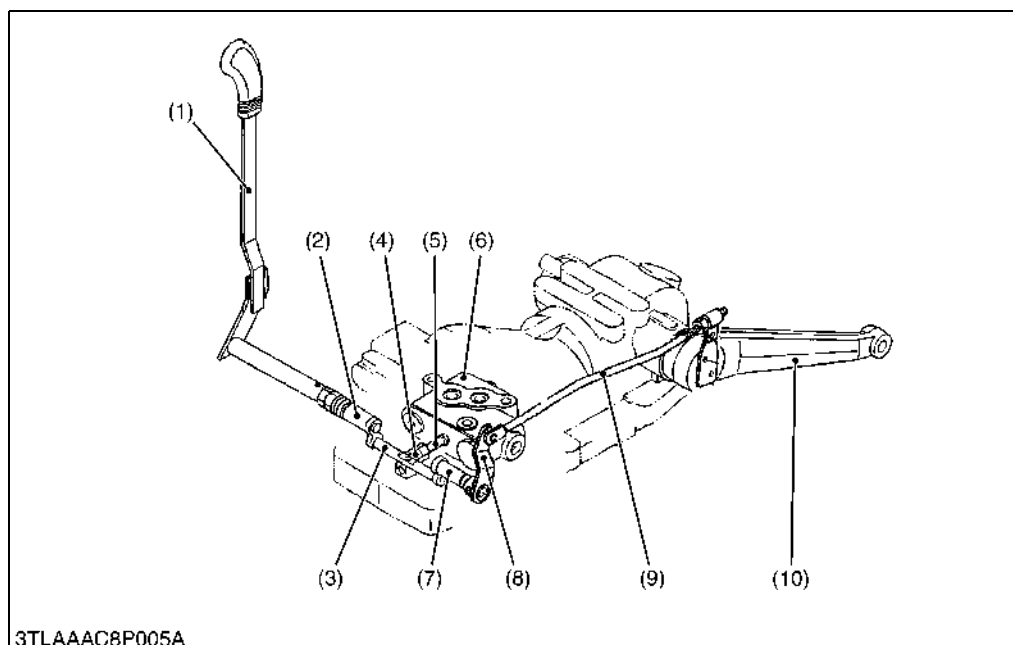
The main components of the hydraulic cylinder are shown in the figure above.

While the lift arm (11) is rising, oil from the hydraulic pump flows into the hydraulic cylinder through the position control valve (14). Then oil pushes out the hydraulic piston (7).

While the lift arm (11) is lowering, oil in the hydraulic cylinder is discharge to the transmission case through the position control valve (14) by the weight of the implement. At this time, the lowering speed of the implement can be controlled by the lowering speed adjusting valve (3) attached to the hydraulic cylinder (4). Turning the lowering speed adjusting knob (1) clockwise decreases the lowering speed, and counterclockwise increases lowering speed. When the lowering speed adjusting valve (3) is completely closed, the lift arm (11) is held at its position since oil in the hydraulic cylinder is sealed between the hydraulic piston (7) and lowering speed adjusting valve (3).

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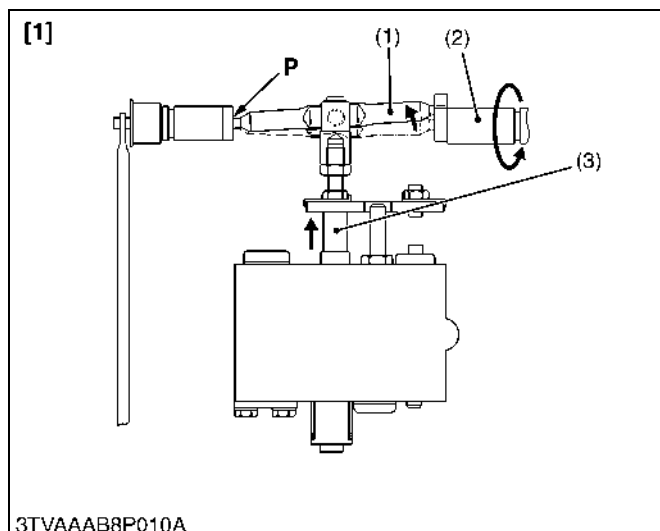
[3] LINKAGE MECHANISM



- (1) Position Control Lever
- (2) Control Arm
- (3) Spool Drive Lever
- (4) Spool Joint 1
- (5) Spool Head
- (6) Position Control Valve
- (7) Feedback Lever Shaft
- (8) Feedback Lever
- (9) Feedback Rod
- (10) Lift Arm

Position control is a mechanism to raise or lower the implement attached to the tractor in proportion to the movement of the position control lever (1). The implement can be set at any height by moving the position control lever.

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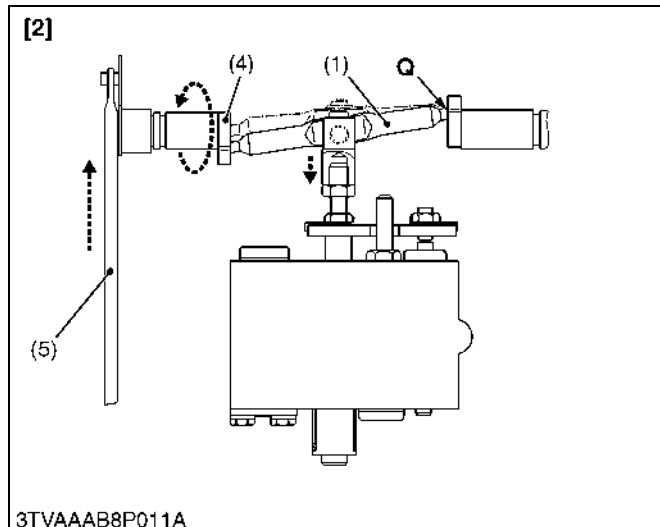


Lifting

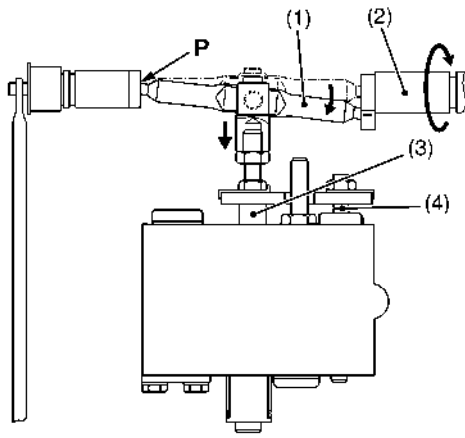
1. When the position control lever is moved to the **LIFT** position, the control arm (2) rotates to the arrow. Therefore, the spool drive lever (1) moves around the fulcrum **P** and pull the spool (3) opening the **LIFT** circuit.
2. When the lift arm moves upward, the feedback lever shaft (4) is rotated to the arrow, since the feedback rod (5) is actuated. Therefore, the spool drive lever (1) moves around the fulcrum **Q** and pushes the spool (3).
3. The lift arm stops when the spool returns to the neutral position.

- (1) Spool Drive Lever
- (2) Control Arm
- (3) Spool
- (4) Feedback Lever Shaft
- (5) Feedback Rod

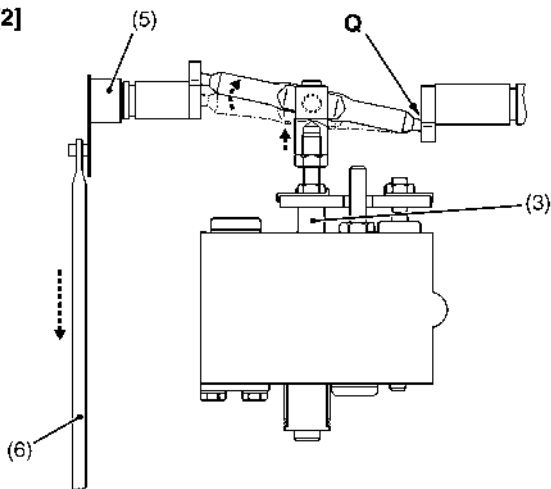
- [1] **Lifting**
- [2] **Lifting to Neutral**



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[1]

3TVAAAB8P012A

[2]

3TVAAAB8P013A

Lowering

1. When the position control lever is moved to the **Lowering** position, the control arm (2) rotates to the arrow. Therefore, the spool drive lever (1) moves around the fulcrum **P** and push the spool (3) and poppet 2 (4) opening the Lowering circuit.
2. When the lift arm moves downward, the feedback lever shaft (5) is rotated to the arrow, since the feedback rod (6) is actuated. Therefore, the spool drive lever (1) moves around the fulcrum **Q** and pull the spool (3).
3. The lift arm stops when the spool (3) returns to the neutral position.

(1) Spool Drive Lever

(2) Control Arm

(3) Spool

(4) Poppet 2

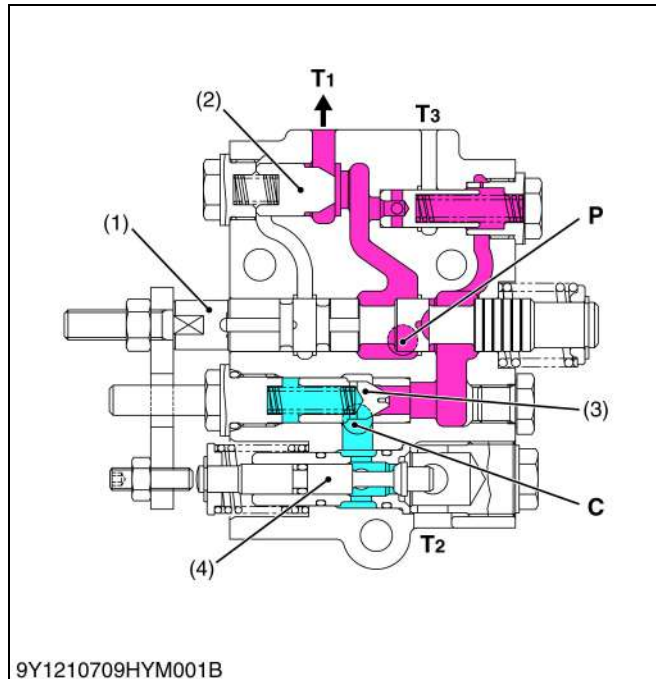
(5) Feedback Lever Shaft

(6) Feedback Rod

[1] Lowering**[2] Lowering to Neutral**

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[4] POSITION CONTROL VALVE



■ Neutral

Pressurized oil delivered from the **P** port, pushes the unload poppet (2) and returns to the transmission case from **T₁** port.

Since the poppet 1 (3) is closed by the spring located behind the poppet 1 (3), the oil in the hydraulic cylinder is not drained to the transmission case.

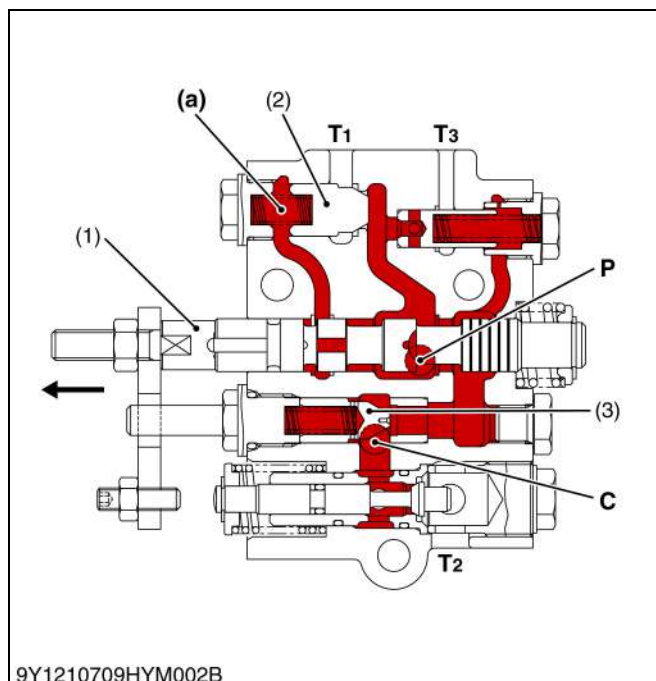
At this condition, position control is kept at **"NEUTRAL"**.

The oil in the hydraulic cylinder is cut off by the actions of poppet 1 (3) and poppet 2 (4).

- (1) Spool
- (2) Unload Poppet
- (3) Poppet 1
- (4) Poppet 2

- C:** C (Cylinder) Port
- P:** P (Pump) Port
- T₁:** T₁ Port
(To Transmission Case)
- T₂:** T₂ Port
(To Transmission Case)
- T₃:** T₃ Port
(To Transmission Case)

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■ Lifting

When the control lever is moved to **"UP"** position, the spool (1) is pulled out from the position control valve body as shown in the figure.

The high-pressure oil delivered from **P** port flows through the oil passage of the spool (1) into the **A** chamber (a).

Since the spring behind the unload poppet (2) and the pressured oil entered to the **A** chamber (a) push and close the unload poppet (2).

At this condition, the pressured oil flows to the **C** port.

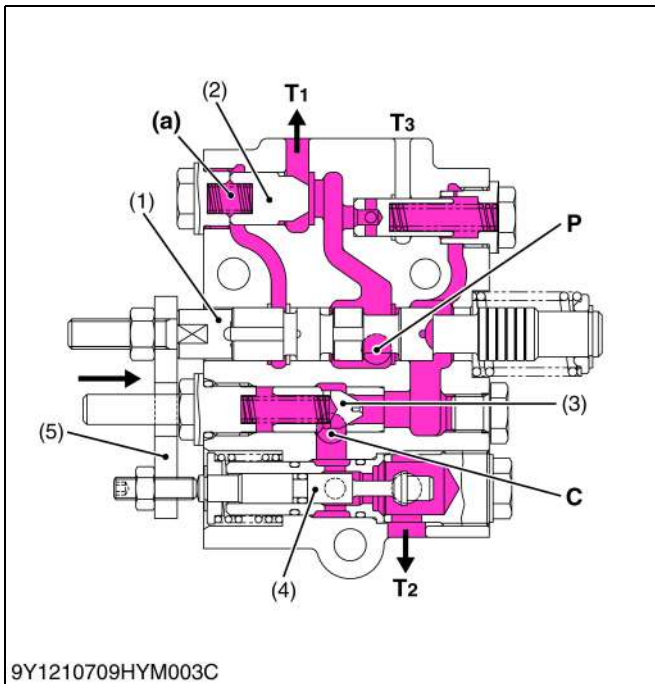
Since the poppet 1 (3) is opened by the pressured oil, the pressured oil flows through **C** port to the hydraulic cylinder, lifting a implement.

- (1) Spool
- (2) Unload Poppet
- (3) Poppet 1

- (a)** A Chamber

- C:** C (Cylinder) Port
- P:** P (Pump) Port
- T₁:** T₁ Port
(To Transmission Case)
- T₂:** T₂ Port
(To Transmission Case)
- T₃:** T₃ Port
(To Transmission Case)

9Y1211012HYM0011US0



■ Lowering

When the control lever is moved to **"DOWN"** position, the spool (1) is pushed into the position control valve body as shown in the figure.

Since the spool (1) blocks the oil entering to **A** chamber (a), pressured oil from **P** port opens the unload poppet (2) and drains to **T₁** port.

The oil remaining in the **A** chamber (a) returns to the transmission case through the clearance between spool (1) and the control valve body.

Since the poppet 2 (4) is pushed by the plate connected to the spool (1), the oil circuit between **C** port and **T₂** port is formed.

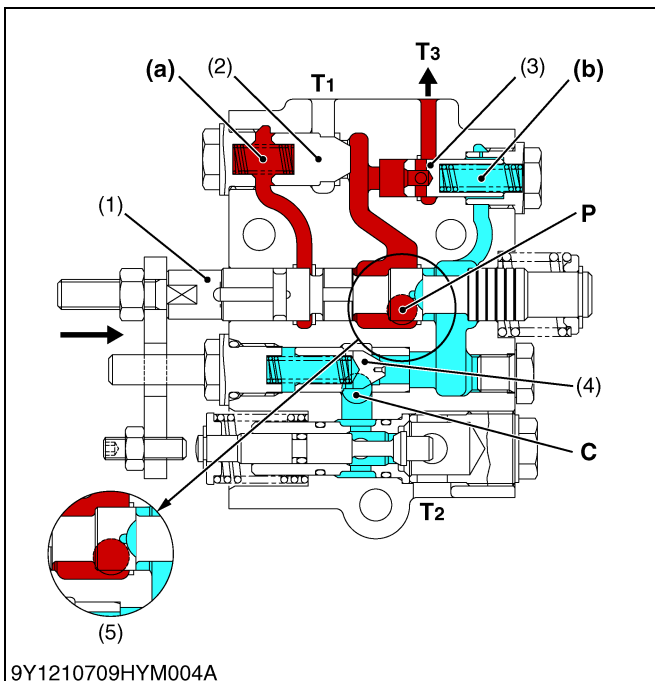
The oil in the hydraulic cylinder is forced out by the weight of the implement, and returns to the transmission case through **T₂** port, lowering the implement.

<Floating>

When the control lever is moved all the way to the bottom, the spool (1) and the poppet 2 (4) remain in the positions described for **"Lowering"**. The oil flows freely between the hydraulic cylinder and the transmission case.

- | | |
|----------------------|---|
| (1) Spool | C: C (Cylinder) Port |
| (2) Unload Poppet | P: P (Pump) Port |
| (3) Poppet 1 | T₁: T ₁ Port |
| (4) Poppet 2 | (To Transmission Case) |
| (5) Plate | T₂: T ₂ Port |
| | (To Transmission Case) |
| (a) A Chamber | T₃: T ₃ Port |
| | (To Transmission Case) |

9Y1211012HYM0012US0



■ Lifting to Neutral

When moving the position control lever from **"LIFTING"** to **"NEUTRAL"**, the spool (1) is pushed back as shown in the figure.

When the **"NEUTRAL"** position comes near, the tapered portion (5) of the spool (1) makes the pressure difference at the **P** port and **C** port.

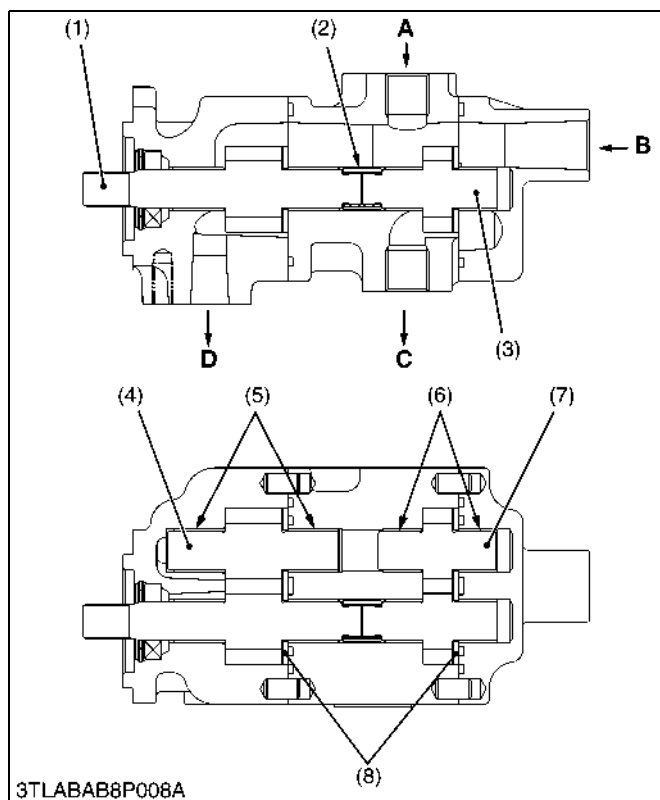
Therefore, the poppet 2 (4) gradually closes, and absorbs any shock at the **A** chamber (a) behind the unload poppet (2), the unload poppet (2) does not open.

However, the poppet 1 (3) opens because of the low pressure in **B** chamber (b), and then the oil from the pump returns to the transmission case through **T₃** port.

- | | |
|----------------------|---|
| (1) Spool | C: C (Cylinder) Port |
| (2) Unload Poppet | P: P (Pump) Port |
| (3) Poppet 1 | T₁: T ₁ Port |
| (4) Poppet 2 | (To Transmission Case) |
| (5) Tapered Portion | T₂: T ₂ Port |
| | (To Transmission Case) |
| (a) A Chamber | T₃: T ₃ Port |
| (b) B Chamber | (To Transmission Case) |

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[5] HYDRAULIC PUMP



The gear type hydraulic pump is adopted for these models. This pump is called as tandem type and composed two pair of gears, side plates, bushings and other components as shown in the figure.

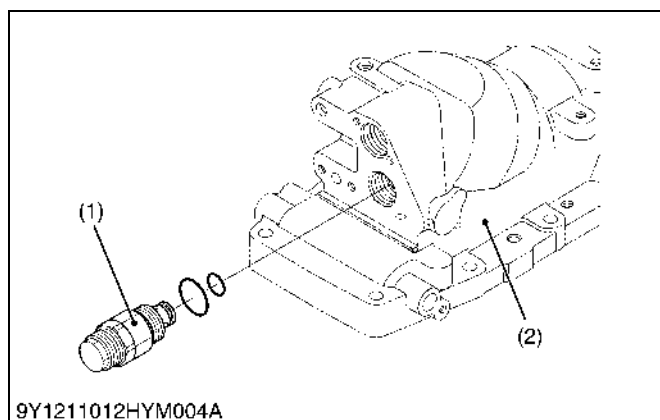
The hydraulic pump pressurize oil from transmission case through oil filter and send the oil to power steering circuit and main hydraulic circuit.

- (1) Drive Gear 1
- (2) Coupling
- (3) Drive Gear 2
- (4) Driven Gear 1
- (5) Bushing
- (6) Bushing
- (7) Driven Gear 2
- (8) Side Plate

- A:** From Power Steering Controller (Manual Transmission Type) From Oil Cooler (HST Type)
- B:** From Transmission Case
- C:** To Power Steering Controller
- D:** To Main Hydraulic Circuit

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[6] SAFETY VALVE

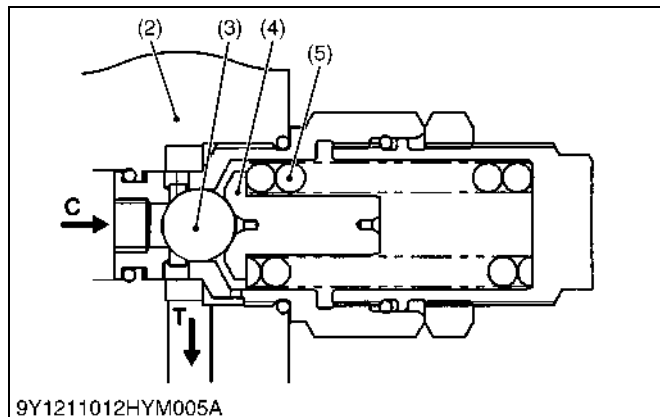


The cylinder safety valve (1) is equipped on the hydraulic cylinder assembly (2).

These models use a direct acting safety valve which is suitable for less frequent operation.

This valve operates to prevent damage to three point hydraulic system components only in case shock pressure is caused. For example, bouncing of heavy implements.

If pressure in the hydraulic cylinder (2) becomes too large, oil pressure pushes ball (3), valve seat (4) and compress the spring (5). The oil in the hydraulic cylinder flows to transmission case through the T port.



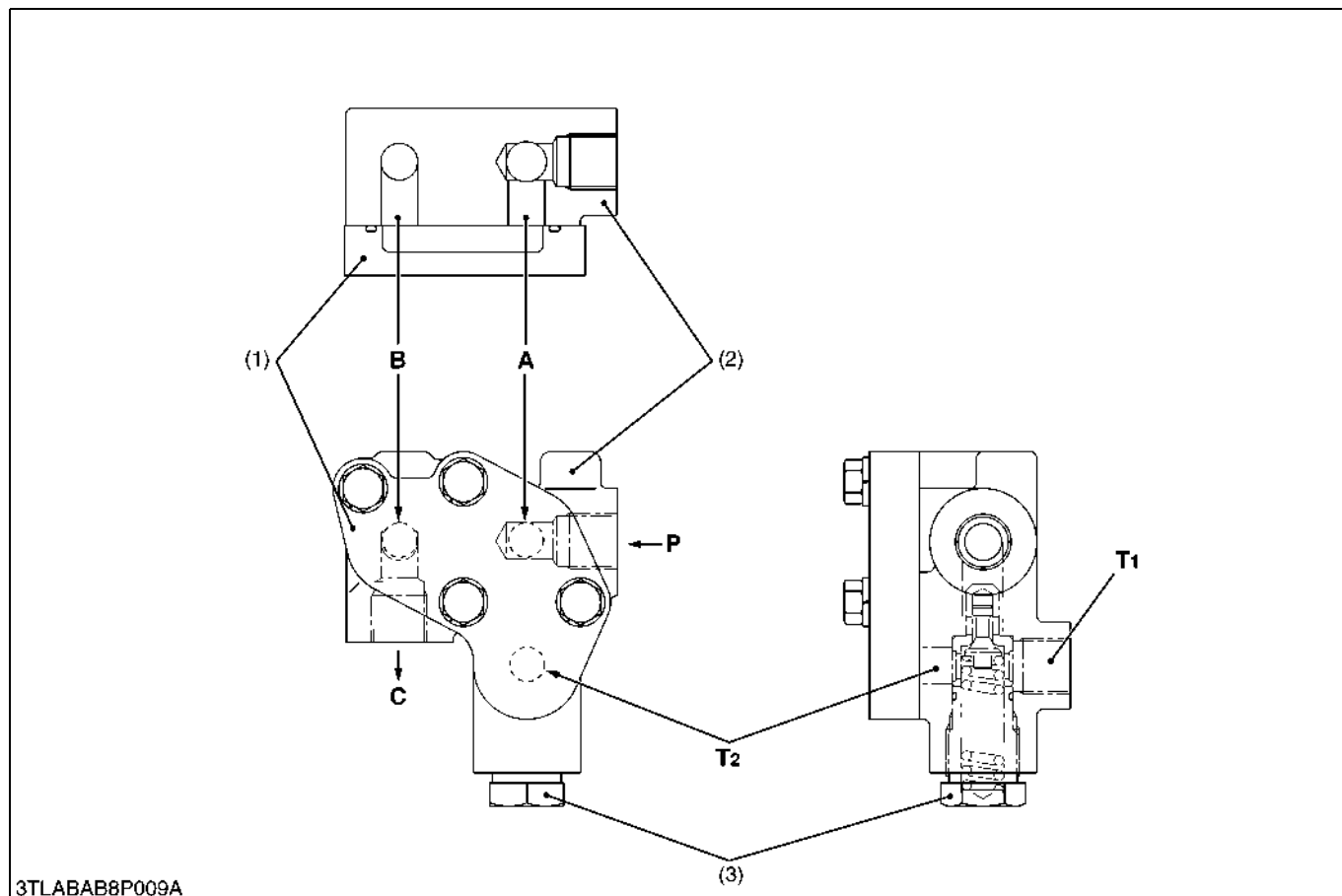
- (1) Cylinder Safety Valve
- (2) Hydraulic Cylinder Assembly
- (3) Ball
- (4) Valve Seat
- (5) Spring

- C:** C port (From Hydraulic Cylinder)
- T:** T port (To Transmission Case)

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4. FRONT HYDRAULIC BLOCK

[1] STRUCTURE



(1) Cap

(2) Front Hydraulic Block

(3) Relief Valve

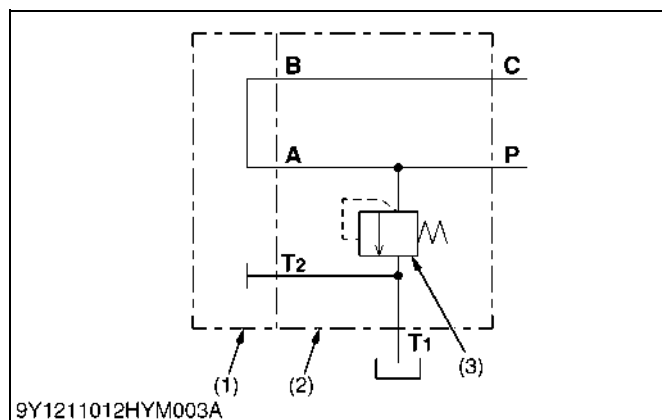
A: To Implement Control Valve **C: To Position Control Valve**
B: From Implement Control Valve **P: From Hydraulic Pump**

T₁: To Transmission Case
T₂: From Implement Control Valve

The front hydraulic block (2) is provided to take power out from the tractor to operate the hydraulic cylinders on the implement, such as front loader, front blade and so on.

9Y1211012HYM0019US0

[2] HYDRAULIC CIRCUIT



(1) Cap

(2) Front Hydraulic Block

(3) Relief Valve

A: To Implement Control Valve

B: From Implement Control Valve

C: To Position Control Valve

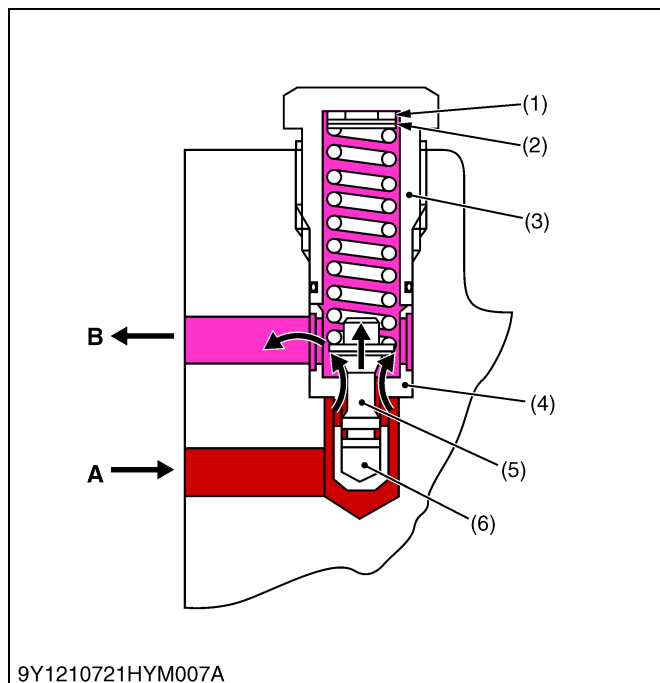
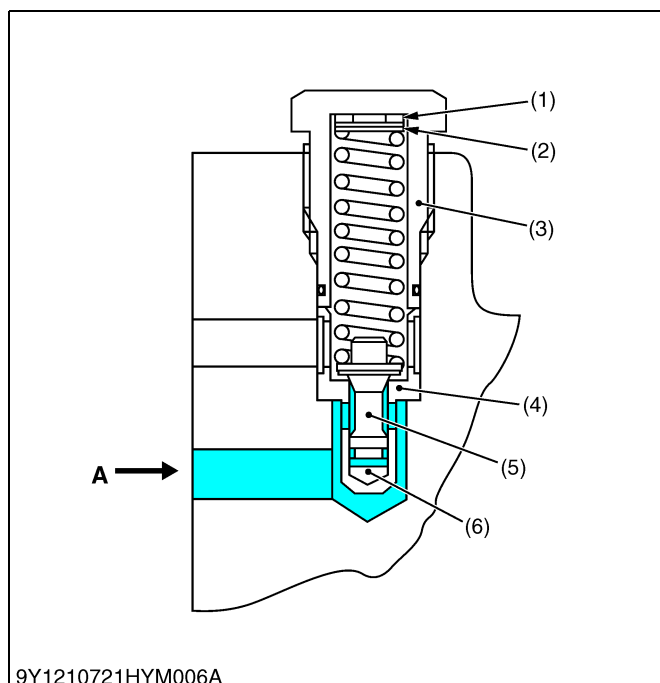
P: From Hydraulic Pump

T₁: To Transmission Case

T₂: From Implement Control Valve

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[3] RELIEF VALVE



The 3-point hydraulic circuit has a relief valve to restrict the maximum pressure in its circuit.

This is a guide piston relief valve with damper, a direct acting relief valve suitable for relatively high pressure and capacity, and constructed so as to prevent chattering and other unstableness associated with direct acting relief valves. As shown in the figure, the poppet (5) has a guide, and there is a valve chamber called a damping chamber (6) in the base of this guide piston.

The valve inlet is connected to this chamber through the clearance between the guide surface and the seat so that the chamber provides a damping effect, controlling valve vibration.

When the pressure in the circuit rises, the pressure in the damping chamber also rises, and when it exceeds the relief pressure setting the spring is compressed, making a clearance between the poppet and the seat.

The hydraulic oil can escape to the transmission case through this clearance, controlling the pressure rise.

- (1) Washer
- (2) Shim
- (3) Plug
- (4) Seat

- (5) Poppet
- (6) Damping Chamber
- A: From Pump**
- B: To Transmission Case**

9Y1211012HYM0021US0

SERVICING

CONTENTS

1. TROUBLESHOOTING.....	8-S1
2. SERVICING SPECIFICATIONS	8-S2
3. TIGHTENING TORQUES.....	8-S5
4. CHECKING AND ADJUSTING.....	8-S6
[1] HYDRAULIC PUMP (POWER STEERING)	8-S6
(1) Test Using Flow-meter	8-S6
[2] HYDRAULIC PUMP (THREE POINT HITCH HYDRAULIC SYSTEM)	8-S8
(1) Test Using Flow-meter	8-S8
[3] RELIEF VALVE	8-S11
(1) Three Point Hitch Hydraulic System.....	8-S11
(2) Power Steering System.....	8-S12
[4] SAFETY VALVE	8-S14
[5] POSITION CONTROL ROD	8-S15
(1) L3301/L3901.....	8-S15
(2) L4701.....	8-S16
5. DISASSEMBLING AND ASSEMBLING	8-S17
[1] HYDRAULIC PUMP	8-S17
(1) L3301/L3901.....	8-S17
(2) L4701.....	8-S18
[2] HYDRAULIC CYLINDER.....	8-S20
[3] POSITION CONTROL VALVE	8-S24
[4] RELIEF VALVE	8-S25
6. SERVICING	8-S26
[1] HYDRAULIC PUMP	8-S26
[2] HYDRAULIC CYLINDER.....	8-S27

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Implement Does Not Rise (Not Noise)	Control linkage improperly adjusted	Adjust	8-S15, 8-S16
	Control linkage improperly assembled or damaged	Repair or replace	8-S24
	Position control valve malfunctioning (unload poppet, spool, poppet 1, 2)	Repair or replace	8-S24
	Relief valve spring weaken or broken	Replace	8-S25
Implement Does Not Rise (Noise)	Hydraulic piston O-ring, cylinder damaged	Replace	8-S22
	Hydraulic oil filter clogged	Replace	G-37, G-65
	Relief valve setting pressure too low	Adjust	8-S11
	Hydraulic pump malfunctioning	Repair or replace	8-S26
Implement Does Not Reach Maximum Height	Position control improperly adjusted	Adjust	8-S15, 8-S16
	Position control valve spool joint 1 improperly adjusted	Adjust	8-S24
	Hydraulic arm shaft, hydraulic arm, lift arm improperly assembled	Adjust	8-S22
Implement Does Not Lower	Control valve malfunctioning (Spool damaged)	Replace	8-S24
	Poppet valve adjusting nut improperly adjusted	Adjust	8-S24
Implement Drops by Weight	Hydraulic cylinder worn or damaged	Replace	8-S27
	Hydraulic piston and O-ring worn or damaged	Replace	8-S22
	Poppet 1 seat surface damaged (control valve)	Replace	8-S24
	Poppet 1 O-ring damaged (control valve)	Replace	8-S24
	Poppet 2 seat surface damaged (control valve)	Replace	8-S24
	Poppet 2 O-ring damaged (control valve)	Replace	8-S24
Implement Hunts (Moves Up and Down)	Poppet 1, poppet 2, poppet 3 seat surface damaged	Replace	8-S24
	Control valve O-rings worn or damaged	Replace	8-S24
Oil Temperature Increases Rapidly	Relief valve operating	Adjust	8-S11
	Hydraulic pump leak or damaged	Replace or repair	8-S26
	Oil leaks from valves	Replace or repair	8-S24
	Gear or bearing damaged in the transmission case	Replace	—

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2. SERVICING SPECIFICATIONS

POWER STEERING

Item		Factory Specification	Allowable Limit
Hydraulic Pump [L3301/L3901] Condition - Engine Speed: approx. 2700 min⁻¹ (rpm) - Rated Pressure: 11.1 to 12.0 MPa (113 to 123 kgf/cm², 1640 to 1740 psi) - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure	Above 16.1 L/min. 4.25 U.S.gals/min. 3.54 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 15.0 L/min. 3.96 U.S.gals/min. 3.30 U.S.gals/min.	13.5 L/min. 3.57 U.S.gals/min. 2.97 Imp.gals/min.
Hydraulic Pump [L4701] Condition - Engine Speed: approx. 2600 min⁻¹ (rpm) - Rated Pressure: 10.7 to 11.7 MPa (109 to 119 kgf/cm², 1552 to 1697 psi) - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure	Above 17.9 L/min. 4.73 U.S.gals/min. 3.94 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 17.6 L/min. 4.65 U.S.gals/min. 3.87 Imp.gals/min.	15.7 L/min. 4.15 U.S.gals/min. 3.45 Imp.gals/min.
Relief Valve [L3301] Condition - Engine Speed: Maximum - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Setting Pressure [2WD]	8.3 to 9.3 MPa 85 to 95 kgf/cm ² 1200 to 1300 psi	—
	Setting Pressure [4WD]	11.4 to 12.4 MPa 116 to 126 kgf/cm ² 1650 to 1790 psi	—
Relief Valve [L3901] Condition - Engine Speed: Maximum - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Setting Pressure [2WD]	8.1 to 9.1 MPa 83 to 93 kgf/cm ² 1200 to 1300 psi	—
	Setting Pressure [4WD]	11.1 to 12.1 MPa 113 to 123 kgf/cm ² 1610 to 1740 psi	—
Relief Valve [L4701] Condition - Engine Speed: Maximum - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Setting Pressure [2WD]	8.0 to 9.0 MPa 81 to 91 kgf/cm ² 1200 to 1300 psi	—
	Setting Pressure [4WD]	10.7 to 11.7 MPa 109 to 119 kgf/cm ² 1550 to 1690 psi	—

THREE POINT HITCH HYDRAULIC SYSTEM)

Item		Factory Specification	Allowable Limit
Hydraulic Pump [L3301/L3901] Condition - Engine Speed: approx. 2700 min⁻¹ (rpm) - Rated Speed: 15.7 to 16.1 MPa (160 to 165 kgf/cm², 2280 to 2340 psi) - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure	Above 23.7 L/min. 6.26 U.S.gals/min. 5.21 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 23.2 L/min. 6.13 U.S.gals/min. 5.10 Imp.gals/min.	19.5 L/min. 5.15 U.S.gals/min. 4.29 Imp.gals/min.
Hydraulic Pump [L4701] Condition - Engine Speed: approx. 2600 min⁻¹ (rpm) - Rated Pressure: 17.1 to 18.1 MPa (175 to 185 kgf/cm², 2489 to 2631 psi) - Oil Temperature: 40 to 60 °C (104 to 140 °F)	Delivery at No Pressure	Above 29.2 L/min. 7.71 U.S.gals/min. 6.42 Imp.gals/min.	—
	Delivery at Rated Pressure	Above 28.6 L/min. 7.56 U.S.gals/min. 6.29 Imp.gals/min.	24.0 L/min. 6.34 U.S.gals/min. 5.28 Imp.gals/min.
Relief Valve [L3301/L3901]	Setting Pressure	15.7 to 16.6 MPa 160 to 170 kgf/cm ² 2280 to 2410 psi	—
Relief Valve [L4701]	Setting Pressure	17.1 to 18.1 MPa 174 to 185 kgf/cm ² 2480 to 2630 psi	—

SAFETY VALVE

Item		Factory Specification	Allowable Limit
Safety Valve	Operating Pressure	19.7 to 22.5 MPa 200 to 230 kgf/cm ² 2850 to 3270 psi	—

POSITION CONTROL ROD

Item		Factory Specification	Allowable Limit
Lift Arm	Free Play	10 to 15 mm 0.40 to 0.59 in.	—

HYDRAULIC PUMP

Item		Factory Specification	Allowable Limit
Housing Bore	Depth of Scratch	0.09 mm 0.0035 in.	—
Bushing to Gear Shaft - Gear Shaft - Bushing	Clearance	0.020 to 0.081 mm 0.0008 to 0.0032 in.	0.15 mm 0.0059 in.
	O.D.	14.970 to 14.980 mm 0.5894 to 0.5898 in.	—
	I.D.	15.000 to 15.051 mm 0.5906 to 0.5926 in.	—
Side Plate	Thickness	2.48 to 2.50 mm 0.0976 to 0.0984 in.	2.40 mm 0.0945 in.

HYDRAULIC CYLINDER

Item		Factory Specification	Allowable Limit
Bushings	Press-fit Location (Right Side)	11.3 to 11.7 mm 0.445 to 0.460 in.	—
	(Left Side)	16.8 to 17.2 mm 0.662 to 0.677 in.	—
Cylinder Bore [L3301/L3901]	I.D.	75.300 to 75.500 mm 2.9646 to 2.9724 in.	75.600 mm 2.9764 in.
Cylinder Bore [L4701]	I.D.	90.000 to 90.050 mm 3.5433 to 3.5452 in.	90.150 mm 3.5492 in.
Hydraulic Arm Shaft to Bushing • Hydraulic Arm Shaft • Bushing	Clearance (Right)	0.125 to 0.220 mm 0.0049 to 0.0086 in.	0.50 mm 0.020 in.
	(Left)	0.125 to 0.230 mm 0.00493 to 0.00905 in.	0.50 mm 0.020 in.
	O.D. (Right)	39.920 to 39.950 mm 1.5717 to 1.5728 in.	—
	(Left)	44.920 to 44.950 mm 1.7685 to 1.7696 in.	—
	I.D. (Right)	40.075 to 40.140 mm 1.5778 to 1.5803 in.	—
	(Left)	45.075 to 45.150 mm 1.7746 to 1.7775 in.	—

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3. TIGHTENING TORQUES

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

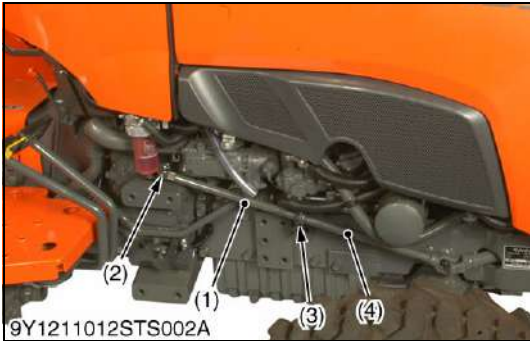
Item	N·m	kgf·m	lbf·ft
Joint shaft bolt [L3301/L3901]	23.5 to 27.4	2.4 to 2.8	18 to 20
Power steering delivery pipe joint bolt	49 to 68	5.0 to 7.0	37 to 50
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6	1.8 to 2.1	13 to 15
PS relief pressure adjusting screw lock nut	33 to 46	3.4 to 4.6	25 to 33
Power steering delivery hose joint bolt	49.0 to 58.8	5.0 to 6.0	37 to 43
Safety valve assembly	40 to 49	4.0 to 5.0	29 to 36
Safety valve lock nut	59 to 78	6.0 to 8.0	44 to 57
Delivery Pipe (Power steering) joint screw	49 to 68	5.0 to 7.0	37 to 50
Hydraulic pump assembly mounting screw and nut	24 to 27	2.4 to 2.8	18 to 20
Delivery pipe (PTO) joint bolt	34.3 to 39.2	3.5 to 4.0	26 to 28
Delivery pipe (regulator) joint bolt	39.2 to 49.0	4.0 to 5.0	29 to 36
Regulator valve mounting screws	17.6 to 20.6	1.8 to 2.1	13 to 15
Pump cover mounting screw	40 to 44	4.0 to 4.5	29 to 32
Delivery pipe (hydraulic block) joint bolt	49 to 69	5.0 to 7.0	37 to 50
Hydraulic cylinder assembly mounting bolt	78 to 90	7.9 to 9.2	58 to 66
Position control valve mounting screws	20 to 24	2.0 to 2.5	15 to 18
Plug 1	39.2 to 58.8	4.0 to 6.0	28.9 to 43.4
Plug 2	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Unload plug	39.2 to 58.8	4.0 to 6.0	28.9 to 43.4
Relief valve plug	35 to 44	3.5 to 4.5	26 to 32

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4. CHECKING AND ADJUSTING

[1] HYDRAULIC PUMP (POWER STEERING)

(1) Test Using Flow-meter

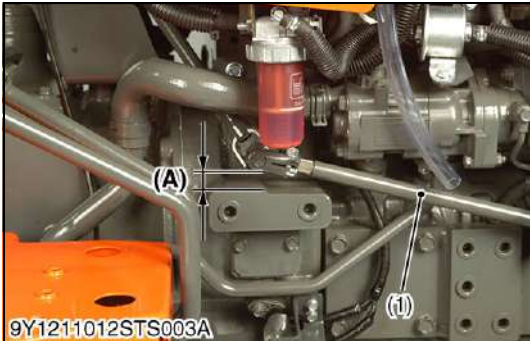


Preparation (L3301/L3901 Only)

- 1. Remove the bolt (2), (4).
- 2. Remove the joint shaft (1).

(When reassembling)

- Lift the joint shaft (1) so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the joint shaft (1) and flywheel housing.
- Then fit the support (3) in position.
- Be sure to insert the bolt (2) into cut-out of joint shaft (1).
- Apply grease to spline part of joint shaft (1).



Tightening torque	Bolt (Joint shaft)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
-------------------	--------------------	---

- (1) Joint Shaft
- (2) Bolt (Joint Shaft)
- (3) Support
- (4) Bolt (Support)

(A) Clearance

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Hydraulic Flow Test

■ IMPORTANT

- When using a flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with that flowmeter.
 - Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.
1. Remove the power steering delivery pipe or delivery hose joint bolt and install the pump adaptor **2** to the pump discharge port.
 2. Connect the hydraulic test hose to the pump adaptor **2** and flowmeter inlet port.
 3. Connect the other hydraulic test hose to the flowmeter outlet port and to transmission fluid filling plug hole.
 4. Open the flowmeter loading valve completely. (Turn counterclockwise.)
 5. Start the engine and set the engine speed at 2000 to 2200 min⁻¹ (rpm).
 6. Slowly close the loading valve to generate pressure approx. 9.81 MPa (100 kgf/cm², 1420 psi). Hold in this condition until oil temperature reached approx. 40 °C (104 °F).
 7. Open the loading valve completely.
 8. Set the engine speed. (Refer to **Condition**.)
 9. Read and note the pump delivery at no pressure.
 10. Slowly close the loading valve to increase pressure (Rated pressure). As the load is increased, engine speed drops, therefore, reset the engine speed.
 11. Read and note the pump delivery at rated pressure.
 12. Open the loading valve completely and stop the engine.
 13. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

(When reassembling)

- Install the copper washers firmly.

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft

Condition

- Engine speed:
 - [L3301/L3901]**
approx. 2700 min⁻¹ (rpm)
 - [L4701]**
approx. 2600 min⁻¹ (rpm)
- Rated pressure:
 - [L3301/L3901]**
11.1 to 12.0 MPa (113 to 123 kgf/cm², 1640 to 1740 psi)
 - [L4701]**
10.7 to 11.7 MPa (109 to 119 kgf/cm², 1552 to 1697 psi)
- Oil temperature:
40 to 60 °C (104 to 140 °F)

[A] L3301/L3901

[B] L4701

(To be continued)

(Continued)

[L3301/L3901]

Hydraulic pump delivery at no pressure	Factory specification	Above 14.4 L/min. 3.80 U.S.gals/min. 3.17 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 14.1 L/min. 3.72 U.S.gals/min. 3.10 U.S.gals/min.
	Allowable limit	11.9 L/min. 3.14 U.S.gals/min. 2.62 Imp.gals/min.

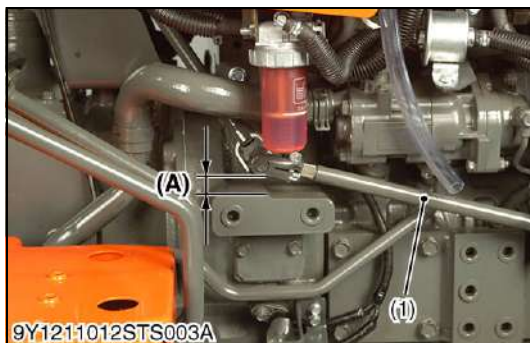
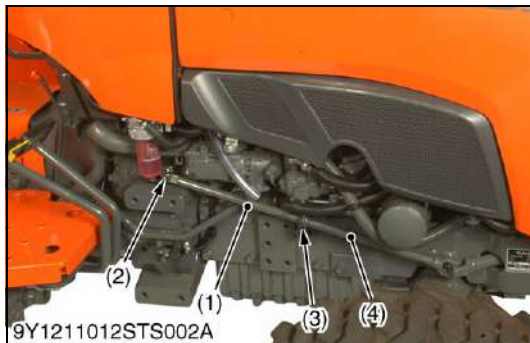
[L4701]

Hydraulic pump delivery at no pressure	Factory specification	Above 17.7 L/min. 4.68 U.S.gals/min. 3.89 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 17.4 L/min. 4.60 U.S.gals/min. 3.83 Imp.gals/min.
	Allowable limit	14.6 L/min. 3.86 U.S.gals/min. 3.21 Imp.gals/min.

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[2] HYDRAULIC PUMP (THREE POINT HITCH HYDRAULIC SYSTEM)

(1) Test Using Flow-meter

**Preparation (L3301/L3901 Only)**

1. Remove the bolt (2), (4).
2. Remove the joint shaft (1).

(When reassembling)

- Lift the joint shaft (1) so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the joint shaft (1) and flywheel housing.
Then fit the support (3) in position.
- Be sure to insert the bolt (2) into cut-out of joint shaft (1).
- Apply grease to spline part of joint shaft (1).

Tightening torque	Bolt (Joint shaft)	23.5 to 27.4 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
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- (1) Joint Shaft
- (2) Bolt (Joint Shaft)
- (3) Support
- (4) Bolt (Support)

(A) Clearance

9Y1211012STS0006US0



Hydraulic Flow Test

■ IMPORTANT

- When using a flowmeter other than KUBOTA specified flowmeter, be sure to use the instructions with that flowmeter.
 - Do not close the flowmeter loading valve completely, before testing, because it has no relief valve.
1. Remove the delivery pipe and install the pump adaptor (see page G-92) 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, 2130 psi). Hold in this condition until oil temperature reached approx. 40 °C (104 °F).
 7. Open the loading valve completely.
 8. Set the engine speed. (Refer to **Condition**.)
 9. Read and note the pump delivery at no pressure.
 10. Slowly close the loading valve to increase pressure (Rated pressure). As the load is increased, engine speed drops, therefore, reset the engine speed.
 11. Read and note the pump delivery at rated pressure.
 12. Open the loading valve completely and stop the engine.
 13. If the pump delivery does not reach the allowable limit, check the pump suction line, oil filter or hydraulic pump.

Tightening torque	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
-------------------	---	---

Condition

- Engine speed:
 - [L3301/L3901]**
approx. 2700 min⁻¹ (rpm)
 - [L4701]**
approx. 2600 min⁻¹ (rpm)
- Rated speed:
 - [L3301/L3901]**
15.7 to 16.1 MPa (160 to 165 kgf/cm², 2280 to 2340 psi)
 - [L4701]**
17.1 to 18.1 MPa (175 to 185 kgf/cm², 2489 to 2631 psi)
- Oil temperature:
 - 40 to 60 °C (104 to 140 °F)

(To be continued)

(Continued)

[L3301/L3901]

Hydraulic pump delivery at no pressure	Factory specification	Above 23.7 L/min. 6.26 U.S.gals/min. 5.21 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 23.2 L/min. 6.13 U.S.gals/min. 5.10 Imp.gals/min.
	Allowable limit	19.5 L/min. 5.15 U.S.gals/min. 4.29 Imp.gals/min.

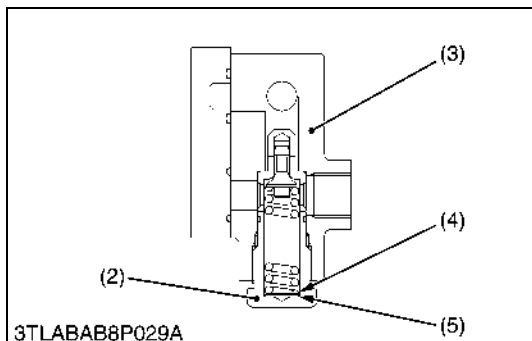
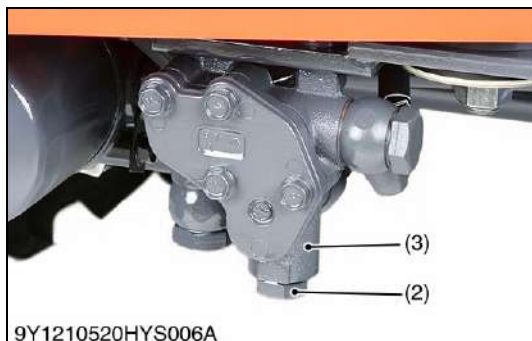
[L4701]

Hydraulic pump delivery at no pressure	Factory specification	Above 29.2 L/min. 7.71 U.S.gals/min. 6.42 Imp.gals/min.
Hydraulic pump delivery at rated pressure	Factory specification	Above 28.6 L/min. 7.56 U.S.gals/min. 6.29 Imp.gals/min.
	Allowable limit	24.0 L/min. 6.34 U.S.gals/min. 5.28 Imp.gals/min.

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[3] RELIEF VALVE

(1) Three Point Hitch Hydraulic System



Relief Valve Setting Pressure

■ IMPORTANT

- When removing the plug from hydraulic cylinder, be sure to lower the three point hitch.
1. Remove the plug from hydraulic cylinder.
 2. Connect the cable and pressure gauge to hydraulic cylinder.
 3. Remove the position control lever stopper (1).
 4. Start the engine and set at maximum speed.
 5. Move the position control lever all way up to operate the relief valve and read the gauge.
 6. If the pressure is not within the factory specifications, remove the relief plug (2) of front hydraulic block (3) and adjust with the adjusting shims (4).
 7. After the relief valve setting pressure test, reset the position control lever stopper firmly.

Relief valve (3-point hitch) setting pressure	Factory specification	L3301/ L3901	15.7 to 16.6 MPa 160 to 170 kgf/cm ² 2280 to 2410 psi
		L4701	17.1 to 18.1 MPa 174 to 185 kgf/cm ² 2480 to 2630 psi

Condition

- Engine speed:
Maximum
- Oil temperature:
40 to 60 °C (104 to 140 °F)

(Reference)

- Thickness of shims (4):
0.1 mm (0.004 in.)
0.2 mm (0.008 in.)
0.4 mm (0.02 in.)
- Pressure change per 0.1 mm (0.004 in.) shim:
Approx. 260 kPa (2.7 kgf/cm², 38 psi)
- When shims are added, the pressure increases.

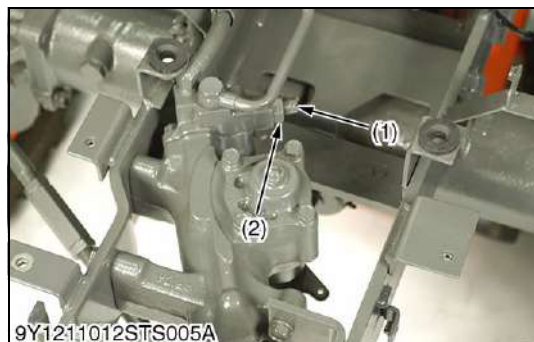
- (1) Stopper
(2) Relief Plug
(3) Front Hydraulic Block

- (4) Adjusting Shim
(5) Washer

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(2) Power Steering System

[A] L3301/L3901



Relief Valve Setting Pressure

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, and adjust relief valve setting pressure by turning adjusting screw (1).

[L3301]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.3 to 9.3 MPa 85 to 95 kgf/cm ² 1200 to 1300 psi
		4WD	11.4 to 12.4 MPa 116 to 126 kgf/cm ² 1650 to 1790 psi

[L3901]

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.1 to 9.1 MPa 83 to 93 kgf/cm ² 1200 to 1300 psi
		4WD	11.1 to 12.1 MPa 113 to 123 kgf/cm ² 1610 to 1740 psi

Tightening torque	Power steering delivery pipe joint bolt	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	PS relief pressure adjusting screw lock nut	33 to 46 N·m 3.4 to 4.6 kgf·m 25 to 33 lbf·ft

Condition

- Engine speed:
Maximum
- Oil temperature:
40 to 60 °C (104 to 140 °F)

(Reference)

- Setting pressure change approx. 1.27 MPa (13 kgf/cm², 180 psi) per adjusting screw 1/4 turn.
- When turn the adjusting screw clockwise, setting pressure increase.

(1) Adjusting Screw

(2) PS Relief Pressure Adjusting Screw
Lock Nut

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[B] L4701**Relief Valve Setting Pressure**

1. Disconnect the power steering delivery pipe joint bolt.
2. Install the adaptor **E** instead of joint bolt, and then set a thread joint, cable and pressure gauge.
3. Start the engine and set the engine speed at max. speed.
4. Fully turn the steering wheel to the left or right and read the pressure when the relief valve functions.
5. Stop the engine.
6. If the pressure is not within the factory specifications, check the pump delivery line, or replace the power steering controller.

Relief valve (power steering) setting pressure	Factory specifica- tion	2WD	8.0 to 9.0 MPa 81 to 91 kgf/cm ² 1200 to 1300 psi
		4WD	10.7 to 11.7 MPa 109 to 119 kgf/cm ² 1550 to 1690 psi
Tightening torque	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft	

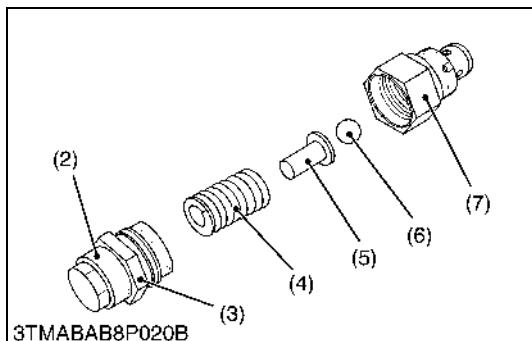
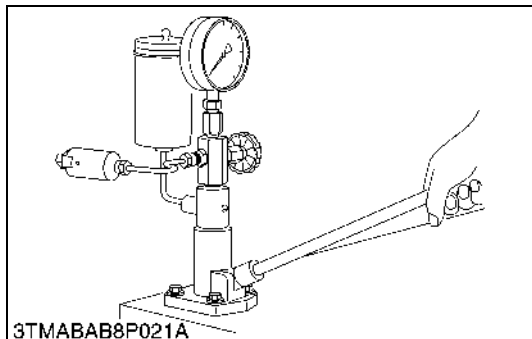
Condition

- Engine speed:
Maximum
- Oil temperature:
40 to 60 °C (104 to 140 °F)

[A] Manual Transmission Model**[B] HST Model**

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[4] SAFETY VALVE



Safety Valve Setting Pressure Test Using Injection Nozzle Tester

1. Remove the safety valve assembly (1).
2. Attach the safety valve to an injection nozzle tester with a safety valve setting adaptor. (Refer to "SPECIAL TOOLS" (see page G-93.).)
3. Measure the operating pressure of the safety valve.
4. If the operating pressure is not within the factory specifications, adjust by turning the adjusting screw (2).
5. After adjustment, tighten the lock nut (3) firmly.

(When reassembling)

- Install the safety valve to the rear hydraulic block, being careful not to damage the O-ring and apply transmission fluid.

Tightening torque	Safety valve assembly	40 to 49 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Safety valve lock nut	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft
Safety valve operating pressure	Factory specification	19.7 to 22.5 MPa 200 to 230 kgf/cm ² 2850 to 3270 psi

■ NOTE

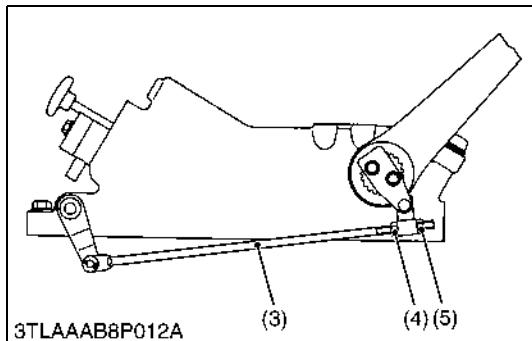
- Use specified transmission fluid (Refer to "4. LUBRICANTS, FUEL AND COOLANT" on page G-10.) to test the operating pressure of the cylinder safety valve.

- | | |
|---------------------------|-------------|
| (1) Safety Valve Assembly | (5) Seat |
| (2) Adjusting Screw | (6) Ball |
| (3) Lock Nut | (7) Housing |
| (4) Spring | |

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[5] POSITION CONTROL ROD

(1) L3301/L3901



Feedback Rod Adjustment

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and set the engine revolution to idling.
3. Move the position control lever (1) to uppermost position.
4. While pushing feedback rod (3) forward, turn the adjusting nut (5) counterclockwise until the relief valve starts working.
5. When relief valve starts operation, turn the adjusting nut (5) clockwise 2 turns.
6. Tighten the lock nut (4) as holding the adjusting nut (5) not to turn.
7. Set the engine revolution to maximum.
8. Move the position control lever (1) to lowest position.
9. Move the position control lever (1) to uppermost position.
10. Check the relief valve does not operate. If operates, adjust the feedback rod again.
11. Measure the lift arm free play.
12. If measurement is not within the factory specification, adjust the feedback rod length.
 - When lift arm free play is large
 - Lengthen the feedback rod (3)
 - When lift arm free play is small
 - Shorten the feedback rod (3)

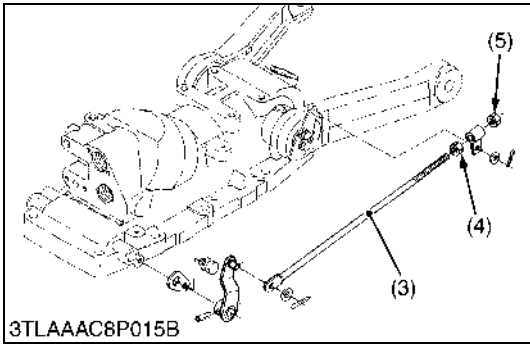
Lift arm free play at maximum raising position	Factory specification	10 to 15 mm 0.40 to 0.59 in.
--	-----------------------	---------------------------------

- (1) Position Control Lever
- (2) Stopper
- (3) Feedback Rod
- (4) Lock Nut
- (5) Adjusting Nut

A: Lift Arm Free Play

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(2) L4701



Feedback Rod Adjustment

1. Set the position control lever (1) to the lowest position.
2. Start the engine, and set the engine revolution to idling.
3. Move the position control lever (1) to uppermost position.
4. While pushing feedback rod (3) backward, turn the adjusting nut (4) clockwise until the relief valve starts working.
5. When relief valve starts operation, turn the adjusting nut (4) counterclockwise 2 turns.
6. Tighten the lock nut (5) as holding the adjusting nut (4) not to turn.
7. Set the engine revolution to 1500 min⁻¹ (rpm).
8. Move the position control lever (1) to lowest position.
9. Move the position control lever (1) to uppermost position.
10. Check the relief valve does not operate. If operates, adjust the feedback rod again.
11. Measure the lift arm free play.
12. If measurement is not within the factory specification, adjust the feedback rod length.
 - When lift arm free play is large
 - Shorten the feedback rod (3)
 - When lift arm free play is small
 - Lengthen the feedback rod (3)

Lift arm free play at maximum raising position	Factory specification	10 to 15 mm 0.40 to 0.59 in.
--	-----------------------	---------------------------------

- (1) Position Control Lever
- (2) Stopper
- (3) Feedback Rod
- (4) Adjusting Nut
- (5) Lock Nut

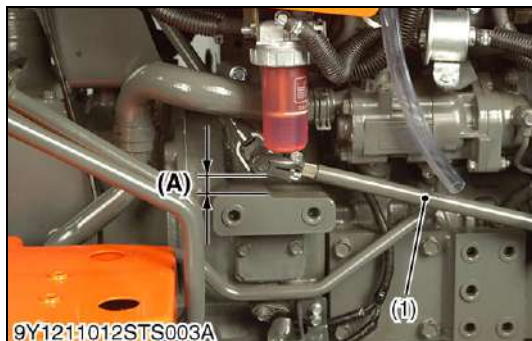
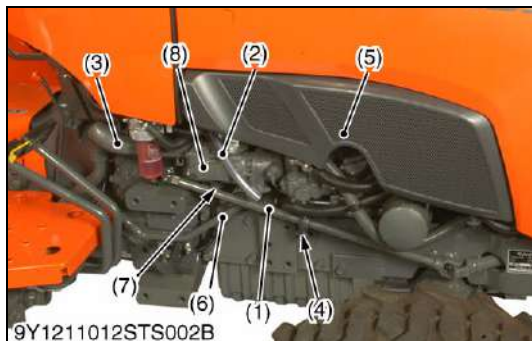
A: Lift Arm Free Play

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5. DISASSEMBLING AND ASSEMBLING

[1] HYDRAULIC PUMP

(1) L3301/L3901



Hydraulic Pump Assembly

1. Remove the side cover (5).
2. Remove the steering joint shaft (1).
3. Disconnect the suction hose (3).
4. Disconnect the return hose (8).
5. Remove the delivery pipe (6), (7).
6. Remove the hydraulic pump (2).

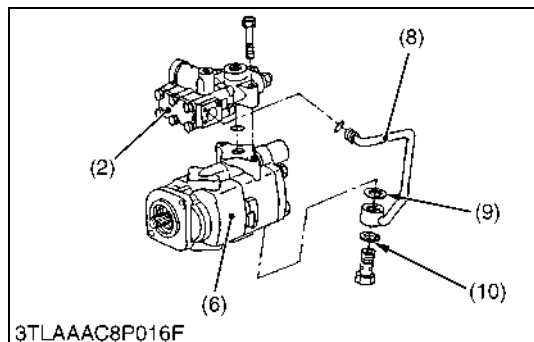
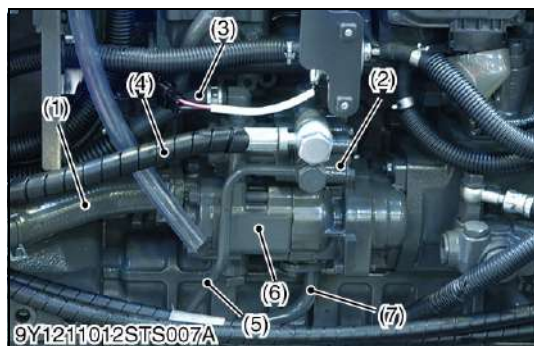
(When reassembling)

- Lift the universal joint so that there should be a clearance **(A)** of more than 5 mm (0.2 in.) between the universal joint and flywheel housing.
- Apply grease to the O-ring and be careful not to damage it.

Tightening torque	Delivery pipe (power steering) joint screw	49 to 68 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- | | |
|--------------------|------------------------------------|
| (1) Joint Shaft | (6) Delivery Pipe (3-point Hitch) |
| (2) Hydraulic Pump | (7) Delivery Pipe (Power Steering) |
| (3) Suction Hose | (8) Return Hose |
| (4) Support | |
| (5) Side Cover | (A) Clearance |

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(2) L4701**[A] Manual Transmission Model****Preparation**

1. Remove the side cover (R.H.).
2. Disconnect the delivery pipe (PTO) (5), power steering delivery hose (4) and power steering return hose (3) from the regulator valve (2).
3. Remove the delivery pipe (regulator) (8).
4. Disconnect the delivery pipe (3-point hitch) (7) from the hydraulic pump (6).
5. Disconnect the suction hose (1).

(When reassembling)

- Apply grease to the O-rings and be careful not to damage them.
- Be sure to wrap a seal tape to thread part of power steering return hose (3).
- There are 2 types of washer for power steering delivery hose. Thicker one should be attached engine side.

Tightening torque	Delivery pipe (PTO) joint bolt	34.3 to 39.2 N·m 3.5 to 4.0 kgf·m 26 to 28 lbf·ft
	Power steering delivery hose joint bolt	49.0 to 58.8 N·m 5.0 to 6.0 kgf·m 37 to 43 lbf·ft
	Delivery pipe (regulator) joint bolt	39.2 to 49.0 N·m 4.0 to 5.0 kgf·m 29 to 36 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- | | |
|----------------------------------|-----------------------------------|
| (1) Suction Hose | (6) Hydraulic Pump |
| (2) Regulator Valve | (7) Delivery Pipe (3-point Hitch) |
| (3) Power Steering Return Hose | (8) Delivery Pipe (Regulator) |
| (4) Power Steering Delivery Hose | (9) Copper Washer |
| (5) Delivery Pipe (PTO) | (10) Copper Washer (Thicker) |

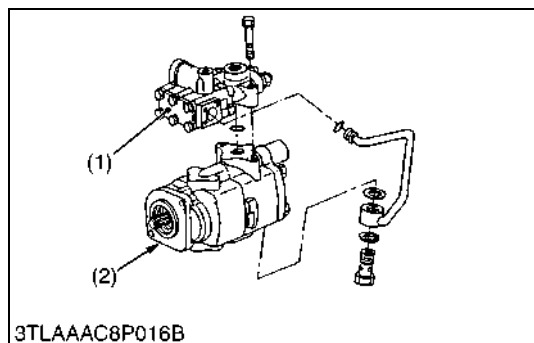
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Regulator Valve and Hydraulic Pump Assembly

1. Loosen and remove the regulator valve mounting screws.
2. Remove the regulator valve (1).
3. Loosen and remove the hydraulic pump assembly mounting screws and nuts, then remove the hydraulic pump assembly.

(When reassembling)

- Apply grease to the O-ring and be careful not to damage it.



Tightening torque	Regulator valve mounting screws	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft
	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft

- | | |
|---------------------|-----------------------------|
| (1) Regulator Valve | (2) Hydraulic Pump Assembly |
|---------------------|-----------------------------|

9Y1211012STS0024US0

[B] HST Model**Hydraulic Pump Assembly**

1. Remove the side cover.
2. Disconnect the suction hose (1).
3. Disconnect the power steering return hose (2).
4. Disconnect the delivery pipe (3-point hitch) (3).
5. Disconnect the power steering delivery hose (4).
6. Remove the hydraulic pump (5).

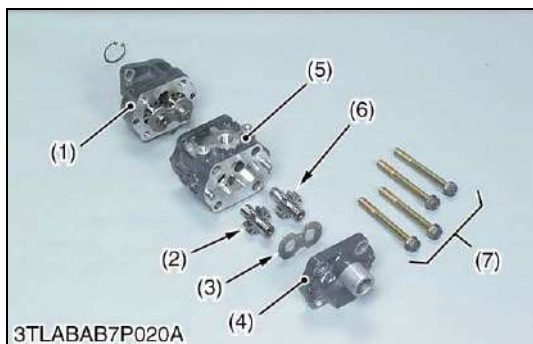
(When reassembling)

- Apply grease to the O-ring and be careful not to damage it.
- Be sure to wrap a seal tape to thread part of power steering return hose (2).

Tightening torque	Hydraulic pump assembly mounting screw and nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Delivery pipe (3-point hitch) mounting bolt	17.6 to 20.6 N·m 1.8 to 2.1 kgf·m 13 to 15 lbf·ft

- | | |
|-----------------------------------|----------------------------------|
| (1) Suction Hose | (4) Power Steering Delivery Hose |
| (2) Power Steering Return Hose | (5) Hydraulic Pump |
| (3) Delivery Pipe (3-point Hitch) | |

9Y1211012STS0025US0

**Hydraulic Pump Assembly**

1. Remove the pump cover mounting screw (7).
2. Remove the drive gear (6), driven gear (2) and side plate (3) from the casing.

(When reassembling)

- Be careful no to damage the gasket.
- Align the hole of the pump cover (4) and casing 2 (5).
- Install the side plate, noting its location and direction.
- Install the gears, noting its direction.

Tightening torque	Pump cover mounting screw	40 to 44 N·m 4.0 to 4.5 kgf·m 29 to 32 lbf·ft
-------------------	---------------------------	---

- | | |
|-----------------|----------------|
| (1) Casing 1 | (5) Casing 2 |
| (2) Driven Gear | (6) Drive Gear |
| (3) Side Plate | (7) Screw |
| (4) Pump Cover | |

9Y1211012STS0026US0

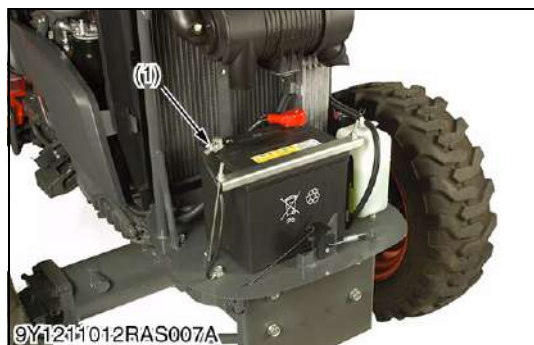
Hydraulic Pump Running-in

After reassembly, perform break-in operation in the following manner, and check the pump for abnormality before use. If the pump temperature should rise noticeably during running-in, recheck should be performed.

1. Install the hydraulic pump to the tractor, and mount the suction pipe and delivery pipe securely.
2. Set the engine speed at 1300 to 1500 mm⁻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 2.9 MPa (30 kgf/cm², 430 psi) to 4.9 MPa (50 kgf/cm², 710 psi) pressure, operate it for approx. 15 minutes.
4. With the engine set to maximum speed, fully turn the steering wheel to the left or right, then actuate the relief valve five times for 25 seconds (one time 5 seconds).

9Y1211012STS0027US0

[2] HYDRAULIC CYLINDER

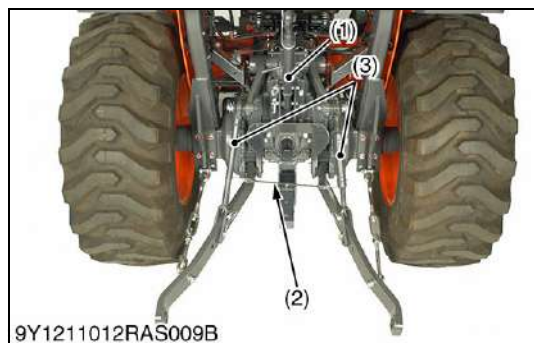


Battery Negative Cable

1. Open the bonnet.
2. Remove the battery negative cable (1).

(1) Battery Negative Cable

9Y1211012HYS0009US0



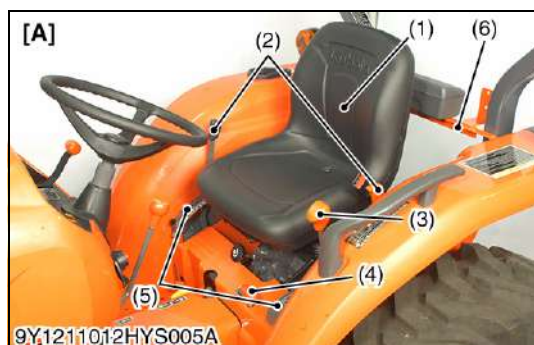
Lift Rod

1. Remove the top link (1).
2. Remove the rubber spring (2).
3. Remove the lift rods (3).

(1) Top Link
(2) Rubber Spring

(3) Lift Rod

9Y1211012HYS0010US0



Outer Components

1. Remove the seat (1).
2. Remove the grips (2), (3), (4), (7).
3. Remove the lever guides (5).
4. Remove the PTO switch (6).

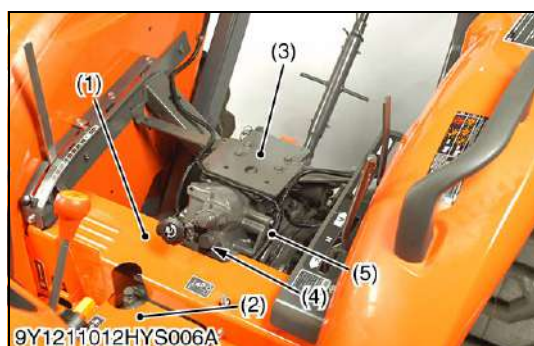
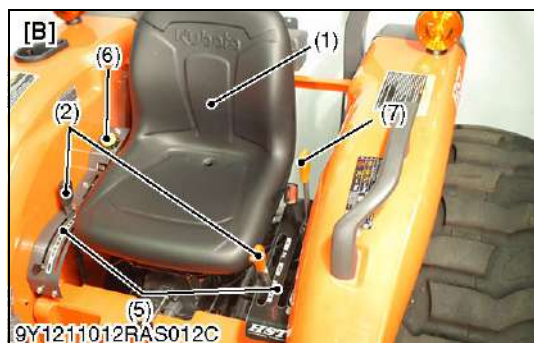
(1) Seat
(2) Grip
(3) Grip (Shuttle Lever)
[Manual Transmission Model Only]
(4) Grip (4WD Lever)
[4WD Model Only]
(5) Lever Guide

(6) PTO Switch [L4701 Only]
(7) Grip (Cruise Lever)
[L4701 HST Model Only]

[A] L3301/L3901

[B] L4701

9Y1211012HYS0011US0



Suspension Seat

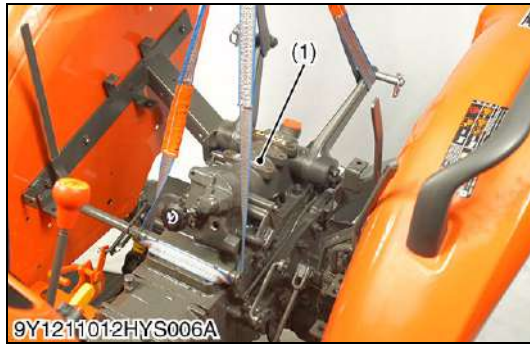
1. Remove the floor seat cover (1).
2. Remove the center cover (2).
3. Remove the suspension seat (3).
4. Remove the joint bolt (4).
5. Remove the wiring (5).

Tightening torque	Delivery pipe (hydraulic block) joint bolt	49 to 69 N·m 5.0 to 7.0 kgf·m 37 to 50 lbf·ft
-------------------	--	---

(1) Floor Seat Cover
(2) Center Cover
(3) Suspension Seat

(4) Joint Bolt
(5) Wiring

9Y1211012HYS0012US0



Hydraulic Cylinder

1. Loosen and remove the hydraulic cylinder assembly mounting bolts and nuts.
2. Support the hydraulic cylinder assembly with nylon strap and crane and remove it.

(When reassembling)

Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminate the water, oil and stuck liquid gasket (L4701 only).

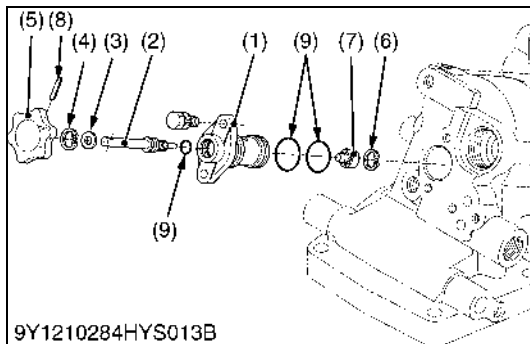
■ NOTE

- Reassemble the hydraulic cylinder assembly to the tractor, be sure to adjust the feedback rod (See page 8-S15).

Tightening torque	Hydraulic cylinder assembly mounting bolt	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
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(1) Hydraulic Cylinder Assembly

9Y1211012HYS0013US0



Lowering Speed Adjusting Valve (L3301/L3901)

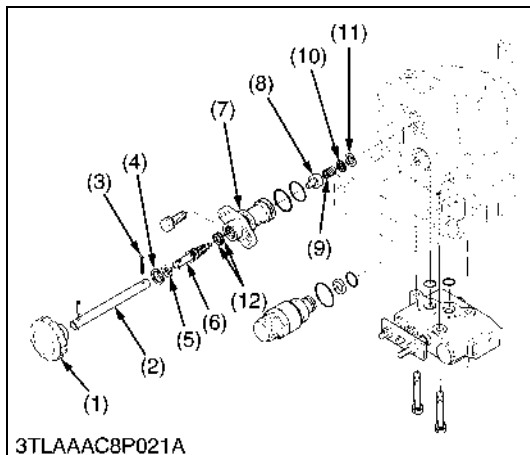
1. Remove the lowering speed adjusting valve from hydraulic cylinder block.
2. Tap out the spring pin (8), and remove the grip (5).
3. Remove the internal cir-clip (4), and remove the hydraulic adjusting shaft (2).
4. Remove the internal cir-clip (6) and draw out the adjusting collar (7).

(When reassembling)

- Install the hydraulic adjusting shaft (2) and valve body (1), noting O-ring (9).

- | | |
|-------------------------------|-----------------------|
| (1) Valve Body | (6) Internal Cir-clip |
| (2) Hydraulic Adjusting Shaft | (7) Adjusting Collar |
| (3) Washer | (8) Spring Pin |
| (4) Internal Cir-clip | (9) O-ring |
| (5) Grip | |

9Y1211012HYS0014US0



Lowering Speed Adjusting Valve (L4701)

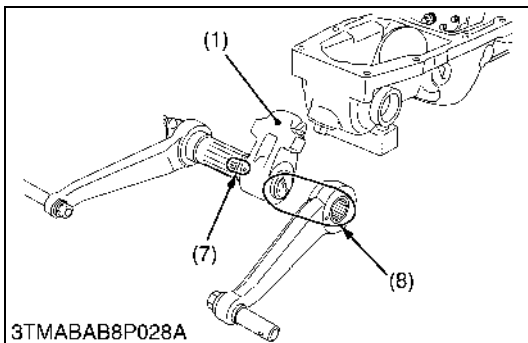
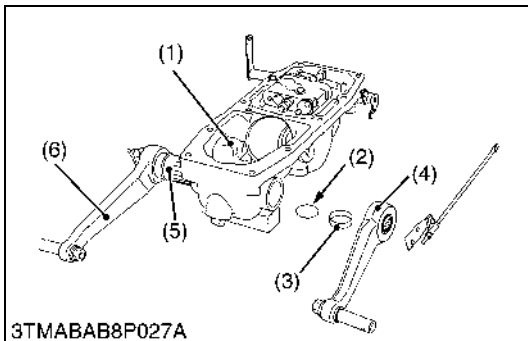
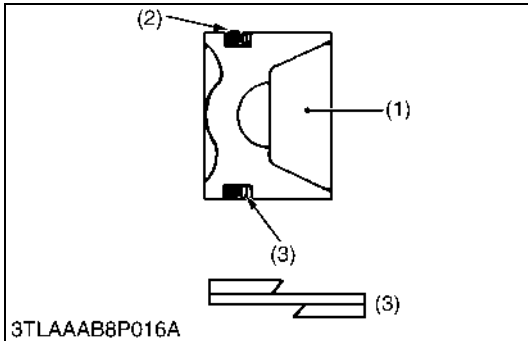
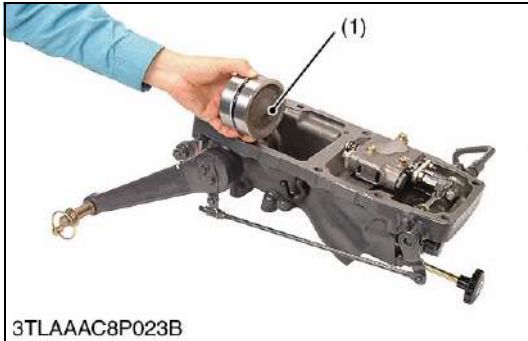
1. Remove the lowering speed adjusting valve assembly from hydraulic cylinder block.
2. Remove the internal snap ring (4), and remove the hydraulic adjusting shaft (6).
3. Remove the internal snap ring (11), and draw out the spring (9) and adjusting collar (8).

(When reassembling)

- Install the hydraulic adjusting shaft (6) to valve body (7), noting two O-rings (12).

- | | |
|-------------------------------|-------------------------|
| (1) Grip | (7) Valve Body |
| (2) Extension Shaft | (8) Adjusting Collar |
| (3) Cotter Pin | (9) Spring |
| (4) Internal Snap Ring | (10) Washer |
| (5) Washer | (11) Internal Snap Ring |
| (6) Hydraulic Adjusting Shaft | (12) O-ring |

9Y1211012HYS0015US0



Hydraulic Rod and Hydraulic Piston

1. Tap out the spring pin.
2. Remove the hydraulic rod.
3. Remove the plug (screw head size: 17 mm) from front of hydraulic cylinder.
4. Inject the compressed air through the plug hole, and remove the hydraulic piston.



CAUTION

- Do not put your hand into the hydraulic cylinder block because the hydraulic piston jumps out with a strong force, which is dangerous.

(When reassembling)

- Install the piston, noting O-ring and back-up ring (3). (See figure).
- Apply grease to the piston bottom contacts with hydraulic rod.
- Apply transmission fluid to the cylinder, and then install the hydraulic piston (1).

(1) Hydraulic Piston

(3) Back-up Ring

(2) O-ring

9Y1211012HYS0020US0

Lift Arm, Hydraulic Arm and Hydraulic Arm Shaft

1. Disconnect the feedback rod from feedback lever.
2. Remove the lift arm setting screws.
3. Remove the lift arm L.H. (4).
4. Draw out the hydraulic arm shaft (5) and lift arm R.H. (6) as a unit.
5. Remove the hydraulic arm (1).
6. Remove the collar (3) and O-ring (2).

(When reassembling)

- Align the alignment marks (7) of the hydraulic arm (1) and hydraulic arm shaft (5).
- Align the alignment marks (8) of the lift arms (6), (4) and hydraulic arm shaft (5).
- Apply grease to the right and left bushings of hydraulic cylinder block and O-ring (2).
- Be careful not to damage the O-ring (2).

(1) Hydraulic Arm

(7) Alignment Mark (Hydraulic Arm Shaft and Hydraulic Arm)

(2) O-ring

(8) Alignment Mark (Hydraulic Arm Shaft and Lift Arm)

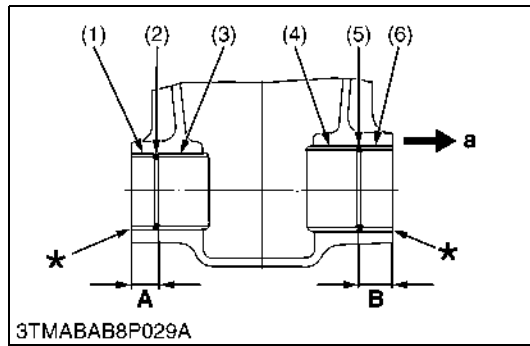
(3) Collars

(4) Lift Arm L.H.

(5) Hydraulic Arm Shaft

(6) Lift Arm R.H.

9Y1211012HYS0021US0



Bushings

1. Remove the bushings (3) and (4).

(When reassembling)

- When press-fitting new bushings (3), (4) with a press-fitting tool (see page G-90) observe the dimensions described in the figure.
- Apply transmission fluid to the hydraulic cylinder boss and bushing.
- Press- fit the bushing so that each seam face upward.

Press-fit location of bushings	Factory specification	A (Left side)	16.8 to 17.2 mm 0.662 to 0.677 in.
		B (Right side)	11.3 to 11.7 mm 0.445 to 0.460 in.

- (1) Collar (Left)
- (2) O-ring
- (3) Bushing (Left)
- (4) Bushing
- (5) O-ring
- (6) Collar (Right)

a: Right Side *Flush the End of Collar with the End of Hydraulic Cylinder Body.

9Y1211012HYS0022US0

[3] POSITION CONTROL VALVE



Position Control Valve

1. Loosen and remove the position control valve mounting screws.
2. Remove the position control valve (1).

(When reassembling)

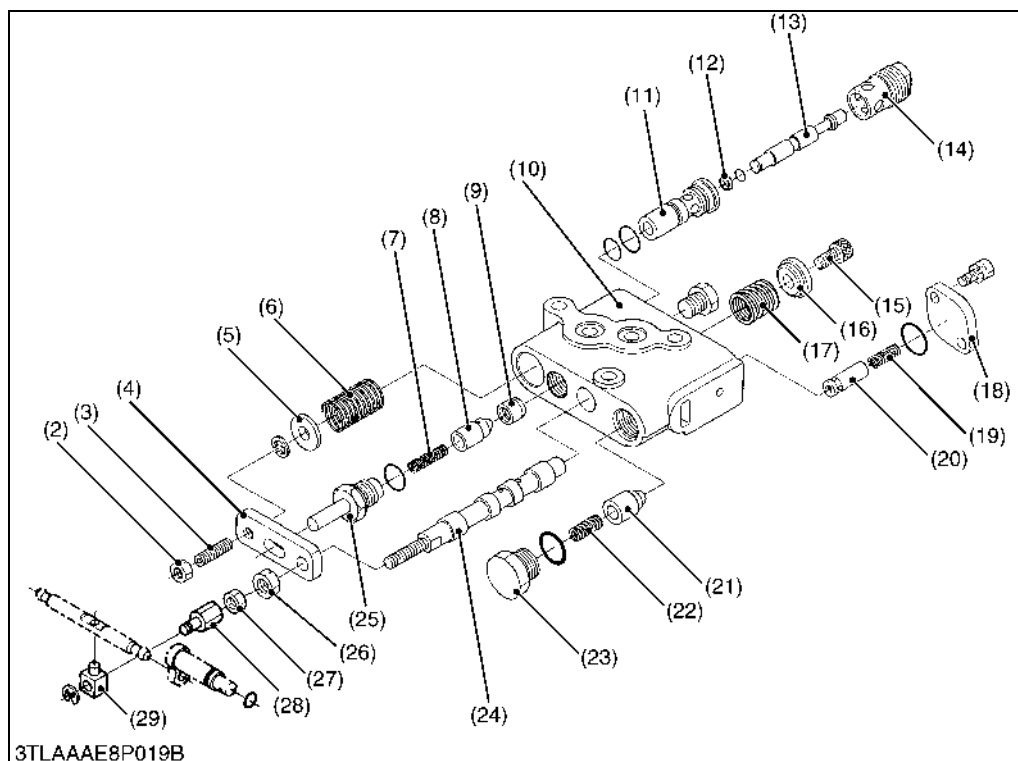
- Be careful not to damage the O-rings.

Tightening torque	Position control valve mounting screws	20 to 24 N·m 2.0 to 2.5 kgf·m 15 to 18 lbf·ft
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■ IMPORTANT

- Measure the distance between the spool edge and spool joint 2 edge before disassembling.

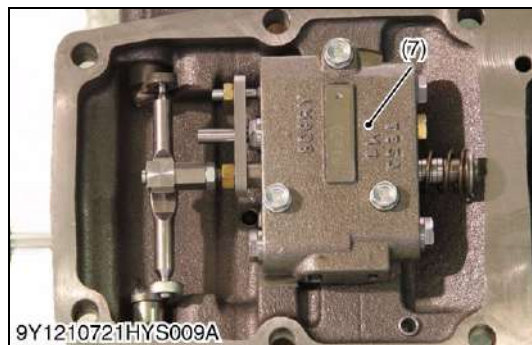
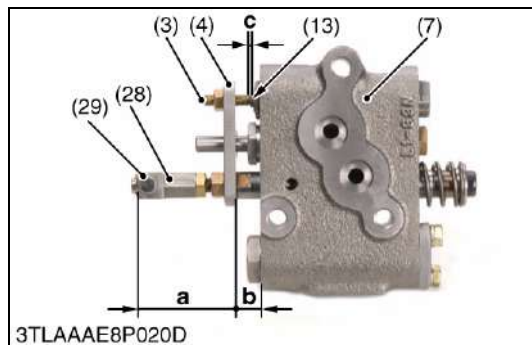
(1) Position Control Valve



- (2) Nut 1
- (3) Set Screw
- (4) Plate 1
- (5) Washer
- (6) Spring
- (7) Spring
- (8) Poppet 1
- (9) Valve Seat
- (10) Valve Body
- (11) Sleeve
- (12) Backup Ring
- (13) Poppet 2
- (14) Plug 1
- (15) Screw
- (16) Spring Holder
- (17) Spring
- (18) Plate 2
- (19) Spring
- (20) Poppet 3
- (21) Unload Poppet
- (22) Spring
- (23) Unload Plug
- (24) Spool
- (25) Plug 2
- (26) Nut
- (27) Lock Nut
- (28) Spool Joint 1
- (29) Spool Joint 2

(To be continued)

(Continued)

**■ IMPORTANT**

- Set screw (3) and spool joint 1 (28) are adjusted to very close accuracy. Do not disassemble them unless necessary.

If disassembled due to unavoidable reasons, be sure to make the following adjustments before assembling.

■ Spool joint 1 (2)

- Turn and adjust the spool joint 1 (28) so that the dimension "a" between the spool joint 2 (29) and the plate 1 (4) is 48.0 mm (1.89 in.).
- After adjustment, be sure to adjust the position control feedback rod.

■ Set screw (3)

- Turn and adjust the set screw (3) so that the clearance "c" between the set screw (3) and the poppet 2 (13) becomes 0.1 to 0.2 mm (0.0039 to 0.0079 in.).

(When reassembling)

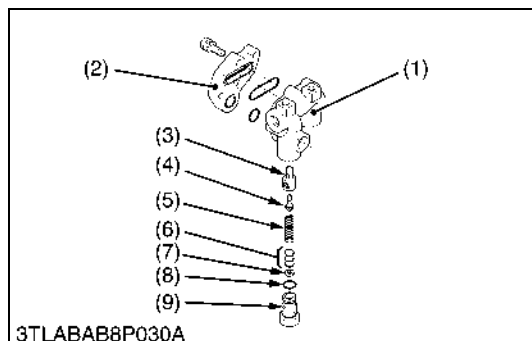
- Assemble the control valve to the hydraulic cylinder as shown in the picture.

Tightening torque	Plug 1	39.2 to 58.8 N·m 4.0 to 6.0 kgf·m 28.9 to 43.4 lbf·ft
	Plug 2	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 lbf·ft
	Unload plug	39.2 to 58.8 N·m 4.0 to 6.0 kgf·m 28.9 to 43.4 lbf·ft

- (3) Set Screw
(4) Plate 1
(7) Valve Body
(13) Poppet 2
(28) Spool Joint 1
(29) Spool Joint 2

- a: Dimension
b: Dimension
c: Clearance

9Y1211012HYS0016US0

[4] RELIEF VALVE**Relief Valve**

- Remove the plug (9), and draw out the spring (5) and the poppet (4).
- Remove the valve seat (3).

(When reassembling)

- Be careful not to damage the O-rings.

Tightening torque	Relief valve plug	35 to 44 N·m 3.5 to 4.5 kgf·m 26 to 32 lbf·ft
-------------------	-------------------	---

■ IMPORTANT

- After disassembling and assembling the relief valve, be sure to adjust the relief valve setting pressure.

- (1) Front Hydraulic Block (6) Adjusting Shim
(2) Cap (7) Washer
(3) Valve Seat (8) O-ring
(4) Poppet (9) Plug
(5) Spring

9Y1211012HYS0017US0

6. SERVICING

[1] HYDRAULIC PUMP



Housing Bore (Depth of Scratch)

1. Check for the scratch on the interior surface of the housing caused by the gear.
2. If the scratch reaches more than half the area of the interior surface of the housing, replace at pump assembly.
3. Measure the housing I.D. where the interior surface is not scratched, and measure the housing I.D. where the interior surface is scratched.
4. If the values obtained in the two determinations differ by more than the allowable limit, replace the hydraulic pump as a unit.

Depth of scratch	Allowable limit	0.09 mm 0.0035 in.
------------------	-----------------	-----------------------

(Reference)

- Use a cylinder gauge to measure the housing I.D.

9Y1211012STS0028US0



Clearance between Bushing and Gear Shaft

1. Measure the gear shaft O.D. with and outside micrometer.
2. Measure the bushing I.D. with and inside micrometer or cylinder gauge, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the gear shaft and the bushings as a unit.

Clearance between bushing and gear shaft	Factory specification	0.020 to 0.081 mm 0.0008 to 0.0032 in.
	Allowable limit	0.15 mm 0.0059 in.

Gear shaft O.D.	Factory specification	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory specification	15.000 to 15.051 mm 0.5906 to 0.5926 in.

9Y1211012STS0029US0



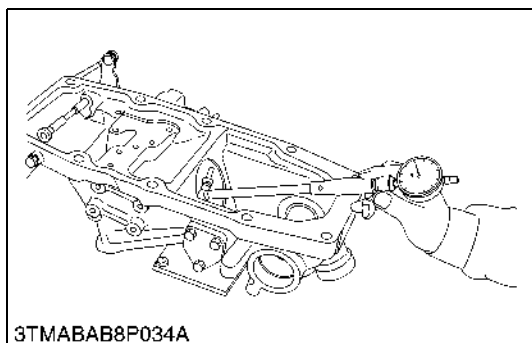
Side Plate Thickness

1. Measure the side plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

Side plate thickness	Factory specification	2.48 to 2.50 mm 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

9Y1211012STS0030US0

[2] HYDRAULIC CYLINDER



Hydraulic Cylinder Bore

1. Check the cylinder internal surface for scoring or damage.
2. Measure the cylinder I.D. with a cylinder gauge.
3. If the measurement exceeds the allowable limit, replace the hydraulic cylinder block.

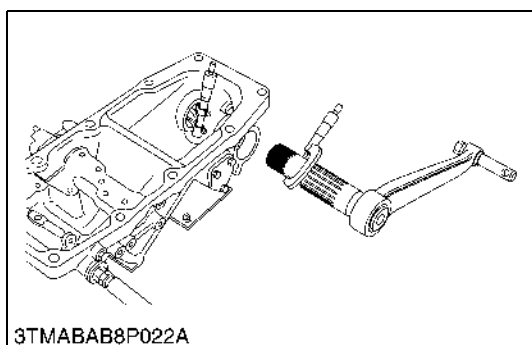
[L3301/L3901]

Cylinder I.D.	Factory specification	75.300 to 75.500 mm 2.9646 to 2.9724 in
	Allowable limit	75.600 mm 2.9764 in

[L4701]

Cylinder I.D.	Factory specification	90.000 to 90.050 mm 3.5433 to 3.5452 in.
	Allowable limit	90.150 mm 3.5492 in.

9Y1211012HYS0018US0



Clearance between Hydraulic Arm Shaft and Bushing

1. Measure the hydraulic arm shaft O.D. with an outside micrometer.
2. Measurement the bushing I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the bushing.

Clearance between hydraulic arm shaft and bushing	Factory specification	Right	0.125 to 0.220 mm 0.0049 to 0.0086 in.
		Left	0.125 to 0.230 mm 0.00493 to 0.00905 in.
	Allowable limit	Right	0.50 mm 0.020 in.
		Left	0.50 mm 0.020 in.

Hydraulic arm shaft O.D.	Factory specification	Right	39.920 to 39.950 mm 1.5717 to 1.5728 in.
		Left	44.920 to 44.950 mm 1.7685 to 1.7696 in.

Bushing I.D. (after press fitted)	Factory specification	Right	40.075 to 40.140 mm 1.5778 to 1.5803 in.
		Left	45.075 to 45.150 mm 1.7746 to 1.7775 in.

9Y1211012HYS0019US0

9 ELECTRICAL SYSTEM

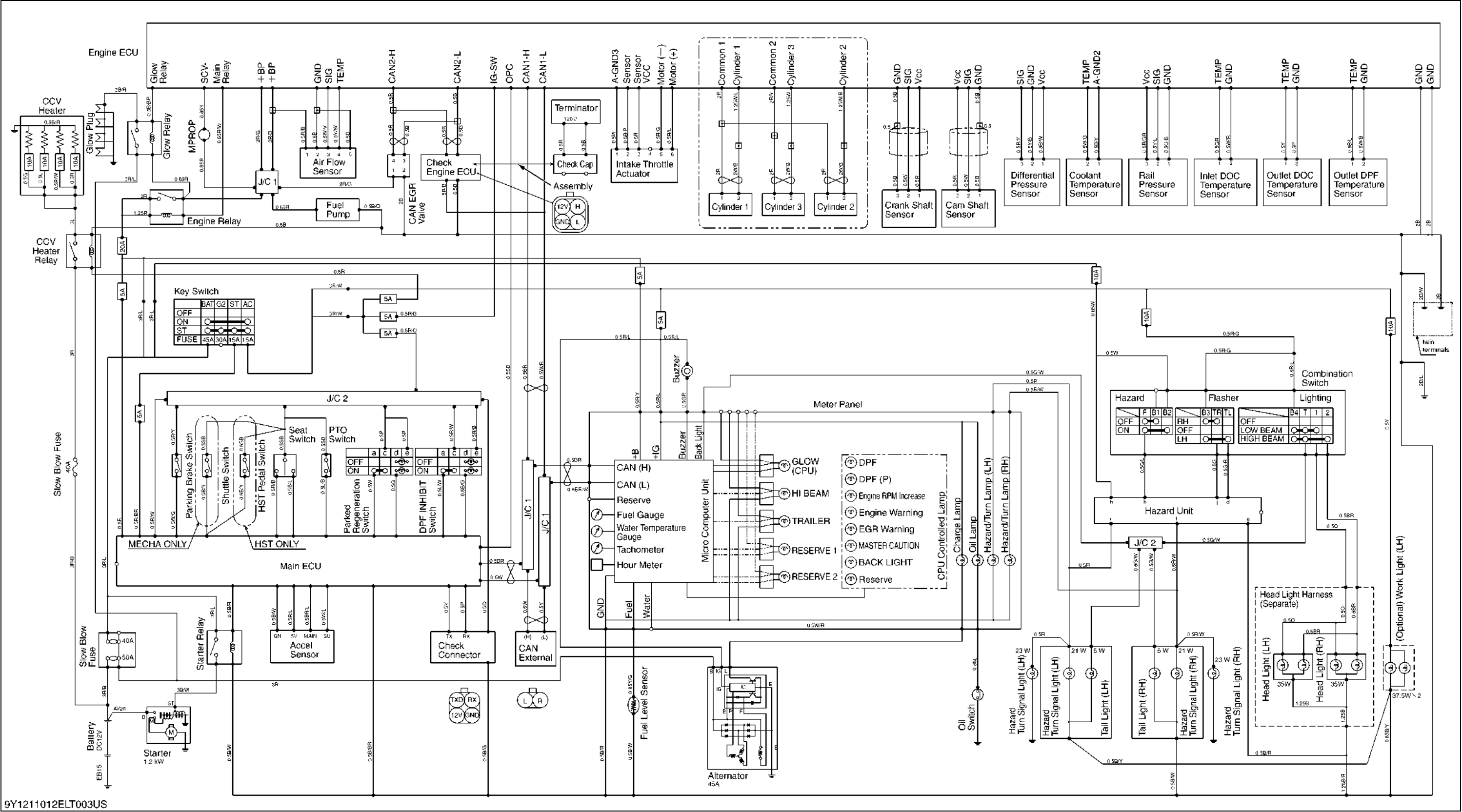
MECHANISM

CONTENTS

1. ELECTRICAL CIRCUIT	9-M1
[1] L3301/L3901	9-M1
[2] L4701	9-M2
2. INSTRUMENT PANEL	9-M3
[1] SYSTEM OUTLINE	9-M3
[2] CONSTRUCTION AND FUNCTION OF COMPONENTS	9-M3
(1) Instrument Panel	9-M3
(2) Electric Control Unit (ECU)	9-M3
(3) Switches	9-M4
(4) Sensors	9-M8
(5) Others	9-M8
[3] BASIC CONTROL SYSTEM	9-M10
(1) Indication Items of Meter Panel	9-M10
(2) Easy Checker™	9-M11
[4] ASSISTANT CONTROL SYSTEM	9-M12
(1) Self-diagnosis Function	9-M12
(2) Testing, Setting and Adjusting Function	9-M12
(3) Glow Control (Old Model)	9-M13
(4) Glow Control (New Model)	9-M13
3. ENGINE STARTING SYSTEM AND STOPPING	9-M14
[1] STARTING CIRCUIT	9-M14
[2] RELATED PARTS	9-M15
[3] ENGINE STARTING CONDITIONS	9-M17
[4] OPERATOR PRESENCE CONTROL (OPC)	9-M18
4. CAN (CONTROLLER AREA NETWORK)	9-M19

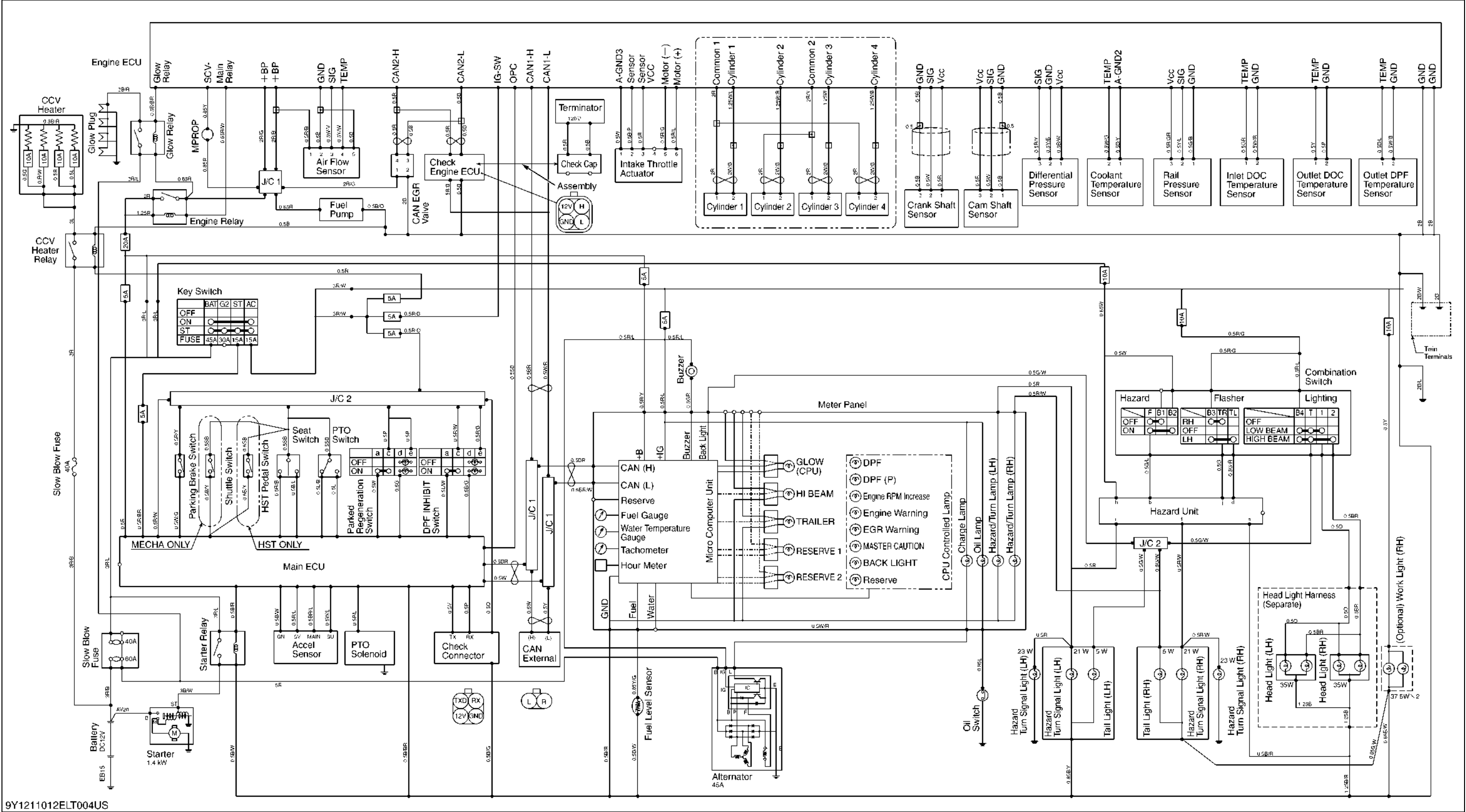
1. ELECTRICAL CIRCUIT

[1] L3301/L3901



9Y1211012ELT003US

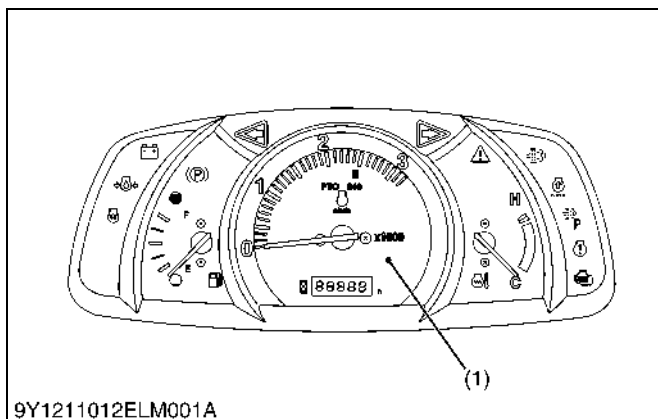
[2] L4701



9Y1211012ELT004US

2. INSTRUMENT PANEL

[1] SYSTEM OUTLINE



Instrument panel uses CAN (Controller Area Network) communication with main ECU (Electronic Control Unit) and engine ECU to share information from various sensors and switches. Mainly Instrument panel acts as an indicator to inform various information such as engine speed, warning lamp and so on. If tractor gets in a certain trouble, a sign is displayed on Instrument panel. This function helps servicing.

The Instrument panel displays following items.

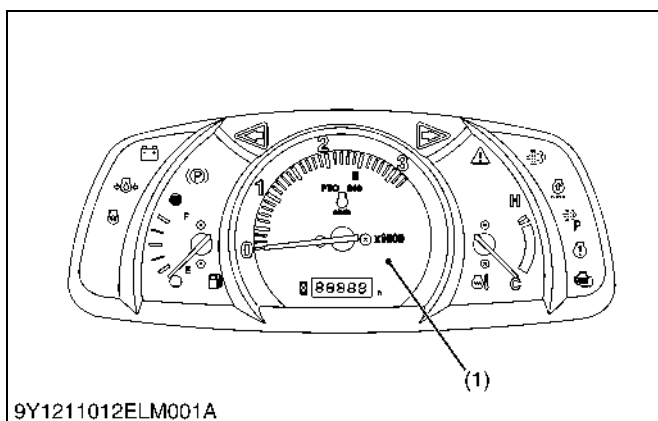
- **Hourmeter**
- **Error Display**
 - Displays the occurrence of DTC (Diagnosis Trouble Code) on the display with the sign.
- **Model Setting, Clear error message, Acceleration Setting, Test Function**
 - The function such as input of some data, fine-adjustment for acceleration sensor and testing of each sensor can be done by using display and switch operation.

(1) Electronic Instrument Panel

9Y1211012ELM0004US0

[2] CONSTRUCTION AND FUNCTION OF COMPONENTS

(1) Instrument Panel



Electronic Instrument Panel

Electronic instrument panel (1) has functions as tachometer, fuel gauge, coolant temperature gauge and hourmeter. Also, this panel has various indicator shows operator useful information.

(1) Electronic Instrument Panel

9Y1211012ELM0005US0

(2) Electric Control Unit (ECU)



Main Electric Control Unit (ECU)

The ECU (1) functions to operate in accordance with information coming from various sensors.

It has the role of controlling all the components while sharing sensor information necessary for control and control information with the electronic instrument panel.

(1) Main Electric Control Unit (ECU)

9Y1211012ELM0006US0



Engine Electric Control Unit (ECU)

The ECU (1) function to operate in accordance with information coming from various sensors.

It has the role of controlling all the components while sharing sensor information necessary for control and control information with the electronic instrument panel.

Engine ECU (1) receives signals from the sensors, calculates the proper injection quantity and injection timing for optimal engine operation, and sends the appropriate signals to the actuators. ECU (1) enables the injectors to be actuated at high speeds.

- (1) Main Electric Control Unit
(ECU)

9Y1211012ELM0007US0

(3) Switches



Key Switch

The key switch (1) transmits a main switch "ON" signal and a "ST" signal to the electronic instrument panel at the time of engine starts. When each lever switch and the associated are in the neutral position, the computer in the electronic instrument panel detects the signals and determines whether the engine can start safely.

- (1) Key Switch

9Y1211012ELM0008US0

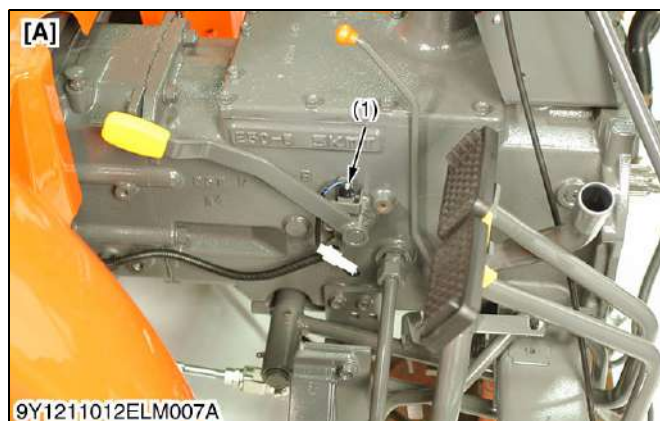


Engine Oil Pressure Switch

Engine oil pressure switch (1) is turned on when the engine oil pressure is lower than 50 kPa (0.5 kgf/cm², 7 psi). When the engine starts oil pump starts operating. Then the oil pressure rises and the engine oil switch (1) turns off.

- (1) Engine Oil Pressure Switch

9Y1211012ELM0009US0



PTO Switch (L3301/L3901 Only)

PTO switch (1) is attached to detect the position of PTO gear shift lever.

This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

(1) PTO Switch

[A] Manual Transmission Model

[B] HST Model

9Y1211012ELM0010US0

PTO Switch (L4701 Only)

PTO switch (1) is attached to choose PTO on/off. By using signal from this switch, main ECU decide to send oil to PTO clutch or not. This switch also has a function as a safety switch. If this switch is in **ON** position, starter motor does not rotate.

(1) PTO Switch

9Y1211012ELM0011US0

Combination Light Switch

Combination light switch (1) is a switch to operate head light, turn signal and hazard light.

(1) Combination Light Switch

9Y1211012ELM0012US0



Parked Regeneration Switch

Press the parked regeneration switch (1) under the specified condition, and the parked regeneration starts.

When specified amount of PM (Particulate Matter) has built up in the DPF, it is possible to do the parked regeneration.

- (1) Parked Regeneration Switch

9Y1211012ELM0013US0



DPF INHIBIT Switch

Press the DPF INHIBIT switch (1), and the Auto Regeneration Mode and Regeneration Inhibit Mode are activated alternately. When the key switch is turned **ON**, Auto Regeneration Mode is automatically activated as a default.

- (1) DPF INHIBIT Switch

9Y1211012ELM0014US0



Parking Brake Switch

The parking brake switch (1) is attached near brake pedals. When parking brake is applied, this switch is turned **ON**. When the main ECU (Electric Control Unit) receives **ON** signal from this switch, the main ECU lights up the parking brake indicator on the meter panel.

- (1) Parking Brake Switch

9Y1211012ELM0015US0

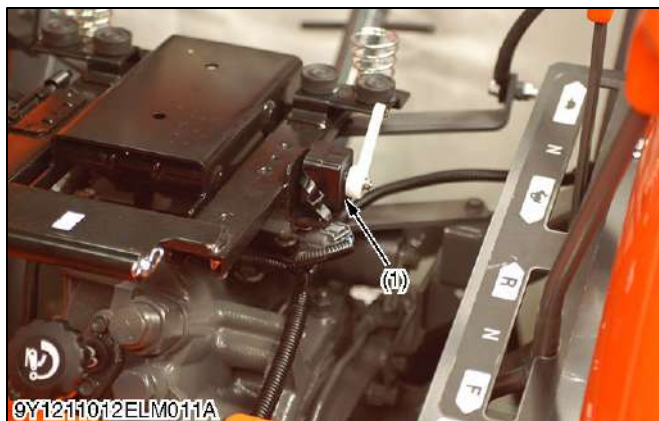


Shuttle Switch (Manual Transmission Model Only)

Shuttle switch (1) is attached at the bottom of shuttle lever. This switch is turned on when the shuttle lever is in "**NEUTRAL**" position. This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

- (1) Shuttle Switch

9Y1211012ELM0016US0

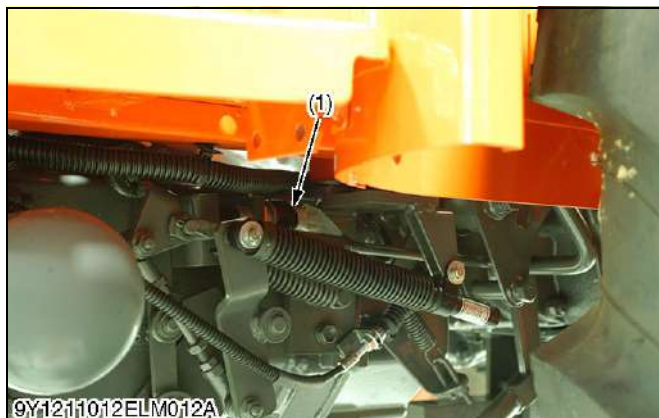


Seat Switch

This switch is attached under the seat. When sitting the seat, the seat switch (1) is pushed in, and electrical circuit is closed. When the seat is vacant, this switch is not pushed and electrical circuit is opened. This switch is adopted to achieve OPC (operator presence control) function.

(1) Seat Switch

9Y1211012ELM0017US0



HST Pedal Switch

The HST pedal switch (1) is attached to detect whether the HST pedal is in neutral position. When the HST pedal is in "**NEUTRAL**" position, this switch is **ON** position.

This switch also has a function as a safety switch. If this switch is **OFF** position, starter motor does not rotate.

(1) HST Pedal Switch

9Y1211012ELM0018US0

(4) Sensors



Fuel Level Sensor

This sensor (1) is designed to detect the fuel level in the fuel tank. It detects the position of the float that moves according to the quantity of fuel through the variation in resistance of the variable resistor in order to indicate the fuel level on the electronic instrument panel.

(1) Fuel Level Sensor

9Y1211012ELM0019US0



Coolant Temperature Sensor

This sensor (1) is designed to detect the temperature of coolant. It employs a thermistor, and detects the variation in resistance due to a change in temperature to indicate the coolant temperature on the electronic instrument panel.

(1) Coolant Temperature Sensor

9Y1211012ELM0020US0



Acceleration Sensor

The acceleration sensor (1) detects the amount of hand throttle lever and foot throttle operation.

(1) Acceleration Sensor

9Y1211012ELM0021US0

(5) Others



Glow Relay

This tractor has a glow circuit to improve performance of engine starting in cold conditions. Engine ECU controls the time current flows into glow plugs by controlling current flows into glow relay.

(1) Glow Relay

9Y1211012ELM0022US0



Flusher Unit

Flusher unit controls the blinking frequency of turn signal and hazard signal.

As a only one side of lamp blinking of turn signal and both right and left side lamps blinking hazard signal.

The blinking frequency is about 60 to 80 times per minutes.

(1) Flusher Unit

9Y1211012ELM0023US0



Alternator

The alternator (1) has a function as a charging device.

The terminal **L** of this alternator detects a signal from the battery charge circuit and send a signal for making the electrical charge warning indicator at the electronic instrument panel to light up when the electricity charge system becomes abnormal.

(1) Alternator

9Y1211012ELM0024US0

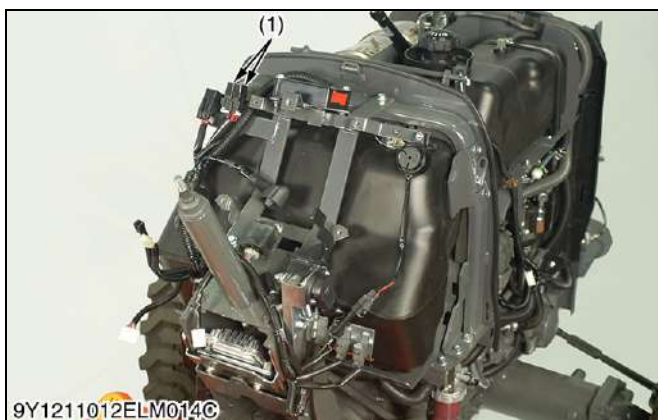


PTO Solenoid Valve (L4701 Only)

The PTO solenoid valve (1) is attached on the right side of mid-case. This valve controls oil flow to the PTO clutch based on signals from main ECU.

(1) PTO Solenoid Valve

9Y1211012ELM0025US0



Starter Relay, Engine Relay

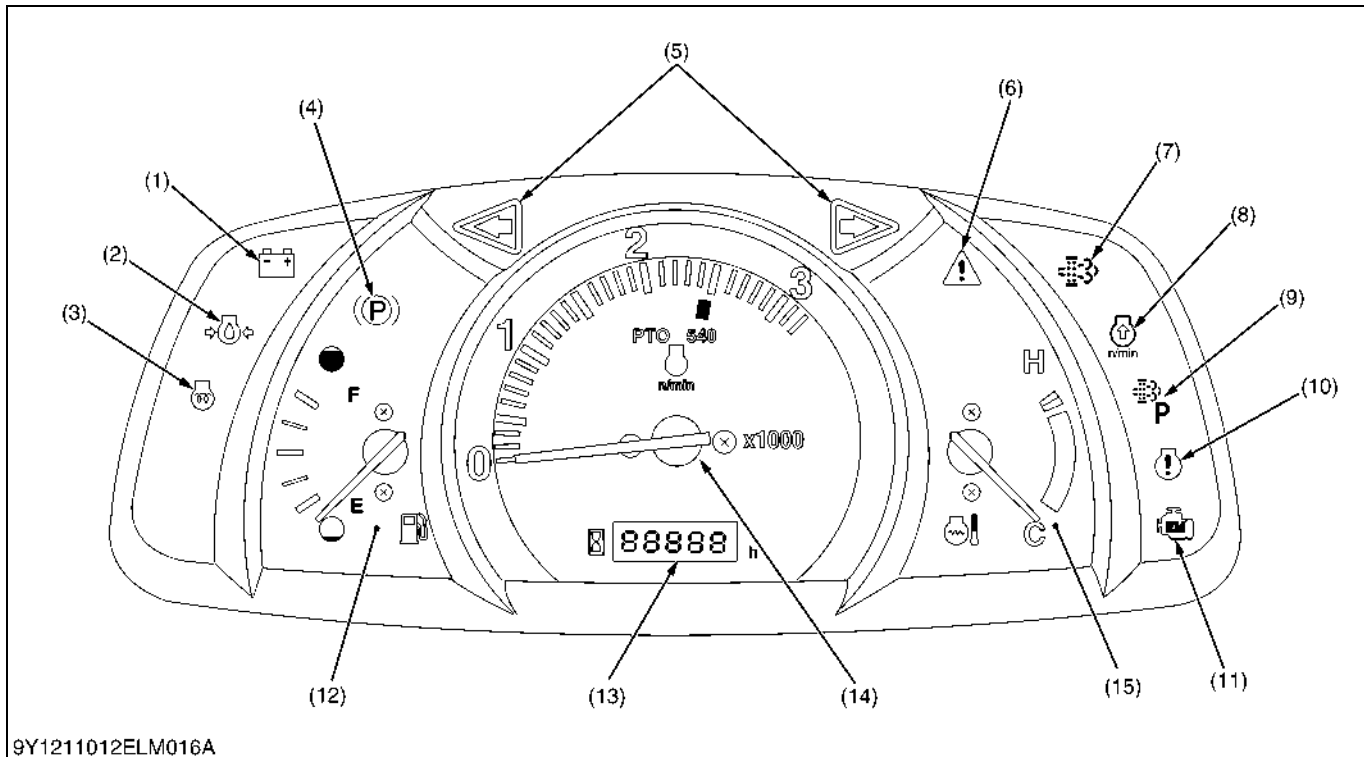
These relays are attached inside the rear bonnet. These relays are same parts. When servicing, be careful not to confuse with another relay. Be sure to check the color of wiring harness.

(1) Starter Relay, Engine Relay

9Y1211012ELM0026US0

[3] BASIC CONTROL SYSTEM

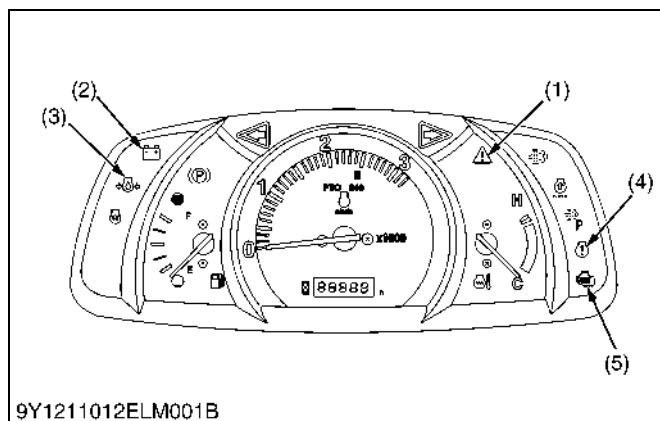
(1) Indication Items of Meter Panel



- | | | | |
|---|-------------------------------------|-----------------------------------|--------------------------------|
| (1) Electrical Charge Warning Indicator | (4) Parking Brake Warning Indicator | (7) Regeneration Indicator | (10) Engine Warning Indicator |
| (2) Engine Oil Pressure Warning Indicator | (5) Turn Signal / Hazard Indicator | (8) Engine RPM Increase Indicator | (11) Emission Indicator |
| (3) Glow Plug Indicator | (6) Master System Warning Indicator | (9) Parked Regeneration Indicator | (12) Fuel Gauge |
| | | | (13) Hourmeter |
| | | | (14) Tachometer |
| | | | (15) Coolant Temperature Gauge |

9Y1211012ELM0027US0

(2) Easy Checker™



If the indicators in the Easy Checker™ come on during operation, immediately stop the engine, and find the cause as shown below.

Never operate the tractor while Easy Checker™ lamp is on.

(1) Master system warning

If trouble should occur at the engine, transmission or other control parts, the indicator flashes as a warning.

(2) Electrical charge Indicator

If the alternator is not charging the battery, the Easy Checker™ will come on.

If this should happen during operation, check the electrical charging system.

(3) Engine oil pressure Indicator

If the oil pressure in the engine goes below the prescribed level, the warning lamp in the Easy Checker™ will come on.

If this should happen during operation, and it does not go off when the engine is accelerated to more than 1000 rpm, check level of engine oil.

(4) Engine warning

This indicator serves the following two functions. If the indicator lights up, pinpoint the cause and take a proper measure.

1. Error with the engine control system

If during operation the water temperature gauge reads an acceptable level but the warning lamp in the Easy Checker™ comes on, stop the engine and get it restarted.

■ IMPORTANT

- If the warning indicator lights up, the following phenomena may appear depending on the engine's trouble spot.
 - a) The engine stops unexpectedly.
 - b) The engine fails to start or gets interrupted just after start.
 - c) The engine output is not enough.
 - d) The engine output is enough, but the warning indicator stays on.
- If the engine output is not enough, immediately interrupt the operation and move the tractor to a safe place and stop the engine.

2. Engine overheat

If the water temperature gauge reads an unusual level and the warning lamp in the Easy Checker™ comes on, the engine may have got overheated.

Check the cooling system.

(5) Emission indicator

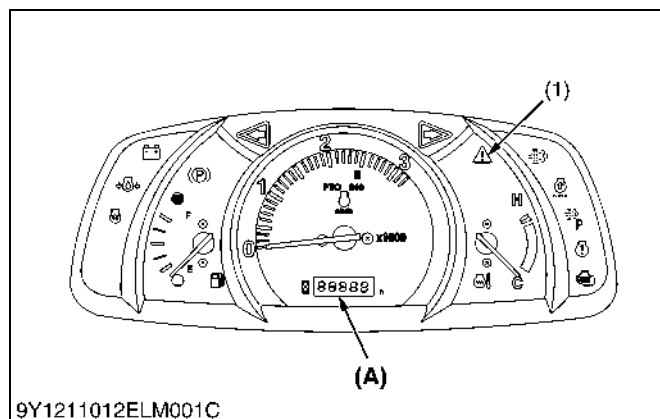
If emission indicator lights up, take the steps to lower the water temperature. This helps keep the emission clean.

- | | |
|---------------------------|------------------------|
| (1) Master System Warning | (4) Engine Warning |
| (2) Electrical Charge | (5) Emission Indicator |
| (3) Engine Oil Pressure | |

9Y1211012ELM0028US0

[4] ASSISTANT CONTROL SYSTEM

(1) Self-diagnosis Function



When the instrumental panel detects something wrong, the master system warning indicator (1) starts blinking and the error code indicating the location of the trouble. showed in below is displayed on the liquid crystal display.

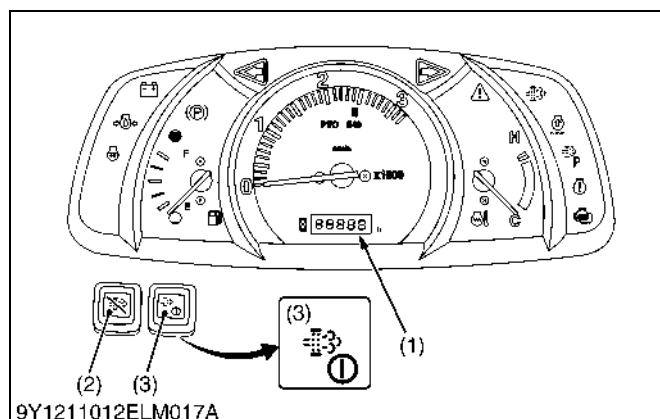
Displayed error code	Trouble
E-20	Communication trouble
E-31	Meter's part code and ECU model setting not compatible
E-40	Input voltage of lever sensor from ECU is in trouble.
E-75	Acceleration sensor output out of spec
E-84	Acceleration sensor maladjusted
E-93	Relay for engine starter motor is in trouble
E-94	Relay for engine stop is in trouble
E-95	Solenoid (PTO) is in trouble

(1) Master System Warning Indicator

(A) The error message is displayed here.

9Y1211012ELM0029US0

(2) Testing, Setting and Adjusting Function



The instrumental panel can do various settings, adjustments and testing by using the Liquid Crystal Display (LCD) (1).

When the main switch is turned to "ON" or "START" position while holding down the DPF INHIBIT switch (2) and the parked regeneration switch (3) together, the service inspect display is indicated. And then, a target mode is selected, the data input and the fine adjustment, etc. can be done. To select target mode, press the parked regeneration switch (3) and the displayed mode is changed. To decide, press the parked regeneration switch (3) for a few seconds while target mode is displayed.

The following table shows the content of each mode display by the alphabet.

(1) Liquid Crystal Display
(2) DPF INHIBIT Switch

(3) Parked Regeneration Switch

Mode	Details of Mode	Contents
A	Test Mode	For the checking the voltages from various sensors
b	Error Information Clear Mode	For the deleting the error information after servicing is finished
c	Acceleration Sensor Fine-adjustment Mode	For setting the position of acceleration sensor (Input the sensor information to main ECU)
d	Tractor Model Select Mode	For inputting the model of tractor to ECU

9Y1211012ELM0030US0

(3) Glow Control (Old Model)

The electronic meter incorporates the glow control which was external single parts so far, and controls it with CPU.

When the main switch is turned "**ON**", the temperature of the coolant is detected with the coolant temperature sensor, and the time to supply current to the glow plug and the glow indicator lamp is controlled by CPU according to the detected temperature. And the supply current to the glow plug is stopped automatically when the preheating time is completed, and indicator lamp on the electronic meter panel is turned off.

9Y1211012ELM0037US0

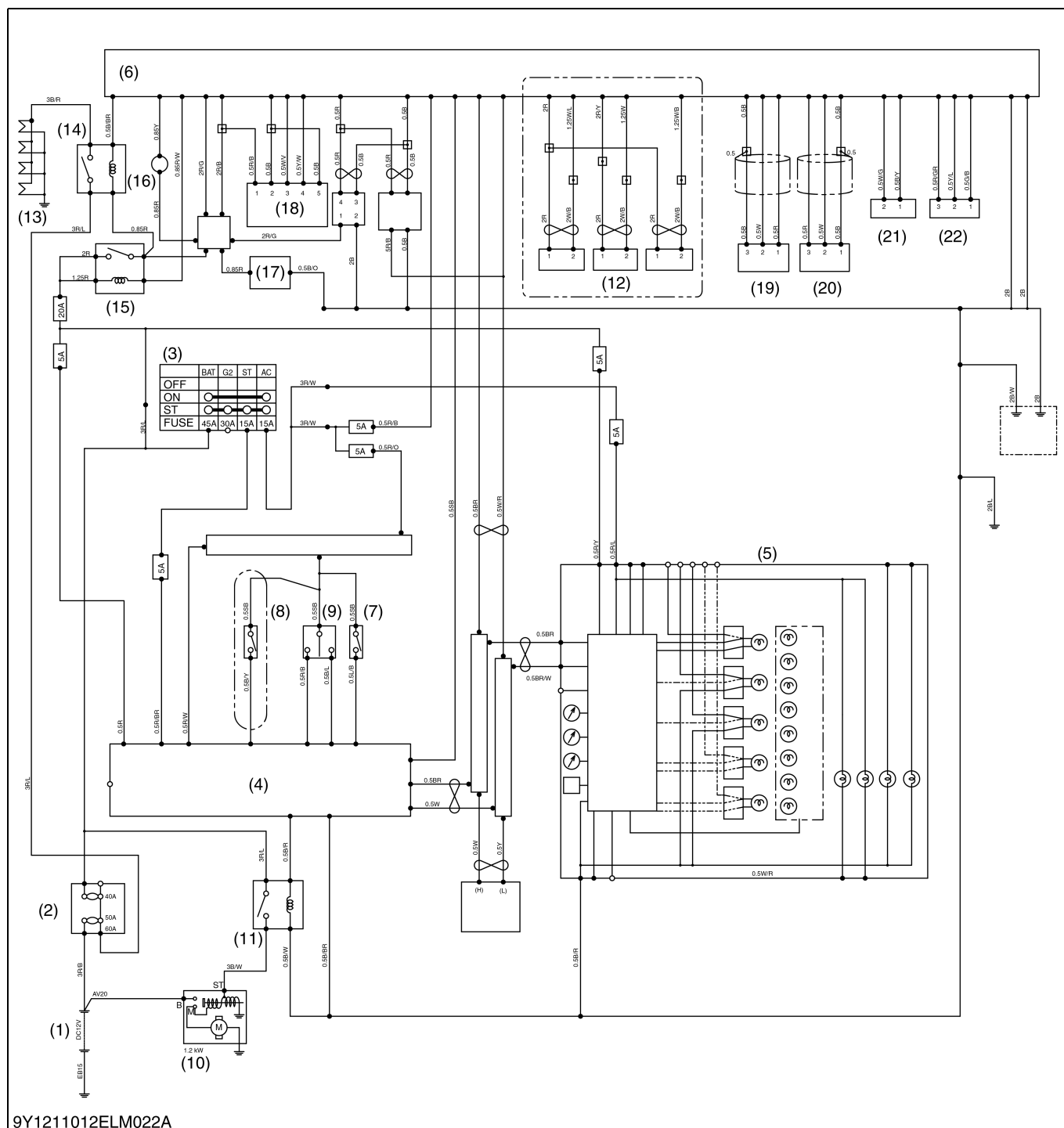
(4) Glow Control (New Model)

ECU takes readings from both coolant temperature and air temperature. The glow time will then be determined automatically by the engine ECU based on whichever is the lowest temperature reading of the both.

9Y1211012ELM0038US0

3. ENGINE STARTING SYSTEM AND STOPPING

[1] STARTING CIRCUIT



- | | | | |
|----------------------|---------------------------------------|--------------------------------|---------------------------------|
| (1) Battery | (7) PTO Switch | (12) Injectors | (18) Air Flow Sensor |
| (2) Slow Blow Fuse | (8) Shuttle Switch / HST Pedal Switch | (13) Glow Plug | (19) Crank Shaft Sensor |
| (3) Key Switch | (9) Seat Switch | (14) Glow Relay | (20) Cam Shaft Sensor |
| (4) Main ECU | (10) Starter | (15) Engine Relay | (21) Coolant Temperature Sensor |
| (5) Instrument Panel | (11) Starter Relay | (16) Supply Pump | (22) Rail Pressure Sensor |
| (6) Engine ECU | | (17) Electromagnetic Fuel Pump | |

9Y1211012ELM0031US0

[2] RELATED PARTS



Main Electric Control Unit (ECU)

The ECU (1) functions to operate in accordance with information coming from various sensors.

It has the role of controlling all the components while sharing sensor information necessary for control and control information with the electronic instrument panel.

- (1) Main Electric Control Unit (ECU)

9Y1211012ELM0006US0



Engine Electric Control Unit (ECU)

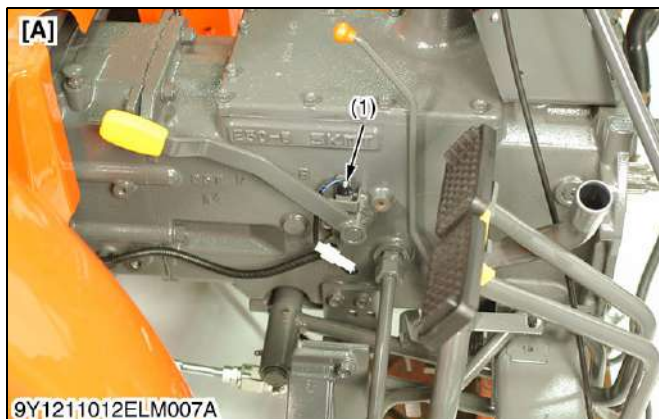
The ECU (1) function to operate in accordance with information coming from various sensors.

It has the role of controlling all the components while sharing sensor information necessary for control and control information with the electronic instrument panel.

Engine ECU (1) receives signals from the sensors, calculates the proper injection quantity and injection timing for optimal engine operation, and sends the appropriate signals to the actuators. ECU (1) enables the injectors to be actuated at high speeds.

- (1) Main Electric Control Unit (ECU)

9Y1211012ELM0007US0



PTO Switch (L3301/L3901 Only)

PTO switch (1) is attached to detect the position of PTO gear shift lever.

This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

- (1) PTO Switch

[A] Manual Transmission Model

[B] HST Model

9Y1211012ELM0010US0



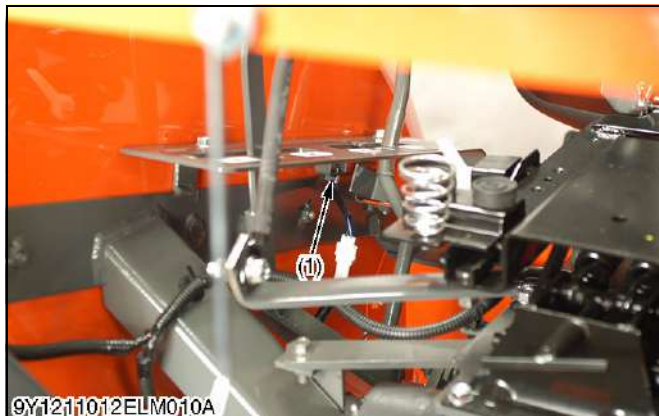


PTO Switch (L4701 Only)

PTO switch (1) is attached to choose PTO on/off. By using signal from this switch, main ECU decide to send oil to PTO clutch or not. This switch also has a function as a safety switch. If this switch is in **ON** position, starter motor does not rotate.

(1) PTO Switch

9Y1211012ELM0011US0

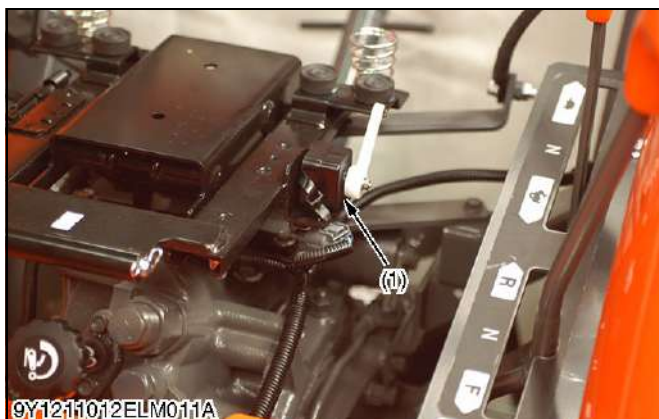


Shuttle Switch (Manual Transmission Model Only)

Shuttle switch (1) is attached at the bottom of shuttle lever. This switch is turned on when the shuttle lever is in **"NEUTRAL"** position. This switch also has a function as a safety switch. If this switch is in **OFF** position, starter motor does not rotate.

(1) Shuttle Switch

9Y1211012ELM0016US0

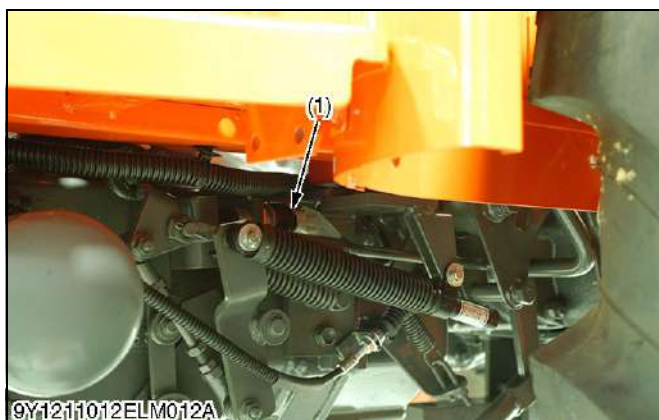


Seat Switch

This switch is attached under the seat. When sitting the seat, the seat switch (1) is pushed in, and electrical circuit is closed. When the seat is vacant, this switch is not pushed and electrical circuit is opened. This switch is adopted to achieve OPC (operator presence control) function.

(1) Seat Switch

9Y1211012ELM0017US0



HST Pedal Switch

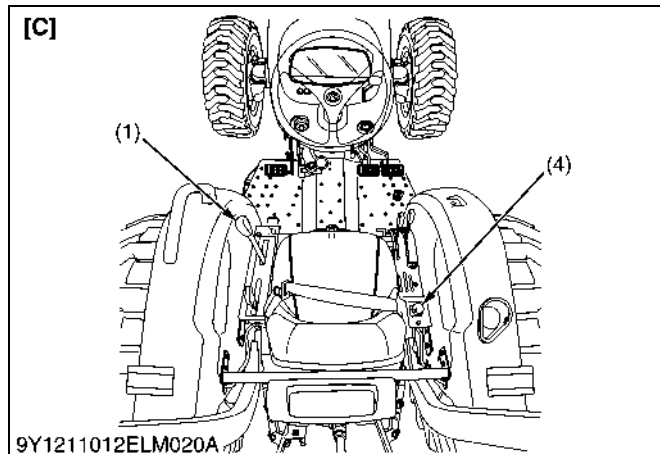
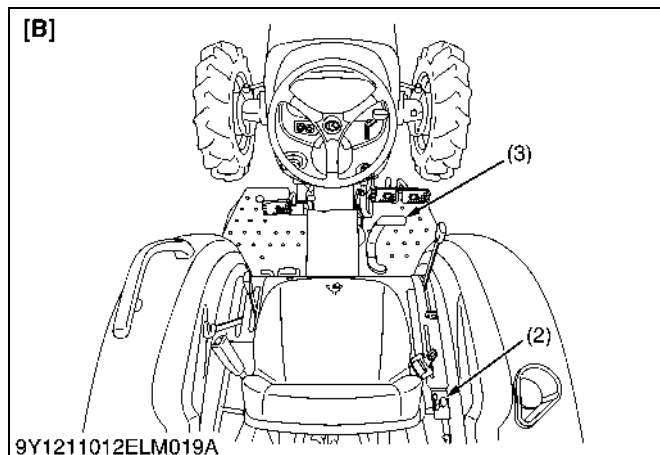
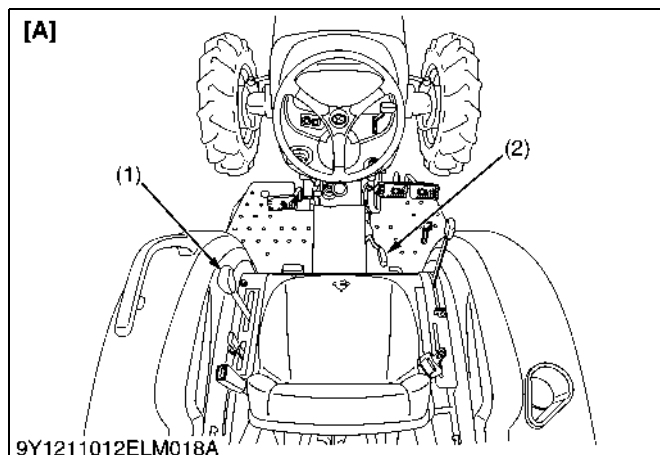
The HST pedal switch (1) is attached to detect whether the HST pedal is in neutral position. When the HST pedal is in **"NEUTRAL"** position, this switch is **ON** position.

This switch also has a function as a safety switch. If this switch is **OFF** position, starter motor does not rotate.

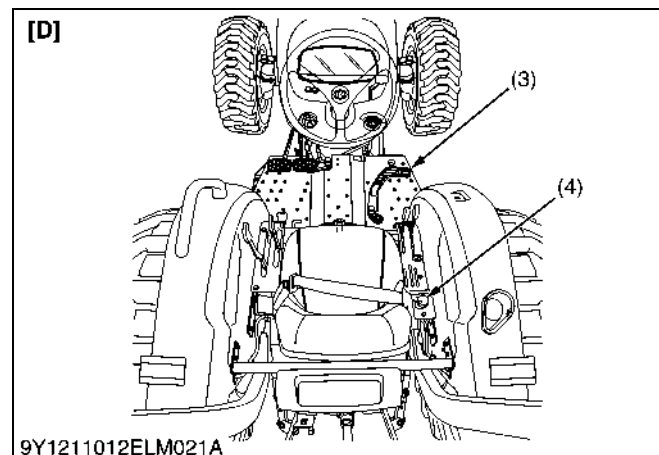
(1) HST Pedal Switch

9Y1211012ELM0018US0

[3] ENGINE STARTING CONDITIONS



When the following conditions become complete, the engine can be started by turning key switch to **START** position.



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

- [A]** L3301/L3901 Manual Transmission Model
- [B]** L3301/L3901 HST Model
- [C]** L4701 Manual Transmission Model
- [D]** L4701 HST Model

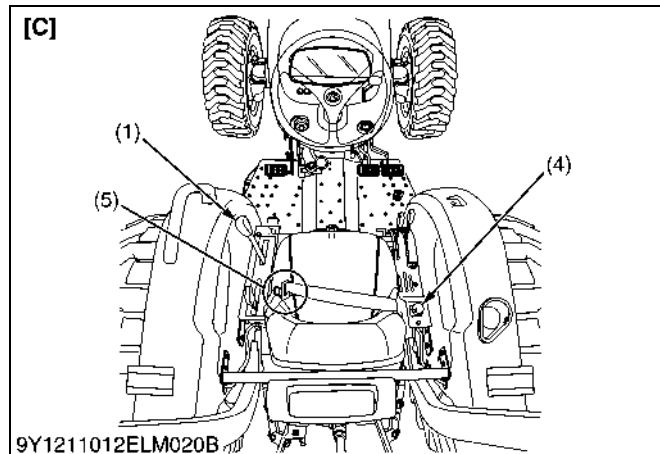
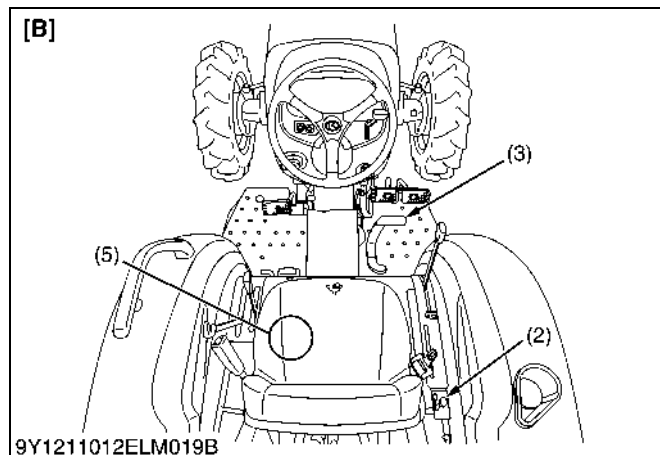
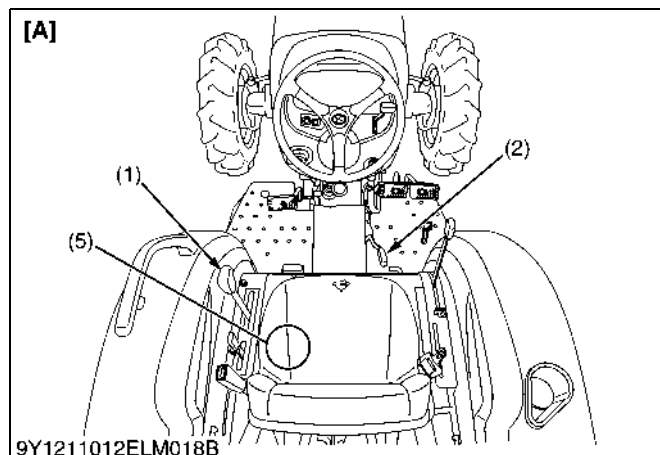
9Y1211012ELM0032US0

Engine Starting Condition

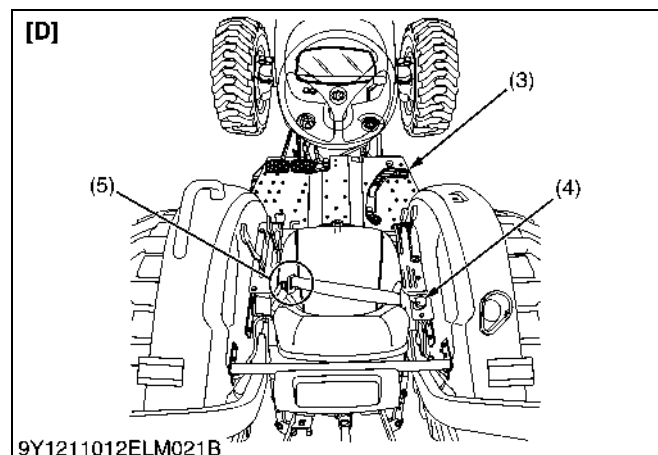
Transmission Type	Shuttle Switch (Neutral: ON) (F or R position: OFF)	HST Pedal Switch (Neutral: ON) (Forward or Reverse position: OFF)	PTO Switch (Neutral: ON) (Engaged: OFF)
Manual Transmission Model	ON	—	ON
HST Model	—	ON	ON

9Y1211012ELM0033US0

[4] OPERATOR PRESENCE CONTROL (OPC)



This tractor is equipped with Operator Presence Control (OPC) system. The engine stops automatically when the operator stands from the seat while engaging PTO, depressing speed control pedal or engaging shuttle lever.



- (1) Shuttle Shift Lever
- (2) PTO Gear Shift Lever
- (3) Speed Control Pedal
- (4) PTO Switch
- (5) Seat Switch

- [A]** L3301/L3901 Manual Transmission Model
- [B]** L3301/L3901 HST Model
- [C]** L4701 Manual Transmission Model
- [D]** L4701 HST Model

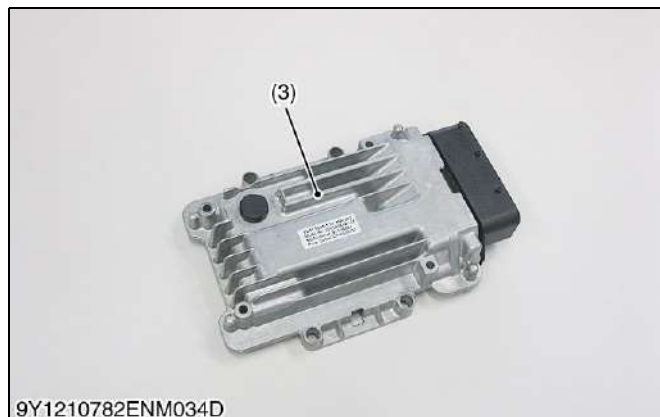
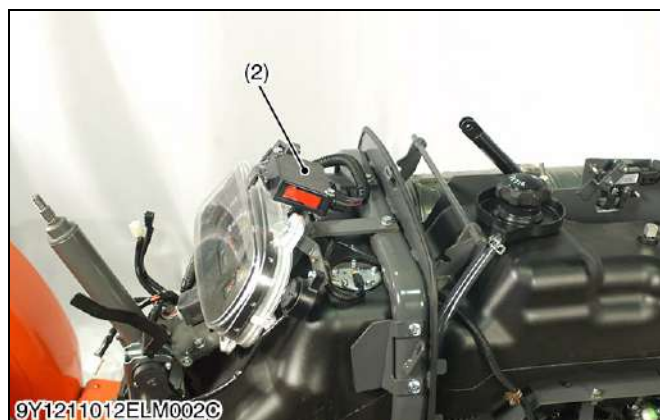
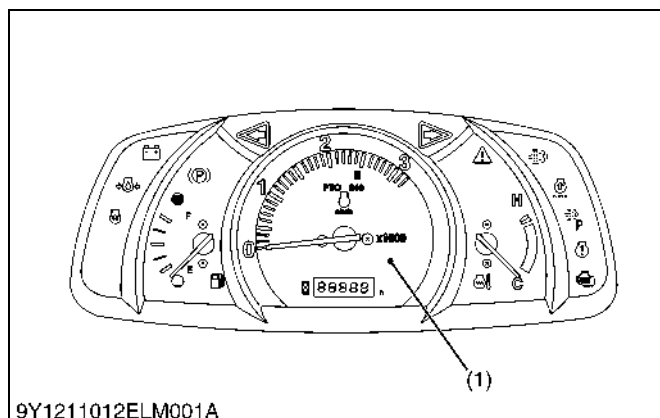
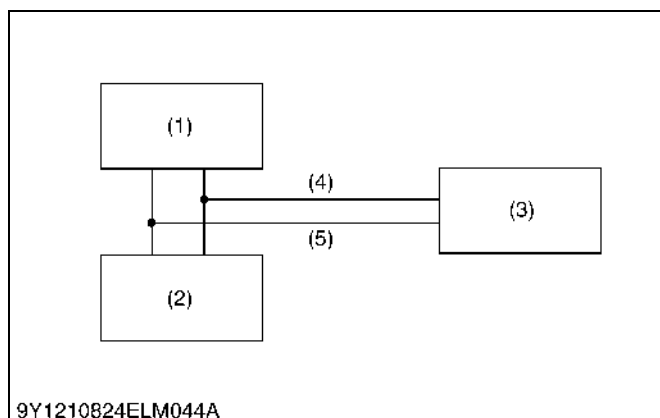
9Y1211012ELM0034US0

Operator Presence Control Operating Condition

Transmission Type	Seat Switch (Occupied: ON) (Vacant: OFF)	Shuttle Switch (Neutral: ON) (F or R position: OFF)	HST Pedal Switch (Neutral: ON) (Forward or Reverse position: OFF)	PTO Switch (Neutral: ON) (Engaged: OFF)
Manual Transmission Model	OFF	OFF	—	ON
		ON	—	OFF
HST Model		—	OFF	ON
		—	ON	OFF

9Y1211012ELM0035US0

4. CAN (CONTROLLER AREA NETWORK)



The Controller Area Network (CAN) specification defines the Data Link Layer, ISO 11898 defines the Physical Layer.

The CAN bus [CAN bus] is a Balanced (differential) 2-wire interface running over a Shielded Twisted Pair (STP), WIRING HARNESS (4) and (5). The Bit Encoding used is Non Return to Zero (NRZ) encoding (with bit-stuffing) for data communication on a differential two wire bus. The use of NRZ encoding ensures compact messages with a minimum number of transitions and high resilience to external disturbance.

A number of data rates is 500 kbps (kilo bits per second).

The CAN bus interface uses an asynchronous transmission scheme controlled by start and stop bits at the beginning and end of each character. This interface is used, employing serial binary interchange. Information is passed from transmitters to receivers in a data frame.

The first merit of the CAN bus is that the wiring harness becomes simplified.

The second merit of the CAN bus is that the output signal data of sensors and switches connected with ECU can be shared by each ECU.

- | | |
|----------------------|-----------------------------------|
| (1) Instrument Panel | (4) Wiring Harness (CAN Bus High) |
| (2) Main ECU | (5) Wiring Harness (CAN Bus Low) |
| (3) Engine ECU | |

9Y1211012ELM0036US0

SERVICING

CONTENTS

1. TROUBLESHOOTING.....	9-S1
2. SERVICING SPECIFICATIONS	9-S8
3. TIGHTENING TORQUES	9-S9
4. CHECKING AND ADJUSTING	9-S10
[1] BATTERY	9-S10
[2] TESTING, SETTING AND ADJUSTING BY ELECTRONIC INSTRUMENT PANEL	9-S12
(1) Mode Selection.....	9-S12
(2) Mode "A" (Test Mode)	9-S13
(3) Mode "b" (Error Information Clear Mode)	9-S13
(4) Mode "c" (Acceleration Sensor fine-adjustment Mode)	9-S14
(5) Mode "d" (Tractor Model Select Mode)	9-S15
[3] FUSES AND GROUND CABLE	9-S16
(1) Checking Fuse and Connector.....	9-S16
[4] ELECTRONIC INSTRUMENT PANEL	9-S18
(1) Checking Electronic Instrument Panel Connector	9-S19
[5] MAIN ELECTRIC CONTROL UNIT (MAIN ECU)	9-S21
(1) Checking Main Electrical Control Unit Connector.....	9-S22
[6] ENGINE ELECTRIC CONTROL UNIT (ENGINE ECU)	9-S23
(1) Checking Electric Control Unit Connector	9-S24
[7] STARTING SYSTEM.....	9-S26
(1) Key Switch.....	9-S26
(2) Safety Switches	9-S27
(3) Starter.....	9-S29
(4) Relays.....	9-S30
(5) Glow Control System.....	9-S31
[8] OPC (OPERATOR PRESENCE CONTROL) SYSTEM	9-S32
(1) L3301/L3901.....	9-S32
(2) L4701.....	9-S33
(3) Safety Switch.....	9-S34
[9] CHARGING SYSTEM	9-S35
[10] LIGHTING SYSTEM.....	9-S36
(1) Combination Light Switch	9-S36
(2) Flasher Unit	9-S38
[11] WARNING LAMP	9-S39
[12] MONITOR LAMP	9-S40
[13] GAUGES	9-S41
[14] ENGINE CONTROL SYSTEM	9-S42
(1) Injector.....	9-S42
(2) SCV (Suction Control Valve)	9-S43
(3) Rail Pressure Sensor.....	9-S44
(4) Fuel Pump	9-S45
(5) EGR Valve.....	9-S46
(6) Crankshaft Position Sensor	9-S46
(7) Camshaft Position Sensor	9-S47
(8) Air Flow Sensor	9-S48
(9) Intake Throttle Valve.....	9-S49
(10) Exhaust Temperature Sensor	9-S50
(11) Differential Pressure Sensor	9-S51
(12) Parked Regeneration Switch.....	9-S52

(13)DPF INHIBIT Switch	9-S53
(14)Acceleration Sensor	9-S54
[15]CCV HEATER.....	9-S55
(1) CCV Relay	9-S55
(2) CCV Heater	9-S55
5. DISASSEMBLING AND ASSEMBLING.....	9-S56
[1] STARTER.....	9-S56
[2] ALTERNATOR.....	9-S57
6. SERVICING	9-S59
[1] STARTER.....	9-S59
[2] ALTERNATOR.....	9-S61

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipment Do Not Operate	Battery discharged or damaged	Recharge or replace	9-S11
	Battery positive cable disconnected or improperly connected	Repair or replace	9-S10
	Battery negative cable disconnected or improperly connected	Repair or replace	9-S10
	Slow blow fuse blown	Replace	9-S17
	Ground cable disconnected or improperly connected	Connect	9-S17
Fuse Blown Frequently	Short-circuited	Repair or replace	–

BATTERY

Symptom	Probable Cause	Solution	Reference Page
Battery Discharges Too Quickly	Battery damaged	Recharge or replace	9-S11
	Alternator damaged	Replace	9-S35
	Wiring harness disconnected or improperly connected (between battery positive terminal and alternator B terminal)	Repair or replace	9-S35
	Cooling fan belt slipping	Adjust	G-29, G-58

STARTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Starter Motor Does Not Operate	Battery discharged or damaged	Recharge or replace	9-S11
	Slow blow fuse blown	Replace	9-S17
	Safety switch improperly adjusted or damaged	Adjust or replace	9-S27
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Starter motor damaged	Repair or replace	9-S29
	Key switch damaged	Replace	9-S26
	Starter relay damaged	Replace	9-S30
	Fuse blown	Replace	9-S16
Glow Lamp Does Not Light	Coolant temperature sensor damaged	Replace	9-S41
	Key switch damaged	Replace	9-S26
	Electronic instrument panel damaged	Replace	9-S18

CHARGING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Charging Lamp Does Not Light when Main Switch Is Turned ON	Fuse blown	Replace	9-S16
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Alternator damaged	Repair or replace	9-S35
Charging Lamp Does Not Go OFF When Engine Is Operating	Short circuit between alternator L terminal lead and chassis	Repair or replace	–
	Alternator damaged	Repair or replace	9-S35

LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	Fuse blown	Replace	9-S16
	Bulb blown	Replace	G-48, G-76
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Combination switch damaged	Replace	9-S36
Tail Light Does Not Light	Fuse blown	Replace	9-S16
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Combination switch damaged	Replace	9-S36
Hazard and Turn Signal Light Does Not Light	Fuse blown	Replace	9-S16
	Bulb blown	Replace	G-48, G-76
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Hazard unit damaged	Replace	9-S38
	Combination Switch damaged	Replace	9-S36
Hazard and Turn Signal Light Does Not Blink	Hazard unit damaged	Replace	9-S38
Work Light Does Not Light	Fuse blown	Replace	9-S16
	Bulb blown	Replace	G-48, G-76
	Wiring harness disconnected or improperly connected	Repair or replace	–

EASY CHECKER™

Symptom	Probable Cause	Solution	Reference Page
Engine Oil Pressure Lamp Lights Up When Engine Is Operating	Engine oil pressure too low	Repair engine	1-S79
	Engine oil insufficient	Fill	G-36, G-64
	Engine oil pressure switch damaged	Replace	1-S41
	Short circuit between engine oil pressure switch lead and chassis	Repair	1-S41
	Electrical instrument panel damaged	Replace	9-S18
Engine Oil Pressure Lamp Does Not Light When Key Switch Is Turned ON and Engine Is Not Operating	Engine oil pressure switch damaged	Replace	1-S41
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S18

GAUGES

Symptom	Probable Cause	Solution	Reference Page
Fuel Gauge Does Not Function	Fuel level sensor damaged	Replace	1-S43
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S18
Coolant Temperature Gauge Does Not Function	Coolant temperature sensor damaged	Replace	9-S41
	wiring harness disconnected or improperly connected	Repair or replace	–
	Electrical instrument panel damaged	Replace	9-S18

ELECTRONIC INSTRUMENT PANEL

Symptom	Probable Cause	Solution	Reference Page
Nothing Is Displayed in LCD	Battery discharged or damaged	Recharge or replace	9-S11
	Slow blow fuse blown	Replace	9-S17
	Fuse blown	Replace	9-S16
	Electronic instrument panel connector disconnect	Connect	9-S20
	Electronic instrument panel damaged	Replace	9-S18
	Ground cable disconnected or improperly connected	Connect	9-S17

Error Display (TRACTOR)

Display on LCD	Trouble Item	Probable Cause	Solution	Reference Page		
E-20	CAN Communication	• CANbus wiring is disconnected or short-circuited • No signals from main ECU • Main ECU damaged	Check the communication line	—		
			Check the main ECU connector	9-S22		
E-31	—	• The pair of instrument panel and main ECU is not correct	Reselect tractor model	9-S15		
E-40	Input voltage to Acceleration Sensor	• Power source from main ECU is dropped • Wiring for the sensor is short-circuited	Check the output voltage at main ECU connector	9-S22		
			Check the sensor connector	9-S54		
			Check the ground cable	9-S17		
E-75	Acceleration Sensor	• Output of the sensor (main, sub) is out of range	Check the output voltage by test mode	9-S13		
E-84			Check the sensor wiring connector	9-S54		
			Check the sensor resistance	9-S54		
			Replace the sensor	9-S54		
E-93	Starter Relay	• Starter relay error	Check the relay	9-S30		
E-94	OPC Output	• Wiring for OPC is disconnected or short-circuited	Check related parts	9-S32		
E-95	PTO Solenoid	• PTO solenoid value failure • Wiring for PTO solenoid is disconnected or short-circuited • Grounding plate of solenoid is poor contact with chassis	Check the wiring connector of PTO solenoid valve	3-S78		
			Check PTO solenoid valve	3-S78		

Error Display (Engine)

ISO 14229 P-Code	J1939-73		Name	Reference Page
	SPN	FMI		
P0016	636	7	NE-G phase shift	See Diagnosis Manual (*)
P0072	171	4	Intake air temperature built-in MAF sensor abnormality	
P0073	171	3		
P0087	633	7	Pressure limiter emergency open	
P0088	157	0	High rail pressure	
P0089	1347	7	SCV (MPROP) stuck	
P0093	1239	1	Fuel leak (in high pressured fuel system)	
P0101	132	1	Intake air volume: Low	
P0102	132	4	MAF sensor abnormality	
P0103	132	3		
P0112	172	4	Intake air temperature error	
P0113	172	3		
P0117	110	4	Coolant temperature sensor abnormality	
P0118	110	3		
P0192	157	4	Rail pressure sensor abnormality	
P0193	157	3		
P0200	523535	0	Injector charge voltage: High	
P0201	651	3	Open circuit of harness/coil	
P0202	653	3		
P0203	654	3		
P0204	652	3		
P0217	110	0	Engine overheat	
P0219	190	0	Engine overrun	
P0237	102	4	Boost pressure sensor abnormality	
P0238	102	3		
P0335	636	8	Crankshaft position sensor (NE sensor) abnormality	
P0336	636	2		
P0340	723	8	Camshaft position sensor (G sensor) abnormality	
P0341	723	2		
P0380	676	5	Glow relay abnormality	
P0380	523544	3		
P0380	523544	4		
P0381	676	0		
P0403	523574	3	EGR actuator abnormality	
P0404	523574	4		
P0409	523572	4		
P0524	100	1	Oil pressure error	
P0543	3242	4	Exhaust gas temperature sensor 1 (T1) abnormality	
P0544	3242	3		

ISO 14229 P-Code	J1939-73		Name	Reference Page
	SPN	FMI		
P0546	4765	4	Exhaust gas temperature sensor 0 (T0) abnormality	See Diagnosis Manual (*)
P0547	4765	3		
P0562	168	4	Battery voltage abnormality	
P0563	168	3		
P0602	523538	2	QR (IQA) data abnormality	
P0602	523538	7		
P0605	628	2	ECU FLASH ROM and CPU abnormality	
P0606	1077	2		
P0606	523527	2		
P0611	523525	1	Injector charge voltage abnormality	
P0628	1347	4	SCV (MPROP) drive system abnormality	
P0629	1347	3		
P062D	523605	6	Internal injector drive circuit short	
P0642	3509	4	Sensor supply voltage 1 abnormality	
P0643	3509	3		
P0652	3510	4	Sensor supply voltage 2 abnormality	
P0653	3510	3		
P0662	3511	4	Sensor supply voltage 3 abnormality	
P0663	3511	3		
P0687	1485	2	Main relay is locked in closed position	
P1990	523700	13	EEPROM check sum error	
P1991	523701	13		
P1992	523702	13		
P2108	523580	2	Intake throttle feedback error	
P2122	91	4	Accelerator position sensor 1 abnormality	
P2123	91	3		
P2127	29	4	Accelerator position sensor 2 abnormality	
P2128	29	3		
P2131	523543	2	Accelerator position sensor error (CAN)	
P2135	91	2	Accelerator position sensor correlation error	
P2147	523523	4	Injector short	
P2148	523523	3		
P2150	523524	4		
P2151	523524	3		
P2228	108	4	Barometric pressure sensor error	
P2229	108	3		
P2293	679	7	Pressure limiter abnormality	
P2293	679	16		
P2413	523575	7	EGR (DC motor) abnormality	
P2414	523576	2		
P2415	523577	2		

ISO 14229 P-Code	J1939-73		Name	Reference Page
	SPN	FMI		
P242C	3246	4	Exhaust gas temperature sensor 2 (T2) abnormality	See Diagnosis Manual (*)
P242D	3246	3		
P2454	3251	4	Differential pressure sensor 1 abnormality	
P2455	3251	3		
P2621	523582	4	Intake throttle lift sensor abnormality	
P2622	523582	3		
P3001	3252	0	Emission deterioration	
P3002	4765	0	Exhaust gas temperature sensor 0: Emergency high	
P3003	3242	0	Exhaust gas temperature sensor 1: Emergency high	
P3004	3246	0	Exhaust gas temperature sensor 2: Emergency high	
P3006	3701	15	Excessive PM3	
P3007	3701	16	Excessive PM4	
P3008	3701	0	Excessive PM5	
P3011	132	15	Boost pressure low	
P3012	523589	17	Low coolant temperature in parked regeneration	
P3013	523590	16	Parked regeneration time out	
P3018	523599	0	All exhaust gas temperature sensor failure	
P3023	523601	0	High exhaust gas temperature after emergency high temperature DTC	
P3024	523602	0	High frequency of regeneration	
P3025	523603	15	Over heat pre-caution	
U0075	523547	2	CAN2 Bus off	
U0076	523578	2	No communication with EGR	
U0077	523604	2	CAN1 Bus off	
U0081	523548	2	CAN2 frame error	
U0082	523591	2		
U0083	523592	2		
U0086	523595	2		
U0087	523596	2		
U0089	523598	2		

(*): Because some of engine error display is disappeared by turning the key switch to **"OFF"**, before referring to the Diagnosis Manual, be sure to perform Mode **"b"** adjustment to clear error information (see page 9-S13).

If the error code is still displayed, refer to the Diagnosis Manual.

9Y1211012ELS0001US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Glow Plug	Resistance	Approx. 0.9 Ω	—
Fuel Level Sensor			
• Float at Upper-most Position	Resistance	1.0 to 5.0 Ω	—
• Float at Middle Position	Resistance	32.5 Ω	—
• Float at Lower-most Position	Resistance	103 to 117 Ω	—
Coolant Temperature Sensor			
• at -20 °C (-4 °F)	Resistance	15.04 k Ω	—
• at 0 °C (32 °F)	Resistance	5.74 k Ω	—
• at 20 °C (68 °F)	Resistance	2.45 k Ω	—
• at 40 °C (104 °F)	Resistance	1.15 k Ω	—
• at 60 °C (140 °F)	Resistance	0.58 k Ω	—
• at 80 °C (176 °F)	Resistance	0.32 k Ω	—
• at 100 °C (212 °F)	Resistance	0.18 k Ω	—
• at 120 °C (248 °F)	Resistance	0.11 k Ω	—
Starter			
• Commutator	O.D.	30.0 mm 1.181 in.	29.0 mm 1.142 in.
• Mica	Under Cut	0.50 to 0.80 mm 0.020 to 0.031 in.	0.20 mm 0.0008 in.
• Brush	Length	15.0 mm 0.591 in.	11.0 mm 0.433 in.
• Brush Holder and Holder Support	Resistance	Infinity	—
Alternator			
	No-load voltage	More than 14 V	—
• Stator	Resistance	Less than 1.0 Ω	—
• Rotor	Resistance	2.9 Ω	12.8 mm 0.504 in.
• Slip Ring	O.D.	14.4 mm 0.567 in.	14.0 mm 0.551 in.
• Brush	Length	10.5 mm 0.413 in.	8.4 mm 0.331 in.

9Y1211012ELS0002US0

3. TIGHTENING TORQUES

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

Item	N·m	kgf·m	lbf·ft
Steering wheel nut	48.0 to 55.9	4.9 to 5.7	36 to 41
Rear bonnet mounting bolt	4 to 5	0.4 to 0.6	3 to 4
Starter terminal nut	5.9 to 11	0.60 to 1.2	4.4 to 8.6
Alternator pulley nut	58.4 to 78.9	5.95 to 8.05	43.1 to 58.2

9Y1211012ELS0003US0

4. CHECKING AND ADJUSTING

⚠ CAUTION

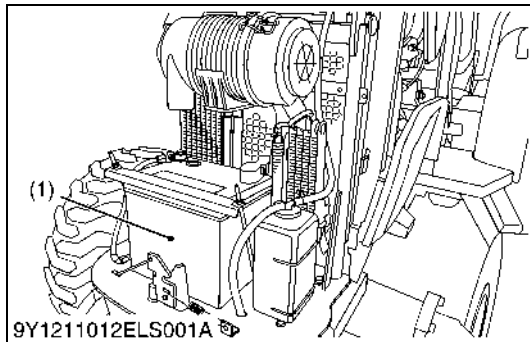
- To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.
- Never remove the battery cap while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are splattered with it, wash it away completely with water immediately and get medical attention.
- Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.
- Wear eye protection and rubber gloves when working around battery.

■ IMPORTANT

- If the machine is to be operated for a short time without battery (using a slave battery for starting), use additional current (lights) while engine is running and insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.

9Y1211012ELS0004US0

[1] BATTERY



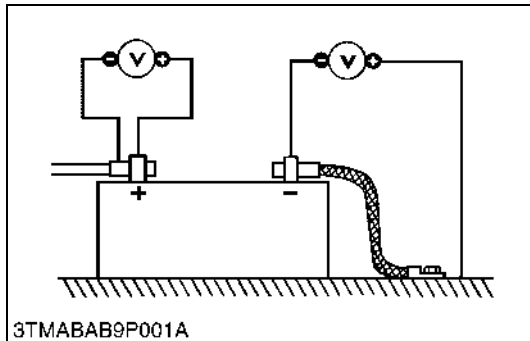
Battery Voltage

1. Stop the engine and turn the main switch off.
2. Connect the COM (–) lead of the voltmeter to the battery's negative terminal post and the (+) lead to the positive terminal post, and measure the battery voltage.
3. If the battery voltage is less than the factory specification, check the battery specific gravity and recharge the battery (1).

Battery voltage	Reference value	More than 12 V
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(1) Battery

9Y1211012ELS0005US0

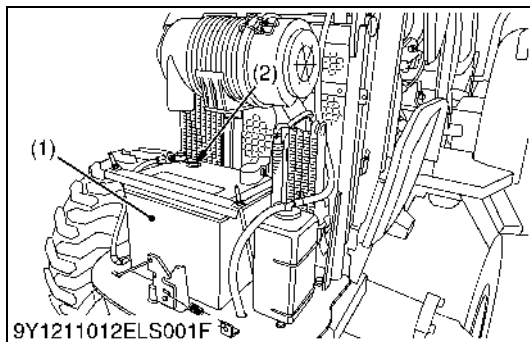


Battery Terminal Connection

1. Turn the main switch on, and turn on the head light.
2. Measure the voltage with a voltmeter across the battery's positive terminal post and the cable terminal, and the voltage across the battery's negative terminal post and the chassis.
3. If the measurement exceeds the service 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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WSM000001ELS0001US0



Battery Condition Indicator

1. Check the battery condition by reading the indicator (2).

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

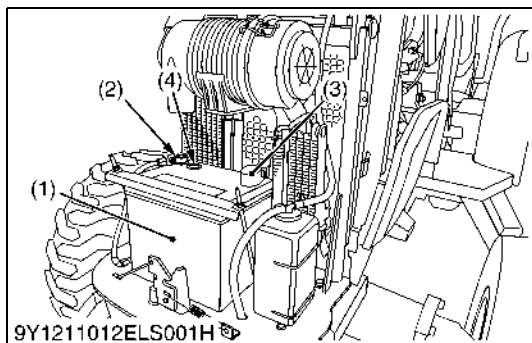
■ IMPORTANT

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

(1) Battery

(2) Indicator

9Y1211012ELS0006US0



Recharging

⚠ CAUTION

- When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.
 - When disconnecting the cable from the battery, start with the negative terminal first.
When connecting the cable to the battery, start with the positive terminal first.
 - Never check battery charge by placing a metal object across the posts.
Use a voltmeter or hydrometer.
1. To slow charge the battery (1), connect the battery positive terminal (3) to the charge positive terminal and the negative (2) to the negative, then recharge in the standard fashion.
 2. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time.
When using a boost-charged battery, it is necessary to recharge the battery as early as possible.
Failure to do this will shorten the battery's service life.
 3. The battery is charge if the indicator display turns green from black.
 4. When exchanging an old battery for a new one, use battery of equal specification shown in table.

Table

Model	Battery Type	Volt (V)	Reserve at (min.)	Cold Cranking Amps	Normal Charging Rate (A)
L3301/ L3901	75D23R	12	110	580	6.5
L4701	80D26R	12	120	600	7.5

CCA: Cold Cranking Ampere

- (1) Battery
(2) Negative Terminal

- (3) Positive Terminal
(4) Indicator

9Y1211012ELS0007US0

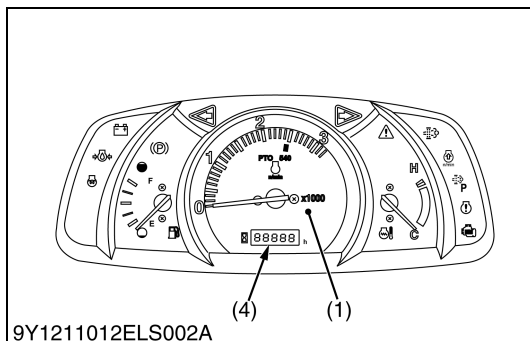
[2] TESTING, SETTING AND ADJUSTING BY ELECTRONIC INSTRUMENT PANEL

The following setting, adjustments and testing can be done by using the electronic instrumental panel.

- Testing: Check a voltage from various sensors or rotation of engine.
- Setting: Input various data to electronic instrumental panel or main ECU.
- Error Information: Check or clear the error information.

9Y1211012ELS0008US0

(1) Mode Selection



⚠ WARNING

- To perform the testing of the electronic instrument panel, operator must be seated on the tractor.
 - When performing this testing, be sure to change gears to neutral and apply parking brake.
1. While holding down both DPF INHIBIT switch (2) and Parked regeneration switch (3), turn key switch to "ON" or "START" position.
 2. Mode selection display is indicated on the LCD (4).
 3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
 4. The code of desired mode is indicated, press the parked regeneration switch (3) for more than 2 seconds.

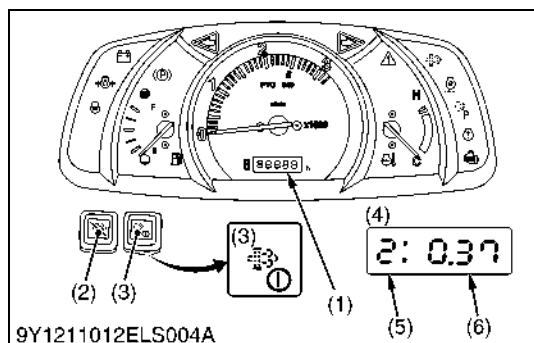
Mode	Detail of Mode
A	Test Mode
b	Error Information Clear Mode
c	Acceleration Sensor Fine-adjustment Mode
d	Tractor Model Select Mode

- (1) Instrument Panel
(2) DPF INHIBIT Switch

- (3) Parked Regeneration Switch
(4) LCD (Liquid Crystal Display)

9Y1211012ELS0009US0

(2) Mode "A" (Test Mode)



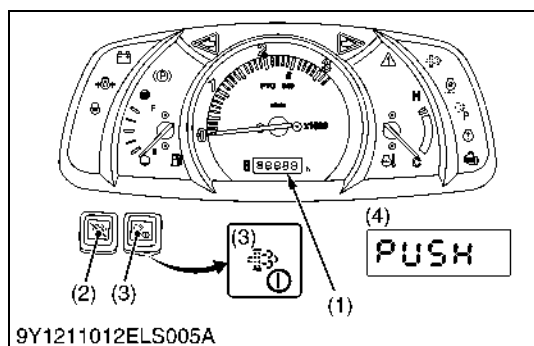
1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "A" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Test mode is selected.
6. If parked regeneration switch (3) is pressed, the displayed item is changed.
7. Turn off the key switch to finish test mode.

Item Number	Contents	Unit	Digit Number
1	coolant temperature	F	integer
2	voltage from fuel sensor	V	the second decimal place
3	engine revolution	rpm	integer
4	voltage from acceleration sensor (main)	V	the second decimal place
5	voltage from acceleration sensor (sub)	V	the second decimal place
6	DOC inlet exhaust temperature (T0)	F	integer
7	DPF inlet exhaust temperature (T1)	F	integer
8	DPF outlet exhaust temperature (T2)	F	integer
9	Software version No.	—	integer triple digit

- (1) LCD (Liquid Crystal Display) (4) Display Example
 (2) DPF INHIBIT Switch (5) Item Number
 (3) Parked Regeneration Switch (6) Value of item

9Y1211012ELS0010US0

(3) Mode "b" (Error Information Clear Mode)



1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "b" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Error Information Clear mode is selected and the expression "PUSH" is displayed.
6. Press the parked regeneration switch (3) for more than 2 seconds.
7. The expression "OFF" is displayed.
8. Turn off the key switch.

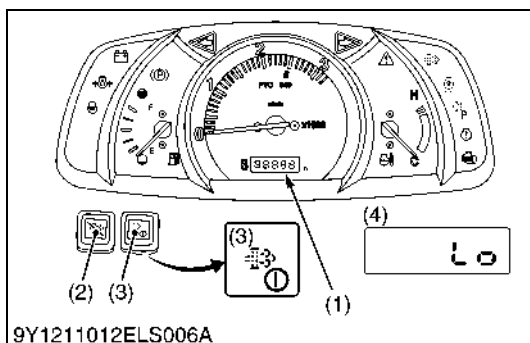
■ NOTE

- Be sure to clear error information by performing this procedure after servicing is finished.

- (1) LCD (Liquid Crystal Display) (3) Parked Regeneration Switch
 (2) DPF INHIBIT Switch (4) Display Example

9Y1211012ELS0011US0

(4) Mode "c" (Acceleration Sensor fine-adjustment Mode)



1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "c" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Acceleration sensor fine-adjustment mode is selected and the expression "Lo" is displayed.
6. Set the hand throttle lever to "IDLING" position. If voltage from acceleration sensor is within proper range, the expression "Lo" and "PUSH" is displayed alternately.
7. Press the parked regeneration switch (3) for more than 2 seconds.
8. If buzzer sounds shortly, the memorization for idling position is successfully completed.
9. The expression "HI" is displayed.
10. Set the hand throttle lever to "MAX" position. If voltage from acceleration sensor is within proper range, the expression "HI" and "PUSH" is displayed alternately.
11. Press the parked regeneration switch (3) for more than 2 seconds.
12. If buzzer sounds shortly, the memorization for max position is successfully completed.
13. The expression "OFF" is displayed.
14. Turn off the key switch.

■ NOTE

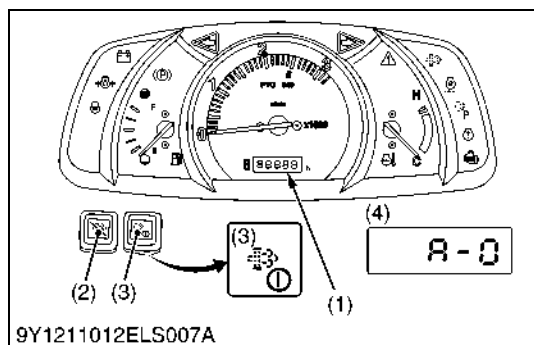
- If the error code E-75 is displayed, the voltage from acceleration sensor is not within proper range. Be sure to set hand throttle lever to "IDLING" or "MAX" position.
- In case although the hand throttle lever is in "NEUTRAL" or "MAX" position, the error code E-75 is displayed, readjust acceleration sensor attachment. (See page 1-S17.)

(1) LCD (Liquid Crystal Display)
(2) DPF INHIBIT Switch

(3) Parked Regeneration Switch
(4) Display Example

9Y1211012ELS0012US0

(5) Mode "d" (Tractor Model Select Mode)



1. While holding down both DPF INHIBIT switch (2) and parked regeneration switch (3), turn key switch to "ON" or "START" position.
2. Mode selection display is indicated on the LCD (4).
3. Press the parked regeneration switch (3) and the mode indicated on LCD is changed.
4. If "d" is indicated on LCD, press the parked regeneration switch (3) for more than 2 seconds.
5. Tractor model select mode is selected.
6. Press the parked regeneration switch (3) to change the displayed code.
The order is [A-0], [b-0], [A-1], [b-1].....
7. While desired code is displayed on LCD, press the parked regeneration switch (3) for more than 2 seconds.
8. The expression "OFF" is displayed.
9. Turn off the key switch.

Code	Detail
A-0	L3301 HST Model
b-0	L3301 Manual Transmission Model
A-1	L3901 HST Model
b-1	L3901 Manual Transmission Model
A-2	L4701 HST Model
b-2	L4701 Manual Transmission Model

■ IMPORTANT

- Choose proper code for the tractor by referring table above.

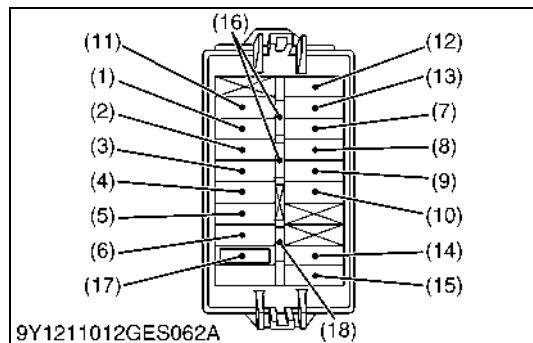
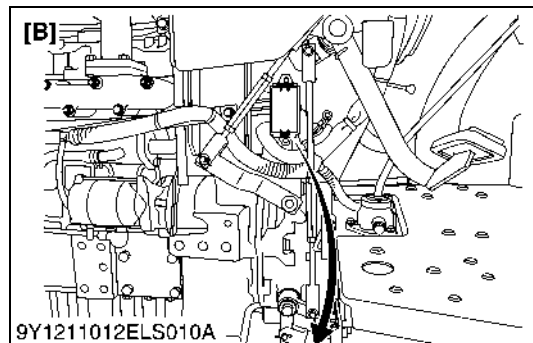
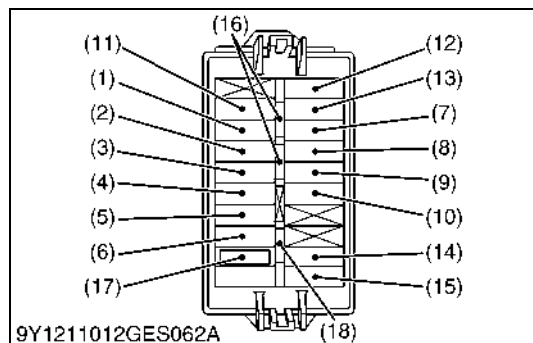
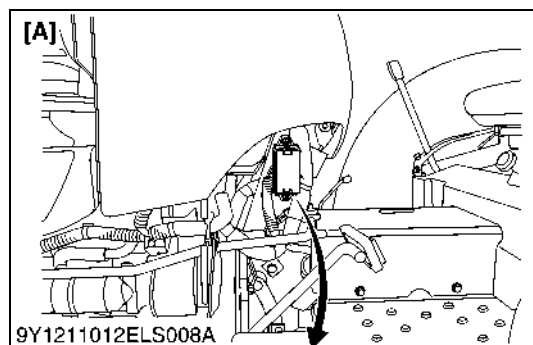
(1) LCD (Liquid Crystal Display)
(2) DPF INHIBIT Switch

(3) Parked Regeneration Switch
(4) Display Example

9Y1211012ELS0013US0

[3] FUSES AND GROUND CABLE

(1) Checking Fuse and Connector



Checking Fuse

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

■ IMPORTANT

- Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system.

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

■ Protected Circuit

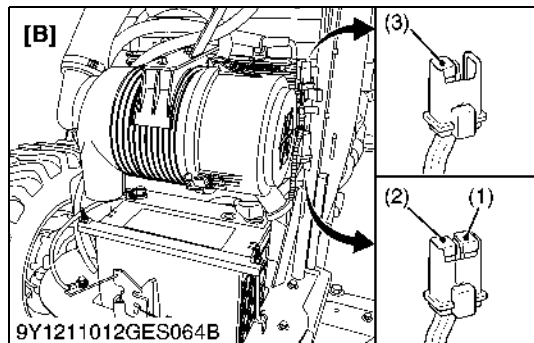
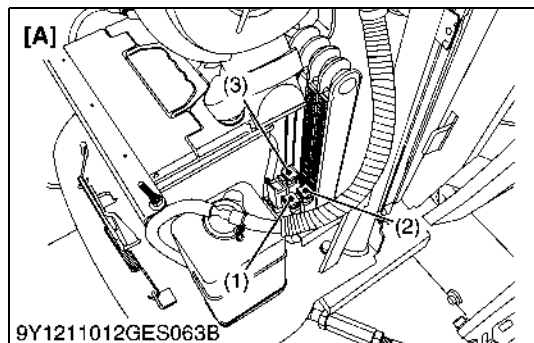
Fuse No.	Capacity (A)	Protected circuit
(1)	5	Engine ECU (Ignition key)
(2)	5	Main ECU (Ignition key)
(3)	5	Meter panel (Ignition key)
(4)	10	Combination switch
(5)	10	Work light
(6)	5	Starter relay
(7)	20	Engine ECU (Battery)
(8)	5	Main ECU (Battery)
(9)	5	Meter panel (Battery)
(10)	10	Hazard
(11)	5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

(16) Spare Fuse
(17) Fuse Puller
(18) Spare Fuse

[A] L3301/L3901

[B] L4701

9Y1211012ELS0014US0



Checking Slow-Blow Fuses

1. The slow-blow fuses are intended to protect the electrical cabling. If any of them has blown out, be sure to pinpoint the cause. Never use any substitute, use only a KUBOTA genuine part.

[L3301/L3901]

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

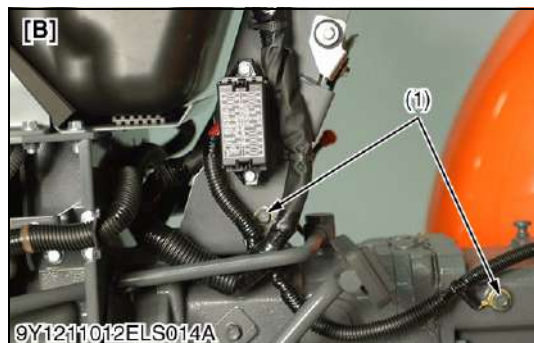
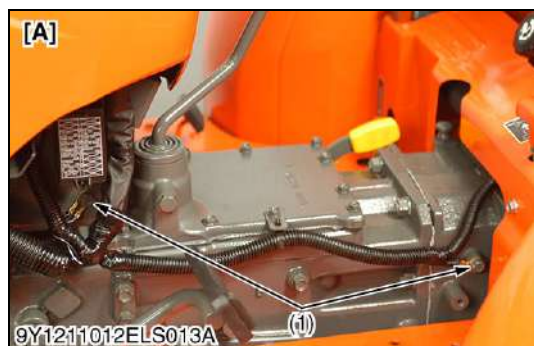
[L4701]

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

[A] L3301/L3901

[B] L4701

9Y1211012ELS0015US0



Checking Ground Cable

1. Check the whether the ground cables (1) are connected securely to the tractor chassis.
2. If the ground cables are broken or disconnected, replace it.

(1) Ground Cable

[A] Manual Transmission Model

[B] HST Model

9Y1211012ELS0016US0

[4] ELECTRONIC INSTRUMENT PANEL



Battery Negative Cable Terminal

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

- (1) Battery Negative Terminal Connector

9Y1211012STS0035US0



Steering Wheel and Rear Bonnet

1. Remove steering wheel cap (1).
2. Remove steering wheel nut (5). Remove steering wheel (2) with steering puller.
3. Remove the throttle grip (3).
4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

- (1) Steering Wheel Cap

- (4) Rear Bonnet

- (2) Steering Wheel

- (5) Steering Wheel Nut

- (3) Throttle Grip

9Y1211012STS0036US0



Electronic Instrument Panel

1. Remove electronic instrument panel (1).
2. Disconnect connector for electronic instrument panel (1).

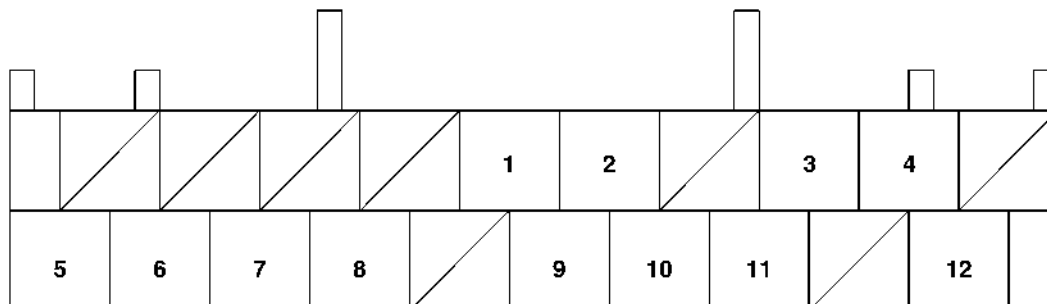
■ NOTE

- When replacing the electronic instrument panel, perform the mode "d" adjustment. (See page 9-S15.)

- (1) Electronic Instrument Panel

9Y1211012ELS0017US0

(1) Checking Electronic Instrument Panel Connector



9Y1211012ELS016A

Connector of Wire Harness Side

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
1	L	Engine Oil Pressure Switch	7	GR	Buzzer
2	W/R	Alternator L Terminal	8	G/W	Head Light (Meter Panel Back Light)
3	R	Hazard/Turn Signal (LH)	9	R/L	IGN
4	R/W	Hazard/Turn Signal (RH)	10	Y/G	Fuel Lever Sensor
5	BR/W	CAN (L)	11	B/R	GND
6	BR	CAN (H)	12	R/Y	+12V (Power Source from Battery)

9Y1211012ELS0018US0



9Y1211012ELS017A

Connector Voltage

■ Main Voltage

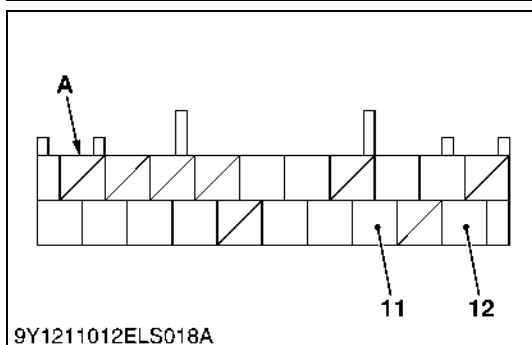
1. Measure the voltage between the terminal **12** (+) and terminal **11** (-).
2. If the voltage differs from the battery voltage (11 to 14 V), the battery, slow blow fuse, fuse or wiring harness is damaged.

Voltage	Terminal 12 – Terminal 11	Approx. battery voltage
---------	---------------------------	-------------------------

(1) Connector

A: Connector of Wire Harness Side

9Y1211012ELS0019US0



9Y1211012ELS018A

**Checking Instrument Panel Connector**

1. Disconnect the connector (1) and check their terminals for contamination and deformation.
2. Check to see that cable does not broken or terminals are not shelled off.
3. If any damaged parts are found, repair or replace them.

■ IMPORTANT

- **Connect connectors surely after checking.**

(1) Connector

9Y1211012ELS0020US0

[5] MAIN ELECTRIC CONTROL UNIT (MAIN ECU)



Battery Negative Cable Terminal

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

- (1) Battery Negative Terminal Connector

9Y1211012STS0035US0



Steering Wheel and Rear Bonnet

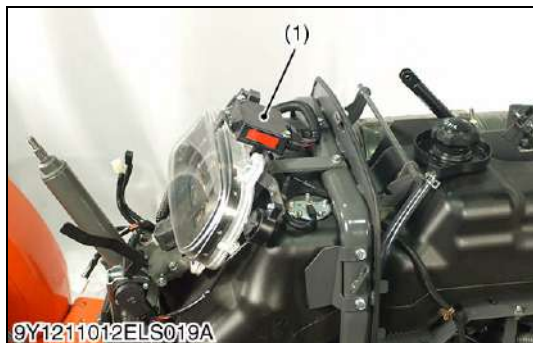
1. Remove steering wheel cap (1).
2. Remove steering wheel nut (5). Remove steering wheel (2) with steering puller.
3. Remove the throttle grip (3).
4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

- (1) Steering Wheel Cap
(2) Steering Wheel
(3) Throttle Grip

- (4) Rear Bonnet
(5) Steering Wheel Nut

9Y1211012STS0036US0



Main Electric Control Unit (Main ECU)

1. Remove electronic instrument unit (1).
2. Disconnect connector for main ECU (1).

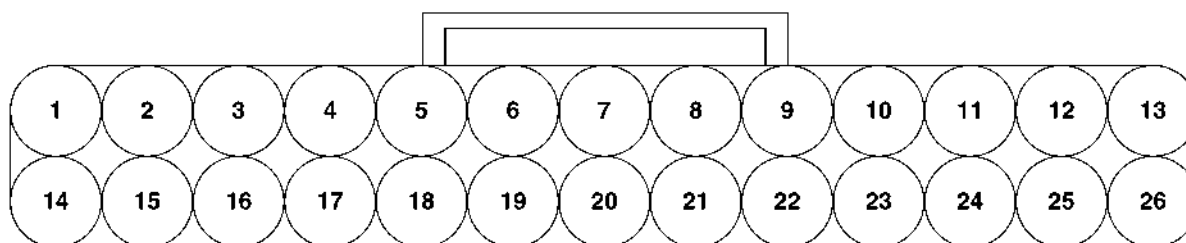
■ NOTE

- When replacing the main ECU, perform mode "d" adjustment. (See page 9-S15.)

- (1) Main Electronic Control Unit

9Y1211012ELS0021US0

(1) Checking Main Electrical Control Unit Connector

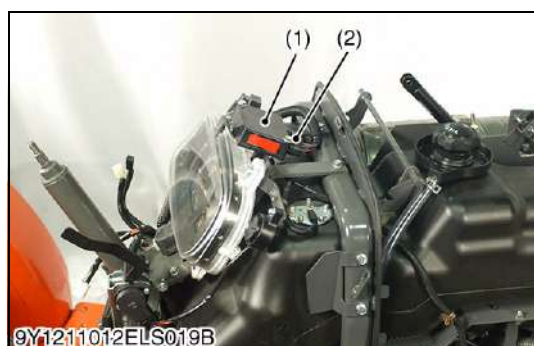


9Y1211012ELS020A

Connector of Wire Harness Side

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
1	R/BR	Key Switch	14	W	DPF Regeneration Switch
2	L/W	DPF INHIBIT Switch	15	W/G	Parking Brake Sensor
3	B/Y	Shuttle Switch (Manual Transmission Model) HST Pedal Switch (HST Model)	16	B/R	Starter Relay
4	L/B	PTO Switch	17	V	RXD (for Check)
5	B/L	Seat Switch	18	P	TXD (for Check)
6	R/B	Seat Switch	19	SB	OPC Signal
7	BR/L	Acceleration Sensor (Main)	20	W/L	Acceleration Sensor (Sub)
8	G	DPF Regeneration Switch Lamp	21	B/G	DPF INHIBIT Switch Lamp
9	–	–	22	W	CAN (L)
10	L	PTO Switch	23	BR	CAN (H)
11	B/BR	GND	24	B/W	Acceleration Sensor (GND)
12	R/L	Acceleration Sensor (Power Supply)	25	R/W	IGN
13	P/L	PTO Solenoid (L4701 Only)	26	R	+12 V (Power Source from Battery)

9Y1211012ELS0022US0



9Y1211012ELS019B

Connector Voltage

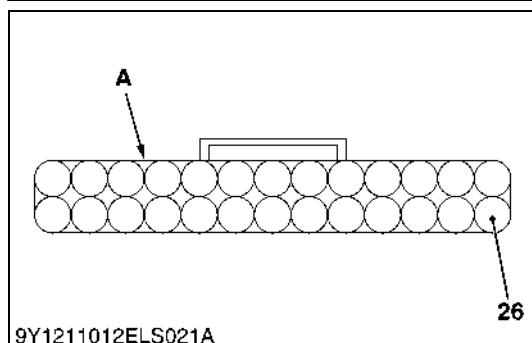
1. Disconnect the connector (2).
2. Measure the voltage between terminal **26** of the connector and chassis.
3. If the voltage differs from the battery voltage (11 to 14 V), battery, slow blow fuse, fuse or wiring harness is damaged.

Voltage	Terminal 26 – Chassis	Approx. battery voltage
---------	------------------------------	-------------------------

- (1) Main ECU
- (2) Main ECU Connector

A: Connector of Wire Harness side

9Y1211012ELS0023US0



9Y1211012ELS021A

[6] ENGINE ELECTRIC CONTROL UNIT (ENGINE ECU)



Battery Negative Cable Terminal

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

(1) Battery Negative Terminal Connector

9Y1211012STS0035US0



Steering Wheel and Rear Bonnet

1. Remove steering wheel cap (1).
2. Remove steering wheel nut (5). Remove steering wheel (2) with steering puller.
3. Remove the throttle grip (3).
4. After disconnecting connectors for key switch and combination switch, remove the rear bonnet (4).

Tightening torque	Steering wheel nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft
	Rear bonnet mounting bolt	4 to 5 N·m 0.4 to 0.6 kgf·m 3 to 4 lbf·ft

(1) Steering Wheel Cap

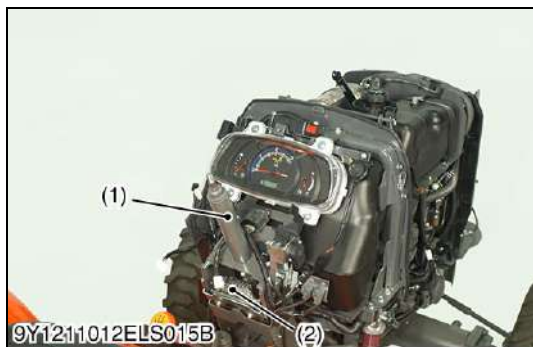
(4) Rear Bonnet

(2) Steering Wheel

(5) Steering Wheel Nut

(3) Throttle Grip

9Y1211012STS0036US0



Engine Electric Control Unit (Engine ECU)

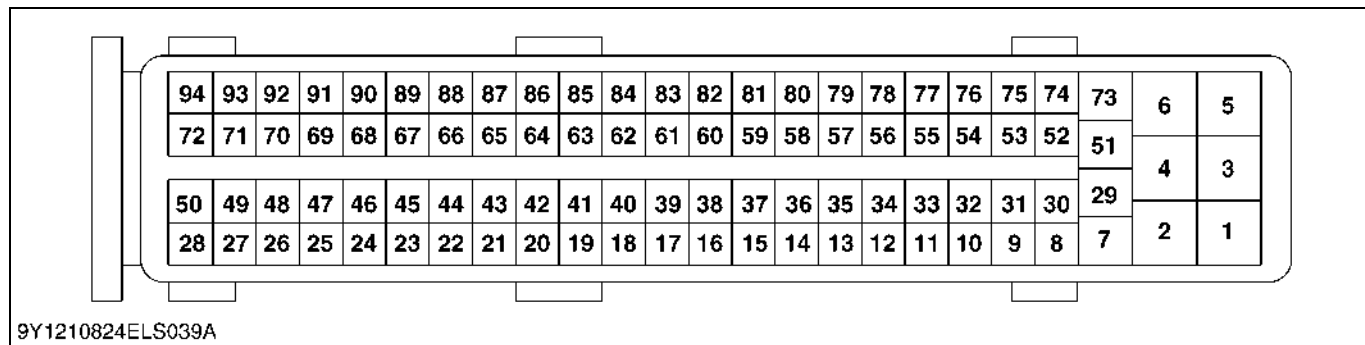
1. Remove steering post assembly (1).
2. Disconnect connector for engine electric control unit (2).
3. Remove engine ECU (2).

(1) Steering Post Assembly

(2) Main Electronic Control Unit

9Y1211012ELS0024US0

(1) Checking Electric Control Unit Connector



No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
1	B	GND	48	—	—
2	B	GND	49	—	—
3	R	Injector #1 and #4 (+)	50	R/W	Engine ECU Main Relay (Coil Side)
4	R/G	Engine ECU Main Relay (Switch Side)	51	W/R	Injector #2 (-)
5	R/Y	Injector #2 and #3 (+)	52	—	—
6	R/B	Engine ECU Main Relay (Switch Side)	53	B	Air Flow Sensor (-)
7	W/B	Injector #4 (-)	54	Y/L	Rail Pressure Sensor (Signal)
8	B	Crankshaft Position Sensor (-)	55	W/B	Exhaust Gas Temperature Sensor T2 (-)
9	—	—	56	—	—
10	—	—	57	Y	Exhaust Gas Temperature Sensor T1
11	B/Y	Coolant Temperature Sensor (-)	58	—	—
12	—	—	59	GR	Exhaust Gas Temperature Sensor T0
13	B/W	DPF Differential Pressure Sensor (+)	60	—	—
14	—	—	61	W/V	Air Flow Sensor (Signal)
15	—	—	62	R	CAN2 (H)
16	—	—	63	B	CAN2 (L)
17	—	—	64	—	—
18	R	Intake Throttle Valve Position Sensor (+)	65	W/R	CAN1 (L)
19	—	—	66	BR	CAN1 (H)
20	S/B	OPC Signal	67	—	—
21	—	—	68	—	—
22	—	—	69	—	—
23	—	—	70	B/BR	Glow Relay (Coil Side)
24	—	—	71	R/B	Ignition Switch
25	—	—	72	—	—
26	—	—	73	W/L	Injector #1 (-)
27	—	—	74	—	—
28	—	—	75	W	Crankshaft Position Sensor (Signal)
29	W	Injector #3 (-)	76	G/B	Rail Pressure Sensor (-)
30	—	—	77	B/L	Exhaust Gas Temperature Sensor T2
31	—	—	78	—	—
32	R/GR	Rail Pressure Sensor (+)	79	P	Exhaust Gas Temperature Sensor T1 (-)
33	W/G	Coolant Temperature Sensor (Signal)	80	—	—
34	—	—	81	W/R	Exhaust Gas Temperature Sensor T0 (-)
35	—	—	82	W	Intake Throttle Valve Position Sensor (-)
36	Y/B	DPF Differential Pressure Sensor (-)	83	—	—
37	B/P	Intake Throttle Valve Position Sensor (Signal)	84	R/L	Intake Throttle Valve Motor (DC Motor +)

No.	Color of wiring	Terminal Name	No.	Color of wiring	Terminal Name
38	R/Y	DPF Differential Pressure Sensor (Signal)	85	R/G	Intake Throttle Valve Motor (DC Motor -)
39	R	Crankshaft Position Sensor (+)	86	Y/W	Intake Air Temperature Sensor (Signal)
40	-	-	87	-	-
41	-	-	88	-	-
42	-	-	89	Y	SCV (-)
43	-	-	90	-	-
44	B	Camshaft Position Sensor (-)	91	-	-
45	R	Camshaft Position Sensor (+)	92	-	-
46	W	Camshaft Position Sensor (Signal)	93	-	-
47	-	-	94	-	-

9Y1211012ELS0025US0



Battery Voltage

1. Disconnect the connector of engine ECU (1).
2. Measure the voltage between terminal 50 of connector and chassis.
3. If the measurement is not approximately battery voltage, check the relating electric circuit.

Voltage	Terminal 50 – Chassis	Approx. battery voltage

9Y1210824ELS040B

(1) Engine ECU

A: Connector of Harness Side

9Y1211012ELS0026US0

[7] STARTING SYSTEM

(1) Key Switch



Key Switch

1. Remove the steering wheel and rear bonnet.
2. Disconnect connector of key switch (1).
3. Performer following checking.

(1) Key Switch

9Y1211012ELS0027US0

Connector Voltage

1. Measure the voltage across the connector **B** terminal and chassis.
2. If the voltage differs from the battery voltage (11 to 14 V), battery, slow blow fuse or wiring harness is damaged.

Voltage	Connector B terminal – Chassis	Approx. battery voltage
---------	---------------------------------------	-------------------------

A: Wire Harness Side Connector 4C

9Y1211012ELS0028US0

Key Switch at ON Position

1. Turn the key switch "ON" position.
2. Measure the resistance across the **B** terminal and the **AC** terminal.
3. If 0 ohm is not indicated, renew the key switch.

Resistance	B terminal – AC terminal	0 Ω
------------	--	-----

A: Key Switch Side Connector 4C

9Y1211012ELS0029US0

Key Switch at START Position

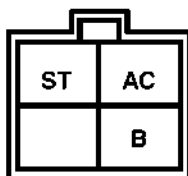
1. Turn and hold the key switch at the "START" position.
2. Measure the resistances across the **B** terminal and the **AC** terminal, and across the **B** terminal, and the **ST** terminal.
3. If 0 ohm is not indicated, renew the key switch

Resistance	B terminal – AC terminal	0 Ω
	B terminal – ST terminal	0 Ω

A: Key Switch Side Connector 4C

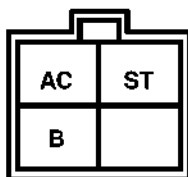
9Y1211012ELS0030US0

A



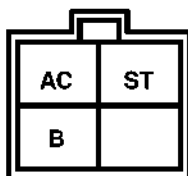
3TLABAB9P027A

A



3TLABAB9P027B

A



3TLABAB9P027B

(2) Safety Switches

[A] Shuttle Switch (Manual Transmission Model)



Shuttle Switch (Manual Transmission Model)

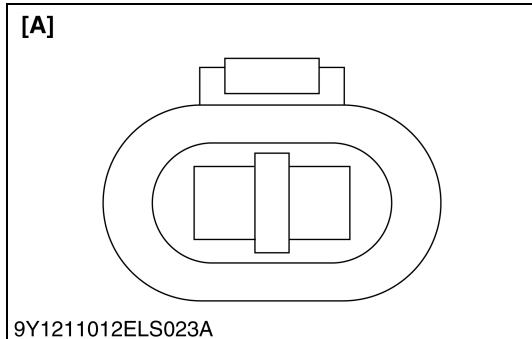
1. Remove connector of shuttle switch (1).
2. Measure the resistance across two terminals of the connector.
3. If measurement is different from following table, replace it.

Resistance (Across switch terminal)	When switch is pushed	0 Ω
	When switch is released	Infinity

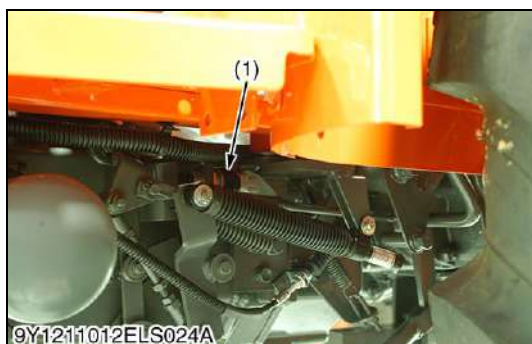
(1) Shuttle Switch

[A] Shuttle Switch Side Connector 2P

9Y1211012ELS0031US0



[B] HST Pedal Switch (HST Model)



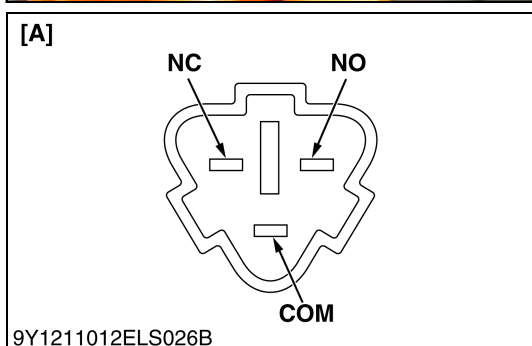
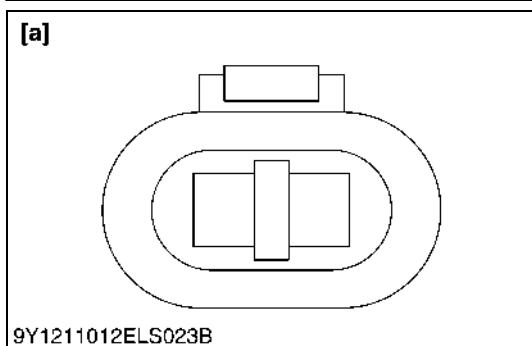
HST Pedal Switch (HST Model)

1. Remove connector of HST pedal switch (1).
2. Measure the resistance across two terminals of the connector.
3. If measurement is different from following table, replace it.

Resistance (Across switch terminal)	When switch is pushed	0 Ω
	When switch is released	Infinity

(1) HST Switch

9Y1211012ELS0032US0

[C] PTO Switch**PTO Switch (L3301/L3901)**

1. Remove connector of PTO switch (1).
2. Measure the resistance across two terminals of the connector.
3. If measurement is different from following table, replace it.

Resistance (Across switch terminal)	When switch is pushed	0 Ω
	When switch is released	Infinity

(1) PTO Switch

[A] Manual Transmission Model**[B] HST Model****[a] PTO Switch Side Connector 2P**

9Y1211012ELS0033US0

PTO Switch (L4701)

1. Remove connector of PTO switch (1).
2. Measure the resistance across two terminals of the connector referring table.
3. If measurement is different from following table, replace it.

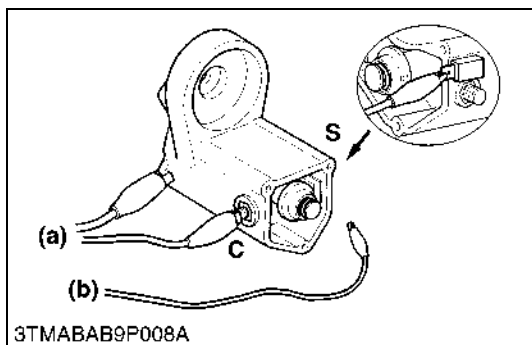
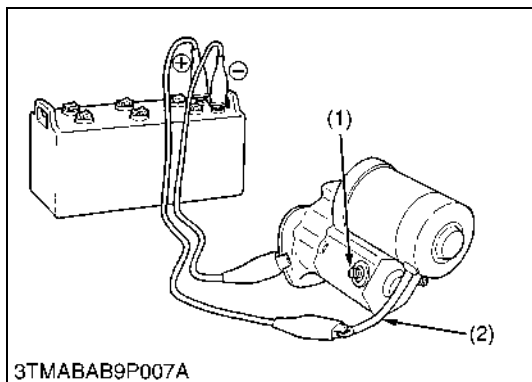
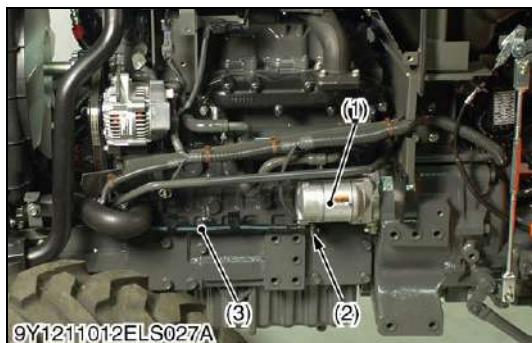
Resistance (Across switch terminal)	When switch is released	NO Terminal – COM Terminal	Infinity
		NC Terminal – COM Terminal	0 Ω
	When switch is pushed	NO Terminal – COM Terminal	0 Ω
		NC Terminal – COM Terminal	Infinity

(1) PTO Switch

[A] PTO Switch Side Connector 2P

9Y1211012ELS0034US0

(3) Starter



Starter Motor B Terminal Voltage

1. Measure the voltage across the **B** terminal and chassis.
2. If the voltage differs from the battery voltage, check battery cable or battery ground cable.

Voltage	Factory specification	Approx. battery voltage
---------	-----------------------	-------------------------

- (1) Starter Motor
(2) Starter **B** Terminal

- (3) Battery Cable

9Y1211012ELS0035US0

Motor Test



CAUTION

- **Secure the starter to prevent it from jumping up and down while testing the motor.**

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter **C** terminal (1).
5. Connect a jumper lead from the connecting lead (2) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter motor housing and the battery negative terminal post.
7. If the motor does not operate, check the motor.

- (1) **C** Terminal

- (2) Connecting Lead

9Y1211012ELS0036US0

Magnet Switch Test (Pull-in, Holding Coils)

1. Remove the motor from the starter housing.
2. Prepare a 6 V battery for the test.
3. Connect jumper leads from the battery negative terminal to the housing and the starter **C** terminal.
4. The plunger should be attached and the pinion gear should pop out when a jumper lead is connected from the battery positive terminal to the **S** terminal. It is a correct.
5. Disconnect the jumper lead to the starter **C** terminal. Then the pinion gear should remain popped out. It is a correct.

■ IMPORTANT

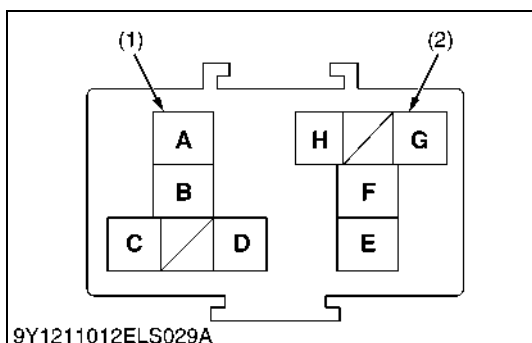
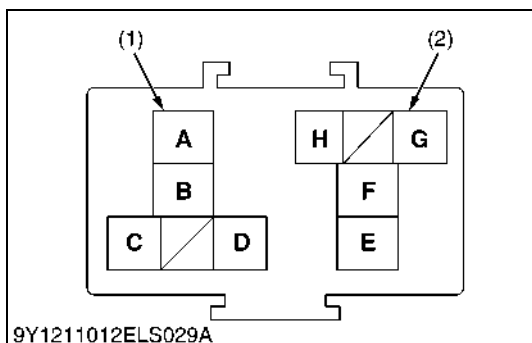
- **Testing time must be 3 to 5 seconds.**

- (a) To Negative Terminal

- (b) To Positive Terminal

9Y1211012ELS0037US0

(4) Relays



Starter Relay and Engine Relay

1. Remove relays (1), (2).

Relay	Terminal	Color of Wiring
Starter Relay	A	R
	B	B/W
	C	B/R
	D	B/W
Engine Relay	E	R
	F	R
	G	R/W
	H	R

NOTE

- Starter relay and engine relay are using same relay. When checking, be sure to check the color of wiring harness.

(1) Starter Relay

(2) Engine Relay

9Y1211012ELS0038US0

Checking Connector Voltage

1. Measure the voltage with a voltmeter across the terminals following table below.
2. If the voltage is different from the battery voltage, battery, slow blow fuse, fuse or wiring harness is damaged.

Starter Relay

Voltage	A Terminal – Chassis	Approx. battery voltage
---------	----------------------	-------------------------

Engine Relay

Voltage	F Terminal – Chassis	Approx. battery voltage
	H Terminal – Chassis	

(1) Starter Relay

(2) Engine Relay

9Y1211012ELS0039US0

Checking Coil Resistance of Relay

1. Measure the resistance with a ohmmeter across the terminal 1 and terminal 2.
2. If the resistance is remarkably different from the following table or there is no resistance, the relay is damaged.

Starter Relay

Resistance	1 terminal – 2 terminal	Approx. 120 Ω
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(1) Relay

9Y1211012ELS0040US0

Functional Check

NOTE

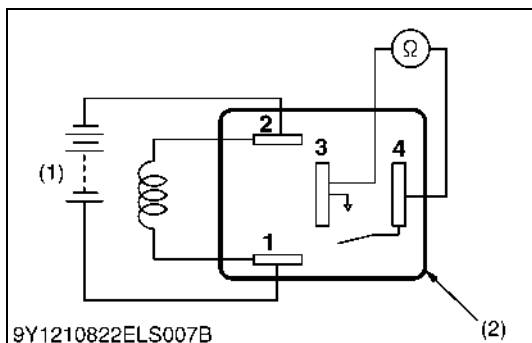
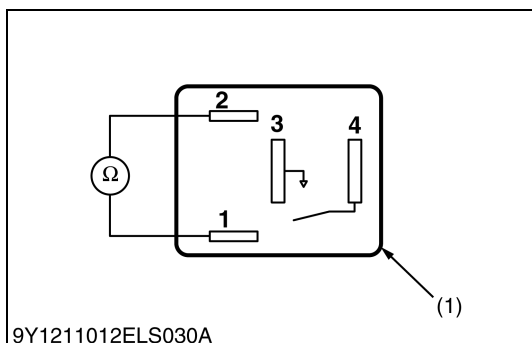
- The relays described here are used same ones so that these are interchangeable.

1. Apply the battery voltage across the terminal 1 and 2, and check for continuity across the terminal 3 and 4.
2. If continuity is not established across the terminal 3 and 4, replace it.

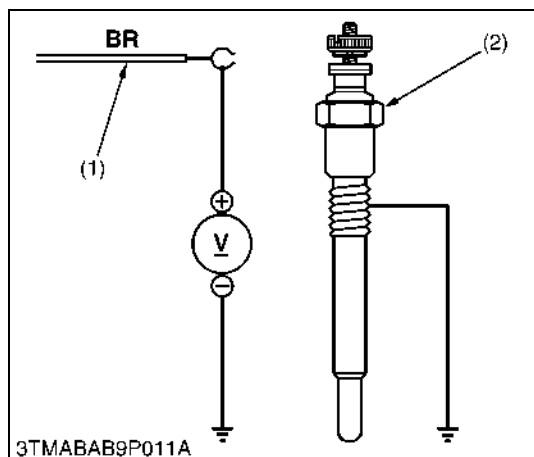
(1) Battery

(2) Connector (Relay)

9Y1211012ELS0041US0



(5) Glow Control System



Glow Plug Lead Terminal Voltage

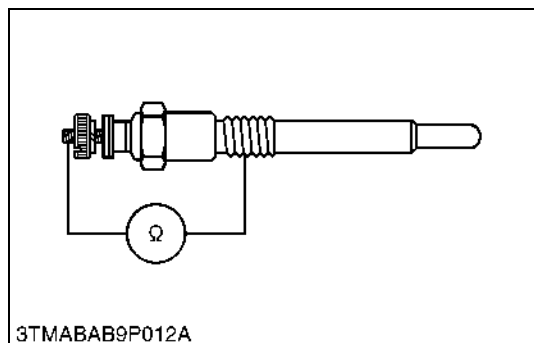
1. Disconnect the wiring lead (1) from the glow plug (2) after turning the main switch off.
2. Turn the main switch key to the "ON" position, and measure the voltage between the lead terminal and the chassis.
3. If the voltage is different from the battery voltage, some parts in the glow circuit is damaged.

Voltage (Lead terminal – Chassis	Main switch key at "ON"	Approx. battery voltage
--	-------------------------	-------------------------

(1) Wiring Lead (Positive)

(2) Glow Plug

9Y1211012ELS0042US0



Glow Plug Continuity

1. Disconnect the lead from the glow plugs.
2. Measure the resistance between the glow plug terminal and the chassis.
3. If 0 ohm is indicated, the screw at the tip of the glow plug and the housing are short-circuited.
4. If the factory specification is not indicated, the glow plug is damaged.

Glow plug resistance	Factory specification	Approx. 0.9 Ω
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9Y1211012ELS0043US0

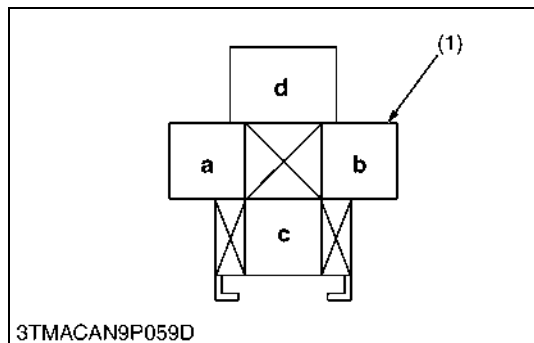


Glow Relay

1. Remove the glow relay (1).

(1) Glow Relay

9Y1211012ELS0044US0



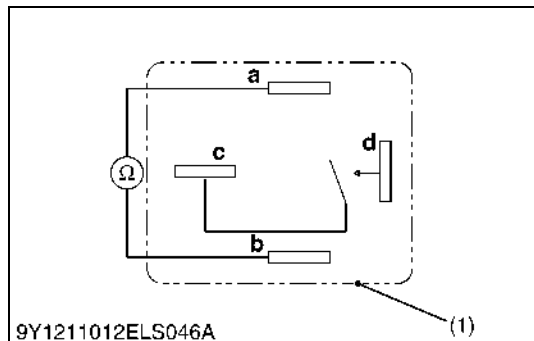
Checking Connector Voltage

1. Measure the voltage with a voltmeter across the terminals following table below.
2. If the voltage is different from the battery voltage, battery, slow blow fuse, fuse, engine relay or wiring harness is damaged.

Voltage	d terminal – Chassis	Approx. battery voltage
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(1) Connector (Wiring Harness Side)

9Y1211012ELS0045US0



Checking Coil Resistance of Relay

1. Measure the resistance with a ohmmeter across the terminal a and terminal b.
2. If the resistance is remarkably different from the following table or there is no resistance, the relay is damaged

Resistance	a terminal – b terminal	Approx. 100 Ω
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(1) Glow Relay

9Y1211012ELS0046US0

[8] OPC (OPERATOR PRESENCE CONTROL) SYSTEM

(1) L3301/L3901

<Manual Transmission Model>

■ Preparation before checking

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the main gear shift lever and the synchro shuttle shift lever to **"NEUTRAL"** position.
4. Shift the PTO gear shift lever to **"OFF"** position.
5. Fully depress the clutch pedal and start the engine.
6. Check the OPC system by following four steps listed in the table below.

■ IMPORTANT

- Be sure to set main gear shift lever to **"NEUTRAL"** position.

Checking System

Step	PTO Gear Shift Lever	Synchro Shuttle Shift Lever	Operator	OPC System is "NORMAL" If
1	"OFF" (Switch: ON)	"FORWARD" or "REVERSE" (Switch: OFF)	Gets up from the seat (Seat switch: OFF)	Engine stops
2	"ON" (Switch: OFF)	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine stops
3	"OFF" (Switch: ON)	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine does not stop
4	"OFF" (Switch: ON)	"NEUTRAL" (Switch: ON)	Gets off the tractor, tilts the seat forward, and then place PTO gear shift lever to ON position (Seat switch: ON)	Engine does not stop

9Y1211012ELS0047US0

<HST Model>

■ Preparation before checking

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the range gear shift lever and release the HST pedal to **"NEUTRAL"** position.
4. Shift the PTO gear shift lever to **"OFF"** position.
5. Fully depress the clutch pedal and start the engine.
6. Check the OPC system by following four steps listed in the table below.

■ IMPORTANT

- Be sure to set range gear shift lever to **"NEUTRAL"** position.

Checking System

Step	PTO Gear Shift Lever	HST Pedal	Operator	OPC System is "NORMAL" If
1	"OFF" (Switch: ON)	"FORWARD" or "REVERSE" (Switch: OFF)	Gets up from the seat (Seat switch: OFF)	Engine stops
2	"ON" (Switch: OFF)	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine stops
3	"OFF" (Switch: ON)	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine does not stop
4	"OFF" (Switch: ON)	"NEUTRAL" (Switch: ON)	Gets off the tractor, tilts the seat forward, and then place PTO gear shift lever to ON position (Seat switch: ON)	Engine does not stop

9Y1211012ELS0048US0

(2) L4701**<Manual Transmission Model>****■ Preparation before checking**

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the main gear shift lever and the synchro shuttle shift lever to **"NEUTRAL"** position.
4. Shift the PTO clutch control switch to **"OFF"** position.
5. Fully depress the clutch pedal and start the engine.
6. Check the OPC system by following four steps listed in the table below.

■ IMPORTANT

- Be sure to set main gear shift lever to **"NEUTRAL"** position.

Checking System

Step	PTO Clutch Control Switch	Synchro Shuttle Shift Lever	Operator	OPC System is "NORMAL" If
1	"OFF"	"FORWARD" or "REVERSE" (Switch: OFF)	Gets up from the seat (Seat switch: OFF)	Engine stops
2	"ON"	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine stops
3	"OFF"	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine does not stop
4	"OFF"	"NEUTRAL" (Switch: ON)	Gets off the tractor, tilts the seat forward, and then place PTO clutch control switch in ON position (Seat switch: ON)	Engine does not stop

9Y1211012ELS0049US0

<HST Model>**■ Preparation before checking**

1. Sit on operator's seat.
2. Set the parking brake.
3. Shift the range gear shift lever and release the HST pedal to **"NEUTRAL"** position.
4. Shift the PTO clutch control switch to **"OFF"** position.
5. Start the engine.
6. Check the OPC system by following four steps listed in the table below.

■ IMPORTANT

- Be sure to set range gear shift lever to **"NEUTRAL"** position.

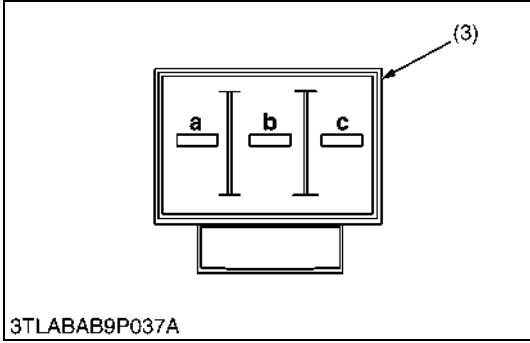
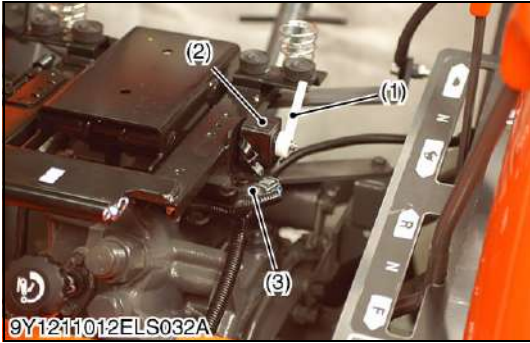
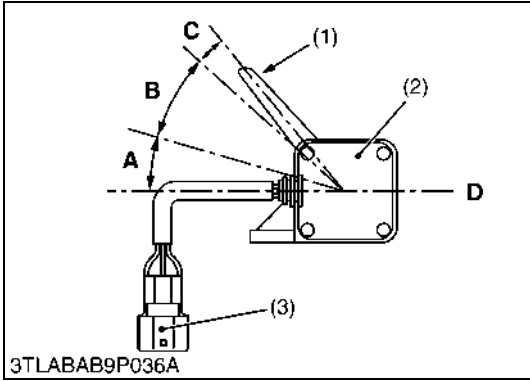
Checking System

Step	PTO Clutch Control Switch	HST Pedal	Operator	OPC System is "NORMAL" If
1	"OFF"	"FORWARD" or "REVERSE" (Switch: OFF)	Gets up from the seat (Seat switch: OFF)	Engine stops
2	"ON"	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine stops
3	"OFF"	"NEUTRAL" (Switch: ON)	Gets up from the seat (Seat switch: OFF)	Engine does not stop
4	"OFF"	"NEUTRAL" (Switch: ON)	Gets off the tractor, tilts the seat forward, and then place PTO clutch control switch in ON position (Seat switch: ON)	Engine does not stop

9Y1211012ELS0050US0

(3) Safety Switch

[A] Seat Switch



Checking Seat Switch

- 1. Remove the seat.
- 2. Disconnect the seat switch connector (3).
- 3. Change the sensor bar angle (1) and measure the resistance between connector terminals, referring to the table below.
- 4. If the measurement does not between as table, switch is damaged.

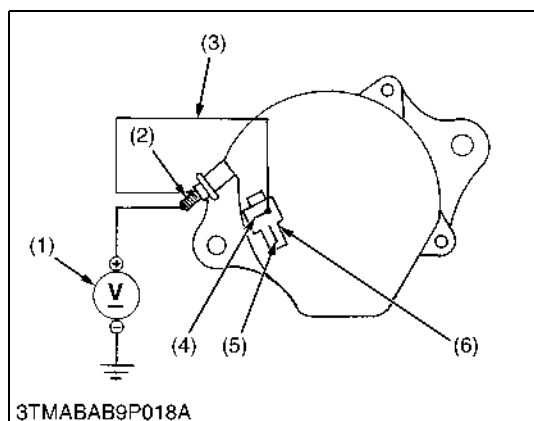
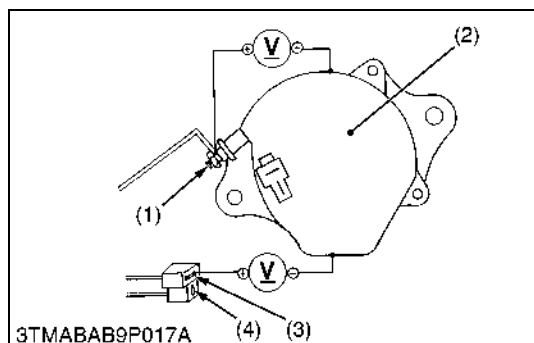
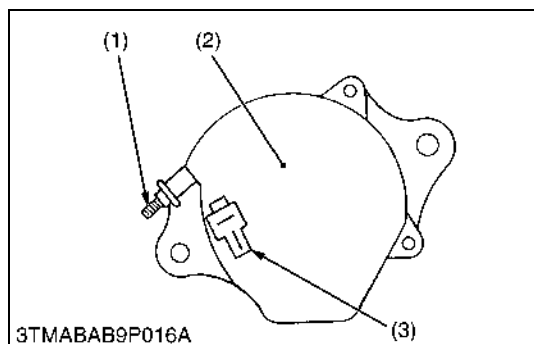
Sensor bar angle	Measuring terminal	Resistance
Approx. 18° (Angle A)	a – c	0 Ω
	a – b, b – c	Infinity
Approx. 25° (Angle B)	a – b, a – c, b – c	Infinity
Approx. 5° (Angle C)	b – c	0 Ω
	a – b, a – c	Infinity

- (1) Sensor Bar
- (2) Seat Switch
- (3) Seat Switch Connector

D: Reference Line
(Seat Suspension Plate Line)

9Y1211012ELS0051US0

[9] CHARGING SYSTEM



Alternator

1. Disconnect the **2P** connector (3) from alternator after turning the key switch "**OFF**".
2. Perform the following checkings.

- (1) **B** Terminal (3) **2P** Connector
(2) Alternator

9Y1211012ELS0052US0

Connector Voltage

1. Turn the key switch "**OFF**". Measure the voltage between the **B** terminal (1) and the chassis.
2. Turn the key switch "**ON**". Measure the voltage between the **IG** terminal (3) and the chassis.

Voltage (Key switch at OFF)	B terminal – Chassis	Approx. battery voltage
Voltage (Key switch at ON)	IG terminal – Chassis	Approx. battery voltage

- (1) **B** Terminal (3) **IG** Terminal
(2) Alternator (4) **L** Terminal

9Y1211012ELS0053US0

No-Load Test

1. Connect the **2P** connector (6) to previous positions of the alternator after you turn the main switch off.
2. Start the engine and then set at idling speed.

(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.
3. Measure the voltage between the **B** terminal (2) and the chassis. (Switch off all the lamps.)
 4. The voltage rises gradually and if it reaches 14 V, the alternator is normal.

NOTE

- It takes about 5 to 10 minutes until the voltage value stabilizes.
5. If the voltage value does not rise to 14 V, the alternator is damaged. Replace the alternator.

Voltage	Service specification	More than 14 V
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- (1) Voltmeter (4) **IG** Terminal
(2) **B** Terminal (5) **L** Terminal
(3) Jumper Lead (6) **2P** Connector

9Y1211012ELS0054US0

[10] LIGHTING SYSTEM

(1) Combination Light Switch

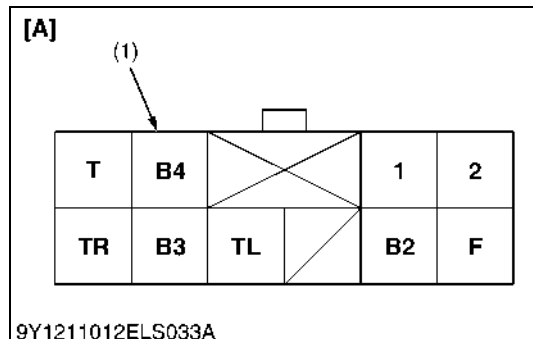


Combination Light Switch

1. Remove steering wheel and rear bonnet.
2. Disconnect connector of combination light switch (1).
3. Perform following checking.

- (1) Combination Light Switch

9Y1211012ELS0055US0



Connector Voltage

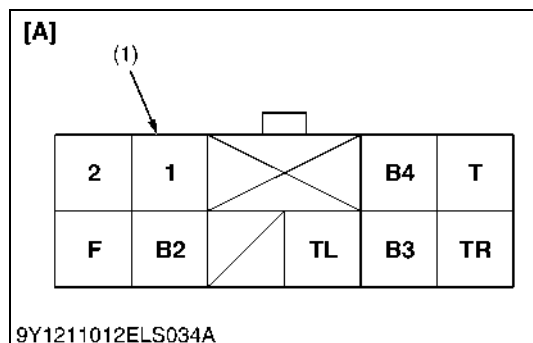
1. Measure the voltage with a voltmeter across the connector **B2** terminal and chassis when key switch is at **"OFF"** position.
2. Measure the voltage with a voltmeter across the connector **B3** and chassis, **B4** terminal and chassis when key switch is at **"ON"** position.
3. If the voltage is different from battery voltage, battery, slow blow fuse, fuse, key switch or wiring harness is damaged.

Voltage	Key switch at "OFF" position	B2 terminal – Chassis	Approx. battery voltage
	Key switch at "ON" position	B3 terminal – Chassis B4 terminal – Chassis	

- (1) **10P** Connector
(Combination Light Switch)

[A] Connector (Wiring Harness Side)

9Y1211012ELS0056US0



Checking Hazard Light Function

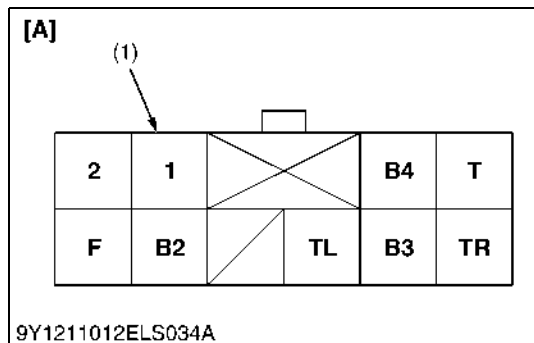
1. Measure the resistance with an ohmmeter across **B2** terminal and **F** terminal when hazard switch is at **"OFF"** position.
2. Measure the resistance with an ohmmeter across **B2** terminal and **F** terminal when hazard switch is in **"ON"** position.
3. If measured value is different from table below, the combination light switch is damaged.

Resistance	Hazard switch at "OFF" position	B2 terminal – F terminal	Infinity
	Hazard switch at "ON" position		0 Ω

- (1) **10P** Connector
(Combination Light Switch)

[A] Connector (Switch Side)

9Y1211012ELS0057US0



Checking Turn Signal Function

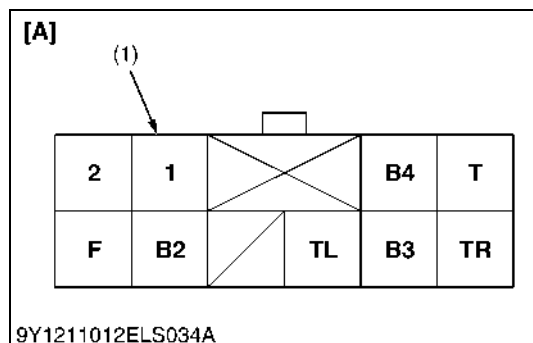
1. Measure the resistance with an ohmmeter across **B3** terminal and **TR** terminal, **B3** terminal and **TL** terminal when turn signal light switch is at "**OFF**" position.
2. Measure the resistance with an ohmmeter across **B3** terminal and **TR** terminal, **B3** terminal and **TL** terminal when turn signal light switch is at "**RIGHT**" position.
3. Measure the resistance with an ohmmeter across **B3** terminal and **TR** terminal, **B3** terminal and **TL** terminal when turn signal light switch is at "**LEFT**" position.
4. If measured value is different from table below, the combination light switch is damaged.

Resistance	Turn signal light switch at " OFF " position	B3 terminal – TR terminal	Infinity
		B3 terminal – TL terminal	Infinity
	Turn signal light switch at " RIGHT " position	B3 terminal – TR terminal	0 Ω
		B3 terminal – TL terminal	Infinity
	Turn signal light switch at " LEFT " position	B3 terminal – TR terminal	Infinity
		B3 terminal – TL terminal	0 Ω

(1) **10P** Connector
(Combination Light Switch)

[A] Connector (Switch Side)

9Y1211012ELS0058US0



Checking Head Light Function

1. Measure the resistance with an ohmmeter across **B4** terminal and **T** terminal, **B4** terminal and **1** terminal, **B4** terminal and **2** terminal when head light switch is at "**OFF**" position.
2. Measure the resistance with an ohmmeter across **B4** terminal and **T** terminal, **B4** terminal and **1** terminal, **B4** terminal and **2** terminal when head light switch is at "**ON (LOW)**" position.
3. Measure the resistance with an ohmmeter across **B4** terminal and **T** terminal, **B4** terminal and **1** terminal, **B4** terminal and **2** terminal when head light switch is at "**ON (HIGH)**" position.
4. If measured value is different from table below, the combination light switch is damaged.

Resistance	Head light switch at " OFF " position	B4 terminal – T terminal	Infinity
		B4 terminal – 1 terminal	Infinity
		B4 terminal – 2 terminal	Infinity
	Head light switch at " ON (LOW) " position	B4 terminal – T terminal	0 Ω
		B4 terminal – 1 terminal	0 Ω
		B4 terminal – 2 terminal	Infinity
	Head light switch at " ON (HIGH) " position	B4 terminal – T terminal	0 Ω
		B4 terminal – 1 terminal	Infinity
		B4 terminal – 2 terminal	0 Ω

(1) **10P** Connector

(Combination Light Switch)

[A] Connector (Switch Side)

9Y1211012ELS0059US0

(2) Flasher Unit

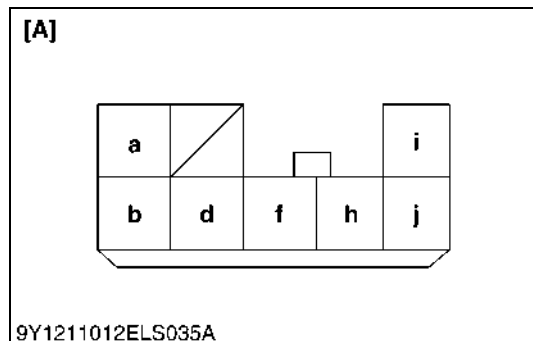


Flasher Unit

1. Remove steering wheel and rear bonnet.
2. Disconnect connector of flasher unit (1).
3. Perform following checking.

(1) Flasher Unit

9Y1211012ELS0060US0



Connector Voltage

1. Measure the voltage with a voltmeter across the connector **h** terminal and chassis.
2. Measure the resistance with a ohmmeter across the connector **a** terminal and chassis.
3. If the measurement value is different from table below, battery, slow blow fuse, fuse or wiring harness is damaged.

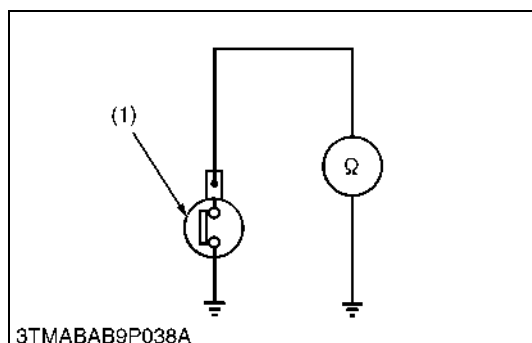
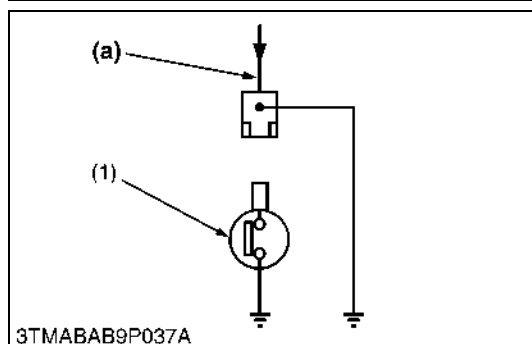
Voltage	h terminal – Chassis	Approx. battery voltage
Resistance	a terminal – Chassis	0 Ω

(1) **8P** Connector (Flasher Unit)

[A] Connector (Wiring Harness Side)

9Y1211012ELS0061US0

[11] WARNING LAMP



Engine Oil Pressure Switch, Panel Board and Wiring Harness

1. Disconnect the lead (2) from the engine oil pressure switch after turning the main switch **"OFF"**.
2. Turn the main switch **"ON"** and connect a jumper lead from the lead to the chassis.
3. If the engine oil pressure indicator lamp does not light, the panel circuit or the wiring harness is damaged.

(1) Engine Oil Pressure Switch
(2) Switch Lead

(a) From Oil Pressure Lamp

9Y1211012ELS0062US0

Engine Oil Pressure Switch Continuity

1. Measure the resistance across the switch terminal and the chassis.
2. If 0 ohm is not indicated in the normal state, the switch is damaged.
3. If infinity is not indicated at pressure over 50 kPa (0.5 kgf/cm², 7 psi), the switch is damaged.

Resistance (Switch terminal – Chassis)	In normal state	0 Ω
	At pressure over approx. 50 kPa (0.5 kgf/cm ² , 7 psi)	Infinity

(1) Engine Oil Pressure Switch

9Y1211012ELS0063US0

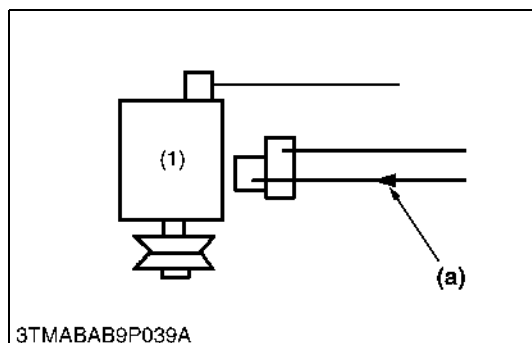
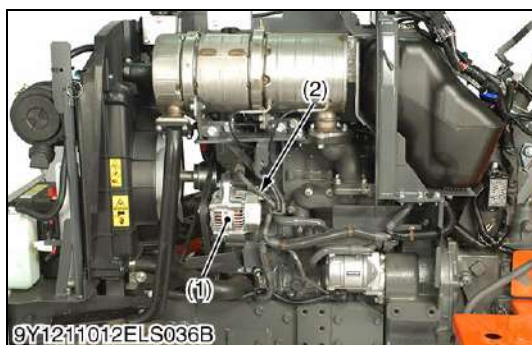
Charging Circuit (Panel Board and Wiring Harness)

1. Disconnect the **2P** connector (2) from the alternator after turning the main switch **"OFF"**.
2. Turn the main switch **"ON"** and connect a jumper lead from the wiring harness connector terminal (**WR**) to the chassis.
3. If the charge lamp does not light, the panel board circuit, alternator, wiring harness or fuse is damaged.

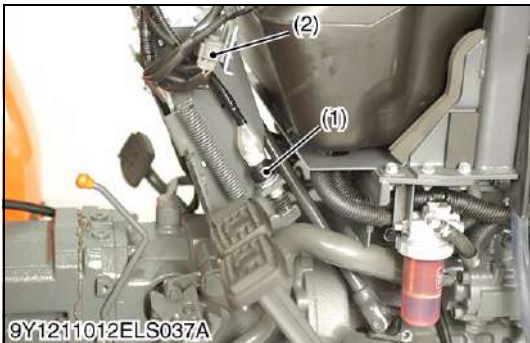
(1) Alternator
(2) **2P** Connector

(a) From Charge Lamp

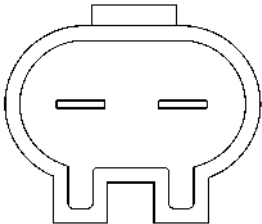
9Y1211012ELS0064US0



[12] MONITOR LAMP

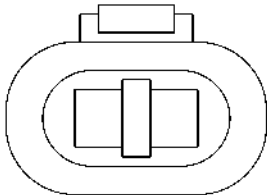


[A]

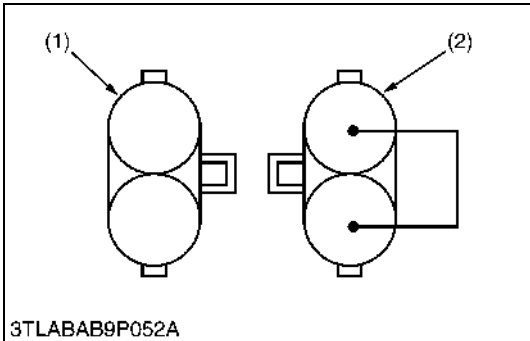


9Y1211012ELS038A

[B]



9Y1211012ELS039A



Parking Brake Switch

1. Disconnect the connector from the parking brake switch (1) after turning the main switch **"OFF"**.
2. Measure the resistance across the two terminals of parking brake switch following table below.
3. If measurement value is different from table, the parking switch is damaged.

Resistance	When switch is released	0 Ω
	When switch is pushed	Infinity

- (1) Parking Brake Switch [A] L3301/L3901
(2) Connector of Parking Brake Switch [B] L4701

9Y1211012ELS0065US0

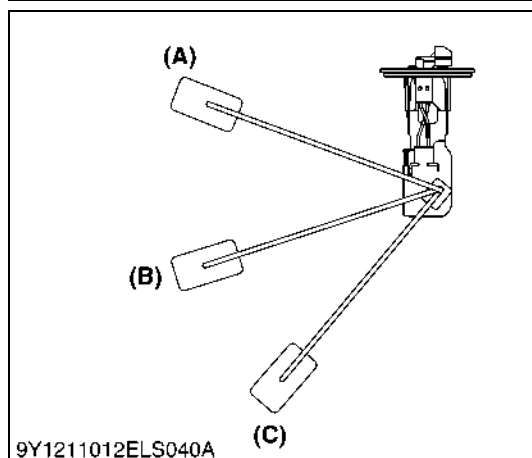
Parking Brake Switch and Wiring Harness

1. Disconnect the connector from the parking brake switch after turning the main switch **"OFF"**.
2. Turn the main switch **"ON"** and connect a jumper lead between the connector terminals of wiring harness.
3. If the parking brake indicator lamp does not light, the panel circuit or wiring harness is damaged.

- (1) Connector of Parking Brake Switch (2) Connector of Wiring Harness

9Y1211012ELS0066US0

[13] GAUGES



Checking Fuel Level Sensor

1. Remove fuel level sensor from fuel tank.
2. Measure the resistance with an ohmmeter across the terminal of fuel level sensor and chassis.
3. If the measurement is remarkably different from table below, the fuel level sensor is damaged.

Resistance (Across sensor terminal and chassis)	Factory specifica- tion	Float at uppermost position	1.0 to 5.0 Ω
		Float at middle position	32.5 Ω
		Float at lowermost position	103 to 117 Ω

(1) Fuel Unit

(A) Float at Uppermost Position

(B) Float at Middle Position

(C) Float at Lowermost Position

9Y1211012ELS0067US0

Coolant Temperature Sensor Continuity

1. Measure the resistance across the sensor terminal and the chassis.
2. If the measurement is not indicated, the sensor is damaged.

Resistance (sensor Terminal 1 – Terminal 2)	Reference value	Temperature	Resistance
		-20 °C (-4 °F)	15.04 k Ω
		0 °C (32 °F)	5.74 k Ω
		20 °C (68 °F)	2.45 k Ω
		40 °C (104 °F)	1.15 k Ω
		60 °C (140 °F)	0.58 k Ω
		80 °C (176 °F)	0.32 k Ω
		100 °C (212 °F)	0.18 k Ω
		120 °C (248 °F)	0.11 k Ω

(1) Coolant Temperature Sensor

9Y1211012ELS0068US0

[14] ENGINE CONTROL SYSTEM

(1) Injector

■ IMPORTANT

- When replacing the engine ECU, be sure to do injector correction. (Refer to the "DIAGNOSIS MANUAL" (9Y110-02420))

9Y1211012ELS0069US0



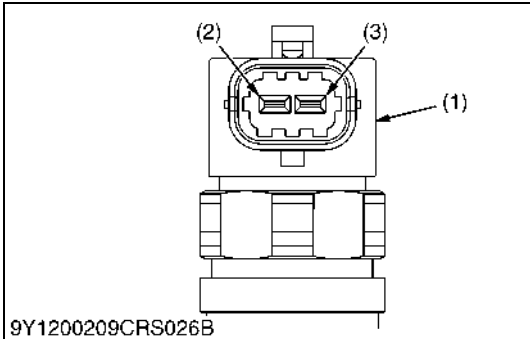
Injector Resistance

1. Measure the resistance with an ohmmeter across the terminals shown in the table below.
2. If the reference value is not indicated, the injector wire harness or injector is damaged.

Resistance	Terminal 1 – 2	0.215 to 0.295 Ω
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- (1) Injector
- (3) Terminal 2
- (2) Terminal 1

9Y1211012ELS0070US0

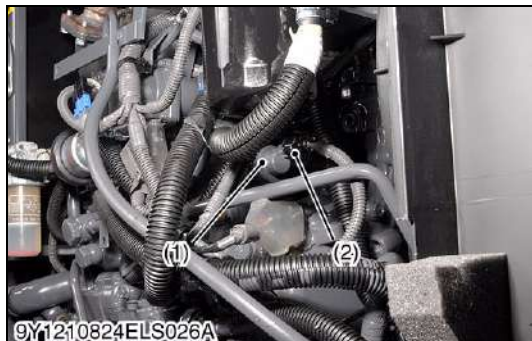


(2) SCV (Suction Control Valve)

■ NOTE

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the SCV resistance.

9Y1211012ELS0071US0



Connector Voltage

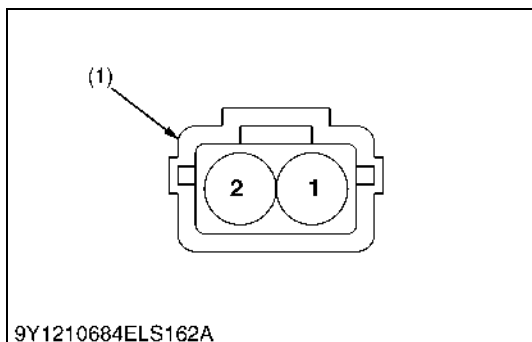
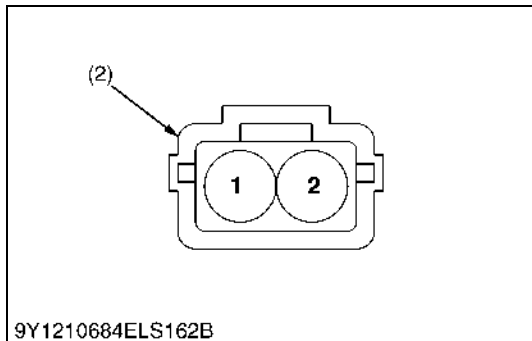
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 2 – Chassis	Approx. battery voltage
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(1) SCV (Suction Control Valve)

(2) Connector (Harness Side)

9Y1211012ELS0072US0



SCV Resistance

- Measure the resistance with an ohmmeter across the terminals shown in the table below.
- If the reference value is not indicated, the SCV is damaged.

Resistance	at 20 °C (68 °F)	Terminal 1 – 2	2.60 to 3.15 Ω
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(1) Connector (SCV Side)

9Y1211012ELS0073US0

(3) Rail Pressure Sensor

■ **NOTE**

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0074US0



Connector Voltage

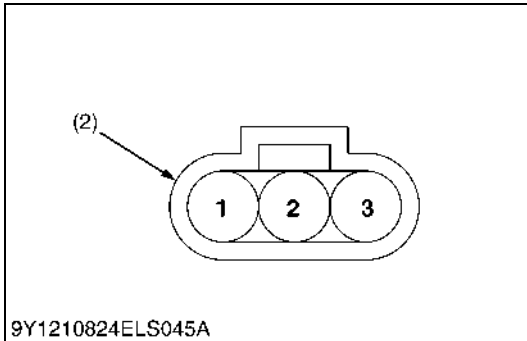
1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 3 – Chassis	Approx. 5 V
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(1) Rail Pressure Sensor

(2) Connector (Harness Side)

9Y1211012ELS0075US0



(4) Fuel Pump

■ NOTE

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the pump resistance.

9Y1211012ELS0076US0



Connector Voltage

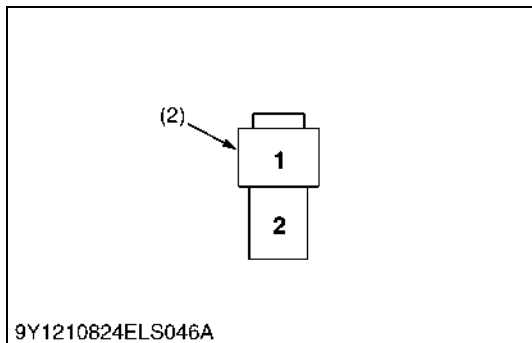
- Disconnect the connector, and turn the main key switch **"ON"** position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. battery voltage
---------	---------------------	----------------------	-------------------------

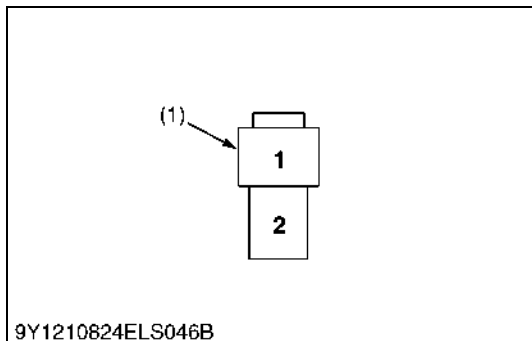
(1) Fuel Pump

(2) Connector (Harness Side)

9Y1211012ELS0077US0



9Y1210824ELS046A



9Y1210824ELS046B

Pump Actuation Test

- Connect a jumper lead from the terminal 1 to the battery positive terminal post.
- Connect a jumper lead from the terminal 2 to the battery negative terminal post.
- If the pump does not work, pump is damaged.

(1) Connector (Pump Side)

9Y1211012ELS0078US0

(5) EGR Valve

■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0079US0



Connector Voltage

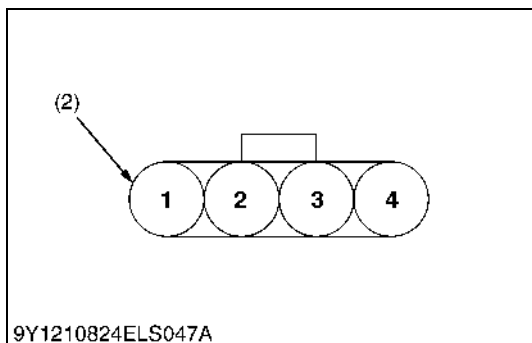
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. battery voltage
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(1) EGR Valve

(2) Connector (Harness Side)

9Y1211012ELS0080US0



(6) Crankshaft Position Sensor

■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0081US0



Connector Voltage

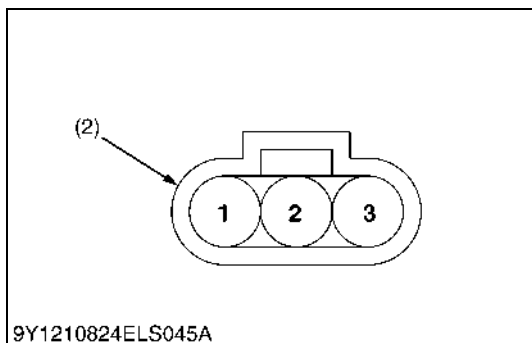
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. 5 V
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(1) Crankshaft Position Sensor

(2) Connector (Harness Side)

9Y1211012ELS0082US0



(7) Camshaft Position Sensor

■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0083US0



Connector Voltage

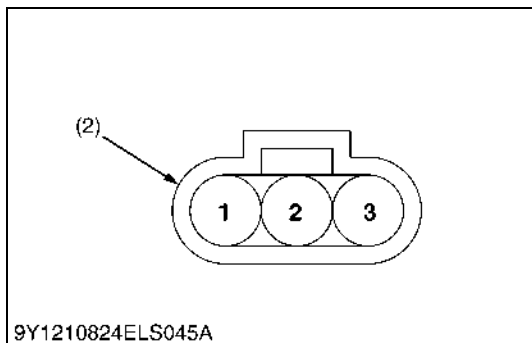
1. Disconnect the connector, and turn the main key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 3 – Chassis	Approx. battery voltage
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(1) Camshaft Position Sensor

(2) Connector (Harness Side)

9Y1211012ELS0084US0

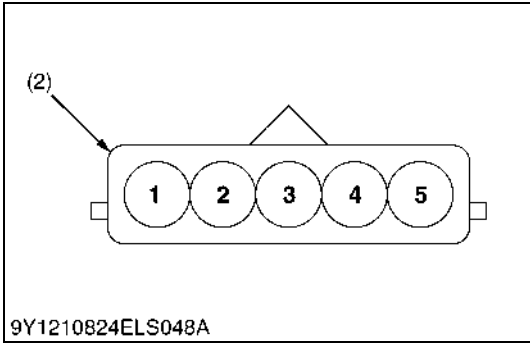
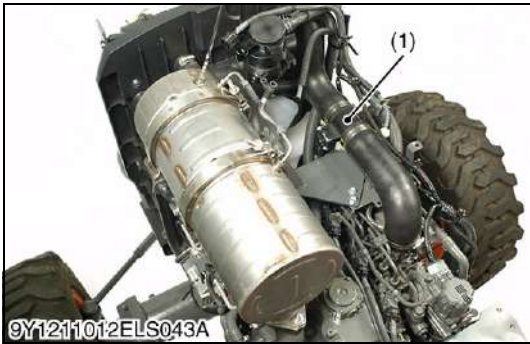


(8) Air Flow Sensor

■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0085US0



Connector Voltage

1. Disconnect the connector, and turn the main key switch "ON" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. battery voltage
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(1) Air Flow Sensor

(2) Connector (Harness Side)

9Y1211012ELS0086US0

(9) Intake Throttle Valve

■ NOTE

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the sensor resistance.

9Y1211012ELS0087US0



Connector Voltage

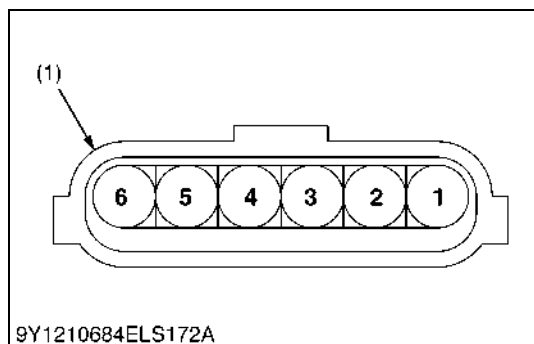
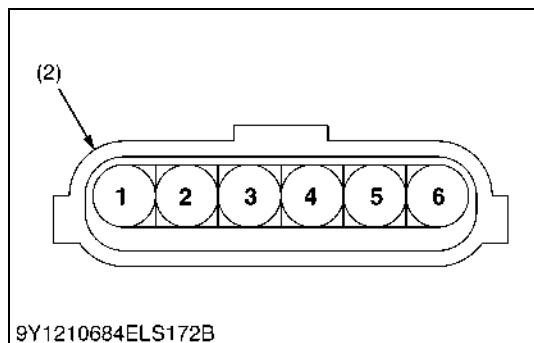
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 3 – Chassis	Approx. battery voltage
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(1) Intake Throttle Valve

(2) Connector (Harness Side)

9Y1211012ELS0088US0



Motor Resistance

- Disconnect the throttle valve connector.
- Measure the resistance with an ohmmeter across the terminal 5 and 6.
- If the measured value is remarkably different from the value written in the table below, DC motor is damaged.

Resistance	Terminal 5 – Terminal 6	Approx. 12 Ω
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(1) Connector (Sensor Side)

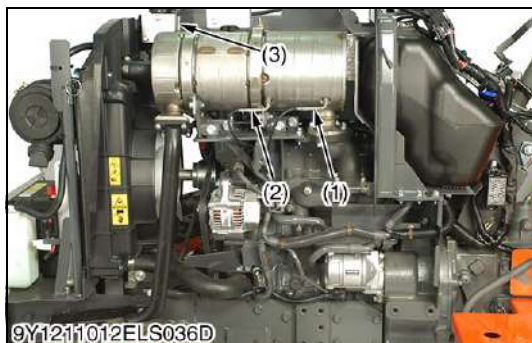
9Y1211012ELS0089US0

(10) Exhaust Temperature Sensor

■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0090US0



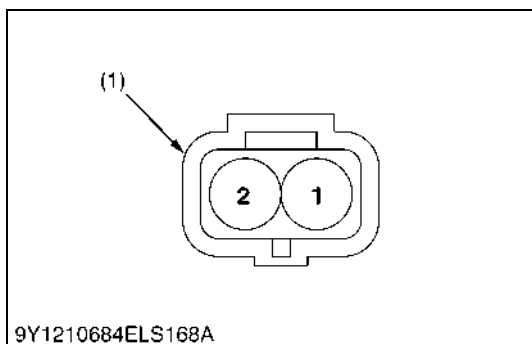
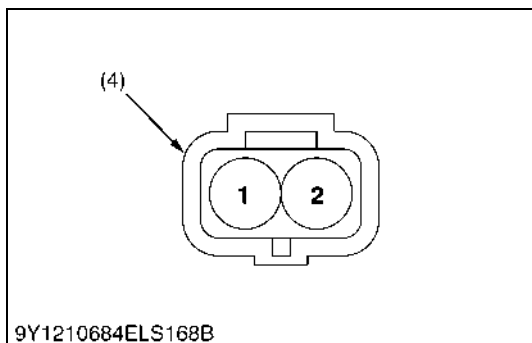
Connector Voltage

- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. 5 V
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- (1) Exhaust Temperature Sensor T0 (3) Exhaust Temperature Sensor T2
(2) Exhaust Temperature Sensor T1 (4) Connector (Harness Side)

9Y1211012ELS0091US0



Sensor Resistance (for Reference)

- Measure the resistance with an ohmmeter across the terminals shown in the table below.
- If the reference value is not indicated, the exhaust temperature sensor is damaged.

Resistance	at 200 °C (140 °F)	Approx. 4.00 kΩ
	at 650 °C (212 °F)	Approx. 0.164 kΩ

- (1) Connector (Sensor Side)

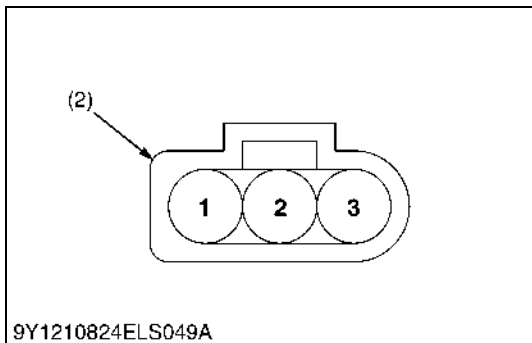
9Y1211012ELS0092US0

(11) Differential Pressure Sensor

■ NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is damaged if the relating electric circuit is normal.

9Y1211012ELS0093US0



Connector Voltage

- Disconnect the connector, and turn the main key switch **"ON"** position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Main switch at "ON"	Terminal 1 – Chassis	Approx. 5 V
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(1) Differential Pressure Sensor

(2) Connector (Harness Side)

9Y1211012ELS0094US0

(12) Parked Regeneration Switch



Connector Voltage

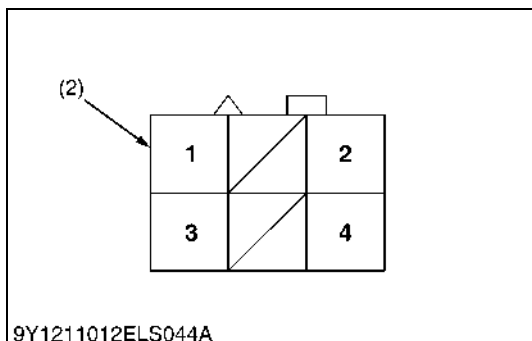
1. Disconnect connector of parked regeneration switch (1).
2. Measure voltage with a voltmeter across the terminals shown in the table below.
3. If measurement value is different from the table, check relating electrical circuit.

Resistance	Key Switch at "ON" position	Terminal 3 – Chassis	Approx. battery voltage
		Terminal 4 – Chassis	

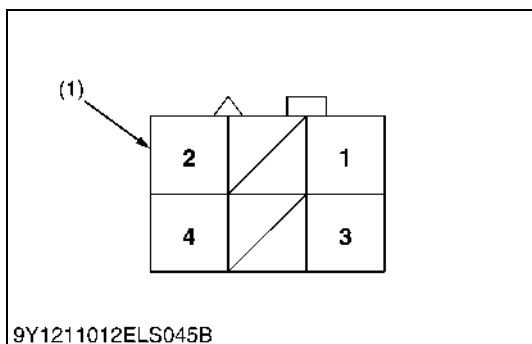
(1) Parked Regeneration Switch

(2) Connector (Wiring Harness Side)

9Y1211012ELS0096US0



9Y1211012ELS044A



9Y1211012ELS045B

Switch Continuity

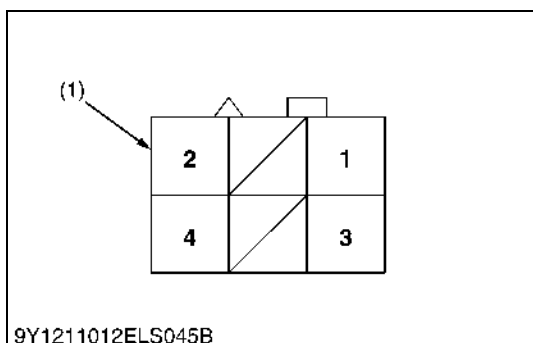
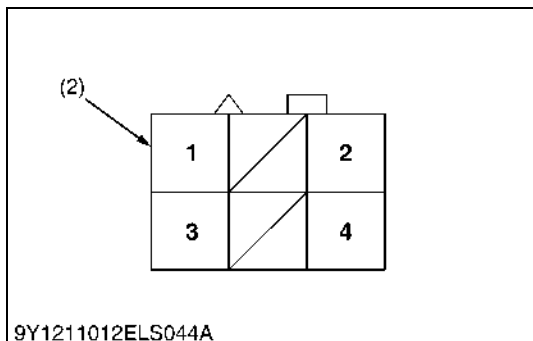
1. Measure resistance with a ohmmeter across the terminals shown in the table below.
2. If measurement value is different from the table, the parked regeneration switch is damaged.

Resistance	When switch is released	Terminal 2 – Terminal 4	Infinity
	When switch is pushed		0 Ω

(1) Connector
(Parked Regeneration Switch Side)

9Y1211012ELS0097US0

(13) DPF INHIBIT Switch



Connector Voltage

1. Disconnect connector of DPF INHIBIT switch (1).
2. Measure voltage with a voltmeter across the terminals shown in the table below.
3. If measurement value is different from the table, check relating electrical circuit.

Resistance	Key switch at "ON" position	Terminal 3 – Chassis	Approx. battery voltage
		Terminal 4 – Chassis	

(1) DPF INHIBIT Switch

(2) Connector (Wiring Harness Side)

9Y1211012ELS0098US0

Switch Continuity

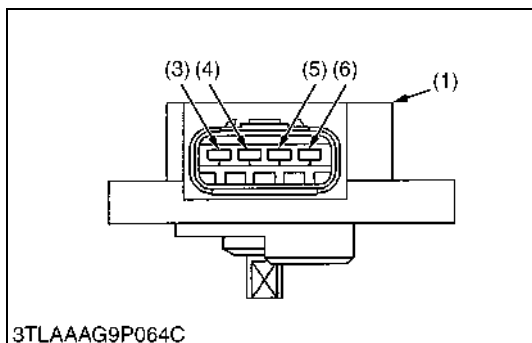
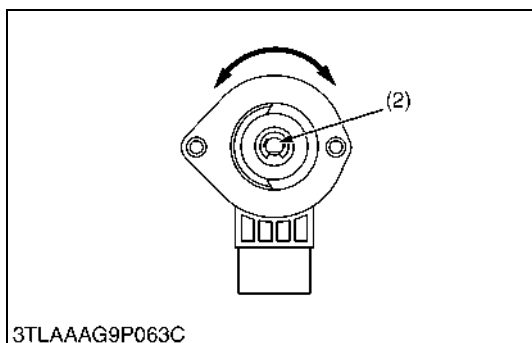
1. Measure resistance with a ohmmeter across the terminals shown in the table below.
2. If measurement value is different from the table, the DPF INHIBIT switch is damaged.

Resistance	When switch is released	Terminal 2 – Terminal 4	Infinity
	When switch is pushed		0 Ω

(1) Connector
(DPF INHIBIT Switch Side)

9Y1211012ELS0099US0

(14) Acceleration Sensor



Acceleration Sensor

1. Disconnect connector of acceleration sensor (1).
2. Measure resistance with a ohmmeter across the terminals following table below.
3. If measurement value is different from the table, the acceleration sensor is damaged.

■ NOTE

- If replacing the acceleration sensor, be sure to perform mode "c" adjustment.

(Reference)

- Change of resistance is easily found by using an analog ohmmeter.

Resistance	Reference Value	Terminal c – Terminal GND	Approx. 1 kΩ
		Terminal a – Terminal GND	smoothly changing approx. 1 kΩ to 0 Ω
		Terminal b – Terminal GND	smoothly changing approx. 0 Ω to 1 kΩ

(1) Acceleration Sensor

(2) Sensor Shaft

(3) Terminal **a**

(4) Terminal **b**

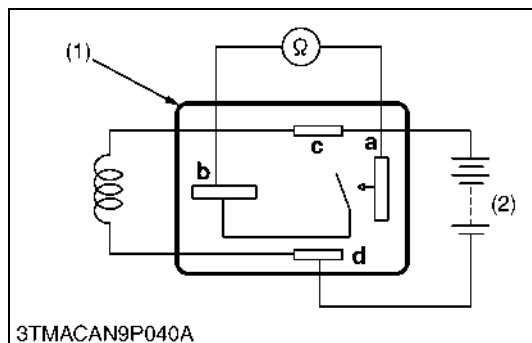
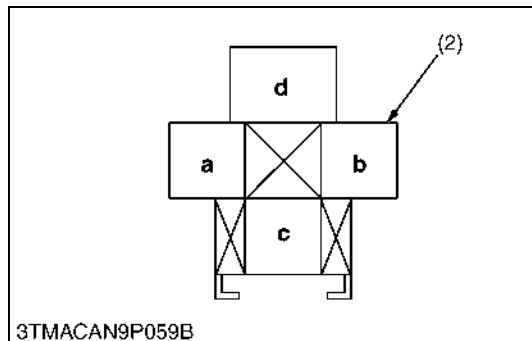
(5) Terminal **c**

(6) Terminal **GND**

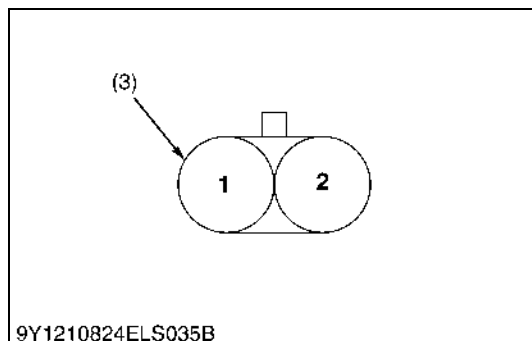
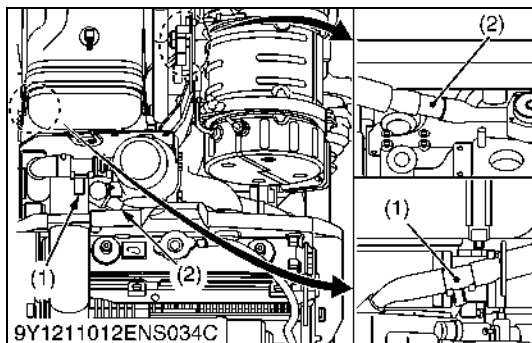
9Y1211012ELS0100US0

[15] CCV HEATER

(1) CCV Relay



(2) CCV Heater



Checking Connector Voltage

1. Measure the voltage with a voltmeter across the battery terminal and chassis as table below.
2. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Terminal d -Chassis	Approx. battery voltage
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(1) CCV Relay

(2) Connector (Wire Harness side)

9Y1211012ELS0101US0

Functional Check

NOTE

- The relays described here are used same ones so that these are interchangeable.

1. Apply battery voltage across the terminals c and d, and check for continuity across the terminals a and b.
2. If continuity is not established across the terminals a and b, replace it.

9Y1211012ELS0102US0

Heater Resistance (for Reference)

1. Check the resistance between terminal 1 and 2.
2. If the reference value is not indicated, the heater is faulty.

Resistance	at 25 °C (77 °F)	1.8 - 2.5 Ω
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(1) CCV Heater (OUT)

[A] Left Side

(2) CCV Heater (IN)

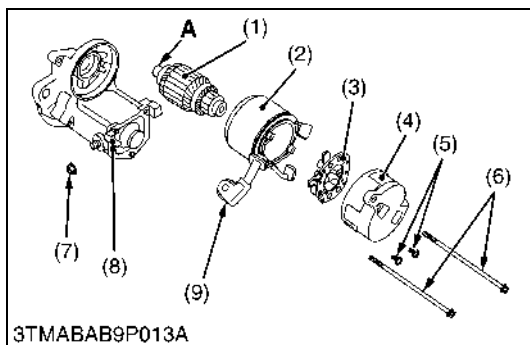
[B] Right Side

(3) Connector of Switch Side

9Y1211012ELS0103US0

5. DISASSEMBLING AND ASSEMBLING

[1] STARTER



Disassembling Motor

1. Disconnect the connecting lead (9) from the magnet switch (8).
2. Remove the screws (6), and then separate the end frame (4), yoke (2) and armature (1).
3. Remove the two screws (5).
4. Remove the brush holder (3) from the end frame (4).

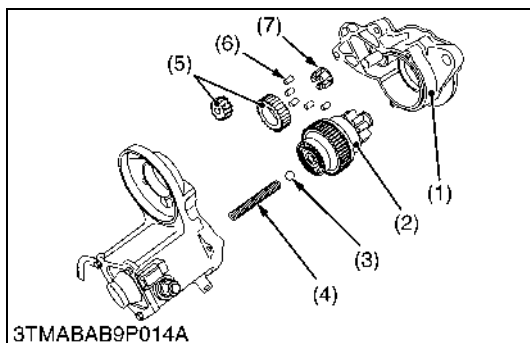
(When reassembling)

- Apply grease to the spline teeth "A" of the armature (1).

Tightening torque	Nut (7)	5.9 to 11 N·m 0.60 to 1.2 kgf·m 4.4 to 8.6 lbf·ft
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- | | |
|------------------|------------------------|
| (1) Armature | (7) Nut |
| (2) Yoke | (8) Magnet Switch |
| (3) Brush Holder | (9) Connecting Lead |
| (4) End Frame | |
| (5) Screw | A: Spline Teeth |
| (6) Screw | |

9Y1211012ELS0095US0



Disassembling Magnet Switch

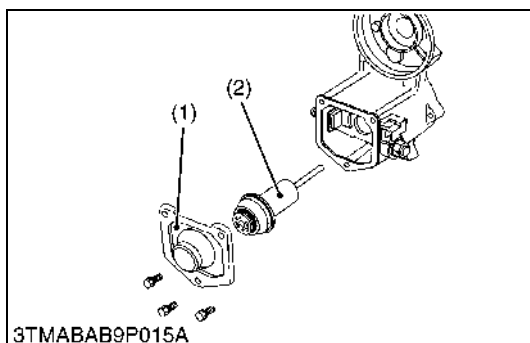
1. Remove the drive end frame (1) mounting screws.
2. Remove the overrunning clutch (2), ball (3), spring (4), gears (5), rollers (6) and retainer (7).

(When reassembling)

- Apply grease to the gear teeth of the gears (5) and overrunning clutch (2), and ball (3).

- | | |
|------------------------|--------------|
| (1) Drive End Frame | (5) Gear |
| (2) Overrunning Clutch | (6) Roller |
| (3) Ball | (7) Retainer |
| (4) Spring | |

WSM000001ELS0021US0



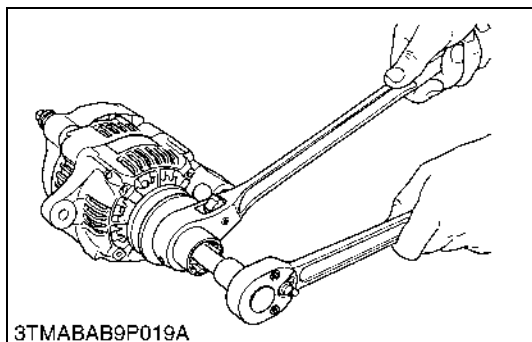
Plunger

1. Remove the end cover (1).
2. Remove the plunger (2).

- | | |
|---------------|-------------|
| (1) End Cover | (2) Plunger |
|---------------|-------------|

WSM000001ELS0022US0

[2] ALTERNATOR



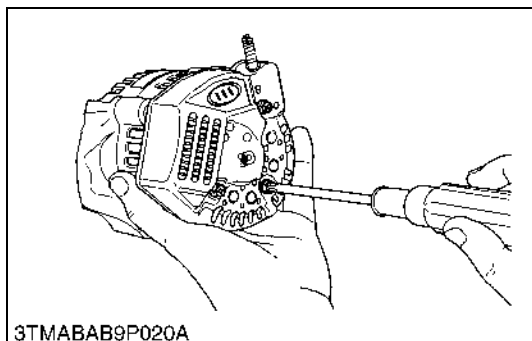
Pulley

1. Secure the hexagonal end of the pulley shaft with a double-ended ratchet wrench as shown in the figure.
2. Loosen the pulley nut with a socket wrench and remove it.

(When reassembling)

Tightening torque	Pulley nut	58.4 to 78.9 N·m 5.95 to 8.05 kgf·m 43.1 to 58.2 lbf·ft
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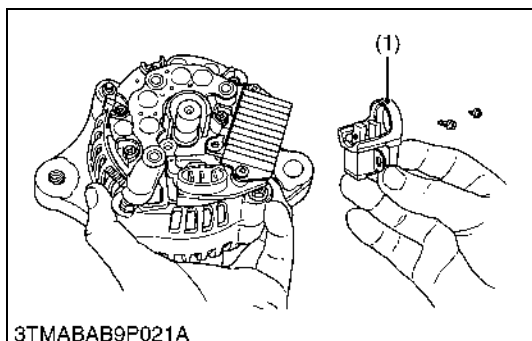
WSM000001ELS0023US0



Rear End Cover

1. Remove the three rear end cover screws and the **B** terminal nut, and remove the rear end cover.

WSM000001ELS0024US0

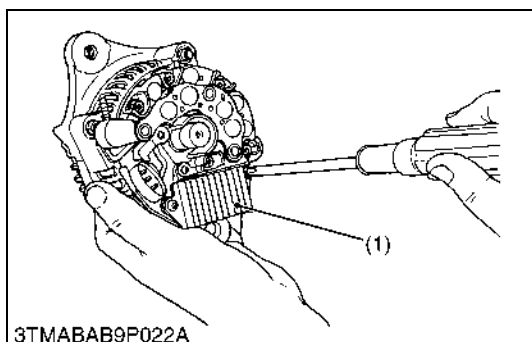


Brush Holder

1. Remove the two screws holding the brush holder, and remove the brush holder (1).

(1) Brush Holder

WSM000001ELS0025US0

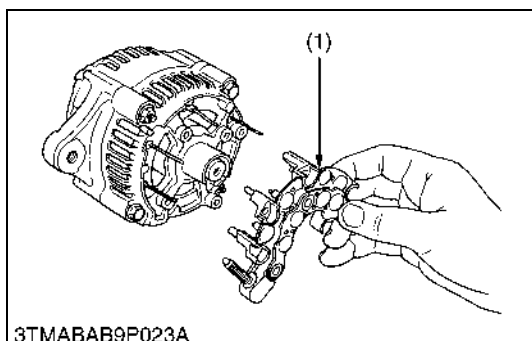


IC Regulator

1. Remove the three screws holding the IC regulator, and remove the IC regulator (1).

(1) IC Regulator

WSM000001ELS0026US0

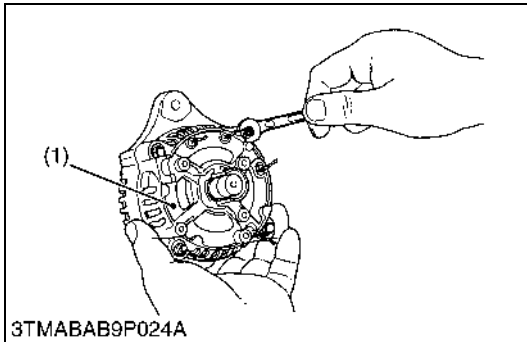


Rectifier

1. Remove the four screws holding the rectifier and the stator lead wires.
2. Remove the rectifier (1).

(1) Rectifier

WSM000001ELS0027US0

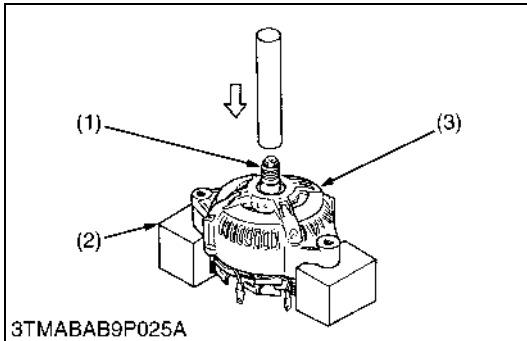


Rear End Frame

1. Remove the two nuts and two screws holding the drive end frame and the rear end frame.
2. Remove the rear end frame (1).

(1) Rear End Frame

WSM000001ELS0028US0



Rotor

1. Press out the rotor (1) from drive end frame (3).

■ IMPORTANT

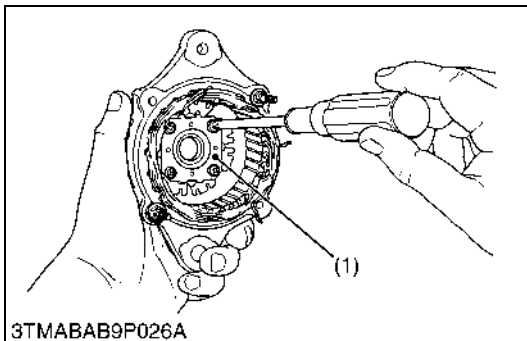
- Be very careful not to drop the rotor and damage the slip ring or fan, etc..

(1) Rotor

(3) Drive End Frame

(2) Block

WSM000001ELS0029US0

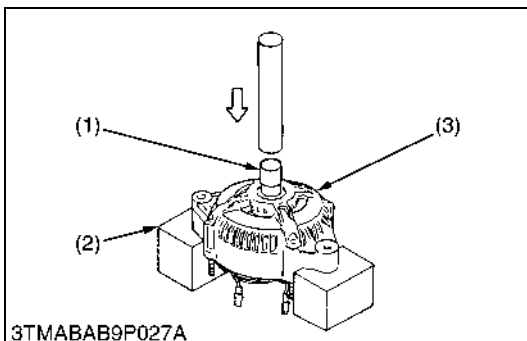


Retainer Plate

1. Remove the four screws holding the retainer plate, and remove the retainer plate (1).

(1) Retainer Plate

WSM000001ELS0030US0



Bearing on Drive End Side

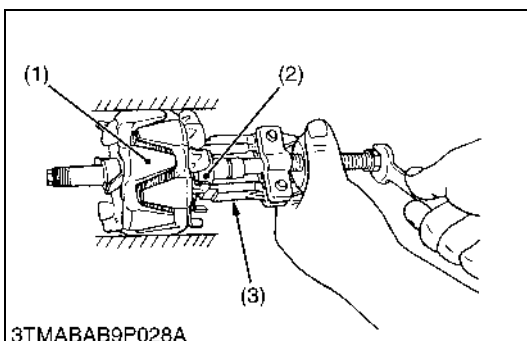
1. Press out the bearing from drive end frame (3) with a press and jig (1).

(1) Jig

(3) Drive End Frame

(2) Block

WSM000001ELS0031US0



Bearing at Slip Ring Side

1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

(1) Rotor

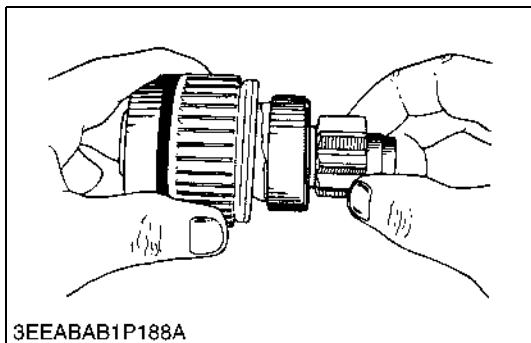
(3) Puller

(2) Bearing

WSM000001ELS0032US0

6. SERVICING

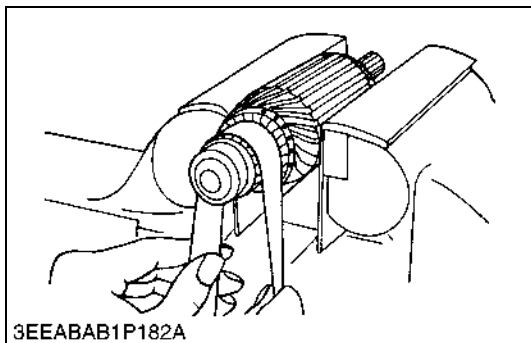
[1] STARTER



Overrunning Clutch

1. Inspect the pinion for wear or damage.
2. If there is any problem, replace the overrunning clutch assembly.
3. Check that the pinion turns freely and smoothly in the overrunning direction and does not slip in the cranking direction.
4. If the pinion slips or does not rotate in the both directions, replace the overrunning clutch assembly.

WSM000001ELS0033US0



Commutator and Mica

1. Check the contact face of the commutator for wear, and grind the commutator with emery paper if it is slightly worn.
2. Measure the commutator O.D. with an outside micrometer at several points.
3. If the minimum O.D. is less than the allowable limit, replace the armature.
4. If the difference of the O.D.'s exceeds the allowable limit, correct the commutator on a lathe to the factory specification.
5. Measure the mica undercut.
6. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.

Commutator O.D.	Factory specification	30.0 mm 1.181 in.
	Allowable limit	29.0 mm 1.142 in.

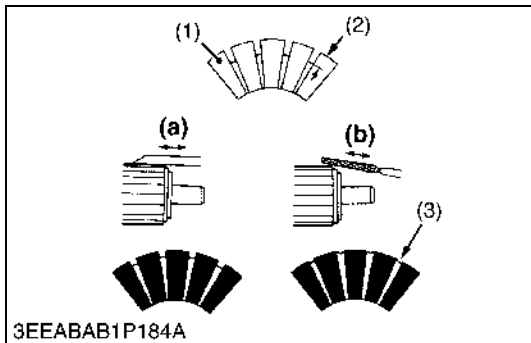
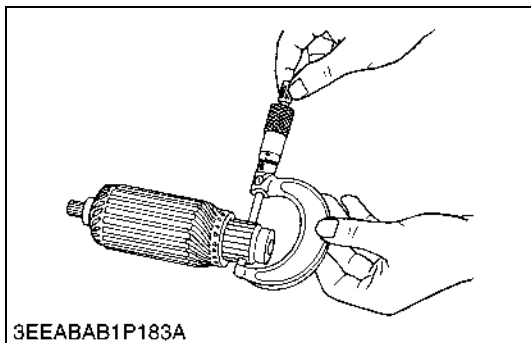
Difference of O.D.'s	Factory specification	Less than 0.02 mm 0.0008 in.
	Allowable limit	0.05 mm 0.0020 in.

Mica undercut	Factory specification	0.50 to 0.80 mm 0.020 to 0.031 in.
	Allowable limit	0.2 mm 0.008 in.

- (1) Segment
- (2) Undercut
- (3) Mica

- (a) Correct
- (b) Incorrect

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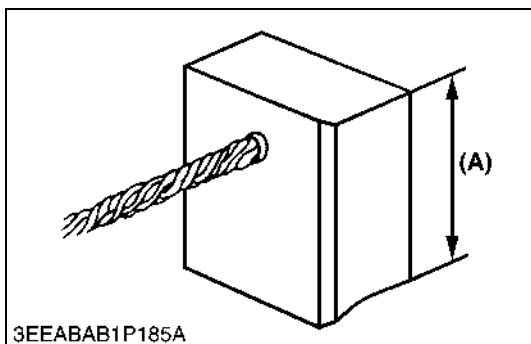


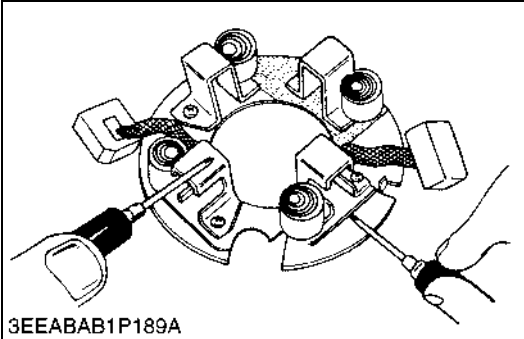
Brush Wear

1. If the contact face of the brush is dirty or dusty, clean it with emery paper.
2. Measure the brush length (A) with vernier calipers.
3. If the length is less than the allowable limit, replace the yoke assembly and brush holder.

Brush length (A)	Factory specification	15.0 mm 0.591 in.
	Allowable limit	11.0 mm 0.433 in.

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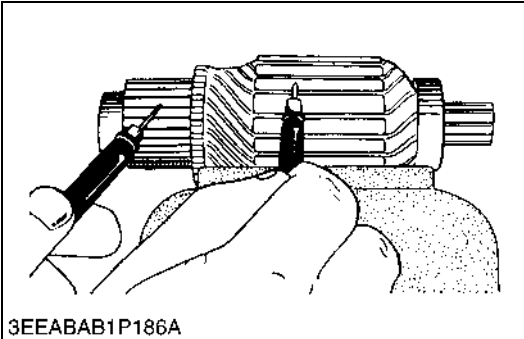


Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

Resistance	Brush holder – Holder support	Infinity
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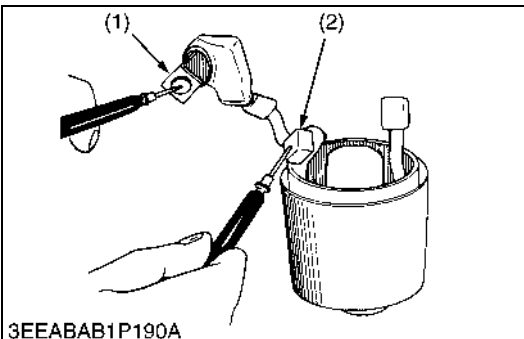
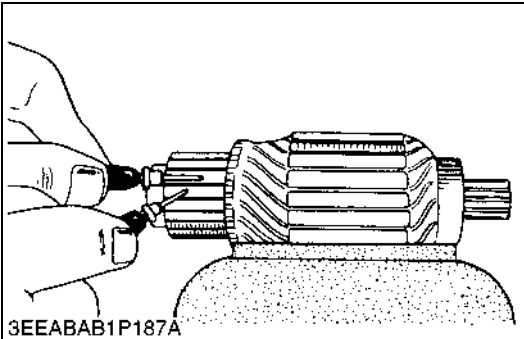
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Armature Coil

1. Check the continuity across the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

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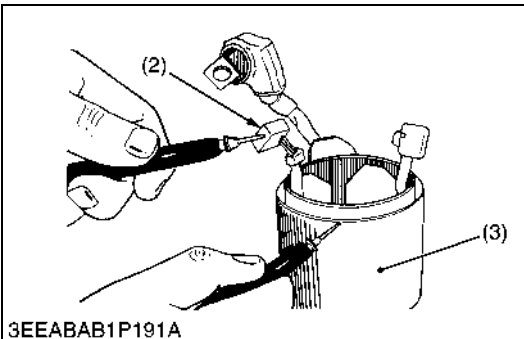
Field Coil

1. Check the continuity across the lead (1) and brush (2) with an ohmmeter.
2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush (2) and yoke (3) with an ohmmeter.
4. If it conducts, replace the yoke assembly.

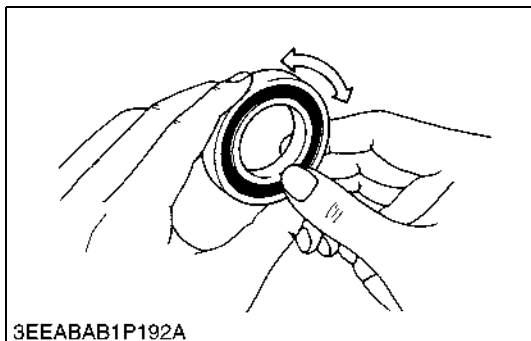
(1) Lead
(2) Brush

(3) Yoke

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[2] ALTERNATOR

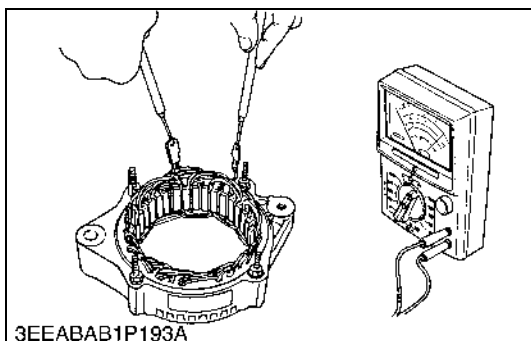


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Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

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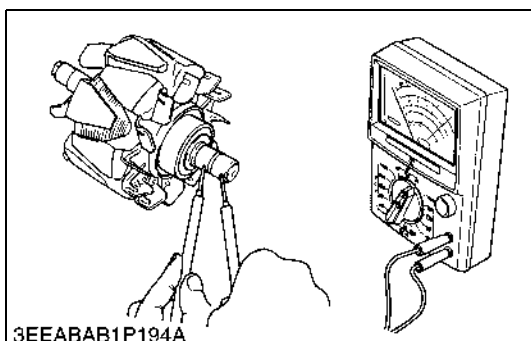
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Stator

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within service specification, replace it.
3. Check the continuity across each stator coil lead and core with an ohmmeter.
4. If the measurement is not within the service specifications, replace it.

Resistance	Service specification	Less than 1.0 Ω
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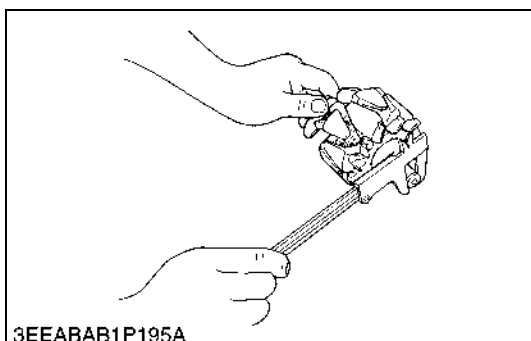
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Rotor

1. Measure the resistance across the slip rings with an ohmmeter.
2. If the resistance is not the service specification, replace it.
3. Check the continuity across the slip ring and core with an ohmmeter.
4. If the measurement is not within the service specifications, replace it.

Resistance	Service specification	2.9 Ω
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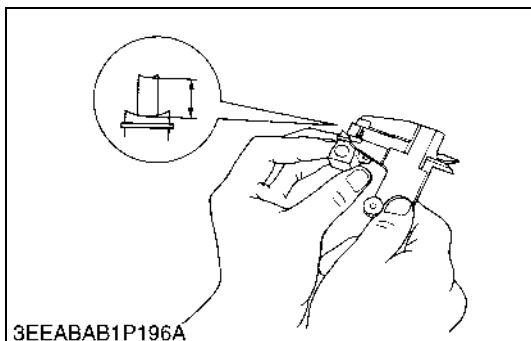
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Slip Ring

1. Check the slip ring for score.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the service limit, replace it.

Slip ring O.D.	Service specification	14.4 mm 0.567 in.
	Service limit	14.0 mm 0.551 in.

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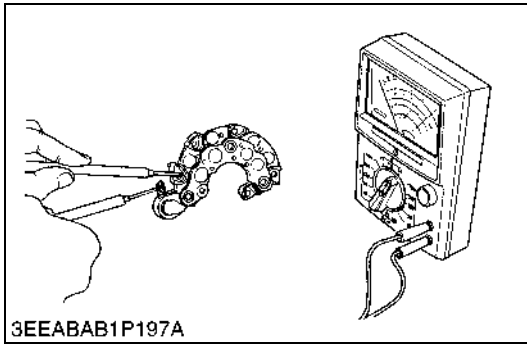
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Brush Wear

1. Measure the brush length with vernier calipers.
2. If the measurement is less than service limit, replace it.
3. Make sure that the brush moves smoothly.
4. If the brush is damaged, replace it.

Brush length	Service specification	10.5 mm 0.413 in.
	Service limit	8.4 mm 0.331 in.

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Rectifier

1. Check the continuity across each diode of rectifier with an analog ohmmeter. Conduct the test in the ($R \times 1$) setting.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

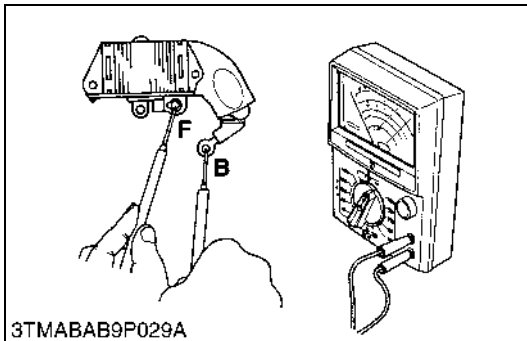
■ IMPORTANT

- Do not use a 500 V megohmmeter for measuring because it will destroy the rectifier.

■ NOTE

- Do not use an auto digital multimeter. Because it's very hard to check the continuity of rectifier by using it.

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IC Regulator

1. Check the continuity across the **B** terminal and the **F** terminal of IC regulator with an analog ohmmeter. Conduct the test in the ($R \times 1$) setting.
2. The IC regulator is normal if the IC regulator conducts in one direction and does not conduct in the reverse direction.

■ IMPORTANT

- Do not use a 500 V megohmmeter for measuring because it will destroy the IC regulator.

■ NOTE

- Do not use an auto digital multimeter. Because it is very hard to check the continuity of IC regulator by using it.

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Editor : Tractor and Agricultural Implement Service Dept.
Address : 64, Ishizu-Kitamachi, Sakai-Ku, Sakai-City, Osaka, 590-0823, Japan
Phone : +81-72-241-1129
Fax : +81-72-245-2484
E-mail : kbt_g.ag-sv@kubota.com

Editor : Harvester, Transplanter and Farm Machinery Products Service Dept.
Address : 64, Ishizu-Kitamachi, Sakai-Ku, Sakai-City, Osaka, 590-0823, Japan
Phone : +81-72-241-6554
Fax : +81-72-241-1751
E-mail : kbt_g.ag-sv@kubota.com
