TORQUE TABLES

Metric fasteners should be tightened according to the following table. These are for general use and include a 10% tolerance: See Table 3:.

Table 3

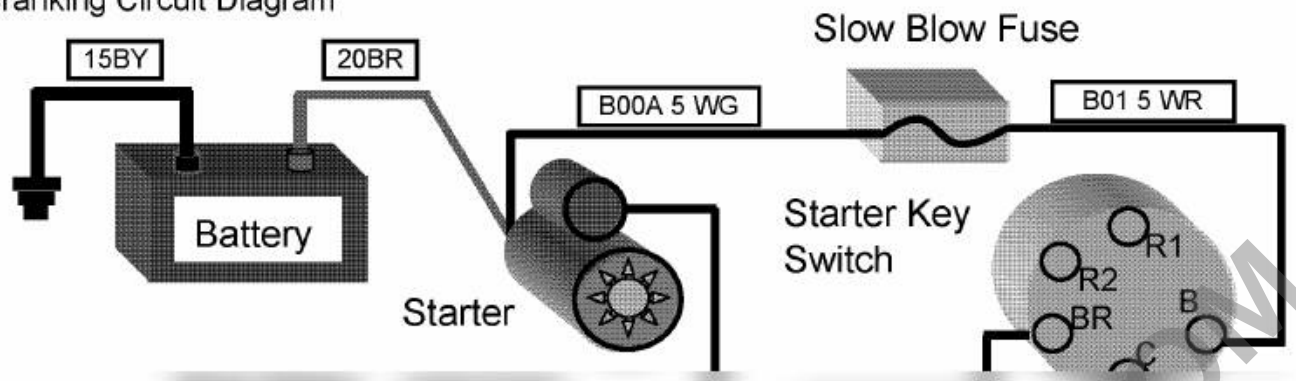
Class	4.8	4.8	4.8	4.8	8.8	8.8	8.8	8.8	10.9	10.9	10.9	10.9	12.9	12.9	12.9	12.9
Lubricated/Dry	Lubricated		Dry		Lubricated		Dry		Lubricated		Dry		Lubricated		Dry	

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Cranking Circuit Diagram



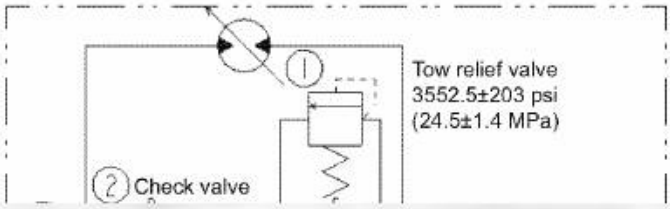
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3-1-2 Construction and Operating Principle of Each Valve on Hydro Static Transmission (HST)

As shown below, various valves are provided in the hydraulic circuit in order to control each function.
The construction and operating principle of each valve are described in this chapter.



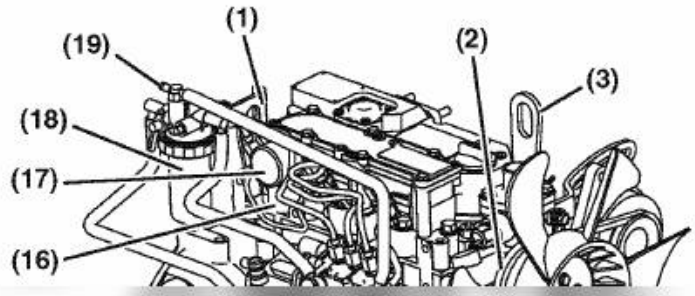
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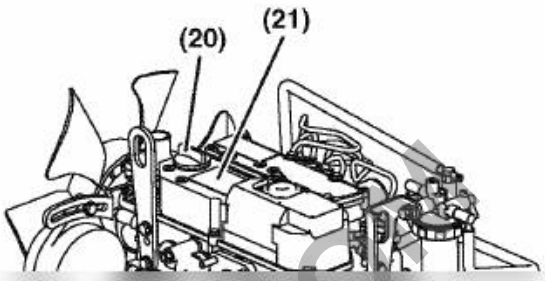
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COMPONENT IDENTIFICATION

Figure 4-1 shows where major engine components are located.





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Engine General Specifications

Type	Vertical In-line, Water Cooled, 4-Cycle Diesel Engine
Combustion System	Swirl Chamber (Ball Type)
Starting System	Electric Starting
Cooling System	Radiator
Lubricating System	Forced Lubrication with Trochoid Pump
PTO Position	Flywheel End
Direction of Rotation	Counterclockwise Viewed from Flywheel End

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○:Check ◇:Replace ●: Contact your authorized Yanmar industrial engine dealer or distributor

System	Check Item	Daily	Periodic Maintenance Interval					
			Every 50 hours	Every 250 hours	Every 500 hours	Every 1000 hours	Every 1500 hours	Every 2000 hours
Cooling System	Check and Refill Engine Coolant	○						
	Check and Clean Radiator Fins			○				
	Check and Adjust Cooling Fan V-Belt		○1st time	○ 2nd and after				
	Drain, Flush and Refill Cooling System with New Coolant					◇ or every 1 yr. which-ever comes first		
Cylinder Head	Adjust Intake / Exhaust Valve Clearance						●	
	Lap Intake / Exhaust Valve Seats							●
Electrical Equipment	Check Indicators	○						
	Check Battery		○					
Engine Oil	Check Engine Oil Level	○						
	Drain and Fill Engine Oil		◇1st time	◇2nd and after				
	Replace Engine Oil Filter							
Engine Speed Control	Check and Adjust Governor Lever and Engine Speed Control	○		○				
Emission Control Warranty	Inspect, Clean and Test Fuel Injectors (if required)						●	
	Inspect Crankcase Breather System						●	
Fuel	Check and Refill Fuel Tank Level	○						
	Drain Fuel Tank			○				
	Drain Fuel Filter / Water Separator		○					
	Check Fuel Filter / Water Separator	○						
	Clean Fuel Filter / Water Separator				○			
	Replace Fuel Filter				◇			
Hoses	Replace Fuel System and Cooling System Hoses							● or every 2 yrs.
Intake and Exhaust	Clean or Replace Air Cleaner Element			○	◇			
Complete Engine	Overall Visual Check Daily	○						

Note: These procedures are considered normal maintenance and are performed at the owner's expense.

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PERIODIC MAINTENANCE PROCEDURES

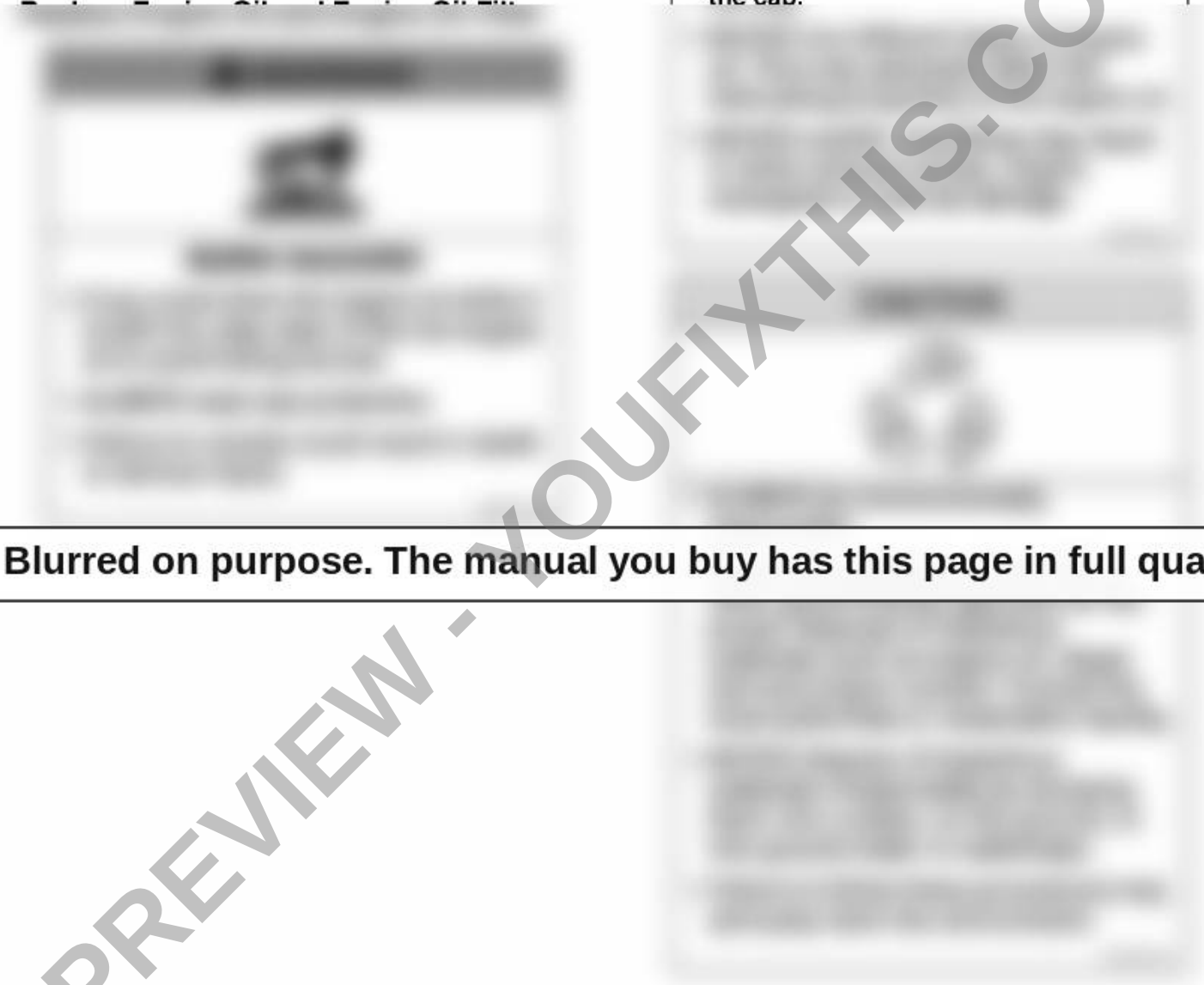
After Initial 50 Hours of Operation

Perform the following maintenance after the initial 50 hours of operation.

- Replace Engine Oil and Engine Oil Filter
- Check and Adjust Cooling Fan V-Belt

CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize and / or shorten engine life.
- Prevent dirt and debris from contaminating the engine oil. Carefully clean the oil cap / dipstick and the surrounding area before you remove the cap.



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Note that a typical fuel tank is shown. The fuel tank on the equipment being serviced may be different.

1. Clean the area around the fuel cap **(Figure 4-3, (1))**.
2. Remove the fuel cap **(Figure 4-3, (1))** from the fuel tank **(Figure 4-3, (2))**.
3. Observe the fuel level sight gauge **(Figure 4-3, (3))** and stop fueling when gauge shows fuel tank is full. NEVER overfill the fuel tank.
4. Replace the fuel cap and hand-tighten. Over tightening the fuel cap will damage it.

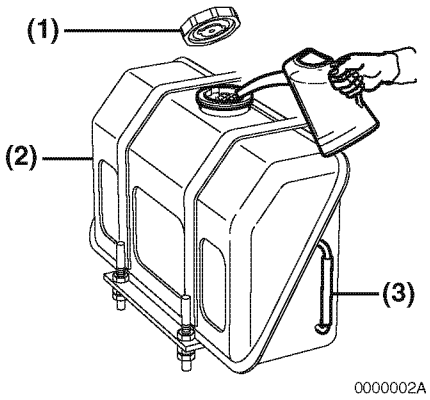


Figure 4-3

Priming the Fuel System

⚠ DANGER



FIRE AND EXPLOSION HAZARD!

- **Diesel fuel is flammable and explosive under certain conditions.**
- **If the unit has an electric fuel pump, when you prime the fuel system, turn the key switch to the ON position for 10 to 15 seconds to allow the electric fuel pump to prime the system.**
- **If the unit has a mechanical fuel pump, when you prime the fuel system, operate the fuel priming lever of the mechanical fuel pump several times until the fuel filter cup is filled with fuel.**
- **Failure to comply will result in death or serious injury.**

0000010en

The fuel system needs to be primed under certain conditions:

- Before starting the engine for the first time
- After running out of fuel and fuel has been added to the fuel tank
- After fuel system maintenance such as changing the fuel filter and draining the fuel filter / water separator, or replacing a fuel system component

To prime the fuel system if an electric fuel pump is installed:

1. Turn the key to the ON position for 10 to 15 seconds. This will allow the electric fuel pump to prime the fuel system.
2. NEVER use the starter motor to prime the fuel system. This may cause the starter motor to overheat and damage the coils, pinion and / or ring gear.

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Piston

Inspection Item		Standard	Limit	Reference Page
Piston Outside Diameter (Measure at 90° to the Piston Pin.)	3TNV72	2.8331 - 2.8343 in. (71.960 - 71.990 mm)	2.8313 in. (71.915 mm)	*See Inspection of Pistons, Piston Rings and Wrist Pin on page 6-48*
Piston Diameter Measurement Location (Upward From the Bottom of the Piston)		0.8661 - 0.9843 in. (22.0 - 25.0 mm)	-	
Piston-to-Cylinder Clearance	3TNV72	0.0012 - 0.0020 in. (0.030 - 0.050 mm)	-	
Wrist Pin	Hole Inside Diameter	0.8661 - 0.8665 in. (22.000 - 22.009 mm)	0.8677 in. (220.039 mm)	
	Pin Outside Diameter	0.8659 - 0.8661 in. (21.995 - 22.000 mm)	0.8648 in. (21.965 mm)	
	Oil Clearance	0.0000 - 0.0006 in. (0.000 - 0.014 mm)	0.0029 in. (0.074 mm)	

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FUEL SYSTEM COMPONENTS

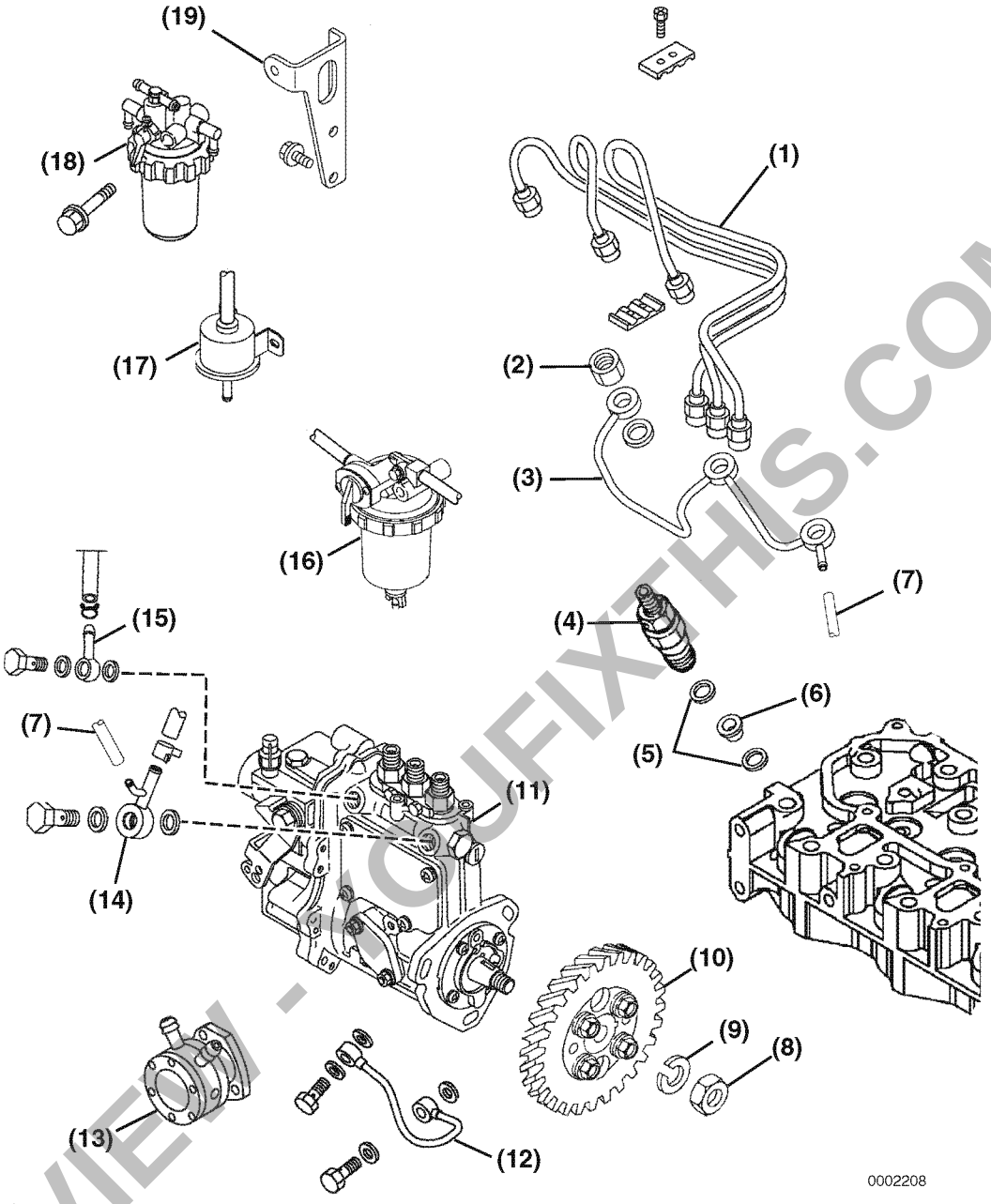


Figure 7-3

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5. Install a switch **(Figure 10-37, (6))** in a circuit between the battery positive (+) terminal **(Figure 10-37, (2))** and the starter solenoid switch terminal **(Figure 10-37, (8))** on the starter motor.
6. Use a suitable tachometer to monitor the rpm of the starter.
7. Turn the switch to the ON position to energize the solenoid and operate the starter. Monitor the rpm, amperage draw and voltage. For test specifications, see *Starter Motor Information on page 10-5* for the appropriate starter motor.

Installation of Starter Motor

1. Reinstall the starter motor to the flywheel housing.
2. Reinstall the starter mounting bolts **(Figure 10-38, (1))**. Tighten the bolts to specification. *See Tightening Torques for Standard Bolts and Nuts on page 4-22.*

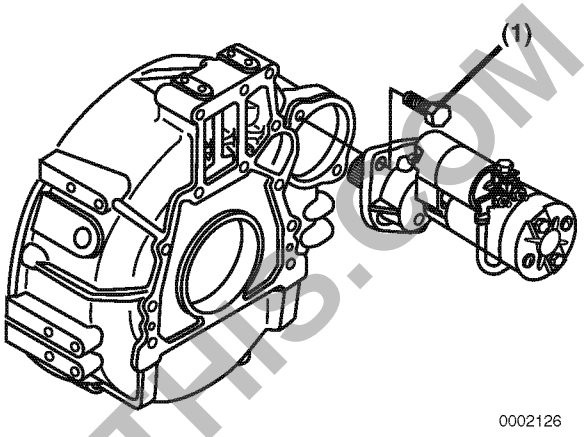


Figure 10-38

3. Reconnect the electrical wires to the solenoid switch assembly. Be sure to place the cover over the battery positive (+) cable connection.
4. Reconnect the battery, negative (-) cable last.

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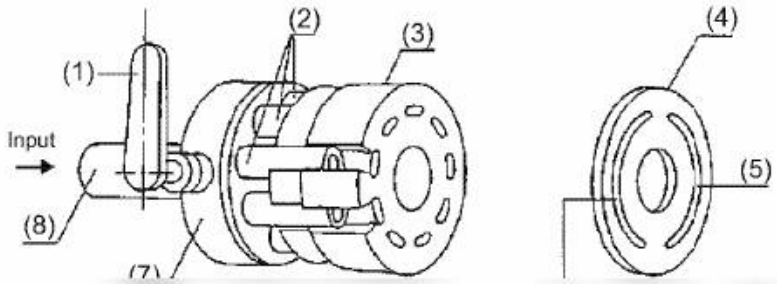
Location	Parts name	Parts catalogue name Parts catalogue number	Operation and remarks
Engine right side	Starter	STARTER CY-119626-77020	Crank the engine when the Starter Key Switch is sent to the START position, PTO Switch is "OFF", Drive pedal is the neutral position, and Parking brake is "ON".
Engine right side	Slow Blow Fuse	BLOW, SLOW FUSE 60A CY-1A6240-51630	Protect wiring & electric equipment related to engine start.
Engine right side	Start Relay	RELAY, STARTER CY-198220-52180	It is activated when PTO Switch is "OFF", Drive pedal is the neutral position, and Parking brake is "ON". It gives requistes for application of 12V to the terminal S of Starter.
Front column	Starter Key Switch	SWITCH ASSY, STARTER CY-198226-52100	Used for ON/OFF of Battery power to the circuits.
Under front column	Battery	BATTERY, 26R, ASSY CY-1A8160-51500	Supplies power to the circuits.
Under front column	Fuse, PTO 5A	FUSE, 5A CY-198535-52110	Protect wiring & electric equipment related to PTO
Under front column	Fuse, START RELAY 25A	FUSE, 25A CY-1A7450-52180	Fuse for Start Relay.
Under step	Brake Pedal Switch	SWITCH NC, PEDAL CY-1A7880-52210	Detects whether Parking brake is ON or not. This is normal close type. When Parking brake is ON, this switch is OFF, that is, this switch allows currency to go through.
Under step	HST Neutral Switch	SWITCH, SEAT, DELTA,AS CY-1A8160-52310	Detect whether Drive pedal stepped forward or not. This is normal open type. When Drive pedal is stepped forward, this switch is ON.
Left side fender	PTO Switch	PTO, SWITCH CY-172531-17300	Detect whether switch ON (Pull up) on not.
Inside dashboard cover	Safety Relay(HST	RELAY, ACM 13211M01 CY-1K1140-82500	When activated, this supplies power to Start Relay.
Inside dashboard cover	Diode 3A (Relay2	DIODE, 3.0AX2 CY-1A8160-51130	Protect Start Relay and Safety Relay (HST from the reverse battery

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(2) Construction and operating principle of the variable displacement motor

Fig. 2(a)



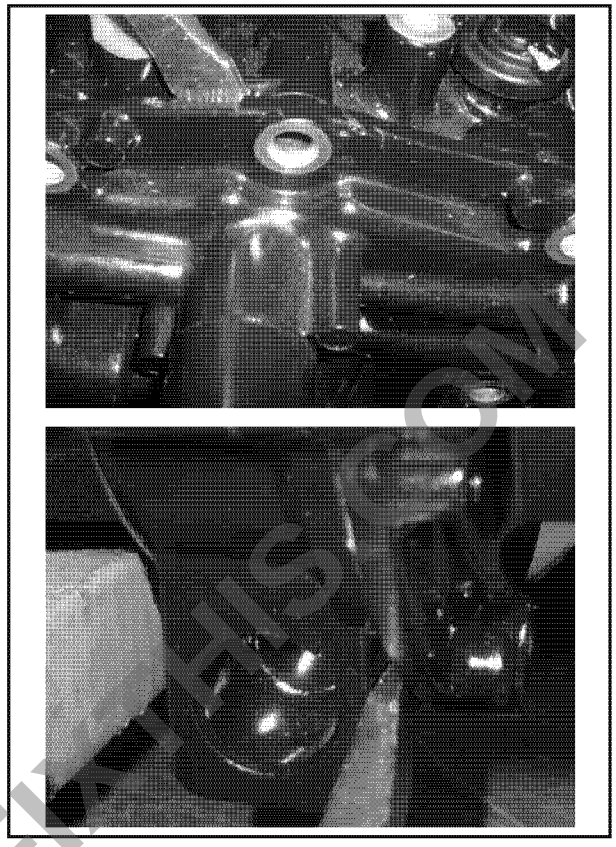
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NOTE:

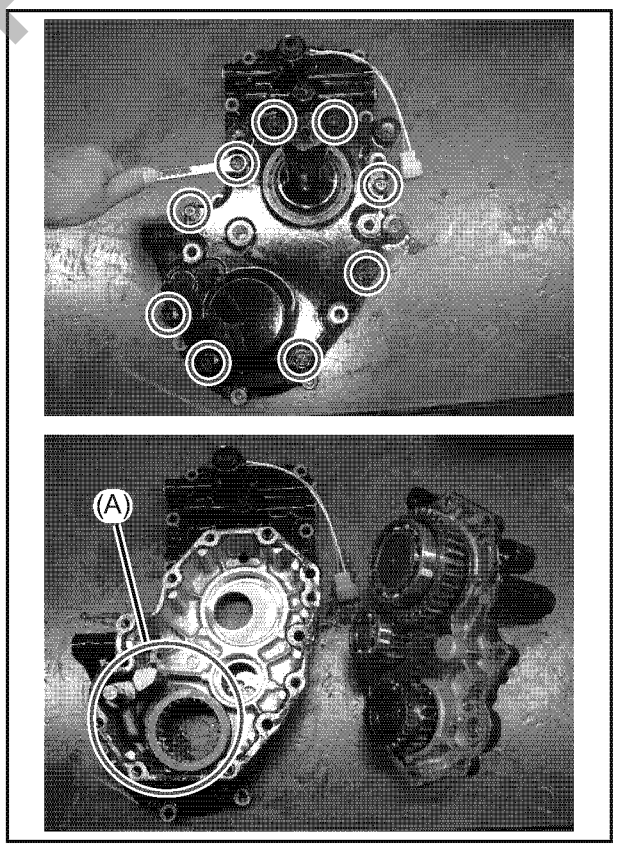
- To aid in separating the Rear Cover from the Trans-Axle insert a screwdriver or prybar into each of the upper and lower grooves provided on the mating surfaces of the rear cover and Trans-Axle.



5. Disassemble the Rear Power Take Off (PTO) Assembly. Loosen the nine (9) M8 x 30 mm (L: 1.2 in.) Bolts. Then split the assembly in two. When doing so, remove the Shift Collar and Shift Fork in the (A) section.

NOTE:

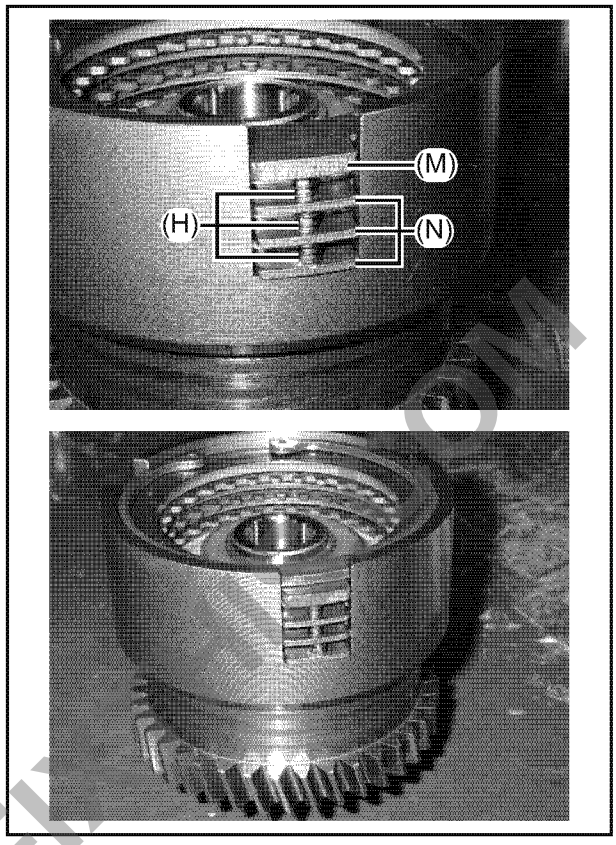
- The Shift Collar is orientated with the double row of teeth facing the rear of the Tractor.



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7. Stack the Springs, Friction Disc and Friction Plates. Finally place the Steel Plate 3.2 (M), which is thicker than the Steel Plate (N), in position and secure with the Internal Snap Ring.



IMPORTANT

- Make sure that the Pins (I) and the Springs (H) are fitted properly in the Steel Plates (N) and (M).

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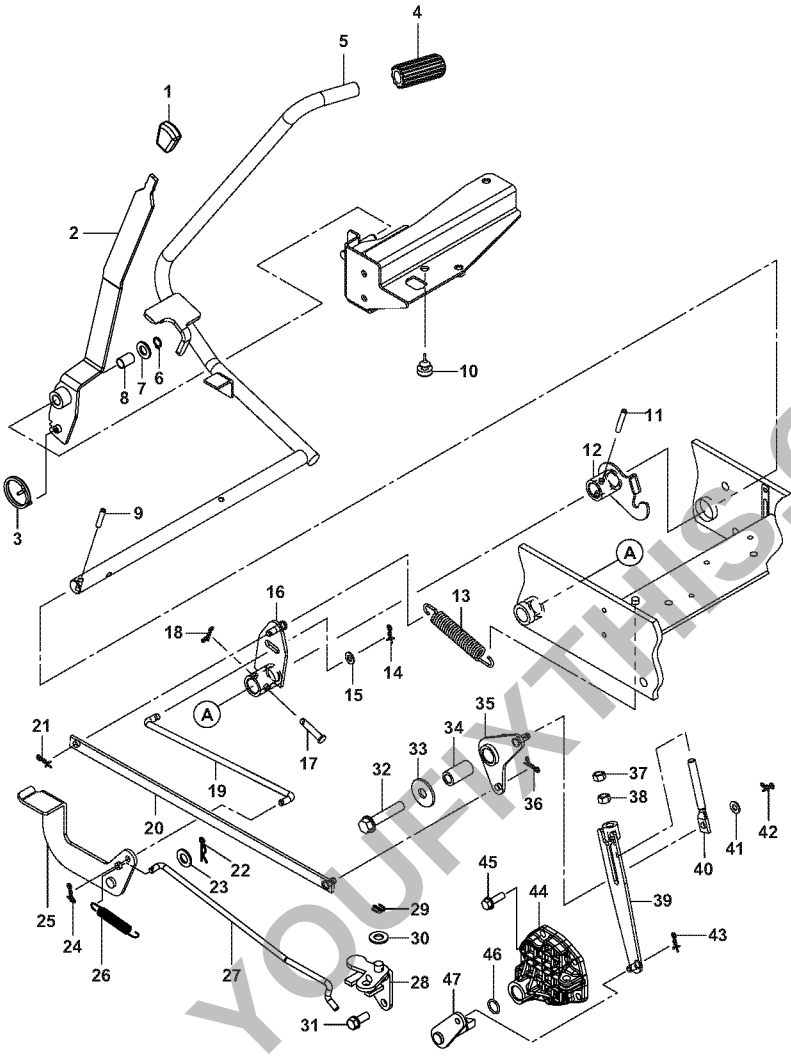


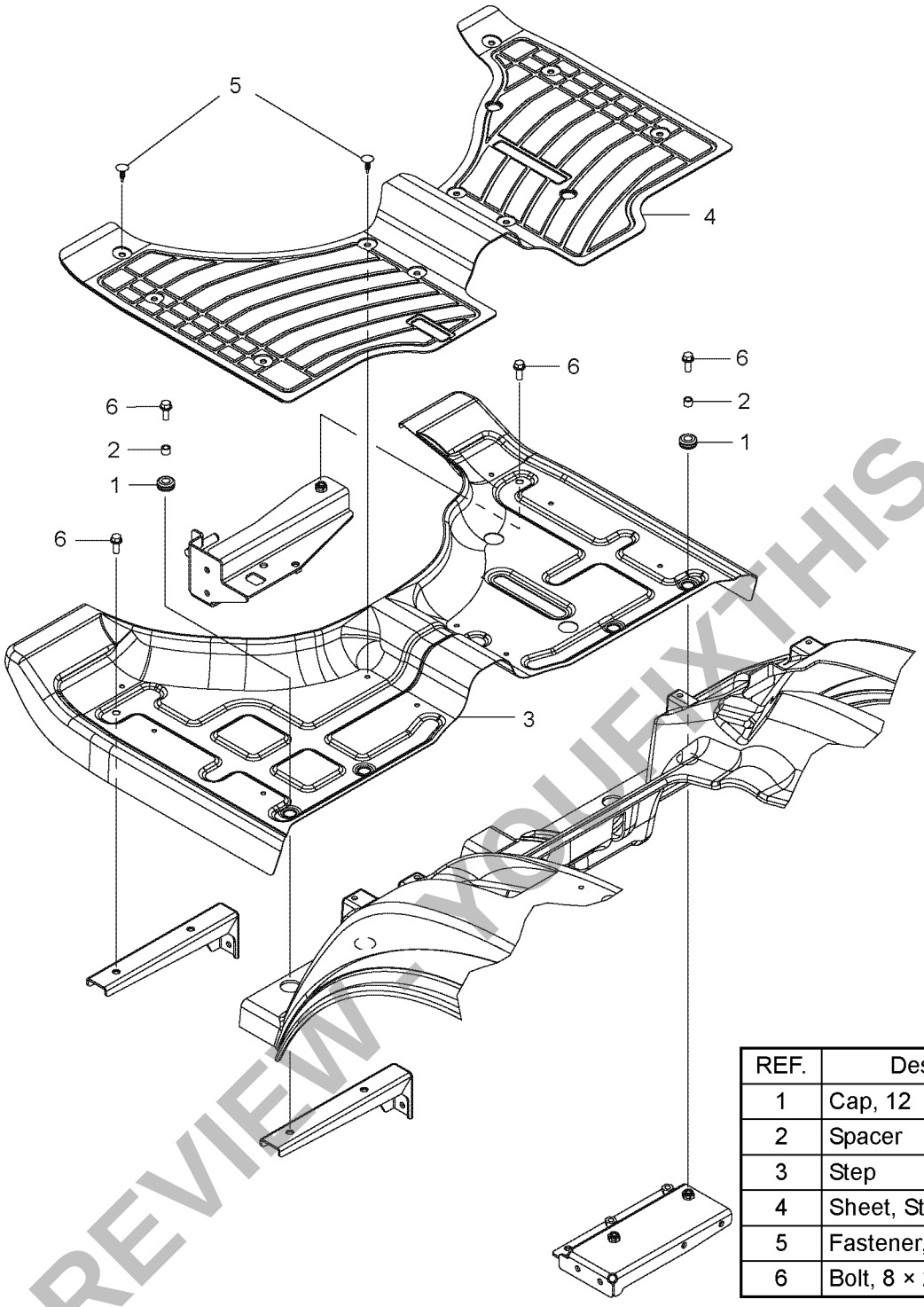
Fig. 1

1. Parking Brake Knob
2. Parking Brake Lever
3. Lock Spring
4. Brake Pedal Head
5. Brake Pedal
6. Ring, 12
7. Washer, 12
8. Bearing, 12 x 20
9. Pin, 6.0A x 32
10. Brake Pedal Stopper
11. Pin, 6.0A x 40
12. Release Arm
13. Brake Return Spring
14. Snap Pin
15. Washer, 8
16. Brake Arm
17. Clevis Pin
18. Snap Pin
19. Differential Link Rod
20. Brake Rod
21. Snap Pin
22. Pin, 14
23. Washer, 14
24. Snap Pin
25. Differential Lock Pedal
26. Differential Lock Return Spring
27. Rear Differential Link Rod
28. Differential Lock Fulcrum
29. Pin, 2.0 x 20
30. Washer, 10
31. Bolt, 8 x 20 (L: 0.8 in.)
32. Bolt, 12 x 60 (L: 2.4 in.)
33. Washer, 12
34. Collar
35. Rear Brake Arm
36. Snap Pin
37. Lock Nut
38. Adjusting Nut
39. Push Rod
40. Adjust Screw
41. Washer, 8
42. Snap Pin
43. Snap Pin
44. Brake Cover
45. Bolt, 8 x 25 (L: 1.0 in.)
46. Packing, P16.0
47. Brake Lever Shaft

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■ Footrest



REF.	Description	Q'TY.
1	Cap, 12	4
2	Spacer	4
3	Step	1
4	Sheet, Step	1
5	Fastener, Cushion	10
6	Bolt, 8 × 20 (L: 0.8 in.)	6

Fig. 5

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Hour Meter Cable



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31. Coolant Tank

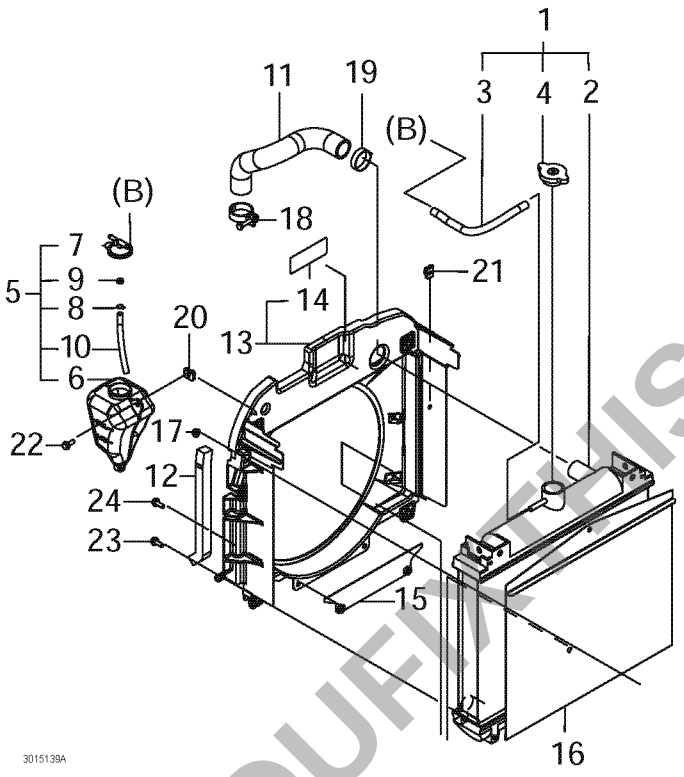


Fig. 1

REF.	Description	Q'TY.
1	Radiator ASSY.	1
2	Radiator	1
3	Hose, Tank	1
4	Cap, Radiator	1
5	Tank ASSY., Coolant	1
6	Tank, Coolant	1
7	Cap	1
8	Retainer, Hose	1
9	Gasket	1
10	Hose, 7 × 130	1
11	Hose, Cooling Water	1
12	Seal, Shroud Lower	2

REF.	Description	Q'TY.
13	Fan Shroud	1
14	Label, Warning, Fan	1
15	Plate ASSY., Shroud	1
16	Screen, Radiator	1
17	Nut, M6	2
18	Band, Hose 38	2
19	Clip, Hose 31.0	2
20	Nut, M6 Plate	2
21	Nut, M6 Plate	1
22	Bolt, 6 × 16 (L: 0.64 in.)	2
23	Bolt, 6 × 16 (L: 0.64 in.)	4
24	Bolt, 6 × 16 (L: 0.64 in.)	2

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Fuel Sensor

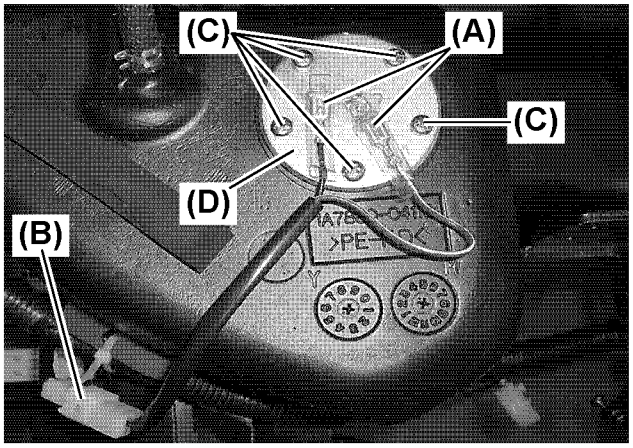


Fig. 2

(A) Fuel sensor connector
(B) Fuel sensor connector
(C) Screws, M5 × 12 mm (L: 0.48 in.)
(D) Fuel sensor

1. Disconnect the fuel sensor connectors **(Fig. 2, (A), (B))**.

2. Mark the fuel sensor and tank with a location mark (white paint etc.) for proper location upon reassembly.

3. Remove the five (5) M5 × 12 mm (L: 0.48 in.) screws **(Fig. 2, (C))** and then slowly take the fuel sensor **(Fig. 2, (D))** out of the fuel tank.

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Disassembling the Control Valve

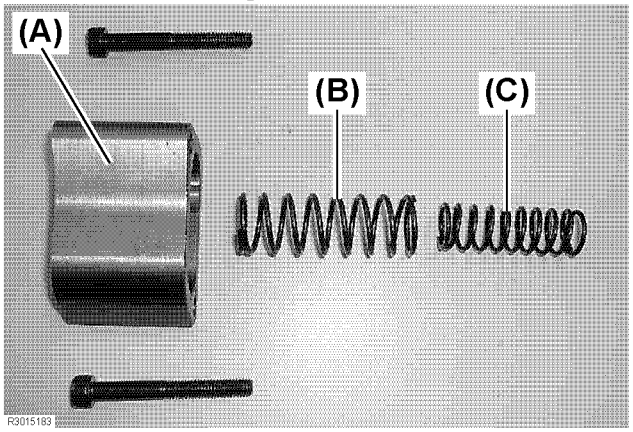


Fig. 13

(A) Spring case
(B) Spring
(C) Spring

8. There are two (2) springs **(Fig. 13, (B), (C))** in the spring case **(Fig. 13, (A))**.

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