Vol. No. KM-TL117E-02

TECHNICAL MANUAL

LX110-7

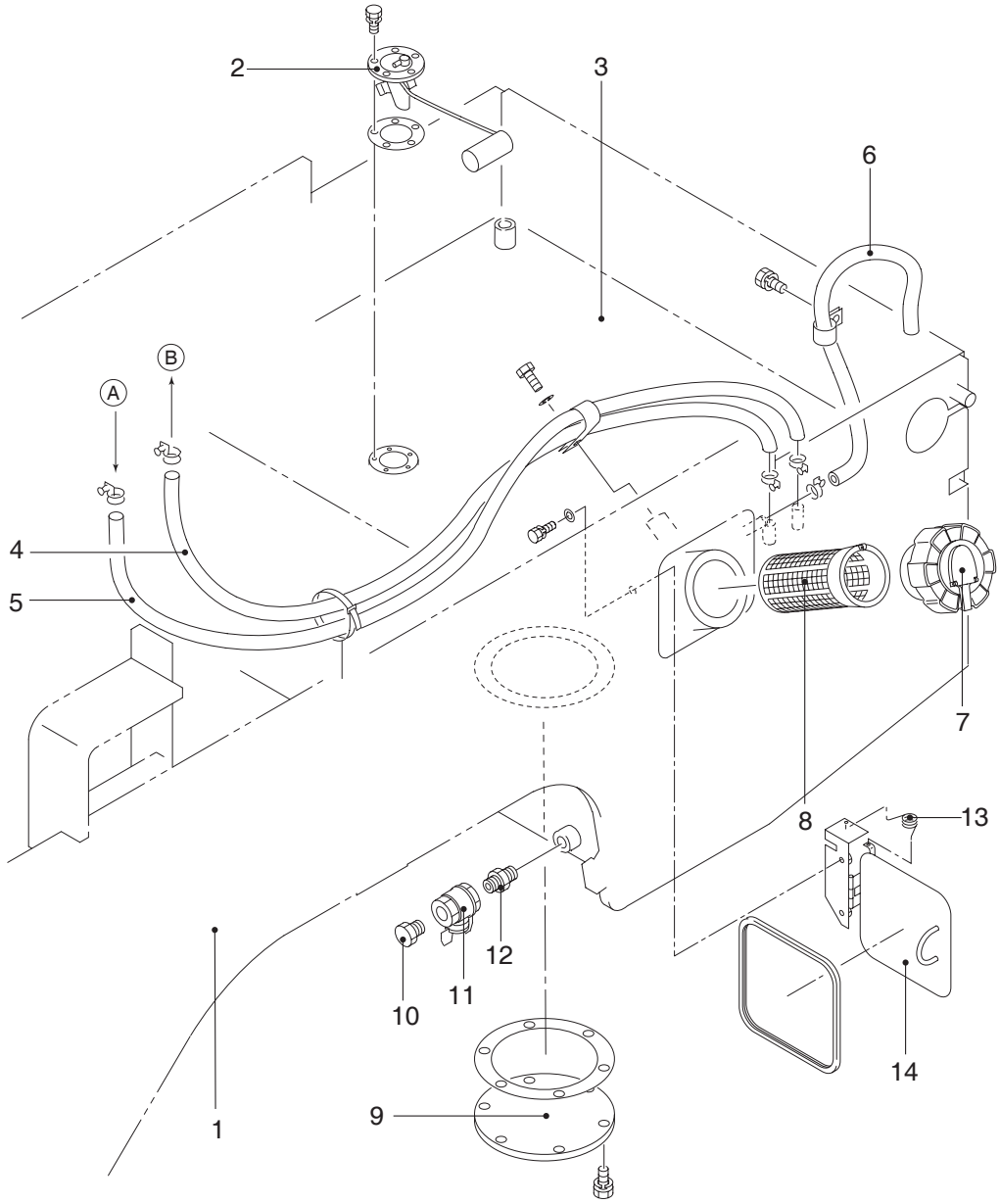
Applicable S/No. :03101～

Dimensions	Rear overhang angle	°	12
	Min. ground clearance, center hinge pin	mm [in.]	400 [15.7]
	Bucket hinge pin height	mm [in.]	3715 [146.3]
	Dumping height, at 45° discharge angle	mm [in.]	2760 [108.7]
	Reach, at 45° discharge angle	mm [in.]	1070 [42.1]
	Bucket roll-back angle, in carry position	°	50
	Bucket dumping angle, bucket fully raised	°	48
	Towing pin height	mm [in.]	1040 [40.9]
Weight	Weight of Loader	kg [lbs]	9450 [20840]
		with ROPS cab (option)	9940 [21920]

2. Fuel Tank

The fuel tank is welded to the rear inside of the rear frame, with its fuel hoses (suction and return) connected to the engine.

The fuel tank is equipped with a fuel level sender unit linked to the fuel meter on the dashboard.

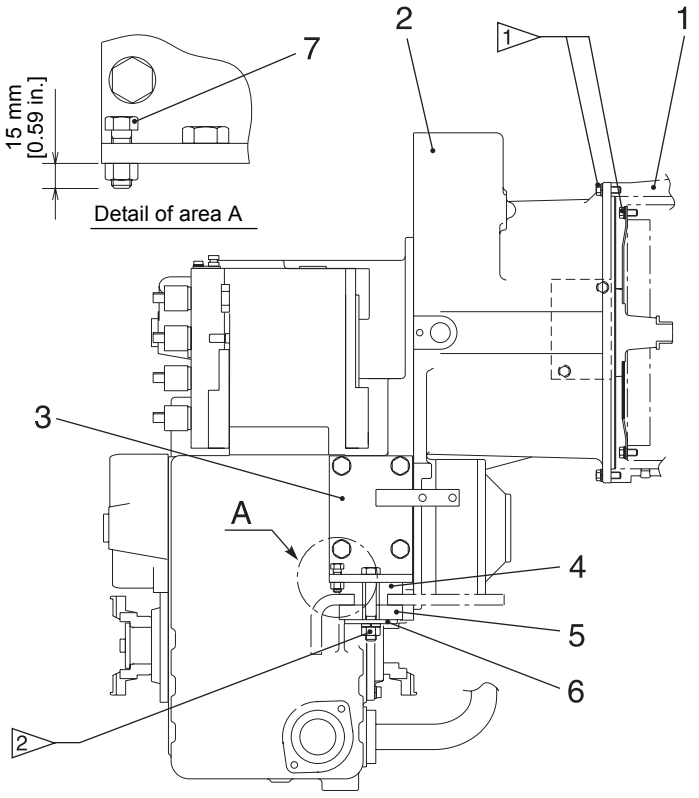


Ⓐ From INJECTION PUMP

Ⓑ To WATER SEDIMENTER (FEED PUMP)

1. REAR FRAME
2. FUEL SENDER UNIT
3. FUEL TANK
4. FUEL HOSE, SUCTION
5. FUEL HOSE, RETURN
6. BREATHER HOSE
7. CAP
8. STRAINER
9. PLATE
10. PLUG
11. COCK
12. NIPPLE
13. SPRING
14. COVER

Fig. 1.7 Fuel Unit of Engine



Note: ▷1◁ 42.1 to 48.0 N-m {4.3 to 4.9 kgf-m} [31.1 to 35.4 lbf-ft]
Threaded area: LOCTITE #262
▷2◁ 178 to 269 N-m {18.2 to 27.4 kgf-m} [132 to 198 lbf-ft]

1. (ENGINE)
2. DRIVE UNIT
3. MOUNT BRACKET
4. MOUNT RUBBER (UPPER)
5. MOUNT RUBBER (LOWER)
6. WASHER
7. STOPPER BOLT (DOWNWARD)

Fig. 2.2 Drive Unit Mount

2.3.2 POWER FLOW

(1) Shift lever in neutral

With neither the forward nor the reverse clutch engaged, the power from the torque converter rotates the forward and reverse shaft, but is not transmitted any further.

(2) Shift lever in forward

When the shift lever is put into one of the four forward speeds, the power from the torque converter is transmitted through the forward clutch and the selected speed clutch to the output shaft.

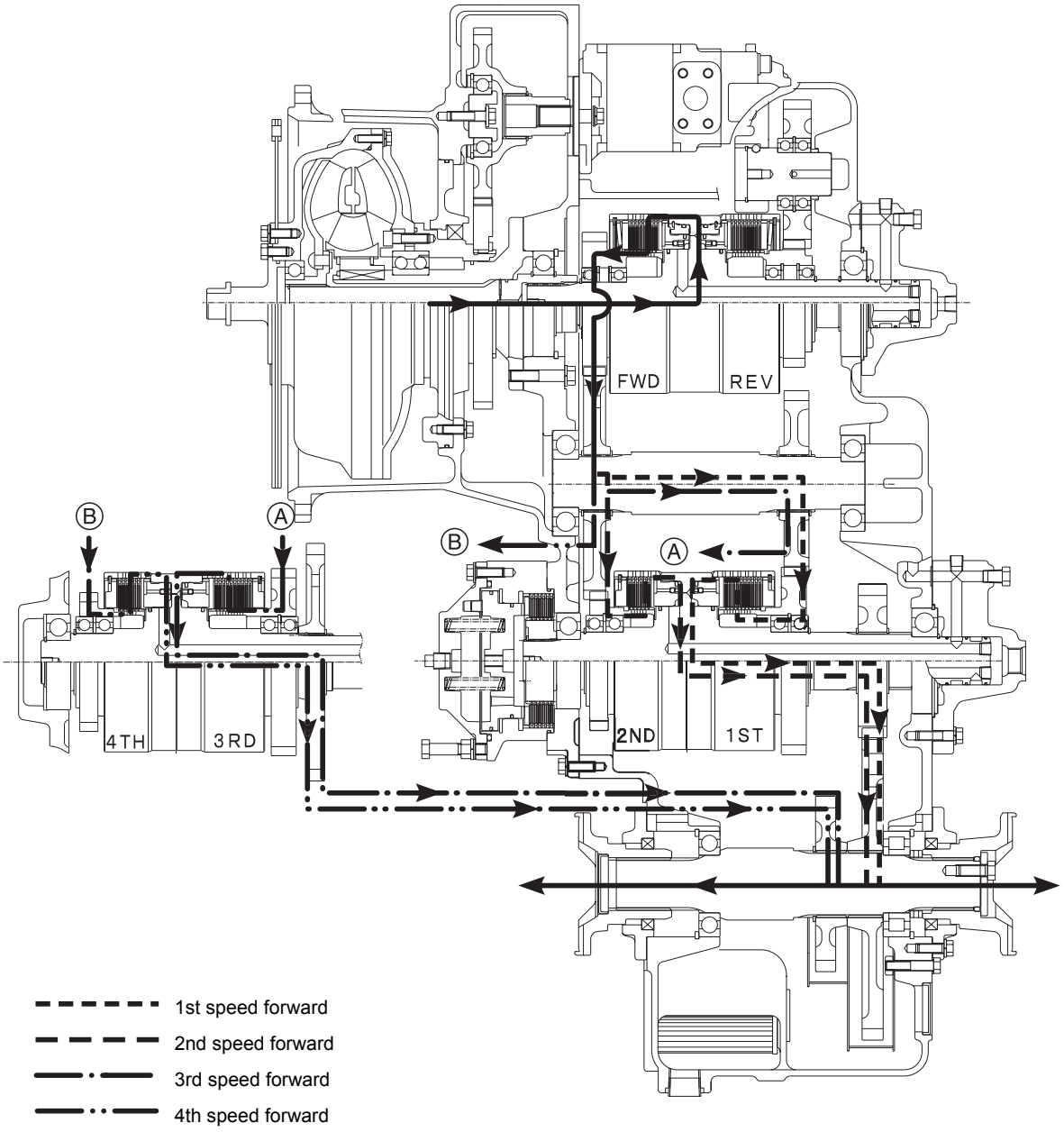


Fig. 2.11 Power Flow in Forward

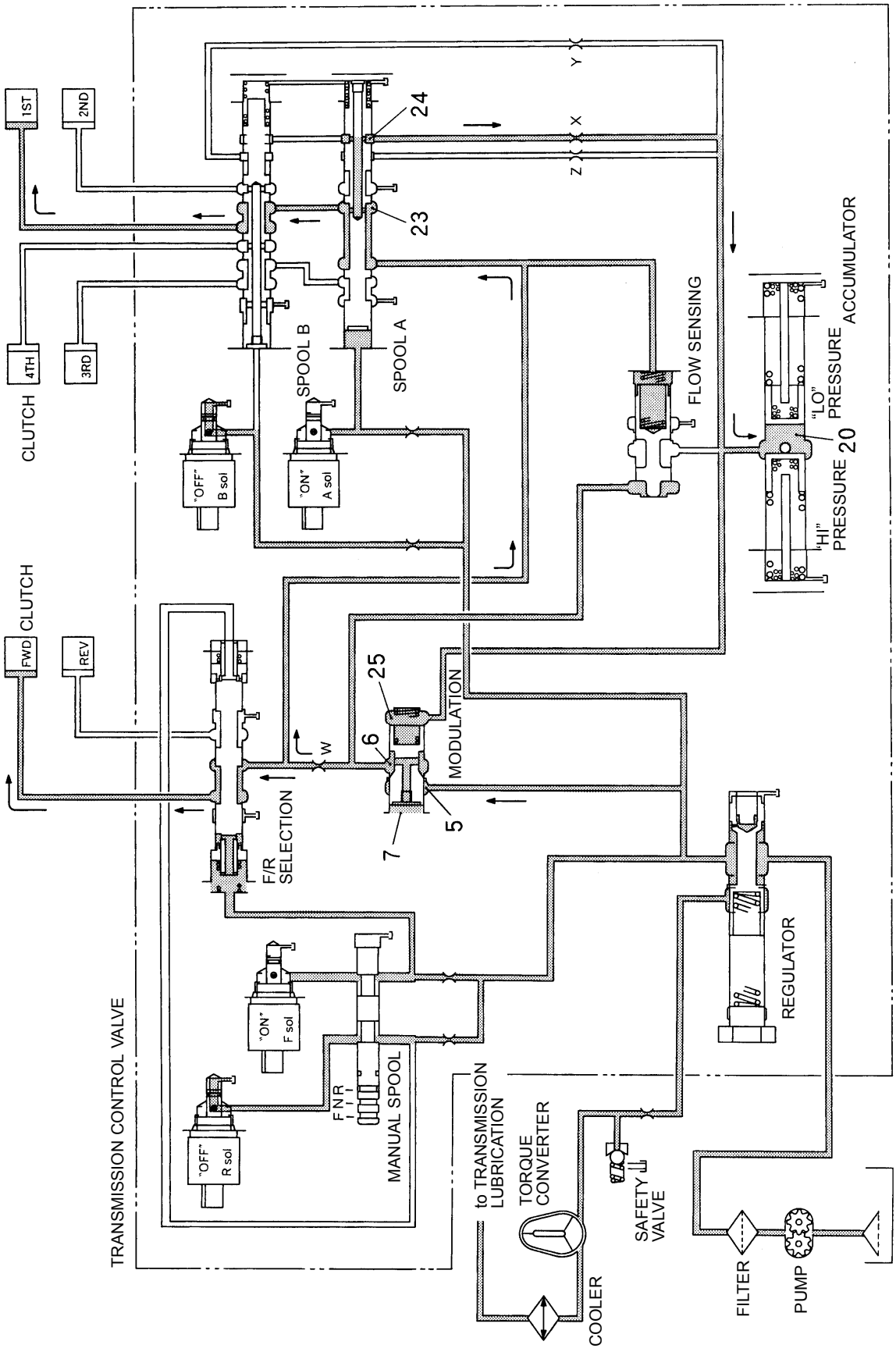


Fig. 2.19 Clutches in Engagement (1st Speed Forward)

② The electric flow "f" generates in the relay 2 so that the relay 2 remains excited even if the DSS switch is turned off.
The transmission remains in the forward first speed gear.

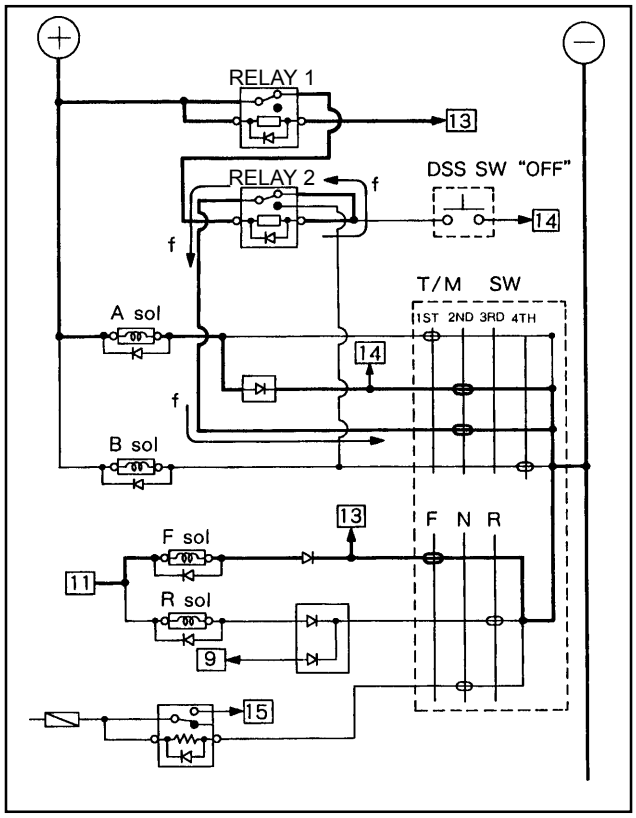


Fig. 2.30

(3) When the transmission control switch is moved to rev. position

① When the transmission control switch is moved to rev. position, the electric flow "b" is eliminated and the operation of relay "1" is released.
Then, the electric flow "f" to the relay "2" is eliminated and the relay 2 is also released.

② The electric flow "d" is revived and the solenoid "B" is excited. Then the transmission is returned to the 2nd speed gear.

③ Meanwhile, the solenoid R is excited by the electric flow "g" and the transmission shifts into the rev 2nd speed gear.

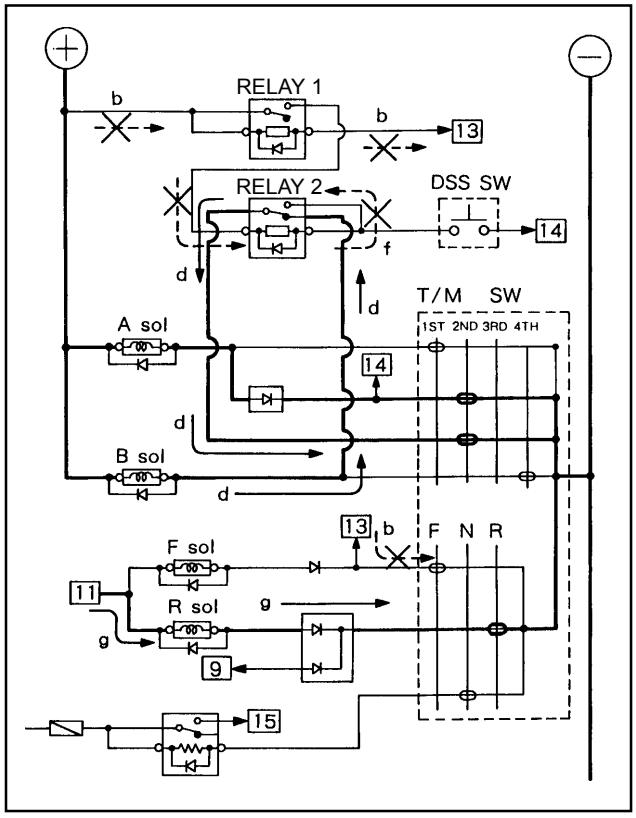


Fig. 2.31

2.4 OIL CIRCULATION ROUTE

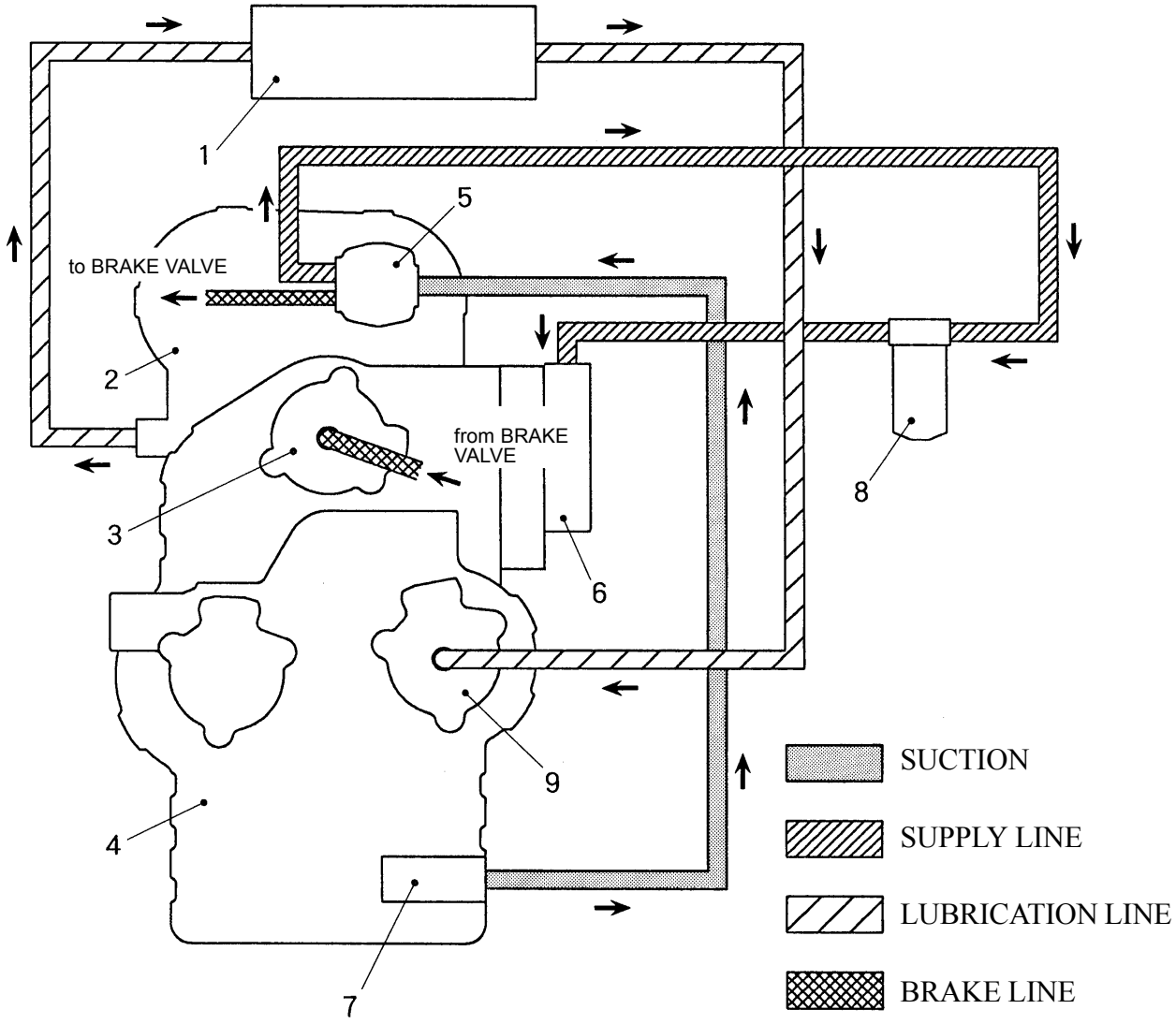
1. General Description

The oil used for the drive unit is supplied from the transmission sump tank.

As the engine starts, the charging pump picks up oil from the transmission sump tank through the strainer and sends it under pressure to the transmission control valve. The oil discharged from the charging pump passes through the inline filter to the transmission control valve. The control valve divides the oil into one for torque converter operation and one for transmission clutch operation.

The oil sent into the converter, after leaving the converter, flows into the oil cooler to get cooled down. After leaving the oil cooler, it lubricates and cools each clutch shaft assembly, before returning into the transmission sump tank.

The oil cooler is incorporated in the lower tank of the radiator. Refer to "1.3 COOLING SYSTEM" for the oil cooler.



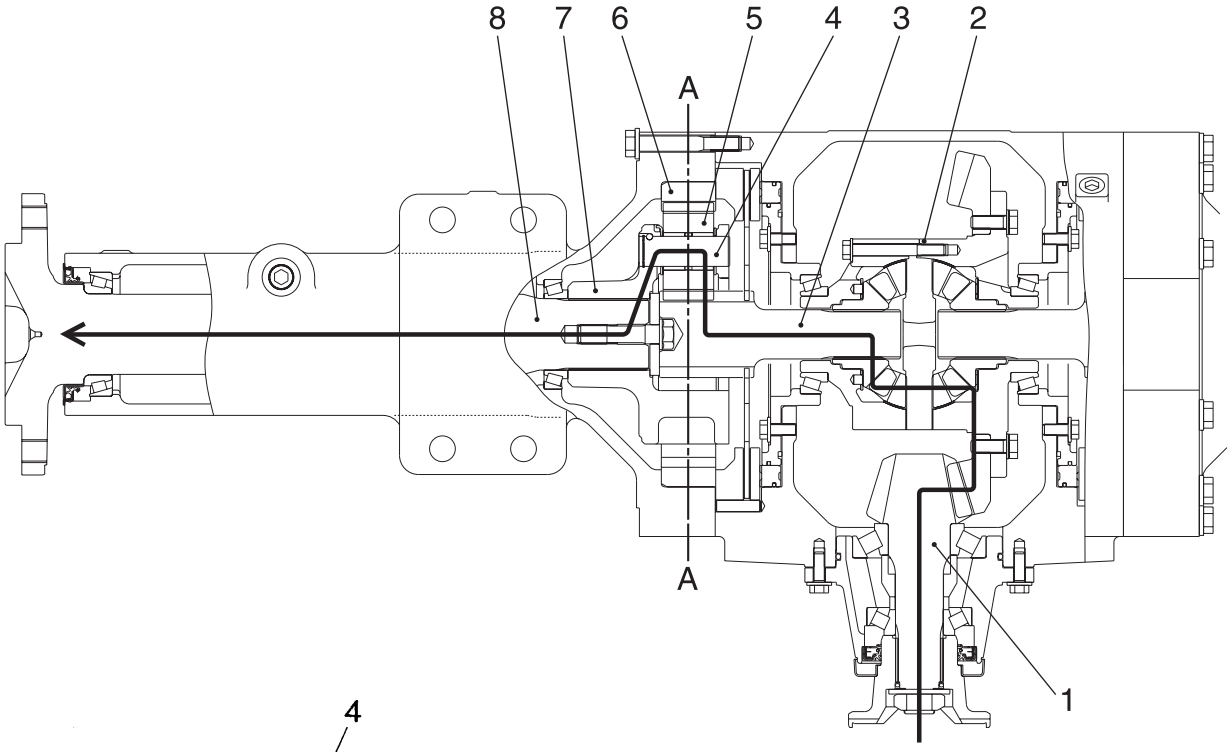
1. OIL COOLER
2. TORQUE CONVERTER
3. DISTRIBUTOR CAP (FOR FWD/REV SHAFT)
4. TRANSMISSION
5. CHARGING PUMP
6. TRANSMISSION CONTROL VALVE
7. STRAINER
8. INLINE FILTER
9. DISTRIBUTOR CAP (1ST/2ND SHAFT)

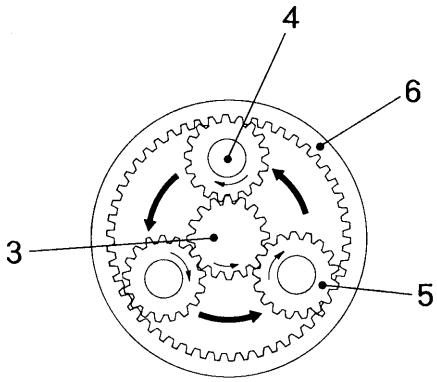
Fig. 2.41 Oil Circulation Route

2.6.3 FINAL REDUCTION GEAR

The final reduction gear assembly is a planetary type and provides final speed reduction of the power from the engine in the power transmission line.

The power from the differential gear rotates the shaft and the three planet gears inside the ring gear. The rotation of the planet gear is transmitted to the planet carrier and the axle shaft.





Section A-A
(Planet gear operation)

: Power flow

1. DRIVE PINION
2. DIFFERENTIAL
3. GEAR & SHAFT
4. PLANET SHAFT
5. PLANET GEAR
6. RING GEAR (Fixed)
7. PLANET CARRIER
8. AXLE SHAFT

Fig. 2.50 Power Flow

(2) Brake pedal in operation

a. Brake pedal in operation

① When the brake pedal (1) is pressed, the brake valve (2) is operated to send the oil from the brake pump (5) under pressure to the split cylinder (10).
The brake valve tank port is closed by the spool.

② The split cylinder is operated by the oil (at the primary side) sent under pressure from the brake valve to send the brake oil (at the secondary side) in the brake oil tank (9) to the disk brake (11) for braking operation.
The brake line after the split cylinder (secondary line) has an independent 2-line system for the front and rear wheels.

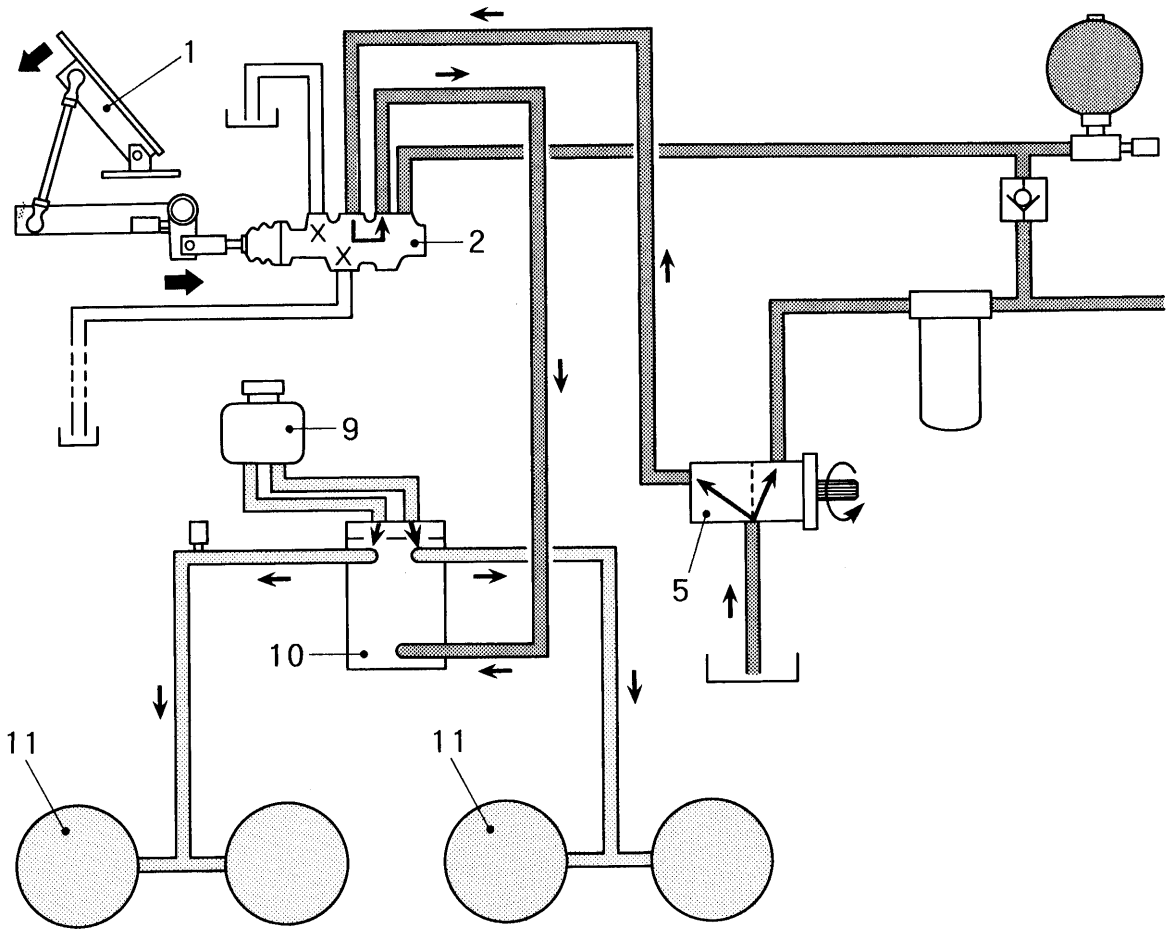


Fig. 3.5 Brake Pedal in Operation

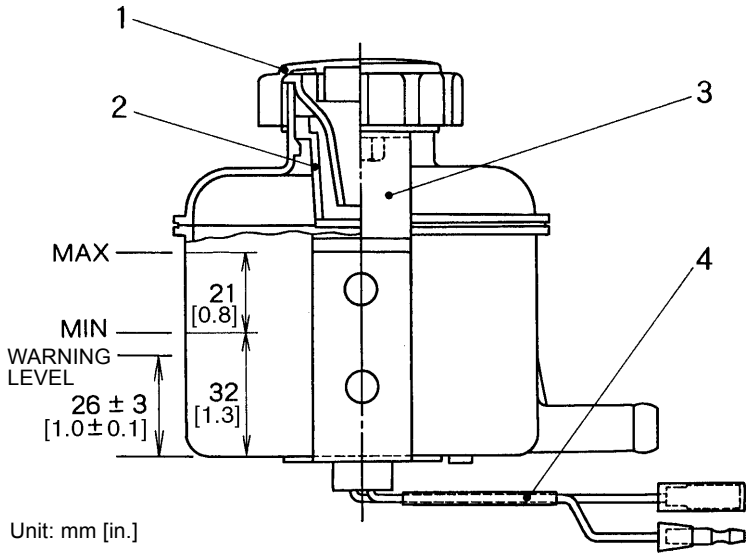
3.1.5 OTHER COMPONENTS

1. Brake Oil Tank

The brake oil tank is installed to supply oil to the split cylinder (disk brake).

Oil to be used:	Engine oil SAE 5W-20
Capacity:	1.0 L [0.26 U.S.gal.] (total capacity), 0.28 L [0.07 U.S.gal.] (Brake oil tank)

⚠ Use a mineral brake fluid for the brake system.
If you use a general automobile brake fluid (JIS automobile non-mineral brake fluid), the rubber parts of the brake system might be damaged to cause malfunction of the brake. In the worst case, it might cause a serious injury or death.



Note: MAX: 283 cc [0.075 U.S.gal.]
MIN: 150 cc [0.040 U.S.gal.]

1. CAP
2. STRAINER
3. BRACKET
4. LEVEL SWITCH ASSEMBLY

Fig. 3.17 Brake Oil Tank

4.2 OIL CIRCULATION ROUTES

The oil picked up from the oil tank by the main pump is sent under pressure to the priority valve where it is divided into two portions: one for the main hydraulic circuit and one for the steering hydraulic circuit.

The steering hydraulic circuit uses the load sensing system so that the orbitrol receives the necessary amount of oil from the priority valve, with the residual amount of oil being sent to the main circuit. When the steering wheel is turned, the oil is sent into the steering cylinder for steering the loader. The oil discharged from the steering cylinder returns into the orbitrol from which it returns into the oil tank.

Note: For the operation of the load sensing system, refer to "4.5 PRIORITY VALVE."

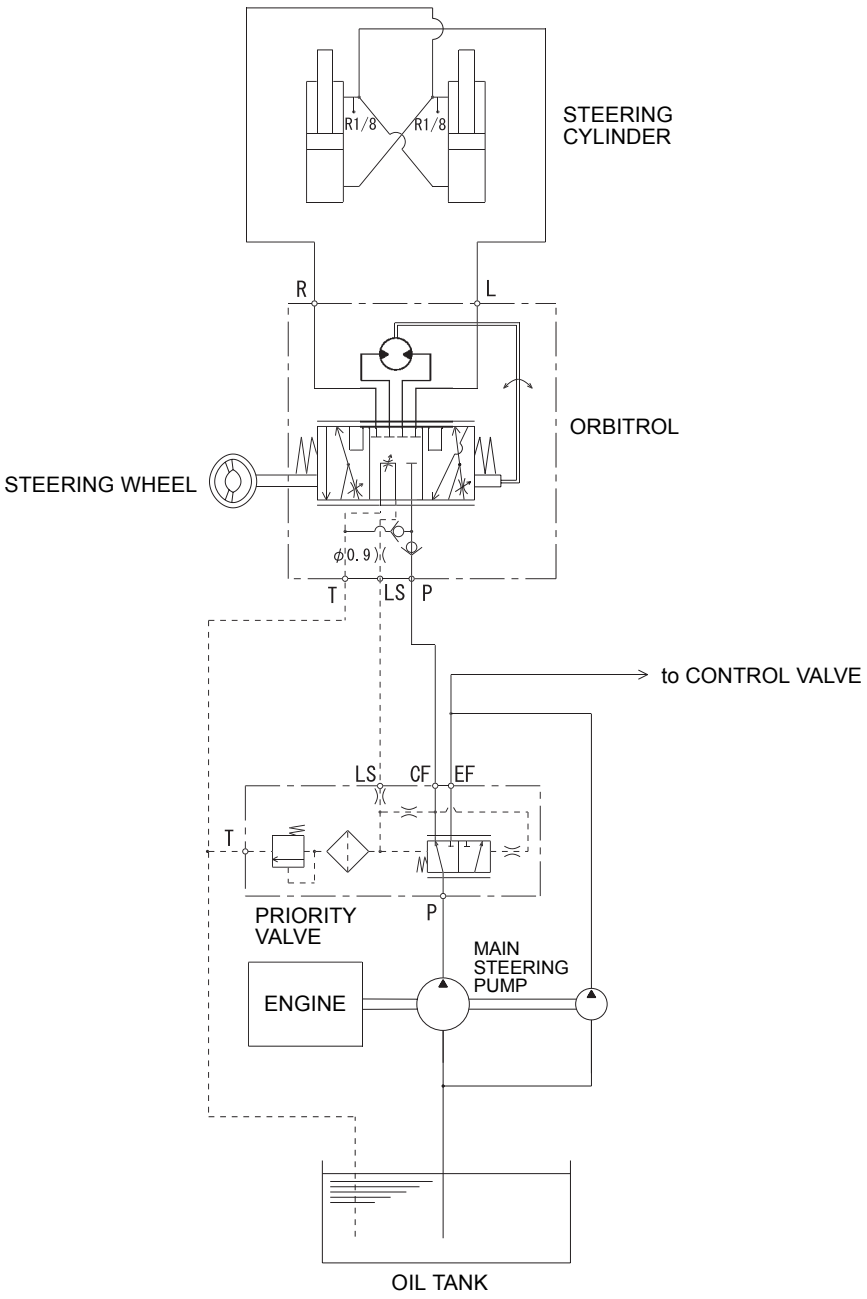


Fig. 4.3 Hydraulic Circuit Diagram

(3) When steering wheel is in rotation

① When the steering wheel is turned from neutral, the oil passages in the orbitrol are switched over to allow the oil in the chamber A and CF port of the priority valve to enter the gerotor through the orifice C_4.

② With the pressurized oil entering the gerotor, the pressure in the chamber A decreases accordingly so that the spool (1) of the priority valve moves to a position where the pressure differential between the pressure chambers (A, B) and the control spring (2) strikes a balance, thus determining the ratio of the flow to EF port, concerning the oil discharged from the main pump.

③ The opening of the orifice C_1 inside the orbitrol is determined depending on the speed at which the steering wheel is turned. The quicker the steering wheel is turned, the wider the orifice opens. The slower it is turned, the narrower. Consequently, when the steering wheel is turned quickly, more oil flows to the CF port to quicken steering operation.

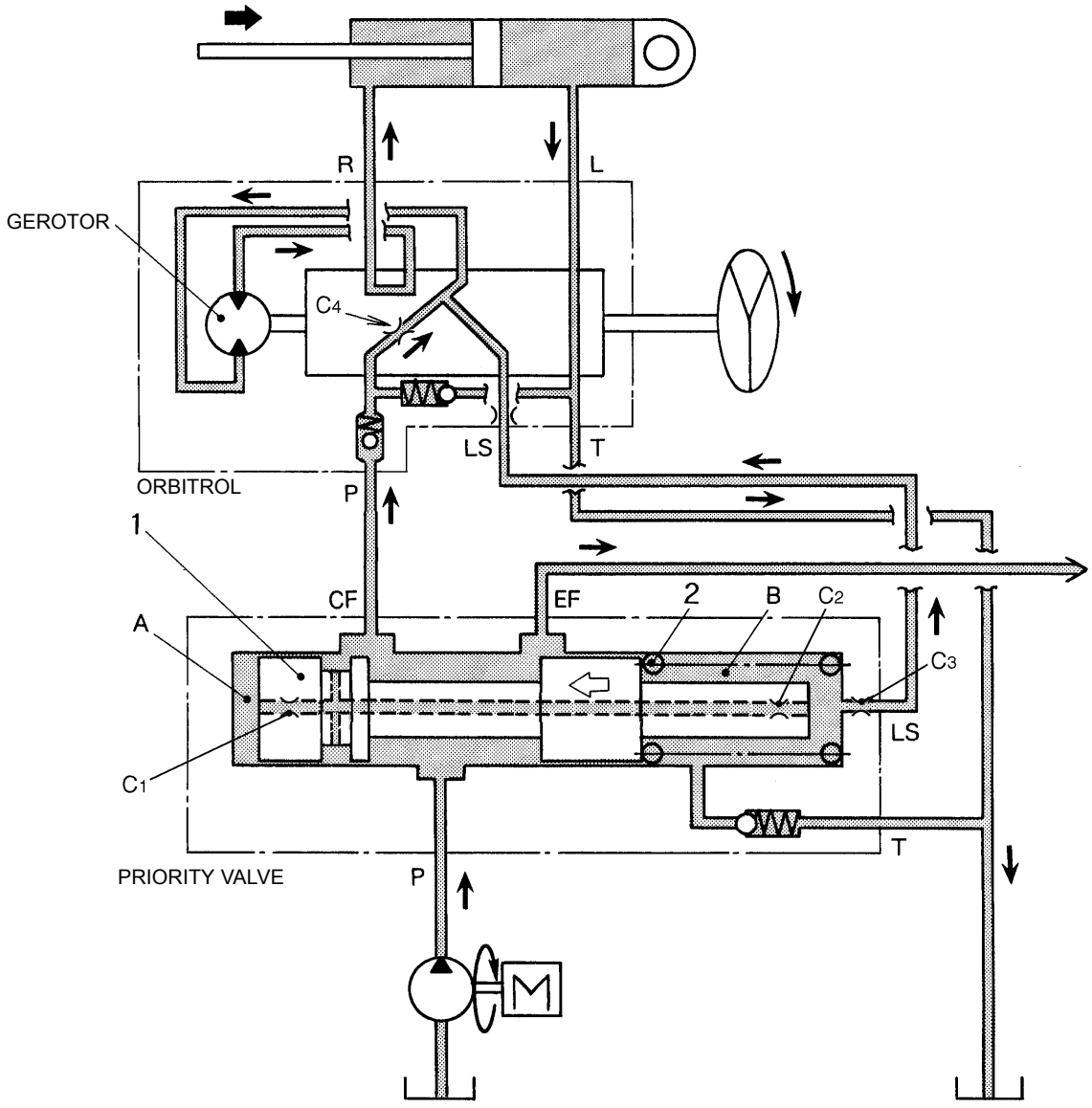


Fig. 4.15 Steering Wheel in Rotation

6.2 PUMP

Main pump	
Name	SB(1)21
Type	Gear type
Drive	Gear type (attached to the steering pump)
Discharge (unloaded)	52 L/min [13.7 gpm] at 2550 rpm, 0.98 MPa {10 kgf/cm^2} [142 psi]
Weight	14.9 kg [32.9 lbs] (w/ steering pump)
Steering pump	
	(Used in common with main pump)
Name	SAR(2)50
Type	Gear type
Drive	Gear type
Discharge (unloaded)	124 L/min [32.8 gpm] at 2550 rpm, (0.98 MPa {10 kgf/cm^2} [142 psi])
Charging pump	
Name	SDY1A36 · 16
Type	Gear type, two-way pump
Drive	Gear type
Discharge (Front)	87 L/min [23 gpm] at 2380 rpm, 2.2 MPa {22 kgf/cm^2} [319 psi]
(Rear)	38 L/min [10.0 gpm] at 2380 rpm, (0.2 MPa {2 kgf/cm^2} [28 psi])
Weight	6.8 kg [15.0 lbs]

The loader uses two pumps: the main pump and charging pump, which are attached to the converter housing and driven by the pump drive of the torque converter.

They always rotate as the engine runs.

Note: For the installation of the charging pump, refer to “2.1 DRIVE UNIT.”

6.2.1 MAIN PUMP

The main pump is a gear type which doubles as the steering pump.

The main pump picks up hydraulic oil from the oil tank and sends it to the priority valve where it is divided into two portions: one for the steering hydraulic circuit and one for the main hydraulic circuit.

4. Detent Operation

(1) Boom side

① When the control lever is pushed forward fully to the "Float" position, the boom spool (1) is pulled out to the full. Due to this, the detent pin (2) installed in the spool end shifts and the detent ball (3) falls into the groove of the detent sleeve (4).

② Since the detent balls are pushed by the spring (5), the boom spool holds its position, and the detent becomes operative.

③ To release the detent, pull the control lever to disengage the detent balls.

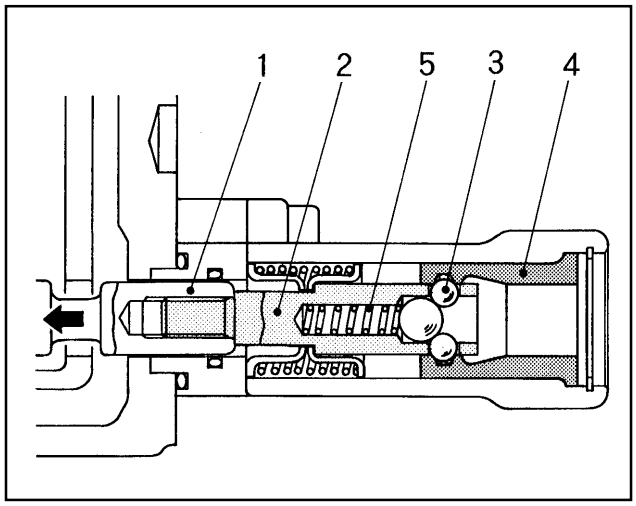


Fig. 6.11 Boom Side Detent in Operation

(2) Bucket side

① The electromagnetic detent is used on the bucket section. The electrical circuit is connected from the battery to the proximity switch of the bucket leveler through the coil assembly of the bucket spool section.

② When the bucket is tilted forward, the proximity switch is electrically closed so that the coil assembly (4) is excited.

③ When the control lever is pulled out fully to the "Roll-back" position, the bucket spool (1) is fully pushed in and the pin (2) at the spool end is also pushed in, so that the plate (3) contacts the coil (4). As a result the bucket spool holds its position, and the detent becomes operative.

④ To release the detent, electrically open the proximity switch to de-energize the coil assembly or operate the control lever by hand.

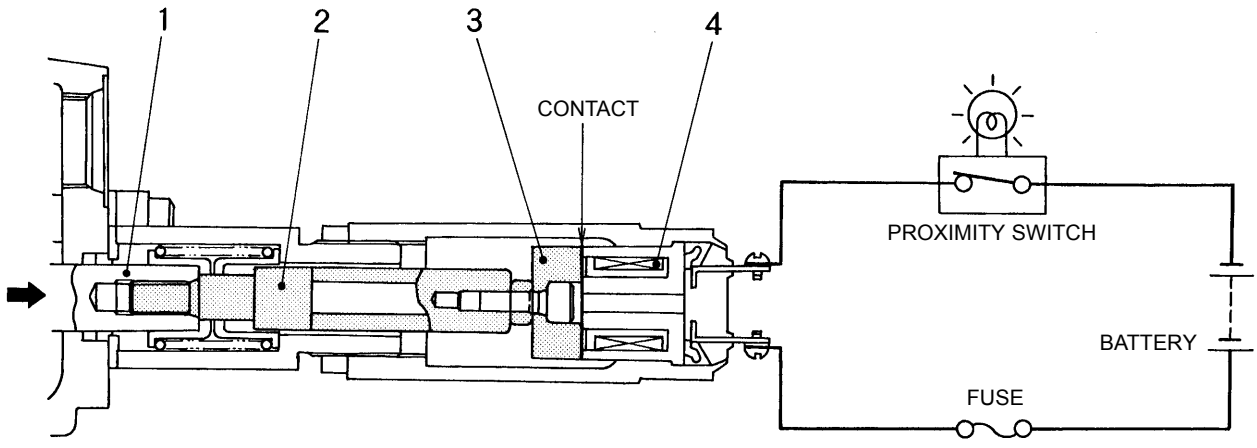
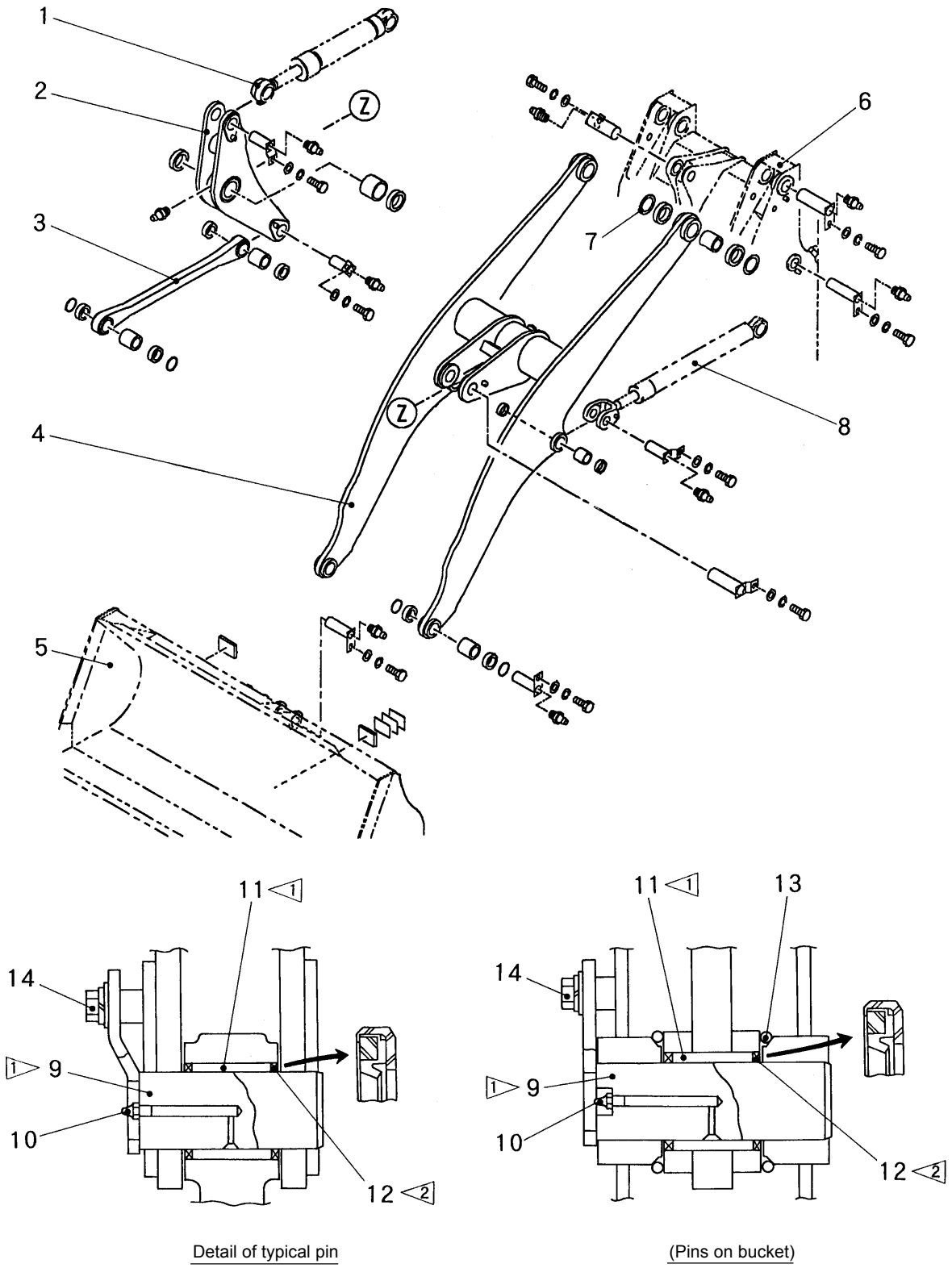


Fig. 6.12 Bucket Side Detent in Operation



Note: 1 All pins, bushings, and bosses: Grease (Apply before installing pins)
2 Dust seal must be installed with lip facing outward.

Fig. 7.2 Boom, Bellcrank and Bucket (1)

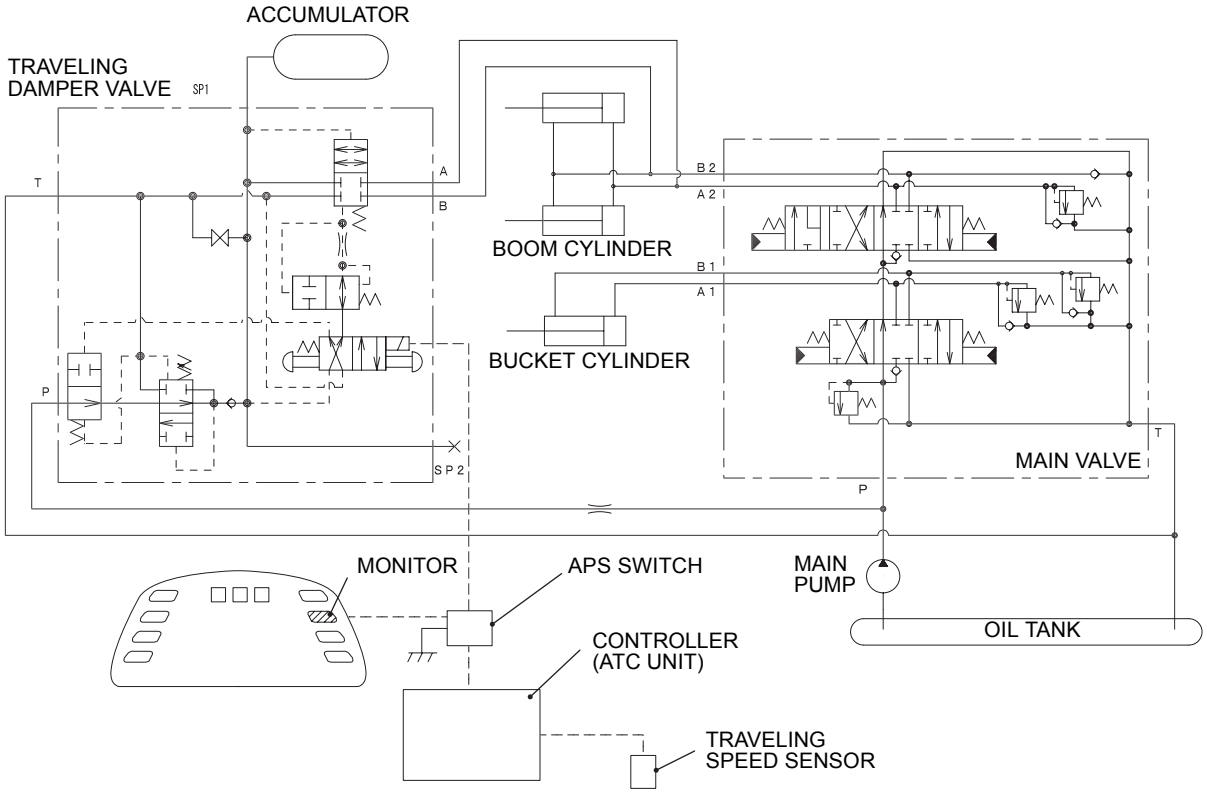
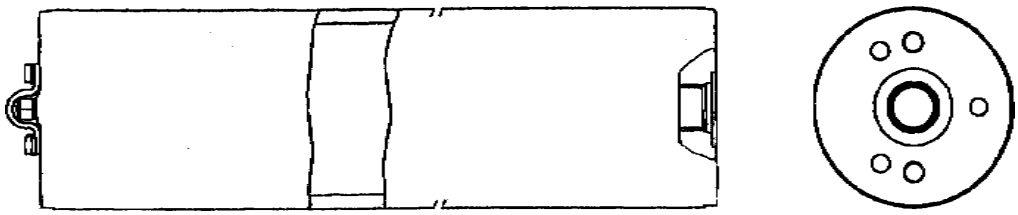


Fig. 7.11 APS Hydraulic Circuit and Electric Unit

3. Accumulator



Gas capacity: 4 liters [244 in.^{3}]
Gas charge pressure: 2.0 ±0.1 MPa {20 ±1.0 kgf/cm^2} [290.1 ±14.5 psi] at 20 ±5°C [68 ±9°F].

Fig. 7.12 Accumulator

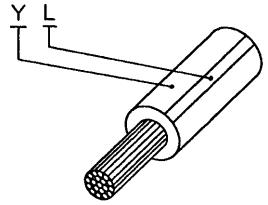
⚠ Caution to be taken when servicing accumulator and piping

- **Use caution when handling the accumulator and piping because the accumulator has high-pressure nitrogen gas charged.**
- **Filling nitrogen gas into the accumulator should be performed only by qualified personnel.**
- **Do not modify or weld the accumulator.**
- **Before trying to service the piping, make sure to remove the pressure from inside the accumulator using traveling damper valve, because hydraulic oil remains in the piping. (For the procedure, see "4. Traveling damper valve".)**
- **When removing the pressure from inside the accumulator, park the loader on a level surface, shut down the engine, and lower the booms and bucket on the ground.**
- **Check the gas pressure every 2000 hours of operation or one year whichever comes first.**

8.4 ELECTRIC CIRCUIT DIAGRAM

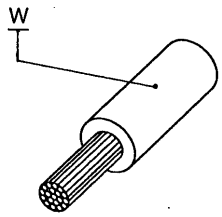
Note: Wire colors:

The wires are classified by color. The first symbol shows the insulation color and the 2nd the marking color.



Example: Yellow coating with a blue

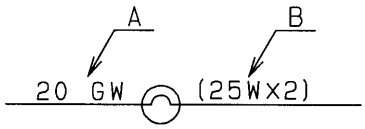
B	Black	W	White
R	Red	G	Green
Y	Yellow	Br	Brown
L	Blue	Lg	Light Green
P	Pink	O	Orange
Gr	Gray		



Example: White coating without marking

(Wire diameter)

———	40 mm^2 [0.0620 in.^{2}]
———	5.0 mm^2 [0.0077 in.^{2}]
———	1.25 mm^2 [0.0019 in.^{2}]



A: indicates the wire number and color
B: indicates the consumption power (electric current)

⚠ Before trying to work on the electric system, be sure to disconnect the battery connectors. When disconnecting the battery connectors, first disconnect the negative side (-) terminal before removing the other terminal.