UTILEV™

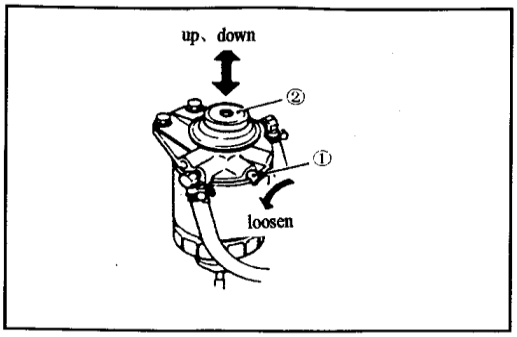
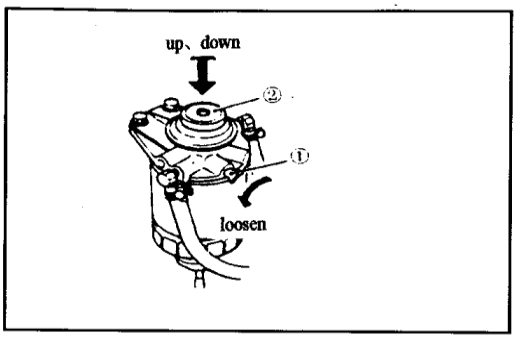
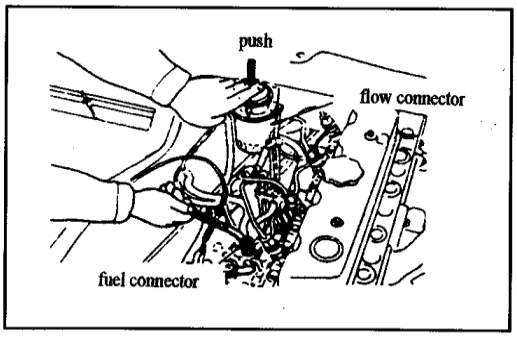
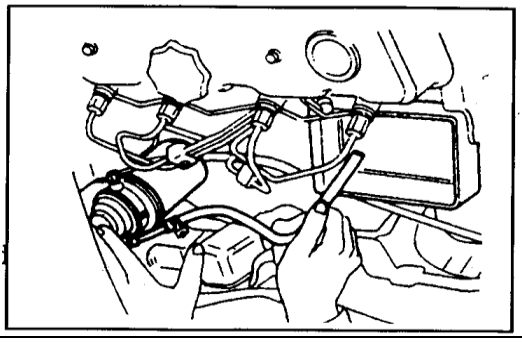
2.0T-3.5T Internal Combustion Counterbalanced Forklift Truck

SERVICE MANUAL

September 2018

Original Instruction

PART NO. 76002089(R5) US Engines

Without Air Vent Screw	
Method A: Move priming pump up and down until you can feel a sudden release of pressure.	
Method B: (1) Loosen injection pump bleeder screw or disconnect return hose and priming	
(2) Make sure fuel overflows at bleeder screw/tube end, then tighten and connect hose	
With Air Vent Screw	
Method A: (1) Loosen the air vent screw	
(2)Move the priming pump up and down until no air comes out of the air vent screw.	
(3)Tighten the air vent screw	
(4)Move the priming pump up and down until there is a sudden increase in resistance.	
Method B: (1) Loosen the air vent screw	
(2)Move the priming pump up and down until no air comes out of the air vent screw	
(3)Tighten the air vent screw	
(4) Loosen injection pump bleeder screw or disconnect return hose and priming	
(5)Make sure fuel overflows at bleeder screw/tube end, then tighten and connect hose. Check Priming Pump	
Before checking priming pump, make sure fuel filter is filled with fuel	
(1)Disconnect fuel return hose. Place a suitable container under return hose	
(2)Pump priming pump and check that fuel flows out of hose end. If it does not, replace priming pump	

2.5.2 Disassembly and Assembly-Two-Way Clutch

• Detach the left and right-end bearings.

• Separately remove the forward I gear, the reverse gear, the active friction discs, and the separator plates.

• Compress the spring at each of the two ends; remove the retainer rings, detach the piston, and the springs.

The assembly sequence is the opposite of the dismantling sequence.

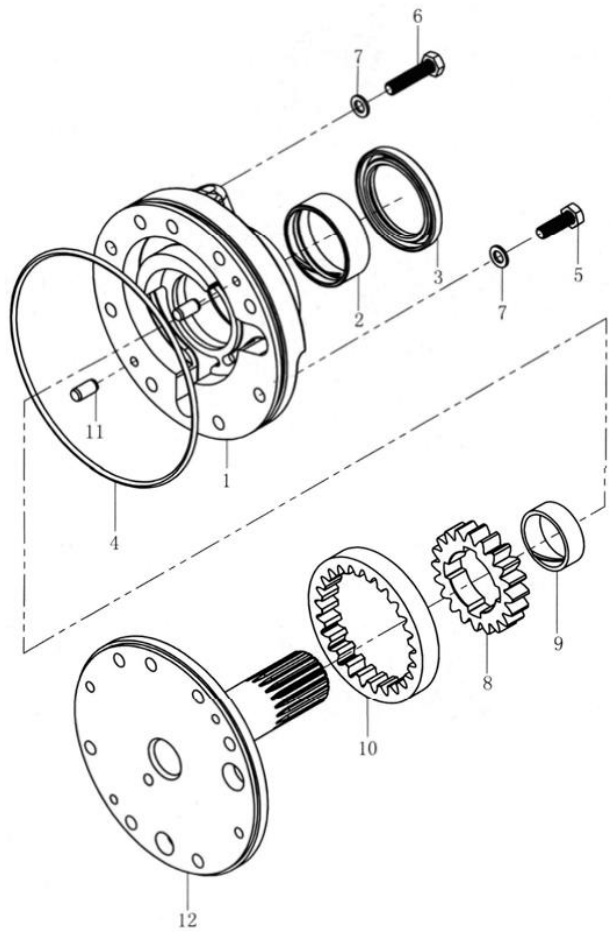
Dismantling and assembly of one-way clutches is similar to two-way clutches.

⚠ Caution:

- Flush the piston cavity of the input shaft assembly, oil route, and clean all other parts except the disc.
- Replace the ring (A), (B) if they are damaged.
- Replace the snap-ring.
- Replace the disc if it is overly worn or bent.
- Restraining ring (A), (B) should face to gears.
- After assembly, rotate the gears, they should rotate freely.

2.6. Charging Pump (Fig. 2-6)

The charging pump is installed on the torque convertor body. The drive gear (#8) is connected to the Pump wheel. Driven by the engine, it drives the driven gear (#10) and supplies oil to the torque convertor and hydraulic transmission.



1. HOUSING	2. BUSHING	3. OIL SEAL	4. O-RING
5. BOLT M8X25	6. BOLT M8X35	7. GASKET	8. DRIVE GEAR
9. BUSHING	10. DRIVEN GEAR	11. PIN	12. IDLER PULLEY SEAT

Fig.2-6 Charge Pump

3.6. Bearing Adjusting

（1）Lubricate taper roller bearing.

（2）Tighten roller bearing lock nut in wheel hub until wheel hub can no longer be rotated with one hand.

（3）From that position, turn back lock nut approx. 60°.

（4）Turn back wheel hub two or three rotations so that bearing settles down.

（5）Again tighten lock nut until it can no longer be rotated with one hand; then turn back approx.600.

（6）Install snap-ring and attach felt ring, install lock washer so it's hole in the pin of snap-ring. Screw lock nut.

（7）Turn wheel hub back and forth two or three rotations to see if rotation starting torque is within specifications. Rotation starting force：2.0T-3.5T is 10-29N, (refer to Fig.3-8);

（8）Measure axial play of wheel hub to see if it is within specification. Axial play should be less than 0.10mm (refer to Fig.3-9).

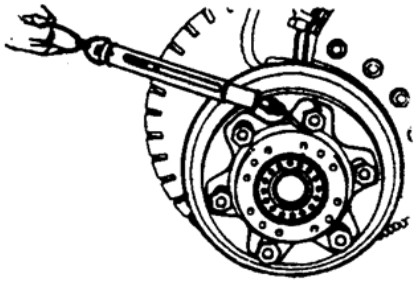


Fig.3-8

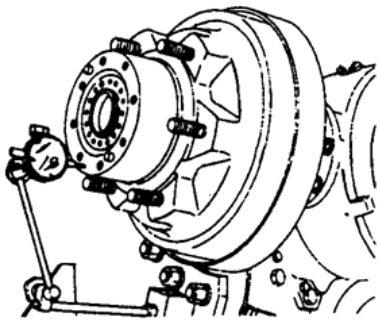


Fig.3-9

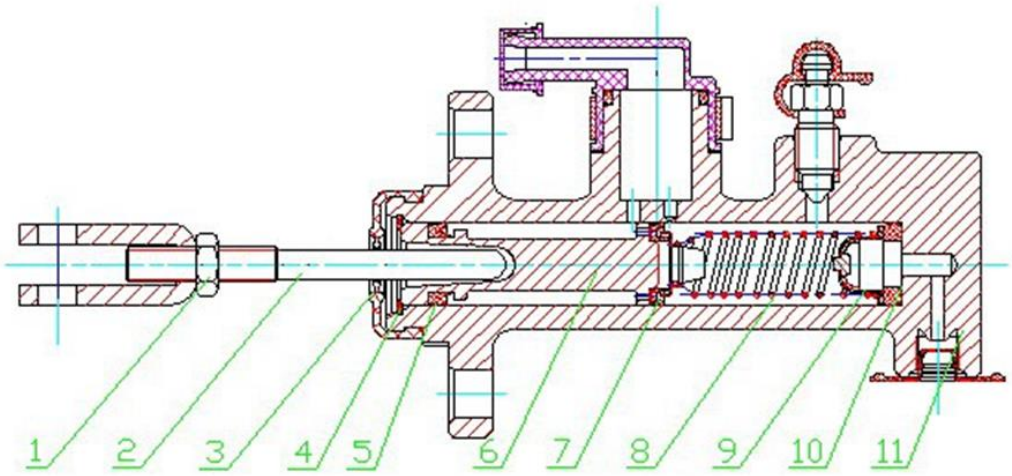
6.2. Summary

The brake system is the front two-wheel braking type consisting of a master cylinder, brakes and brake pedal.

6.2.1 Master Cylinder (Fig. 6-1)

The 2-3.5T master cylinder contains a valve seat, check valve, return spring, primary cup, piston and secondary cup, which are kept in place with a stop washer and stop wire. The exterior of the cylinder is protected from dust by means of a rubber dust cover. The piston is actuated through the push rod by operation of the brake pedal. First, as the brake pedal is depressed, the push rod pushes the piston forward. The brake fluid in the cylinder flows back to the reserve tank through the return port until the primary cup fills up the return port. After the primary cup passes the return port, the brake fluid in the cylinder is pressurized and opens the check valve, flowing through the brake lines to the wheel cylinders. Thus, each wheel cylinder piston is forced outwards. This brings the brake shoes into contact with the wheel drums and slows or stops the lift truck. Meanwhile, the cavity created behind the piston is filled with brake fluid led through the return port and inlet port to lubricate the pistons. When the brake pedal is released, the piston is forced back by the return spring. At the same time, the brake fluid in each wheel cylinder is pressurized by the force of the brake shoe return spring, thus returning to the master cylinder through the check valve. With the piston in its original position, the fluid in the cylinder flows into the reserve tank through the return port. The brake fluid in the brake lines and wheel cylinders has a residual pressure proportioned (about 0.04MPa) to the set pressure of the check valve, which makes each wheel cylinder piston cup securely seated to prevent oil leakage and eliminates the possibility of vapor lock developing when the lift truck is sharply braked.

Brake principle of brake master cylinder of 1-1.8t forklift is similar to that for 2-3.5T forklift.



1. LOCK NUT	2. ROD	3. BOOT	4. LIGHT SPRING
5. GASKET RING	6. PISTON	7. PRIMARY CUP	8. SPRING
9. RAFFINATE VALVE	10. VALVE SEAT	11. CYLINDER HOUSING	

Fig. 6-1
Master Cylinder

7.4. Hydraulic Control Valve (Fig. 7-2)

The two lever type control valve consists of a four-spool valve housing, two plungers, a relief valve and a divided valve. The four spool valve housing is assembled with three bolts and nuts. The tilting plunger is fitted by tilting the lock-self valve. According to the requirements of the work device, it is capable of adding combined lock valve and rotating valve.

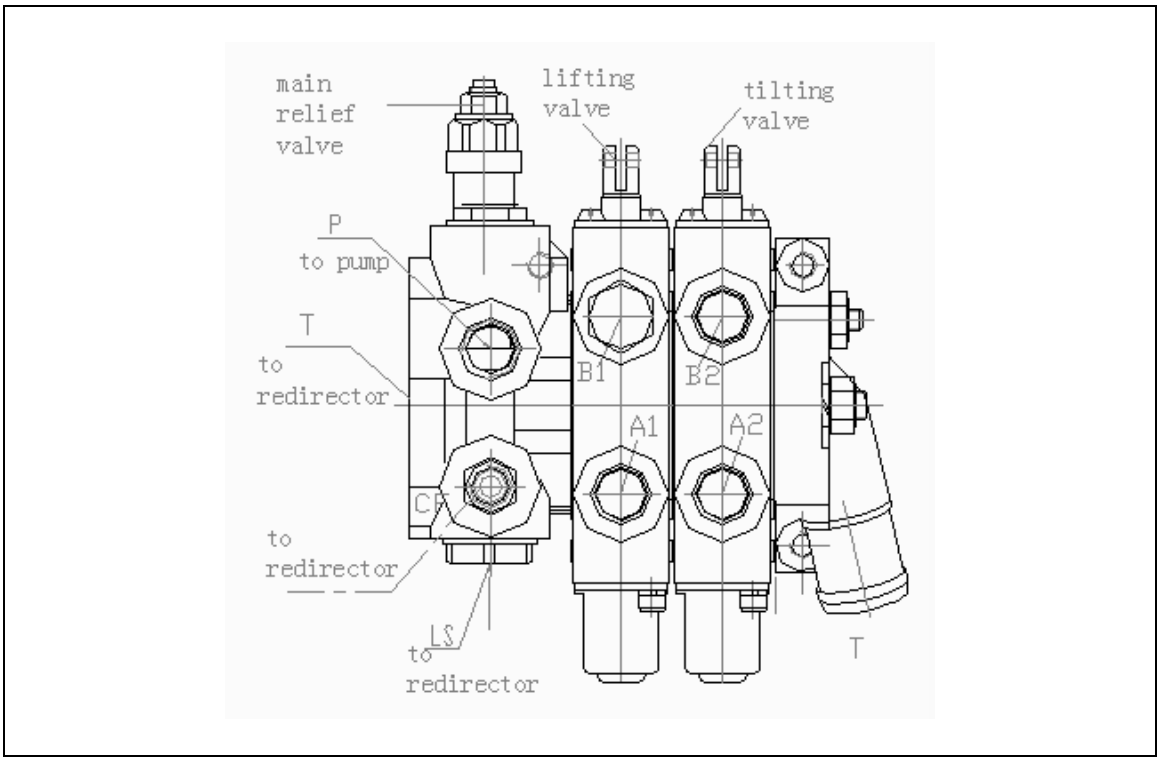


Fig.7-2

2 Lever Hyd. Control Valve for 2-3.5T Forklift Truck

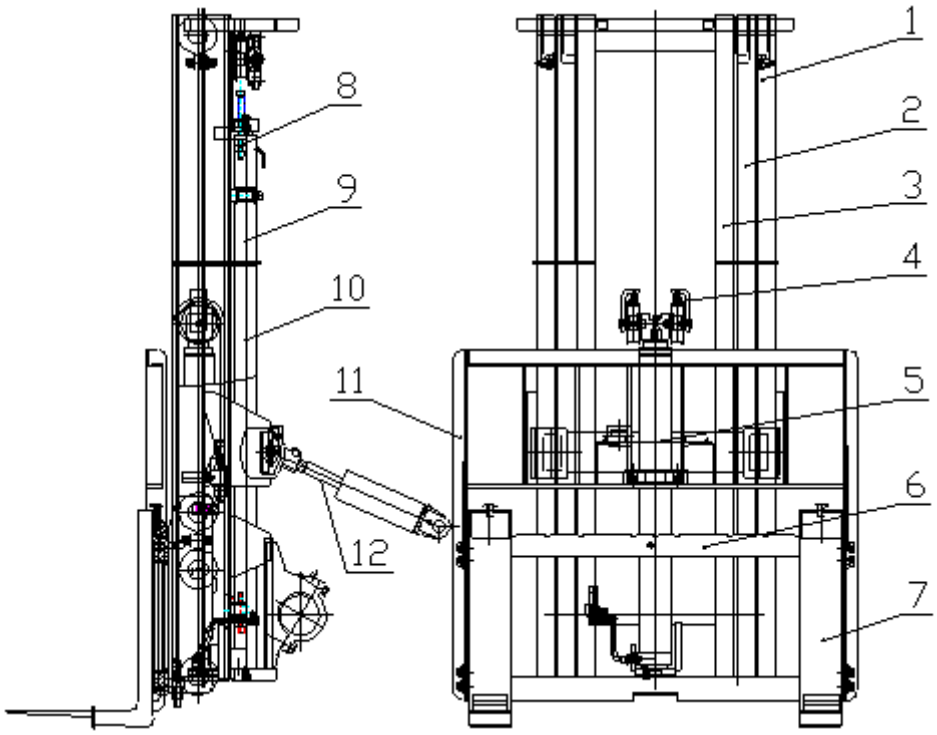
7.4.1 Main Relief Valve and Flow Dividing Valve (Fig. 7-3)

The main relief valve is a pilot valve; used for limiting the maximum pressure of the system. The main relief valve disk is not open under normal operating conditions. When the truck works at overload condition, or hydraulic system faults come, the system pressure is up to the set value of main relief valve, the pilot valve disk firstly opens, and then control valve disk opens to make system pressure not increase continuously, thus ensuring the system stays safe.

The steering relief valve is a directly operated type valve. Its set value is lower than the main relief valve. When steering system malfunctions or the load is too big, pressure is up to set value by spring, and pressure overcome spring and friction force to open relief valve, thus ensuring the steering system stays safe.

One end of the pilot valve disk connects with the oil inlet of steering valve, and the other end connects with the steering valve outlet (signal port), keeping the pressure difference invariable, the pilot valve supplies proper oil flow according to the rotated speed of steering wheel by operator.

Extra oil flows to supply other working devices via a control valve. This device can improve system efficiency, reduce oil temperature, and improve experimental environment of the system.



1. OUTER MAST	2. MIDDLE MAST	3. INNER MAST	4. FRONT CYLINDER CHAIN
5. FREE LIFTING CYLINDER	6. FORK ARM CARRIER	7. FORK ARMS	8 CHAIN
9. LEFT LIFTING CYLINDER	10. RIGHT LIFTING CYLINDER	11. LOAD BACKREST	12. TILTING CYLINDER

Fig.8-3
3 Stage FFL Mast

Caution:

- Throw away and do not re-use the dust ring and the Y Seal Ring

8.6.2 Assembly Following Replacement of Seal Rings

The assembly procedure is the opposite of the dismantling procedure, but pay attention to the following:

1) Use clean hydraulic fluid to lubricate each part.
2) Prevent dust and grease from falling into the cylinder.
3) Avoid scratching the end of the cylinder tube and the oil inlet and outlet.
4) Carefully align and push the piston rod into the cylinder drum. Be especially careful to keep the Y Seal Ring from becoming scratched or broken.
5) Before inserting the guide sleeve, first lubricate with hydraulic oil of the same brand and specification number as the operating oil.
6) During insertion, be careful not to scratch or break the O-ring on the outer ring.
7) After the cylinder cover has been screwed on, do not forget to install the nylon plug and fastening screws.

8.7. Debugging Precautions Following Forklift Assembly

1) Adjusting the forward and backward tilt of the mast

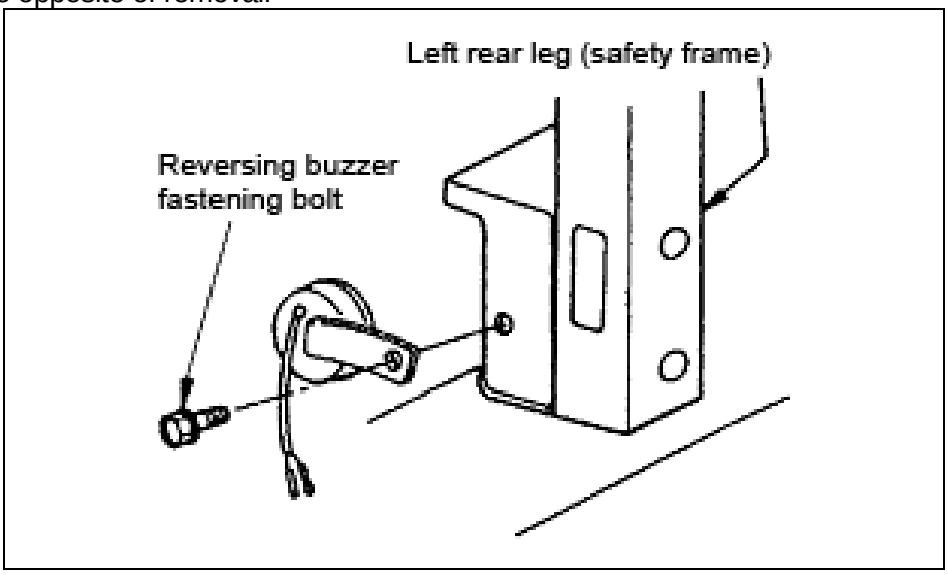
Park the forklift truck on a flat surface. Operate the hydraulic control valve control lever, causing the forklift truck mast to tilt fully forward and fully backward. In accordance with assembly debugging data (see above) requirements, adjust the length of the thread for joining the tilt cylinder front-end piston rod and the clevis until the backward tilt data angle is met. Then lock the clevis at the end of the tilt cylinder. (See the table above for the M10 bolt tightening torque.)

2) Re-adjusting the installation positions of the left and right lift cylinders
   a. Observe, while the two cylinders are rising and falling, whether their exterior shapes synchronously vary as to height. Adjust the shims between the piston rod and the inner mast support seat.
   b. Loosen the two nuts for the U-shaped mounting bolt. Then repeatedly move the mast several times up and down, positioning the U-shaped bolt properly relative to the cylinders. Then tighten the two nuts on the U-shaped bolt, and tighten the fastening screws on the other side. This is the only way to lengthen the life of the lift cylinders and reduce wear on the piston rod.
3) For the tightening forces for the bolts and screws, see the table above. For the rest, please use the screw diameters to consult the ordinary bolt tightening torques specified by our company. (See the operating and maintenance handbook that complements these.)

Backup Alarm

Removal and installation

1. Disconnect the wiring conductor; then remove the bolt.
2. Installation is the opposite of removal.



Horn

Removal and installation

1. Remove the connector for the horn connecting wire.
2. Remove the bolt and the horn.
3. Installation is the opposite of removal