



UniCarriers Americas Corporation

Service Manual

Chassis & Mast

FC/MC

TX30M AUB25-00012-09999

TX35M AUB26-00012-09999

TX40M AUB26-50012-59999

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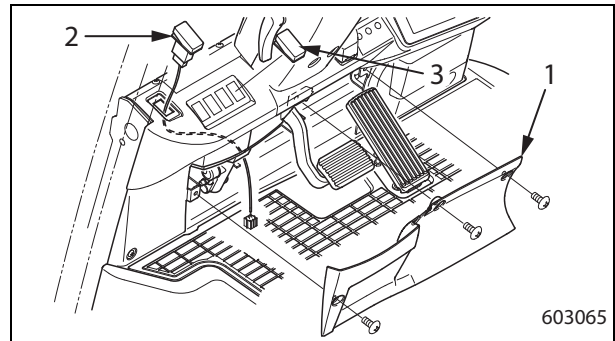
2.2 Suggestions for Disassembly

CAUTION

- Turn the key switch to the OFF position.
- Record places of the harness connections before disassembling.
- Do not disassemble the combination switch.

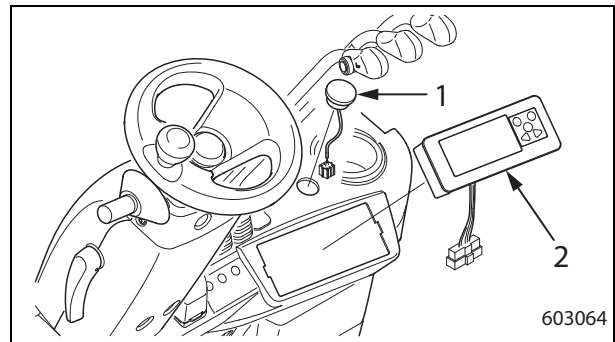
Removal of parking switch, Battery disconnect switch, Meter panel and lighting switch

- (1) Remove the kick panel.
- (2) Disconnect the harness connector of the parking switch, and remove the switch.
- (3) Disconnect the harness connector of the lighting switch (rear work lamp), and remove the switch.



1. Kick panel
2. Parking switch
3. Lighting switch (Rear work lamp) [OP]

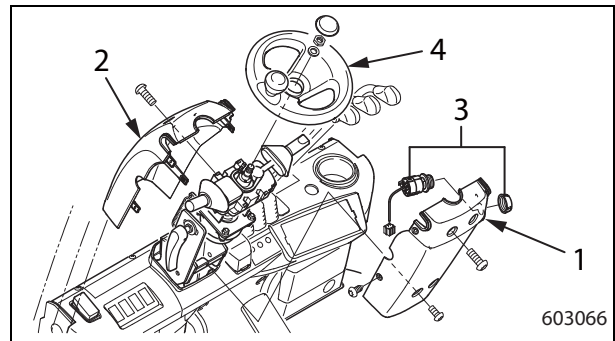
- (4) Disconnect the harness connector of the Battery disconnect switch, and remove the switch.
- (5) Disconnect the harness connector of the Meter panel, and remove the Meter panel.



1. Battery disconnect switch
2. Meter panel assembly

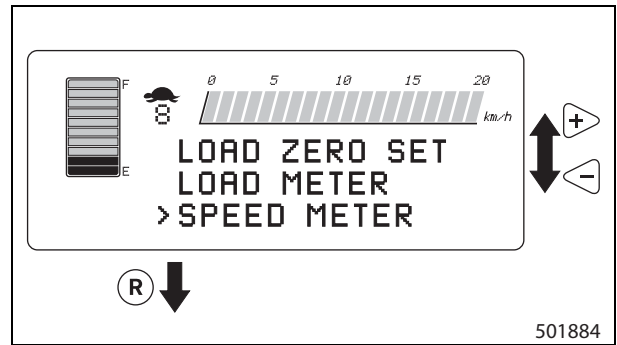
Disassembly of key switch and combination switch

- (1) Remove the column panel (1) and (2).
- (2) Disconnect the harness connector of the key switch, and remove the switch.
- (3) Remove the steering wheel assembly.



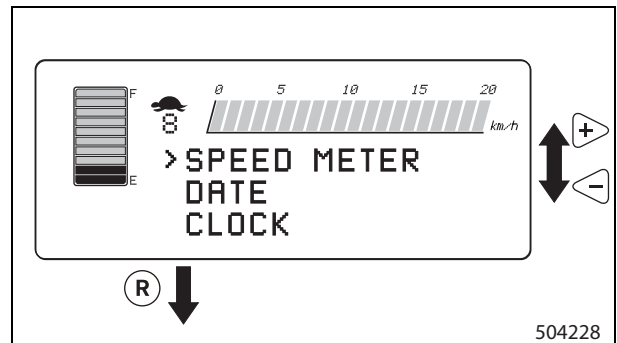
1. Column panel (1)
2. Column panel (2)
3. Key switch
4. Steering wheel assembly

- (5) Move the cursor to "SPEED METER" by pushing ◀ or ▶ button.



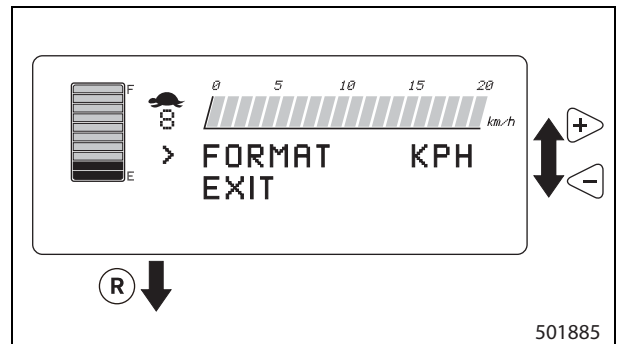
Screen 4

- (6) Move the cursor to "SPEED METER" by pushing ◀ or ▶ button.



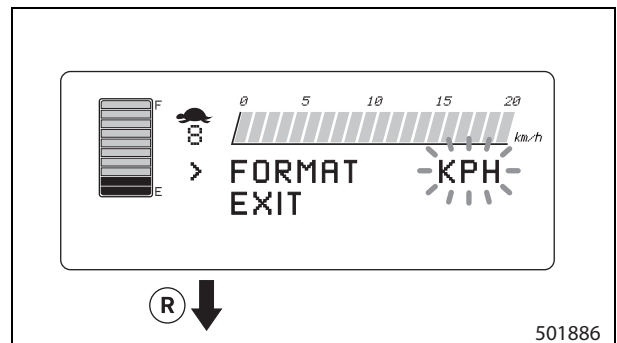
Screen 4

- (7) Push (R) button. Then screen 5 appears.
 (8) Select the operation by pushing ◀ or ▶ button.



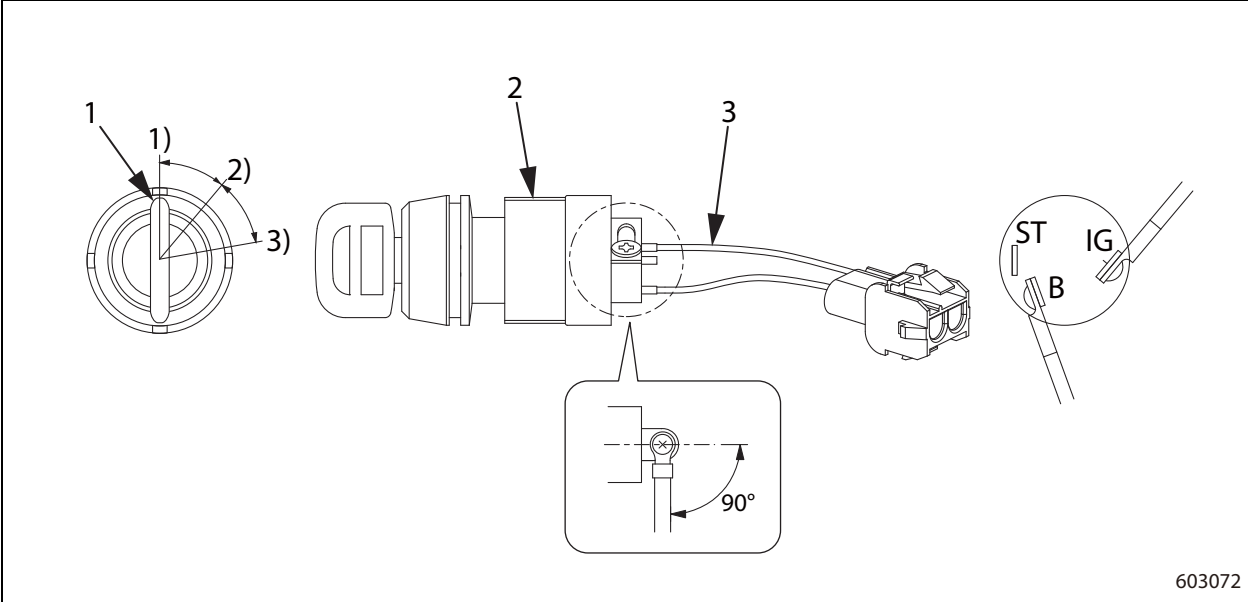
Screen 5

- (9) Push (R) button, and screen 6 appears. The current unit is blinking.



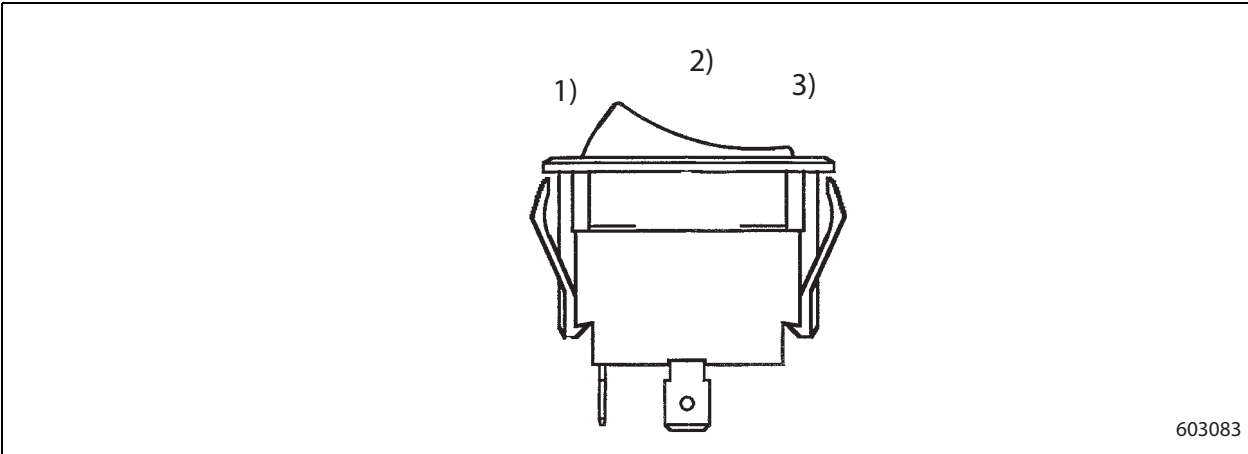
Screen 6

5. Key Switch



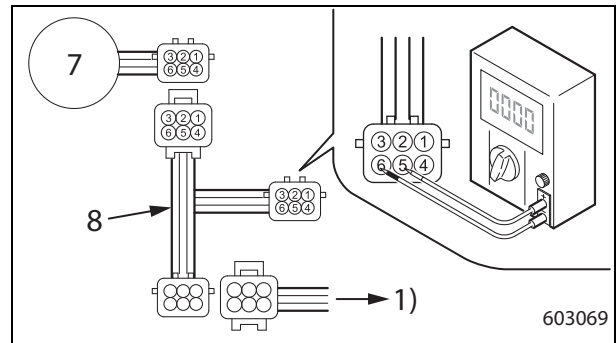
- 1. Key
- 2. Key switch
- 3. Key harness
- 1) OFF position
- 2) ON position
- 3) ON (START) position

6. Lighting Switch (Rear Work Lamp)



- 1) OFF position
- 2) ON position
- 3) ON position

- (2) Turn the key switch to the OFF position.
- (3) Unplug the connector of the potentiometer.
- (4) Insert the adapter for easy adjustment, then connect the potentiometer again.
- (5) Turn the key switch to the ON position.
- (6) Apply DC 5 ± 0.5 V voltage between Red (+) and Black (GND).
- (7) Measure the voltage at following sections.
 - Between White (OUT 1) and Black (GND)
 - Between Blue (OUT 2) and Black (GND)
- (8) So that the voltage of both sections is 3.10 V or more, adjust dimension 4) of the truss screw.

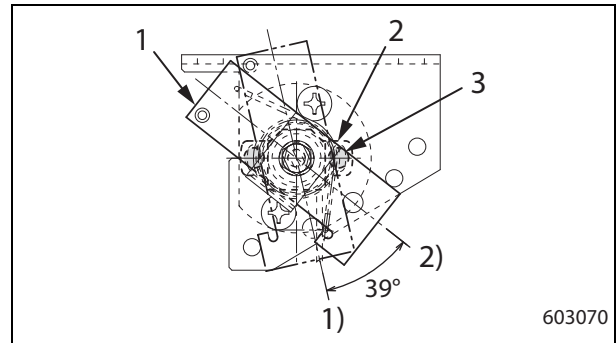


- | | |
|------------------------|--------------------|
| 1. Blank | 6. White (OUT 1) |
| 2. Blue (OUT 2) | 7. Potentiometer |
| 3. Red (+) | 8. Adapter |
| 4. Green (Ground line) | 1) To body harness |
| 5. Black (GND) | |

| Specified dimension | | |
|---------------------|--------------------|--------------------------------------------------|
| 4) | Truss screw length | Approximately 27 mm (Approximately 1.063 in.) |

Adjusting potentiometer

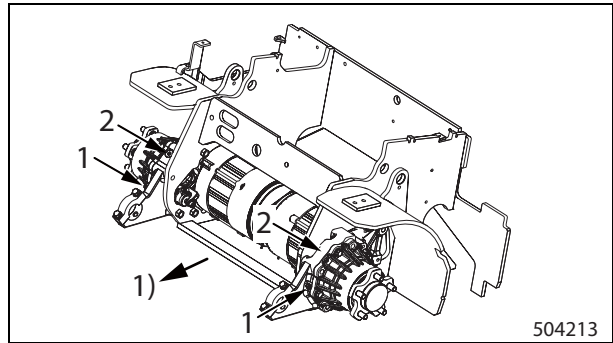
- (1) Perform the step 2 to 7 in Accelerator linkage adjustment procedure.
- (2) So that the voltage of both sections is as follows, adjust the mounting angle of the potentiometer by using the flat head screw.



- | | |
|--------------------|----------------------------------|
| 1. Lever | 1) At lever rotated 39° position |
| 2. Potentiometer | 2) At pedal release position |
| 3. Flat head screw | |

| Specified voltage | | |
|-------------------|-------------------------------|-------------------------------------------------------|
| 1) | At lever rotated 39° position | More than 3.20 V and less than 4.50 V |
| 2) | At pedal released position | $0.7 \times V_i / 5.0 \pm 0.1$ V Vi: Apply voltage |

- (2) Bleed the brake oil line.
(See "BRAKE SYSTEM".)
- (3) Pour oil into the transfer cases:
Remove oil level plug.
Remove oil filler plug.
Pour appropriate oil from the oil inlet. Make sure the oil fills up to the level plug.
Tighten the oil level and inlet plugs.



1. Oil level plug
2. Oil filler plug
1) Front of Vehicle

| Item | Value |
|--------------|-----------------------------|
| Oil quantity | 0.53 liter (0.14 U.S. gal.) |

5. Removing Gear Pump

5.1 Preparation

Before disconnecting the hydraulic hoses and pipes, release internal oil pressure as following.

- (1) Sit on the seat and turn the key switch to the ON position.

Note: You must sit on the seat. Otherwise, the mast is not operated because of the Mast Interlock System.

- (2) Push the lift lever forward to lower the fork on the ground.
- (3) Repeat pushing forward and releasing the lift lever a few times between lowering and neutral positions to release the internal pressure.

Note: Do not pull the lift lever nor operate any other hydraulic levers. (If the hydraulic motor runs, high pressure is applied to all hydraulic circuits.)

- (4) Turn the key switch to the OFF position and disconnect the battery plug/connector.

⚠ WARNING

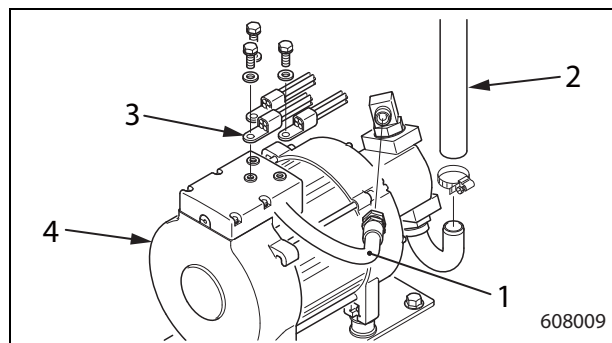
Prepare a drip pan to catch remaining oil in the pipes and hoses before disconnecting each pipe. Further, take appropriate measures for the connections of pipes and control valves to prevent dust and dirt from entering in the opening.

5.2 Suggestions for Removal

⚠ CAUTION

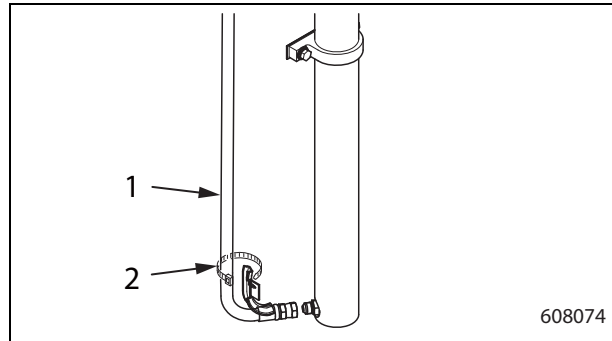
- Record places of the lead wire connections before removal.
 - Do not disassemble the gear pump.
- When damaged, replace the whole gear pump assembly.

- (1) Remove the floor plates.
 - (2) Disconnect following hoses from the gear pump.
 - High-pressure hose (from the control valve)
 - Low-pressure hose (from the hydraulic tank)
- Note: Prepare a drip pan to catch remaining oil inside the hoses.
Plug the hose openings to prevent from leaking.
- (3) Disconnect lead wires of the pump motor.



- | | |
|-----------------------|---------------|
| 1. High-pressure hose | 3. Lead wires |
| 2. Low-pressure hose | 4. Pump motor |

- (3) Disconnect the high-pressure hose from the first cylinder.

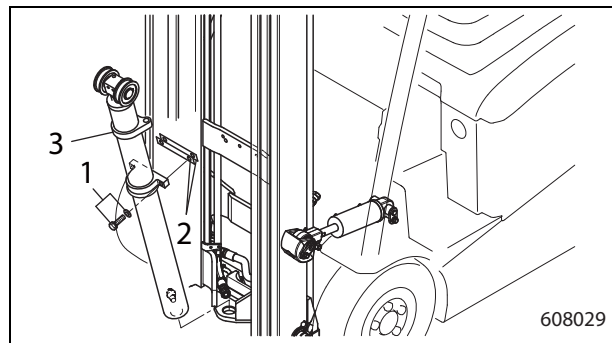


1. High-pressure hose 2. Hose clamp

Tightening torque for high-pressure hose

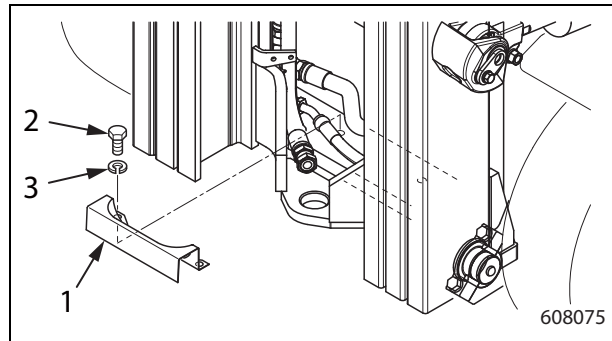
$58.8 \pm 5.9 \text{ N}\cdot\text{m}$ ($6.0 \pm 0.6 \text{ kgf}\cdot\text{m}$) [$43.4 \pm 4.4 \text{ lbf}\cdot\text{ft}$]

- (4) Hitch a sling to the first lift cylinder, and suspend the cylinder with a hoist. Wind the sling securely around the lift cylinder to prevent slipping.
 (5) Remove the washer assembled bolts, and gently dismount first lift cylinder.



1. Washer assembled bolt 3. First lift cylinder
 2. Shim

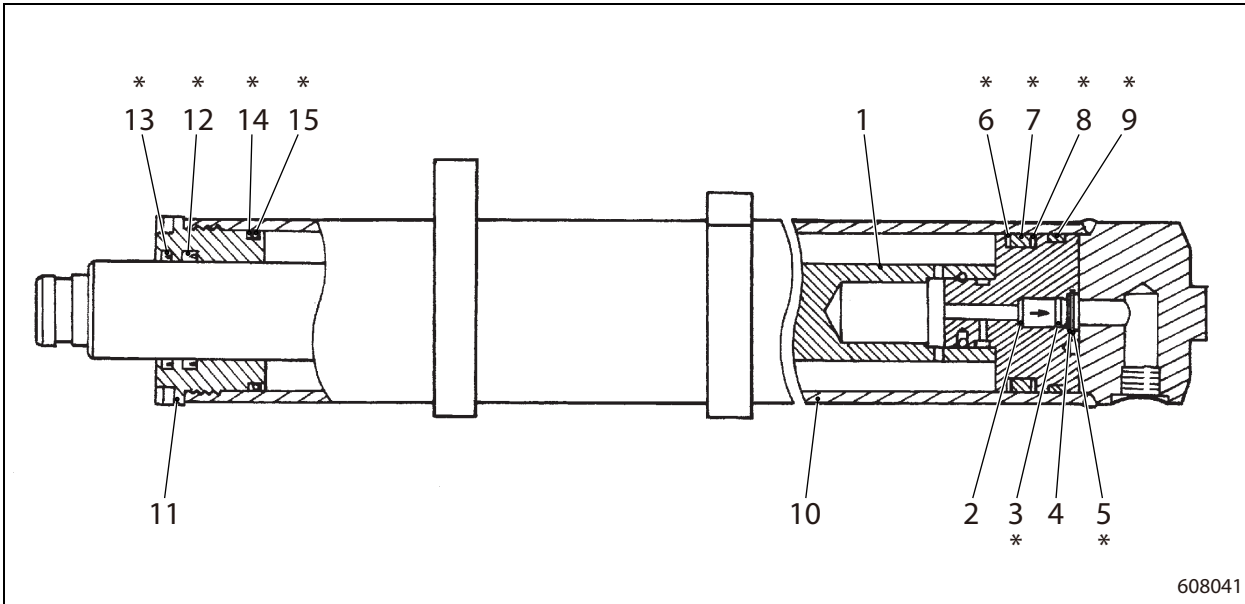
- (6) Remove the hose guard.



1. Hose guard 3. Spring washer
 2. Bolt

- (7) Remove the hose clamp.
 (8) Disconnect the hydraulic piping at the joints indicated by arrows. Use a drip pan to catch oil flowing out of the hoses.

Duplex Mast, Triplex Mast First Lift Cylinder

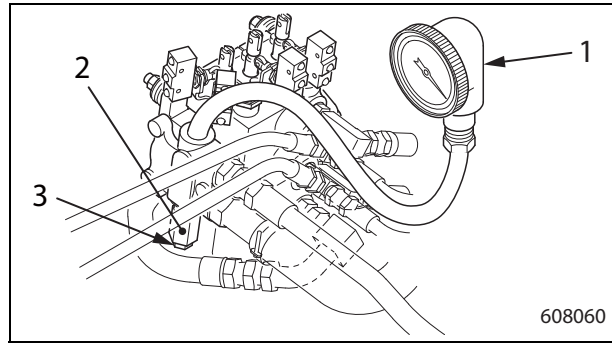


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- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Piston rod, Piston Install parts 2 through 9 to part 1. 2. Check valve 3. O-ring* 4. Washer 5. Circlip* 6. Nylon ring* 7. Piston seal* 8. Nylon ring* | <ol style="list-style-type: none"> 9. Wear ring* 10. Cylinder shell 11. Retainer Install parts 12 through 15 to part 11. 12. Rod seal* 13. Wiper* 14. Backup ring* 15. O-ring* |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Note: The part marked with * is included in the seal kit.

- (4) Turn the key switch to the ON position, and pull the lift lever to the top end.
- (5) Read the indication of the pressure gauge with pulling the lift lever.



1. Pressure gauge
2. Main relief valve
3. Adjusting screw

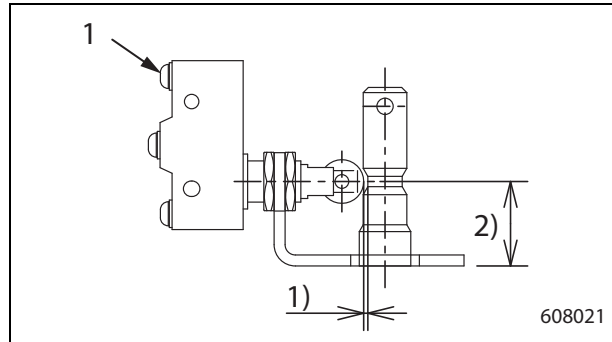
| Item | Standard |
|--------------------------------|-----------------------------------------------------------|
| Main relief valve set pressure | 18.1 MPa (184.57 kgf·cm ²) [2625.2 psi] |

- (6) If the relief pressure is out of this specification, loosen the locknut of the relief valve, and while observing the gauge indication, adjust the pressure using the adjusting screw.
- (7) While pressing the adjusting screw, tighten the locknut securely.
- (8) After tightening the locknut, check the set pressure of the relief valve again.

17.4 Adjusting Microswitch

Microswitches of low-speed lift, tilt and attachment

- (1) Adjust the microswitch position to activate the switch when the spool moves from 0.7 mm to 1.2 mm from the NEUTRAL position. (the lever is moved from 15 to 25 mm at the top of the lever from the NEUTRAL position.)
- (2) After adjustment, apply THREEBOND [#1401] or an equivalent product on both fixing nuts of the switch.



1. Microswitch

| Ref. | Item | Standard |
|------|--------------------------------------------------------|---------------------------------------|
| 1) | Dimension with the hydraulic lever in NEUTRAL position | 0.1 to 0.6 mm (0.004 to 0.024 in.) |
| 2) | | 24.6 mm (0.969 in.) |

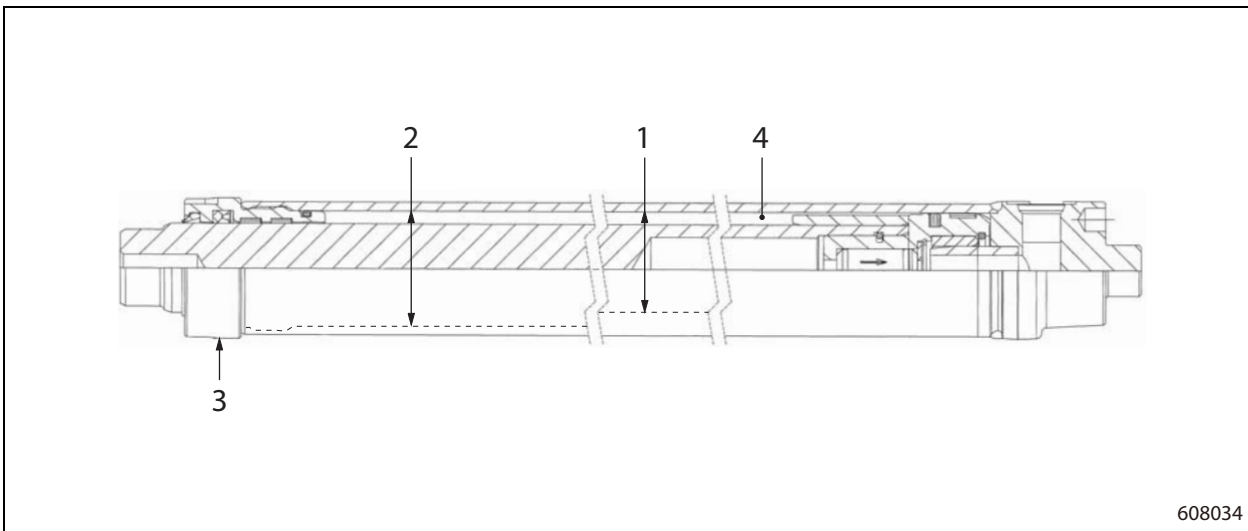
20.2 Control Valve (MC)

| Ref. | Item | | Specified value |
|------|---------------------------|----------|-----------------------------------------------------|
| - | Rated flow rate | Standard | 60 L/min (3661.98 cu.in/min) [15.85 U.S.gal./min] |
| - | Main relief valve setting | Standard | 18.1 MPa (184.57 kgf·cm ²) [2625.2 psi] |

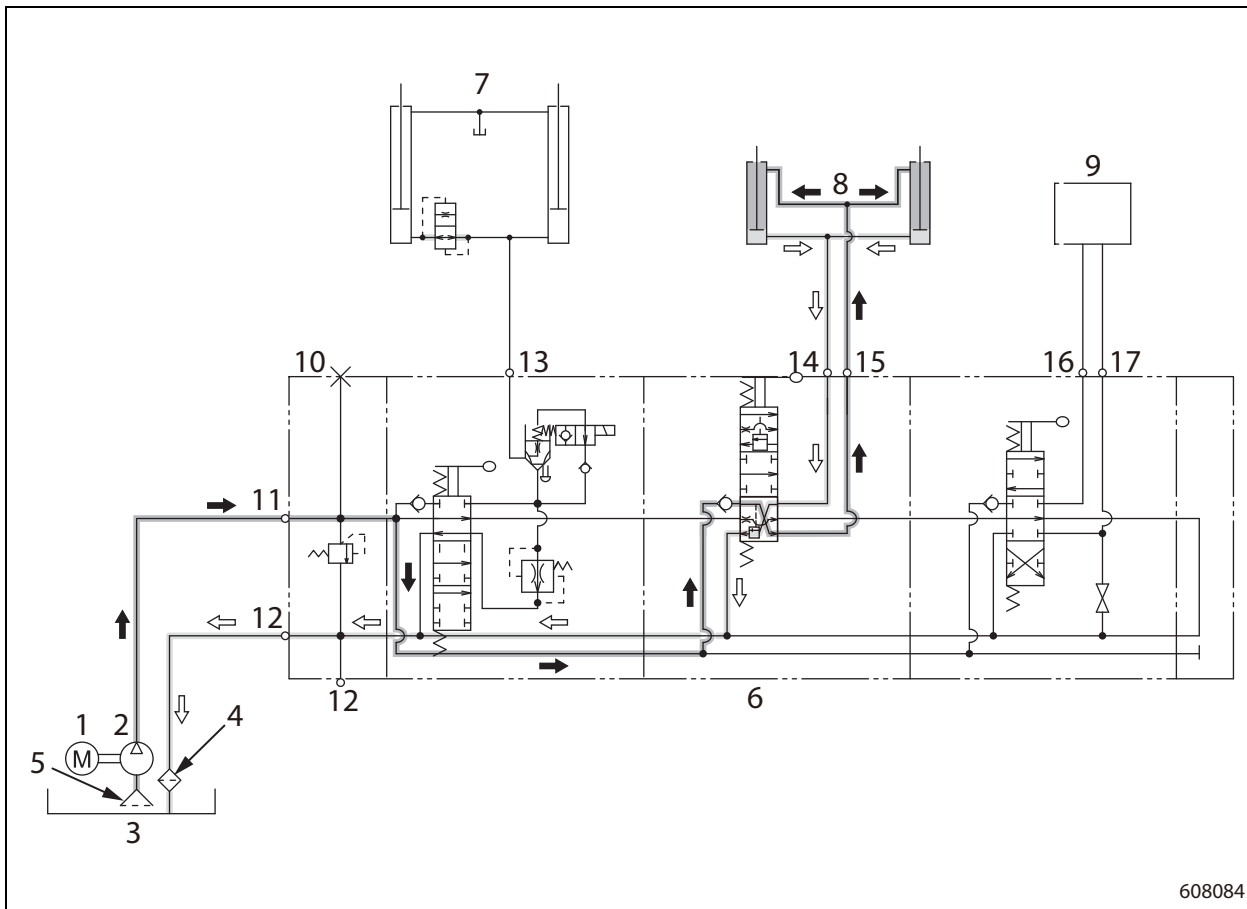
20.3 Lift Cylinder

Lift Cylinders (Simplex Mast, Triplex Mast Second Cylinder)

| Ref. | Item | | Specified value |
|------|--------------------------------|----------|-------------------------------------------------------------------|
| 1 | Inside diameter of cylinder | Standard | 45 mm (1.77 in.) |
| 2 | Outside diameter of piston rod | Standard | ø35 mm (1.38 in.) |
| 3 | Tightening torque for retainer | Standard | 170 to 240 N·m (17.3 to 24.5 kgf·m) [125.4 to 177.0 lbf·ft] |
| 4 | Amount of hydraulic oil | Standard | 57 cc (3.48 cu.in.) |



Tilt Backward



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- | | |
|-----------------------------------------|-----------------------------|
| 1. Pump motor | 10. Gauge port |
| 2. Gear pump | 11. Pump port |
| 3. Hydraulic tank | 12. Tank port |
| 4. Return filter | 13. A1 port (lift cylinder) |
| 5. Suction filter | 14. B2 port (tilt forward) |
| 6. Control valve | 15. A2 port (tilt backward) |
| 7. Lift cylinder with down safety valve | 16. B3 port (attachment) |
| 8. Tilt cylinder | 17. A3 port (attachment) |
| 9. Attachment | |

Bleed-off Valve Operation in Relation to Load Pressure

- (1) The FC hydraulic system consists of the following main circuits:
 - Circuit for lift tilt / attachment
- (2) The bleed-off valve for the lift/tilt / attachment circuit is incorporated in the inlet section.
- (3) Bleed-off valve 6 is a pressure control valve that creates a constant flow amount by making constant the difference in static pressure between the upstream side and downstream side of the throttle of the lift/tilt/attachment valve spool. (The flow amount is a product of the throttle flow amount and opening area of the throttle.)
- (4) The static pressure of oil flowing through the throat (throttle) of the lift/tilt/attachment valve is led through load pressure oil passage 2 to bleed-off valve.

The diagram on the preceding page shows the tilt spool, bleed-off valve and shuttle valve in the states in which they are placed when the joystick is placed in the "tilt backward" position.

The tilt spool is moved right, allowing the hydraulic oil in the supply oil passage 1 to flow to passage 4.

The hydraulic oil then pushes up the check valve of tilt lock valve 3 to open its way to the rod end of the tilt cylinder. The mast is tilted backward as a result.

The load pressure oil in passage 2 is led from passage 4 which constitutes a throttle, so its pressure is the static pressure of the hydraulic oil flowing through the throttle.

The load pressure oil flows to shuttle valve 5.

Shuttle valve 5 selects the high pressure oils that enter from port A and port B and allows the selected oil to flow out to port C.

In the shown case where hydraulic supply oil is flowing to the tilt cylinder, the pressure of the tilt load pressure oil in port B is higher than that of attachment load pressure oil in port A.

The hydraulic oil from port B pushes down the steel ball in valve 5 and closes port A while opening the passage from port B to port C.

The load pressure oil of port B flows to port C, then pilot oil flows from there to the chamber of bleed-off valve 6.

In bleed-off valve 6, the position of spool 8 is determined by the balance of different forces as follows:

- The hydraulic oil in supply passage 1 (with a pressure equal to that of the oil in the passage before the throttle) enters chambers 11, pushing spool 8 to right and attempting to make part of the oil in passage 1 flow into passage 10.
- The load pressure in chamber 7 and spring 9 together push spool 8 left, preventing the hydraulic oil in passage 1 from flowing into passage 10. Spool 8 is settled in a position where the pressure in chamber 11 (pressure before throttle) balances with the combined force of spring 9 and pressure in chamber 7 (pressure after throttle). The bleed-off valve maintains a constant pressure difference in the following process.

When the pressure difference is too large: Too large pressure difference means that too large an oil amount is supplied to the actuator.

Spool 8 then moves right to allow the hydraulic oil in oil supply passage 1 to flow into passage 10.

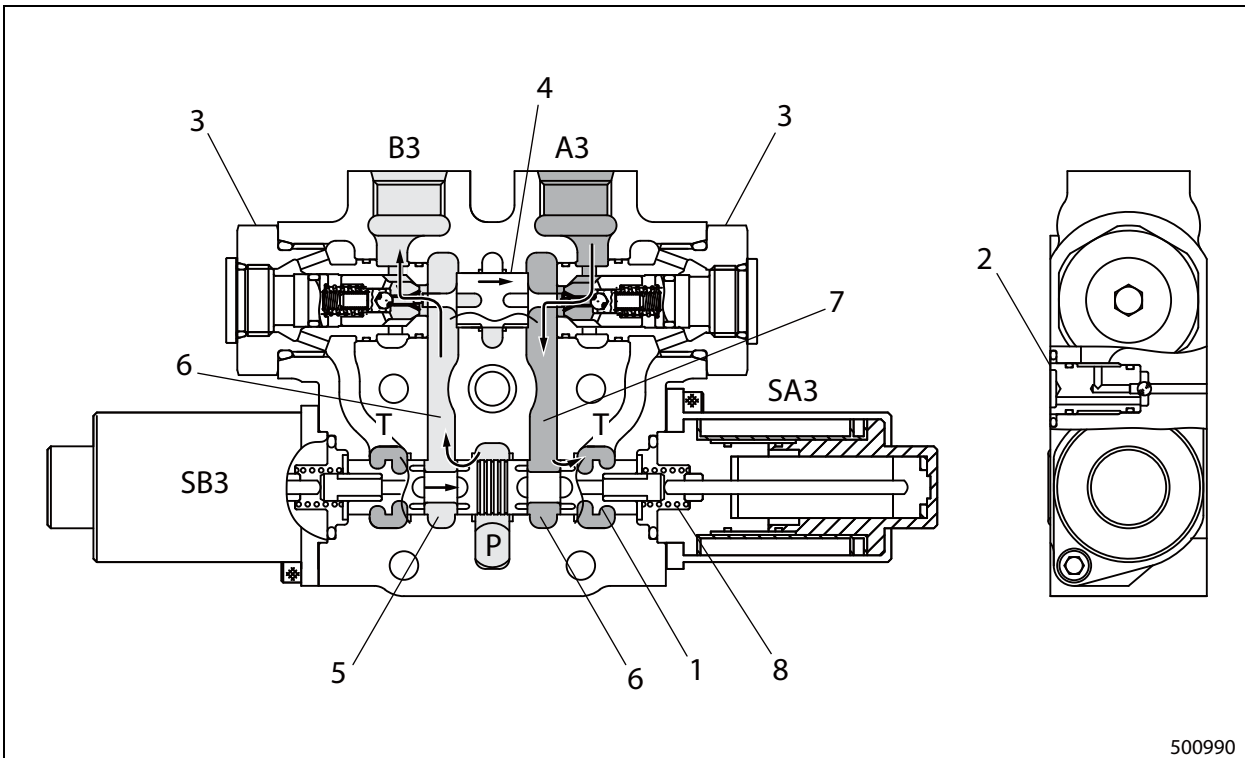
This reduces the amount of supply oil and thus reduces the pressure difference.

When the pressure difference is too small: Too small pressure difference means that too small an oil amount is supplied to the actuator.

Spool 8 then moves left to reduce hydraulic oil flow from passage 1 into passage 10. This increases the amount of supply oil and thus increases the pressure difference.

Through the above process, the bleed-off valve keeps an constant oil amount passing through the throttle according to the position of joystick. Therefore, the hydraulic oil amount supplied to the cylinder is proportional only to the opening created by the spool of control valve that moves in proportion to the joystick movement. Pilot valve (relief valve) 12 serves as the lift/tilt or attachment circuit relief valve. When Pilot valve 12 opens, the load pressure is released. This causes spool 8 to move right and allows the hydraulic oil in passage 1 to flow into passage 10.

The set pressure of pilot valve 12 is 18.6 ± 0.2 MPa (189.67 ± 2.04 kgf/cm²) [2697.7 ± 29.0 psi] @40L/min both in lift/tilt and attachment circuits.



- | | |
|----------------------|-----------------------|
| 1. Attachment spool | 5. Passage to B3 port |
| 2. Shuttle valve | 6. Passage to A3 port |
| 3. Pilot check valve | 7. Spring |
| 4. Piston | 8. Spring |

Operation When SB3 Solenoid is Energized

When electromagnetic proportional solenoid valve (SB3) is energized, attachment spool 1 moves right and pushes spring 8.

In this movement, the hydraulic oil in oil passage P of attachment circuit flows to oil passage 5.

The hydraulic oil flows into oil passage 5, pushes up pilot check valve 3 and flows to B3 port.

The pressure of the hydraulic oil that comes out from the B3 port acts on the hydraulic actuator of the attachment.

The return oil from the hydraulic actuator enters the control valve through the A3 port, and then flows through pilot check valve 3 and passage 6 to the hydraulic tank.

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28.5 Suggestions for Disassembly

Lift valve

- (1) Place the spool horizontally on the workbench.
- (2) Remove the electromagnetic proportional solenoid on both ends of spool by unscrewing them using a hexagon wrench engaged in the socket in each of their heads. Be careful not to drop the valve in spool.
- (3) Remove the spring and plane washer.
- (4) Carefully pull-out the spool from valve housing, then pull-out the valve from spool.

Bleed-off valve

- (1) Remove socket head plug, and remove the spool.
- (2) Remove socket head plug, and remove the spring. If necessary, disassemble the bleed-off valve further.

Flow control valve

(Pressure-compensated flow control valve)

Same to the bleed-off valve.

If necessary, disassemble the flow control valve further.

Lift lock valve

Do not remove the lift lock valve unless it is absolutely necessary. (Assembling is difficult.)

If removal is necessary for inspection or other purposes, follow the instructions below:

- (1) Remove the body of lift lock valve as an assembly.
- (2) Remove the valve and spring from the housing.

Shut-off valve assembly

Do not remove the shut-off valve unless it is absolutely necessary.

If removal is necessary for inspection or other purposes, follow the instructions below:

- (1) Loosen the locknut of shut-off valve and loosen the set screw.
- (2) Remove the valve from the housing.

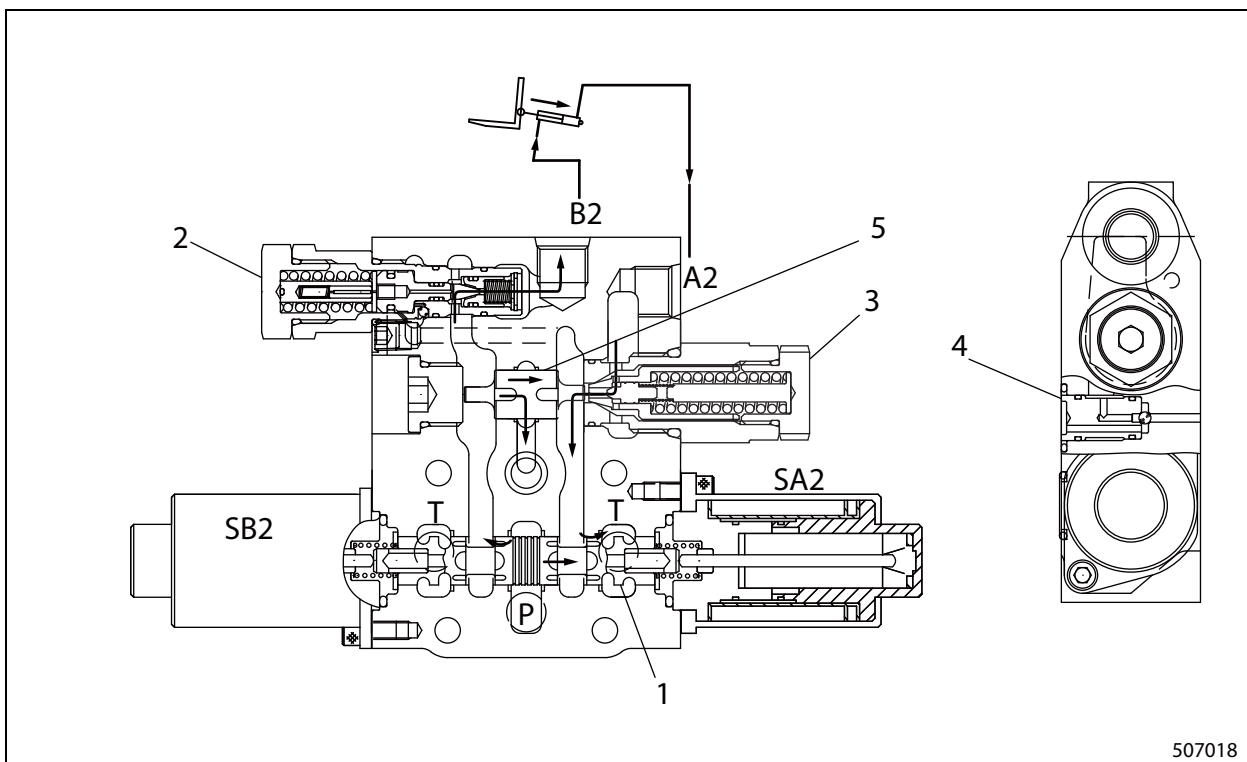
Relief valve

Remove the relief valve assembly from the valve body. Do not loosen the adjusting screw unless it is absolutely necessary. Loosening adjusting screw will change the setting, and re-adjustment will be required.

Surge cut valve

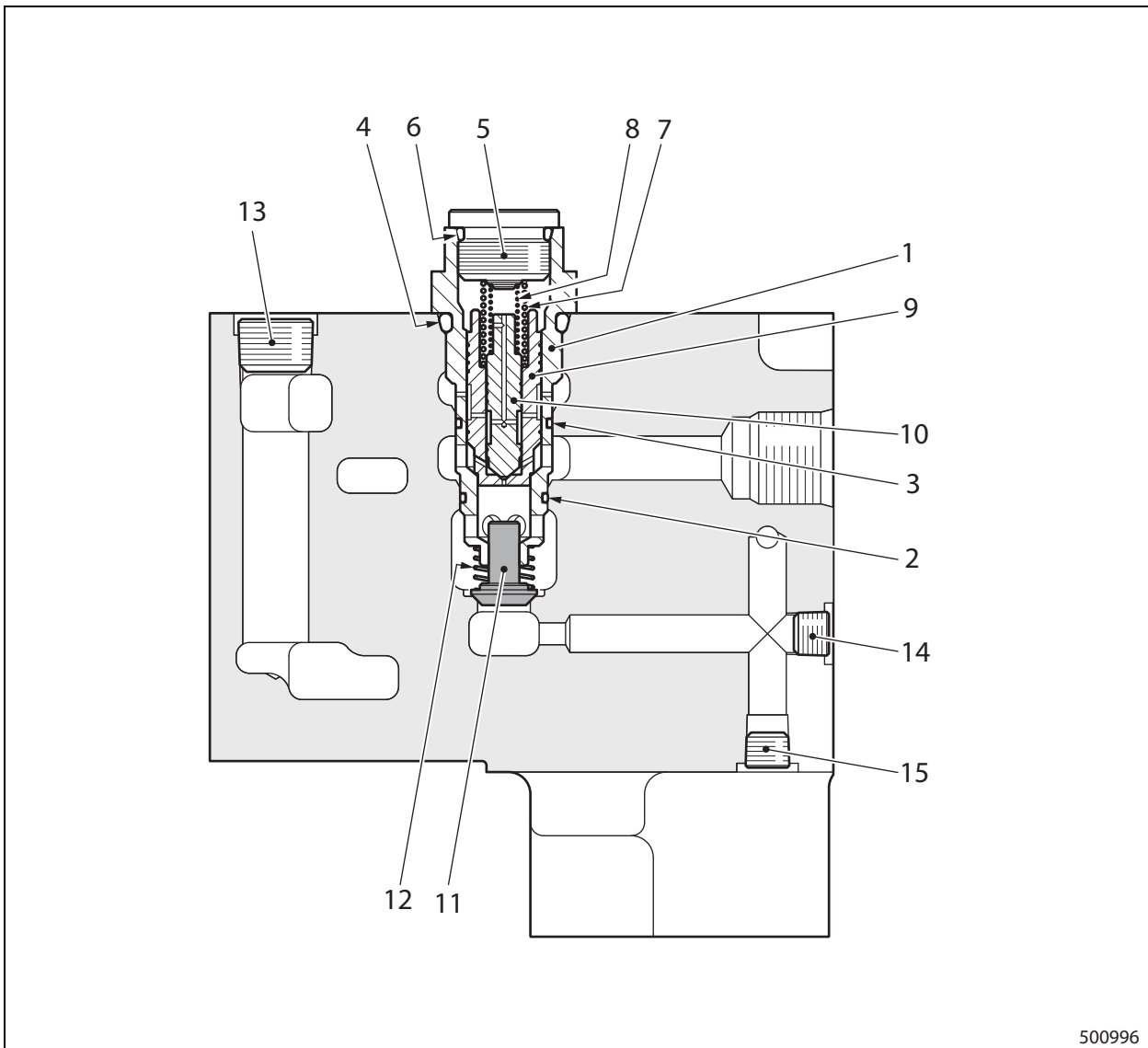
Remove the surge cut valve assembly from the valve body. Do not disassemble the surge cut valve assembly unless it is absolutely necessary. Disassembling the surge cut valve will change the setting, and re-adjustment or replacement will be required.

29. Valves Included in Tilt Section



- | | |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Tilt spool 2. Tilt lock valve | <ol style="list-style-type: none"> 3. Pilot check valve 4. Shuttle 5. Piston |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|

37.2 Disassembly Sequence

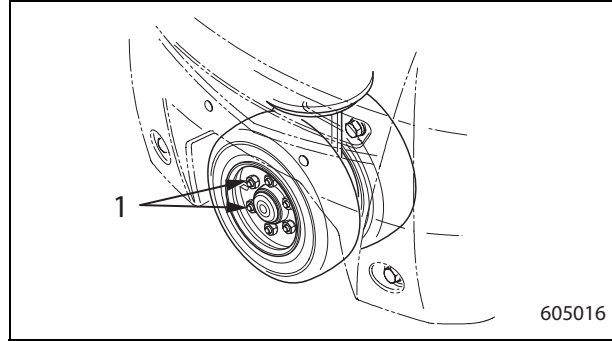


- | | |
|-----------|------------|
| 1. Body | 9. Poppet |
| 2. O-ring | 10. Valve |
| 3. O-ring | 11. Valve |
| 4. O-ring | 12. Spring |
| 5. Plug | 13. Plug |
| 6. O-ring | 14. Plug |
| 7. Spring | 15. Plug |
| 8. Spring | |

⚠ CAUTION

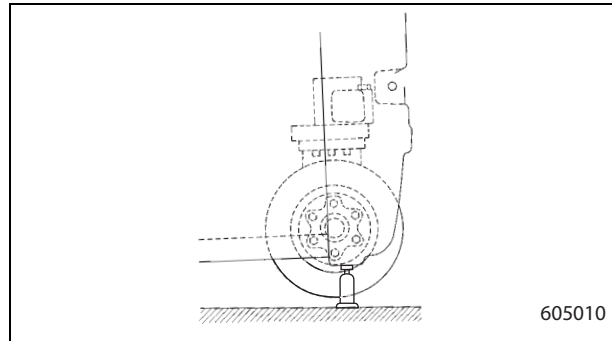
- Lift or jack up the lift truck and support it with safety blocks or rigid stands.
- Apply wheel chocks to front tires to prevent the lift truck from moving.

- (1) Push the parking brake switch, and place wheel stoppers at the front wheels.
- (2) Turn the key switch to the ON position.
- (3) Turn the steering wheel to either the right or the left, and locate the hub nut on the one side of the vehicle where it is visible from the rear.
- (4) Loosen the hub nut by turning it two or three rotations.
- (5) Turn the steering wheel to the opposite direction, and loosen the hub nut on the opposite side by turning it two or three rotations.

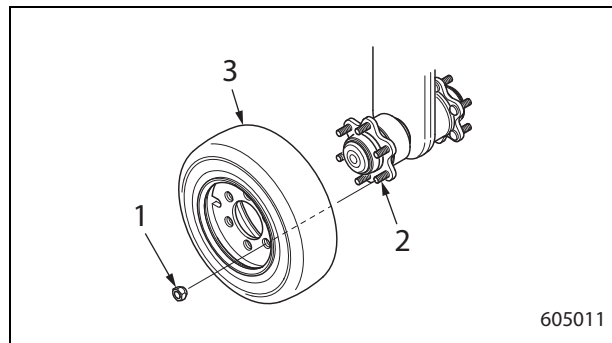


1. Hub nut

- (6) Turn the key switch to the OFF position, and lift the back of the vehicle until the rear tires are off the ground.
 - Place a jack under the counterweight, and lift.
 - Attach a wire rope to the draw bar pin and lift with a crane.
- (7) After the back of the vehicle is lifted, place jack stands under the frame on both sides at the rear as a safety measure.

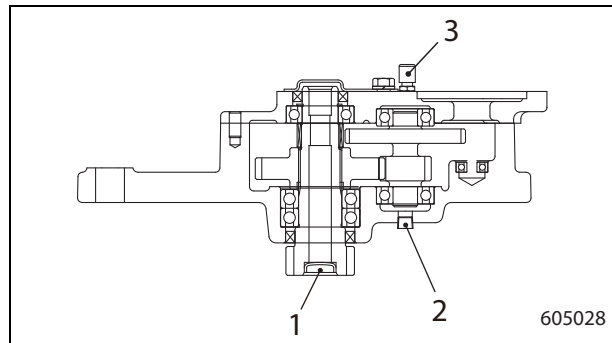


- (8) Turn the key switch to the ON position, turn the steering wheel, and remove the right and left tires.
- (9) Turn the key switch to the OFF position.

1. Hub nut
2. Hub bolt

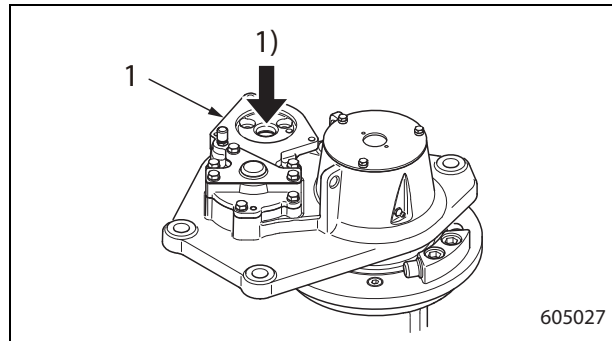
3. Rear wheel

- (2) When installing screw plugs and breather
- Apply seal tape on the thread.



1. Screw plug
2. Screw plug
3. Breather

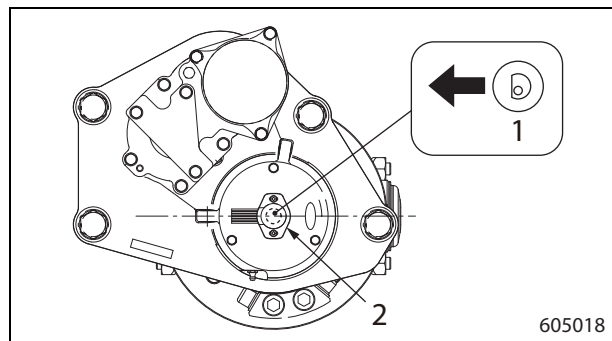
- (3) When installing EPS cover
- Apply THREEBOND #1212 (or equivalent) on the surface contacting the rear axle support.
 - Fill the following gear oil.



1. EPS cover
1) Fill the gear oil

| Oil | Volume |
|---------------------|---------------------------|
| HE#80 or equivalent | 0.35 liter (0.09 U.S.gal) |

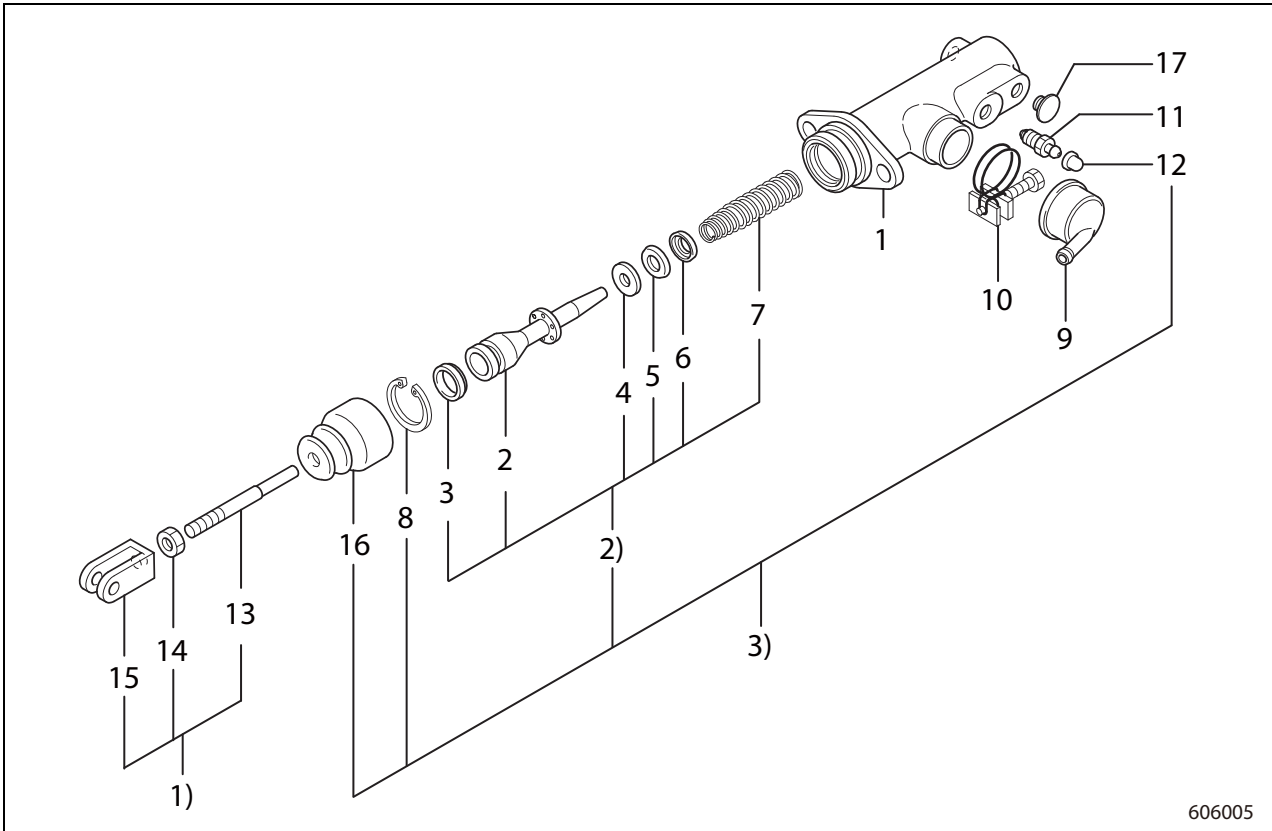
- (4) When installing EPS motor
- Apply THREEBOND #1212 (or equivalent) on the surface contacting the EPS cover.
- (5) When installing stopper and stopper bracket
- Apply LOCTITE #242 (or equivalent) on the stopper and mounting screws.
- (6) When installing potentiometer and potentiometer cushion
- Install it in the shown direction in right-hand figure.



1. Potentiometer cushion
2. Potentiometer

4. Disassembling Master Cylinder

4.1 Disassembly Sequence



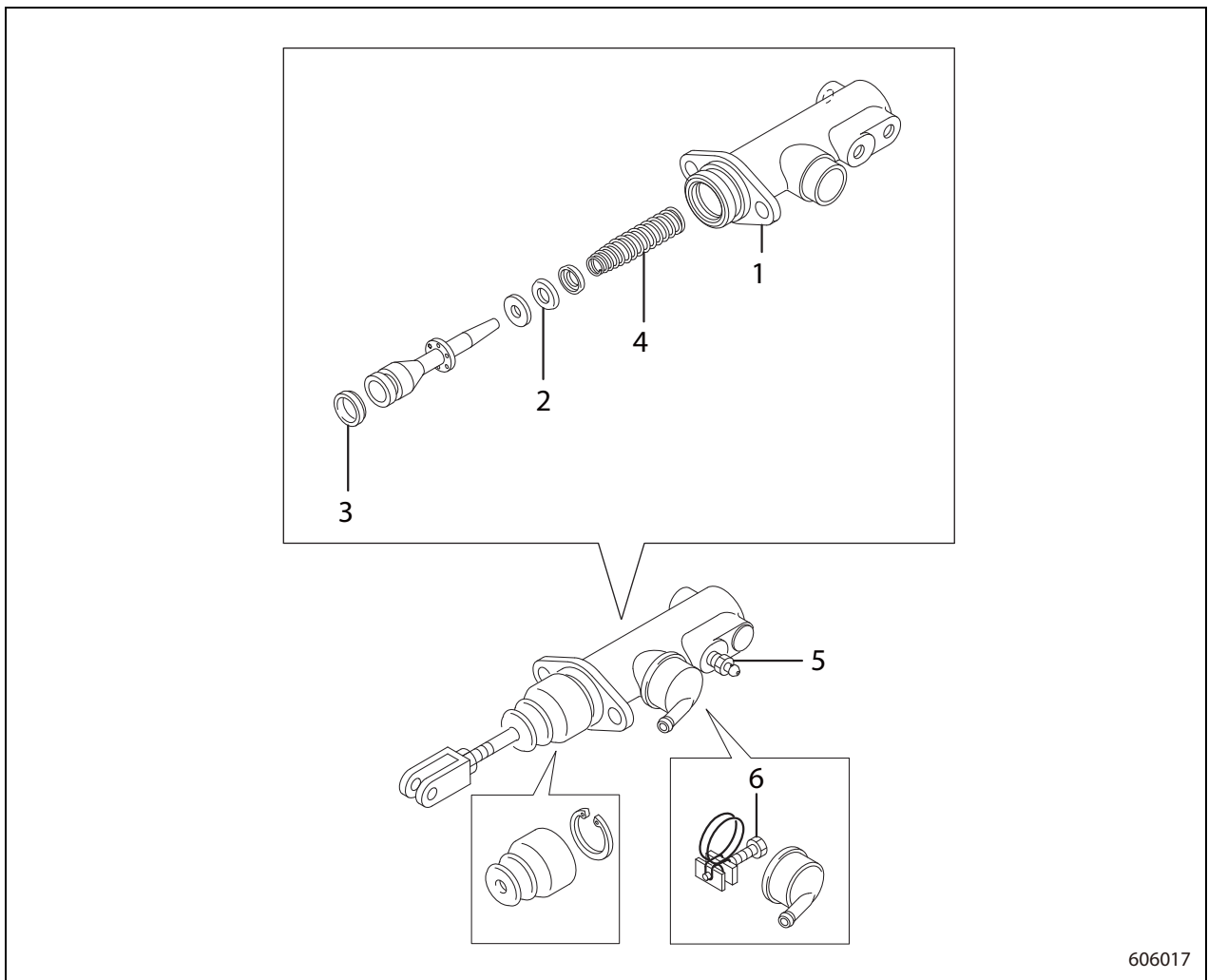
606005

- | | |
|------------------|----------------------|
| 1. Cylinder body | 11. Bleeder valve |
| 2. Piston | 12. Bleeder cap |
| 3. Secondary cup | 13. Push rod |
| 4. Spacer | 14. Nut |
| 5. Primary cup | 15. Yoke |
| 6. Thimble | 16. Boots |
| 7. Spring | 17. Cap |
| 8. Snapping | 1) Push rod assembly |
| 9. Union | 2) Piston assembly |
| 10. Clamp | 3) Cylinder assembly |

| Ref. | Clamp tightening torque |
|------|------------------------------------------------------------------|
| 10 | 1.96 to 2.94 N·m (20 to 30 kgf·cm) [14.75 to 22.13 lbf·ft] |

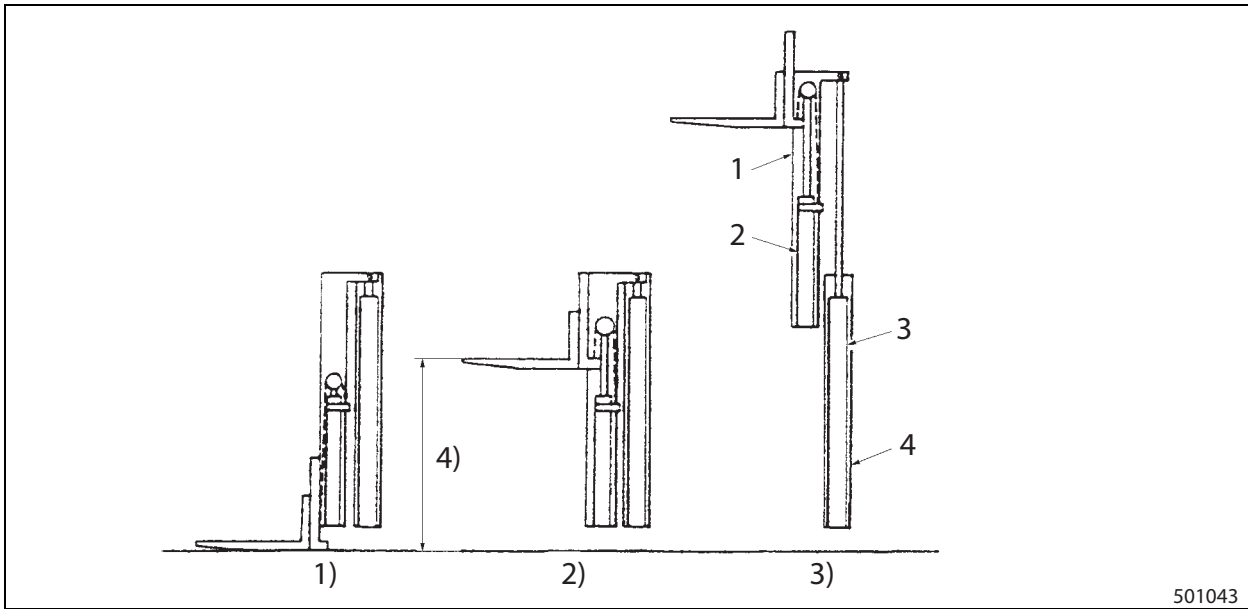
10.2 Master Cylinder

| Ref. | Item | | Specified value |
|------|-----------------------------------------|----------|------------------------------------------------------------|
| 1 | Cylinder body inside diameter | Standard | 19.05 mm (0.75 in.) |
| - | Maximum stroke | Standard | 30 mm (1.2 in.) |
| - | Clearance between cylinder and piston | Standard | Less than 0.02 to 0.105 mm (0.0008 to 0.0041 in.) |
| | | Limit | 0.2 mm (0.0079 in.) |
| 2 | Primary cup lip-side outside diameter | Standard | 19.8 ± 0.2 mm (0.78 ± 0.008 in.) |
| | | Limit | (Replace once a year.) |
| 3 | Secondary cup lip-side outside diameter | Standard | 20.1 ± 0.2 mm (0.79 ± 0.008 in.) |
| | | Limit | (Replace once a year.) |
| 4 | Return spring free-movement length | Standard | 83 ± 0.7 mm (3.27 ± 0.03 in.) |
| | | Limit | (Replace once a year.) |
| 5 | Tightening torque of bleeder valve | Standard | 6.9 to 8.8 N·m (70 to 90 kgf·cm) [51.63 to 66.38 lbf·ft] |
| 6 | Tightening torque of clamp bolt | Standard | 1.96 to 2.94 N·m (20 to 30 kgf·cm) [14.75 to 22.13 lbf·ft] |



606017

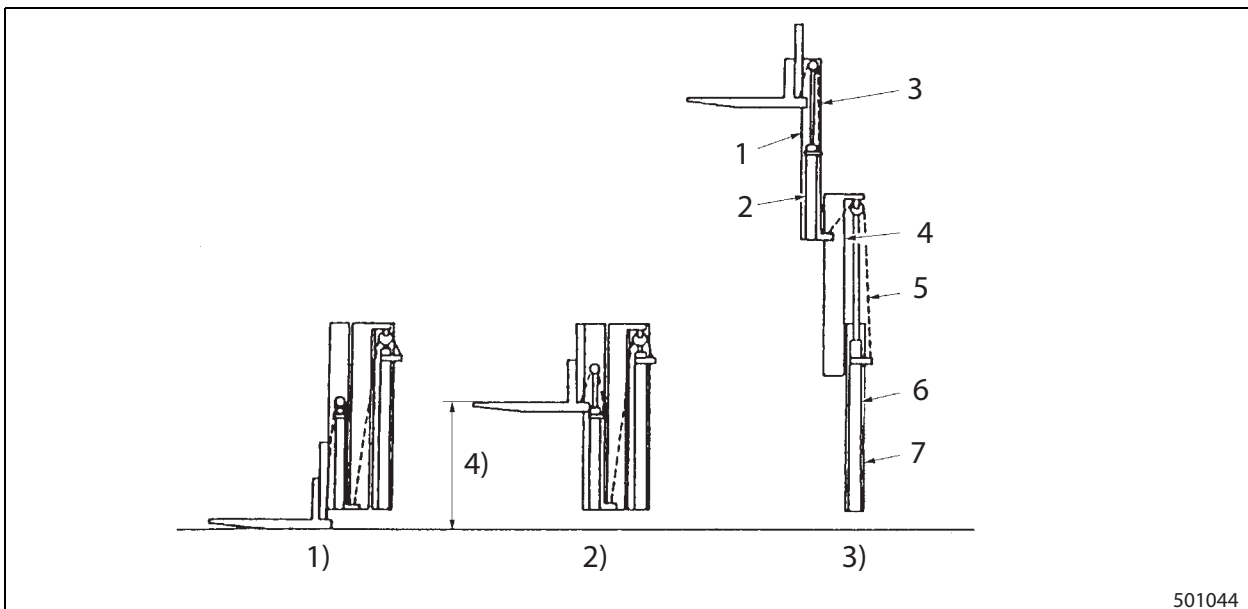
2.4 Operation of Duplex Mast



501043

- | | |
|-------------------------|------------------------|
| 1. Inner mast | 1) Forks on the ground |
| 2. First lift cylinder | 2) Maximum free lift |
| 3. Second lift cylinder | 3) Maximum lift |
| 4. Outer mast | 4) Free-lift height |

2.5 Operation of Triplex Mast



501044

- | | |
|-------------------------|------------------------|
| 1. Inner mast | 1) Forks on the ground |
| 2. First lift cylinder | 2) Maximum free lift |
| 3. First lift chain | 3) Maximum lift |
| 4. Middle mast | 4) Free-lift height |
| 5. Second lift chain | |
| 6. Second lift cylinder | |
| 7. Outer mast | |

| Item | Tightening torque |
|---------|-----------------------------------------------------------|
| Locknut | 98 to 147 N·m (10 to 15 kgf·m) [72.3 to 109 lbf·ft] |

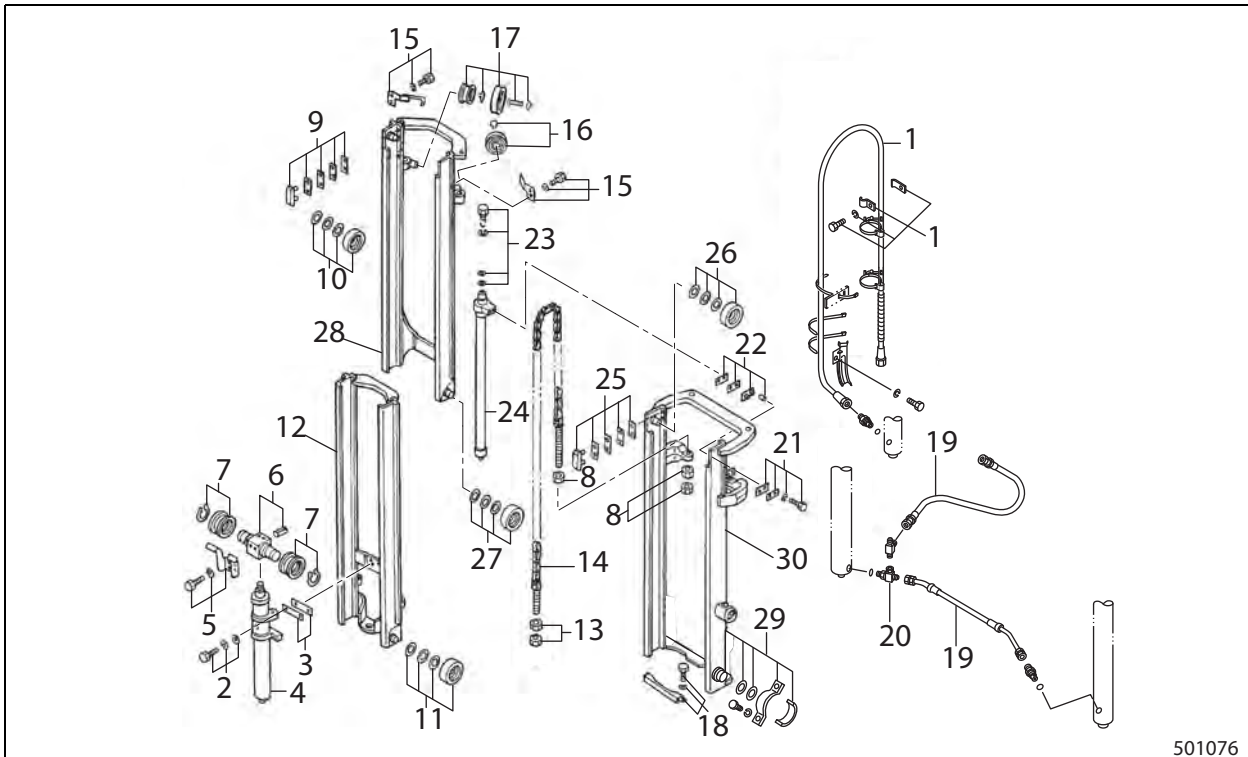
- (3) Air bleeding lift cylinders.
In the Duplex mast, only the second lift cylinders are provided with air bleeding valves.
The other lift cylinder does not require air bleeding since it is an internal drain type cylinder.
- (4) After proper operation is confirmed, check the oil level.

9. Disassembling Triplex Mast

Preparation

With the lift bracket side facing up, place the mast horizontally on wood blocks. Use a wood block as a wedge to prevent the inner and middle masts from sliding.

9.1 Disassembly Sequence

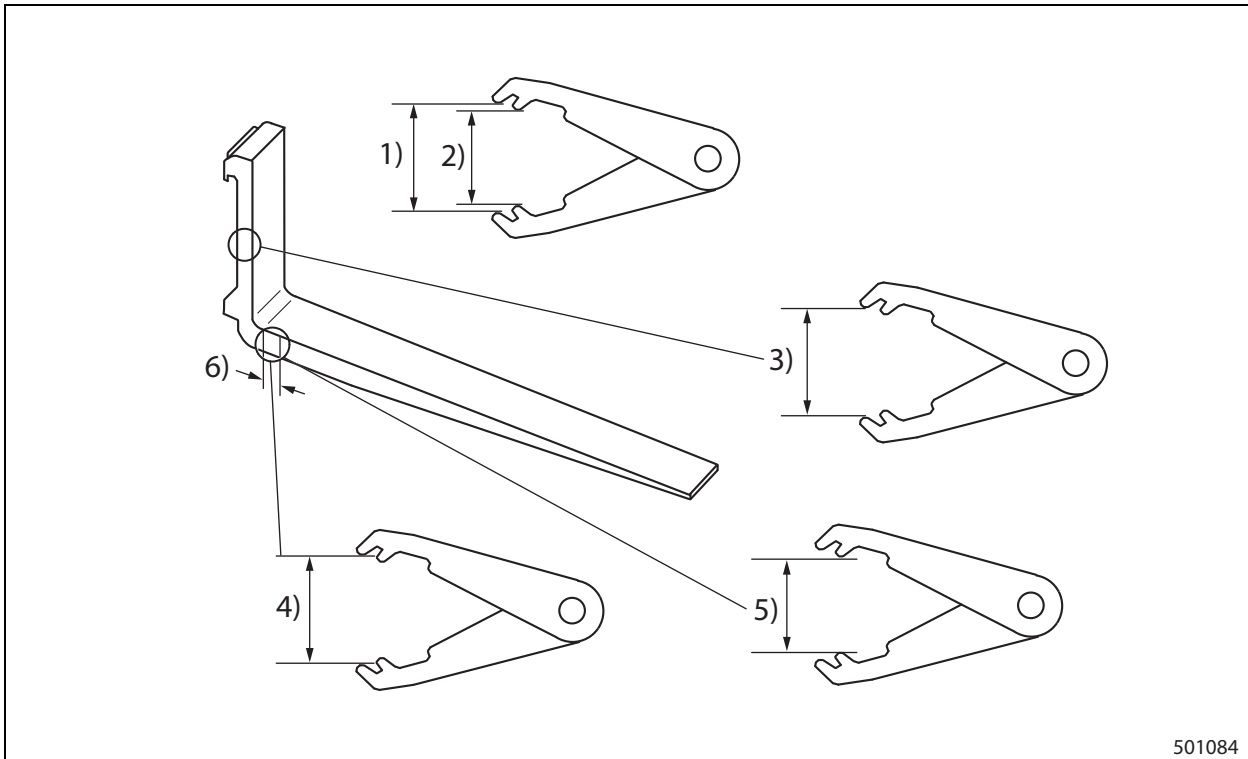


- | | |
|------------------------------------------------------|-------------------------------------------------|
| 1. Hose for first lift cylinder, Clamp, Bolt, Washer | 16. Chain wheel, Snapping |
| 2. Bolt, Washer | 17. Chain wheel, Hose pulley, Shaft, Snapping |
| 3. Shims | 18. Hose guard, Bolt, Washer |
| 4. First lift cylinder | 19. Hoses for lift cylinders, Down safety valve |
| 5. Chain guard | 20. T-Joint |
| 6. Chain wheel support, Pin | 21. Bolt, Seat, Cushion, Collar |
| 7. Chain wheels, Snap rings | 22. Cushion, Shims |
| 8. Nut (chain for second lift cylinder) | 23. Bolt, Washer, Shims |
| 9. Mast strip, Shims | 24. Second lift cylinder |
| 10. Main roller, Shims | 25. Mast strip, Shims |
| 11. Main roller, Shims | 26. Main roller, Shims |
| 12. Inner mast | 27. Main roller, Shims |
| 13. Nuts | 28. Middle mast |
| 14. Lift chain (for second lift cylinder) | 29. Mast Cap, Bolt, Washer, Shims |
| 15. Chain guard, Bolt, Washer | 30. Outer mast |

Note: For lift bracket disassembly procedure, refer to the simplex mast, as the procedure is the same.

13. Inspecting and Adjusting Mast and Forks

13.1 Forks (All Mast Models)



501084

- | | |
|--------------------------------------------|-----------------------------------------------------------------------|
| 1) Outside jaws 100% | 4) Fork OK |
| 2) Inside jaws 90% | 5) Replace fork with 10% wear (Not for use on full tapered forks.) |
| 3) New fork arm shank cross section = 100% | 6) 50 mm (2 in.) |

Fork calipers perform two tasks at once.

They measure the thickness of the fork arm shank and then automatically indicate what a 10% wear factor would be when the calipers are applied to the blade cross section.

Forks are often mistreated and forgotten. As insubstantial as they seem, neglecting forks could make them dangerous.

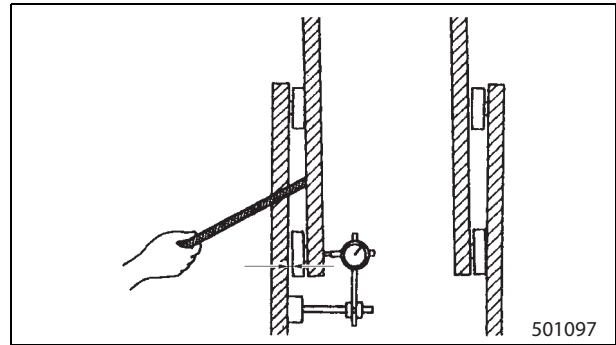
Forks carry larger loads than almost any lifting device but there are no mandatory requirements for maintenance or inspection.

You can find thousands of extra parts for lift trucks in some fleet repair shops, but you'll seldom see spare forks. Even when all the lift trucks on the fleet are the same, fleet maintenance managers rarely order spare forks. Forks last a long time if treated properly, but they can deceive by looking as good from most viewing angles when they are worn as when they are new.

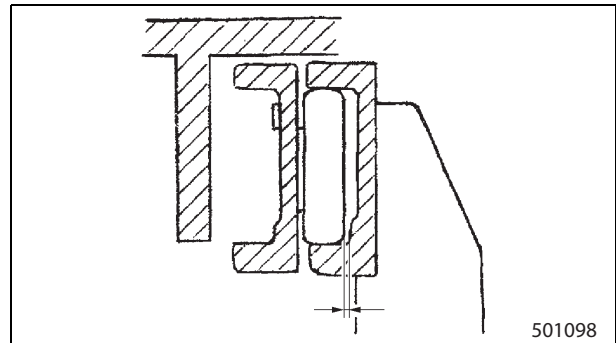
It's true that most forks are customized to the lift truck by model and capacity: they are big and heavy and thought of as indestructible. But forks can be abused or ruined in the course of daily work.

Lateral clearance adjustment on inner mast main rollers

- (1) Raise the mast to the top.
- (2) Set a dial indicator on the inside of the outer mast with its contact point rested on the inner mast.
- (3) Go over to the opposite side of the mast, and push the inner mast against the outer mast. Set the indicator to zero.

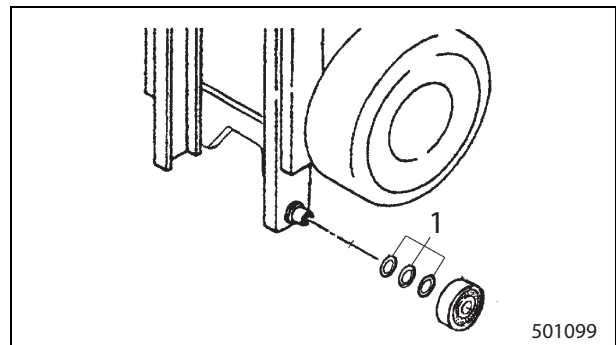


- (4) Insert a bar between the outer and inner masts on the indicator side, and push the inner mast to the opposite side.
- (5) Read the indicator.



| Item | Standard |
|-----------|---------------------------------------|
| Clearance | 0.1 to 0.5 mm (0.004 to 0.020 in.) |

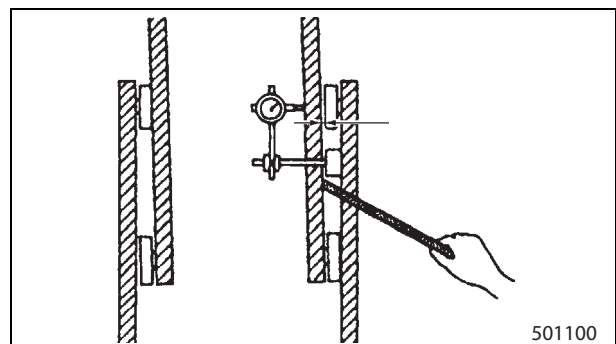
- (6) If the clearance is out of specification, adjust by shims. See 9-47 "Main Roller Shim Replacement - Simplex Mast", 9-48 "Main Roller Shim Replacement - Duplex Mast", or 9-49 "Main Roller Shim Replacement - Triplex Mast".

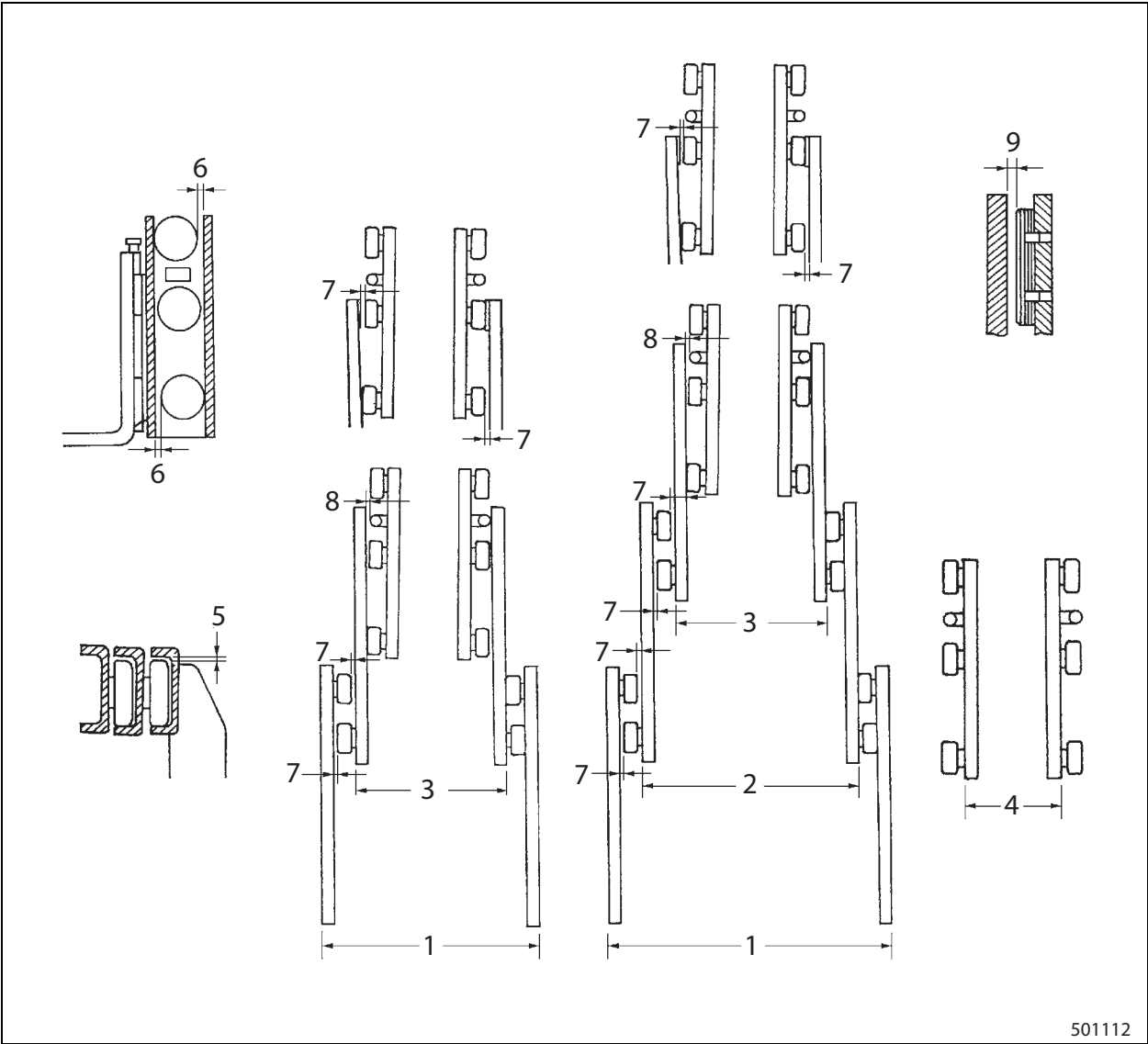


1. Shims

Lateral clearance adjustment on outer mast main rollers

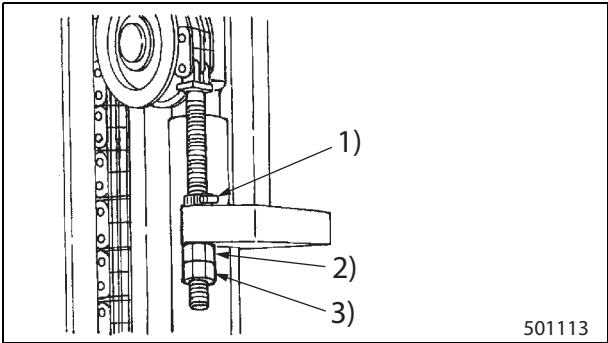
- (1) Raise the mast to the top.
- (2) Set a dial indicator on the outer mast with its contact point rested on the inner mast.
- (3) Go over to the opposite side of the mast, and push the outer mast against the inner mast with a bar. Set the indicator to zero.
- (4) Insert a bar between the outer and inner mast, and push the inner mast to the opposite side.
- (5) Read the indicator.





501112




Mast width is slightly wide at the lower portion than at the upper portion.
 Measure the clearance at the mast upper position.



501113

- 1) Clamp
- 2) Nut
- 3) Nut

3.2 Metric coarse thread

| Nominal size | Pitch | With spring washer | | | | | | | | |
|--------------|-------------|---------------------------------------------------------------------------------------------|--------|---------|----------------------------------------------------------------------------------------------|--------|---------|-----------------------------------------------------------------------------------------------|--------|---------|
| | |  500247 | | |  500248 | | |  500249 | | |
| mm (in.) | mm (in.) | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft |
| 10 (0.39) | 1.5 (0.06) | 33.3 | 3.40 | 24.56 | 43.1 | 4.39 | 31.79 | 67.7 | 6.90 | 49.93 |
| 12 (0.47) | 1.75 (0.07) | 58.8 | 6.00 | 43.37 | 76.5 | 7.80 | 56.42 | 115.7 | 11.80 | 85.33 |
| 14 (0.55) | 2 (0.08) | 96.4 | 9.83 | 71.10 | 124.5 | 12.70 | 91.82 | 182.4 | 18.60 | 134.53 |
| 16 (0.63) | 2 (0.08) | 147.1 | 15.00 | 108.49 | 191.2 | 19.50 | 141.02 | 274.6 | 28.00 | 202.53 |
| 18 (0.71) | 2.5 (0.10) | 203.0 | 20.70 | 149.72 | 264.8 | 27.00 | 195.30 | 383.4 | 39.10 | 282.78 |
| 20 (0.79) | 2.5 (0.10) | 286.4 | 29.20 | 211.23 | 371.7 | 37.90 | 274.15 | 536.4 | 54.70 | 395.62 |
| 22 (0.87) | 2.5 (0.10) | 383.4 | 39.10 | 282.78 | 499.2 | 50.90 | 368.18 | 725.9 | 74.02 | 535.39 |
| 24 (0.94) | 3 (0.12) | 492.3 | 50.20 | 363.10 | 640.4 | 65.30 | 472.33 | 924.8 | 94.30 | 682.09 |
| 27 (1.06) | 3 (0.12) | 724.7 | 73.90 | 534.50 | 942.2 | 96.08 | 694.92 | 1350.4 | 137.70 | 995.99 |
| 30 (1.18) | 3.5 (0.14) | 969.9 | 98.90 | 715.35 | 1259.2 | 128.40 | 928.72 | 1843.7 | 188.00 | 1359.82 |
| 33 (1.30) | 3.5 (0.14) | 1328.8 | 135.50 | 980.06 | 1727.0 | 176.10 | 1273.75 | 2477.2 | 252.60 | 1827.06 |
| 36 (1.42) | 4 (0.16) | 1676.0 | 170.90 | 1236.13 | 2180.0 | 222.29 | 1607.86 | 3199.9 | 326.29 | 2360.09 |
| 39 (1.54) | 4 (0.16) | 2219.2 | 226.29 | 1636.77 | 2884.1 | 294.09 | 2127.17 | 4118.8 | 419.99 | 3037.82 |
| 42 (1.65) | 4.5 (0.18) | 2754.7 | 280.90 | 2031.73 | 3581.4 | 365.20 | 2641.46 | 5137.7 | 523.89 | 3789.31 |

2. LOCKOUT/TAGOUT

LOCKOUT is not only used to disconnect a power supply, but also to physically isolate power sources from supplying power to the lift truck, with a lockout device, disabling the lift truck.

TAGOUT also reduces the risk of operating the machine during LOCKOUT with the use of a "DO NOT OPERATE" or similar warning tag. Warning tags are ideally placed on the lockout device to indicate the lift truck must not be operated until the tag is removed. Combined use of LOCKOUT/TAGOUT reduces the risk of accidental or inadvertent operation.

A lift truck that has been LOCKED OUT and TAGGED OUT must not be operated until the required service has been completed and the lift truck is no longer LOCKED OUT and TAGGED OUT.

Note: In the United States, employers have a responsibility to provide a safe workplace under the regulations of the Occupational Safety and Health Administration (OSHA). For more information on OSHA LOCKOUT/TAGOUT see the 29 CFR 1910.147 and Appendix A to 29 CFR 1910.147 (available at www.osha.gov).

WARNING

- Personnel could be exposed to death or serious injury if LOCKOUT/TAGOUT procedure is not performed prior to servicing the lift truck.
- Only the trained technician who performs the LOCKOUT/TAGOUT procedure must release the lift truck back into service.
- Only proper LOCKOUT/TAGOUT devices must be used.

WARNING

Basic requirements before servicing equipment:

- Wear appropriate personal protective equipment.
- Move equipment to secure maintenance area.
- Park the lift truck on a hard and level surface with the forks lowered until the forklift tips touch the ground, parking brake applied, direction lever in the NEUTRAL position, engine stopped, and the wheels blocked.
- Turn the key switch to the OFF position.
- Remove the key from the key switch.

Typical LOCKOUT/TAGOUT procedures are shown below:

Internal combustion (IC) lift truck

- (1) Remove the key to the lift truck from the key switch and access the battery compartment.
- (2) Remove the negative (-) battery cable from the battery terminal and place in the proper lockout device.
- (3) Lock the lockout device with the negative (-) battery cable locked inside.
- (4) TAGOUT the lift truck by placing a "DO NOT OPERATE" or similar warning tag where it can be visibly seen.
- (5) After the work is finished, the technician with the key to the lift truck must unlock the lockout device and remove the tag.

Electric lift truck

- (1) Remove the key to the lift truck from the key switch and access the battery compartment.
- (2) Disconnect the battery plug/connector and their connections from the lift truck and place in the proper lockout device.
- (3) Lock the lockout device.
- (4) TAGOUT the lift truck by placing a "DO NOT OPERATE" or similar warning tag where it can be visibly seen.
- (5) After the work is finished, the technician with the key to the lift truck must unlock the lockout device and remove the tag.

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