

INTRODUCTION

GENERAL

This section has the description and repair procedures for the steering housing and the steering control unit. Additional information on parts of the steering system are in the following sections: **STEERING AXLE** and **HYDRAULIC SYSTEM**.

DESCRIPTION (See FIGURE 1.)

This section has a description and the repair procedures for more than one brand of steering control unit. The units are similar in construction and operation with hose connections on the side at a manifold or valve block assembly. See FIGURE 2. or FIGURE 4. Some manifolds also have a relief valve.

The steering control unit is a hydrostatic unit that is controlled by the steering wheel. The control unit is installed in a housing or on a bracket at the cowl and is operated by the column assembly and steering wheel. The steering control unit has a control section and a metering section.

The steering system is a hydraulic system that does not have a mechanical connection between the steering wheel and the steering axle. The control of the steering is through a hydraulic circuit.

If the hydraulic pump for the steering system does not operate, steering is still possible. A check valve permits the steering control unit to control the steering cylinder. The lift truck is difficult to steer when the steering pump is not operating, but the steering control unit can operate the steering cylinder and make steering possible.

OPERATION (See FIGURE 1.)

The steering control unit is a rotary valve operated by the steering wheel. During the steering operation, the steering control unit controls the direction of flow and amount of oil that flows to the steering cylinder. The steering cylinder in the axle actuates the steering linkage to move the steer tires. Hydraulic oil returns from the

steering cylinder to the steering control unit and then returns to the hydraulic tank.

Turning the steering wheel actuates three main parts of the steering control unit: (1) The spool for the control section, (2) the sleeve for the control section and (3) the rotor in the metering section. When the steering wheel is not moving, the spool and sleeve are held in the neutral (center) position by springs. During this time, oil flows freely through the steering control unit. The oil does not flow to the steering cylinder.

As the steering wheel is turned, the spool just begins to rotate. The springs try to move the sleeve to keep the neutral position between the spool and sleeve. However, the force necessary to turn the rotor is greater than the pressure of the springs. The springs begin to bend, letting the spool move a small amount within the sleeve. The spool stops moving when it touches the center pin. In this position, the holes in the sleeve and the spool are aligned. Oil coming into the control unit flows to the metering section.

More rotation of the steering wheel causes the spool to rotate the pin. This action causes the rotation of the sleeve and the rotor in the metering section. The oil then flows to one side of the steering cylinder. Hydraulic oil from the other side of the steering cylinder returns through the control section of the steering control unit.

When the steering wheel stops moving, the metering action in the metering section also stops. The neutral position springs return the sleeve to the neutral position stopping oil flow to or from the cylinder. The pressure stays in the steering cylinder to keep the steer tires in position. Oil from the pump flows through the steering control unit to the tank or other parts of the system. To return the steer wheels to the straight position, the steering wheel must be rotated in the opposite direction. The steering control unit will operate as described, but all parts will rotate in the opposite direction.

REPAIRS

STEERING WHEEL AND COLUMN ASSEMBLY (See FIGURE 1. through FIGURE 4.)

The upper end of the steering shaft has splines for the steering wheel. A large nut holds the steering wheel onto the steering shaft. The horn button is the cover for the

center of the steering wheel. The lower end of the steering shaft has splines or a tang to engage the steering control unit. Contacts at the horn button (see FIGURE 2.), a wire in the column and slip ring contacts in the column assembly (see FIGURE 1.) allow for horn operation by the operator.

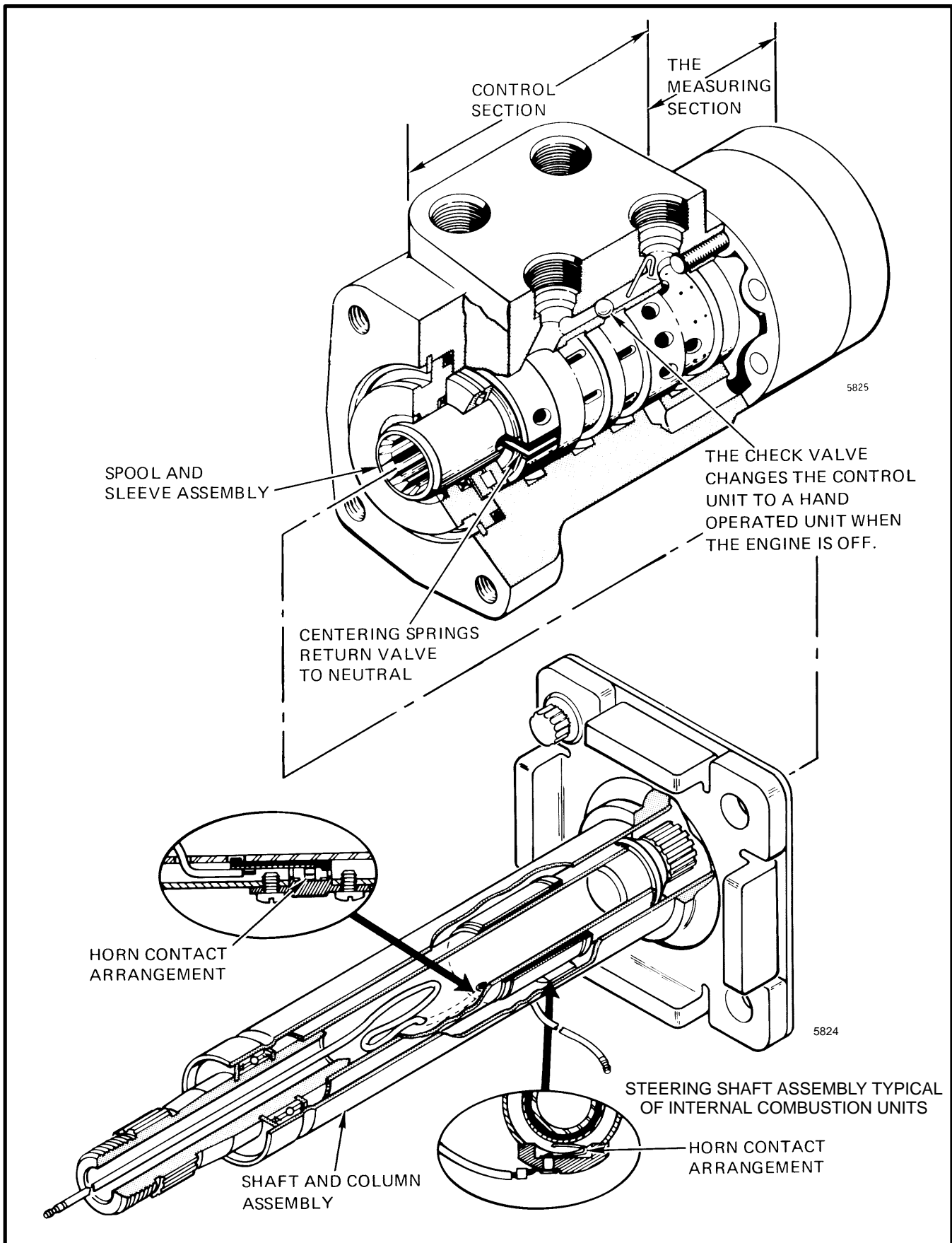


FIGURE 1. STEERING CONTROL UNIT

There are two types of steering column assemblies discussed here; Type “A” and Type “B”. Type “A” has a column housing that is a support for the mount bracket of the steering control unit as shown in FIGURE 3. Type “B” has a mount bracket of the steering control unit that is the support for the column housing as shown in FIGURE 4.

The steering column assembly is adjustable and held in position by a latch. The assembly position can be changed as needed for operator comfort. An access cover on the steering column gives access to the steering control unit hose connections.

TYPE “A” STEERING COLUMN ASSEMBLY

Removal And Disassembly (See FIGURE 2. and FIGURE 3.)

CAUTION

Disconnect the negative battery cable on internal combustion trucks. Disconnect the battery connector on electric trucks. Disconnect the battery before removing the covers.

1. Attach a tag on the battery connector or negative cable stating “DO NOT CONNECT BATTERY”. Move the steering column to the most forward position. Remove the access cover from the steering column.
2. Put tags for identification on the hydraulic hoses at the steering control unit so that they can be connected correctly during assembly. Disconnect the hydraulic hoses at the bottom of the manifold or valve block. Install plugs at all hoses and ports to prevent dirt from entering the steering hydraulic system.
3. Carefully lift the horn switch at the center of the steering wheel and pull the switch wire out of the steering shaft. See FIGURE 1. Pull the switch assembly out of the steering wheel and disconnect it. Remove the nut. If possible to install, use a puller to remove the steering wheel.
4. Put tags for identification on the meters and gauge wires at the steering column housing so that they can be connected correctly during assembly. Also put a tag on the horn wire. See FIGURE 1. Disconnect all wires.
5. Remove the capscrews that fasten the mount plate to the cowl and remove the steering column assembly from the lift truck.

6. Remove the two springs for the latch. Remove the two capscrews, nuts, washers and spacers at the pivot points of the column housing. Remove the mount plate.

7. Remove the four capscrews, washers, grommets and spacers that fasten the bracket for the steering control unit to the column housing. Carefully remove the steering control unit, bracket and column from the column housing. If necessary, remove the latch assembly from the column housing.

8. Remove the four screws that fasten the bracket and steering column to the steering control unit. Do not lose the spacers or washers. Remove the two screws that fasten the manifold or valve block to the port side of the steering control unit. If necessary, disassemble the steering control unit as shown in FIGURE 5.

Assembly And Installation (See FIGURE 2. and FIGURE 3.)

1. If necessary, assemble the steering control unit as shown in FIGURE 6. Install the manifold or valve block on the steering control unit using new O-rings. If removed, install the latch assembly in the column housing.
2. Install the steering column and bracket on the steering control unit as removed during disassembly. Install this assembly in the column housing. Do not damage the horn wire contact (see FIGURE 1.) or column grommet. Make sure to install the grommets, washers and spacers as a sound isolator for the steering control unit.
3. Install the two capscrews, nuts, washers and spacers at the pivot points of the column housing and mount plate. Install the two springs for the latch. Install the mount plate and column assembly on the cowl of the lift truck.

WARNING

The hydraulic hoses MUST be connected to the correct ports and fittings or the steering system will not operate as expected. This operation that is not expected can cause damage or personal injury. Make sure the hoses are identified and connected correctly.

4. Install all wires and hoses as removed during disassembly. Install the steering wheel and nut. Push the horn switch wire into the steering shaft and install the switch in the steering wheel. Install the access plate, remove the battery tag and connect the battery connector or cable.

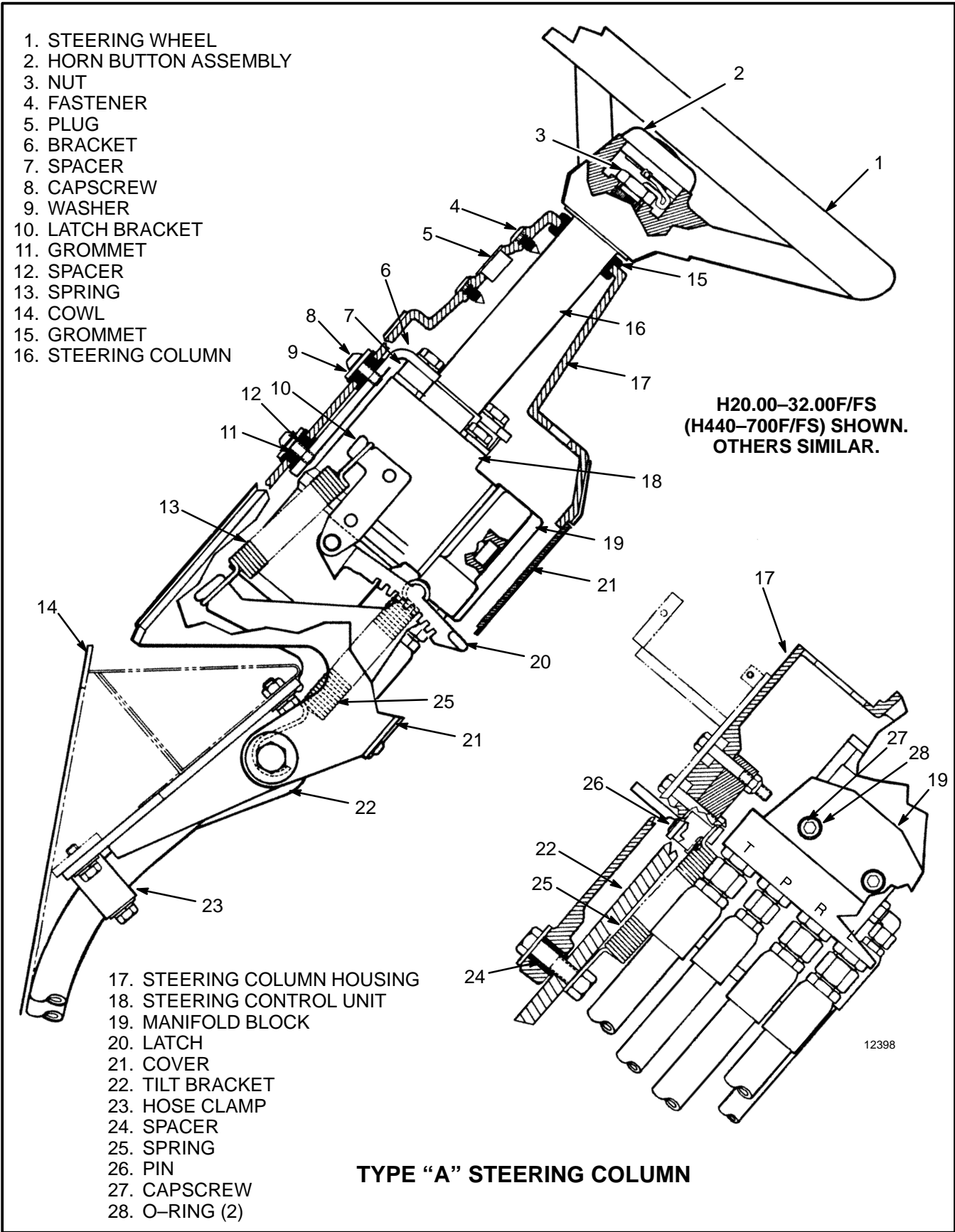
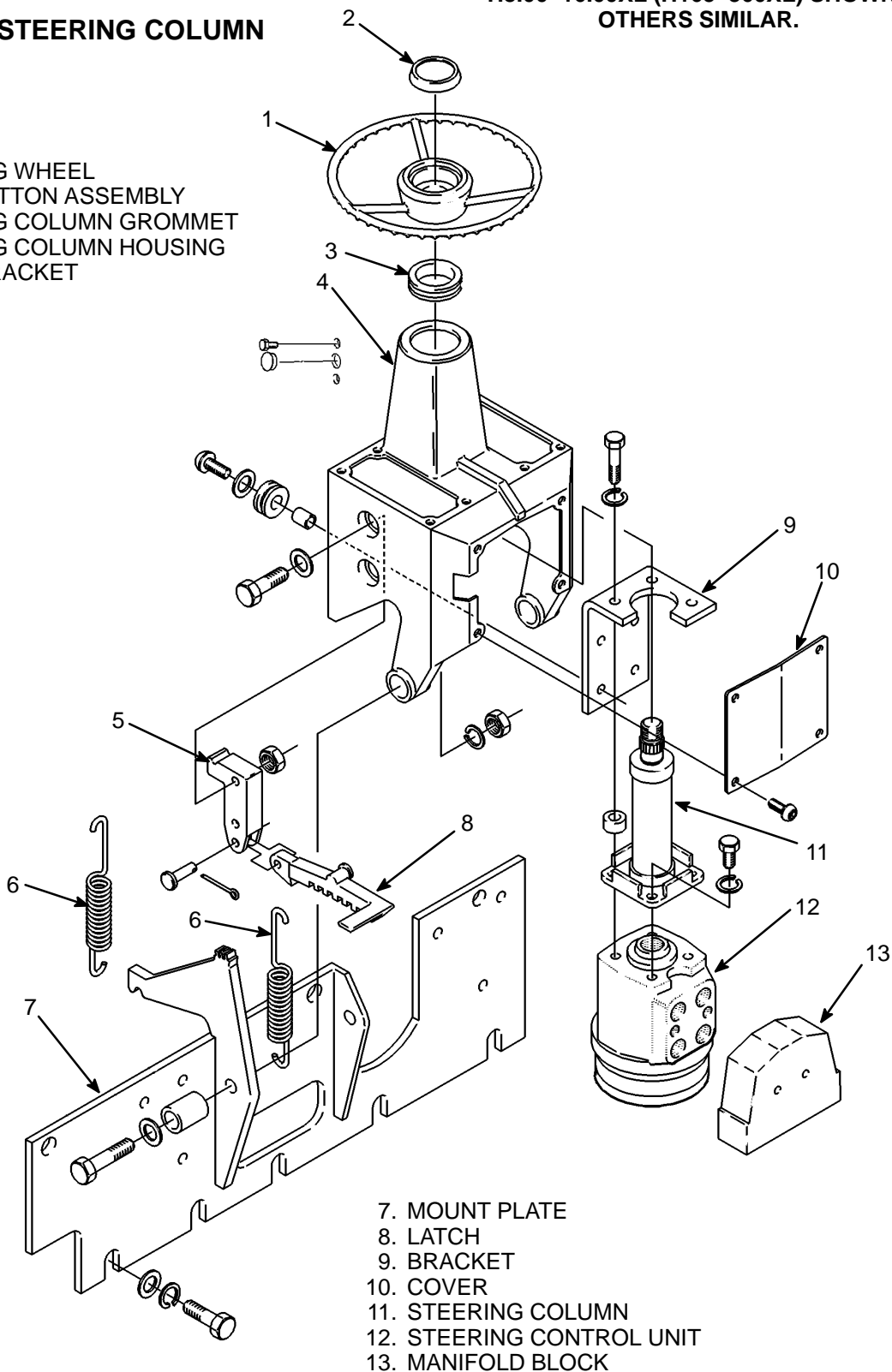


FIGURE 2. STEERING WHEEL AND STEERING COLUMN ASSEMBLY

TYPE "A" STEERING COLUMN

H8.00-16.00XL (H165-360XL) SHOWN.
OTHERS SIMILAR.

- 1. STEERING WHEEL
- 2. HORN BUTTON ASSEMBLY
- 3. STEERING COLUMN GROMMET
- 4. STEERING COLUMN HOUSING
- 5. LATCH BRACKET
- 6. SPRING



- 7. MOUNT PLATE
- 8. LATCH
- 9. BRACKET
- 10. COVER
- 11. STEERING COLUMN
- 12. STEERING CONTROL UNIT
- 13. MANIFOLD BLOCK

FIGURE 3. STEERING WHEEL AND STEERING COLUMN ASSEMBLY

WARNING

After making repairs, do not extend the hands or arms through the center of the steering wheel. If the control unit was not assembled correctly or the hoses not connected correctly it can rotate with a strong force and cause serious injury. If this action occurs, disassemble the control unit and correct the problem.

5. Operate the steering system to check for correct operation and leaks.

TYPE “B” STEERING COLUMN ASSEMBLY

Removal And Disassembly (See FIGURE 4.)

CAUTION

Disconnect the negative battery cable on internal combustion trucks. Disconnect the battery connector on electric trucks. Disconnect the battery before removing any covers.

1. Attach a tag on the battery connector or negative cable stating “DO NOT CONNECT BATTERY”. Move the steering column to the most forward position.

2. Put tags for identification on the hydraulic hoses at the steering control unit so that they can be connected correctly during assembly. Disconnect the hydraulic hoses at the bottom of the manifold or valve block. Install plugs at all hoses and ports to prevent dirt from entering the steering hydraulic system.

3. Carefully lift the horn switch at the center of the steering wheel and pull the switch wire out of the steering shaft. See FIGURE 1. Pull the switch assembly out of the steering wheel and disconnect it. Remove the nut. If possible to install, use a puller to remove the steering wheel.

4. Put tags for identification on the meters and gauge wires at the steering column housing so that they can be connected correctly during assembly. Also put a tag on the horn wire. See FIGURE 1. Disconnect all wires.

5. Remove the screws that fasten the column housing to the bracket for the steering control unit. Carefully lift the column housing and bushing off the steering column assembly.

6. Remove the four screws, the washers, isolator and spacers that fasten the steering column and the steering control unit to the bracket. Remove the steering column from the steering control unit. Remove the two screws

that fasten the manifold or valve block to the port side of the steering control unit. If necessary, disassemble the steering control unit as shown in FIGURE 5.

7. If necessary, remove all parts of the latch from the bracket. If necessary, remove all parts of the spring mechanism and pivot to remove the bracket from the cowl of the lift truck.

Assembly And Installation (See FIGURE 4.)

1. If necessary, assemble the steering control unit as shown in FIGURE 6. Install the manifold or valve block on the steering control unit using new O-rings. If removed, install the bracket and spring mechanism on the cowl of the lift truck. If removed, install the latch assembly and spring mechanism on the steering control bracket.

2. Install the steering column on the steering control unit. Install the four screws, the washers, isolator and spacers that fasten the steering column and the steering control unit to the bracket. Make sure to install the clamp in the correct position as shown in FIGURE 4.

3. Carefully install the column housing and bushing over the steering column. Install the screws that fasten the housing to the bracket.

WARNING

The hydraulic hoses **MUST** be connected to the correct ports and fittings or the steering system will not operate as expected. This operation that is not expected can cause damage or personal injury. Make sure the hoses are identified and connected correctly.

4. Install all wires and hoses as removed during disassembly. Install the steering wheel and nut. Push the horn switch wire into the steering shaft and install the switch in the steering wheel. Remove the battery tag and connect the battery connector or cable.

WARNING

After making repairs, do not extend the hands or arms through the center of the steering wheel. If the control unit was not assembled correctly or the hoses not connected correctly it can rotate with a strong force and cause serious injury. If this action occurs, disassemble the control unit and correct the problem.

5. Operate the steering system to check for correct operation and leaks.

(More Content includes: Brake system, Capacities, and specifications, Frame, Hydraulic, System, Industrial battery, Main control, Valve, Mast repair, Fasteners, Schematics diagrams, Steering axle, Steering system, Wire harness repair And more)

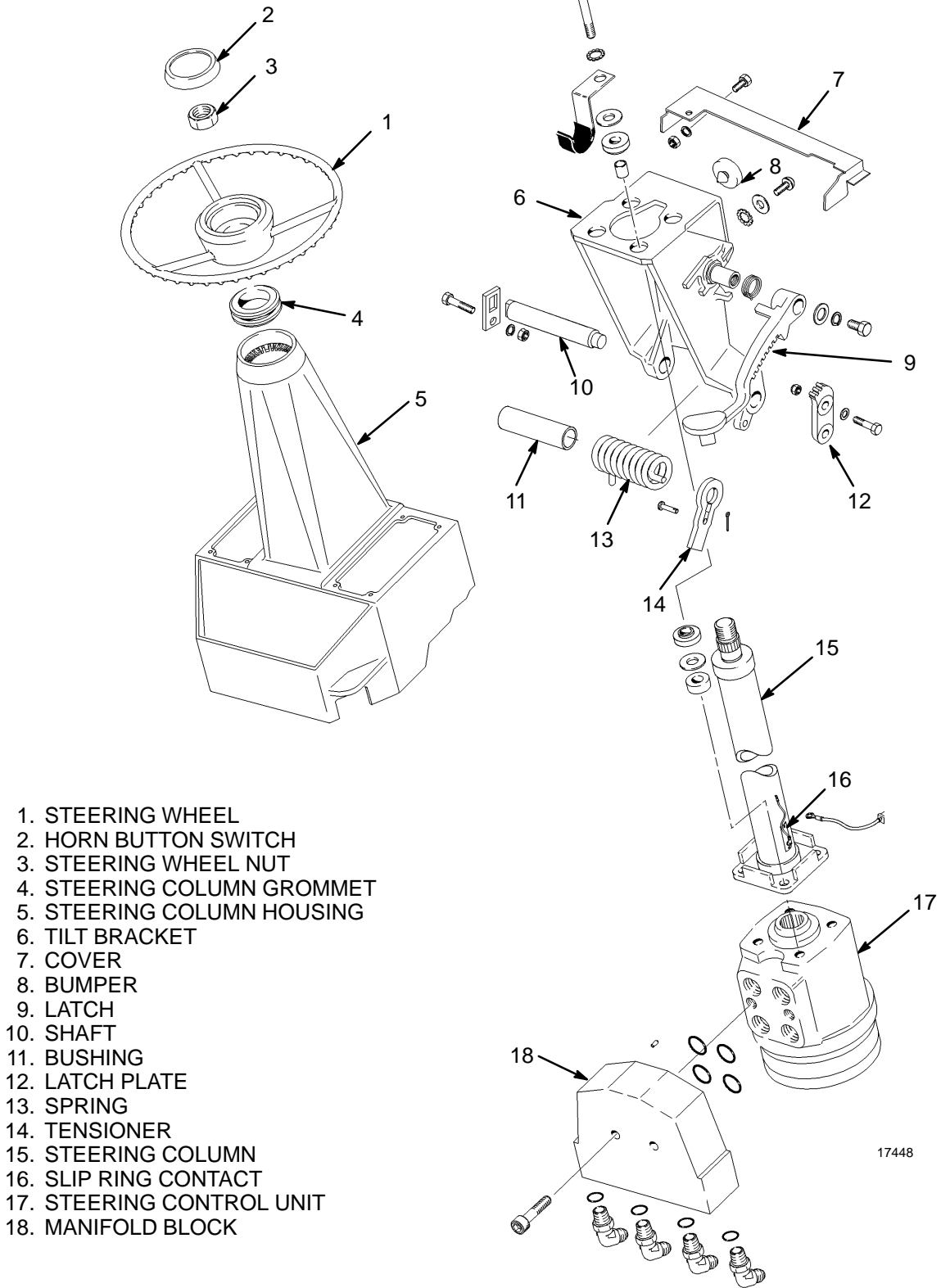
[Click Here](#)

**Get all the content
after purchase**

**Thank you very
much.**

TYPE "B" STEERING COLUMN

H2.00-7.00XL (H40-155XL) &
S3.50-6.50XL (S70-150XL) SHOWN.
OTHERS SIMILAR.



17448

FIGURE 4. STEERING WHEEL AND STEERING COLUMN ASSEMBLY

Disassembly of Steering Control Unit (See FIGURE 5.)

Follow the steps of FIGURE 5. to disassemble the steering control unit.

Cleaning of Steering Control Unit



WARNING

Cleaning solvents can be flammable and toxic, and

can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety precautions.

Clean all the parts in solvent. Dry the parts with compressed air. Do not dry the parts with a cloth. Make sure all surfaces are free of scratches and sharp edges.

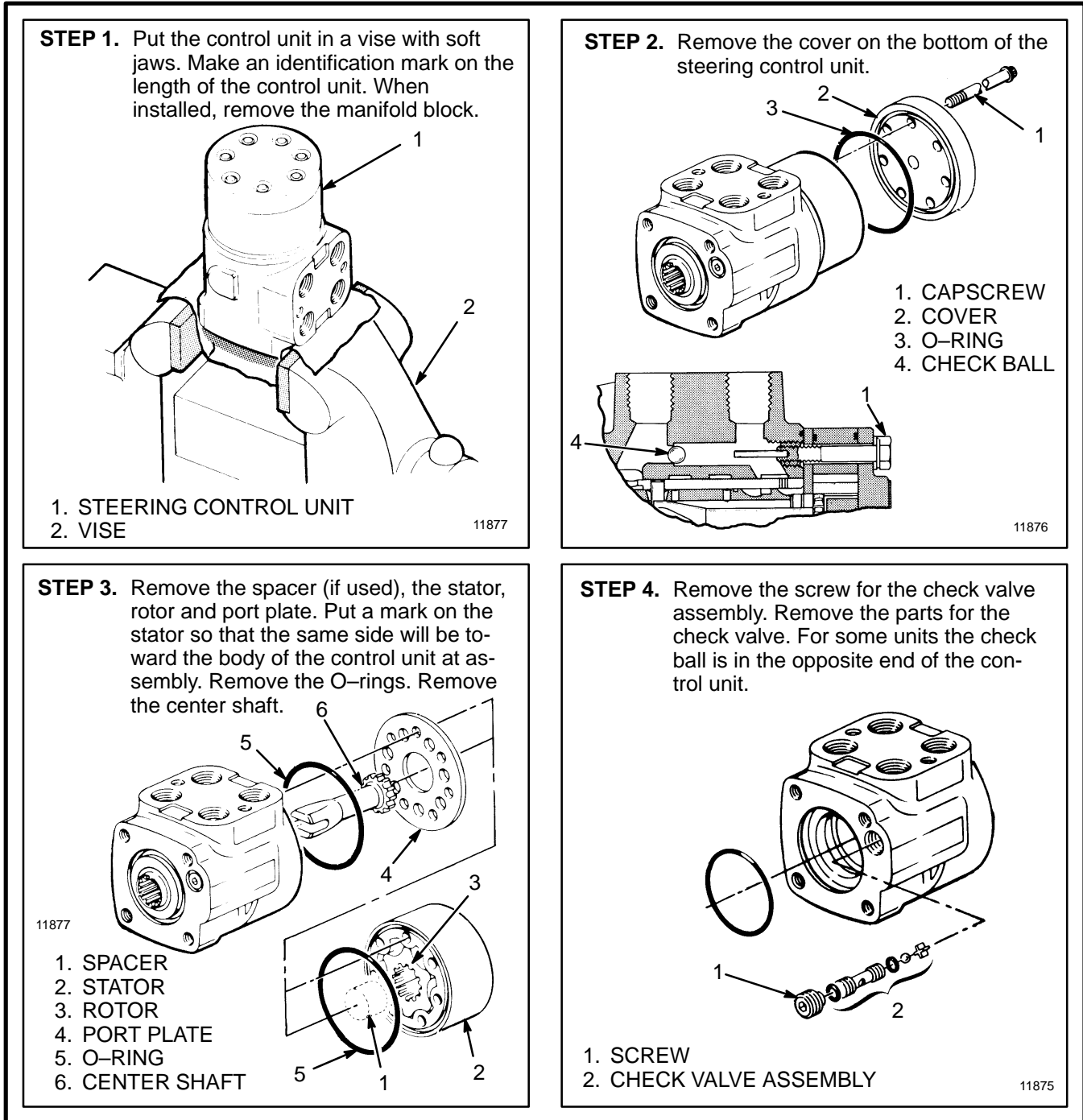
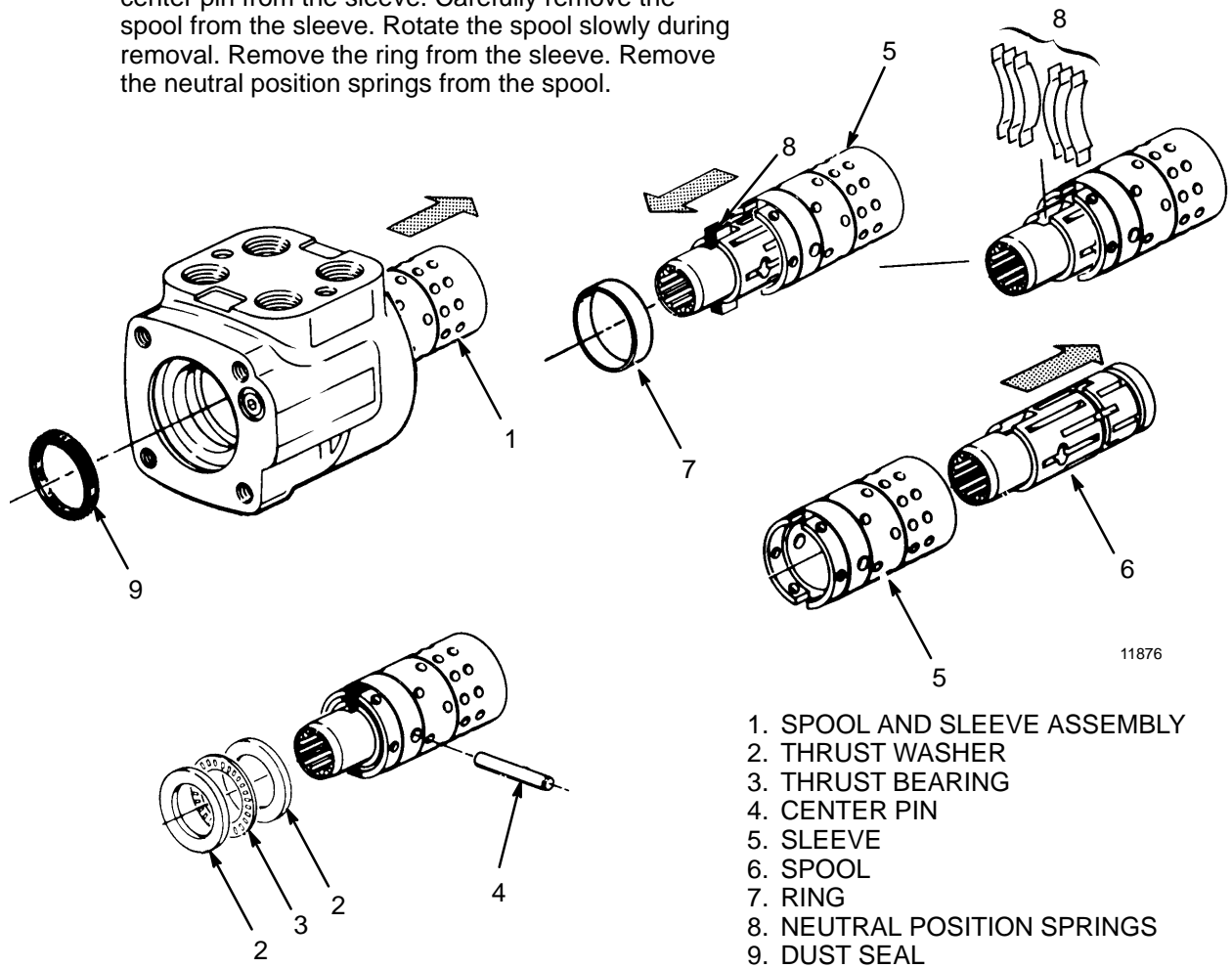


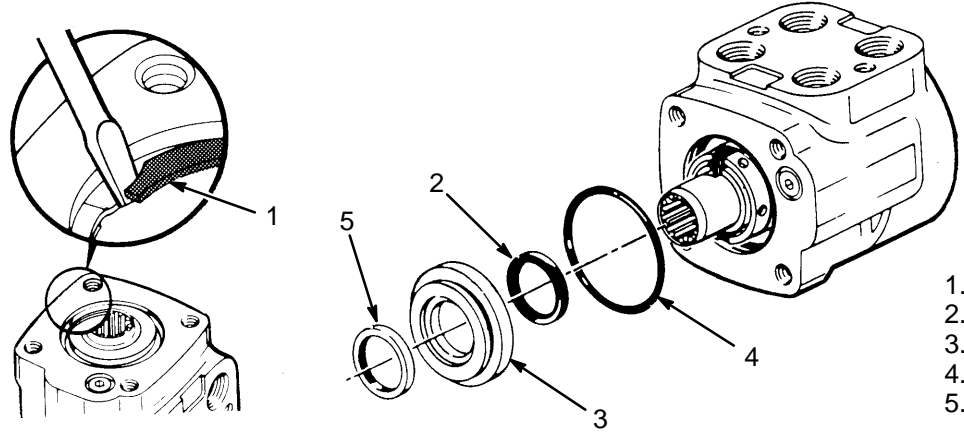
FIGURE 5. DISASSEMBLY OF THE STEERING CONTROL UNIT (1 of 2)

STEP 5. Remove the spool and sleeve assembly. Remove the thrust bearing assembly from the spool. Push the center pin from the sleeve. Carefully remove the spool from the sleeve. Rotate the spool slowly during removal. Remove the ring from the sleeve. Remove the neutral position springs from the spool. Remove the dust seal from the housing.



- 1. SPOOL AND SLEEVE ASSEMBLY
- 2. THRUST WASHER
- 3. THRUST BEARING
- 4. CENTER PIN
- 5. SLEEVE
- 6. SPOOL
- 7. RING
- 8. NEUTRAL POSITION SPRINGS
- 9. DUST SEAL

STEP 6. When installed, remove the snap ring, bushing, O-ring and seal ring. Remove the oil seal from the bushing or housing.



- 1. SNAP RING
- 2. SEAL
- 3. BUSHING
- 4. O-RING
- 5. OIL SEAL

FIGURE 5. DISASSEMBLY OF THE STEERING CONTROL UNIT (2 OF 2)

**Assembly of Steering Control Unit
(See FIGURE 6.)**

Use new seals, O-rings and neutral position springs during assembly. Lubricate all parts with clean hydraulic

oil. Follow the steps of FIGURE 6. to assemble the steering control unit.

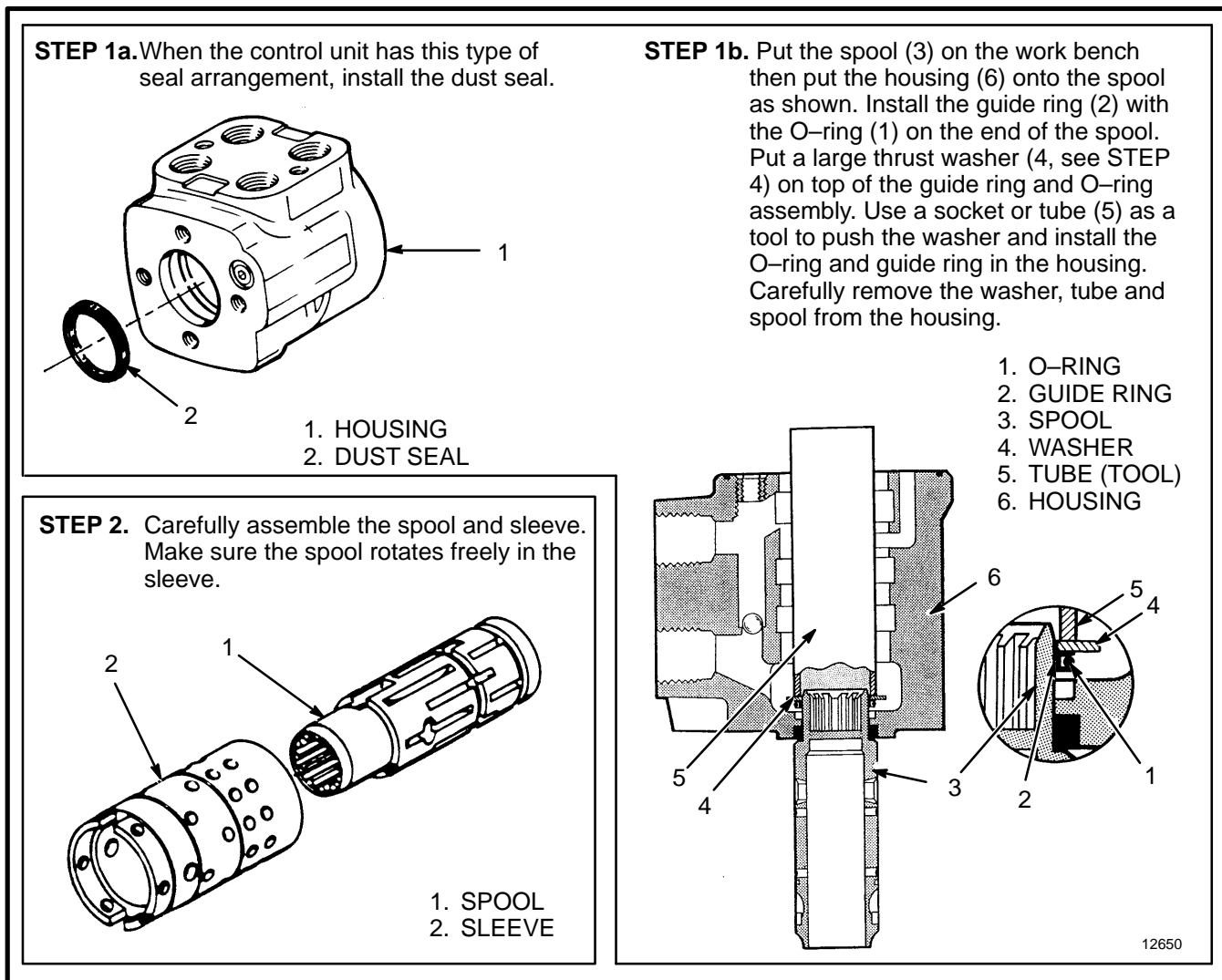


FIGURE 6. ASSEMBLY OF THE STEERING CONTROL UNIT (1 of 4)

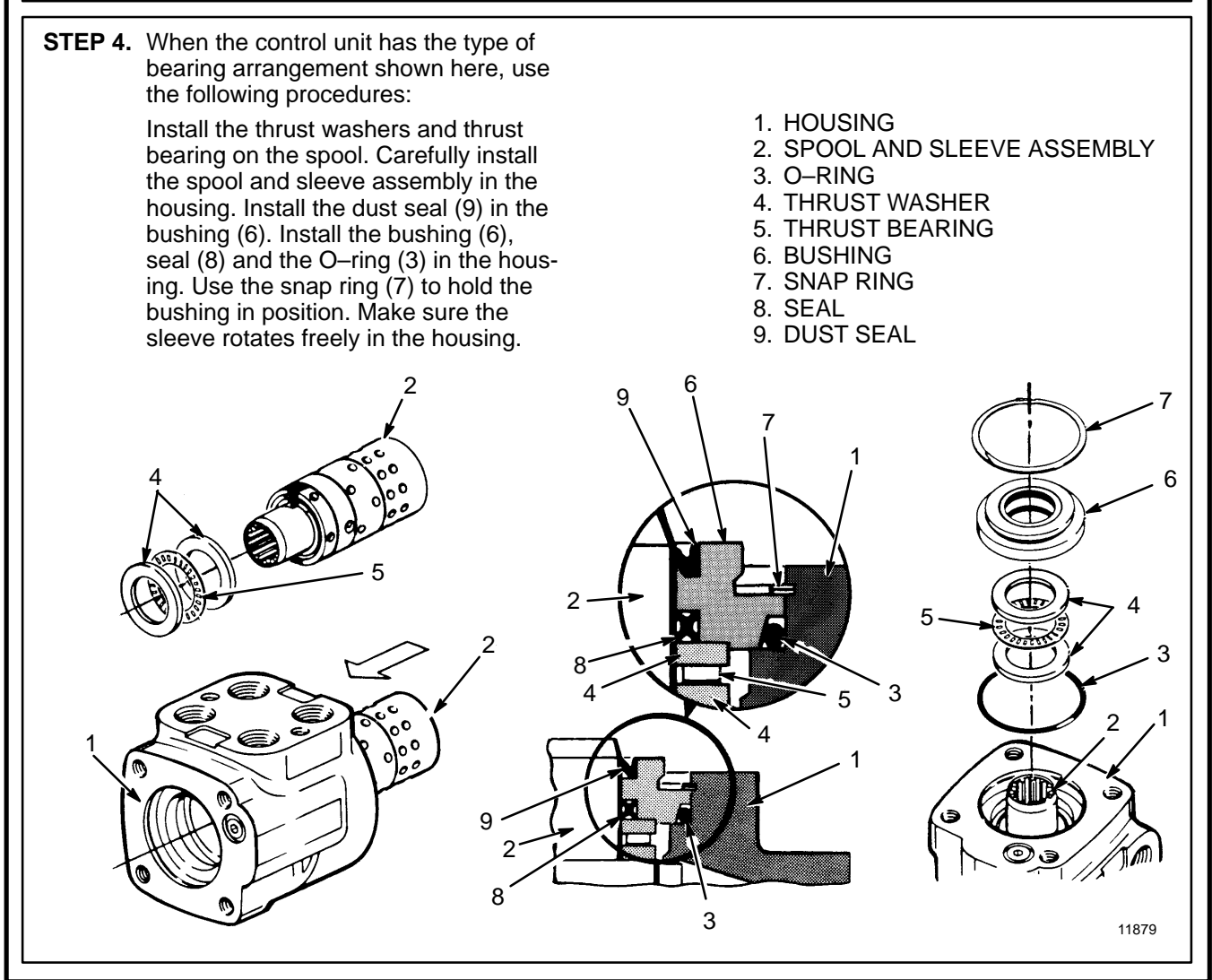
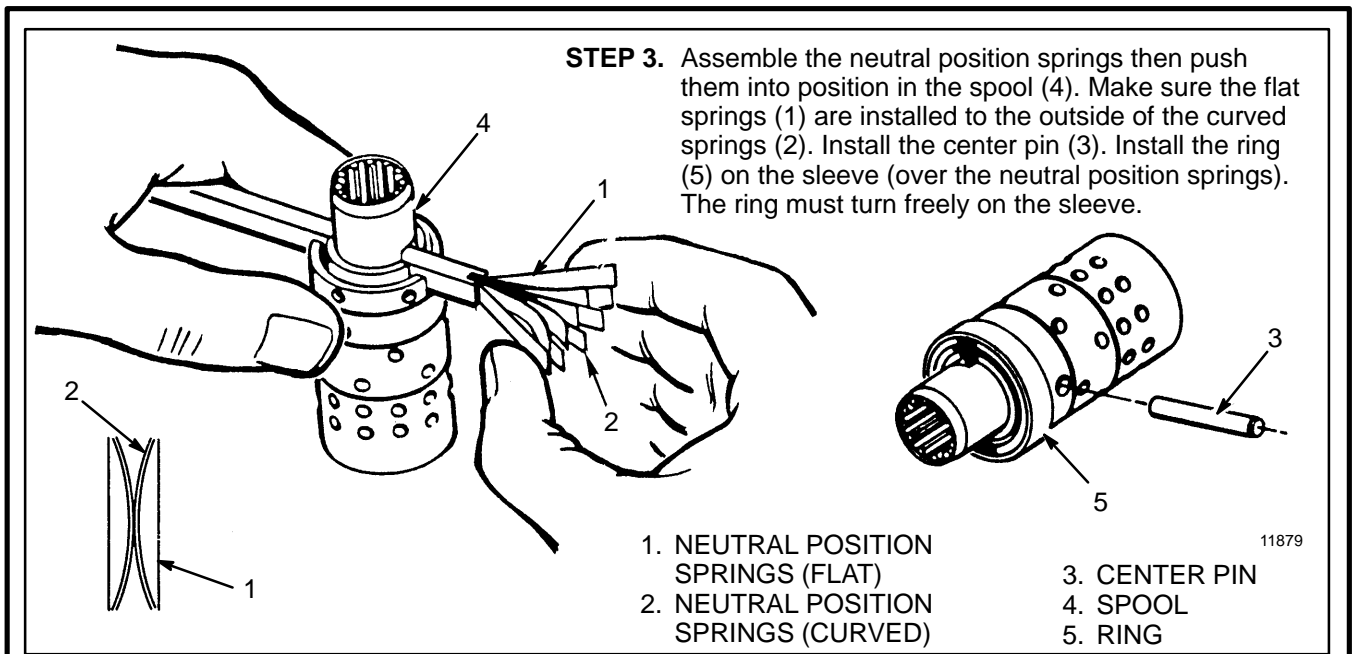
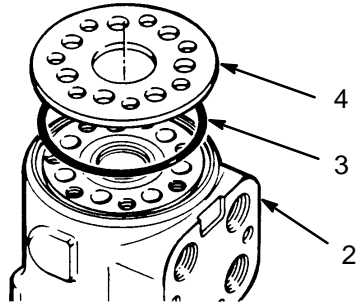
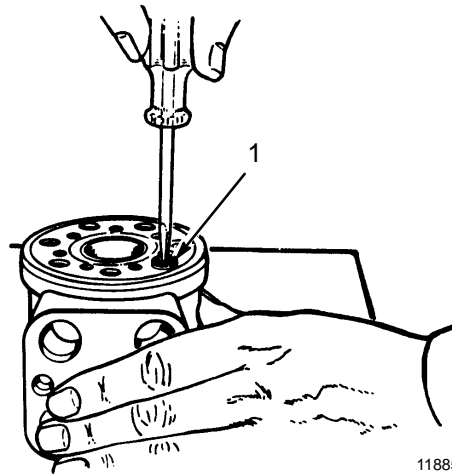


FIGURE 6. ASSEMBLY OF THE STEERING CONTROL UNIT (2 of 4)

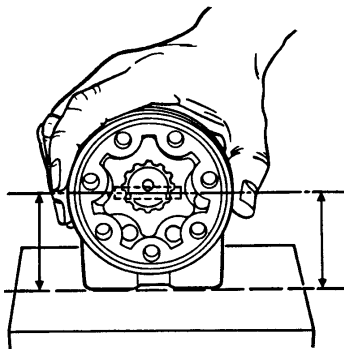
STEP 5. When the check valve is at the end of the housing as shown here, install the check ball and sleeve. Make sure the sleeve is even with or below the surface of the housing (2). Lubricate the O-ring (3) and install the O-ring and port plate (4). Align the holes in the port plate with the holes in the housing.



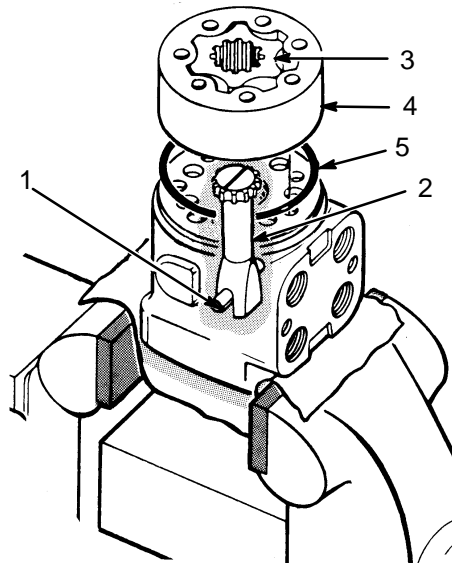
1. CHECK BALL SLEEVE
2. HOUSING
3. O-RING
4. PORT PLATE



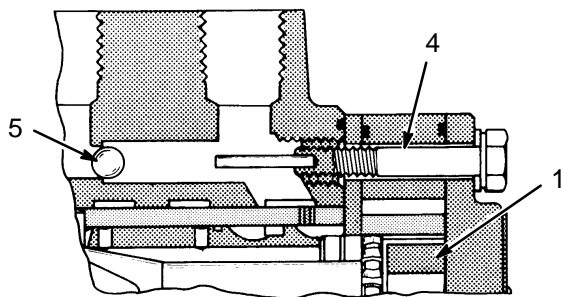
STEP 6. Install the center shaft (2) so that it engages with the center pin (1) in spool and sleeve assembly. Make sure the center pin is still parallel to the surface with the ports. Install the rotor (3) on the center shaft. Make sure that a valley in the rotor aligns with the slot (center pin) in the center shaft. Install the O-ring (5) and stator (4). Make sure to align the marks made during disassembly.



1. CENTER PIN
2. CENTER SHAFT
3. ROTOR
4. STATOR
5. O-RING



STEP 7. When used, install the spacer (1). Install the O-ring (2) and the cover (3). Tighten the capscrews for the cover in the sequence shown to 17 Nm (150 lbf in), then tighten them to 30 Nm (265 lbf in). Make sure the capscrew (4) with the pin fits in the hole for the check ball (5).



1. SPACER
2. O-RING
3. COVER
4. CAPSCREW
5. CHECK BALL

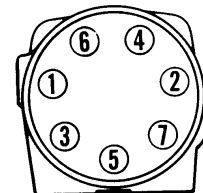
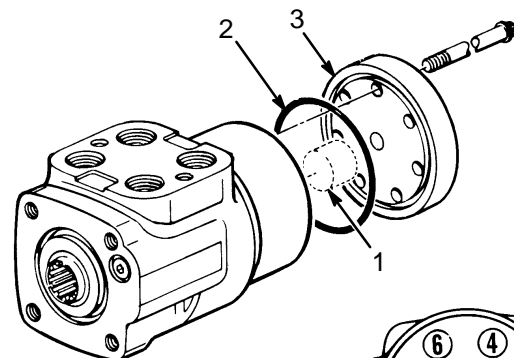
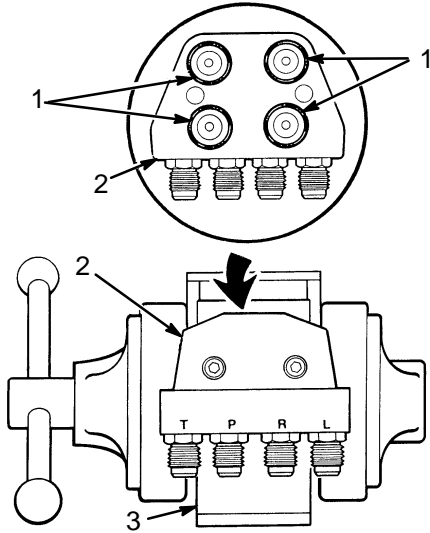


FIGURE 6. ASSEMBLY OF THE STEERING CONTROL UNIT (3 of 4)

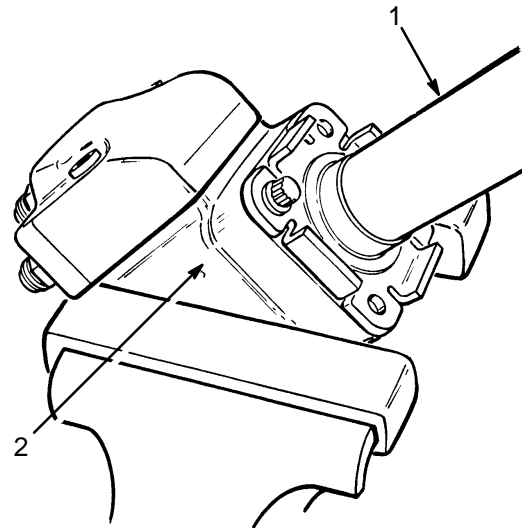
STEP 8. When used, install the manifold block and O-rings on the steering control unit. Tighten the capscrews for the manifold block to 40 Nm (30 lbf ft).



- 1. O-RING
- 2. MANIFOLD BLOCK
- 3. STEERING CONTROL UNIT

5717

STEP 9. Install the steering column on the steering control unit. Make sure the splines are aligned.



- 1. STEERING COLUMN
- 2. STEERING CONTROL UNIT

5717

FIGURE 6. ASSEMBLY OF THE STEERING CONTROL UNIT (4 of 4)

CHECKS AND ADJUSTMENTS

REMOVE AIR FROM THE SYSTEM

Air can enter the system when a hydraulic line is disconnected. If the operation is rough, start the engine and ro-

tate the steering wheel from stop to stop several times in each direction. The air will be removed without disconnecting any lines. If the operation is still rough, check if air is entering the system at a loose fitting.

TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	PROCEDURE OR ACTION
The steering wheels do not move when the steering wheel is turned.	<p>The oil level is low or there is no oil in the tank.</p> <p>The steering control unit is damaged.</p> <p>No oil flow from the steering control unit to the steering cylinder.</p> <p>The sleeve and spool in the control unit will not move.</p> <p>Hydraulic hoses not connected or have damage.</p>	<p>Fill tank to the correct level. Check for leaks.</p> <p>Repair or install new control unit.</p> <p>Repair or install new components. Check for leaks.</p> <p>Install new components.</p> <p>Check for leaks. Tighten connections. Install new components as necessary.</p>
Slow or difficult steering.	<p>Relief valve for the steering system is damaged or not adjusted correctly.</p> <p>Low oil pressure from the hydraulic pump.</p> <p>Seal in the steering cylinder has a leak.</p> <p>Hydraulic lines are too small or have restrictions.</p> <p>Steering control unit is worn, not assembled correctly or has damage.</p>	<p>Adjust or install new relief valve.</p> <p>Check for restrictions. See Troubleshooting Chart, "Hydraulic System".</p> <p>Repair cylinder. Install new seal or new cylinder.</p> <p>Remove restrictions. Install larger or new hydraulic lines.</p> <p>Repair or install new control unit.</p>
Steering wheel turns the tires in the wrong direction.	The hydraulic lines are not connected correctly at the steering cylinder or at the steering control unit.	Connect lines correctly. Remove air from the system.
Steering function continues after the steering wheel stops.	The steering control unit is assembled wrong or has damage.	Repair or install new control unit.
The steering operation is not smooth.	<p>The oil level in the tank is low.</p> <p>Air was not removed after repair to the hydraulic system.</p> <p>The steering control unit is assembled wrong or has damage.</p> <p>The hydraulic pump has a leak at the inlet.</p>	<p>Fill tank. Check for leaks.</p> <p>Remove air from the system.</p> <p>Repair or install new control unit.</p> <p>Fix leaks. Remove air from the system.</p>