

SERVICE MANUAL

This Manual has been prepared for and is considered part of -

RT530E-2

Crane Model Number

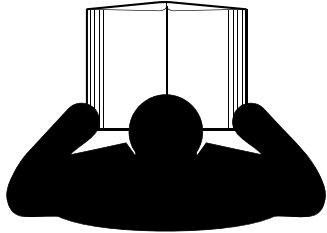
This Manual is divided into the following Sections:

SECTION 1	INTRODUCTION
SECTION 2	HYDRAULIC SYSTEM
SECTION 3	ELECTRIC SYSTEM
SECTION 4	BOOM
SECTION 5	HOIST AND COUNTERWEIGHT
SECTION 6	SWING SYSTEM
SECTION 7	POWER TRAIN
SECTION 8	UNDERCARRIAGE
SECTION 9	LUBRICATION

NOTICE

The crane serial number is the only method your distributor or the factory has of providing you with correct parts and service information.

The crane serial number is stamped on the top of the outrigger box. **Always furnish crane serial number** when ordering parts or communicating service problems with your distributor or the factory.



! WARNING

To prevent death or serious injury:

- Avoid unsafe operation and maintenance.
- This crane must be operated and maintained by trained and experienced personnel. Manitowoc is not responsible for qualifying these personnel.
- Do not operate or work on this crane without first reading and understanding Operator's Manual and Rating Plate supplied with crane.
- Store Operator's Manual in holder provided on crane.
- Attach laminated Capacity Charts supplied with crane to chain in operator's cab.
- If Operator's Manual or Capacity Charts are missing from cab, contact your distributor for new ones.

Maintenance	2-46
Removal	2-46
Installation	2-46
Range Shift/Parking Brake Valve	2-47
Description	2-47
Maintenance	2-47
Removal	2-47
Installation	2-47
Functional Tests	2-47
Axle Oscillation Lockout Valve (Standard Units)	2-48
Description	2-48
Maintenance	2-48
Removal	2-48
Installation	2-48
Axle Oscillation Lockout Valve (Optional CE Units)	2-50
Description	2-50
Maintenance	2-50
Removal	2-50
Installation	2-50
Cylinders	2-52
General	2-52
Maintenance	2-52
General	2-52
Surface Protection for Cylinder Rods	2-52
Leakage Check	2-52
Temperature Effects on Hydraulic Cylinders	2-53
Lift Cylinder	2-54
Description	2-54
Maintenance	2-54
Disassembly	2-54
Inspection	2-54
Assembly	2-54
Dual Rod Telescope Cylinder	2-57
Description	2-57
Maintenance	2-57
Disassembly	2-57
Inspection	2-59
Assembly	2-59
Axle Oscillation Lockout Cylinder	2-61
Description	2-61
Maintenance	2-61
Disassembly	2-61
Inspection	2-61
Assembly	2-64
Steer Cylinder	2-65
Description	2-65
Maintenance	2-65
Disassembly	2-65
Inspection	2-65
Assembly	2-65
Outrigger Extension Cylinder	2-68
Description	2-68
Maintenance	2-68
Disassembly	2-68
Inspection	2-68
Assembly	2-68
Outrigger Stabilizer Cylinder	2-71

SUPPLY PRESSURE AND RETURN CIRCUIT

Description

The supply pressure and return circuit is made up of several circuits which route hydraulic oil from the hydraulic pumps to the directional control valves for the individual operating circuits. The supply pressure and return circuit consists of the reservoir and integral filter, two hydraulic pumps, a hydraulic oil cooler, and a 12-port hydraulic swivel. Refer to HYDRAULIC PUMPS in this section for descriptions and maintenance instructions for each hydraulic pump. Refer to Section 6 - SWING for description and maintenance instructions for the 12-port hydraulic swivel.

The supply pressure and return circuit uses Ports 5 and 6 for pump supply and the dual Port 4 for return. Each operating circuit's description and components begin with the circuit's directional control valve.

Hydraulic Reservoir and Filter

The reservoir (Figure 2-3), attached to the right side of the carrier frame, has a capacity of 442.3 liters (116.8 gallons) total, 395.9 liters (104.6 gallons) to the full mark. The all-steel reservoir has an internally mounted full-flow filter and integral baffles that help cool the hydraulic oil and prevent hydraulic oil foaming.

Hydraulic oil flows through two tubes at the rear of the reservoir to the two hydraulic pumps. Almost all of the return flow goes through the filter at the top of the reservoir. The return line that goes directly into the reservoir (instead of through the filter) is from the No. 10 port (drain) of the 12-port swivel.

A magnetized drain plug in the bottom of the reservoir collects metal particles from the hydraulic oil if it becomes contaminated.

A sight gauge is located on the front of the reservoir to indicate hydraulic oil level.

1. A breather/fill cap located on the top of the reservoir allows air to enter or exhaust the reservoir. It consists of a breather, fill neck, gaskets and strainer. It is important that the breather be kept clean to prevent damage to the

reservoir. The breather/fill cap also provides for filling the reservoir.

A large access cover on top of the reservoir provides for cleaning. The access cover can also be used to fill the reservoir after it has been completely drained.

An oil temperature gauge is located on the lower front of the reservoir to indicate oil temperature.

The hydraulic oil filter (Figure 2-4) is located in the top of the reservoir. The filter housing contains a replaceable filter element. Returning hydraulic oil flows through the filter head, through the filter element and into the reservoir.

An element condition indicator on the filter head indicates when to change the filter element. When back pressure caused by a dirty filter element exceeds 172.3 kPa/1.72 bar (25 psid), the filter head's bypass feature functions to allow the hydraulic oil to bypass the filter element and flow into the reservoir through the bypass outlet instead. A bypass filter screen prevents gross contamination from passing through the filter even during bypass. Refer to Return Hydraulic Filter for filter changing instructions.

Pump Distribution

Pump No. 1 is mounted off drive pads of the torque converter. Pump No. 2 is mounted on the left front side of the engine.

Pump No. 1

Pump No. 1 is a variable displacement axial piston pump with a maximum displacement of 112 cm³/rev. (6.83 in³/rev). The pump differential or standby pressure is 2413 kPa/24 bar (350 psi). Pump No. 1 supplies oil to the integrated outrigger/rear steer valve, boom lift, telescope, hoist, brakes and pilot functions.

Pump No. 2

Pump No. 2 is a single positive displacement gear pump with a displacement of 39 cm³/rev. (2.40 in³/rev) delivering a theoretic flow of 84 lpm (22.2 gpm). Pump No. 2 supplies oil to the front steer and swing circuits.

OUTRIGGER STABILIZER CYLINDER

Description

The four outrigger stabilizer cylinders (Figure 2-41) each have a hollow rod for internal porting. Each cylinder has a 10.1 cm (4.0 inch) diameter bore. A port block is welded to the rod of each cylinder and a pilot operated check valve is threaded into each port block. The retracted length of the cylinder from the end of the barrel to the center of the rod's port block rod bushing is 122.2 ± 30.8 cm (48.12 $\pm$ 12 inches). The extended length of the cylinder from the end of the barrel to the center of the rod's port block rod bushing is 185.7 cm (73.12 inches). Its stroke is 63.5cm (25 inches). A wiper ring prevents foreign material from entering the cylinder. O-rings and other seals prevent internal and external leakage.

The cylinder weighs approximately 64.6 kg (142.52 pounds).

Maintenance

Disassembly

NOTE: Any maintenance requiring disassembly of the cylinder should include replacement of all cylinder seals.

1. Clean away all dirt from the head. Place protective padding around the rod near the head to prevent damaging the chrome. Using a spanner wrench, unscrew the head from the barrel.



DANGER

Do not use air pressure to remove the rod. Use only a source of controlled hydraulic oil pressure if the rod is hard to remove.

CAUTION

Exercise extreme care when handling or setting down the rod. Do not damage the chrome surface.

2. Open ports on the side of the cylinder barrel and drain the oil from the cylinder.
3. Secure cylinder barrel in a chain vise without putting pressure on the side feeder tube in the vertical position with the rod assembly up.
4. Using a 5/32 inch Allen wrench, remove the setscrew on the barrel OD at the head.

NOTE: Oil or oil/air mixture may rapidly exit out of the ports during rod extension. Shield the work area from the exiting oil.

5. With the ports open, extend the rod assembly with a hoist enough to access the top of the head with spanner wrench. Do not extend completely.

6. Turn the head counterclockwise with a fitted spanner wrench until the threads disengage.
7. Extend the rod assembly slowly until the piston is free of the barrel assembly. Place the rod assembly horizontally on a workbench taking care not to damage the surface of the rod.

NOTE: Cover the barrel opening to avoid contamination.

8. Remove the piston seal to gain access to the piston setscrew. Using a 3/16 inch Allen wrench, remove the setscrew from the piston.
9. Remove the piston by turning counterclockwise with a fitted spanner wrench.
10. Remove the spacer and head from the rod.

CAUTION

When removing seals and rings, avoid scratching the grooved and gland surfaces.

11. Remove the seal assembly from the outside of the piston and the O-ring and backup rings from the inside of the piston.

NOTE: Arranging discarded seals and rings in the order of disassembly will aid in installation of new seals and rings. Pay attention to how each seal and ring is installed to avoid installing replacement seals and rings improperly.

12. Remove the O-ring and backup ring from the outside of the head. Remove the wear rings, buffer seal, rod seal and wiper ring from the inside of the head.

Inspection

1. Inspect the rod. There should be no scratches or pits deep enough to catch the fingernail. Pits that go to the base metal are unacceptable. Chrome should be present over the entire surface of the rod. If lack of chrome on rod, the rod should be replaced.
2. Inspect rod for straightness. Determine if it can be straightened or must be replaced.
3. Inspect the head. Visually inspect the inside bore for scratching or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading, and the bore should be checked for out-of-roundness.
4. Inspect the piston. Visually inspect the outside surface for scratches or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading, and the diameter should be checked for out-of-roundness.
5. Inspect the barrel carefully for scoring. If barrel is scored, it must be repaired or replaced.

9. Remove the capscrews securing each top (1) and bottom (2) (Figure 4-17) side wear pads at the front of the outer mid. Remove wear pads, shims, and mounting angle (3) (top left side only).

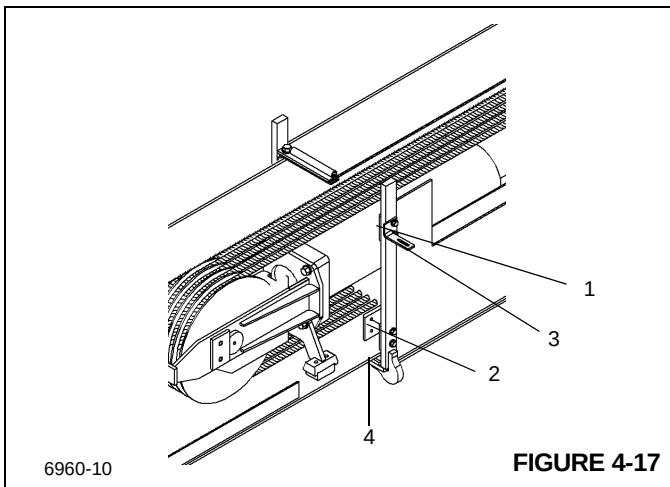


FIGURE 4-17

10. Lift up on the front of the fly assembly and remove the wear pads (4) (Figure 4-17) from the pockets in the bottom of the outer mid.
11. Continue to pull the assembly from the outer mid section until access to the rear of the fly is gained to disconnect the four retract cables.
12. Remove the clip pins and pins (1) securing the four fly retract cables (2) to the rear of the fly (Figure 4-18).

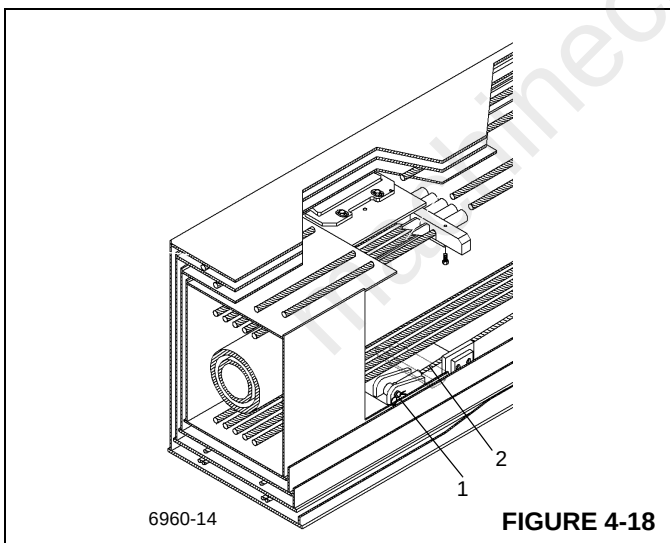


FIGURE 4-18

13. If necessary, remove the synchronizing cable and sheave assembly from the top of the outer mid.

14. If necessary, remove the four fly retract cables from the inside of the outer mid.
15. If necessary, remove the two bolts securing the bottom wear pad to the outer mid. Remove wear pad.
16. If necessary, remove the two bolts securing each lower rear side wear pad to the outer mid. Remove wear pads and shims. Note location of shims for installation.

Remove Telescope Cylinder

1. Attach a suitable lifting device to the telescope cylinder. Raise the cylinder and remove the blocking device from under the cylinder
2. Slide the cylinder out the rear of the fly until the extend cable sheave assembly is aligned with the side access hole in the fly section.

NOTE: The telescope cylinder weighs approximately 899 kg (1980 lb).

3. Remove the capscrews and washers (1) securing the extend cable keeper plate (2) to the rear of the fly (Figure 4-19). Remove the keeper plate and remove the five extend cable ends from the slots in the fly.

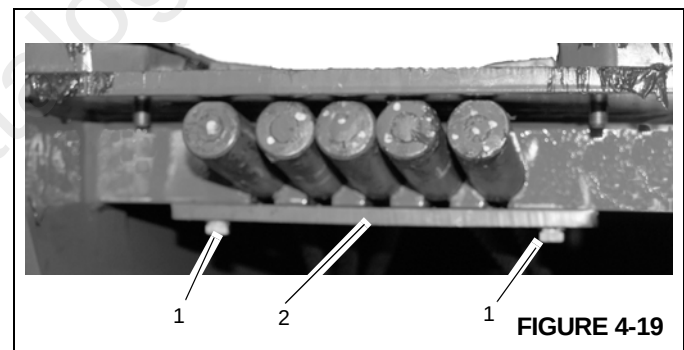


FIGURE 4-19

4. Lift up on the sheave end of the cylinder and remove the two lower capscrews securing the support foot weldment and sheave mounting assembly to the cylinder barrel. Remove the support foot weldment .
5. If necessary, remove the capscrews securing each wear pad to the support foot weldment. Remove the wear pads.
6. Continue to pull the cylinder from the fly section until access to the rear of the fly is gained to disconnect the five extend cables.
7. If necessary, remove the screws securing the bottom rear wear pad to the fly. Remove wear pad.

Electrical Swivel

Description

The swivel assembly consists of a 15 conductor slip ring and cover assembly.

Each brush set incorporates two brushes, leads, and clips which are attached to a brush holder assembly. The brush set leads are formed into harnesses which are routed through the mounting plate on the swivel. The collector ring leads are formed into one harness which is routed downward through the center of the hydraulic swivel. Extending from the base of the hydraulic swivel, the collector ring leads are also formed into connectors which plug into receptacles from the chassis power supply.

The swivel cover is secured with a seal and bolts

The electrical swivel also incorporates a slew potentiometer. The potentiometer controls functions in the load moment indicating, working area definition, and rear axle oscillation lockout systems.

Theory of Operation

The electrical swivel is located on top of the water swivel and transfers electricity between the carrier and superstructure. Wiring harnesses transmit the electricity between the carrier and superstructure.

Maintenance

Removal

1. Perform steps 1 through 4 of HYDRAULIC SWIVEL - REMOVAL in this section.



DANGER

Disconnect the batteries before performing any maintenance on the electrical system. Serious burns may result from accidental shorting or grounding of live circuits.

2. Disconnect the batteries. Refer to Section 3 - ELECTRIC SYSTEM.
3. Locate the connectors which join the collector ring harness to the receptacles for the carrier.
4. Tag the connectors and their receptacles with numbers. Disconnect the connectors from the chassis wiring receptacles.
5. Remove the clamp securing the wiring harness to the retainer plate on the bottom of the hydraulic swivel assembly.

6. Secure the connectors and wires from each of the numbered connectors so the harness can be withdrawn through the center of the hydraulic swivel.
7. Tag and disconnect the connectors from the receptacles on the cab bulkhead mounting plate.
8. Remove the setscrews and remove the cover from the electrical swivel.
9. Loosen the capscrews securing the electrical swivel mounting tube to the center post on the water swivel.
10. Remove the capscrew and jam nut securing the electrical swivel case to the plate on the case of the water swivel.

CAUTION

When withdrawing the wiring harness through the center of the hydraulic and water swivels, ensure the wires do not get caught and damaged.

11. Remove the swivel and wiring harness from the crane. If necessary, remove the spacer bushing from the center post.

Installation

1. If removed, install the spacer bushing on the center post. Route the collector core wiring harness through the center of the hydraulic and water swivels.

NOTE: The boom should be centered directly over the front of the crane before adjustment is made to the slew potentiometer.

2. Slide the electrical swivel mounting shaft onto the center post.
3. Ensure the threaded hole on the bottom of the electrical swivel base is aligned with the mounting hole in the plate on the water swivel case. Install the capscrew through the hole in the plate and install the jam nut. Screw the capscrew into the hole in the electrical swivel base until the capscrew head is approximately 6.0 mm (0.23 in) from the bracket. Tighten the nut against the electrical swivel (Figure 6-6).
4. Apply medium strength Loctite to the setscrews securing the electrical swivel to the center post and tighten them 5 to 6 Nm (44 to 53 pounds-inch)
5. Install the swivel cover and secure with capscrews and washers.
6. Connect the wiring harness connectors to the receptacles on the cab bulkhead mounting plate as tagged during removal.

9. When the vehicle is equipped with a water heater connected to the cooling system, flush the heater, following the same procedure as for the radiator core.
10. After completing the flushing operation, clean out the surge tank overflow pipe; inspect the water pump; clean the thermostat and the radiator cap control valves. Check the thermostat for proper operation before installation.
11. Blow insects and dirt from the radiator core air passages, using water, if necessary, to soften obstructions.

Component Inspection

Radiator/Surge Tank

1. Side Tanks - Look for leaks, particularly where the tank is soldered to the core. Vibration and pulsation from pressure can fatigue soldered seams.
2. Filler Neck - The sealing seat must be smooth and clean. Cams on filler neck must not be bent or worn so as to allow a loose fitting cap. Ensure the overflow tube is not plugged.
3. Radiator Cap - This is the pressure-setting type. Its purpose is to hold the cooling system under a slight pressure, increasing the boiling point of the cooling solution and preventing loss of solution due to evaporation and overflow.

The cap has a spring-loaded valve, the seat of which is below the overflow pipe in the filler neck. This prevents the escape of air or liquid while the cap is in position. When the cooling system pressure reaches a predetermined point, the cap valve opens and will again close when the pressure falls below the predetermined point.

When removing the pressure type cap, perform the operation in two steps. Loosening the cap to its first notch raises the valve from the gasket and releases the pressure through the overflow pipe. In the first stage position of the cap, it should be possible to depress the cap approximately 3 mm (0.13 in). The prongs on the cap can be bent to adjust this condition. Care must be taken that the cap is not too loose as this would prevent proper sealing.



DANGER

Loosen cap slowly and pause a moment to avoid possible burning by hot water or steam. Continue to turn the cap to the left until it can be removed.

4. Tubes are very small and can become easily clogged by rust and scale. The general condition of the cooling system and operating temperature are indications as to

whether or not tubes are clean. Another good test is to feel the core for cold spots.

5. Fins are thin metal sheets that dissipate heat picked up by the tubes. They should be kept free of bugs, leaves, straw etc., so as to allow the free passage of air. Bent fins should be straightened.

Engine Water Jacket

The water jacket permits coolant to be circulated around the cylinder walls, combustion chamber, and valve assemblies. Some of these coolant passages are small and can easily become clogged, if the cooling system does not receive the proper maintenance.

1. Core Plugs - These are sometimes mistakenly called freeze plugs. They do not provide protection against freezing expansion, but are only present because of engine block casting methods. Remove and replace core plugs that show signs of leaking or rusting through. Use an installation tool for core plug replacement.
2. Drain Plugs - The water jacket of each engine has one or more drain plugs. These should receive seasonal care and be kept free of rust and scale.
3. Gaskets - Gaskets must be in good condition to prevent both internal and external leaks. If there are external leaks around gaskets, there may also be internal leaks into the engine. Proper tightening of the head bolts with a torque wrench is essential for preventing leaks around the head gasket.

Water Pump

The pump should be checked carefully for leaks and proper lubrication. Replace or rebuild if leaking, cracked, or worn.

Fans and Belts

The fan should be checked for cracked or broken blades.

Refer to ENGINE DRIVE BELTS in this Section.

Thermostat

The thermostat is of the nonadjustable type and is incorporated in the cooling system for the purpose of retarding or restricting the circulation of coolant during engine warm up. Engine overheating and loss of coolant is sometimes due to an inoperative thermostat. To check for this condition, remove the thermostat and test by submerging it in hot water and noting the temperature at which the thermostat opens and closes. Use an accurate high temperature thermometer for making this test.

Hoses and Clamps

Hoses and their connections must be checked regularly because they are often the source of hidden trouble. Hoses

5. Lower the jack until the holes in the cylinder rod align with the holes in the outrigger beam.
6. Apply anti-seeze compound to the retaining pin. Secure the cylinder and cylinder cap retaining bracket to the support tube with the retaining pin and cotter pins.
7. Install the cylinder cap.
8. Install the fittings in the cylinder ports and connect the hoses as tagged during removal.

Functional Check

1. Activate the hydraulic system.
2. Extend and retract the stabilizer cylinder.
3. Check for smooth operation of the cylinder.
4. Check all hydraulic connections and hoses for evidence of leakage.

Outrigger Stabilizer Cylinder Internal Leak Test

Use the following procedure to troubleshoot and diagnose an internal leak, a leaking pilot operated check valve or a thermal contraction on an outrigger stabilizer cylinder.



DANGER

Perform the following procedures with the crane positioned on a firm level surface with outriggers fully extended and set, and the crane in the travel position.

Remove hoses from one cylinder at a time.

Checking Cylinder For Internal Piston Seal Leak

1. Fully extend and set the outriggers.

CAUTION

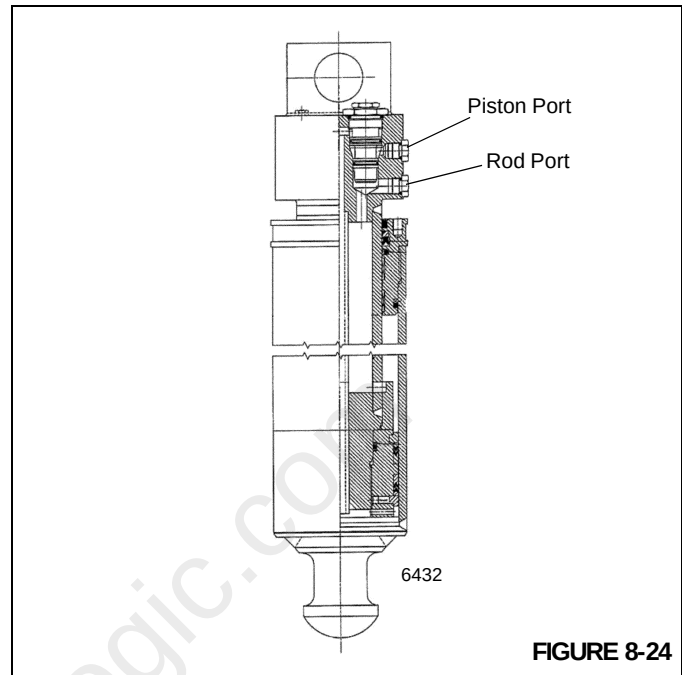
When performing step number 2, remove hose to adapter connection slowly. Trapped pressure may exit between the outrigger cylinder and the work port pilot operated check valves in the outrigger selector valve.

2. Remove the rod side cylinder hose from the suspected leaking stabilizer cylinder (Figure 8-24). Oil will flow until the cavity in the cylinder port block empties. Once the port block cavity empties, oil should stop flowing from the rod side port.

Check for the following conditions:

- a. If oil stops flowing, the cylinder's internal piston seal is sealing properly.

- b. If oil continues to flow out the rod port, the cylinder's internal piston seal is leaking.



3. After determining the condition of the cylinder's internal piston seal, let the rod side hose disconnected and continue to test the pilot operated check valve.

Testing Pilot Operated Check Valve For Leakage

1. Fully extend and set the outriggers.

CAUTION

When performing step number 2, remove hose to adapter connection slowly. Trapped pressure may exit between the outrigger cylinder and the work port pilot operated check valves in the outrigger selector valve.

2. Remove the piston side cylinder hose from the suspected leaking stabilizer cylinder (see Figure 8-27). Oil will flow until the cavity in the cylinder port block empties. Once the port block cavity empties, oil should stop flowing from the piston side port.
 - a. If oil stops flowing, the cylinder's pilot operated check valve is sealing properly.
 - b. If oil continues to flow out the piston port, the cylinder's pilot operated check valve is leaking.

If oil flow is not noticed from either port, the cylinder and pilot operated check valve are functioning properly, and any cylinder contraction during normal operation can be attributed to thermal contraction of the oil.

Full Version Available

Grove RT530E-2 Rough Terrain Crane Service Manual

Grove RT530E-2 rough terrain crane service manual with repair procedures, adjustments and troubleshooting across the main systems. Instant PDF download.

VIEW THE FULL MANUAL

<https://machinecatalogic.com/grove-rt530e-2-rough-terrain-crane-service-manual/>

Book No: CTRL106-03 · File Pages: 536 · File Count: 2 · File Language: English