

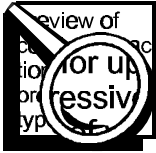
N-01

MAINTENANCE MECHANIC TRAINING

SKILL DEVELOPMENT GUIDE

Duty N: System Troubleshooting
N-01: Troubleshoot Hydraulic System

Issued 06/01/98



Task Preview

Troubleshoot Hydraulic System

The Maintenance Mechanic troubleshoots a hydraulic system when a machine stops moving (the slide or axis is not functioning). The hydraulic system is also checked when a machine operates sluggishly, when an Electrician notifies you of a motor load kicking out, or a Machine Operator is having a product quality problem. The Machine Operator needs to assist by operating the machine during hydraulic system troubleshooting.

Basic machine operation and good communication skills are critical to troubleshooting the hydraulic system for any machine. The Maintenance Mechanic must be able to repair/replace gages and repair/replace valves to correct the hydraulic system faults. When individual components within the hydraulic system are identified as defective, the Maintenance Mechanic must troubleshoot or repair those components. The Maintenance Mechanic must troubleshoot the hydraulic system thoroughly or the quality of the product will suffer and/or the machine will not work.

To troubleshoot a hydraulic system, the Maintenance Mechanic must communicate with the Machine Operator about the problem. Check the system pressure and component temperatures. Read the hydraulic print and verify valve and actuator operation. Troubleshooting must result in the identification of a corrective action that returns the hydraulic system to normal operation.

How your skills will be checked

The Skill Check will require you to troubleshoot the hydraulic system. All tools, materials, and resources will be available. The Evaluator will verify that your demonstration meets the skill objective by observing or measuring each task standard. You must demonstrate safe work practices during the Skill Check. Contact your Evaluator when you are ready for the Skill Check.



Skill Objective

Given a hydraulic system that is not operating within normal parameters, troubleshoot the hydraulic system.

Task Standards

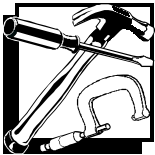
1. The fault must be identified.
2. The recommended corrective action returns the hydraulic system to the normal operating conditions shown on the hydraulic print or in the manufacturer's manual.

What You Will Need

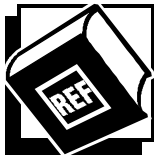
This section contains the safety information, tools, and resources you will need before troubleshooting the hydraulic system.



- Follow all Caterpillar facility safety standards when performing this task.
- Watch for rotating and moving parts/shafts, slides, or conveyors; the machine is energized during troubleshooting.



- Maintenance Mechanic hand tools



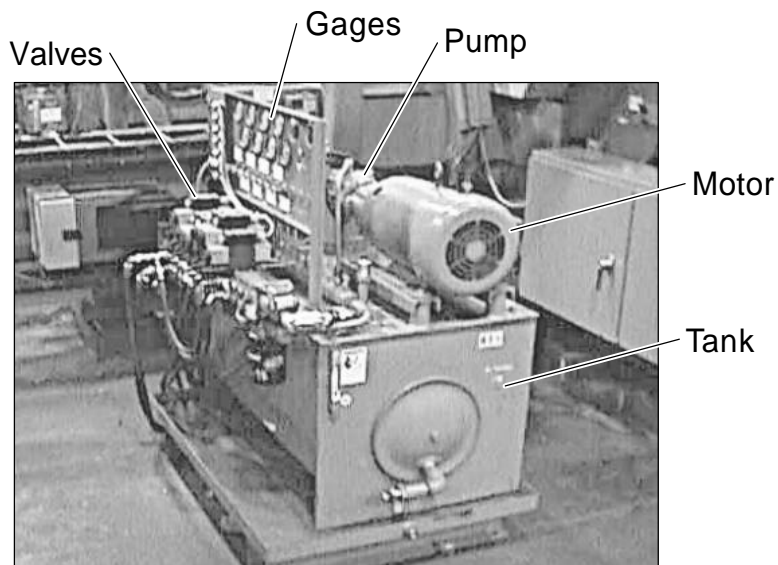
- machine manufacturer's manual
- hydraulic print



Task Steps

Troubleshoot Hydraulic System

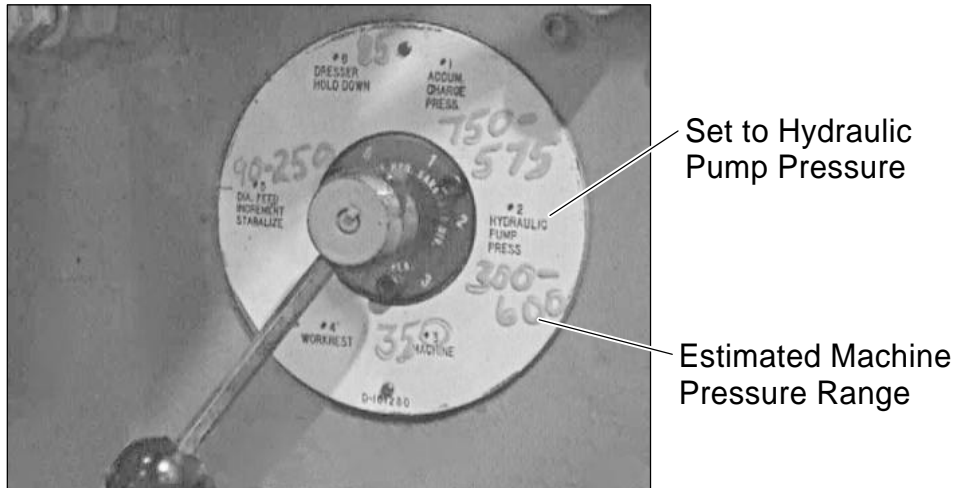
1. Ask the Machine Operator to describe the problem.
 - Note the hydraulic problems and when they occur.
2. Check the system hydraulic pressure.



Example of Hydraulic System Components

- Visually scan the area for excessive hydraulic fluid.
- Repair any leaks you detect.
- Check the oil tank level.

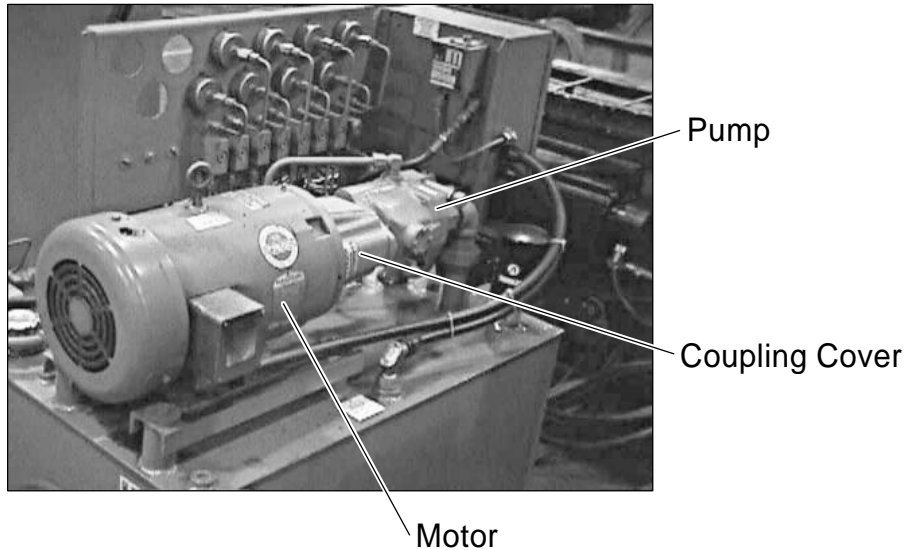
- Set the gage manifold, if applicable, to read pump pressure.



Gage Manifold Control

- Physically touch the pump and valves to see if they are hotter than normal. Excessive heat is an indication that the component is operating incorrectly. Troubleshoot the fluid control device according to procedures, as needed.
3. Verify that the pump is running.
 - Listen for abnormal sounds, if the pump is operating, and perform a corrective action to replace or repair the pump if any abnormal sounds are heard.
 - Check the motor if the pump is not operating.
 4. Verify that the pump motor is running.
 - Troubleshoot the motor, according to fluid motor procedures, if it is not operating according to nameplate data.

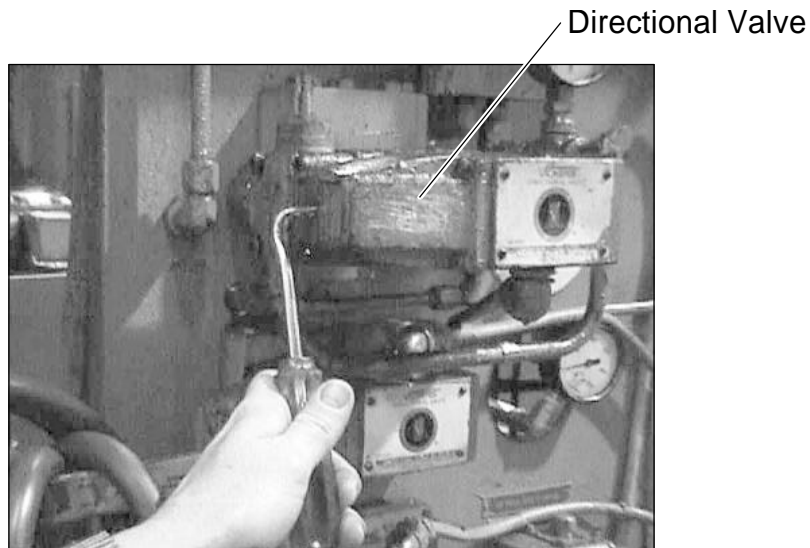
- Check the coupling or belt, if the motor is operating according to nameplate data.



Hydraulic Power Unit

5. Verify the coupling or belt operation.
 - Ask the Machine Operator to turn off the power so you can check the drive, coupling or belt.
 - Remove the coupling cover and verify that it is visibly transferring power.
 - Verify that the belt, if applicable, is tensioned and operating according to normal drive belt conditions.
 - Troubleshoot the coupling or replace the belts or pulleys, as required, if the coupling or belt is not operating normally.
6. Troubleshoot the pump, following maintenance procedures, if the motor and coupling are operating normally and the pump is not working.
 - Check the pump pressure if the pump is running or you have replaced the pump.

7. Test the pump pressure at the relief valve.



Directional Valve Adjustment

- Adjust the pressure at the directional valve if the gage pressure reading is low.
 - Turn the relief valve pressure down, first, then attempt to increase the pressure.
 - Replace the relief valve, following maintenance procedures, if the pressure fails to increase.
8. Test the associated valve for the component the Machine Operator designates as the problem.
 - Use the hydraulic print to identify the valve.
 - Troubleshoot the valve according to maintenance procedures.
 - Ask the Machine Operator to activate the actuator you are testing.
 - Replace the valve if it is faulty.

9. Check the fluid line from the valve to the actuator.

Note: Actuators include any fluid motor, linear actuators, rotary actuators, or wedges.

- Repair any leaks in the hose or tubing and replace any bad connectors.
- Follow the procedures to troubleshoot the cylinder or the rotary actuator.



Concept Check

Troubleshoot Hydraulic System

Answer the following questions to check your understanding of troubleshooting a hydraulic system. Circle the correct answer in each question. Then compare your responses with the answers at the bottom of this page. Some of the questions may have more than one correct answer. If you have difficulty answering a question, review the Skill Development Guide or ask your Trainer for assistance.

1. Physically touch the pump and valves to see if they are _____ than normal.
 - a. cooler
 - b. hotter
 - c. wetter
 - d. drier

2. Excessive heat is an indication that the _____ is working incorrectly.
 - a. component
 - b. machine
 - c. coolant
 - d. oil

3. Ask the Machine Operator to _____ the power so you can check the coupling or belt.
 - a. turn off
 - b. turn on
 - c. restore
 - d. lockout

Answers: (1. b 2. a 3. a)

Next Step

If you are ready to demonstrate the task now, ask your Evaluator or Trainer to schedule the Skill Check. However, if you need to practice some of the steps first, continue to the next section.



Practice

The following practice will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.

Practice

Ask your Trainer to set up a machine for hydraulic system troubleshooting. Troubleshoot the system using the hydraulic print for the machine, if necessary.

Tools and equipment for Practice:

Machine with a hydraulic system

Machine hydraulic print

Practice Objective

You must identify the fault in the hydraulic system. You must recommend a corrective action the Trainer agrees will restore the hydraulic system to normal operating conditions. All safe work practices must be demonstrated.

Next Step

Continue to practice until you are ready for the Skill Check. When you are ready to demonstrate the task, ask your Evaluator or Trainer to schedule the Skill Check.