For downloadable product manuals, data sheets and CAD drawings, visit Lake's web site today!

www.lakemonitors.com

LAKE MONITORS

LAKE MONITORS 8809 INDUSTRIAL DRIVE FRANKSVILLE, WI 53126
P: (800) 850-6110 (262) 884-9800 F: (262) 884-9810 WWW.LAKEMONITORS.COM

Hydraulic System Test Analyzers

Operating Manual for Styles K & T Analyzers

www.lakemonitors.com

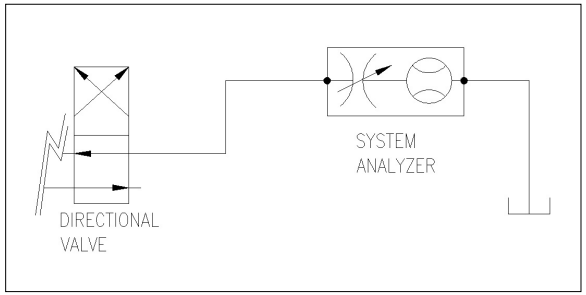

Illustration 4

Step 5 - Directional Control Valve

To test for leakage in a directional control valve, disconnect the flow line exiting the control valve and connect the line to the inlet of the Analyzer. Connect the outlet of the Analyzer to a line returning to the reservoir. **(See Illustration 4)** Fully open the Analyzer's load valve by turning it completely CCW (counter clockwise). Start the system's pump and allow the oil to reach proper operating temperature.

To test the valve, shift the valve to allow flow to pass through the Analyzer. Operate the system's pump at its rated RPM - note the flow rate indicated on the Analyzer. Gradually increase the system pressure by turning the Analyzer's load valve CW until system pressure is just below the relief valve setting. Note the indicated flow rate. If the flow rate has dropped more than it did in Step 2, the valve needs servicing.

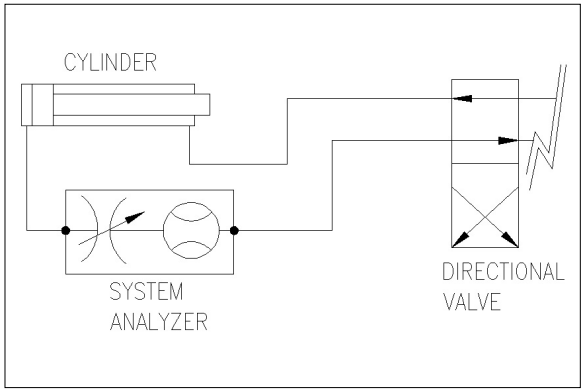

Illustration 3

Generally, it is recommended that the reverse flow capable variation of analyzers is used to diagnose cylinder leakage as this will make the tests simpler and compliment the bi-directional nature of the flows to and from the cylinder. This being stated, the standard analyzer product is not capable of reverse flow and the misuse of the product will result in damage to the analyzer and/or the system under test that is not covered by the warranty.

Run the piston to one end of its stroke and leave it stalled in this position and power down the system. Plumb the analyzer into the line at the end of the cylinder in which the piston is resting, orient the flow arrow toward the directional valve. **(See Illustration 3)**

Fully close the Analyzer's load valve by turning it completely CW (clockwise). Power up the system and actuate the directional valve so that the piston remains stalled under pressure. **Do not actuate in the reverse direction unless your analyzer part number includes an –RF at the end (reverse flow capable)**. Now check the pressure gauge on the Analyzer. If pressure exists open the valve for a moment and close it again. If pressure returns, the cylinder is leaking.

After checking, power down the system remove the analyzer and restore the plumbing connections, run the piston to the opposite end of the cylinder and repeat the test. This test does not check the cylinder bore for inclusions. If the bore is suspect the cylinder should be removed from the system disassembled and inspected.

Introduction

A properly designed and maintained hydraulic system will perform dependably under extreme conditions, but as its components begin to wear overall efficiency of the system will suffer. This loss of efficiency in various components can place a strain on the entire system resulting in higher oil temperatures which tend to jeopardize the lubricating properties of oils. The other issue that results from improperly operating hydraulic systems with excessive wear and/or contamination is the increased energy consumption that can be expected.

The Troubleshooting Problem

Because a loss of efficiency can be attributed to a variety of individual component failures, a systematic approach to troubleshooting will more positively locate the source of the failure. Simply replacing system components on a trial and error basis will waste time and money. Generally, the ideal method for diagnosing and servicing hydraulic systems involves testing the most costly components first while repairing or replacing the least costly components as a result of the outcome of these tests.

The Troubleshooting Solution

To assure the proper operating characteristics of hydraulic system components, Lake Monitors offers its proven products and a 5-Step Method to systematically perform hydraulic troubleshooting.

Warning! The Analyzer and troubleshooting method are designed to be general in nature and require a knowledgeable user to identify system components and have an understanding of system operating characteristics. Use by non-qualified personnel can lead to serious system damage and/or personal injury.

The heart of Lake's troubleshooting method is the Hydraulic System Analyzer. (**See Illustration 1)** The Analyzer provides direct indication of flow rate, system pressure and temperature*. It also has an integral load valve that is adjusted during the troubleshooting process.

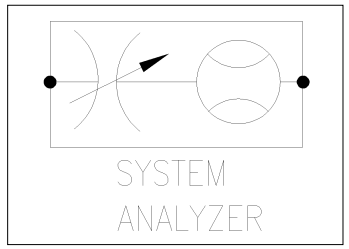

Illustration 1

* *The T-series of products offers temperature, flow and pressure indication, whereas the K-series offers flow and pressure.*

Step 1 - Basics

Before any extensive troubleshooting procedures are started, the following several items need to be considered:

- Ensure that the suction strainer, which is located either in the line between the reservoir and pump or inside the reservoir, is clean. Restrictions in the pump's suction line will cause pump cavitations and loss of high pressure and can cause excessive pump noise and premature wear.
- Ensure that the suction line within the reservoir covered with at least 3" of oil. Failure to maintain a flooded suction line can also lead to the conditions stated above.
- Make an effort to obtain all product data sheets and specifications for the equipment to be tested. Having this information at hand will help during the diagnosis.
- Most importantly, study and apply the applicable safety guidelines for the equipment being tested. Apply best practices and avoid damage to equipment or personal injury.

Step 2 - Pump Output

To measure the hydraulic horsepower that is being generated by the system's pump, the Lake System Analyzer should be plumbed directly in-line after the system's pump outlet and relief valve. **Be sure to orient the Analyzer so that its flow direction arrow corresponds with the actual flow direction.**

Open the flow control valve on the Analyzer fully CCW (counter clockwise), start the system and bring the oil temperature to standard operating temperature.

With the pump operating at the RPM recommended by the manufacturer, note the flow rate indicated on the Analyzer. Adjust the load valve on the Analyzer CW (clockwise) until the pressure indicated on the Analyzer is just below the relief valve setting. Note the flow rate on the Analyzer. An indication lower than what is specified by the pump manufacturer as an acceptable margin or a drop of more than 10% in flow rate (flow rate under pressure/flow rate at no pressure = less than 0.9) indicates a need for pump service.

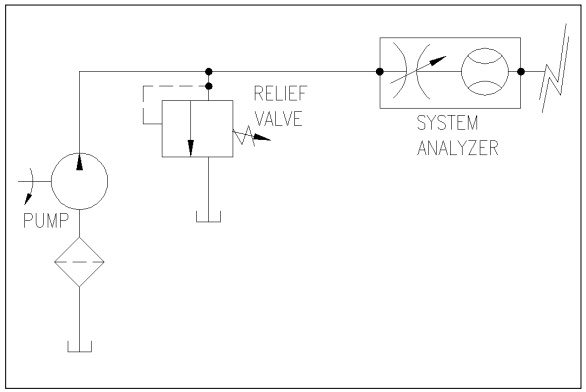

Illustration 2

Step 3 - Relief Valve

To test for proper operation of the system's relief valve, install the Analyzer immediately downstream from the valve ensuring proper orientation of the Analyzer. (**See Illustration 2)**

Open the valve on the Analyzer fully CCW (counter clockwise), start the system and allow it to run until it reaches its normal operating temperature as dictated by the manufacturer supplied data.

With the pump operating at the RPM recommended by the manufacturer, gradually close the Analyzer's load valve noting the pressure that the flow rate drops off at. If that pressure differs from the system's design pressure, the valve may need to be cleaned, adjusted or replaced.

This point of the procedure requires that the data from the equipment manufacturer calls out a set point and/or an acceptable range of tolerance for the relief valve. Often times this information can be found on a label or tag on the valve or pump housing.

Step 4 - Testing Hydraulic Cylinder Leakage

If the results of Steps 1 - 3 are acceptable, the problem lies down stream from those components. One common source of poor system performance can be faulty seals in hydraulic cylinders. To test the cylinder's seals, make certain the cylinder is not under any mechanical load and that the ram or piston rod is completely unobstructed.