

N-06: Correlate Components Problems with Pneumatic Valves

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- All machines must be locked out and reduced to a Zero Mechanical State (ZMS) before any work is performed.
- Moving equipment hazard exists when a core box machine is energized; components can move suddenly when a valve shifts or air pressure to an actuator changes.

EQUIPMENT

- screwdriver
- wrenches (socket, combination, Allen) necessary for the bolts, line fittings, and cap screws on the machine
- wiping rags
- flashlight

RESOURCES

- machine manufacturer's documentation, specifications, and prints
- Machine Operator
- Electrician

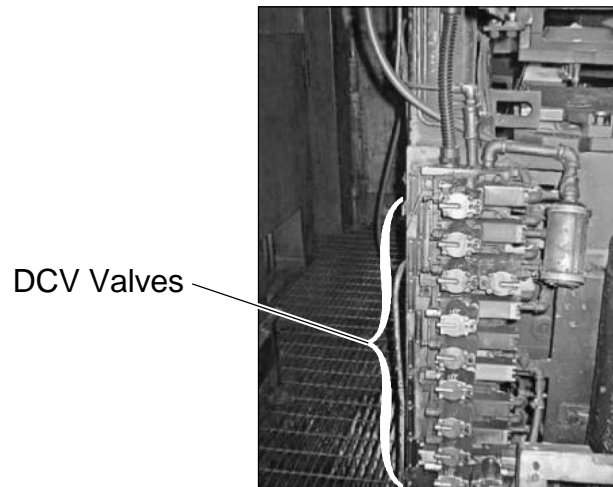


Correlate Components Problems with Pneumatic Valves

Note: This procedure was analyzed on a 4-101 T-gas Isocure Core Box Machine.

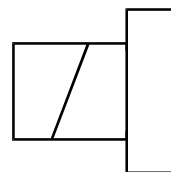
Note: If the hopper of a core box machine is loaded with sand, determine the sand shelf life, and empty the hopper if this task is likely to take longer than the shelf life.

1. Locate all pneumatic valves on the machine.
 - Find the solenoid-operated directional control valves (DCV) on a common manifold as shown below.

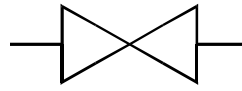


Solenoid-operated DCVs on a Manifold

- Find the individual solenoid-operated DCVs in the lines to pneumatic actuators and pneumatic subsystems. See the figure below.

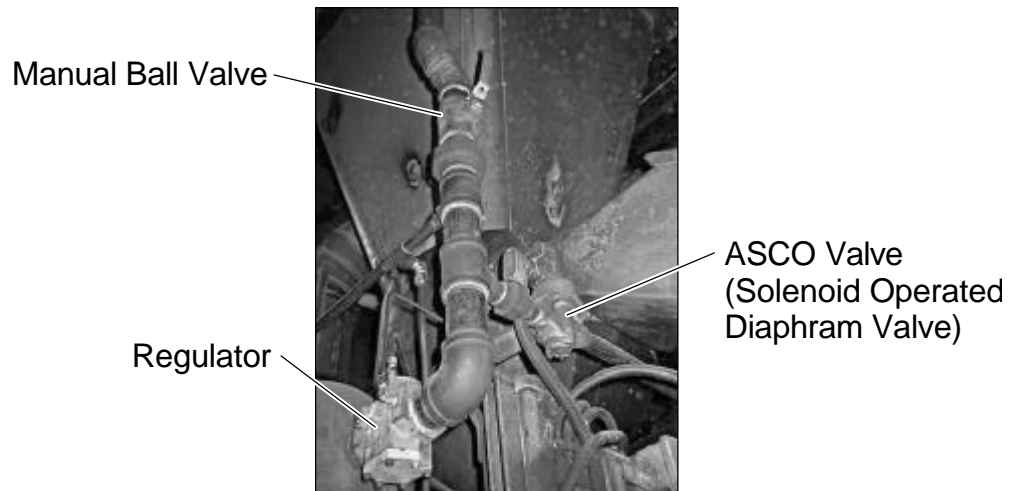


- Locate the manual shutoff valves in air supply lines. See the figure below.



Manual Shutoff Valve

- Locate the pilot-operated, pressure-reducing, check, shuttle, and other special-purpose valves as shown below.



Individual Pneumatic Valves

- Locate the manually adjusted flow control valves.
- Find the pressure regulating valves.

2. Identify the function of each valve.
 - Read the label beside the valve if there is one as shown below.

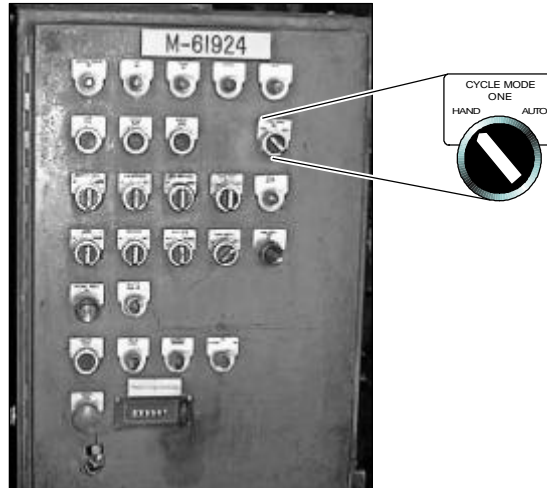
Valve
Identification
Tags



Labeled Valves

- Consult the machine documentation.
 - Trace the air line(s) from the valve to other valves or actuators.
3. Identify the machine operating problems.
 - Confer with the machine operator.
 - Watch the machine through several cycles until the (intermittent) problem occurs.
 - Inspect the core produced by the machine for defects.
 4. Determine which pneumatic valve could cause the machine operating problem.
 5. Test the automatic solenoid-operated valve.
 - Determine if manual operation of the valve (out of the control sequence) would damage machine components.

- Set the machine control panel to manual mode, as shown below, if manual valve operation is feasible. Ask for assistance from the operator, if necessary.



Machine Control Panel

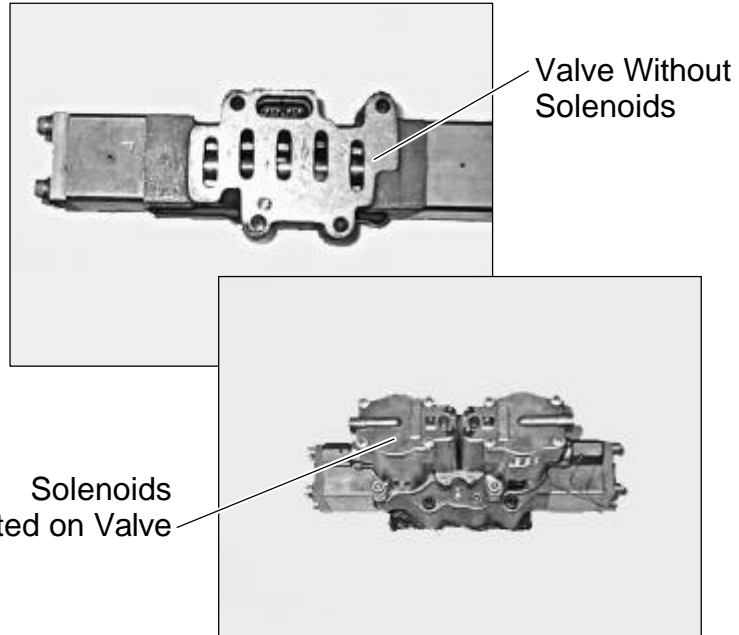
- Manually activate the suspected valve at the control panel while checking for the expected machine function.
- Shut off the air supply if manual valve operation could damage machine components.

Note: Some machines are connected to more than one air supply line. Be sure to shut off the supply to the suspected valves.

- Set the machine control panel to manual mode.

Note: While working in or on the machinery, shut off the air supply; you may need to bleed off the air tank.

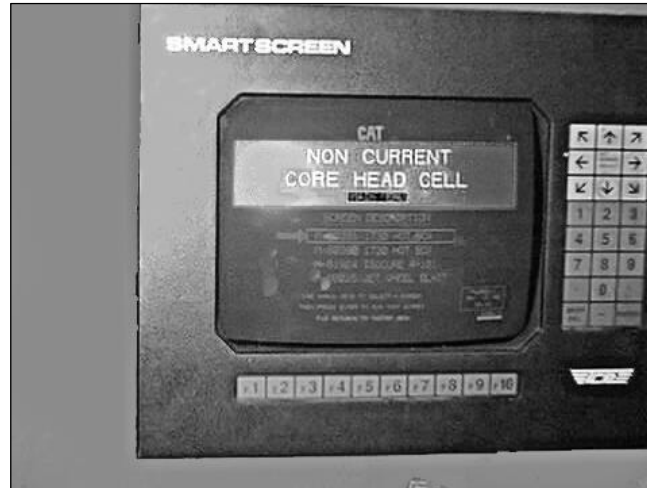
- Manually activate the valve while an Electrician checks the indicator light on the valve solenoid and feels the solenoid for activation.
- If the expected machine function does not occur, or the solenoid does not appear to activate, remove, inspect, and repair or replace the valve. See the figure below.



Removed Solenoid Valve

- Restore the air supply and test machine operation.

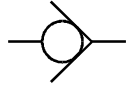
- If the expected machine function does occur and the solenoid does activate, ask the operator to check the PLC program control parameters on the Smart Screen. See the figure below.



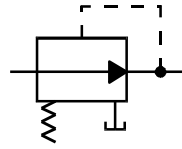
Smart Screen

- If necessary, ask an Electrician to reset the parameters or check the control program listing.
6. Test the manually set flow control valve, if necessary.
 - Determine the expected effect of changing the setting.
 - Adjust the setting and verify the effect on system operation.
 - Set the flow to provide specified machine operation found on the prints.
 7. Test the manually set pressure regulating valve, if necessary.
 - Identify the pressure gauge that indicates the output pressure from the valve (may be pilot operated.)
 - Adjust the setting and verify the changed pressure reading.
 - Set the regulated pressure to machine specifications found on the prints.

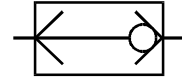
8. Test the check, pressure reducing, and shuttle valves, if necessary. See the figure below.



Check



Pressure Reducing



Shuttle

- Troubleshoot the valve's operation with pressure gauge readings.
- If necessary, replace the valve if an exact replacement valve or a cross-referenced equivalent valve is in stock.
- Remove and disassemble the valve to identify the problem, if the symptoms lead to the valve. Investigate the possibility of repairing the valve.
- Check new valve operation in the 634 shop using various manifolds.