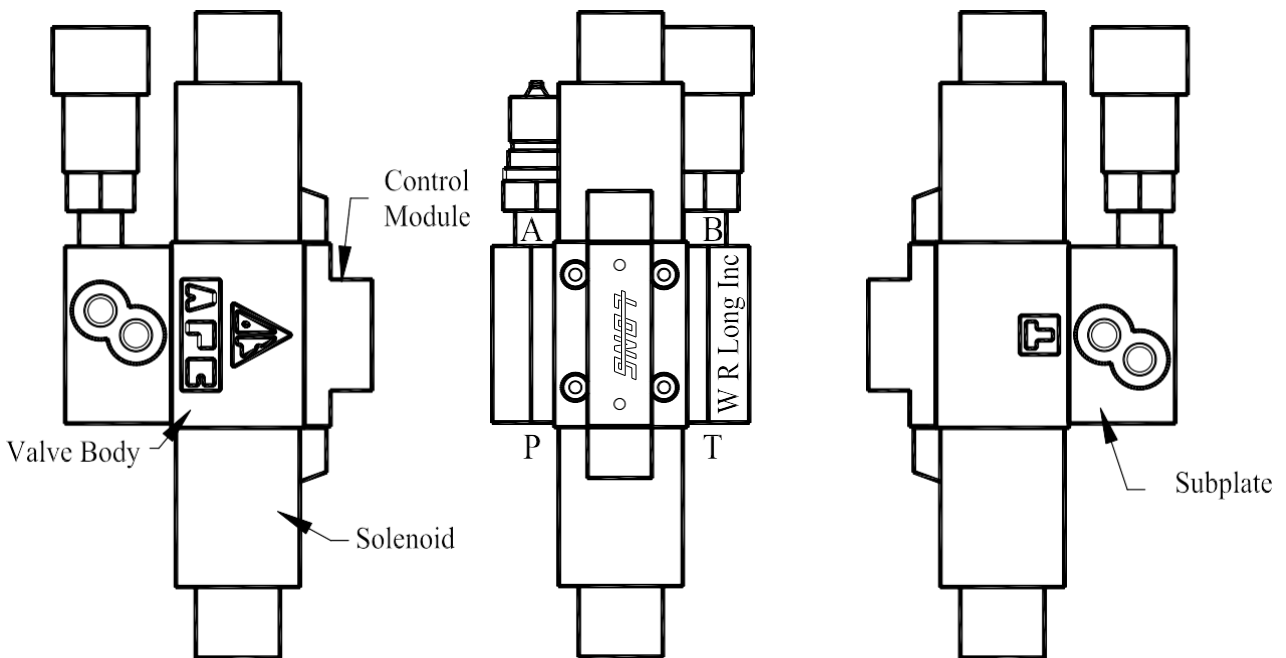


W. R. Long Inc. Live 3rd Function Valve Kit

Trouble Shooting Guide

This manual provides the necessary information for troubleshooting the W. R. Long Live 3rd function valve kit. There have been improvements to the kits over the past 20 years; however the basic components are similar.

Becoming familiar with how the live 3rd function kit normally operates may help while troubleshooting and problem solving. Assuming that the kit is installed properly, your attachment should open when one side of the rocker switch or button is pressed and stop moving when it is released. When the other side of the rocker switch or other button is pressed your attachment should close and stop moving when it is released. No movement of the joystick is required. This kit is designed for tractors with open center hydraulic systems. This means that the fluid travels from one valve to the next "in series" and there are no "Tees" in the system. Informational videos are available on our website by visiting www.wrlonginc.com/help.



W R Long Live 3rd function Valve, Subplate, and Control Module



W R Long Live 3rd function Valve shown with, Subplate, Control Module, Adaptors, and QC's.



Valve



Control Module shown with screws



Rocker Switch

So how does my loader valve work:

The loader valve is operated with a joystick that is either directly connected to the loader valve or connected with cables. The loader valve has seven hoses or steel tubes connected to it. Four of the hoses attach to the loader to make it go up, down, dump, or curl. The 5th connection allows the loader valve to receive fluid from the pump. The 6th connection sends fluid directly to the tank. The 7th connection is the power beyond port that supplies fluid to other valves downstream (3 point hitch, remotes, backhoe, 3rd function valve). When the tractor is running and no valves are being operated the fluid is flowing from the pump, through the loader valve, out the power beyond port and then to the next valve in the hydraulic loop. When the joystick is shifted the fluid is redirected to the loader cylinders causing the loader to either move up or down or the bucket to dump or curl. The fluid from the other side of the cylinders then return to the loader valve and then out the power beyond port. If the joystick is held in one direction and the loader has traveled all the way to the stops and the joystick is still held in that position then there is nowhere for the fluid to go. When this happens, the pressure goes up and the pressure relief valve opens and then the fluid starts going out the tank line. When this happens there is no fluid going out the power beyond port line. That means that no other valve after the power beyond port will operate since there is no fluid going out the power beyond port. When the joystick is released the pressure returns to normal the pressure relief valve closes and fluid starts going out the power beyond port and the fluid is no longer going out the tank line.

How to use this trouble shooting guide.

Read through the potential problem and then identify the number for example P1. Scroll down to the detail for P1. There will be listing of "H" Hydraulic or "E" issues. Scroll down further to read through the specific H or E issue to consider.

Page 4 – "P" Listing of potential problems followed by suggested solutions

Page 6 – "H" Listing of potential Hydraulic specific issues.

Page 6 – "E" Listing of potential Electrical specific issues.

Page 6 – "O" Listing of "how to's"

Page 7 – "H" Detailed steps to address each Hydraulic issue.

Page 10 – "E" Detailed steps to address each Electrical issue.

Page 11 – "O" Detailed explanation of each how to.

P – Potential Problems

- P1 - Nothing happens when button is pressed. “My valve is sticking”.
- P2 - Attachment creeps open or closes at high idle.
- P3 - Attachment locks open or closed. Will unlock when other button is pressed.
- P4 - Attachment will not hold pressure after releasing button.
- P5 - Attachment Operates slowly.
- P6 - Hydraulic fluid is leaking out of valve or other component.
- P7 - Valve is making a lot of noise.
- P8 - Valve, hoses, hydraulic fluid is getting hot.
- P9 - None of the hydraulics on the tractor work properly.
- P10 - Only works when operating loader.
- P11 - Attachment opens but closes by itself when button released.

OK Let's get Started.

- In most cases the 1st step is to Manually Operate the Valve (**H1**). This will determine if it is a Hydraulic or Electrical issue. If you already know for sure, then move on to the next step.

P1 - Nothing happens when button is pressed.

- Manually Operate the Valve. (**H1**) Note: Turn a few pages to see **H1** for trouble shooting details.
 - If Manually Operating does not work.
 - H3** - Quick connect is not fully engaged.
 - H4** - Quick Connect is defective (may act like check valve).
 - H7** - No Fluid going through WRLong valve.
 - H7.1** - W R Long valve is connected to the tank line (no flow or pressure).
 - H7.2** - (PRV) Pressure Relief Valve on Loader Valve is open (no flow or pressure).
 - H7.3** - “Other valves after the W R Long valve are closed or blocked. Remotes or backhoe (No flow but high pressure).
 - If Manually Operating works but not switch, then
 - E1** - One or both screws are not contacting the circuit board.
 - E2** - Control Module is bad.
 - E3** - Switch is bad.
 - E4** - No power or not enough power.
 - E5** - Fuse is blown.
 - E6** - Solenoid is bad.
 - E7** - No Ground.

P2 - Attachment creeps open or closes at high idle.

H2 - P & T port hoses are reversed.

P3 - Attachment locks open or closed. Will unlock when other button is pressed.

Solution same as P2: H2.

P4 - Attachment will not hold pressure after releasing button.

H8 - Seals in cylinder are bad.

H10 - Spool or valve body is scarred or worn out.

P5 - Attachment operates slowly.

H4 - Quick Connect is defective (may act like check valve).

H8 - Seals in cylinder are bad.

P6 - Hydraulic fluid is leaking out of valve or other component.

- This could be caused by high pressure. The PRV "Pressure Relief Valve which is normally located inside your loader valve" is set to 2,750 psi so the maximum pressure should be 2,750 psi.

H5 - WRLong "P" port hose connected to pump line.

Tighten connections if no resolution then replace leaking components.

P7 - Valve is making a lot of noise.

Normally caused by vibrations due to hydraulic fluid traveling through valves, fittings, and hoses.
Reroute hoses.

P & T hoses could be reversed (H2)

P8 - Valve, hoses, hydraulic fluid is getting hot.

Caused by restrictions as hydraulic fluid traveling through valves, fittings, and hoses or higher hydraulic flow than what the system was designed for.

Could be a partial blockage in system.

H4 - Quick Connect is defective (may act like check valve).

Check tractor implement flow rate. D03 valve up to 12 gpm. D05 valve up to 20 gpm.

May need larger valve or subplate that bypasses part of flow.

P9 - None of the hydraulics on the tractor work properly.

H7.3 - Other valves after the W R Long valve are closed or blocked.

Remotes could be in detent position.

Take W R Long valve out of loop and check to make sure it is not something else in the system that is causing this.

P10 - Only works when operating loader.

H6 - WRLong "P" port hose connected to tank line.

P11 - Attachment opens but closes by itself when button released .

H11 - Hoses on attachment are crossed.

What might be the problem with the kit

H – Hydraulic Problem

H1 - Spool is stuck.

H2 - P & T port hoses are reversed.

H3 - Quick connect is not fully engaged.

H4 - Quick Connect is defective (may act like check valve).

H5 - WRLong "P" port hose connected to pump line.

H6 - WRLong "P" port hose connected to tank line.

H7 - No Fluid going through WRLong valve.

H7.1 – W R Long valve is connected to the tank line (no flow or pressure).

H7.2 - (PRV) Pressure Relief Valve on Loader Valve is open (no flow or pressure).

H7.3 - "Other valves after the W R Long valve are closed or blocked. Remotes or backhoe (No flow but high pressure).

H8 - Seals in cylinder are bad.

H9 - Cylinder is broken.

H10 - Spool or valve body is scarred or worn out.

H11 - Hoses on attachment are crossed.

E – Electrical Problem

E1 - One or both screws are not contacting the circuit board.

E2 - Control Module is bad.

E3 - Switch is bad.

E4 - No power or not enough power.

E5 - Fuse is blown.

E6 - Solenoid is bad.

E7 - No Ground.

E8 - Power wire grounding out (wire damaged).

O - Other Issue

- O1 - How to locate the power beyond port (PBP).
- O2 - How to remove the solenoids.
- O3 - How to remove the subplate.
- O4 - How to remove the control module.
- O5 - How to clean the valve.

H – Hydraulic Problem

H1 - Spool is stuck. Need to Manually Operate the Valve.

There may be some debris in the valve and if so, we will need to clear this debris. (If the attachment is always trying to open or trying to close then it could be an electrical issue, so we need to remove the fuse 1st).

- We have a video on our website showing how to manually operate the valve. This is how we clear debris and also determine if there is a hydraulic or electrical issue. Visit the FAQ's page on our website and watch the video, then manually operate your valve.
- On the W R Long valve there are two solenoids opposite of each other. Looking through the center of the plastic nut that holds the solenoid on, you can see the end of the tube of the valve and also the end of a brass rod which has an indentation. This brass rod when depressed all the way actually shifts the spool inside of the valve which operates your attachment. Pressing one side will open your attachment, and pressing the other side will close your attachment. There is a spring inside the valve that pushes the spool back into the center position. When the tractor is not running the brass rod does not pop back out; however it does when the tractor is running and the hydraulic fluid is being circulated through the valve. When the button is flush with the end of the tube we call this the home position.
 - We now want to manually operate the valve with the tractor off. Using a Phillips head screwdriver press the brass rod. The diameter of the screwdriver shank must be smaller than the diameter of the brass rod. The button will move about 1/8" and stay in that position (bottom position). Pressing the button another 1/16" will compress the spring and shift the spool. When the pressure is removed from the screwdriver the spring will push the spool back to the bottom position along with the brass rod. Do this on both sides.
 - If you can feel the spool moving and the spring returning it back to the bottom position then the spool in your valve is not stuck. Do this a few times on both sides to get the feel.
 - If you cannot feel the spool moving, then we will need to persuade it a little more. Push the brass rod with the screwdriver and also tap the end of the screwdriver with a rubber mallet or hammer. Do not hit it like a nail; however you can give it numerous firm taps.
 - If it is still stuck then the valve can be taken apart and cleared. There is a parts break down on the W. R. Long Inc dealer page. Click on the American Flag on the top right corner of our website and select item 12.

- Now crank up the tractor and do the same process and your attachment should open when you push one side and then close when you push the other side. Keep in mind that when hydraulic fluid is circulating through the valve it will push the button back into the home position which is flush with the end of the tube.
- Now try to operate your attachment with the switch or buttons on your handle. If good then congratulations if not **(Go to Electrical E1-E8)**.
- If your attachment will not operate and the spool is not stuck when the tractor is off then there is no fluid going through the valve **(H6)**. This is confirmed by the button staying in the bottom position.
- If you cannot push the button when the tractor is running then there most likely is a blockage downstream. Check to make sure that the remotes, backhoe and 3 point hitch are not causing a blockage. If there is a blockage, then the pressure relief valve (PRV) is open and dumping fluid into the tank causing the tractor to strain since the PRV setpoint is normally 2,750 PSI.

H2 - P & T port hoses are reversed.

- The valve is designed for the fluid to travel in the “P” port and out the “T” port. This helps to center the spool. If the fluid is moving through the valve backward, then it is trying to shift the spool out of the home position. If this happens then your attachment could creep open or close or get locked in the all the way open or closed position. The fluid needs to travel out of the PBP of your loader valve into the “P” port of the W. R. Long valve. Most likely yours is reversed. Simply switch the hoses connected to the “P” and “T” ports on the W. R. Long valve and then your kit should work properly.

H3 - Quick connect is not fully engaged.

- Disconnect and reconnect hydraulic quick connect.

H4 - Quick Connect is defective (may act like check valve).

- Sometimes the quick connect will go bad. When this happens the quick connect normally allows fluid to go in one direction but not the other, so it acts like a check valve. Quick Connect will need to be replaced.

H5 - WRLong “P” port hose connected to pump line.

- Reinstall hoses or steel tube to original location and then connect hoses to the proper location, which would be to the power beyond port.

H6 - WRLong “P” port hose connected to tank line.

- Connect hoses to the proper location. See **(O1)**

H7 - No fluid going through the valve.

H7.1 - W R Long valve is connected to the tank line.

- Connect hoses to the proper location. See **(O1)**

H7.2 - PRV (pressure relief valve on loader valve is open).

- PRV valve on loader valve is broken (This is extremely rare)
- Blockage downstream.

H7.3 - Other valves after the W R Long valve are closed or blocked.

- Remotes or backhoe - Make sure remotes are not in the detent position. Make sure backhoe hoses are connected properly.

H8 - Seals in cylinder are bad.

- Open attachment all the way.
- Disconnect the hydraulic quick connects from both hoses that connect the attachment to the loader. Put a weight on the open attachment. If it closes then the hydraulic fluid is bypassing the seals in one or both of the cylinders. Will need to replace the cylinders or seals.
- If it does not close then the seals are good.

H9 - Cylinder is broken.

- Cylinder will need to be replaced. Also there may be some debris from the broken cylinder in the hydraulic fluid. If so then the debris could get lodged in the W R Long valve. May need to clean the valve if it gets stuck.

H10 - Spool or valve body is scarred or worn out.

- The tolerance between the valve body and the spool is very tight. With this tolerance the valve does a great job of holding pressure. In this case either a piece of debris has scarred the spool or body of the valve. If the valve is older, something abrasive could be in the hydraulic fluid causing wear. The valve needs to be replaced.

H11 - Hoses on attachment are crossed. *(Attachments like Front Blade for moving snow are supposed to be crossed).*

- There are 2 "Tees" on the back of the attachment. One tee carries fluid to the retracting side of the cylinder. The other tee carries fluid to the extending side of the cylinder. One set of hoses are connected to the wrong end of the cylinders.

E – Electrical Problem

E1 - One or both screws are not contacting the circuit board.

- Make sure screws are tight. Could be the screw has bottomed out, but the head of the screw is not touching the circuit board.
- Head of screw must touch circuit board for it to properly ground.
- Small washers can fix this.

E2 - Control Module is bad.

- Remove both solenoids to expose the terminals on the control module **(O2)**.
- Using a test light or multimeter check to make sure that the control module is sending 12 volts though it when operating the switch.
- Each side of the control module has 2 terminals. One is 12 volts, triggered by the switch. The other is chassis ground. Check to make sure there is 12 volts going to the control module. **(E4)**

E3 - Switch is bad.

- Remove back of handle.
- With tractor running disconnect one of the outer terminals and touch to center terminal. If it now works then it is a bad switch.

E4 - No power or not enough power.

- Check for 12 volts where the red wire comes into the control module. Remove the solenoids **(O2)**. Pull the cover off the control module but do not remove the screws. The cover is held in place only by the prongs on the solenoid.
- There are 2 black shielded wires that enter the control module. One has a red wire that is soldered to the bottom of the circuit board.
- If the power source is not a full 12 volts, then the solenoid may not operate properly. Connect directly to battery to eliminate potential power source issue.

E5 - Fuse is blown.

- Visually check fuse.
- We include an orange wire with a fuse and fuse holder in our kits. The orange wire should be close to the power source and then connected to the red wire which terminates in our control module.
- The fuse is a 10 amp mini fuse.

E6 - Solenoid is bad. Remove solenoid (O2).

- 1.) Swap Solenoids.
 - Swap the 2 solenoids to see if the problem follows the solenoid.
- 2.) Check for magnetism.
 - Remove the solenoid
 - Place screwdriver with metal shank in solenoid.
 - Ground one prong of solenoid and apply 12 volts to another prong.
 - If the screwdriver is magnetized and adheres to inside of solenoid, then solenoid is good.

E7 - No Ground.

- Valve grounds through mounting bracket and wire in hydraulic hose.
- If you feel it is not getting a good ground then run a wire from one of the bolts that hold the valve onto the valve mounting bracket and then the other end to a ground on your tractor.

E8 - Power wire grounding out.

- If the wire between the control module and the fuse is touching a ground then the fuse will blow. Replace the wire between the fuse and the control module.

O - Other Issue

O1 – How to locate the power beyond port (PBP).

- Some loader valves have “PB” or “BY” in raised letters or stamped next to the power beyond port.
- Some loader valves have a power beyond sleeve that can be seen. It looks like a nut except that it is about twice as long as a regular nut.
- Typically there are 7 hoses connected to the loader valve.
- Four are to operate the loader.
- One feeds your valve and comes from the pump.
- One is connected to the Pressure Relief Valve (PRV) and is routed directly to the tank.
- The last one is the Power beyond port (PBP), which feeds the next valve in your hydraulic loop. These lines can be traced to determine which one is the PBP.
- When the tractor is running normally the fluid is coming into the loader valve through the pump line, going out the PBP, and no flow through the tank port.

O2 – How to remove the solenoids.

- There is a plastic nut on both ends of the valve. Unscrew the plastic nut. If it will not unscrew by hand then use an adjustable wrench to get it started.
- Slide the solenoid off. Do not attempt to rotate it or you might damage the prongs.
- If it will not slide off by hand then a large flat head screw driver can be inserted in between the solenoid and valve body to get it started.

O3 – How to remove the subplate.

- Make sure the tractor is turned off.
- Make sure the hydraulic pressure is relieved. Rotate the loader joystick left and right and forward and backward until the loader quits moving.
- Place a container under the W R Long valve to catch any hydraulic fluid that leaks out.
- The valve has letters embossed on the side of the valve. Take a photo or take note of what letters match up to what side of the subplate. On the D03 valve it is possible to mount the valve 180 degrees in the wrong direction.
- Remove the 4 hydraulic hoses from the subplate. Make sure you note which hose is attached to which port on the subplate.
- Remove the 4 socket head cap screws that attach the W R Long valve to the subplate.
- Remove the 2 socket head cap screws that attach the subplate to the W R Long valve mounting bracket.

O4 - How to remove the control module.

- Remove the solenoids **(O2)**.
- Remove the plastic cover. The prongs of the solenoid hold the control module on not the screws.
- Unscrew the 2 small phillips head screws which hold the circuit board onto the top of the valve.
- Do not lose these screws; they are required. The head of the screw must touch the circuit board for it to have a proper ground.

O5 - How to clean the valve.

- Remove the solenoids **(O2)**.
- Remove the subplate **(O3)**.
- Unscrew the tube from both ends.
- Remove the internal parts. Make sure to place them in order and correct orientation so that when you put the parts back in, your valve will work properly.
- See the parts breakdown of the vale by clicking the American Flag on the W. R. Long Inc website and then select item 12.
- Clean with a non-chlorinated brake cleaner.
- Reassemble the WR Long valve and lubricate the internal parts with fresh hydraulic fluid.

Bi-Directional Leak Test

- Test 1: Open the Grapple
 - Start by opening the grapple fully.
 - Disconnect the quick couplers of the grapple from the tractor's 3rd function.
 - Check if the grapple leaks down. A small leak may take time to show itself, but a significant leak will be readily apparent.
 - If it does not immediately leak down, try to close the grapple by pulling on the grapple tines.
 - Wait and see if the grapple leaks down. Several hours may be required if the leak is small.
 - If the cylinders are functioning correctly, the grapple should not move.
- Test 2: Close the Grapple
 - Next, you need to perform the same test but in reverse. First, close the grapple fully.
 - Roll the grapple forward as far as it will allow to allow gravity to assist.
 - Disconnect the quick couplers from the tractor's 3rd function.
 - Check if grapple leaks open. A small leak may take time to show itself, but a significant leak will be readily apparent.
 - If it does not immediately leak open, try to open the grapple by pulling on the grapple tines.
 - Wait and see if the grapple leaks open. Several hours may be required if the leak is small.
 - If the cylinders are functioning correctly, the grapple should not move.