

## **THE HYDRAULIC SLIDE OUT SYSTEM**

### **GENERAL OPERATION & TROUBLE SHOOTING NOTES**

The hydraulic slide-out system is a fixed displacement system, using double acting hydraulic cylinders to open and close a room assembly built into the travel trailer or motor home. Cylinders are energized by a 12 volt DC high pressure hydraulic pump through electrically operated directional valves. The pump is supplied the 12V power from the vehicle's battery circuit.

A wall mounted, three (3) position momentary switch activates the room movement. For safety purposes, the switch must be pressed continuously during the room movement.

#### **Operation of the system**

When the momentary switch is held to activate the 12V motor, it closes the solenoid valve circuit. This causes the pump to start and simultaneously shifts the valve. Fluid is pumped through the valve and into the cylinder ports. Depending on the switch position, the room will either move to extend or retract to the home position.

When a single cylinder is used in the system, the cylinder becomes a part of the reservoir fluid volume. As the cylinder extends, the fluid is pumped from the rod end of the cylinder to the base end. The extra fluid needed to fill the base end of the cylinder is pulled from the reservoir. As the room is retracted, the fluid moves from the rod end to the base end. The extra fluid is returned to the reservoir.

When two cylinders are used in tandem to move the room, one cylinder is called the "Master" and the other is called the "Slave". NOTE: in this system the oil *between* the two cylinders *never goes to the reservoir*. This is the most important feature that the repairman or troubleshooter must understand when diagnosing or repairing this type of system. The Master cylinder (the larger cylinder) receives fluid from the pump into the rear port, which causes it to *extend*. As this cylinder extends, it pushes the fluid from the *front port out*. The fluid moves through a hose that is attached to the *rear port* of the Slave cylinder, which causes it to *extend*. The fluid from the *front* of the Slave cylinder is pushed *out* of the port and moves through a hose that returns the fluid back to the pump and reservoir. When the process is reversed to *retract* the room, the pump will send fluid through the hose to the *front port of the Slave cylinder*. As the fluid enters the front port, it will force the room to *close*. As the Slave cylinder retracts, the fluid at the *rear* will be forced to the *front port* of the *Master* cylinder. It will then be retracting at the same rate as the Slave cylinder and the room will evenly close. The fluid from the *rear* of the Master cylinder will be returned to the pump and reservoir. For a better understanding of how the system functions, refer to illustrations HS-1 thru HS-4 following this section.

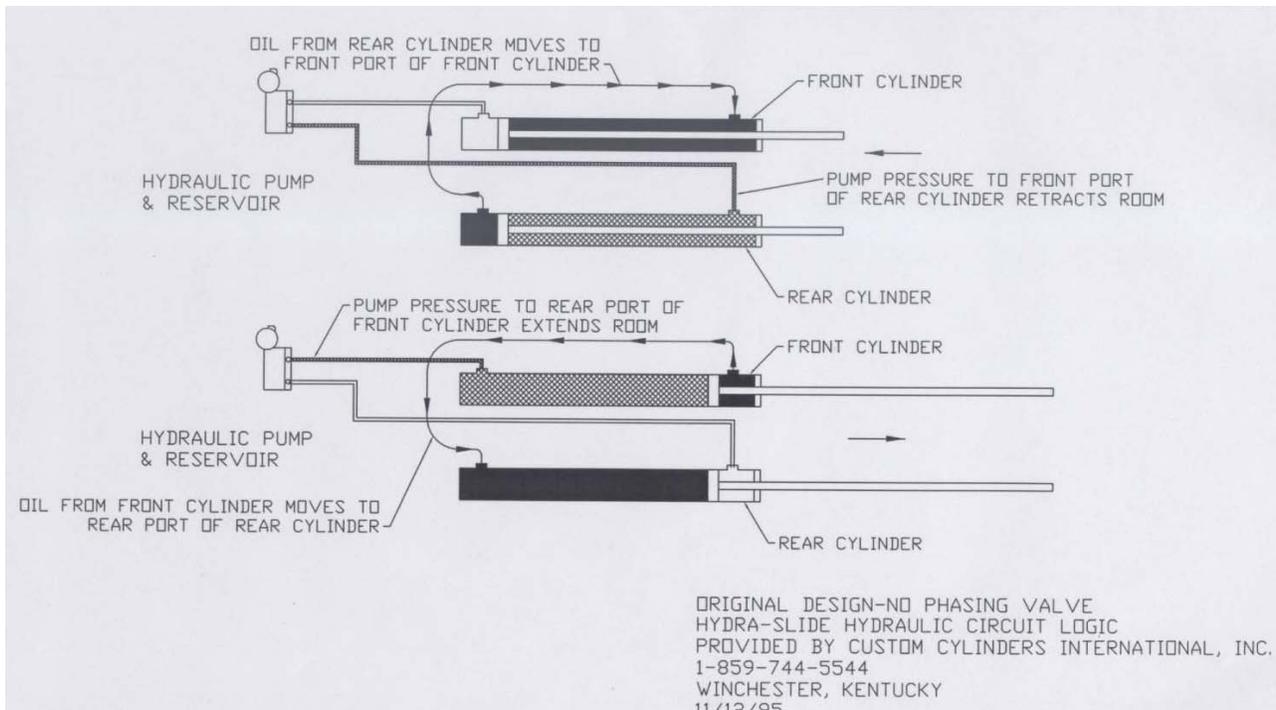
NOTE: The typical installation of the Hydra-Slide System assembly is to assemble the larger diameter Master cylinder toward the front of the vehicle and the Slave cylinder toward the rear. All illustrations show the system set up in this configuration. Identify the Master and Slave cylinders on your travel trailer by measuring the outside diameter of the *body*. The Master cylinder will be 1 7/8" diameter and the Slave cylinder will be 1 3/4" diameter. When removing cylinders for replacement, make certain that the Master and Slave cylinders are replaced in the *same* slide tube from which they were removed.

The early Production of this system proved to be unreliable for two reasons:

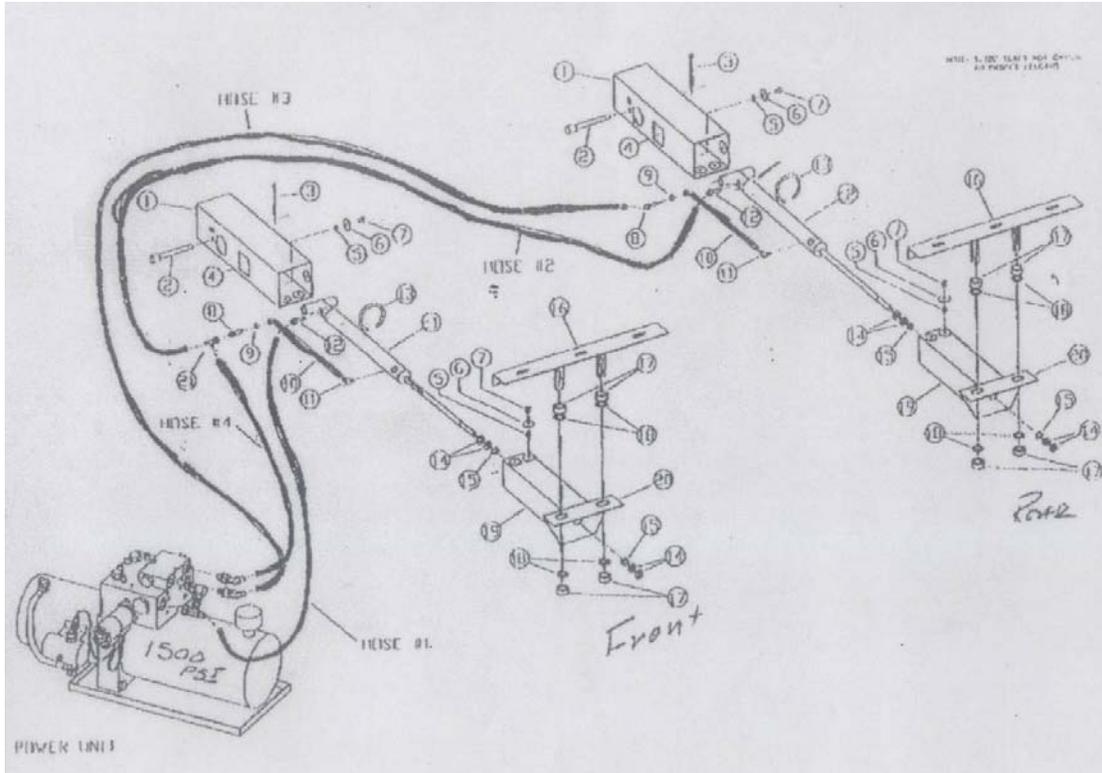
1. The room would drift out while driving to or from a location. This problem was "fixed" by placing a Check Valve in the system, as noted in the following paragraph.
2. As fluid would be "lost" from the hose *between* the Master and Slave cylinder, the room would not close evenly. As the room would extend, the front of the room would get ahead of the rear. As the room would retract, the rear of the room would retract ahead of the front of the room. If this condition is not corrected, the room will be damaged. This problem was initially solved by the addition of a small in-line check valve, and was eventually replaced by a Phasing Valve mounted directly on the pump. Custom Cylinders International, Inc. has developed a pump system that eliminates the add-on valve by integrating a special logic circuit to check the volume of fluid between the Master and Slave cylinders on each activation cycle.

**FOLLOWING ILLUSTRATIONS REPRESENT 3 HYDRA-SLIDE FLEETWOOD TRAVEL TRAILER- 2 CYLINDER ROOM CIRCUITS**

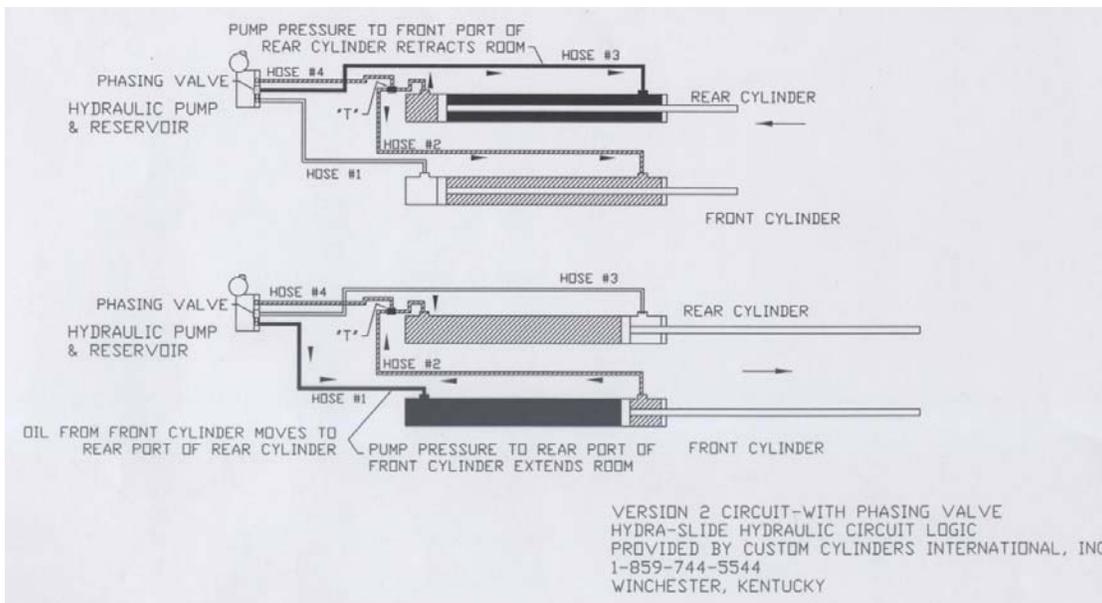
ILLUSTRATION  
HS-1



## ILLUSTRATION HS-2



## ILLUSTRATION HS-3



# ILLUSTRATION HS-4

## HYDRAULIC SLIDE-OUT SYSTEM HYDRA-SLIDE VERSION

### SERVICE PARTS-SEE ILLUSTRATION

<u>ITEM</u>	<u>NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
1	1234	1	Tube
2	1235	1	Pin, mounting
3	1236	1	Pin, Cotter
4	1237	1	Plate, Access
5	1238	10	Nut
6	1239	10	Bearing
7	1240	10	Screw
8	TH10050	1	Nut
9	TH10000	1	Fitting, Hydraulic
10	ZZ70601	1	Assembly, Hose
11	H105660	1	Fitting, Hydraulic
12	TH10100	1	Fitting, Hydraulic
13	1246	1	Strap, tie
14	1247	4	Nut, Jam
15	1248	2	Washer, Flat
16	1249	1	Bracket
17	1250	4	Nut
18	1251	4	Washer, Flat
19	1252	1	Tube
21	H103820	1	Fitting, Hydraulic
C1	141625-36H	1	36" Stroke Front Cylinder
C2	141500-36H	1	36" Stroke Rear Cylinder
C3	141625-33H	1	33" Stroke Front Cylinder
C4	141500-33H	1	33" Stroke Rear Cylinder

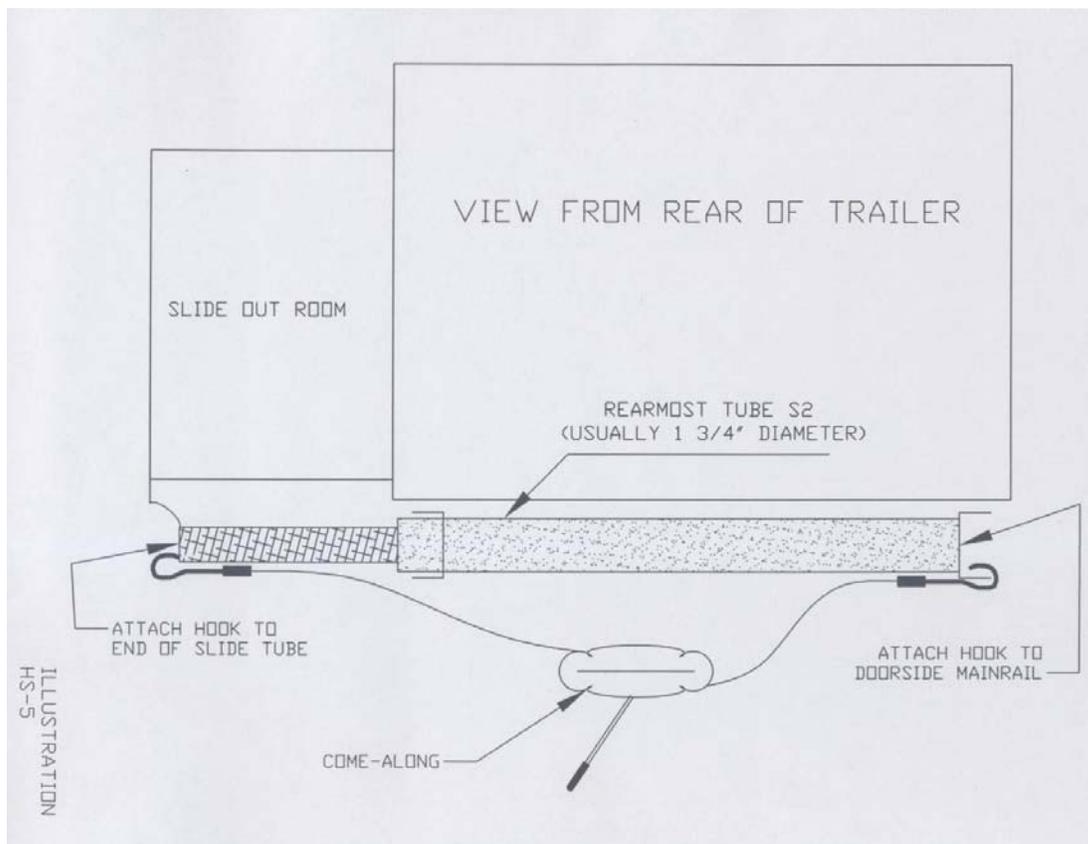
Custom Cylinders International, Inc.  
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Winchester, KY 40391

## MANUAL CLOSING OF ROOM

Most systems will use a Check Valve that blocks the reverse flow of fluid to keep the room closed. As a safety precaution there are usually mechanical locks to hold the room in place during transit on the highway.

Should it be necessary to manually retract the room due to pump failure or some other problem, remove the hose at the pump that supplies fluid to the *rear* port of the Master cylinder and place it in a container to catch a considerable amount of fluid. Remove the hose at the pump that supplies fluid to the *front* port of the Slave cylinder. Attach a come-along to the door-side mainframe and the other end to the end of the Slave slide tube. See diagram number HS-5. As the room is gradually forced in to the closed position, fluid will move from the Slave cylinder to the Master cylinder and force it to retract.

ILLUSTRATION  
HS-5



### **Electrical system maintenance**

For optimum performance, the slide out system requires full battery current and voltage. The battery must be maintained at full capacity. Other than good battery maintenance, check the terminals and other connections at the battery, the control switch, and the pump motor for corrosion, tightness, or damage. Check motor leads under the trailer or motor home chassis. Since these connections are subject to damage from road debris, be sure they are in good condition.

### **Mechanical maintenance**

Although the system is designed to be almost maintenance free, actuate the room once or twice a month to help keep the seals and internal moving parts lubricated.

The best time to check for external leaks in the system is when the unit is moved from the parking spot, by looking for any signs of hydraulic fluid.

### **Hydraulic system troubleshooting**

The hydraulic system is only one of several interrelated slide out room system components. When something restricts from travel on front, rear, or both, system performance will be unpredictable. It is very important that both cylinders are allowed to travel full distance (full stroke). Remember that the hydraulics are tied very closely to the electrical system and one problem might appear to be a hydraulic problem and will actually be an electrical issue.

### **Testing for hydraulic valve performance**

This test will check for operation of the phasing valve. Perform this test with extreme caution or damage can occur to the room. ***Never allow the room to run more than two inches out of alignment.***

When retracting the room place a 12" to 14" long 2X4 between the chassis and S1 slide tube, and flange end (flange that support the room). This will restrict the front cylinder in movement and allow the back to continue to move. **DO NOT ALLOW A MISALIGNMENT OF MORE THAN 1 TO 2 INCHES. DAMAGE CAN OCCUR TO THE VEHICLE AND ROOM.**

After misalignment has occurred, stop and measure both front and rear extension. Let room set for a couple of minutes and re-measure. If there is movement, check for leaking fittings. If no movement, extend room to full open position, (be sure to allow room to realign itself) and measure. Let set for a few minutes and then re-measure. If there is no movement, retract and check to see if room is sealed. Note: it is normal for the front of the room to run ahead of rear one half to three quarter inch before closing. Be cautious that the misalignment does not cause any damage to interior room. When fully extended, the room should realign itself. If it does not realign, it may be required that the pump pressure be set a little higher. CAUTION: DO NOT SET THE PUMP PRESSURE HIGHER THAN 1800 PSI. Operate room through at least two complete cycles to make certain that the front and rear are in alignment during travel and stop simultaneously. Test is now complete.

NOTE: It is OK for the front to stop first and the back to travel one half to three quarter inch before closing. It is ***not*** OK for the back to stop first. This will cause the front to not close fully. Cycle the room one more time to see if this corrects the misalignment.

### **Electrical troubleshooting**

Since there are very few serviceable parts for the pump, motor, or reservoir, electrical troubleshooting and service by the owner is limited to thorough checking of wiring and connections. Loose connections or broken wiring tends to be the most common problems associated with the electrical system. CCI initiated an Engineering program in early 2009 to develop an electrical replacement parts inventory of Hydra Slide System components. If the owner can not determine the problem, it may be necessary that a qualified RV service center or automotive electrical continue the diagnosis.

Since there are no records available for the Hydra Slide System circuits and spare parts list, it may be necessary to send the travel trailer's or motor home suspect part to CCI for reverse engineering to find or develop a replacement. This type of activity has already resulted in the design and manufacture of a relay circuit board that was no longer available. ***There is no charge for this service.***

### **System troubleshooting guide**

The following guide outlines some of the common problems of the Hydra Slide system, the causes, and possible corrective actions. This is not a comprehensive listing, but will provide the Service Tech basic information. See Illustrations HS-6a and HS-6b.

### **Motor/control/reservoir troubleshooting**

Before attempting to troubleshoot the motor/pump assembly, be sure an adequate power source is available. The trailer batteries should be fully charged or the unit should be plugged into A/C service with batteries installed. ***Do not attempt to troubleshoot the motor/pump assembly without assuring full electrical system capacity.***

The following tests require only a DC volt meter (or 12 volt DC test lamp) and a jumper lead.

### **Hydra-Slide hydraulic systems troubleshooting guide**

The following troubleshooting chart outlines some of the most common problems associated with the Hydra-Slide recreational vehicle room slide out hydraulic systems.

#### 1) **ROOM DOES NOT MOVE WHEN SWITCH IS PRESSED**

**a**-The travel locks are still in place

Remedy=Remove travel locks

**b**-Low battery voltage, blown fuse, defective wiring

Remedy=Check battery charge condition. Charge battery or add auxiliary power source.

c-Motor/pump not functioning

Remedy=See “MOTOR/PUMP/RESERVOIR TROUBLESHOOTING” notes.

2) **PUMP RUNS, BUT ROOM DOES NOT MOVE**

a-Shuttle valve is not shifting fluid direction

Remedy=Check wiring to valve. Wires may be reversed or damaged.

=Remove valve, clean, check for damage to seats or seals.

=Verify relay is operative.

=Replace valve or relay

3) **PUMP RUNS, BUT ROOM MOVES SLOWLY**

a-Low battery, poor ground, extremely low outdoor temperature.

Remedy=Charge battery to full capacity or replace

=Verify ground connection at battery post and to the vehicle chassis.

=Allow system to warm up.

b-S2 (rear hydraulic cylinder) is leaking at Port.

Remedy=Tighten fitting or replace if damaged.

c-Gap between jam nuts too large.

Remedy=Reduce gap. CAUTION: Room must be completely closed or open when adjusting. Both cylinders must close and open within 2” or room could be damaged.

4) **THE FRONT OF THE ROOM WILL DRIFT OUT IN THE CLOSED POSITION**

a-Leak in line between S1 (front cylinder front port) and S2 (rear cylinder).

Remedy=Check fittings for leaks and tighten.

b-Cylinder has internal bypass around the piston.

Remedy=Repack or replace cylinder.

ILLUSTRATION

HS-6a

c-Room roller is damaged

Remedy=Replace roller.

d-#3 or #4 hose from pump is leaking at pump

Remedy=Check all fittings at pump for leaks & tighten.

e-Contamination in valve body

Remedy=Cycle room in & out to clear.

5) **THE BACK OF THE ROOM DRIFTS OUT WHEN IN THE CLOSED POSITION**

a-#1 or #2 hose from pump is leaking at pump

Remedy=Check all fittings at pump for leaks & tighten.

ILLUSTRATION  
HS-6b

**MOTOR/CONTROL/RESERVOIR TROUBLESHOOTING & REPAIR**

Before attempting to troubleshoot the motor/pump assembly it is mandatory that an adequate 12V power source is available. The trailer batteries must be fully charged or the vehicle be attached to AC converter with batteries installed. ***Do not attempt to troubleshoot the system without adequate, full, electrical system capacity.***

The following tests require only a DC voltmeter (or 12V DC test lamp) and a jumper wire.

Attach voltmeter (or test light) leads to the negative and positive switch terminals. Does the meter indicate 12V DC?

***YES***

***NO***

Check all connections between battery and switch. Check fuse and replace, if necessary. Recheck as above.

At the motor, check incoming leads for 12V DC (if necessary, disconnect leads at the wire splices). Does the meter indicate 12V DC?

***YES***

***NO***

Replace the motor. The motor is not field serviceable. Do not attempt to repair it.

Check all wires and connections between the wall switch and motor. Repair or replace connections as required. Retest as above.

## Electrical troubleshooting

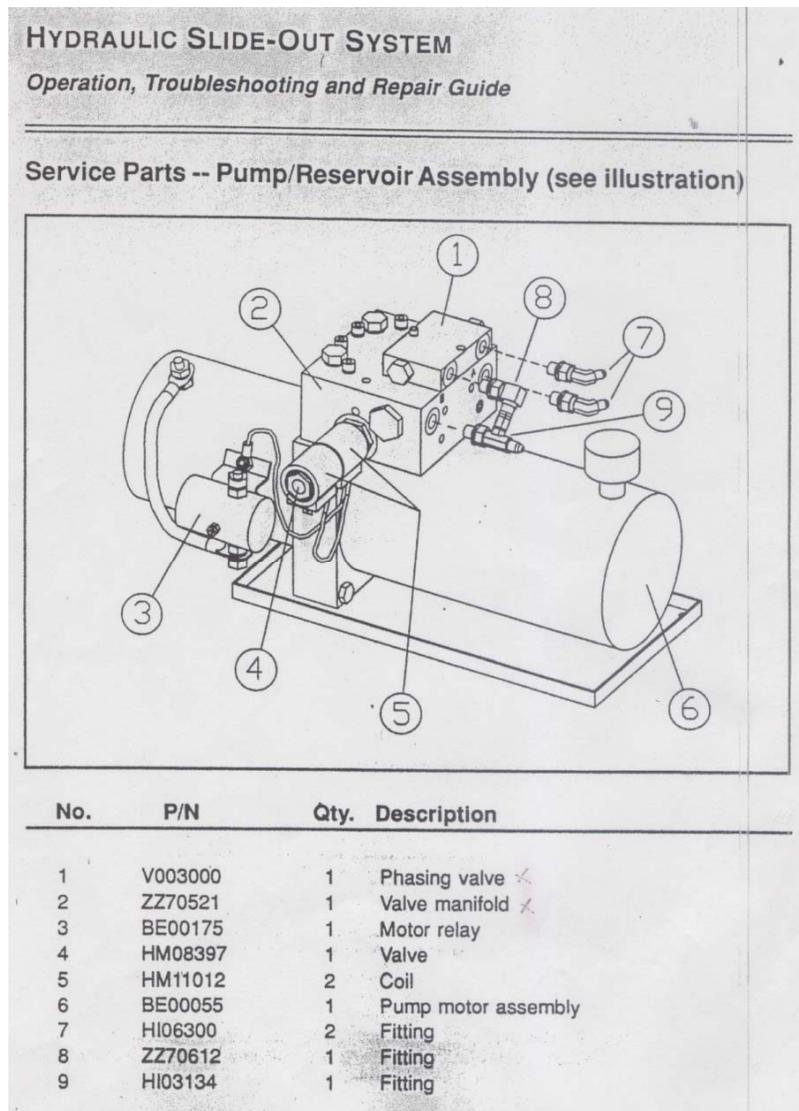
Since there are no field serviceable parts in the motor or pump/reservoir, electrical troubleshooting and service is limited to replacing only those components as previously outlined. Thorough checking of wiring and connections is the only other electrical service that can be performed. Generally replacement parts are limited to motors, solenoids, relays, and circuit boards. Contact the Engineering Department for additional information, or to reverse engineer a component.

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## SERVICE PARTS

Refer to HS-8 for available service parts.

### DEVELOP PARTS LIST AND DRAWING OF TYPICAL PUMP/RESERVOIR FOR ILLUSTRATION HS-7



**THE FOLLOWING EXCERPTS WERE REPRODUCED FROM A FLEETWOOD MOTOR HOME SERVICE BULLETIN**

**HYDRA-SLIDE CORPORATION  
EZ-GLIDE MOTOR HOME SYSTEM  
USED ON ALL FLEETWOOD MOTOR HOME VEHICLES**

**HYDRAULIC CYLINDER TEST PROCEDURES**

The following steps have been established to determine a defective hydraulic cylinder that has an internal fluid bypass condition (fluid bypassing the piston seal) or leaking externally at the chrome rod seal (fluid leaking around the rod where it moves in and out of the cylinder body) at the front of the cylinder. This test is performed with the cylinder installed on the EZ-Glide System and the room in its full retracted "IN" position.

**CAUTION-Protective safety glasses are to be worn while performing this test. THE SYSTEM OPERATING PRESSURE IS 1500 POUNDS AND A LEAK CAN PENETRATE THE SURFACE OF THE BODY, WHICH CAN CAUSE SEVERE INJURY.**

- 1) Locate the hose attached to the rear of the hydraulic cylinder. Trace this hose up to the connection at the hydraulic pump.
- 2) When you have located where the hose is connected to the pump, disconnect this hose at the pump connection, using a 9/16" open end wrench. CAUTION: Pressurized fluid may flow out until the system is relaxed. This is a normal condition for a hydraulic system that has been under operating pressure.
- 3) Using a container, place the hose end into the container to catch the fluid that was inside the hydraulic hose. Catching the fluid will not only protect the environment but will also keep the oil mess off the equipment and out of the work area.
- 4) The next step will require an additional person. This helper will be used to operate the power switch of the EZ-GLIDE system. With the hose inside the container, activate the switch of operate the room (to move the room "IN"). At this point fluid may flow in the amount of 3 to 4 tablespoons into the container. This would be a normal event and is not a defect.
- 5) If the piston seal is defective, there will be a continuous flow of fluid out of the end of the disconnected hose.
- 6) If the rod seal (where the chrome rod comes out of the front of the cylinder) is defective, there will be a spray or continuous leak at the front of the cylinder.
- 7) The cylinder will need to be replaced ONLY if fluid is flowing as described in #5 or #6. If fluid is not flowing, the cylinder is operating to specifications and does not require replacement.
- 8) This system has only 1 hydraulic cylinder that operates the room slide-out. When replacing this cylinders, order part #141625-15H.

If no defects are found in the hydraulic cylinder, the next logical step to check is the pump/manifold assembly. The majority of problems are then isolated to the check valve. Remove and clean the check valve, looking for damage to the ball or seat and any debris that may be keeping it from fully seating.

Custom Cylinders International Inc. provides repair service for most brands of hydraulic systems used in the RV, industrial equipment, and general industrial industries through the sister company Custom Cylinder Repair Service, Inc.