

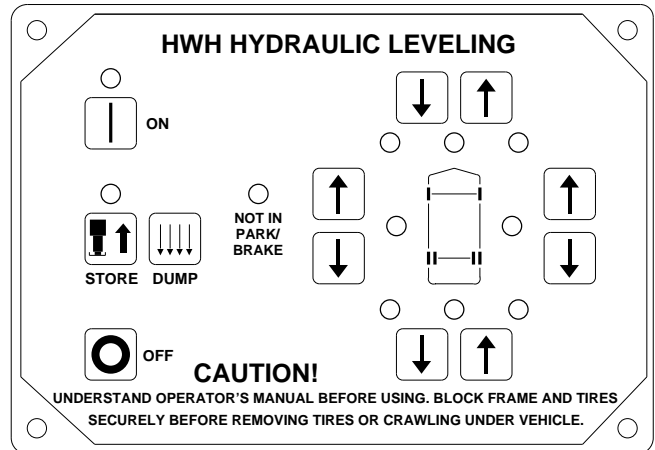
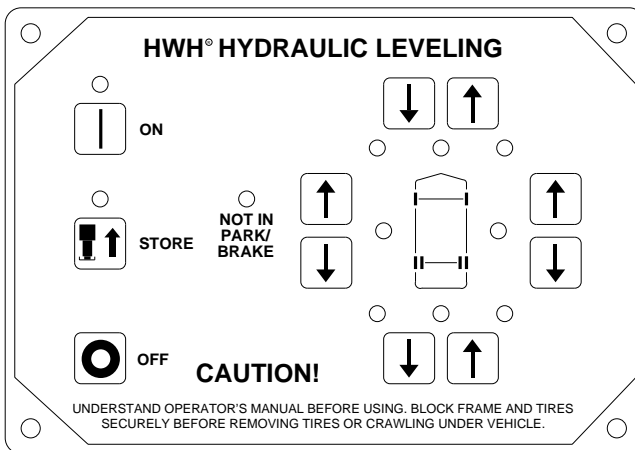


SERVICE MANUAL

HWH® TOUCH PANEL-CONTROLLED 325 SERIES HYDRAULIC LEVELING SYSTEM

FEATURING:

*Touch Panel Leveling Control
BI-AXIS® Hydraulic Leveling
(With or Without Air Dump)*



HWH CORPORATION

(On I-80, Exit 267 South)

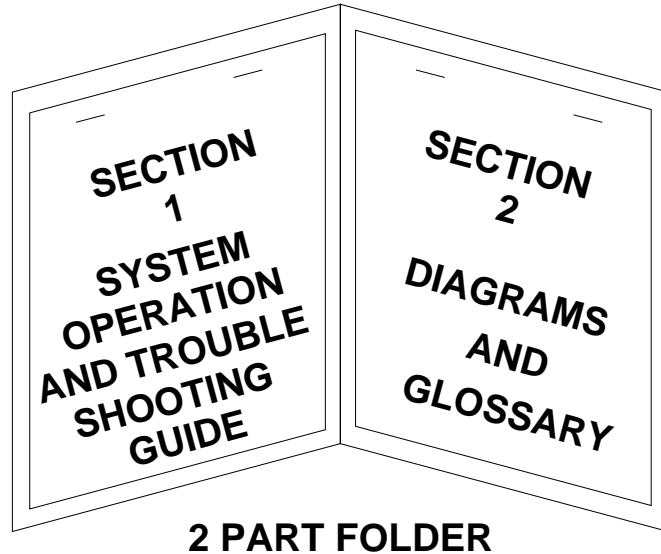
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SECTION 1



HOW TO USE MANUAL

This manual is written in two sections. Section 1 is System Operation and Trouble Shooting Steps. Section 2 is the Diagrams and Parts Glossary. Begin diagnosis of the system with Section 1. This will give the correct operation and function of the system. The Trouble Shooting Steps are written in order of operation. The Trouble Shooting Steps should be followed in order to avoid improper diagnosis of the system. Section 2 contains diagrams and a parts glossary. Refer to diagrams as directed in the Trouble Shooting Steps. The parts glossary explains the function of individual parts.

Before beginning your repair, it is **IMPORTANT** to read the **CAUTIONS** and **NOTES AND CHECKS** in the first section, **TROUBLE SHOOTING GUIDE**. In many cases this will save time and mistakes when trouble shooting a system.

This Repair Manual is offered as a guide only. It is impossible to anticipate every problem or combination of problems. For any problems encountered that are not addressed in this manual, contact HWH Corporation for assistance. (800-321-3494)

PROCEED WITH SYSTEM OPERATION



TROUBLE SHOOTING

CAUTIONS!

BLOCK FRAME AND TIRES SECURELY BEFORE CRAWLING UNDER VEHICLE. DO NOT USE THE LEVELING JACKS OR AIR SUSPENSION TO SUPPORT VEHICLE WHILE UNDER VEHICLE OR CHANGING TIRES. VEHICLE MAY DROP AND OR MOVE FORWARD OR BACKWARD WITHOUT WARNING CAUSING INJURY OR DEATH.

WHEN ROUTING OR REROUTING HYDRAULIC HOSES AND WIRES, BE SURE THEY ARE NOT EXPOSED TO ENGINE EXHAUST OR ANY HIGH TEMPERATURE COMPONENTS OF THE VEHICLE.

NEVER PLACE HAND OR OTHER PARTS OF THE BODY NEAR HYDRAULIC LEAKS. OIL MAY CUT AND PENETRATE THE SKIN CAUSING INJURY OR DEATH.

SAFETY CLASSES ARE TO BE WORN TO PROTECT EYES FROM DIRT, METAL CHIPS, OIL LEAKS, ECT. FOLLOW ALL OTHER SHOP SAFETY PRACTICES.

NOTES AND CHECKS

Read and check before proceeding with Trouble Shooting Steps.

NOTE: HWH CORPORATION ASSUMES NO LIABILITY FOR DAMAGES OR INJURIES RESULTING FROM THE INSTALLATION OR REPAIR OF THIS PRODUCT.

1. If the jacks cannot be retracted, see TROUBLE SHOOTING PART 15 Step 2 for temporary measures. Make sure the manual retract valves are closed before trouble shooting.
2. The Trouble Shooting Guide must be followed in order. Problems checked for in one step are assumed correct and may not be checked again in following steps.
3. Check that the oil reservoir is full with the jacks in the fully retracted position. If the vehicle is equipped with HWH room extensions, refer to the HWH Owners Manual for proper position of the room when checking the oil level.
4. Most coaches have more than one battery; one for the engine and the other(s) for the coach. The engine battery supplies power for the control box and hydraulic pump. Batteries under no load should read 12.7 volts. Batteries must maintain good voltage under load. Batteries must be in good condition with no weak cells. The system will draw up to 200 amps. An alternator, convertor or battery charger will not supply enough power for the system to operate properly.
5. Proper grounding of all components is critical. See the electrical circuit for specific grounds required. Faulty grounds, especially for the control box, solenoid manifold or the pump assembly, may cause control box component damage and /or improper or erratic operation.

6. Do not replace the control box unless the Repair Steps say to replace it. Otherwise the malfunctions may damage the new control box.

This manual is intended for use by experienced mechanics with knowledge of hydraulic and automotive electrical systems. People with little or no experience with HWH leveling systems should contact HWH technical service (800-321-3494) before beginning. Special attention should be given to all cautions, wiring, and hydraulic diagrams.

Special note: When installing a new control box, make sure the box is properly grounded before applying power to the system.

Tightening of hose ends: If tightening a new hose end, make the hose end snug (finger tight) on the fitting, then tighten the hose end 1/3 turn (2 FLATS). If tightening an existing hose end, tighten the hose end to snug plus 1/4 turn (1 FLAT).

Suggested tools for trouble shooting the HWH leveling systems:
JUMPER WIRES(UP TO 10 GAUGE)
PRESSURE GAGE(3500 PSI MIN.)
MULTI-METER
12 VOLT TEST LIGHT

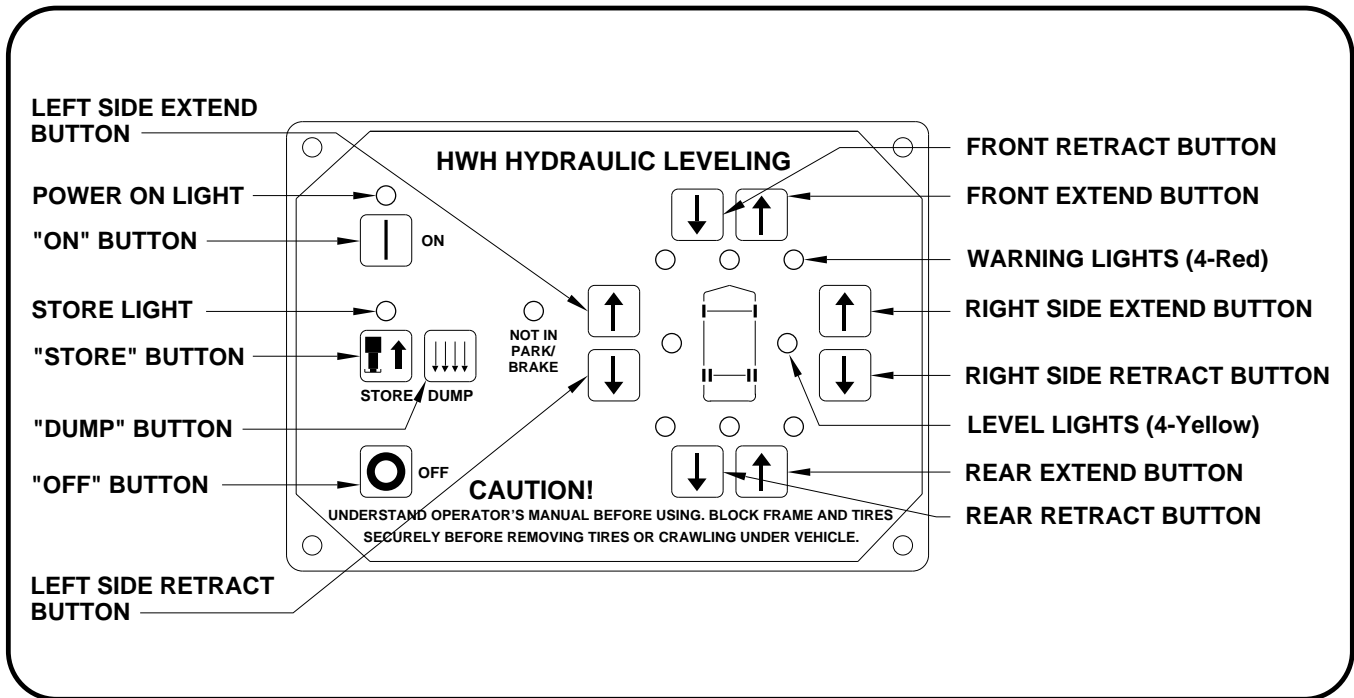
PROCEED WITH THE TROUBLE SHOOTING STEPS ON THE FOLLOWING PAGE



CONTROL IDENTIFICATION

325 SERIES LEVELING SYSTEM

TOUCH PANEL-CONTROL



CONTROL FUNCTIONS

CONTROL BUTTONS

ON (I) BUTTON: This is the on button for the leveling system. The on indicator light is above the (I) button.

"OFF" BUTTON: Push the "OFF" button to stop hydraulic operation.

"STORE" BUTTON: The store indicator light is above the "STORE" button. This button is used to automatically retract the jacks.

EXTEND BUTTONS (UP ARROWS): These buttons will extend their respective jack pairs to lift the vehicle.

RETRACT BUTTONS (DOWN ARROWS): These buttons will retract their respective jack pairs to lower the vehicle.

DUMP BUTTON: (IF APPLICABLE) This button will dump the air from the vehicle suspension.

INDICATOR LIGHTS

HYDRAULIC OPERATIONS (I) LIGHT: This light indicates that the panel is active.

"NOT IN PARK/BRAKE" LIGHT: This indicator will light when the hand/auto brake is not set and the "LEVEL" button is being pushed.

STORE LIGHT: This light indicates that the system is in STORE mode.

LEVELING LIGHTS: The four yellow indicating lights are level sensing indicators. When a yellow light is on, it indicates that its side, end, or corner of the vehicle is low. No more than two lights should be on at the same time.

JACK DOWN LIGHTS: The four red lights surrounding the yellow level indicators are jacks down WARNING lights. They are functional only when the ignition is in the "ON" or "ACC" position, the system is on, and the jacks are extended 1/4 to 1/2 inch.

MASTER "JACKS DOWN" WARNING LIGHT: This is a light mounted in the dash separate from the touch panel. It will be on when any one or more jacks are extended and the ignition is "ON".

BUZZER: This is a jacks down warning. It will sound if the master "JACKS DOWN" warning light is on.

SYSTEM OPERATION

The 325 leveling system is a manually controlled, BI-AXIS pushbutton system. This system will always extend two [2] jacks at the same time, both front jacks, the left front and the left rear jacks, the right front and right rear jacks or both rear jacks. The jacks are controlled by the UP and DOWN arrow buttons on the right hand side of the touch panel. The UP arrows extend jack pairs and the DOWN arrows retract jack pairs.

There are two parts to leveling a vehicle. First the vehicle is leveled. The jacks are used to turn all the yellow level indicators off. The second part of leveling is to stabilize the vehicle. This is accomplished by extending any jacks not used for leveling to the ground and lifting the vehicle about $\frac{3}{4}$ to 1 inch.

The ignition must be in the "ON" or "ACC." position and the park brake must be set to turn the system on. The "NOT IN PARK/BRAKE" indicator light will come on while the "ON" button is being pushed if the park brake signal is not present. The system will not turn on.

Pushing the "ON" (I) button will turn the system on. The POWER ON light should be lit. With the POWER ON light on, the UP and DOWN arrows will function. The "DUMP" button will function at this time.

If the vehicle is equipped with an air suspension, the air must be exhausted from the suspension before leveling the vehicle. If the air is not exhausted, the suspension height control valves will interfere with the leveling procedure. There are two types of air dump systems that HWH controls. One system uses air solenoid valves supplied by HWH. The second system is supplied by the chassis manufacturer. This is a pilot air dump system. The HWH touch panel has a "DUMP" button. The "DUMP" button will only work if the POWER ON light is on. If the vehicle uses the HWH air dump pilot air dump system is used, the engine may be on or off. The "DUMP" button can be pushed and released. The pilot air dump system will return to the travel position if the ignition is on and the "STORE" button is pushed or the park brake is released.

NOTE: Releasing the park brake to return the suspension to travel mode (vehicle to ride height) is not recommended for normal operation. This is a fail safe if the "STORE" button is not used to retract the jacks.

MANUAL LEVELING OPERATION

On the right hand side of the touch panel there are four (4) red and four (4) yellow indicator lights. The four red indicator lights are JACK DOWN warning lights. There is one light for each jack. These warning lights come on when their respective straight-acting jacks are extended about $\frac{1}{4}$ to $\frac{1}{2}$ inch or a kick-down jack is in the vertical position. The four yellow indicator lights are level indicators, front, left side, right side and rear. A lit yellow level light indicates that a side, end or corner is low. When all four yellow level lights are out, the vehicle is level within the tolerance of the level sensing unit.

Use the UP and DOWN arrow buttons to extend jack pairs as needed to level and stabilize the vehicle. Side level lights should be turned off before turning off front or rear level lights.

The "OFF" button will turn the system off at any time.

STORE MODE

The touch panel has a "STORE" button and light. The "STORE" button will work with the POWER ON light on or off. The ignition must be in the "ON" or "ACC." position. The STORE light will come on when the "STORE" button is pushed. The STORE light will go out two (2) minutes after the last of the four individual red WARNING lights go out. If the POWER ON light is on while the STORE light is on, the POWER ON light will go out at this time also.

The "STORE" button should always be used to retract the jacks. This allows the system to store any jack that extends due to thermal expansion of the hydraulic fluid while traveling. When traveling, if a jack extends enough to allow a jack warning switch to turn on, the processor will turn the appropriate solenoid valve on so the jack can retract. The master warning light and buzzer will NOT come on at this time. If thirty (30) seconds after the solenoid valve is turned on, the warning switch is still on, the processor will turn the master warning light, the buzzer and the appropriate red WARNING light on the touch panel on.

IMPORTANT: When testing a leveling system, all four sets of UP and DOWN arrow buttons should be used to make sure the complete system operates correctly, including the red WARNING lights and the yellow LEVEL lights.

325 TROUBLE SHOOTING STEPS

MANUAL OPERATION

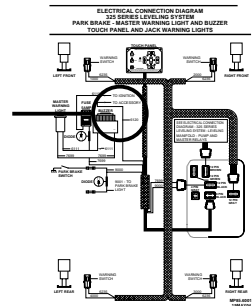
NOTE: The following diagnostic functions are written in order of operation and should be checked in this order. Failure to do so may cause improper diagnoses of the problem(s) and increase the time needed to repair the system.

PART 1. WITH THE IGNITION OFF THE HWH TOUCH PANEL SHOULD HAVE NO LIGHTS ON AND SHOULD NOT FUNCTION.

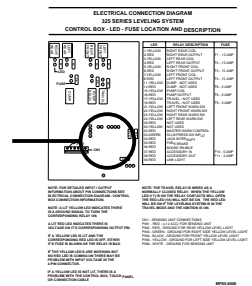
1. If the touch panel has lights on or will function, the red 6120 wire in the touch panel harness is connected to a constant power source and should be moved to the "ACC." side of the ignition switch.
SEE: MP85.6001 or MP85.6022

PART 2. WITH THE IGNITION ON, THE MASTER "JACKS DOWN" LIGHT AND BUZZER SHOULD NOT BE ON.

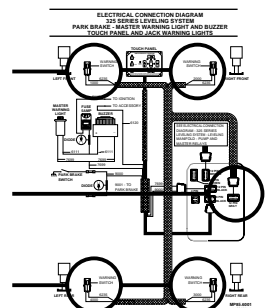
1. The ignition is on, the master "JACKS DOWN" warning light and buzzer are on and none of the jacks are extended.
 - a. Check the four yellow LEDs for the warning switch inputs in the control box. Number 21 is for the left front jack, 22 is for the right front jack, 23 is for the right rear jack and 24 is for the left rear jack. If no warning switch LEDs are on, replace the control box. **SEE: MP85.6060**
 - b. If a warning switch LED is on, unplug the warning switch for the jacks that have a lit LED. If the LEDs go out, the problem is the warning switch. **NOTE:** The magnet in the jack may be bad. If a new switch does not fix the problem, contact HWH customer service. If the LED stays on with the warning switch unplugged, unplug the 12 pin gray connector from the back of the control box. If the LED remains on, replace the control box. If the LED goes out, the warning switch wire(s) for the LEDs that are on are shorted to ground. **SEE: MP85.6001 or MP85.6022**



**MP85.6001
OR
MP85.6022**



MP85.6060



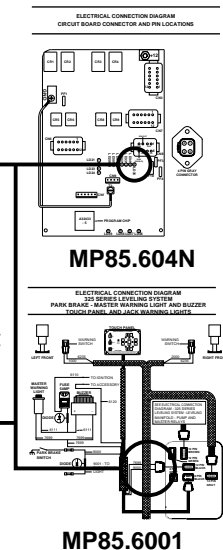
**MP85.6001
OR
MP85.6022**

325 TROUBLE SHOOTING STEPS

MANUAL OPERATION

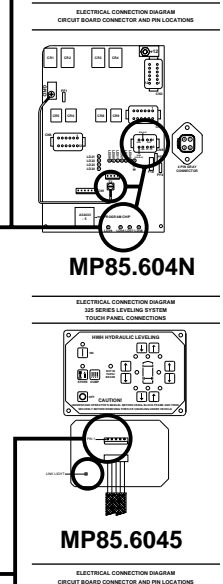
PART 3. THE PANEL WILL NOT TURN ON. THE IGNITION IS ON. THE "NOT IN PARK/BRAKE" LIGHT IS ON WHILE PUSHING THE LEVEL (I) BUTTON.

1. Check that the park brake is set.
2. Check LED 35 on the board in the control box. LED 35 should be on.
SEE: MP85.604N
 - a. If LED 35 is on, replace the control box.
 - b. If LED 35 is off, check for a ground on the 9000 wire on pin 7 of the 12 pin black connector on the back of the control box. If there is a ground on wire 9000, unplug the 12 pin black connector and ground pin 7 in the box receptacle. If LED 35 does not come on, replace the control box. If LED 35 does come on the problem is wire 9000 or the 12 pin black connection. If there is no ground on wire 9000, the problem is wire 9000 or the park brake switch. **SEE: MP85.6001 or MP85.6022 & MP85.604N**

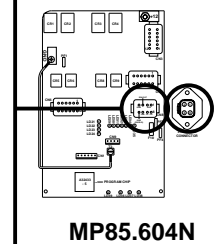


PART 4. THE PANEL WILL NOT TURN ON. THE IGNITION IS ON. THE "NOT IN PARK/BRAKE" LIGHT IS NOT COMING ON WHEN THE LEVEL (I or HYD) BUTTON IS PUSHED.

1. Check LEDs 36, 37 and 39. They Should be on if the ignition is on. **SEE: MP85.604N**
 - a. **LED's 36, 37 and 39 are off.** Check fuse F10. If F10 is blown, replace the control box. If F10 is OK, check for +12 volts between PIN 4 (gnd) and PIN 6 (ign) of CN8. If +12 is present, replace the control box. If +12 is not present, check for +12 between T2 and PIN 6 (ign) of CN8. If voltage is present, replace the control box. If +12 is not present, the problem is either the ground for the control box in the 4 pin gray connector or +12 ignition power on wire 6120, PIN 6 of CN8. Voltage to the control box on the 6120 wire should be above 12 volts. **SEE: MP85.604N**
 - b. **LED's 36 and 37 are on, LED 39 is off. Check for +12 volts between PIN 4 (ground-white wire) and PIN 5 (+12-red wire) at the touch panel.** Less than 11.3 volts at the touch panel may indicate that there is a low voltage situation for the leveling system but the system may still functions. If there is less than 11 volts at the touch panel, the voltage problem should be taken care of before proceeding. If there is a voltage problem, check the voltage between PIN 4 (gnd) and PIN 6 (ign) of CN8 at the control box and PIN 4 (gnd) and PIN 3 (ign out) of CN8. If there is more than 1(one) volt difference, replace the control box. If voltage between PIN 4 and PIN 6 is low, the problem is the ground from the white wire in the 4 pin gray connector or the voltage on the red 6120 wire in the CN8 connector for PIN 6. **SEE: MP85.6045 & MP85.604N**



If there is good voltage between PIN 4 and PIN 5 at the touch panel, check the link light at the touch panel. If it is blinking, the touch panel is probably the problem. If the link light is not blinking check the resistance between PIN 1 (yellow wire) and PIN 2 (green wire) at the touch panel with the harness plugged in. The ignition must be off when checking resistance on these wires. **NOTE: If the vehicle is a towable vehicle or the control box is not wired to the ignition circuit, remove power from the 6120 wire in the 8 PIN black connector CN8.** There should be 60 ohms of resistance ± 7.5 ohms. If the resistance is OK, the problem is probably the control box but could be the touch panel. If the resistance is not correct, unplug the harness from the touch panel. Check the resistance between the yellow and green wire in the harness plug and between PIN 1 and PIN 2 of the panel plug. The resistance should be 120 ohms ± 15 ohms. If the resistance between the panel pins is wrong, replace the touch panel. If the resistance between the harness pins is wrong, unplug the touch panel cable (CN8-8 pin black connector) at the control box. Check the resistance between PIN 7 (CL) and PIN 8 (CH) of CN8 in the control box. If the resistance is OK (120 ohms ± 15 ohms), replace the touch panel cable. If not replace the control box. **SEE: MP85.6045 & MP85.604N**



625 TROUBLE SHOOTING STEPS

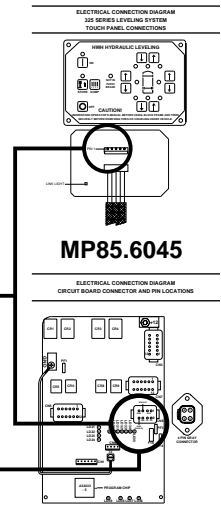
MANUAL OPERATION

PART 4. continued. . .

If there is no voltage between PIN 4 and PIN 5 at the touch panel, check for voltage between pins 3 (ign out) and 4 (gnd) of CN8 at the control box. If there is good voltage, the problem is the touch panel cable or it's connections. If there is no voltage between pins 3 and 4, check for voltage on the legs of poly fuse PF3. If there is no voltage on either leg, replace the control box. If there is voltage on one leg of the poly fuse, unplug the touch panel cable at the touch panel and recheck pins 3 and 4. (It will take about 30 seconds for the poly fuse to reset). If voltage is now present, replace the touch panel. If there is still no voltage, remove the 6800 wire from the CN8 connector and recheck pins 3 and 4. If there is voltage now, the 6800 wire is shorted to ground. If voltage is still not present, replace the control box.

SEE: MP85.6045 & MP85.604N

- c. **LED 37 is on. LED 36 is off. LED 39 may or may not be on, blinking.** Check voltage between PIN 4 (gnd) and PIN 6 (ign) of CN8 at the control box. If there is less than 12 volts present, check the ground and ignition supply connections for any problems including corrosion. If there is good voltage between pins 4 and 6, replace the control box. **SEE: MP85.604N**



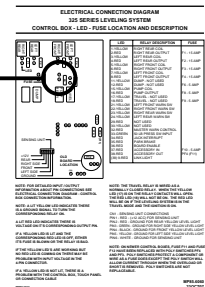
MP85.604N

PART 5. THE PUMP STARTS TO RUN WHEN THE TOUCH PANEL IS TURNED ON.

1. Check LEDs 15 (YELLOW) and 16 (RED)

SEE: MP85.6060

- a. If LEDs 15 and/or 16 are on, replace the control box.
- b. If LEDs 15 and/or 16 are off replace the pump relay. The pump relay contacts are stuck.



MP85.6060

325 TROUBLE SHOOTING STEPS

LEVELING OPERATION

PART 6. FOR VEHICLES EQUIPPED WITH AN AIR SUSPENSION. THE AIR WILL NOT EXHAUST FROM THE SUSPENSION AIR BAGS WHEN THE "DUMP" BUTTON ON THE TOUCH PANEL IS PUSHED. THE IGNITION AND THE TOUCH PANEL POWER ON LIGHT ARE ON.

1. **For vehicles equipped with the HWH air dump valves.** There is normally one air dump valve for each height control valve on the suspension. Air will only be exhausted while the "DUMP" button is being pushed.
 - a. Check LEDs 11, 12, 17 and 18 while the "DUMP" button is being pushed. LEDs 11 and 17 (YELLOW) along with LED 12 (RED) should be on. LED 18 (RED) should be off. If LEDs 11 and/or 17 are not on, or LED 18 is on, replace the control box. If LED 11 is on but LED 12 is off, check fuse F6. If F6 is not blown, check for power on the 6100 wires in the 4 pin gray connector. The 6100 wire connects to the #2 post of the pump relay. If +12 power is not present, the problem is the 6100 wire, its connection to the box or relay, or there is no battery power to the pump relay. If +12 power is present, replace the control box. If F6 is blown, there may be a short on the 9300 wire going to the HWH air dump valves or one or more of the air dump valves may be bad.

SEE: MP85.6060

- b. LEDs 11 and 17 (YELLOW) and LED 12 (RED) are on. LED 18 is off. There should be power on the 9300 wire on pin 11 in the 12 pin brown connector on the back of control box. If not, there is a problem with the connector, pin connections or the 9300 wire. If there is power on the 9300 wire at the control box, check for power between the 9300 (BLACK) wire and the white wire in the Packard connector at the air dump valves. If there is no power, the problem is the 9300 wire, the white ground wire or their pin connections. If power is present at the connectors, replace the air dump valve(s). Check that the exhaust ports for the air dump valves are not plugged.

SEE: MP85.6060 & MP85.603N

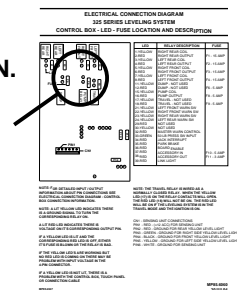
2. **For vehicles equipped with a pilot air dump system supplied by the chassis manufacturer** and controlled electronically by the HWH leveling system. The "DUMP" button may be pushed and released. The pilot valve should shift to the dump position and remain there.

- a. Check LEDs 11, 12, 17 and 18 while the "DUMP" button is being pushed. LEDs 11 and 17 (YELLOW) along with LED 12 (RED) should be on. LED 18 (RED) should be off. If LEDs 11 and/or 17 are not on, or LED 18 is on, replace the control box. If LED 11 is on but LED 12 is off, check fuse F6. If F6 is not blown, replace the control box. If F6 is blown, there may be a short on the 9300 wire or a problem with the suspension pilot dump valve. Locate the 4 pin UML connector in the HWH harness. Unplug the 4 pin connector. Replace the F6 fuse and retry. If the fuse blows again, the problem is with the HWH 9300 wire. If the fuse does not blow, the problem is with the pilot dump valve. Contact the vehicle manufacturer for assistance.

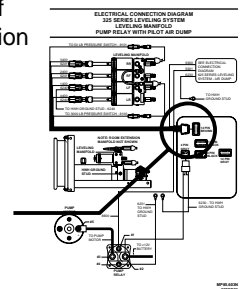
SEE: MP85.6060 & MP85.6022

- b. LEDs 11 and 17 (YELLOW) and LED 12 (RED) are on and LED 18 (RED) is off. Find the 4 pin UML plug for the pilot dump in the HWH harness. While pushing the "DUMP" button, check between the pins in the 4 pin UML connector for the black 9300 wire and the white ground wire. If there is no power on the 9300 wire, the problem is the 9300 wire, the white ground wire or their connections. If there is power on the 9300 wire, the problem is the suspension pilot dump valve. Contact the vehicle manufacturer for assistance.

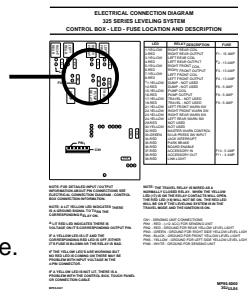
SEE: MP85.6060 & MP85.6022



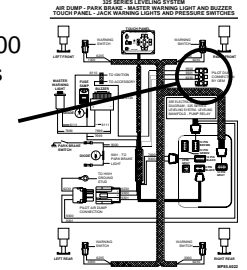
MP85.6060



MP85.603N



MP85.6060



MP85.6022

325 TROUBLE SHOOTING STEPS

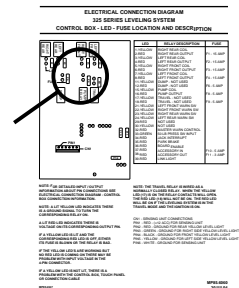
MANUAL OPERATION

PART 7. THE PUMP WILL NOT RUN OR RUNS ERRATICALLY WHEN AN UP ARROW (EXTEND) BUTTON IS PUSHED. THE ON LIGHT IS ON.

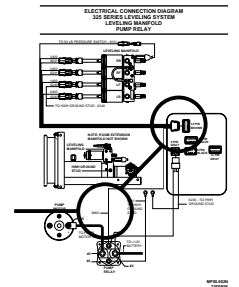
- If the pump will not run when one or more UP ARROWS are pushed but other UP ARROWS will run the pump, replace the touch panel.
- Check LEDs 15 (YELLOW) and 16 (RED) while an UP ARROW is being pushed. Both LEDs should be lit. **SEE: MP85.6060**
 - If the yellow LED (15) is not lit, replace the control box. If the yellow LED is lit, the red LED (16) should be lit.
 - If red LED 16 is not lit, check fuse F8. If F8 is OK, replace the control box. If F8 is blown, the 8600 wire going to the pump relay is shorted to ground or the pump relay is bad. Wire 8600 is on pin 12 in the 12 pin brown connector on the back of the control box. Disconnect this wire from the pump relay, replace the fuse and retry. If the fuse only blows with the 8600 wire connected to the pump relay, the pump relay is bad. **SEE: MP85.6060 & MP85.602N or MP85.603N**
- LEDs 15 (YELLOW) and 16 (RED) are lit when an UP ARROW is being pushed. The problem is with the relay, the pump motor, wiring or wiring connections. **SEE: MP85.6060**

IMPORTANT: THE DEFINITION OF POWER IS 10.0 VOLTS OR MORE AT THE MASTER AND PUMP RELAYS WITH LEDs 13, 14, 15 AND 16 ON.

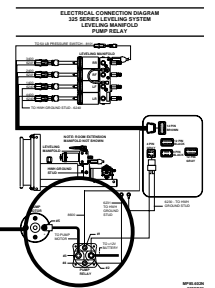
- Terminals 1, 2 and 3 should all have power when above LEDs are lit. Terminal 4 should be connected to the ground stud on the side of the pump. Make sure all terminals are tight and that the wires, ring terminals and the relay terminals are free of corrosion. **SEE: MP85.602N or MP85.603N**
 - If terminal 1 has no power, the problem is the 8600 wire or its connections to the control box or to the pump relay. **SEE: MP85.602N or MP85.603N**
 - If terminal 2 has no power, the problem is the battery cable from the battery supply or its connections to the battery supply or to the pump relay. **SEE: MP85.602N or MP85.603N**
 - If terminals 1 and 2 have power, check terminal 4 for ground. If ground is not present, the problem is the white ground wire or its connections to the ground stud or to the master relay. **SEE: MP85.602N or MP85.603N**
 - If terminals 1 and 2 have power and terminal 4 has a ground, check terminal 3 for power. If there is no power on terminal 3, replace the pump relay. **SEE: MP85.602N or MP85.603N**
 - If terminal 3 has power, check terminal 5 on the pump motor. If terminal 5 has no power, the problem is the short cable between the pump relay and the pump motor or its connections. If terminal 5 has power, make sure the power unit assembly has a good frame mounting. The pump motor is internally grounded and the mounting of the assembly supplies the ground for the motor. Make sure the stud on the pump motor is tight. If all connections, mountings and wires are OK, replace the pump motor. **SEE: MP85.602N or MP85.603N**
- The pump runs erratically or slowly. Review number 3 of PART 7.



MP85.6060



**MP85.602N
OR
MP85.603N**



**MP85.602N
OR
MP85.603N**

325 TROUBLE SHOOTING STEPS

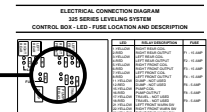
MANUAL OPERATION

PART 8. WHEN PUSHING ANY UP ARROW (EXTEND) BUTTON, NO JACKS WILL EXTEND, THE PUMP RUNS UNDER A LOAD.

1. The shuttle valve must shift and the control box must see the 50 p.s.i. manifold pressure switch before the control box will allow any solenoid valves to open.

IMPORTANT: Check the number on the program chip on the board in the control box. (See MP85.185J) If the number on the chip is a -5 or greater number, the control box does not need to see the 50 P.S.I. pressure switch. If the chip number is a -5 or greater and the LED's in PART 8 step 1, are not working properly, replace the control box. After replacing the control box, check step 2. If the LED's in step 1 are working properly, proceed to PART 8 step 2b.

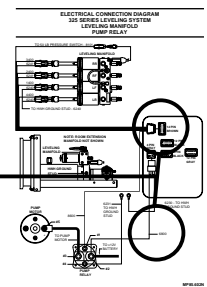
- a. Check yellow LEDs 1 (right rear solenoid valve), 3 (left rear solenoid valve), 5 (right front solenoid valve) and 7 (right rear solenoid valve). If these LEDs are coming on when UP ARROWS are being pushed, the shuttle valve and the 50 p.s.i. switch are functioning properly. The red LEDs 2 (right rear solenoid valve), 4 (left rear solenoid valve), 6 (right front solenoid valve) and 8 (left front solenoid valve) should come on. The LEDs will come on with their respective UP ARROWS as follows:
FRONT UP ARROW LEDs 5 and 7 (YELLOW) and LEDs 6 and 8 (RED)
REAR UP ARROW LEDs 1 and 3 (YELLOW) and LEDs 2 and 4 (RED)
RIGHT SIDE UP ARROW LEDs 1 and 5 (YELLOW) and LEDs 2 and 6 (RED)
LEFT SIDE UP ARROW LEDs 3 and 7 (YELLOW) and LEDs 4 and 8 (RED)



MP85.6060

SEE: MP85.6060

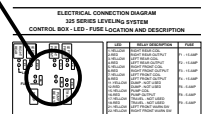
- b. If the red LEDs are not coming on, the 6100 wire going to the 4 pin gray connector on the back of the control box may be the problem. Check fuses F1, F2, F3 and F4. If these fuses are blown, the solenoid valves may be bad. The 6100 wire connects to terminal 2 of the pump relay. If there is no power on the 6100 wire, the problem is with the 6100 wire or it's connections to the control box or to the pump relay.
SEE: MP85.6060 & MP85.602N or MP85.603N
- c. If the red LEDs are coming on as necessary, this indicates there should be power on the appropriate output pins for the solenoid valves. Check for +12 and ground at the valves. If there is no +12 at the valves, there is most likely a problem with the 12 pin brown connector on the back of the control box the wires to the solenoid valves or their connections. If +12 is present, replace the valves. **SEE: MP85.602N & MP85.603N**



MP85.602N
OR
MP85.603N

2. If yellow LEDs 1,3,5, and 7 are not coming on, (or the yellow LEDs are coming on and the chip is -5 or greater) check LED 33 (GREEN). This LED should be on when the pump is running. This would indicate the control box is receiving a ground signal from the 50 p.s.i. switch on the manifold. **SEE: MP85.6060**

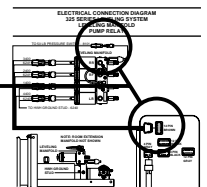
- a. If LED 33 is coming on and the yellow LEDs are not, replace the control box.



MP85.6060

- b. If LED 33 is not coming on, the shuttle valve is not shifting, the 50 p.s.i. switch or its connections to the control box are bad, the control box is bad or the pump is bad. Open a valve release nut or T-handle **IMPORTANT: (SEE: MI91.999X)** and push an UP ARROW. If the jacks start to extend, the shuttle valve is shifting. The problem is the 50 p.s.i. switch, its connections to the control box or the control box. Proceed to c. If the jacks do not extend, check the pump pressure. The pump pressure should be a minimum of 3300 p.s.i. and a maximum of 3600 p.s.i. (if the pump develops at least 1000 p.s.i., the shuttle valve should shift.) If the pump pressure is low, check voltage at the power stud on the motor while the motor is running. Less than 9 volts at the motor while it is running may cause a pressure drop. If the pressure is OK, the problem is the shuttle valve. **SEE: MP65.270C**

- c. If the shuttle valve and the pump are OK, unplug the 50 p.s.i. switch and apply a ground on the 8101 wire going to the control box. If the green LED 33 comes on, replace the pressure switch. If the LED does not come on, unplug the 12 pin brown connector from the control box and apply a ground to pin 3 in the 12 pin brown control box connector. If LED 33 comes on, the problem is the 8101 wire or it's connections in the harness plugs. If LED 33 does not come on, replace the control box.
SEE: MP85.6060 & MP85.602N or MP85.603N



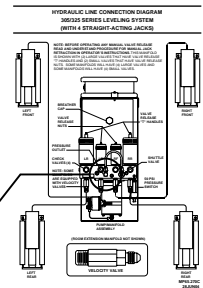
MP85.602N
OR
MP85.603N

325 TROUBLE SHOOTING STEPS

MANUAL OPERATION

PART 9. WHEN PUSHING ANY UP ARROW (EXTEND) BUTTON, NO JACKS WILL EXTEND OR WILL EXTEND BUT NOT LIFT THE VEHICLE. THE PUMP IS FREE WHEELING UNDER NO LOAD.

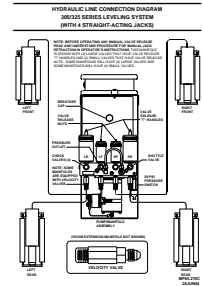
1. The problem is most likely the shuttle valve or the pump. Voltage at the pump motor, while running, should not be less than 9.0 volts. If the vehicle is equipped with any HWH hydraulic room extensions, make sure none of the room extension solenoid valves are open.
 - a. Check the pump pressure. The pump pressure should be between 3300 p.s.i. and 3600 p.s.i. If the pump is not developing adequate pressure, replace the pump. If the pump pressure is OK, replace the shuttle valve. **SEE: MP65.270C**



MP65.270C

PART 10. WHEN PUSHING AN UP ARROW, THE CORRECT JACKS DO NOT EXTEND.

1. When testing the function of the UP ARROWS, always test all four UP ARROWS. Make sure that not only the correct jacks are operating but also other jacks are not moving. The problem most likely the plumbing or wire connections at the solenoid valves or control box. Check that the correct yellow and red LEDs are coming on for the UP ARROW that is being pushed. If the correct LEDs are not coming on, the control box is bad. Refer to the plumbing diagram and check that the correct jack is connected to the appropriate solenoid valve. Move hose connections as necessary. **SEE: MP65.270C**



MP65.270C

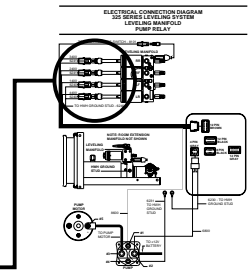
NOTE: If the plumbing is incorrect, change the plumbing as necessary, **DO NOT** change the way the solenoid valves are wired. Do not remove hoses until all jacks are retracted. When re-tightening a hose end, tighten the hose end finger tight (snug) plus 1/4 turn. **DO NOT OVER TIGHTEN.**

If the plumbing is OK, refer to the wiring diagrams to check the wiring. The solenoid valve wires are in the 12 pin brown connector on the back of the control box as follows:

- LEFT FRONT SOLENOID VALVE ---- WIRE 1400 ---- PIN 5
- RIGHT FRONT SOLENOID VALVE -- WIRE 2400 ---- PIN 10
- RIGHT REAR SOLENOID VALVE ---- WIRE 3400 ---- PIN 9
- LEFT REAR SOLENOID VALVE ----- WIRE 4400 ---- PIN 8

Move the wires in the plug or at the solenoid valves as necessary. Retry the system.

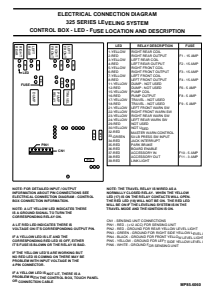
SEE: MP85.602N or MP86.603N



**MP85.602N
OR
MP85.603N**

PART 11. ONE OR MORE JACKS WILL NOT EXTEND, OTHER JACKS ARE FUNCTIONING PROPERLY. THE PUMP IS RUNNING NORMALLY.

1. Check the yellow and red LEDs for the jack(s) that will not extend. **SEE: MP85.6060 & MP85.602N or MP85.603N**
 - a. If the yellow LED is not coming on, replace the control box.
 - b. If the yellow LED is coming on but the red LED is not coming on, check the appropriate fuse. If the fuse is OK, replace the control box. If the fuse is blown, unplug the solenoid valve, replace the fuse and retry. If the fuse blows, the wires for the valve or their connections are shorted **OR** the control box is bad.
 - c. If the yellow and red LEDs are coming on, check for power between the two wires in the plug at the solenoid valve. If there is power at the plug, replace the solenoid valve. If there is no power at the plug, the problem is the wires or their connections. The solenoid valve wires are in the 12 pin brown connector on the back of the control box. Wiring for the solenoid valves is as follows:



MP85.6060

- LEFT FRONT VALVE ----- POWER ----- WIRE 1400 ----- PIN 5
GROUND --- WHITE WIRE TO GROUND STUD
- RIGHT FRONT VALVE --- POWER ----- WIRE 2400 ---- PIN 10
GROUND --- WIRE 7600 ---- PIN 6
- RIGHT REAR VALVE ----- POWER ----- WIRE 3400 ---- PIN 9
GROUND --- WIRE 7601 ---- PIN 7
- LEFT REAR VALVE ----- POWER ----- WIRE 4400 ---- PIN 8
GROUND --- WHITE WIRE TO GROUND STUD

NOTE: Low voltage can be a problem. With the valve plugged in and turned on, there should be a minimum of 9.0 volts between the two wires for the valve. If there is less than 9.0 volts, low volts may be the problem

325 TROUBLE SHOOTING STEPS

MANUAL OPERATION

PART 12. ONE OR MORE JACKS WILL NOT STAY DOWN AFTER BEING EXTENDED TO THE GROUND.

1. If a jack retracts more than 3/8 inch after being extended to the ground, if there are no visible leaks, replace the solenoid valve. To check this, extend the jacks to the ground and lift the coach slightly. Mark the rods of the jacks with a piece of tape about 1 inch down from the barrel of the jack. Monitor this to see how far the jack will retract.
2. If a jack retracts quickly after being extended, retry and push the OFF button as soon as the UP ARROW is released. If the jack continues to retract, replace the solenoid valve. If the jack stops retracting, the control box is most likely the problem.

PART 13. A RED WARNING LIGHT ON THE TOUCH PANEL WILL NOT TURN ON WHEN IT'S JACK IS EXTENDED 1/4 TO 1/2 INCH OR MORE.

1. Each jack has a two wire magnetic warning switch. The switch is located on top of the jack. There is a magnet inside the jack. The contacts of the switch close when the jack has extended approximately 1/4 to 1/2 inch. The contacts open when the jack is retracted. The white wire in the harness supplies a ground to the switch and the black wire carries a ground signal to the control box when the jack is extended and the switch contacts are closed. There is a yellow LED in the control box for each warning switch input. A lit yellow LED indicates the warning switch is on. The warning switch LEDs and inputs are:
LEFT FRONT ----- LED 21 ----- PIN 3 ----- WIRE 1000
RIGHT FRONT --- LED 22 ----- PIN 4 ----- WIRE 2000
RIGHT REAR ----- LED 23 ----- PIN 9 ----- WIRE 3000
LEFT REAR ----- LED 24 ----- PIN 10 --- WIRE 4000

SEE: MP85.6060

The warning switch inputs are in the 12 pin gray connector on the back of the control box.

SEE: MP85.6001 or MP85.6022

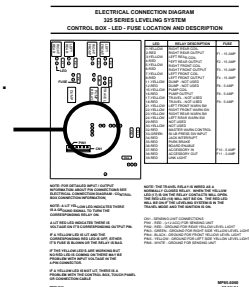
- a. The warning switch LED in the control box is coming on but the warning light on the touch panel is not coming on. The problem is most likely the control box but could be the touch panel.
- b. The warning switch LED in the control box is not coming on. Unplug the 12 pin connector from the back of the control box. Ground the appropriate pin in the box connector. If the warning switch LED does not come on, replace the control box. If the warning switch LED comes on, the problem is the wire harness or the jack warning switch. Plug the 12 pin connector back into the control box.
SEE: MP85.6001 or MP85.6022
- c. If the problem is the wire harness or warning switch, unplug the warning switch at the jack. Short the two pins in the harness plug together. If the warning switch LED comes on, replace the warning switch. If the warning switch LED does not come on, short the black warning switch wire in the harness to ground. If the warning switch LED does not come on, the problem is the black wire or it's connections. If the warning switch LED comes on, the problem is the white ground wire. **SEE: MP85.6001 or MP85.6022**

PART 14. THE MASTER WARNING LIGHT AND BUZZER WILL NOT COME ON WHEN A TOUCH PANEL WARNING LIGHT IS ON.

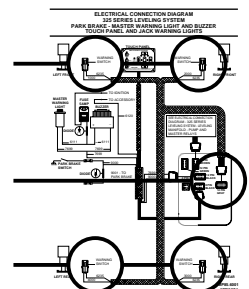
1. The master "JACKS DOWN" warning light and buzzer are controlled by one wire from the control box. If one works but the other does not, the problem would only be with the component that is not working.

2. The red LED 32 should be on if any warning switch LED is on. **SEE: MP85.6060**

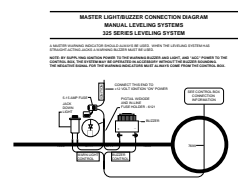
- a. If LED 32 is not on and any warning switch LED is on, replace the control box.
- b. If LED 32 is on, unplug the 12 pin black connector from the control box and check pin 11 for a ground. If a ground is not present, replace the control box. **SEE: MP85.6055**
- c. If there is a ground on pin 11 in the 12 pin black connector, the problem is the 7699 wire, the light, buzzer, their connections or the ignition power to the light and buzzer.
SEE: MP85.626A



MP85.6060



**MP85.6001
OR
MP85.6022**



MP85.626A

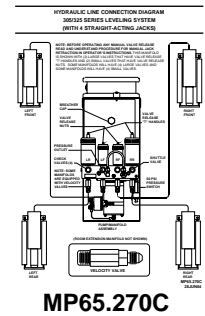
**MI91.325Q
24FEB06**

325 TROUBLE SHOOTING STEPS

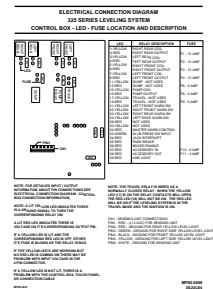
MANUAL OPERATION

PART 15. ONE OR MORE JACKS WILL NOT RETRACT WHEN A DOWN ARROW (RETRACT) BUTTON IS PUSHED. SOME JACKS WILL RETRACT.

1. The pump should not run when a DOWN ARROW is pushed. If a pump runs when a DOWN ARROW is pushed, the control box or touch panel is the problem.
2. Open the valve release nut (small valve) 4 1/2 complete turns or the valve release T-handle (large valve) approximately 5 full turns counterclockwise. **SEE: MP85.270C**
 - a. If the jack will not retract, the problem is the hose, velocity valve (if so equipped) or the jack. Slowly remove the hose from the jack. If the jack does not retract, replace the jack. If the jack starts to retract, tighten the hose and loosen the hose at the manifold. If the jack does not retract, there is a problem with the hose, such as a kink. If the jack retracts and the manifold is equipped with a velocity valve, the valve is most likely the problem. If there is no velocity valve, there may be a check valve or solenoid valve problem. Contact HWH technical service. **SEE: MP85.270C**
3. If the jack retracts when the valve is manually opened, the control box is most likely the problem. If the jack will extend, the valve and its connection to the control box should be OK.
 - a. Check the yellow and red LEDs for the jack that is not retracting. If the yellow LED is not coming on while the down arrow is being pushed, replace the control box. If the yellow LED is coming on, review PART 11, 1b and 1c. If a jack will extend, the solenoid valve and wiring should be OK when pushing a DOWN ARROW also. REMEMBER LOW VOLTAGE WILL CAUSE PROBLEMS. **SEE: MP85.6060**



MP65.270C

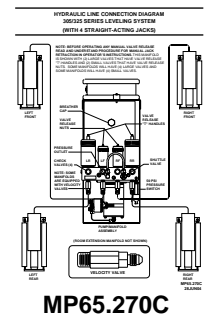


MP85.6060

CAUTION: DO NOT CRAWL UNDER ANY VEHICLE SUPPORTED ON THE LEVELING JACKS WITHOUT PROPERLY SUPPORTING THE FRAME OF THE VEHICLE SO IT CANNOT DROP WHEN THE FLUID IS RELEASED FROM A JACK.

PART 16. NO JACKS WILL RETRACT WHEN PUSHING ANY OF THE DOWN ARROW (RETRACT) BUTTONS.

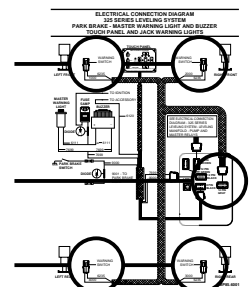
1. Check the yellow and red LEDs for the solenoid valves while pushing the DOWN ARROW buttons. If the yellow LEDs are not coming on, the problem is the control box or touch panel. If the red LEDs are not coming on, the 10 gage wire from the pump relay to the four (4) pin gray connector could be the problem. Review **Part 8-1b**. If the yellow and red LEDs are coming on, the problem is most likely the shuttle valve. Turn the valve release nuts (small valves) 4 and 1/2 complete turns (no more) or valve release T-handles (large valves) 5 full turns counterclockwise. If the jacks retract, the problem is the solenoid valves or their connections. If the jacks do not retract, replace the shuttle valve. **IMPORTANT: Do not remove the shuttle valve until all solenoid valves are closed, electrically or manually.** **SEE: MP85.6060 or MP85.270C**



MP65.270C

PART 17. THE RED WARNING LIGHT FOR A JACK WILL NOT GO OUT WHEN THE JACK IS FULLY RETRACTED.

1. Check the yellow LED for the proper warning switch input in the control box. Number 21 is for the left front jack, 22 is for the right front jack, 23 is for the right rear jack and 24 is for the left rear jack. If the warning switch LED is not on, replace the control box. **SEE: MP85.6060**
2. If a warning switch LED is on, unplug the warning switch for the jack(s) that have a lit LED. If the LED(s) go out, the problem is the warning switch. **NOTE: The magnet in the jack may be bad. If a new switch does not fix the problem, contact HWH customer service.** If the LED stays on with the warning switch unplugged, unplug the 12 pin gray connector from the back of the control box. If the LED remains on, replace the control box. If the LED goes out, the warning switch wire(s) for the LED(s) that are on are shorted to ground. **SEE: MP85.6001 or MP85.6022**



MP85.6001

OR

MP85.6022

MI91.325T

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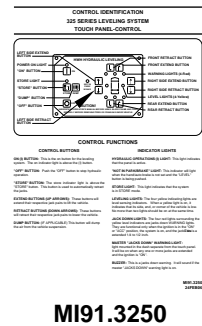
325 TROUBLE SHOOTING STEPS

MANUAL OPERATION

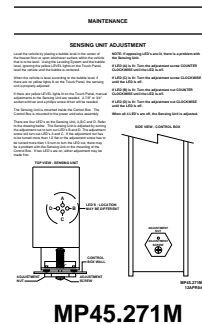
PART 18. THE YELLOW LEVEL INDICATORS ON THE TOUCH PANEL ARE NOT FUNCTIONING PROPERLY.

A lit yellow level light indicates that side or end is low. When all of the yellow lights are out, the vehicle should be level. One or two yellow lights may be on at one time but opposing yellow lights should never be on. The sensing unit is located in the control box. Because the control box can be mounted with the clear Plexiglas cover pointing in any of four directions, the sensing unit must be programmed for direction and also the type of suspension, air or spring. Most systems that are installed by the vehicle manufacturer have a preprogrammed sensing unit. After market systems will most likely have a programmable sensing unit. Replacement control boxes will usually be a generic type with a programmable sensing unit. Replacement sensing units will be programmable. When replacing a control box or sensing unit, refer to instruction sheet ML31215 for detailed instructions for programming the sensing unit. No special tools are needed.

1. The yellow lights do not correspond to the position of the vehicle, such as the right side of the vehicle is low but the left side yellow level indicator light is on.
 - a. There are four yellow LEDs on the sensing unit board. These LEDs should correspond to the yellow level indicators on the touch panel. If they do not, the sensing unit is not programmed properly. If the sensing unit is programmable, reprogram the sensing unit. If the sensing unit is not programmable, the position of the complete power unit assembly will have to be changed. If this is not reasonable to do, the sensing unit will have to be replaced with a programmable one. **SEE: MI91.3250 & MP45.271M**
 - b. If the sensing unit LEDs and the touch panel lights correspond, the sensing unit may be out of adjustment. There is an adjustment nut and screw on the outside of the control box for the sensing unit. Refer to the maintenance sheet for sensing unit adjustment procedures. Minor, gentle movement of the adjustment nut and screw work best. **SEE: MP45.271M**
2. No yellow level indicators on the touch panel will come on. The yellow LEDs on the sensing unit board are NOT working.
 - a. Unplug the sensing unit. Use a test light to check pin 1 on the board for +12 volts and pin 6 for a ground. If these pins are OK, replace the sensing unit. If either pin is not working, replace the control box.
3. No yellow level indicators on the touch panel will come on. The yellow LEDs on the sensing unit board ARE working.
 - a. Unplug the sensing unit. Use a test light to ground pins 2 (rear), 3 (right side), 4 (front) and 5 (left side). If the appropriate yellow lights on the touch panel come on, replace the sensing unit. If the appropriate yellow lights do not come on, replace the control box.
4. Yellow level indicator lights on the touch panel will not go out or opposing yellow indicator lights are on.
 - a. Compare the yellow LEDs on the sensing unit board to the yellow indicators on the touch panel. If the LEDs on the sensing unit board match the yellow level lights on the touch panel, replace the sensing unit. If the LEDs on the sensing unit board DO NOT match the yellow lights on the touch panel, replace the control box. **SEE: MI91.3250 & MP45.271M**



MI91.3250



MP45.271M

325 TROUBLE SHOOTING STEPS

AUTOMATIC STORE (RETRACT) SEQUENCE

1. The ignition must be in the ON or ACC. position. If the ignition is in the ON position, the master warning light and buzzer will be on while the jacks are retracting.
2. Push the "STORE" button. The touch panel does not have to be on.
3. The STORE light will come on.
4. The jacks will start to retract.
5. Five (5) seconds later the rear jacks will start to retract.
6. The red warning lights on the touch panel will go out as each jack retracts within 1/4 to 1/2 inch.
7. Two minutes after the last red warning light goes out, the touch panel will turn off.

NOTE: If one or more jacks will not retract and/or a red jack down warning light will not go out, the system will stay in the STORE mode for thirty (30) minutes from the time the "STORE" button was pushed then the system will turn off. The "TRAVEL MODE" light will not be on.

DIAGNOSTICS FOR THE AUTOMATIC STORE SEQUENCE

PART 1. THE STORE LIGHT WILL NOT COME ON WHEN THE "STORE" BUTTON IS PUSHED. THE IGNITION IS ON.

- a. Push the "ON" button. If the touch panel will not turn on review Part 4 of Manual Operation.
- b. If the touch panel will turn on but the "STORE" button does not work, the problem is the touch panel or the control box.

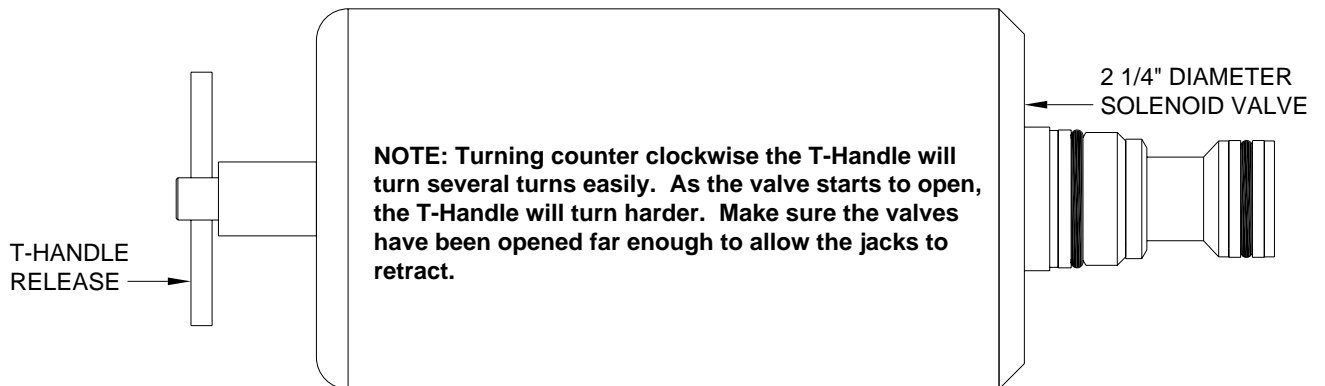
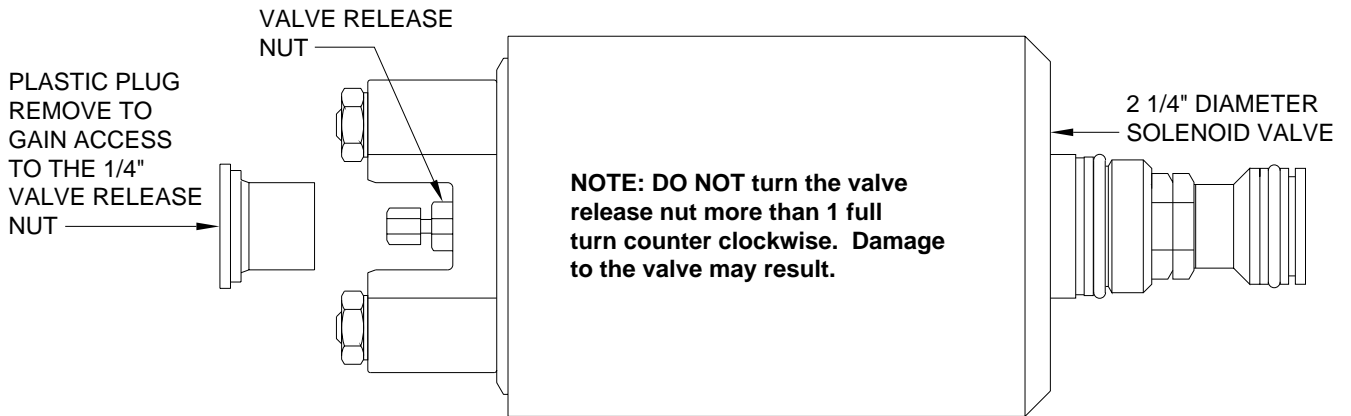
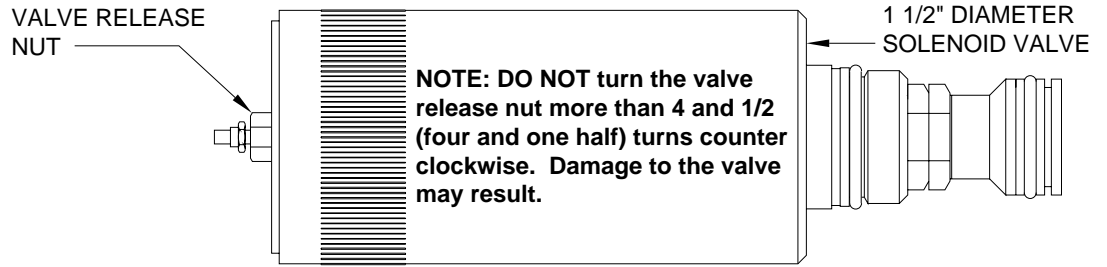
PART 2. ONE OR MORE JACKS WILL NOT RETRACT AFTER THE "STORE" BUTTON IS PUSHED.

1. If at least one jack retracts properly but others will not review Part 15 of the manual operation section.
2. If no jacks will retract, review Part 16 of the manual operation section.

PART 3. ONE OR MORE RED WARNING LIGHTS ON THE TOUCH PANEL WILL NOT TURN OFF WHEN THE JACKS ARE FULLY RETRACTED.

1. Review Part 17 of the manual operation section.

MANUAL VALVE RELEASE PROCEDURES



MAINTENANCE/SERVICE

SENSING UNIT ADJUSTMENT

Level the vehicle by placing a bubble level in the center of the freezer floor or upon whichever surface within the vehicle that is to be level. Using the Leveling System and the bubble level, ignoring the yellow LEVEL lights on the Touch Panel, level the vehicle until the bubble is centered.

With the vehicle level according to the bubble level, if there are no yellow lights lit on the Touch Panel, the sensing unit is properly adjusted. If there are yellow LEVEL lights lit on the Touch Panel, manual adjustments to the Sensing Unit are needed. A 7/8", 3/4" or 5/16" socket w/driver or box end wrench and a philips screw driver will be needed.

The Sensing Unit is mounted inside the Control Box. The Control Box is mounted to the power unit/valve assembly.

There are four LED's on the Sensing Unit, A,B,C and D. Refer to the drawing below. The Sensing Unit is adjusted by turning the adjustment nut to turn out LED's B and D. The adjustment screw will turn out LED's A and C. If the adjustment nut has to be turned more than 1/2 flat or the adjustment screw has to be turned more than 3/4 turn to turn the LED out, there may be a problem with the Sensing Unit or the mounting of the Control Box. If two LED's are on, it is best to make the B-D adjustments first, then hold the adjustment nut from moving while making the A-C adjustment.

NOTE: If opposing LED's are lit, there is a problem with the Sensing Unit.

If LED (A) is lit: Turn the adjustment screw COUNTER CLOCKWISE until the LED is off.

If LED (C) is lit: Turn the adjustment screw CLOCKWISE until the LED is off.

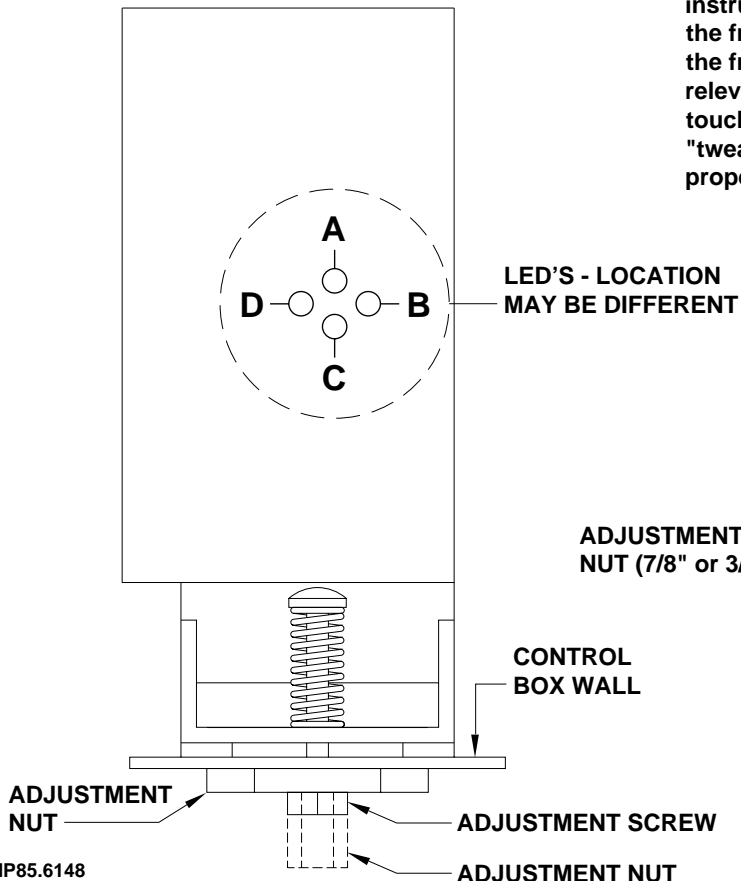
If LED (B) is lit: Turn the adjustment nut COUNTER CLOCKWISE until the LED is off.

If LED (D) is lit: Turn the adjustment nut CLOCKWISE until the LED is off.

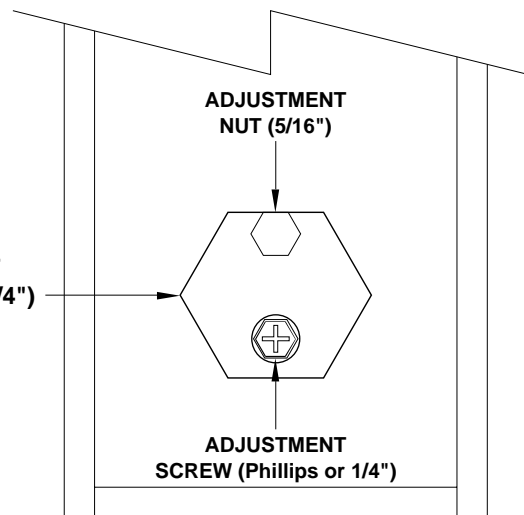
IMPORTANT: When all 4 LED's are off, move the vehicle to an unlevel position so one or two yellow lights are on. Level the vehicle according to the yellow LEVEL lights. Recheck the level. If more adjustment is needed, DO NOT try to adjust the sensing unit until the yellow level lights go out, instead just "tweak" the sensing unit, ignoring the LED's on the sensing unit.

Example: After the initial adjustment and releveling the vehicle, the front is still low. This means the front yellow level light is turning off too soon. Determine which sensing unit light is the front light, A-B-C or D. Move the adjustment for that light very, very, slightly in the OPPOSITE direction that is given in the above instructions for LED's A, B, C, and D. This will allow the front yellow light to stay on slightly longer to bring the front up more. Again, unlevel the vehicle then relevel the vehicle using the yellow level lights on the touch panel. Recheck with a level. Repeat the "tweaking" process until the system levels the vehicle properly.

TOP VIEW - SENSING UNIT



SIDE VIEW - CONTROL BOX





**READ
INSTRUCTIONS
THOROUGHLY
BEFORE
PROCEEDING**

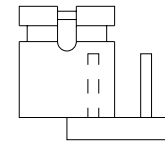
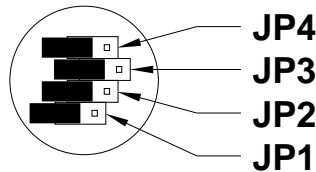
INSTRUCTION SHEET - JUMPER PLACEMENT FOR 325 AND 625 AFTER MARKET INSTALLATIONS OR ELECTRONIC SENSING UNIT REPLACEMENT

IMPORTANT: 325 AND 625 ELECTRONIC SENSING UNITS USED IN AFTER MARKET INSTALLATIONS OR REPLACEMENT SITUATIONS ARE PROGRAMMABLE. DURING INSTALLATION OF A SYSTEM OR REPLACEMENT OF AN ELECTRONIC SENSING UNIT DO NOT ASSUME THAT THE SENSING UNIT JUMPERS ARE PRE-SET. THE MOUNTED ORIENTATION OF THE CONTROL BOX ASSEMBLY AND THE SUSPENSION TYPE MUST BE ESTABLISHED IN ORDER TO SET THE JUMPERS AS NEEDED TO PROGRAM THE SENSING UNIT TO THE COACH.

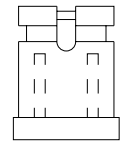
JP1 AND JP2 - CONTROL BOX ORIENTATION (Page 1 of 2)

MOVE JUMPERS JP1 AND JP2 ACCORDING TO THE ORIENTATION OF THE CONTROL BOX. USE THE DRAWINGS PROVIDED TO DETERMINE WHICH APPLICATION IS FOR THE ORIENTATION OF YOUR CONTROL BOX.

FOR SHIPPING PURPOSES THE (4) JUMPERS ARE SLID ONTO ONE SIDE OF JP1 THROUGH JP4. MOVE ONLY THE JUMPERS NEEDED TO DETERMINE ORIENTATION AND SUSPENSION. LEAVING THE REMAINING JUMPERS AS THEY ARE SHIPPED WILL NOT CAUSE PROBLEMS.



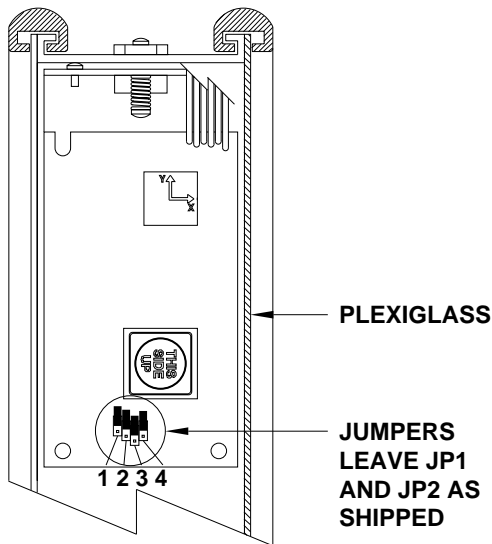
SHIPPED POSITION



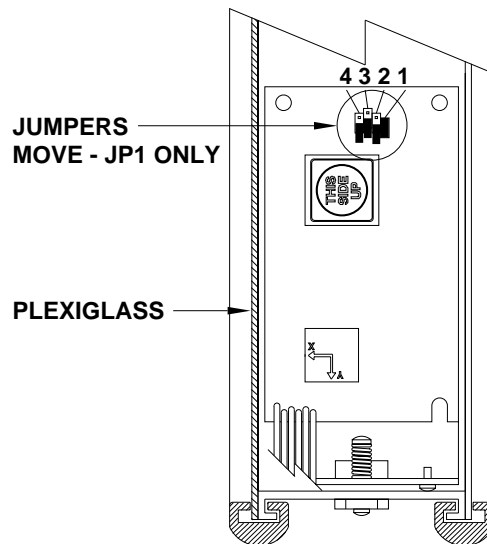
MOVED POSITION

THE FOLLOWING DRAWINGS SHOW THE SENSING UNIT, INSIDE THE CONTROL BOX, AS VIEWED WHEN LOOKING DOWN FROM THE TOP OF THE CONTROL BOX. REMOVE THE RUBBER RING AND PLASTIC COVER ONLY IF NEEDED. THE RING AND COVER MUST BE REINSTALLED.

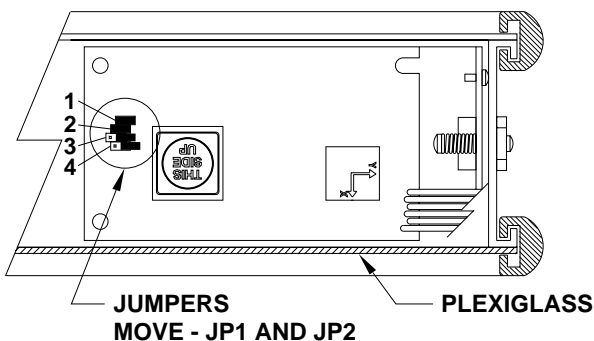
FRONT OF VEHICLE



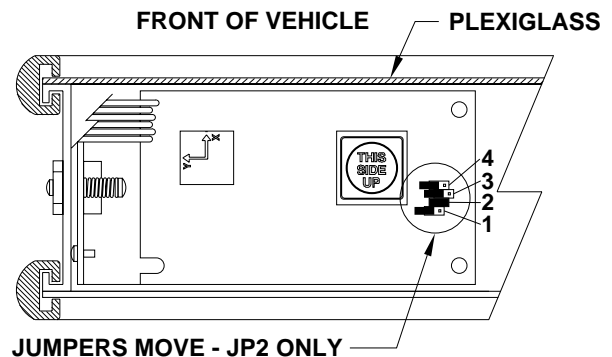
FRONT OF VEHICLE



FRONT OF VEHICLE



FRONT OF VEHICLE



NOTE: AFTER MOVING THE JUMPERS, REMOVE AND REAPPLY +12 POWER FOR THE CONTROL BOX. THIS WILL "RE-BOOT" THE SENSING UNIT.

**MP45.272M
17SEP07**



READ
INSTRUCTIONS
THOROUGHLY
BEFORE
PROCEEDING

INSTRUCTION SHEET - JUMPER PLACEMENT FOR 325 AND 625 AFTER MARKET INSTALLATIONS OR ELECTRONIC SENSING UNIT REPLACEMENT

IMPORTANT: 325 AND 625 ELECTRONIC SENSING UNITS USED IN AFTER MARKET INSTALLATIONS OR REPLACEMENT SITUATIONS ARE PROGRAMMABLE. DURING INSTALLATION OF A SYSTEM OR REPLACEMENT OF AN ELECTRONIC SENSING UNIT DO NOT ASSUME THAT THE SENSING UNIT JUMPERS ARE PRE-SET. THE MOUNTED ORIENTATION OF THE CONTROL BOX ASSEMBLY AND THE SUSPENSION TYPE MUST BE ESTABLISHED IN ORDER TO SET THE JUMPERS AS NEEDED TO PROGRAM THE SENSING UNIT TO THE COACH.

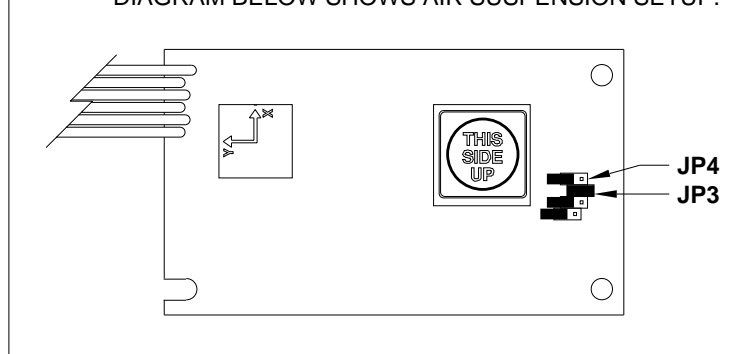
JP3 AND JP4 - CONTROL SUSPENSION TYPE (Page 2 of 2)

MOVE JUMPERS JP3 AND JP4 ACCORDING TO THE TYPE OF SUSPENSION ON THE VEHICLE.

JUMPERS JP3 AND JP4 DETERMINE SUSPENSION TYPE.

SPRING - LEAVE JUMPERS JP3 AND JP4 AS SHIPPED.
NEITHER JUMPER NEEDS TO BE MOVED.

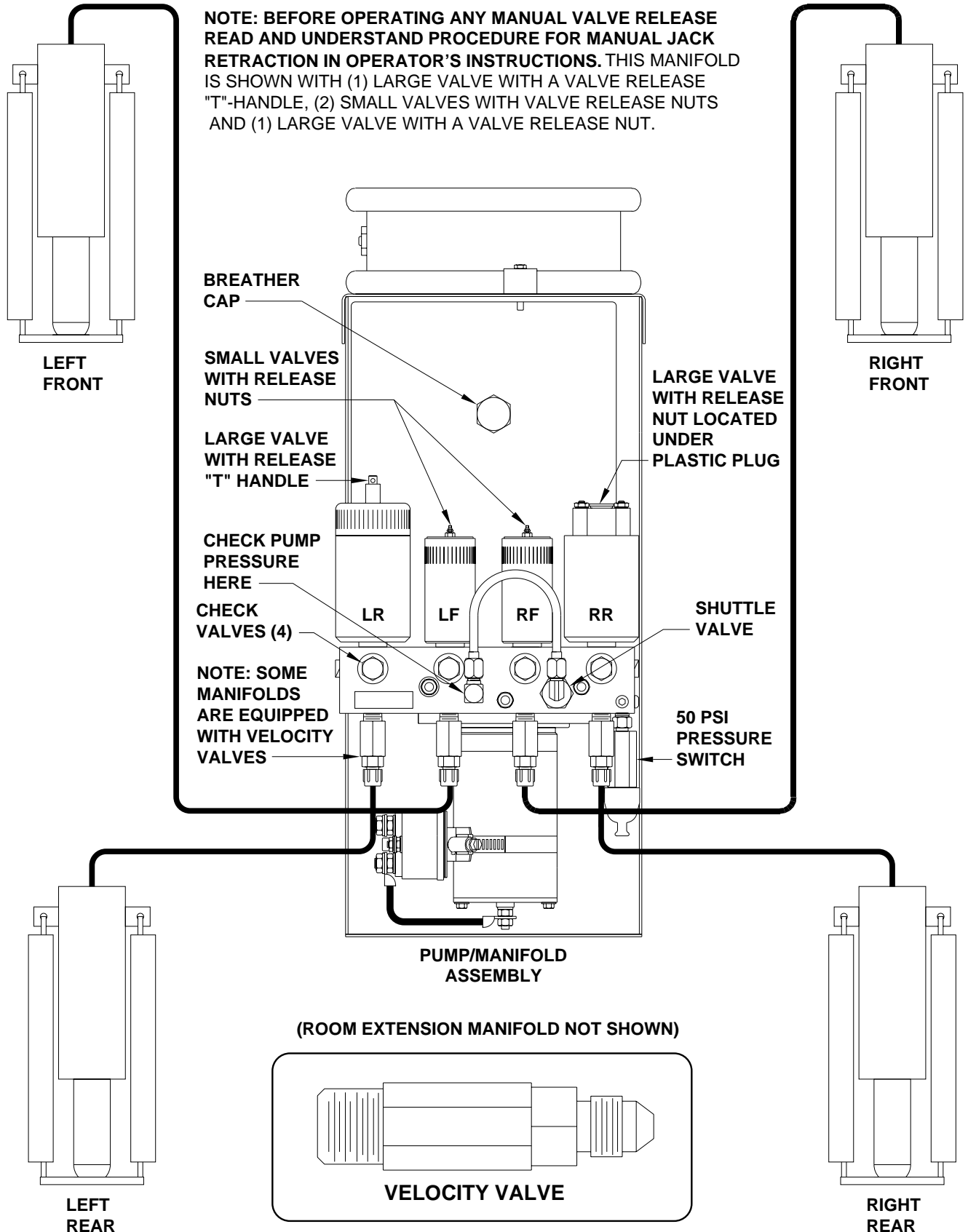
AIR - LEAVE JUMPER JP4 AS SHIPPED, MOVE JP3 ONLY.
DIAGRAM BELOW SHOWS AIR SUSPENSION SETUP.



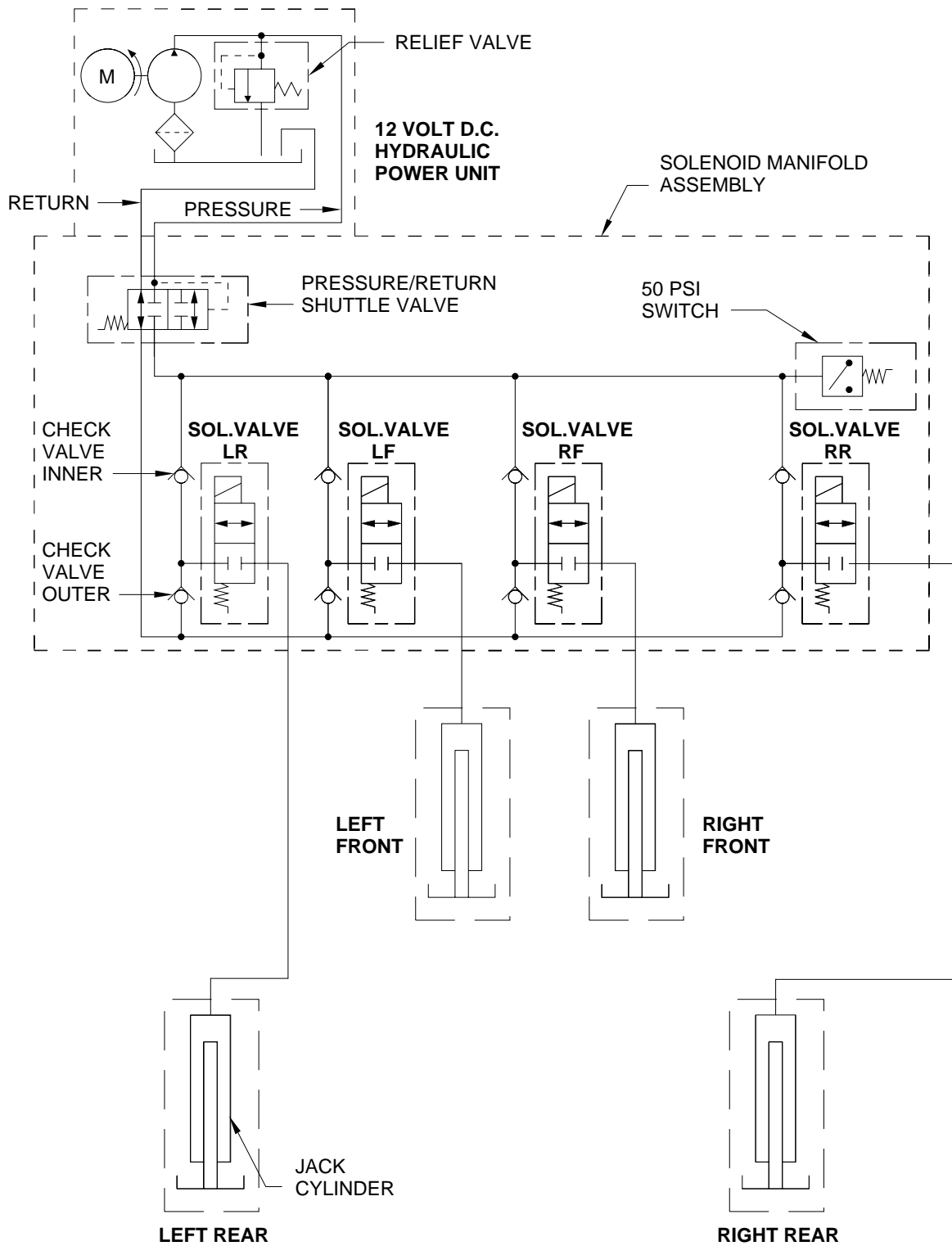
HYDRAULIC LINE CONNECTION DIAGRAM

305/325 SERIES LEVELING SYSTEM

(WITH 4 STRAIGHT-ACTING JACKS)



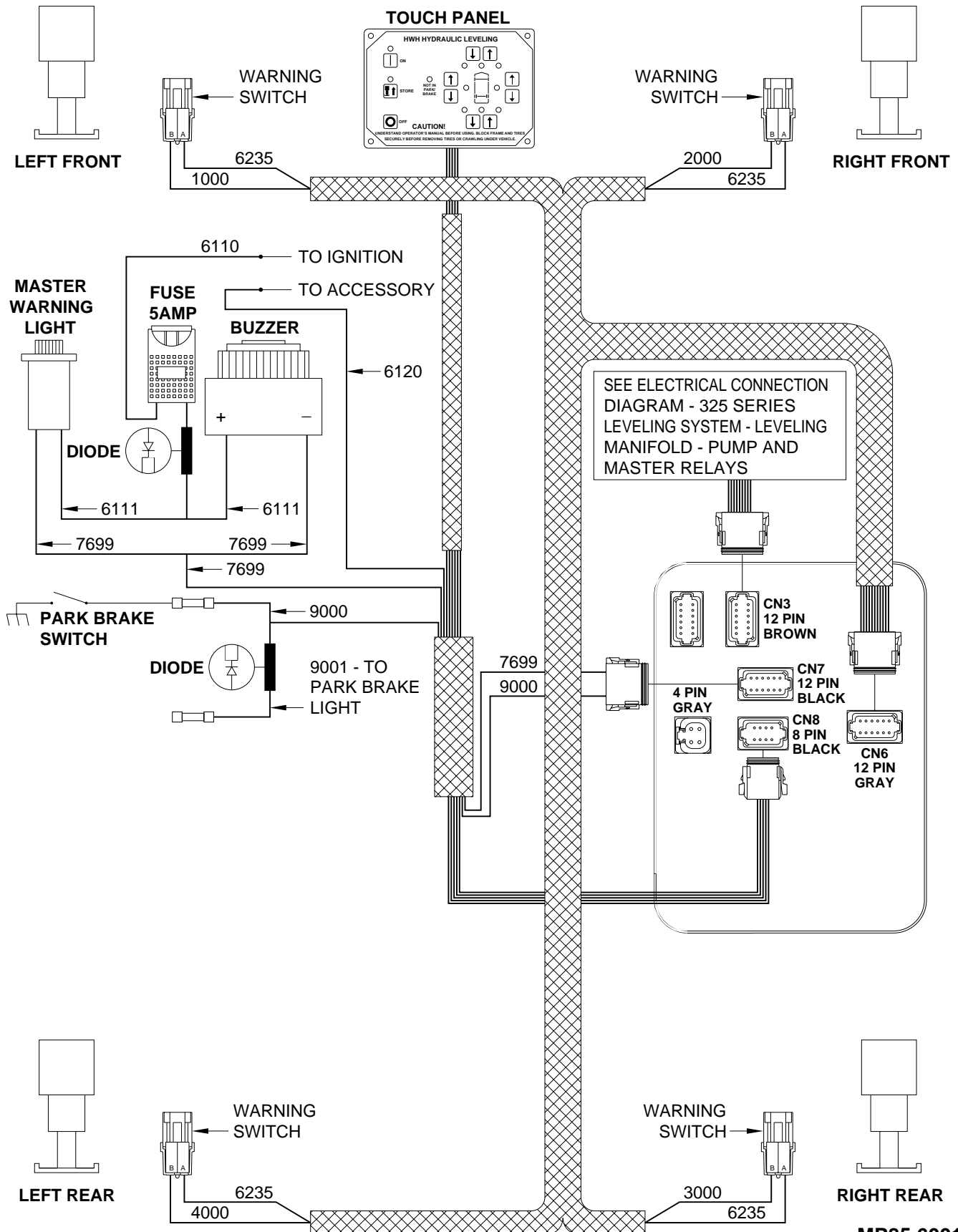
HYDRAULIC SCHEMATIC
305/310/325 SERIES LEVELING SYSTEM
WITH STRAIGHT-ACTING JACKS



ELECTRICAL CONNECTION DIAGRAM

325 SERIES LEVELING SYSTEM

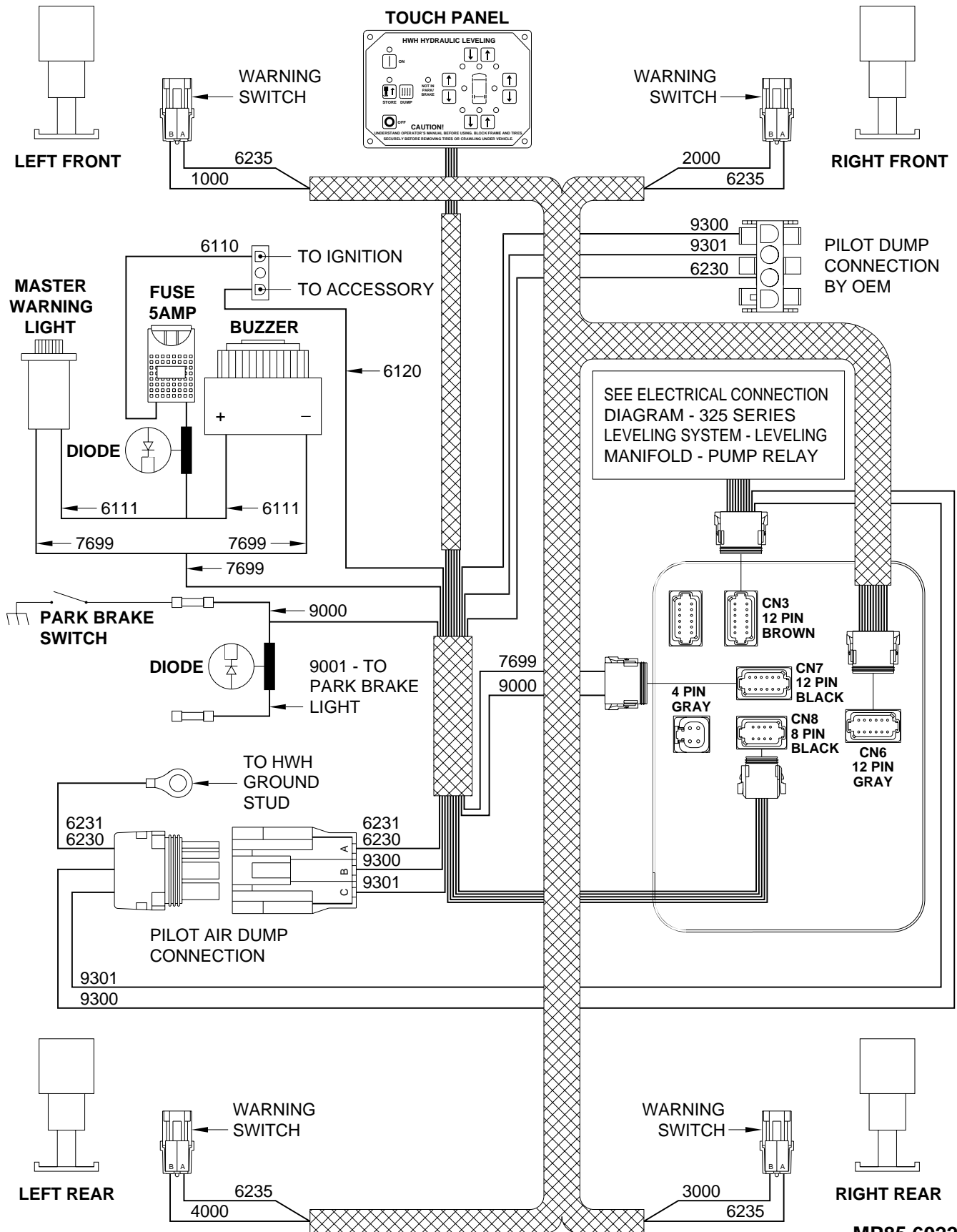
PARK BRAKE - MASTER WARNING LIGHT AND BUZZER TOUCH PANEL AND JACK WARNING LIGHTS



ELECTRICAL CONNECTION DIAGRAM

325 SERIES LEVELING SYSTEM

AIR DUMP - PARK BRAKE - MASTER WARNING LIGHT AND BUZZER TOUCH PANEL - JACK WARNING LIGHTS AND PRESSURE SWITCHES

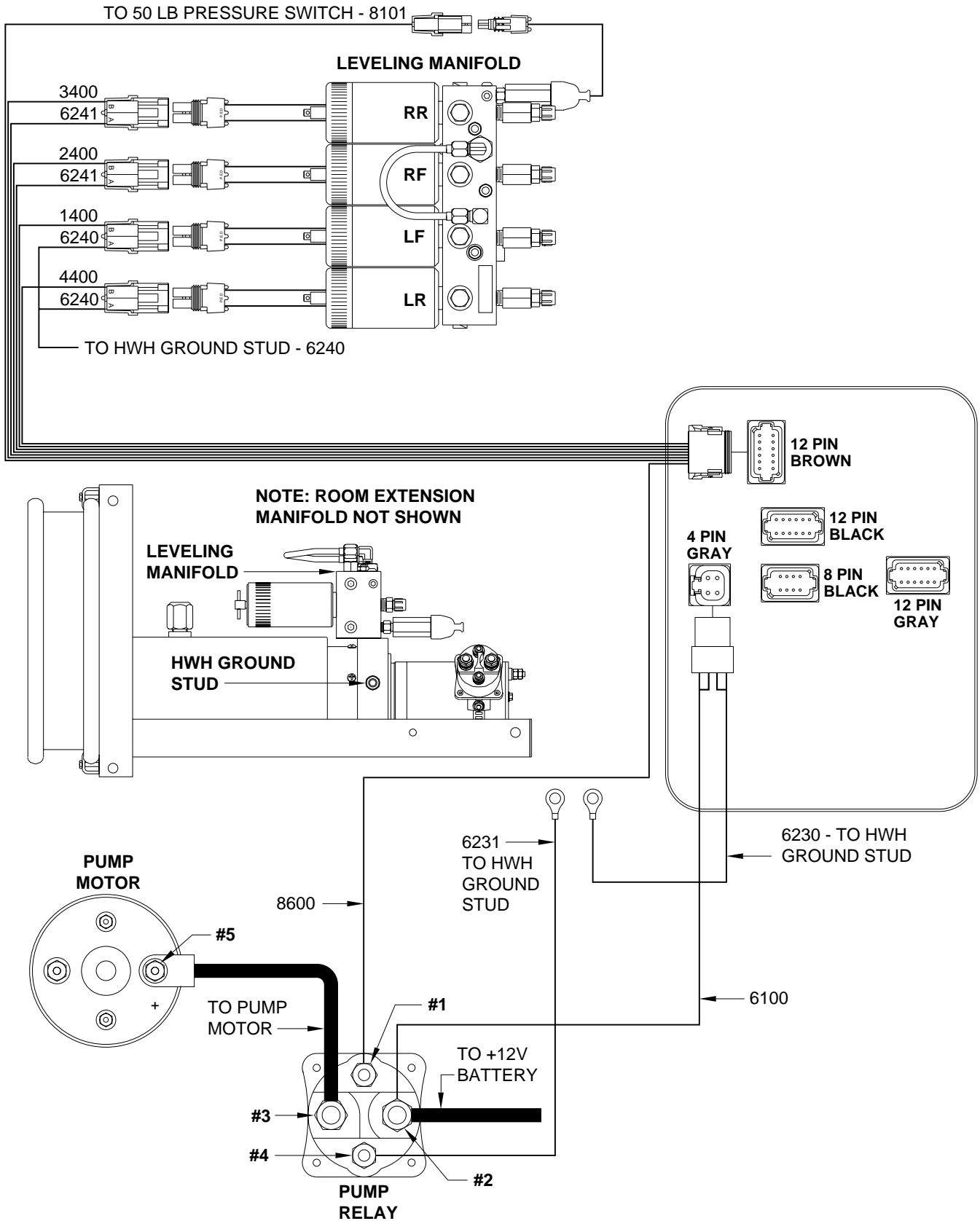


ELECTRICAL CONNECTION DIAGRAM

325 SERIES LEVELING SYSTEM

LEVELING MANIFOLD

PUMP RELAY

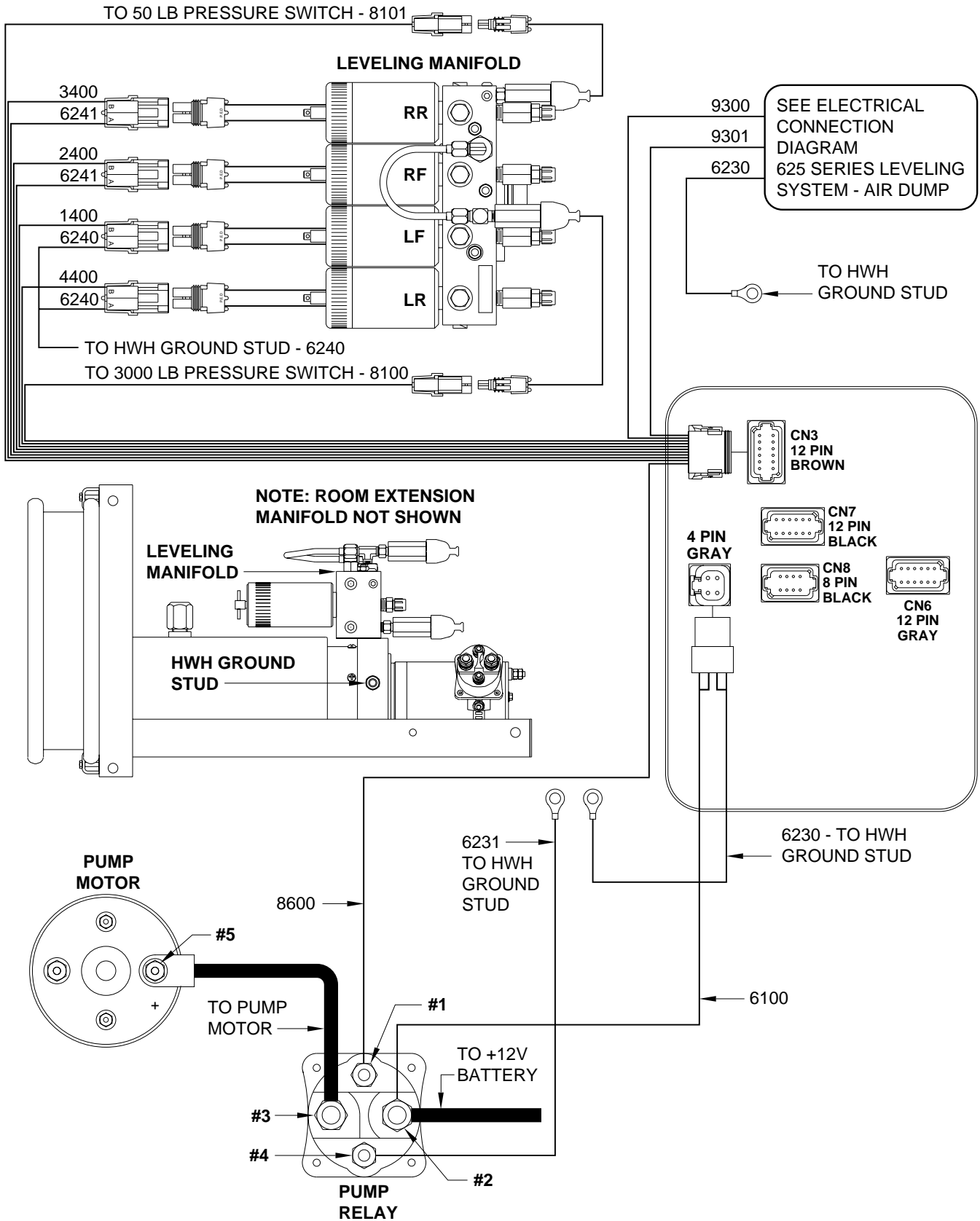


ELECTRICAL CONNECTION DIAGRAM

325 SERIES LEVELING SYSTEM

LEVELING MANIFOLD

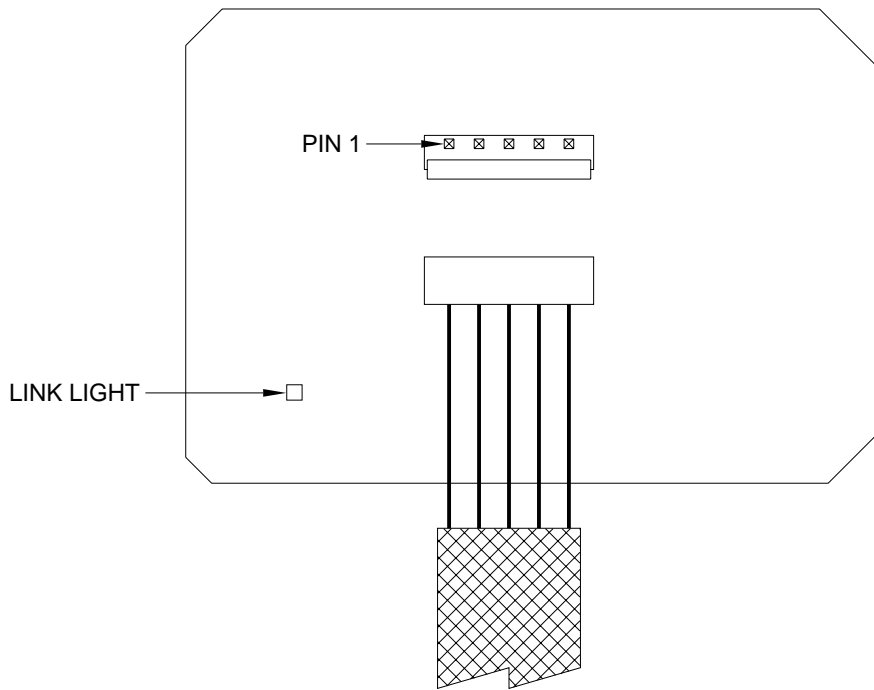
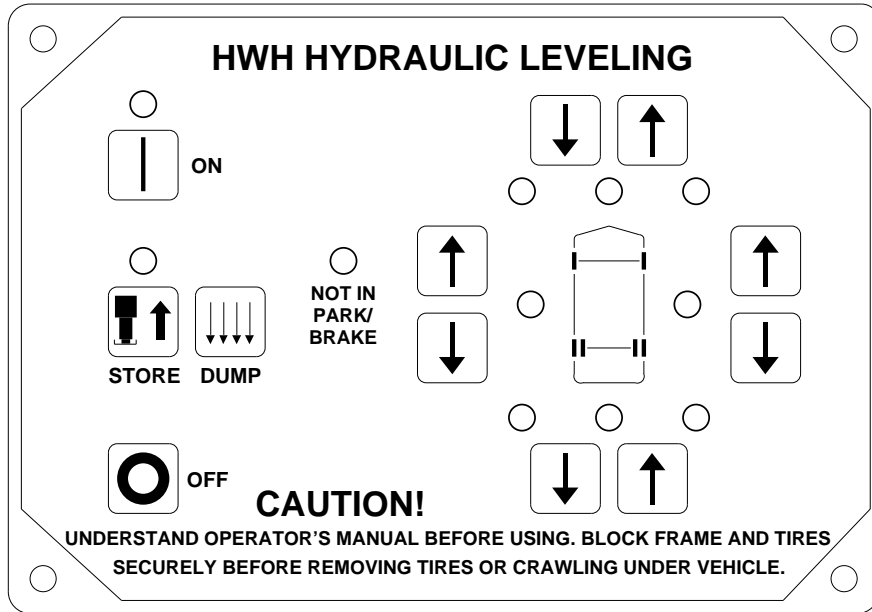
PUMP RELAY WITH PILOT AIR DUMP



ELECTRICAL CONNECTION DIAGRAM

325 SERIES LEVELING SYSTEM

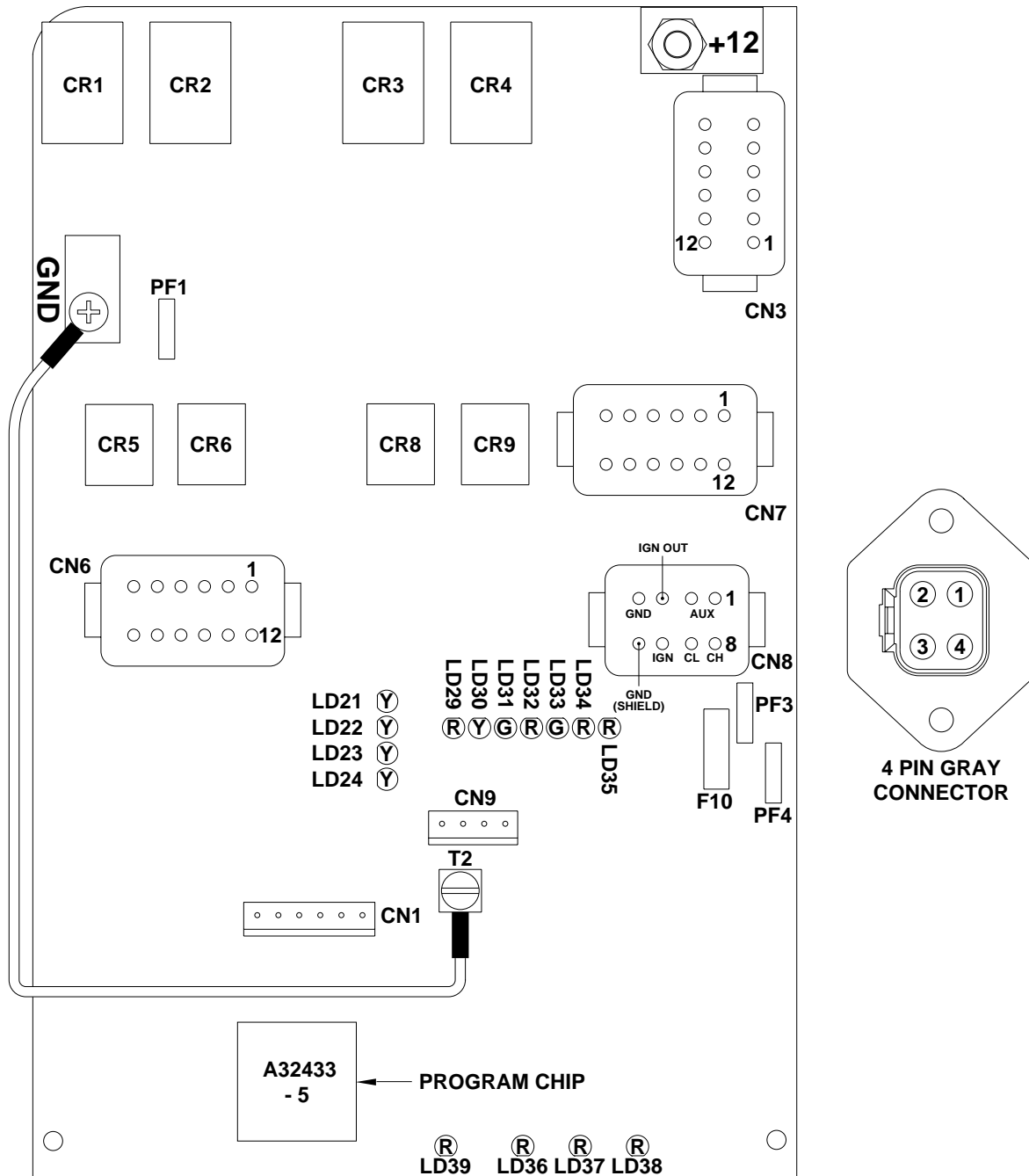
TOUCH PANEL CONNECTIONS



PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
1	YELLOW		CAN HIGH
2	GREEN		CAN LOW
3			CAN SHEILD
4	WHITE	6230	GROUND FROM CONTROL BOX
5	RED	6800	SWITCHED BATTERY FROM CONTROL BOX

ELECTRICAL CONNECTION DIAGRAM

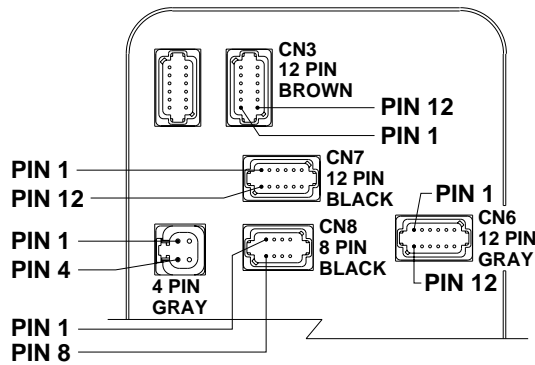
CIRCUIT BOARD CONNECTOR AND PIN LOCATIONS



ELECTRICAL CONNECTION DIAGRAM

325 SERIES LEVELING SYSTEM

CONTROL BOX CONNECTION INFORMATION

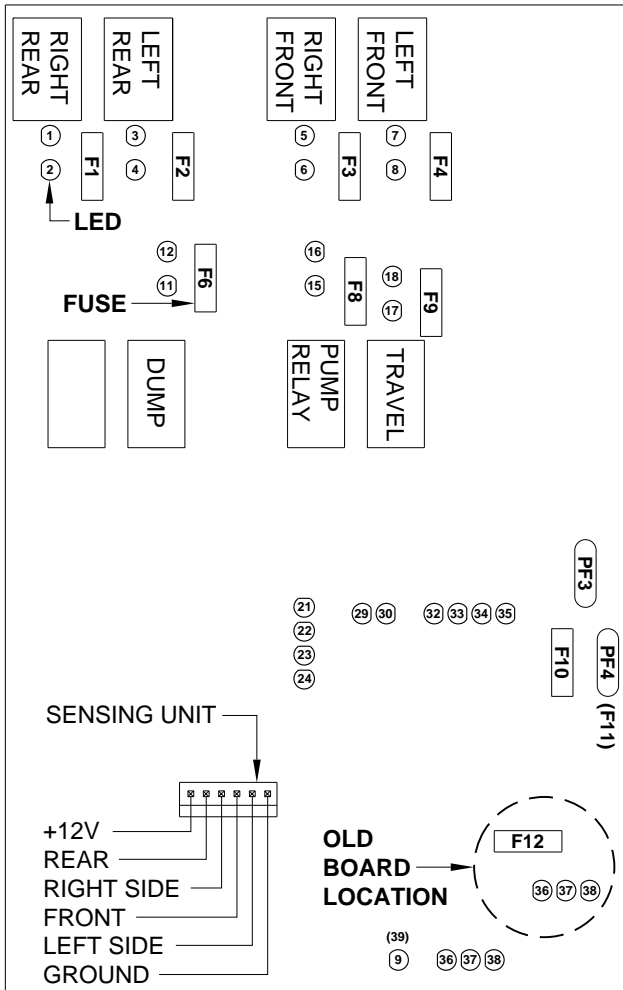


PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
4 PIN GRAY CONNECTOR			
1	RED	6100	+12V BATTERY POWER FROM PUMP RELAY
2	RED	6100	+12V BATTERY POWER FROM PUMP RELAY
3	WHITE	6230	GROUND FROM HWH GROUND STUD
4	WHITE	6230	GROUND FROM HWH GROUND STUD
12 PIN BROWN CONNECTOR - CN3			
1 & 2			NO CONNECTION
3	BLACK	8101	50 LB PRESSURE SWITCH - SWITCHED GROUND
4	BLACK	9301	SWITCHED +12 FOR TRAVEL
5	BLACK	1400	SWITCHED +12 FOR LEFT FRONT SOLENOID VALVE
6 & 7			NO CONNECTION
8	BLACK	4400	SWITCHED +12 FOR LEFT REAR SOLENOID VALVE
9	BLACK	3400	SWITCHED +12 FOR RIGHT REAR SOLENOID VALVE
10	BLACK	2400	SWITCHED +12 FOR RIGHT FRONT SOLENOID VALVE
11	BLACK	9300	SWITCHED +12 FOR DUMP
12	BLACK	8600	PUMP RELAY CONTROL - SWITCHED +12
12 PIN BLACK CONNECTOR - CN7			
1 THRU 6			NO CONNECTION
7	BLACK	9000	SWITCHED GROUND FROM PARK BRAKE SWITCH
8 THRU 10			NO CONNECTION
11	BLACK	7699	BUZZER & MASTER WARNING LIGHT CONTROL - SWITCHED GROUND
12			NO CONNECTION
8 PIN BLACK CONNECTOR - CN8			
1 AND 2			NO CONNECTION
3	RED	6800	SWITCHED BATTERY
4	WHITE	6230	GROUND
5			CAN SHIELD
6	RED	6120	SWITCHED +12 ACCESSORY
7	GREEN		CAN LOW
8	YELLOW		CAN HIGH
12 PIN GRAY CONNECTOR - CN6			
1 AND 2			NO CONNECTION
3	BLACK	1000	SWITCHED GROUND FROM LEFT FRONT WARNING SWITCH
4	BLACK	2000	SWITCHED GROUND FROM RIGHT FRONT WARNING SWITCH
5 THRU 8			NO CONNECTION
9	BLACK	3000	SWITCHED GROUND FROM RIGHT REAR WARNING SWITCH
10	BLACK	4000	SWITCHED GROUND FROM LEFT REAR WARNING SWITCH
11			NO CONNECTION
12	WHITE	6235	SHARED GROUND FOR WARNING SWITCHES

ELECTRICAL CONNECTION DIAGRAM

325 SERIES LEVELING SYSTEM

CONTROL BOX - LED - FUSE LOCATION AND DESCRIPTION



LED	RELAY DESCRIPTION	FUSE
1-YELLOW	RIGHT REAR COIL	F1 - 15 AMP
2-RED	RIGHT REAR OUTPUT	
3-YELLOW	LEFT REAR COIL	F2 - 15 AMP
4-RED	LEFT REAR OUTPUT	
5-YELLOW	RIGHT FRONT COIL	F3 - 15 AMP
6-RED	RIGHT FRONT OUTPUT	
7-YELLOW	LEFT FRONT COIL	F4 - 15 AMP
8-RED	LEFT FRONT OUTPUT	
11-YELLOW	DUMP - NOT USED	F6 - 5 AMP
12-RED	DUMP - NOT USED	
15-YELLOW	PUMP COIL	F8 - 5 AMP
16-RED	PUMP OUTPUT	
17-YELLOW	TRAVEL - NOT USED	F9 - 5 AMP
18-RED	TRAVEL - NOT USED	
21-YELLOW	LEFT FRONT WARN SW	F10 - 5 AMP PF4 (F11)
22-YELLOW	RIGHT FRONT WARN SW	
23-YELLOW	RIGHT REAR WARN SW	
24-YELLOW	LEFT REAR WARN SW	
29-RED	NOT USED	F12
30-YELLOW	NOT USED	
32-RED	MASTER WARN CONTROL	F10 - 5 AMP PF4 (F11)
33-GREEN	50 LB PRESS SW INPUT	
34-RED	JACK INTERRUPT	F10 - 5 AMP PF4 (F11)
35-RED	PARK BRAKE	
36-RED	BOARD ENABLE	F10 - 5 AMP PF4 (F11)
37-RED	ACCESSORY IN	
38-RED	ACCESSORY OUT	F10 - 5 AMP PF4 (F11)
(39) 9-RED	LINK LIGHT	

NOTE: FOR DETAILED INPUT / OUTPUT INFORMATION ABOUT PIN CONNECTIONS SEE ELECTRICAL CONNECTION DIAGRAM - CONTROL BOX CONNECTION INFORMATION.

NOTE: A LIT YELLOW LED INDICATES THERE IS A GROUND SIGNAL TO TURN THE CORRESPONDING RELAY ON.

A LIT RED LED INDICATES THERE IS VOLTAGE ON IT'S CORRESPONDING OUTPUT PIN.

IF A YELLOW LED IS LIT AND THE CORRESPONDING RED LED IS OFF, EITHER IT'S FUSE IS BLOWN OR THE RELAY IS BAD.

IF THE YELLOW LED'S ARE WORKING BUT NO RED LED IS COMING ON THERE MAY BE PROBLEM WITH INPUT VOLTAGE IN THE 4-PIN CONNECTOR.

IF A YELLOW LED IS NOT LIT, THERE IS A PROBLEM WITH THE CONTROL BOX, TOUCH PANEL OR CONNECTION CABLE

NOTE: THE TRAVEL RELAY IS WIRED AS A NORMALLY CLOSED RELAY. WHEN THE YELLOW LED (17) IS ON THE RELAY CONTACTS WILL OPEN. THE RED LED (18) WILL NOT BE ON. THE RED LED WILL BE ON IF THE LEVELING SYSTEM IS IN THE TRAVEL MODE AND THE IGNITION IS ON.

CN1 - SENSING UNIT CONNECTIONS
 PIN1 - RED - (+12 ACC) FOR SENSING UNIT
 PIN2 - RED - GROUND FOR REAR YELLOW LEVEL LIGHT
 PIN3 - GREEN - GROUND FOR RIGHT SIDE YELLOW LEVEL LIGHT
 PIN4 - BLACK - GROUND FOR FRONT YELLOW LEVEL LIGHT
 PIN5 - YELLOW - GROUND FOR LEFT SIDE YELLOW LEVEL LIGHT
 PIN6 - WHITE - GROUND FOR SENSING UNIT

NOTE: ON NEWER CONTROL BOXES, FUSE F11 AND FUSE F12 HAVE BEEN REPLACED WITH POLY SWITCHES PF4 AND PF3. POLY SWITCHES PROTECT A COMPONENT OR WIRE AS A FUSE DOES EXCEPT THE POLY SWITCH WILL ALLOW CURRENT THROUGH WHEN THE OVERLOAD OR SHORT IS REMOVED. POLY SWITCHES ARE NOT REPLACEABLE.

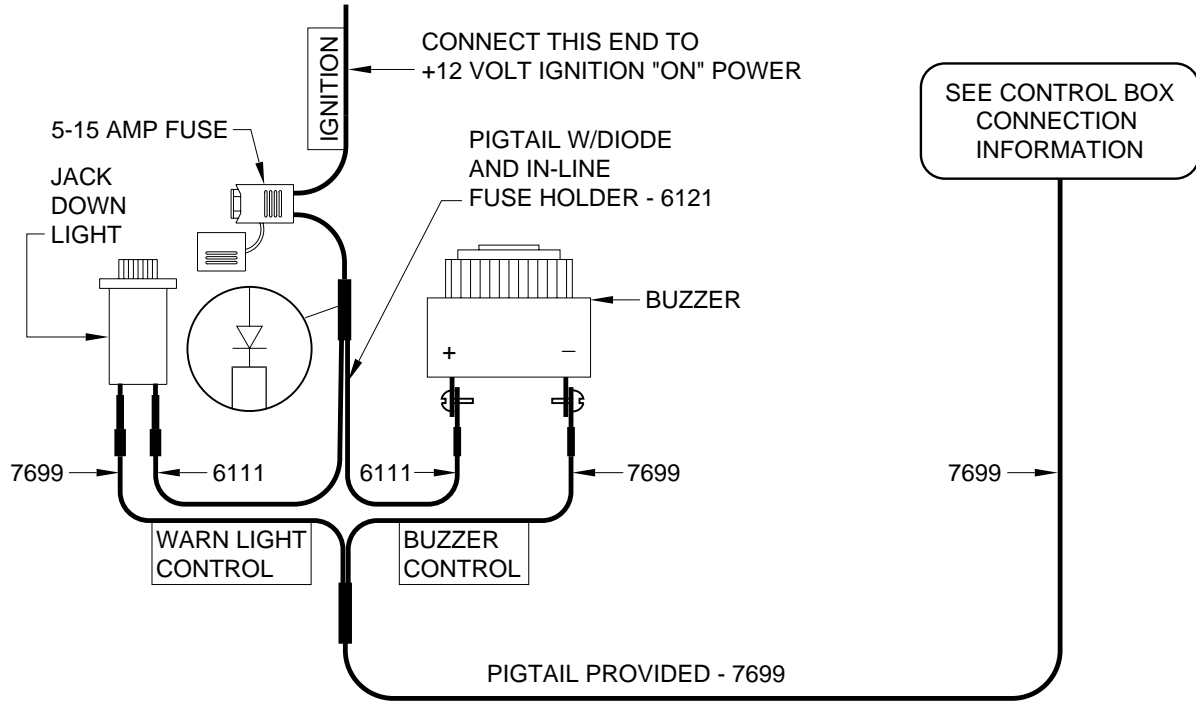
MASTER LIGHT/BUZZER CONNECTION DIAGRAM

MANUAL LEVELING SYSTEMS

325 SERIES LEVELING SYSTEM

A MASTER WARNING INDICATOR SHOULD ALWAYS BE USED. WHEN THE LEVELING SYSTEM HAS STRAIGHT-ACTING JACKS A WARNING BUZZER MUST BE USED.

NOTE: BY SUPPLYING IGNITION POWER TO THE WARNING BUZZER AND LIGHT, AND "ACC" POWER TO THE CONTROL BOX, THE SYSTEM MAY BE OPERATED IN ACCESSORY WITHOUT THE BUZZER SOUNDING. THE NEGATIVE SIGNAL FOR THE WARNING INDICATORS MUST ALWAYS COME FROM THE CONTROL BOX.



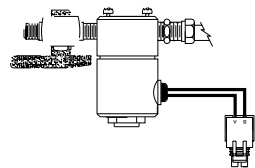
325 TROUBLE SHOOTING GUIDE

GLOSSARY

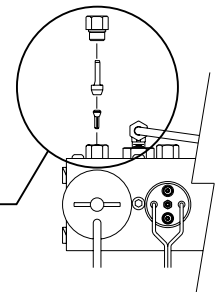
AIR DUMP - PILOT: The pilot operated air dump system is supplied by the chassis manufacturer. This system uses an electronically controlled two position pilot valve that switches the suspension from a travel mode to a dump mode. In the travel mode, the height control valves control the suspension. In the dump mode, the height control valves are isolated from the air bags and the air is exhausted from the air bags. Only the air in the bags is exhausted, the air in the rest of the system remains. The pilot valve has a simple 12 volt coil on each end of the valve. Part of the control harness is supplied by the vehicle manufacturer and the harness from the HWH control box is supplied by HWH. There are normally three wires in the HWH harness, a white ground wire, a number 9300 black wire for the dump side and a number 9301 black wire for the travel side of the pilot valve. The HWH control box switches +12 volts to control the pilot valve. When power is supplied to either coil on the pilot valve, the valve remains in that position until power is supplied to the other coil.

NOTE: Other types of pilot operated air dump systems may be used such as manually controlled valves, but the above described system is controlled by the HWH leveling system controls.

AIR DUMP VALVE - HWH: The air dump valve is a normally closed valve that is actuated with a 12 volt coil. When power is supplied to the valve, the valve opens to allow air through. When power is removed, the valve is closed with a spring. Although there are different arrangements, the most common is one HWH dump valve for each suspension height control valve. The dump valve is teed into the air line between the height control valve and the suspension air bags. When the dump valves are open, they exhaust all the air from the air bags and the vehicle suspension. Normally the complete harness for this system is supplied by HWH. There are two wires to each valve, a white wire and a black number 9300 wire. The HWH control box switches +12 volts to open the air dump valves.

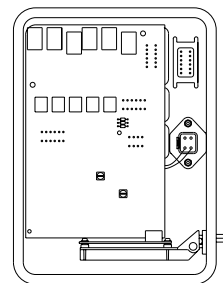


CHECK VALVE - LEVELING SYSTEM HYDRAULIC MANIFOLD: There are two check valves for each solenoid valve. The check valves allow two solenoid valves to be opened at the same time without fluid flowing from one jack to the other. This keeps the vehicle from dropping when one jack is on the ground and another jack is being extended. Although the check valves can be replaced, HWH should be contacted when there are check valve problems.



CONTROL BOX: The control box utilizes inputs from the touch panel, level sensing unit, manifold and jack pressure switches and jack warning switches to control the leveling system. The control box supplies outputs to the touch panel to control indicator lights and to the pump/manifold assembly to control the hydraulic solenoid valves and the hydraulic pump. The control box also supplies outputs to control the air dump system if needed. The level sensing unit and the mini blade fuses are the only serviceable parts in the control box. The control box is mounted to the power unit/manifold assembly. Because the sensing unit is mounted in the control box, the orientation of the control box is critical. The sensing unit may need to be programmed if the control box is replaced.

(SEE LEVEL SENSING UNIT) The ignition must be in the ON or ACC. position and the park brake must be set for the control box to function. The control box is equipped with LEDs to indicate different functions are operating. A lit LED indicates a function is working, LEDs are not turned on to indicate a problem.



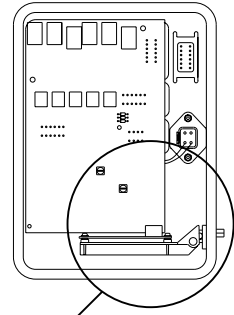
JACK CYLINDER: The jack cylinders are hydraulic, single acting cylinders which are used to level and stabilize the vehicle. The cylinders are extended with fluid supplied by the hydraulic pump under pressure. The jacks are retracted by the use of a pair of springs which pull the jack up when it's solenoid valve is open and the pump is not running. Jack cylinders are mounted to the frame of the vehicle in a pivot bracket. When a cylinder has a problem such as a leak, only the cylinder should be replaced. The cylinders are available in different capacities, lengths and spring arrangements. The capacities are 6,000#, 9,000#, 12,000#, 16,000# and 24,000#.



325 TROUBLE SHOOTING GUIDE

GLOSSARY

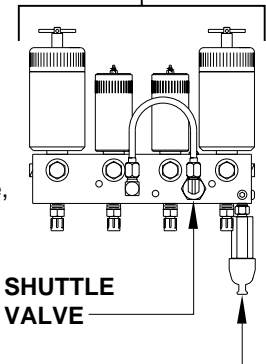
LEVEL SENSING UNIT: The level sensing unit controls the yellow LEVEL indicators on the touch panel. The sensing unit is mounted in the control box. The sensing unit must be programmed for the mounting direction of the control box and the type of suspension, air or spring. The sensing unit is equipped with four sets of pins with jumpers. These are used to program the sensing unit. There is a detailed instruction sheet available for programming the sensing unit. The sensing unit has six wires. There is a red +12 volt supply wire on one end of the MTA plug and a white ground wire on the other end of the plug. The red power wire is hot when the ignition is in the ON or ACC. position. The center four wires supply a ground signal to turn a yellow LEVEL light on when that side or end of the vehicle is low. The yellow wire is for the left side light, the black wire is for the front light, the green wire is for the right side light and the red wire is for the rear light. The sensing unit can be replaced if needed.



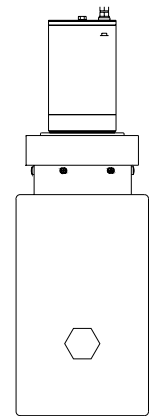
NOTE: The level sensing unit has a tolerance for leveling. The vehicle may not always be 100% level and may level somewhat differently when the vehicle is parked in different places. The vehicle should be within 3 to 4 inches front to rear and 1 inch side to side when all yellow level lights are out.

MANIFOLD HYDRAULIC: The hydraulic manifold is mounted on top of the pump. The manifold distributes the hydraulic fluid to the jacks as needed to extend the jacks. When retracting jacks the fluid returns to the pump through the manifold. The manifold consists of four solenoid valves, a pair of check valves for each solenoid valve, a 50 p.s.i. pressure switch, a 3000 p.s.i. pressure switch and a shuttle valve. The replaceable parts of the manifold are the solenoid valves, the pressure switches and the shuttle valve. If it is determined a check valve is bad, it may be required to replace the complete manifold. Contact HWH when check valve problems occur.

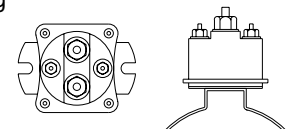
PRESSURE SWITCH - 50 P.S.I. MANIFOLD: This pressure switch is a single wire, normally open switch. It is mounted on the leveling system hydraulic manifold. The contacts of this switch will close when the pressure in the manifold reaches 50 p.s.i. When the contacts of the switch close, this supplies a ground signal to the control box. The solenoid valves that control the jacks will not open until the control box sees the ground signal from the 50 p.s.i. switch. Without this ground signal, the pump will run under load and no jacks will extend. This switch will not interfere when retracting jacks.



PUMP: The hydraulic pump supplies fluid to extend the jacks and operate any HWH slide mechanisms. The pump is turned with a +12 volt motor. (Some systems may use a +24 volt motor) The motor is a replaceable part. The pump motor is internally grounded. This requires the pump/manifold assembly to have a good frame ground through the mounting of the assembly. This may require a separate ground cable, minimum size #2, to supply the necessary ground for the assembly. The oil level in the pump reservoir should be checked with all HWH cylinders, leveling jacks and/or slides retracted. The oil level should be (1) inch down from the top of the reservoir fill hole. The pump should not run when the leveling jacks are being retracted. The pump motor does not have thermal protection built into the motor. The correct pump pressure should be 3500 p.s.i. When checking the pump pressure, the minimum pressure should be 3300 p.s.i. and the maximum pressure should be 3600 p.s.i. The pump reservoir is equipped with a breather cap/dipstick that has a 1/4 inch nut driver in the end of the dipstick to manually open solenoid valves with valve release nuts. The reservoir has to be vented and should never be plugged tight.



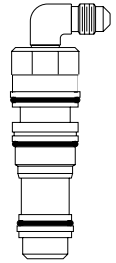
RELAY - PUMP: The pump relay is an intermittent duty, normally open, four post relay that consists of one pair of contacts and a coil. The contacts are used to switch +12 volts to the pump motor. Power in and power out on the contacts can be reversed. The coil is a +12 coil. There is a small post on the relay for each side of the coil. Either post can be +12 volts with the other post being ground. The control box switches +12 volts to turn the relay on. With the relay turned on, the contacts will close supplying +12 volts to the pump motor. With the relay off, there should be power on one of the large posts only. With the relay on, the voltage on both large posts should be the same. With the relay off, both sides of the relay coil, the small posts, should show a ground. With the relay on, one small post should show +12 volts, the other small post should show ground. If the ground is missing, both small posts will show +12 volts.



325 TROUBLE SHOOTING GUIDE

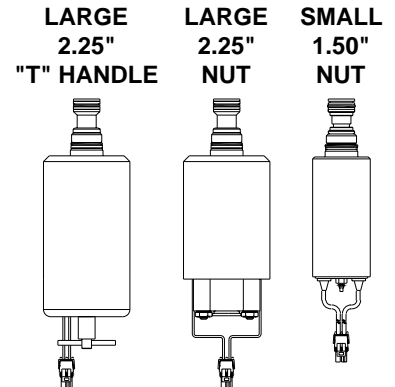
GLOSSARY

SHUTTLE VALVE: The shuttle valve is located on the leveling system hydraulic manifold. (See MANIFOLD HYDRAULIC) Fluid flows from the pump to the manifold, through a fitting on top of the manifold, through a U shaped tube to a fitting on top of the shuttle valve, then into the manifold to extend the jacks. The fluid flows from the manifold through the shuttle valve back to the pump when retracting the jacks. The shuttle valve is a hydraulically actuated valve. When the pump is running, the shuttle valve shifts to allow the fluid into the manifold. At the same time, the shuttle valve closes the path for fluid return to the pump. It takes approximately 800 p.s.i. to shift the shuttle valve. When the pump shuts off, the shuttle valve should shift back to the off position. This will allow fluid to flow from the manifold to the pump when the jacks are retracted. The shuttle valve is a replaceable part.

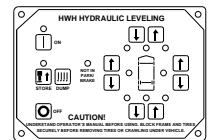


SOLENOID VALVE HYDRAULIC: There are three different solenoid valves at this time. All three valves are normally closed. The valve opens when +12 volts is supplied to the coil of the valve. A spring closes the valve when +12 volts is removed from the coil. There are two large valves, 2.25 inches, and a small valve, 1.50 inches. One of the large valves has a t-handle to open the valve manually the other has a valve release nut. The small valve has a valve release nut to open the valve manually. The large valves are interchangeable. The small valve orifice size in the end of the valve is different making the flow rate of the valve different and non-interchangeable. All three valves have two wires for the coil of the valve. The control box switches +12 volts to the valves. If a valve will not open with a minimum of 9 volts between the two wires of the valve, with the valve plugged in, the valve needs to be replaced. If replacing the o-rings for a solenoid valve use only O-rings supplied by HWH.

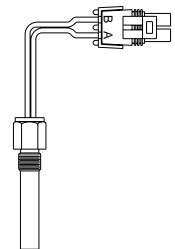
NOTE: For proper manual opening procedures see MI91.999X.



TOUCH PANEL: The touch panel supplies operational information to the control box. The touch panel receives information from the control box to turn touch panel indicator lights on. See the CONTROL IDENTIFICATION page for the leveling system touch panel to obtain information about the buttons and lights on the touch panel. There is only one cable that plugs into the touch panel. There is a small pulsating light on the back of the touch panel called the link light. The link light should pulsate dimly anytime the ignition is on.



WARNING SWITCH: STRAIGHT-ACTING JACK --- This warning switch is a two wire, normally closed, magnetic switch. The switch mounts in the center of the top of the jack cylinder. There is a magnet inside the jack rod. When the jack is retracted, the magnet is close to the switch. This opens the contacts of the switch. When the jack extends between 1/4 and 1/2 inch, the contacts of the switch close. One of the switch wires supplies a ground to the switch. The other wire carries a ground signal to the control box when the switch is closed. (Jack extended) The control box then turns on the appropriate red WARNING light on the touch panel.



WARNING SWITCH: KICK-DOWN JACK --- This warning switch is a two wire switch. Inside the switch are two contacts and a steel ball. The switch mounts to the pivot point of the jack cylinder at about a 45 degree angle to the cylinder. When the jack is in the vertical position, the wires of the switch should point to the ground. The steel ball will roll into the contacts, closing the circuit. One wire supplies a ground to the switch, the other wire carries a ground signal to the control box when the jack is in the vertical position and the steel ball is shorting the contacts together. The control box then turns on the appropriate red WARNING light on the touch panel. When the jack is in the horizontal position, the ball rolls away from the contacts, opening the circuit. This turns the red WARNING lights off.

