

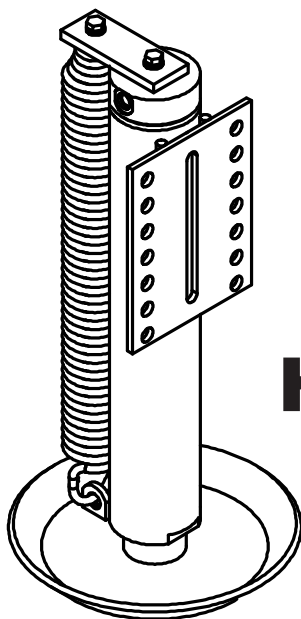


Aftermarket Hydraulic Leveling Installation & Service Manual

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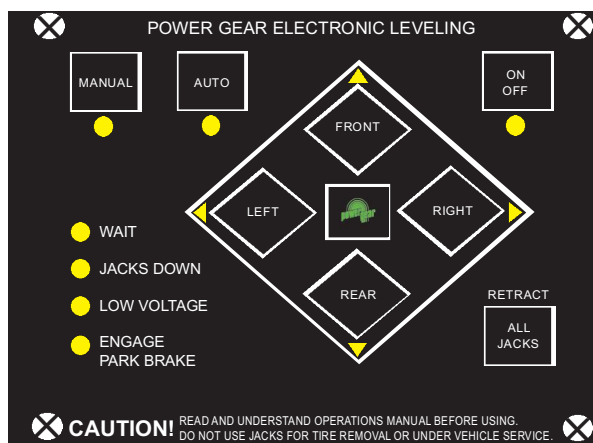
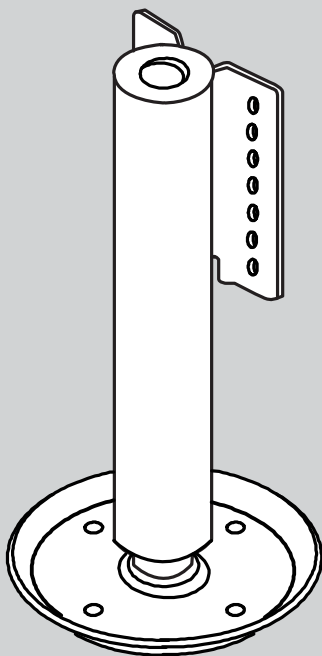
powergear.
PowerLevel™
▲ series ▲

Hydraulic Leveling Installation & Service Manual

Introduction

The Power Gear PowerLevel series leveling systems are electronically controlled, hydraulically operated units that consist of a 12-volt DC powered motor/pump/manifold assembly with a fluid reservoir, hydraulic hoses, four hydraulically operated jacks, motor control unit and a switch panel. The systems are designed to meet the varying requirements of class "A" motorhomes.

The configuration of chassis and vehicular components can vary greatly from one manufacturer to another. The installation procedures outlined in this instruction sheet represent a generalized approach. Your installation application may vary. If, after reading this manual, you have questions regarding the installation of the PowerLevel system, please contact our Technical Service Department at 574-537-8900. Getting your questions answered in advance will help ensure a smooth installation and proper operation.





NOTICE

If your vehicle does not readily lend itself to the suggested system configuration and alternatives do not appear feasible, feel free to contact the LCI® Technical Service Department at 574-537-8900.

Pre-Installation Planning

Prior to beginning the actual installation, examine the vehicle and visualize the mounting position of each of the system's main components.

- Motor/pump/manifold assembly
- Four hydraulic cylinders
- Touch pad and control box

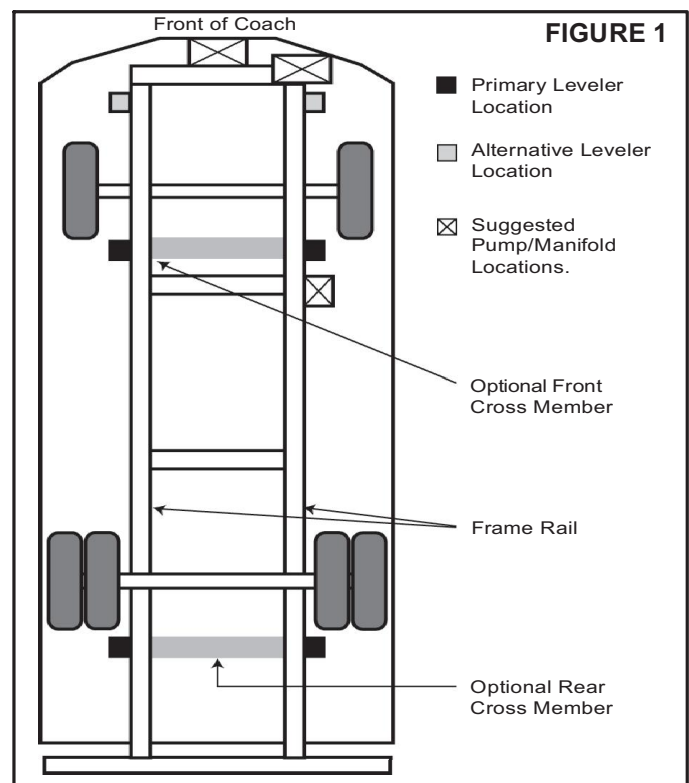
Motor/Pump/Manifold Location: An ideal location for mounting the motor/pump/manifold assembly is immediately forward and below the engine radiator. Be sure not to restrict ventilation to the radiator cooling surfaces. This position should provide easy access to the vehicle battery and offer an accessible area for attaching the hydraulic hoses, making wiring connections and performing routine maintenance. Close proximity to the chassis battery is preferred.

Jack Location: Examine the under carriage of the vehicle. You will notice that the construction of the chassis super structure includes two parallel frame rails extending almost the entire length of the vehicle. The ideal location for the rear hydraulic jacks is along the exterior side of the frame rail and behind the rear axle and no more than 12" behind the rear spring hanger. The ideal location for the front jacks is along the exterior side of the frame rail, behind the front axle (see figure 1).

For lighter-duty chassis, Power Gear recommends that jacks be positioned as close to the chassis cross member as possible (see figure 1). If no cross member is near the selected jack location, a cross member can be attached between the rear jacks to help support the chassis. Power Gear can supply cross members for this purpose.

NOTE: On a gasoline-powered chassis do not mount the rear jacks more than 12" behind the rear spring hanger.

Touch Pad Location: In most applications, the touch pad is situated either below or, if space is available, in the driver's instrument panel (dash board) or side panel. Access to these positions provides easy system operation and installation.





WARNING

Prior to initiating any installation/mounting procedure, read and understand the following important precautions.

- Read the entire installation procedure before beginning
- Do not connect the power source (battery) until the installation of all components is complete
- In many of the installation procedures, the initial fastening and securing of components is temporary. Later in the installation process, the components will be securely fastened.
- When routing and securing the hydraulic hoses and wiring, be sure that they are not exposed to engine exhaust or any other high temperature component of the vehicle. Any hose or wiring should be situated a minimum of 12 inches away from any heat source. If 12 inches of separation is not possible, it will be necessary to fabricate a heat shield/baffle to protect hoses and wiring. The heat shield should be composed of an appropriate, nonflammable, heat resistant material.
- Do not mount jack assemblies on 'Mor-Ride' suspension components except when suspension is supplied with jack mounting plates
- Use only the hoses supplied by Power Gear as part of the installation kit - use of any other hoses and/or fittings will void the warranty.

Installation

Touch Pad Installation:

First determine where the wires are to be routed. Look for any pre-existing holes that can be used to route the control panel wiring from the control manifold to the touch pad location.

Touch Pad

FIGURE 2



Flush Panel Mounting:

Inspect the location for flush mounting the touch pad and ensure that there is adequate space for the box portion of the touch pad and the multi-wire cable connection. Using the template in *Appendix A*, layout and cut the opening. Route multi-wire cable through the opening and insert the connector into the receptacle on the back of the touch pad. The touch pad should fit snugly into this opening. Remember, it is easier to cut the opening too small and enlarge it to fit than it is to cut it too large and have to fill the opening.

NOTE: When the touch pad has been installed and wires have been routed, seal any holes you may have drilled from the interior to the exterior of the vehicle with a silicone sealant.

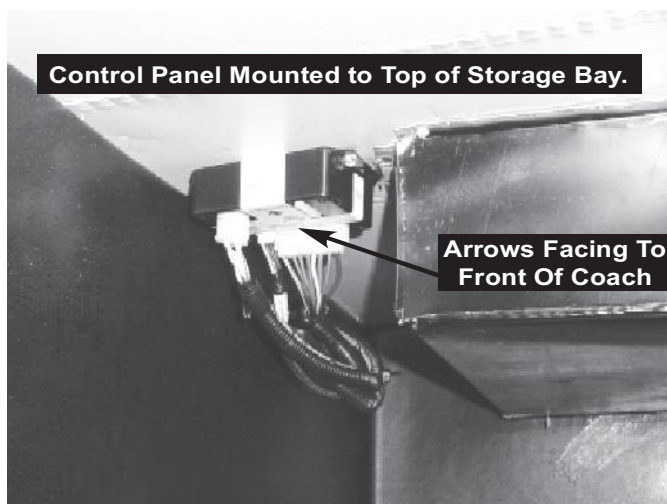
Control Box installation:

1. Mount control box in a storage compartment that will protect the components from the elements (see figure 3). Mounting location should be made to a solid surface and not to any flexible material.
2. Mount to ceiling with label arrow pointed towards the front of the motorhome. Make sure the control box is oriented parallel to the chassis.
3. Route touch pad harness to where touchpad will be mounted.
4. Route ignition harness to driver foot well. Connect red to ignition signal, blue to park brake.

FIGURE 3

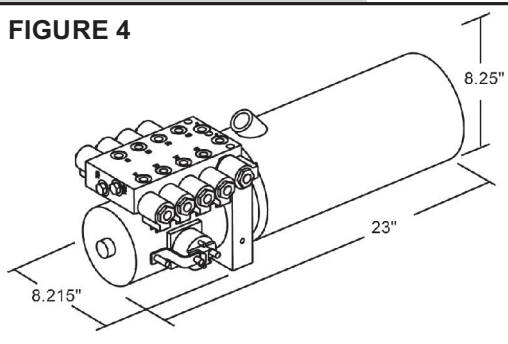
Control Panel Mounted to Top of Storage Bay.

Arrows Facing To Front Of Coach



Installation, cont.

FIGURE 4



Motor/Pump/Manifold installation:

The motor/pump/manifold assembly requires an area 26" long x 12" x 12" deep for installation (see figure 4). The bottom of the pump body has been tapped for mounting with 3/8"-16 x 1/2" bolts. The assembly must be mounted horizontally (see figure 5).

For some applications the pump assembly can be mounted to an existing chassis cross member in front of, below, or beside the radiator. The location of the pump assembly should not block or restrict the flow of air to the radiator. Be sure there is sufficient clearance around the assembly to connect the hoses and wiring, as well as room for checking and filling the reservoir.

CAUTION

Firmly support the end of the reservoir to prevent excessive vibration of tank. Excessive vibration may cause the tank to leak.

NOTICE

Hydraulic lines will be routed to the manifold. Be sure there is adequate working space around the manifold for making the hose connections.

NOTICE

To prevent debris from entering the hydraulic system and damaging valve seals, the hose ends have been sealed with removable soft plastic plugs. Do not remove these plugs until you are ready to attach the hydraulic lines.

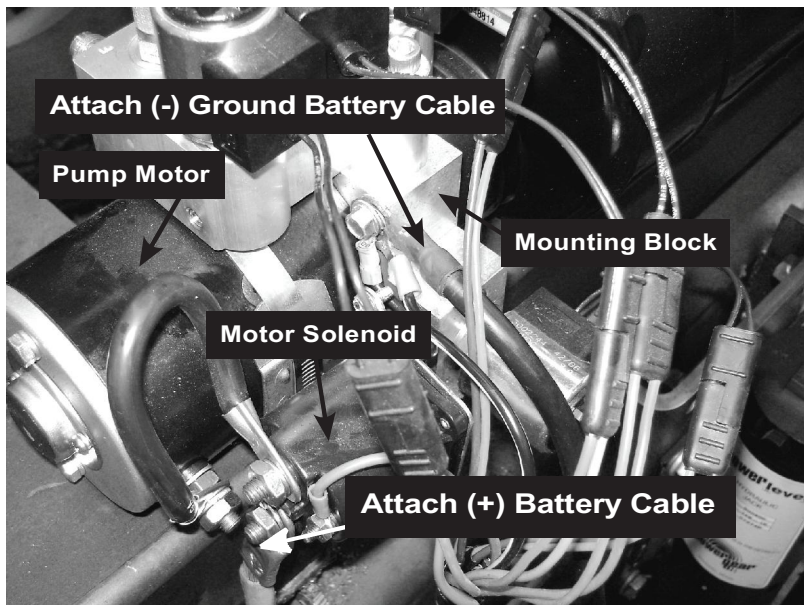
Once a position satisfying these conditions has been determined, align and drill two 1/2" diameter mounting holes, centered 3-1/4" apart. Position the pump/motor assembly over the mounting holes and secure it in place using the two 3/8"-16x1/2" bolts and lock washers. Attach a #2 or heavier gauge ground cable (not supplied) using the 5/16" bolt on the side of the motor mounting block (see figure 6).

Next, route the other end of the black ground cable to the chassis battery and connect it to the negative (-) battery post. Connect a #2 or heavier gauge red battery (not supplied) cable to the stud on the pump motor solenoid and route it to the chassis battery of the RV. Protect pump assembly with 125 amp circuit breaker.

NOTE: Do not connect red battery cable to the post at this time.

FIGURE 5

Pump Assembly Wiring



CAUTION

When welding to the chassis rail, use care to avoid damaging any of the chassis equipment. This equipment includes wiring, fuel, brake, hydraulic and/or compressed air lines. Always check the opposite side of the welding surface for anything that could be damaged by the heat from the weld.

CAUTION

Prior to welding on the chassis frame, any microprocessor controlled electronics such as engine monitoring devices and Kwikkee electric entry steps should be disconnected - both power feed and ground connections.

CAUTION

Use adequate hose lengths and observe recommended radius bends (6" minimum) to avoid kinks, flattened hose and restricted flow capabilities.

NOTICE

To prevent debris from entering the hydraulic system and damaging the valve seals, the hose ends have been sealed with removable plastic plugs. Do not remove these plugs until you are ready to attach the hydraulic lines.

Mounting Jacks: On all PowerLevel systems when using the mounting bracket, the top of the bracket should be flush with the top of the chassis. Placing the bracket flush with the top of the chassis will allow for maximum ground clearance (a minimum of 8" of ground clearance is recommended). With these conditions satisfied, clamp and weld the mounting brackets in place.

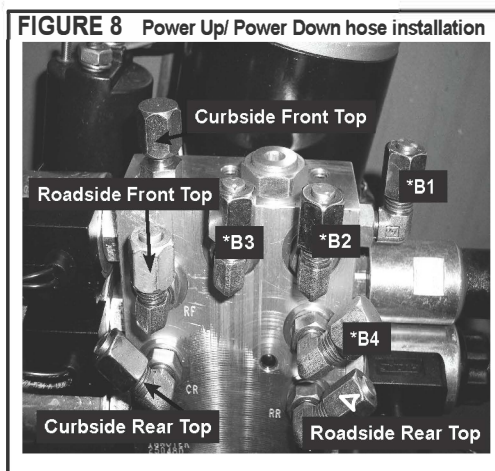
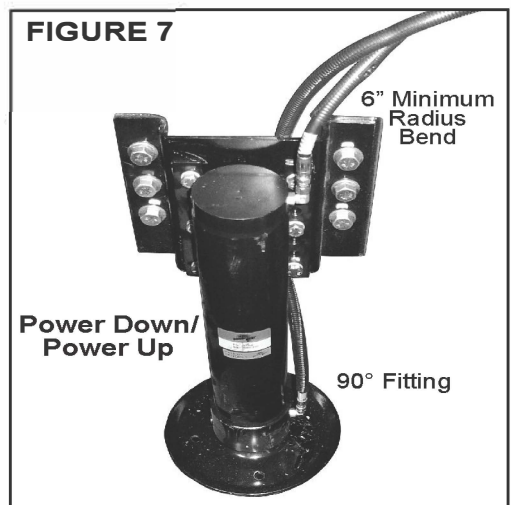
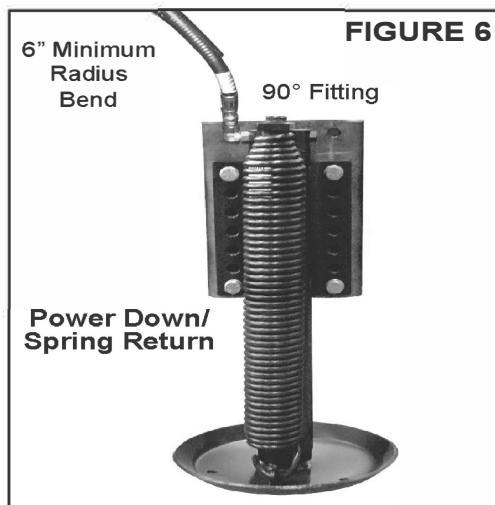
With all four mounting positions prepared on the chassis frame, the next step is to assemble the hydraulic fittings to the jack.

For **Power Down/Spring Return** jacks, on a work bench, install the 90° hydraulic fitting into one of the two ports located at the top of each cylinder (see figure 6). Tighten to a maximum of 30 in./lb.

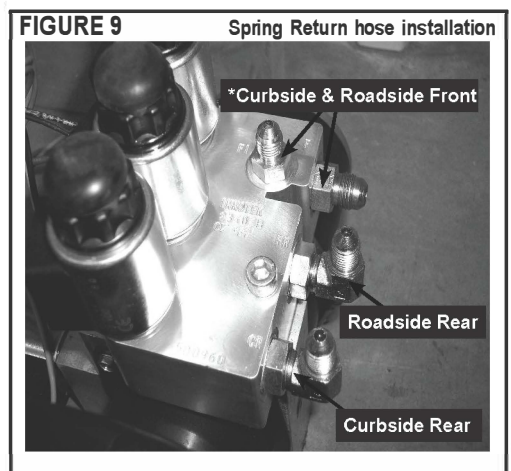
For **Power Down/Power Up** jacks, on a work bench, install the 90° hydraulic fitting into the opening closest to the bottom of the cylinder (see figure 7). Insert the non-tapered end with the self-sealing 'O' ring into the cylinder. With the nipple pointing up, tighten the fitting to 30 in./lb. Next install the 90° hydraulic fitting into one of the two ports located at the top of each cylinder (see figure 7). Tighten to a maximum of 30 in./lb.

Return to the chassis with the cylinder assemblies. Place the cylinders onto the mounting brackets. Install and tighten the top two mounting bolts just enough to hold the cylinders in place.

From the uppermost position on the mounting bracket, hydraulic cylinders can be adjusted downward a maximum of 3" and maintain adequate mounting support. This cylinder mounting adjustment range allows for fine tuning the system. When the cylinder is in its final mounting position, secure the mounting bolts to 90 ft./lb. Now install the middle and lower sets of bolts and tighten to 90 ft./lb.



*B1, B2, B3, and B4 are the bottom jack hoses and orientation does not matter for these parts.



*Hose orientation does not matter for these parts.

! WARNING

Be sure hoses are not exposed to high temperature vehicle components like the engine and exhaust manifold/tailpipe. Avoid routing or stretching lines over or around any sharp surface. Do not secure the lines to any moving part. If a 12" minimum separation is not available, use of a heat shield is required. (see figure 10)

! NOTICE

Most new class "A" motorhome chassis are equipped with an automatically applied park brake system. These systems automatically apply the parking brake when the transmission is shifted into "park".

In the chassis wiring harness you will need to identify the park brake signal wire. This wire will carry a positive (+) 12-volt or ground signal. A signal wire can generally be found in one of the following places:

- Steering column just below the head and rim at the upper adjustment point or at the base just above the floor line.
- Front bulkhead wiring connector - located on the driver side of the vehicle and accessible either under the dash or under the hood.
- At the slave cylinder actuator of the park brake.
- Possibly in the transmission wiring harness

Once you have located the appropriate wire, determine the type of signal by using a volt-ohm meter while engaging the park brake. If a positive signal is present, the use of a relay is required. See figure 11. Splice a pigtail into this wire as explained in instructions.

Installation, cont.

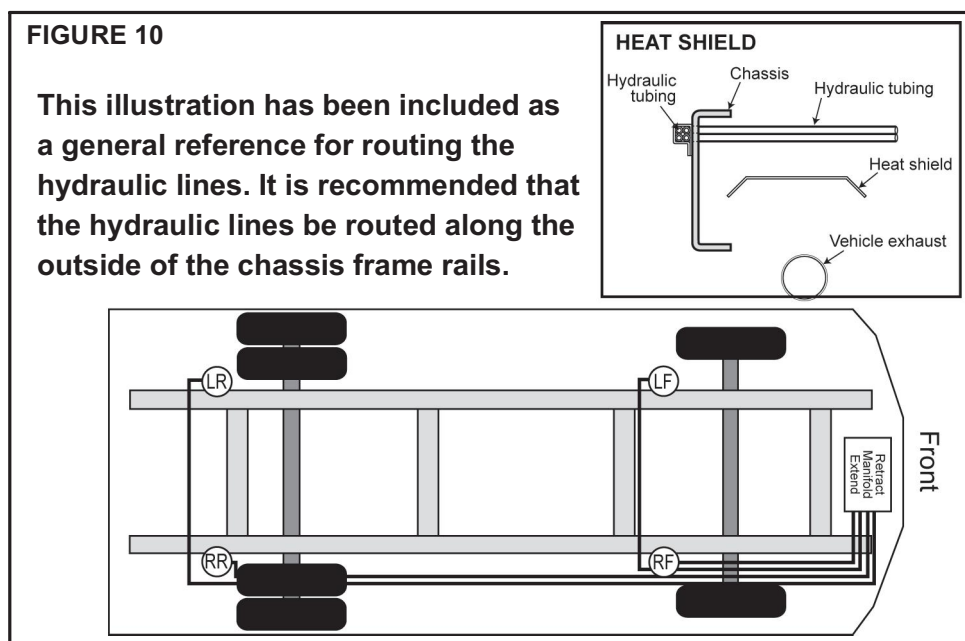
Hydraulic Hose Installation: The leveling system comes with factory hydraulic lines. Each hose is labeled on one end to correspond to a port on the manifold.

Attach one end of each hose to the four jack cylinder fittings and route the hoses towards the pump assembly (see figures 8 & 9). Continue by routing and loosely securing the hydraulic lines along the vehicle undercarriage to the pump/manifold. As you route these lines forward to the pump/manifold, use wire ties to loosely secure them to the frame rail. Use a sufficient number of straps so that when the lines are finally secured, they will not sag or sway when the vehicle is in motion. Do not strap the hydraulic lines to any moving or heat-producing parts of the vehicle.

All fittings should be connected to the manifold and tightened to 30 in./lb. Connect the swivel fitting of each hydraulic line to its corresponding valve port fitting as labeled on the manifold. Tighten to 30 in./lb.

FIGURE 10

This illustration has been included as a general reference for routing the hydraulic lines. It is recommended that the hydraulic lines be routed along the outside of the chassis frame rails.



Completing Wiring Connections

Note: The positive battery cable should still be disconnected at this point. With the wiring from the touch pad routed to the control box, complete the wire connections. Refer to figure 11 for wire connection information.

1. Check that all system harness ground connections are firmly attached.
2. Locate the vehicle fuse box and attach the red ignition sense wire to an ignition activated circuit (circuit to be fused at a maximum of 7.5 amps).
3. Power Gear Power Level systems are equipped with a brake interlock (blue wire). The interlock is designed to allow operation of the system only when the vehicle parking brake is set.

In the chassis wiring harness, identify the park brake signal wire. The park brake switch and signal wire will usually be found on, or near the brake pedal assembly. This wire will show ground or 12 volts positive when the park brake is applied. The type of signal will vary from one type chassis to another. Once you have located the appropriate wire, determine the type of signal by using a volt-ohm meter while engaging the park brake. If a positive signal is present, when the park brake is set, the use of a relay is required. See figure 11.

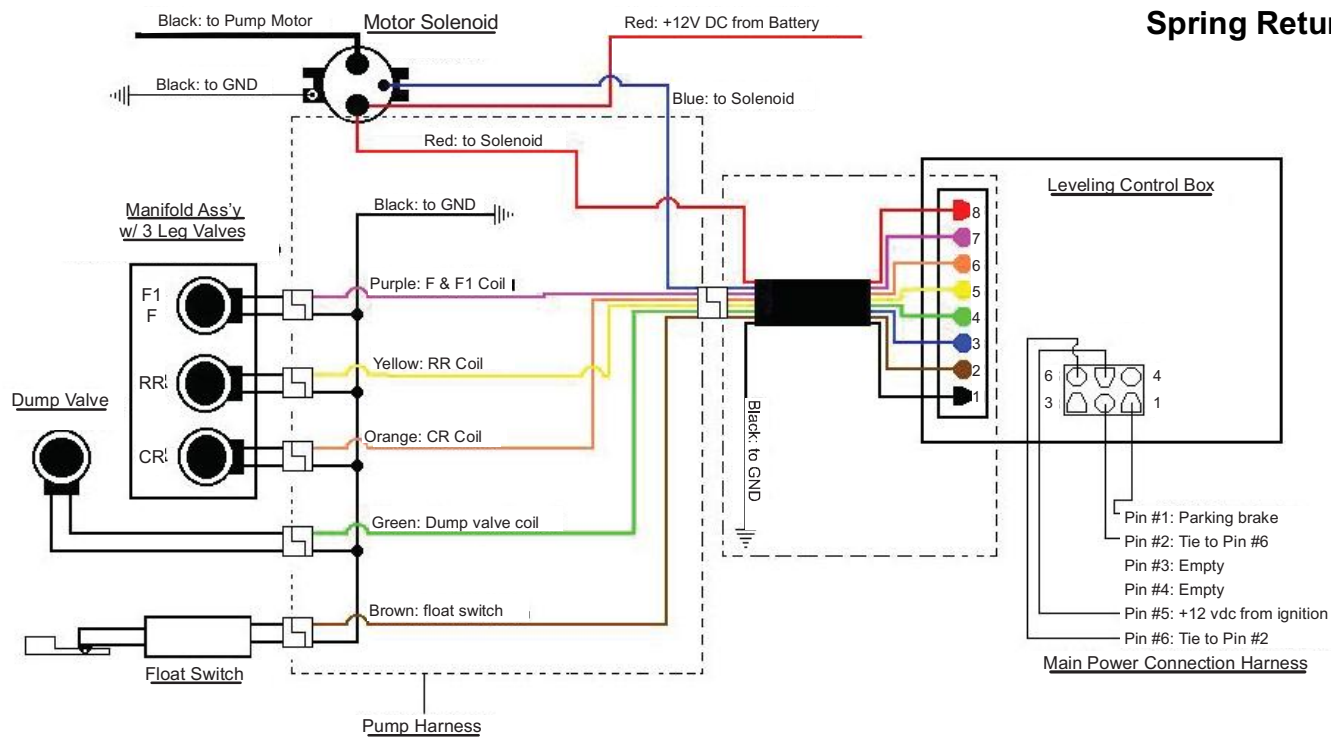
Next, splice the blue brake park wire from the control unit into the signal wire.

4. The final connection is the red power cable from the pump motor solenoid to the positive (+) terminal of the chassis battery.

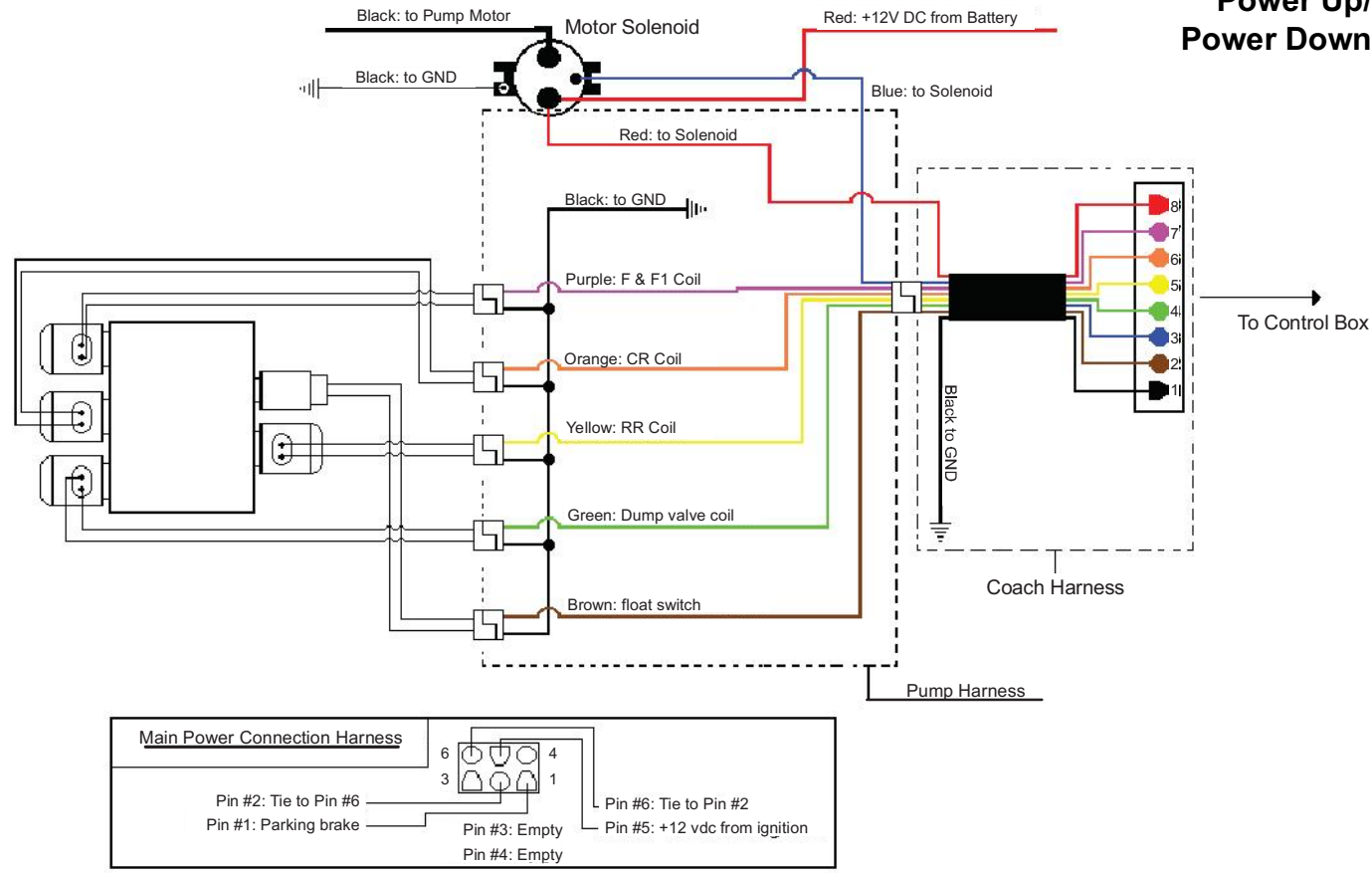
Wiring Diagrams

FIGURE 11

Power Down/
Spring Return



Power Up/
Power Down



! NOTICE

Engine must be running any time the system is being operated.

! CAUTION

Do not run the pump without fluid as damage to the pump will occur. Do not engage the pump motor for periods greater than 30 seconds as motor damage may occur.

! NOTICE

When filling and purging the system, use only transmission fluid (ATF). Power Gear recommends using Dextron III. Do not mix fluids. When checking the fluid level in the reservoir, all levelers must be in the retracted position.

Filling The Hydraulic System

Prior to initiating the filling process, verify that all the fittings on the cylinders and the manifold have been tightened. The entire system must be filled with ATF during the fill process. It is recommended that the reservoir be filled with 1-1/4 gallons of fluid to start the process. The hoses and cylinders hold approximately 1 gallon of fluid, therefore it will be necessary to refill the reservoir several times during the filling process.

Finish filling and purging the system using the following procedure.

1. Fill Reservoir to rim or fill port hole until just before oil starts to dribble out.
 2. Cycle front legs to touch ground only, then retract fully.
 3. Refill reservoir per step 1.
 4. Cycle rear legs to touch ground only, then retract fully.
 5. Refill reservoir per step 1.
 6. Cycle front and rear legs to full extension, then retract fully.
 7. Refill reservoir per step 1.
- Repeat steps 6 and 7 a minimum of 2 times.

When the system has been filled, retract all levelers and check the fluid level in the reservoir. With all cylinders fully retracted, the fluid level in the reservoir should be just visible in the filler port hole.

Manually Bleeding The Cylinders

In most cases the above procedure will purge all air from the system. However, if you have difficulty with a particular cylinder during the fill/purge process, it is possible to manually bleed a cylinder. Extend the cylinder until it just touches the ground.

Loosen the top hose fitting on the cylinder. You will hear air escaping. Do not remove the fitting from the cylinder to vent this air. Tighten the fitting again when air ceases to vent and only fluid is escaping. Operate the cylinder in and out several times to check for smooth operation. Repeat manual bleeding process as necessary.

Hydraulic System and Electrical Connections

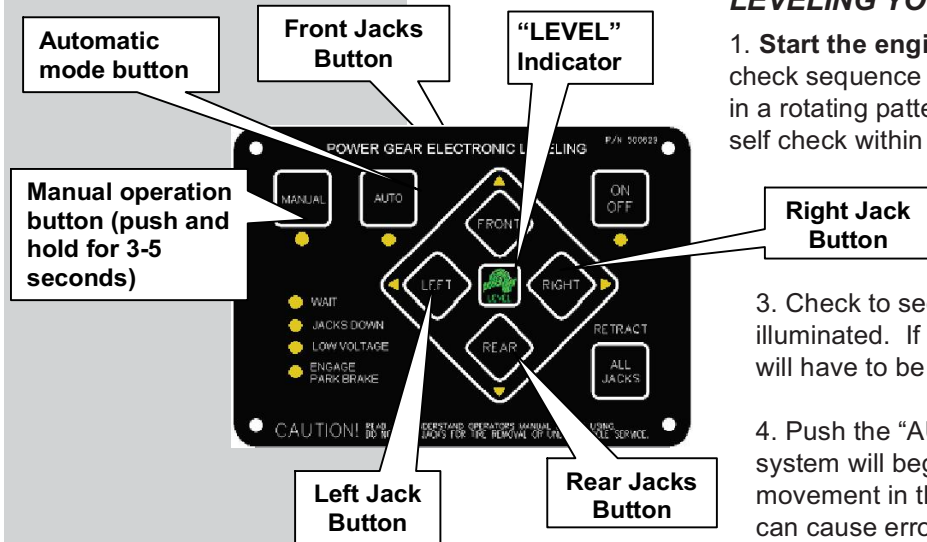
Be sure that:

- All hydraulic fittings on the cylinders and manifold assembly have been tightened.
- All cylinder mounting bolts have been tightened.
- All electrical power delivery and ground connections are securely fastened.
- There are no leaks.

NOTE: Be sure that any holes from interior to exterior of vehicle made during the installation process have been completely sealed with a silicone sealant.



Operating Instructions



LEVELING YOUR COACH

1. **Start the engine.** Your leveling control will start a self check sequence indicated by the lights on the panel blinking in a rotating pattern. It will turn off when it has finished its self check within a few seconds.

2. Push the "On/Off" button on control panel. The system is now operational and the "On/Off" LED will turn on.

3. Check to see that the engage park brake light is not illuminated. If so, engage the parking brake. (Your coach will have to be in neutral or park to operate the system).

4. Push the "AUTO" button. The automatic leveling system will begin its leveling procedure. Please avoid movement in the coach during automatic leveling as it can cause errors in operation. The green LEVEL indicator LED will illuminate when the auto leveling

process is complete. Check to make sure that all jacks are on the ground. Also check to make sure that no tire is off the ground. If so, your leveling process is complete. If further adjustments are needed, refer to the "Manual Operation" section.

5. You can then turn the system off by pushing the on/off button again.

NOTE: Visually inspect jacks to ensure all pads are touching ground. Should one of the rear jacks not be touching the ground, press the corresponding left or right rear jack buttons to lower the appropriate jack to the ground. Never lift the wheels off the ground to level the coach. This can lead to an unsafe condition and damage to the leveling system or coach.

NOTE: The right and left rear jacks are used to level the coach side to side. Pushing the "LEFT" button on the control panel will extend the left rear jack. Pushing the "RIGHT" button on the control panel will extend the right rear jack. There is no individual control of the right or left front jacks on 4 jack systems. Automatic pressure equalization built into the system automatically shifts the front jacks.

Retracting Your Jacks

1. **Start the engine.**

2. Turn on the system by pushing the "on/off" button. The system is now operational and the "On/Off" LED will turn on.

3. Push the "ALL JACKS" retract button. When the "JACKS DOWN" light turns off, visually check to make sure that all jacks have fully retracted. If so, your coach leveling system is ready to travel.

Manual Operation

There are certain conditions where manually leveling your coach may be desirable. Conditions where large amounts of side to side or front to rear leveling are necessary may work better using the manual leveling procedures that follows.

1. **Start the engine.**

2. Push the "On/Off" button to turn on the system.

3. Push and hold the "MANUAL" button for 3-5 seconds in order for the system to switch to the manual mode. It will signal that it is in the manual mode when the light under the "MANUAL" button is illuminated.

4. Push "FRONT" button until the front of the coach rises approximately 3". This is important and necessary to allow the coach to pivot when leveling side to side. If there is insufficient jack stroke to lift the front of the coach at least 3 inches the coach will have to be moved to an area with less front to rear slope.

5. Push the "REAR" button until both rear jacks contact the ground.

6. Level the coach from front to rear by pushing the "REAR" button if the light under the "REAR" button is illuminated. If the light is illuminated above the "FRONT" button, push the "FRONT" button. In either case, keep button depressed until the green center "LEVEL" light is illuminated, or both front and rear lights have turned off.

NOTE: If the “Wait” light is ever flashing by itself, it means the control is busy and you cannot operate the jacks. After a short period of time (from 5 to 30 seconds), the “Wait” light will go off again, and you can resume operation as normal.



WARNING

Your coach should be supported at both front and rear axles with jack stands before working underneath, failure to do so may result in personal injury or death.

7. Level the coach from side to side by pushing the “RIGHT” button if the light beside the “RIGHT” button is illuminated. If the light beside the “LEFT” button is illuminated, push the “LEFT” button until the “LEVEL” light is illuminated.

8. Repeat steps 6 and 7 if needed.

9. Turn power off to leveling system by pushing “ON/OFF” button.

10. Visually inspect jacks to ensure all pads are touching ground. Should one of the rear jacks not be touching the ground, press the corresponding left or right rear jack buttons to lower the appropriate jack to the ground. Never lift the wheels off the ground to level the coach. This can lead to an unsafe condition and damage to the leveling system or coach.

Preventative Maintenance

1. Check and/or fill the reservoir with the jacks and room(s) in the fully retracted position, each month. ATF fluid should be added to the top of the fill port on the reservoir.

2. Change fluid every 24 months (if necessary).

3. Inspect and clean all hydraulic pump electrical connections every 12 months.

4. Remove dirt and road debris from jacks as needed.

5. If jacks are down for extended periods, it is recommended to protect exposed leveling jack chrome rods with a silicone lubricant every 5 to 7 days for protection.

6. If your coach is located in a salty environment (within 60 miles of coastal areas), it is recommended to spray the rods every 2 to 3 days with a silicone lubricant.

7. Grease the fitting on the bottom of each jack cylinder with Lithium grease every 20-30 uses. Do not overfill.

RECOMMENDED HYDRAULIC FLUIDS FOR YOUR HYDRAULIC PUMP

Your unit is filled with Automatic Transmission Fluid (ATF) from the factory. In most applications, Type A automatic transmission fluid (ATF, Dexron III, etc.) will work satisfactorily. Mercon V is also recommended as an alternative fluid for Power Gear hydraulic systems. Do not use “hydraulic oil” fluids in conjunction with ATF.

If operating in cold temperatures (less than 10° F) the jacks may extend and retract slowly. For cold weather operation, fluid formulated for low temperatures may be desirable. Mobil DTE 11M, Texaco Rando HDZ 15HVI, Kendall Hyden Glacial Blu, or any Mil. Spec. H5606 hydraulic fluids are recommended for cold weather operation. Do not mix ATF and hydraulic oils.

Please consult factory before using any other fluids than those specified here.

Troubleshooting

Locations of breakers, fuses, fuse panels, etc. are coach specific. Consult your coach owner’s manual or the coach manufacture for locations of these components.

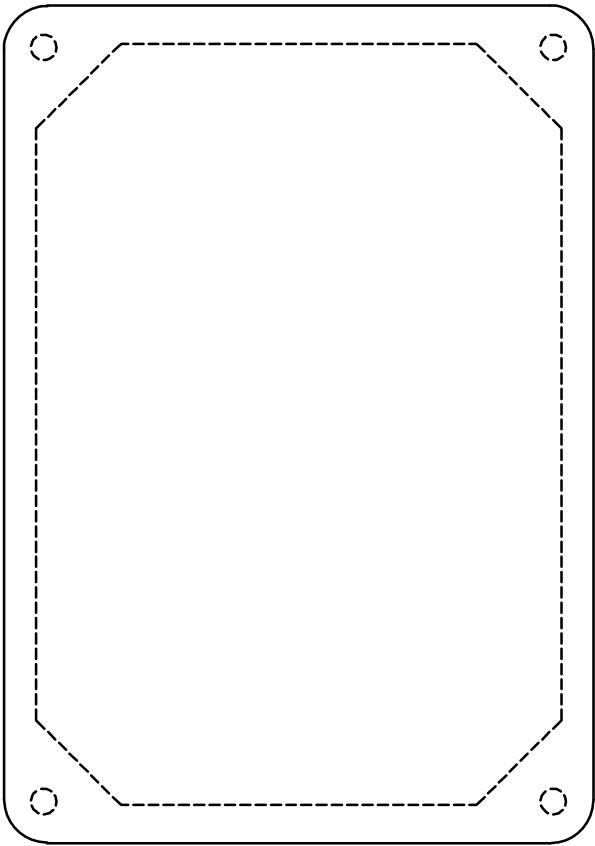
The following information will guide you to repairs that may be made on site. For problems not covered here, contact your service center or our website for more extensive troubleshooting information in the service manual for your system.

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
System will not turn on, indicator light does not light.	Coach ignition not in run position.	Turn ignition to run position.
	Transmission not in park or neutral.	Place transmission in park or neutral.
	Parking brake not set.	Set brake.
	Control has been left on for more than four minutes, auto shut off.	Push on/off button twice.
Jacks will not extend, pump is not running.	Battery voltage is low.	Recharge battery. Coach must be running.

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Jacks will not extend, pump is running.	Fluid level low.	Fill tank to proper level with Dexron III Automatic Transmission Fluid.
All jacks will not retract or will not fully retract.	System overfilled with fluid.	Drain fluid to recommended level.
Any one or two jacks will not retract at all.	Weak or obstructed jack spring(s).	Replace jack spring or remove obstruction.
	Jack rod guide is rusted or dirty.	Clean chrome rod, grease rod guide if equipped with grease fittings. Otherwise lubricate with lithium grease. It may be necessary to reseal jack or replace.
Any jack retracts very slowly	Jack rod is rusted or dirty.	Clean chrome rod, grease rod guide if equipped with grease fittings. Otherwise lubricate with lithium grease. It may be necessary to reseal jack or replace.
Panel "jacks down" light illuminated, jacks are retracted.	Low fluid level.	Fill tank to proper level with Dexron III Automatic Transmission Fluid.
Panel "jacks down" light and alarm on while driving, jacks retracted.	Low fluid level.	Fill tank to proper level with Dexron III Automatic Transmission Fluid.



Appendix A - Touch Pad Template





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Follow proper safety practices. If in doubt, consult a professional RV technician.