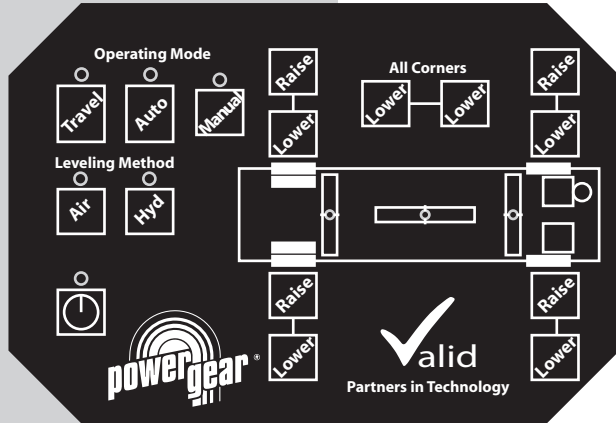




Operation Guide Air/Hydraulic Leveling System

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PowerLevelTM series Air/Hydraulic Leveling System Operation Guide

Introduction

Power Gear's leveling and stabilizing system is an electronically controlled/ hydraulically and/or air operated unit that consists of a 12 volt DC motor/pump/manifold assembly with fluid reservoir, hydraulic hoses, hydraulically operated jacks, a control unit with switch panel, level sensor unit and pressure sensor.

If after thoroughly reading this manual, you still have questions in regard to the operation and maintenance of this leveling system, please contact the service department.

WARNING

**READ ALL OPERATING
INSTRUCTIONS FIRST
BEFORE USING YOUR
AIR/HYDRAULIC LEVELING
SYSTEM.**

WARNING

- Do not use the vehicle's suspension or leveling jacks to support the vehicle for servicing or inspection. Instead, install adequate blocking before working under any vehicle. The system is designed as a 'leveling' system only.
- Keep people clear of the coach while leveling system is in use.
- Never lift the wheels off the ground to level the coach. Doing so may create an unstable condition.
- Never expose hands or other parts of the body near hydraulic leaks. High pressure oil leaks may cut and penetrate the skin causing serious injury.

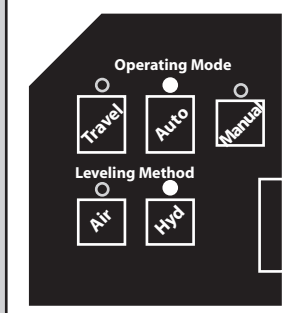
CAUTION

- Park the coach on a reasonably solid surface or the jacks may sink into the ground. On soft surfaces, use load distribution pads under each jack.
- Check that potential jack contact locations are clear of obstructions or depressions before operation.
- Read and understand the entire operator's manual before using or servicing your leveling system.
- Ensure that the area around the vehicle is clear of obstructions before operating the leveling system.
- Your leveling system should be serviced only by qualified personnel.
- Leaks in a vehicle's air system can cause the vehicle to lower over time regardless of whether the leveling system is operational.



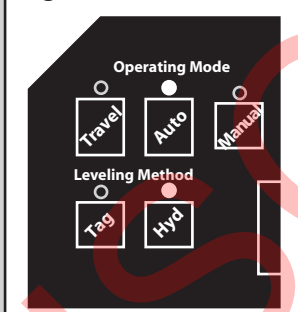
Note: To prevent improper operation of the leveling system, which could result in damage to the levelers and/or the vehicle itself, read the operating instructions carefully before using the leveling jacks.

Figure 1



NOTE: If the vehicle engine is started and either the park brake is released or the vehicle is put in gear, the jacks leveling system will go into 'Emergency Retract' which retracts the jacks and puts the air suspension in travel mode.

Figure 1A



Operating Modes

There are three main operating modes of the Power Gear Air/Hydraulic Leveling System (see figure 1).

Auto Level Mode (Air or Hydraulic) Auto mode should be used by default when the vehicle is at a stop. This mode is the easiest to use and is suitable for most situations. Auto / Air would be used if you wish to level the coach without putting the hydraulic jacks in contact with the ground. Auto / Hydraulic would be used to level the coach for maximum stability. Auto mode can be used only when the vehicle is parked and the ignition is on.

Manual Level Mode (Air or Hydraulic) Manual mode allows you to raise and lower each corner of the vehicle individually, to the level you want. This mode lets you have more control over the leveling process.

- With air leveling, manual mode can also be used at low traveling speeds when an uneven surface must be negotiated.
- With hydraulic leveling, manual leveling can only be used when the vehicle is parked and the ignition is on.

Travel Mode (Air Only) Travel mode is used when the vehicle is in motion. This mode will initiate when the vehicle moves at a speed higher than 10 mph. However, it is best for the operator to enter this mode before the vehicle begins moving. The leveling system can only be switched to travel mode if the ignition is turned on. Placing the vehicle in travel mode causes the hydraulic jacks to retract and the suspension to go to ride height.

Leveling Display In each mode, the three level indication displays can be viewed as if they were a carpenter's level, with the indicator lamp as the level's "bubble". The lamp displays red if not level and green if level. For example: If the indicator lamp is to the left of center (See Figure 2) on either of the axle displays, then the left side of that axle is high. If the indicator is forward of center on the middle level then the front of the vehicle is high.

When all three lights are green and centered in the levels then the vehicle is level. (See Figure 3).

Tag Axle On dual axles, there is a driven axle and a non-driven axle. When located behind the drive axle, this free-rotating axle is called a tag axle. Depending on the coach manufacturer, the tag axle may or may not have a lift capability. A tag axle will always have air bags. Even if there is no tag lift, these air bags can be exhausted so the tag axle is not supporting the coach; this is often done when put in reverse gear or by selecting a switch on the dash. A dedicated pressure regulator may be used to set the "down" pressure of a tag axle.

Lifting a tag axle will allow the coach to be more maneuverable, such as when parking or navigating through a tight space. It also provides increased traction on the remaining wheels which can be useful in slippery road conditions.

Figure 2

Front axel indicates High on left side

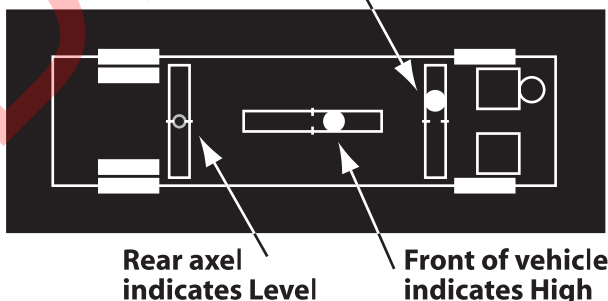
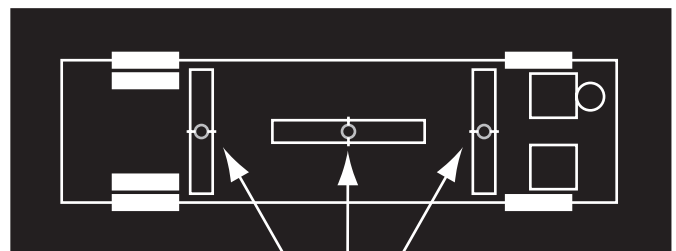


Figure 3



All lights indicate Level

NOTE: If you wish to immediately adjust the level of the coach anytime it is in sleep mode, simply press and release **AUTO** once to have the coach reset the level. *Only in Air Level Mode.

NOTE: The **WAKE** feature is not needed in hydraulic mode and will not operate.

Auto Level Mode

What Happens During The Leveling Cycle

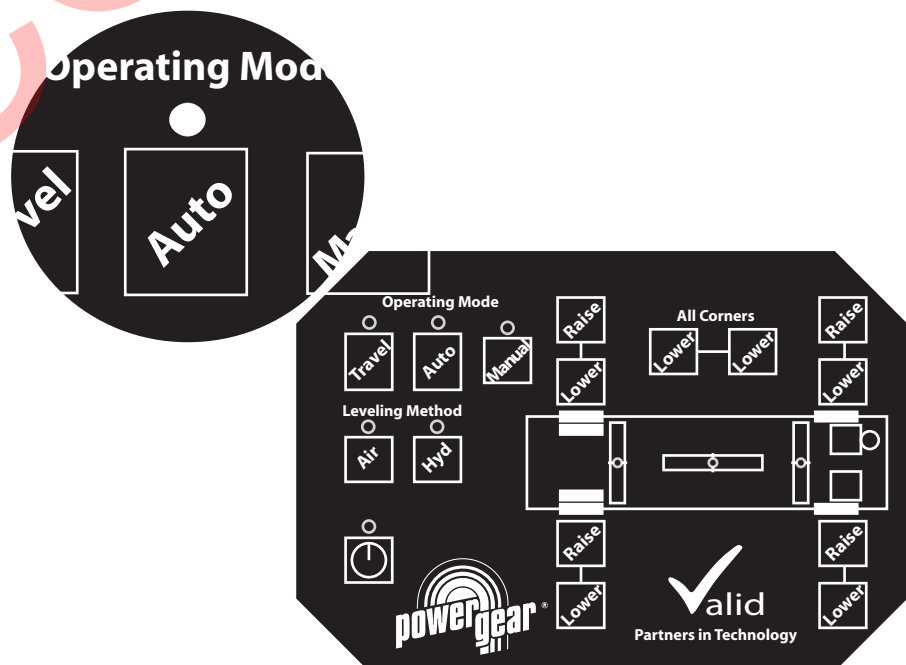
The **AUTO** indicator will flash as it is leveling the coach, then remain lit after the leveling process is completed. 20 seconds after Auto leveling has been completed, the level controller goes into “**SLEEP**” mode indicated by the occasional flashing of the **AUTO** and **POWER** indicator lamps.

In the “**WAKE**” feature the level controller wakes, every 2 hours, the two sensor units and checks to see if adjustments are required. If leveling is required, it agains levels the coach. If no leveling is required, the two sensors are allowed to go back to sleep and the level controller drops back into sleep mode after 20 seconds.

Using Hydraulic Auto Level Mode

1. Ensure that:
 - a. The ignition switch is on and vehicle's engine is running.
 - b. The front wheels are straightened.
 - c. The vehicle is in 'Neutral' or 'Park' with the parking brake engaged.
 - d. The control panel is turned on. (If the **POWER** indicator is not lit, press and release **POWER**. If the **POWER** indicator is flashing, the ignition switch is off, and must be turned on.
2. Press and release **HYD**.
3. Press and release **AUTO**. Check for the green light (See Figure 1). If the level controller will not go into auto mode, it is most likely because the vehicle's parking brake has not been applied (See Figure 5). If the system fails to enter **AUTO** mode, check that the parking brake indicator is illuminated. (Flashing park signal means coach is in gear.)

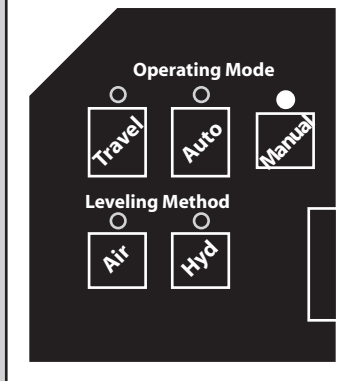
Once the leveling has been accomplished, the vehicle should be level and all three level displays should indicate green (See Figure 3). The **AUTO** indicator stops flashing and stays lit. Once the vehicle has been leveled the level controller goes into “sleep” mode indicated by the occasional flashing of the **AUTO** and **POWER** indicator lamps.



WARNING

While it is possible to also lower the coach while driving slowly, it is the operator's responsibility to ensure that the coach is at an adequate height before driving. If the coach is too low, severe damage can result to the fenders when the wheels are turned.

Figure 4



NOTE: The PARK indicator will flash if the park brake is on but the vehicle is still in gear. Once the vehicle has been put in neutral with the park brake on, the PARK indicator will stop flashing and remain lit.

NOTE: Due to the sensitivity of the leveling sensors, any noticeable movements within the coach can cause difficulty while leveling is in process. Therefore, if you are inside the vehicle while it is leveling, please sit quietly or walk lightly.

Manual Level Mode

Use manual leveling mode if you wish to have control over the leveling process. Manual control of the air system can be used to lift the vehicle while traveling at low speed when an uneven surface must be negotiated. The Air+Hydraulic Leveling System automatically switches from Manual mode to Travel mode at speeds higher than 10 mph.

Using Manual Air Level Mode

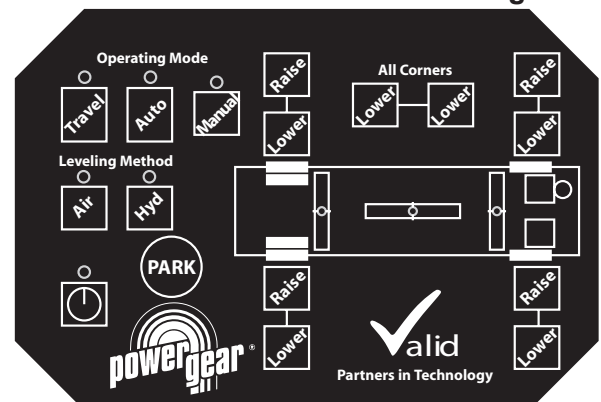
1. Ensure that the leveling system is turned on. If the **POWER** indicator is not lit, press and release **POWER**.
2. With the vehicle either parked (with engine running) or traveling slower than the Travel mode speed limit, press **MANUAL**. If the vehicle is parked, make sure the front wheels are straightened.
3. Press **RAISE** or **LOWER** for each of the four corners you wish to manually adjust. If the leveling system detects an excess amount of twist in the vehicle frame during the manual adjustments, any further actions that may cause more twist are not permitted by the leveling controller.

To control all 4 corners simultaneously, use the **ALL CORNERS RAISE** button to raise the coach and the **ALL CORNERS LOWER** button to lower the coach. This can be useful if you wish to raise or lower the entry step height. For your convenience, the **ALL CORNERS RAISE** button has a "lock" feature that keeps the button activated after you have pressed it. Hold **ALL CORNERS RAISE** for 3 seconds. This "locks" the button on for a period of one minute. You may repeat this process until the coach is at the height you want. To stop the elevating process during the one-minute period, press and release **MANUAL**. Because of the risk of damage to your coach, the **ALL CORNERS LOWER** button does not have this lock feature.

Using Hydraulic Manual Level Mode

1. Ensure that:
 - a. The ignition switch is on and vehicle's engine is running.
 - b. The front wheels are straightened.
 - c. The vehicle is in 'Neutral' or 'Park' with the parking brake engaged.
 - d. The control panel is turned on. (If the **POWER** indicator is not lit, press and release **POWER**. If the **POWER** indicator is flashing, the ignition switch is off, and must be turned on.
2. Press and release **HYD**.
3. Press and release **MANUAL**. Check for the green light (See Figure 1). If the level controller will not go into manual mode, it is most likely because the vehicle's parking brake has not been applied (See Figure 5). If the system fails to enter **MANUAL** mode, check that the parking brake indicator is illuminated.
4. Press **RAISE** or **LOWER** for each of the four corners you wish to manually adjust. If the leveling system detects an excess amount of twist in the vehicle frame during manual adjustments, any further actions that may cause more twist are not permitted by the leveling controller. You may also use the **ALL CORNERS RAISE** and **ALL CORNERS LOWER** buttons.

Figure 5



NOTE: If you are in **MANUAL** mode and wish to go to **AUTO** mode with hydraulic control, push the **TRAVEL** button, then after the jacks are retracted, push the **AUTO** button.

WARNING

The time required to achieve travel height varies with coach design. It is the operator's responsibility to ensure that the coach is at an adequate height before driving. If the coach is too low, severe damage can result to the fenders when the wheels are turned. 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.

Note: Tag Lift is disabled for the first 2-minutes after turning on the ignition. This allows the coach air pressure to build up.

Manual Level Mode, cont.

Air Dump

The AIR DUMP button allows you to dump air in all the airbags.

1. Press and hold AIR DUMP to lower vehicle by emptying the airbags. The AIR DUMP indicator will light up.
2. Release the AIR DUMP any time you wish to stop the lowering process.

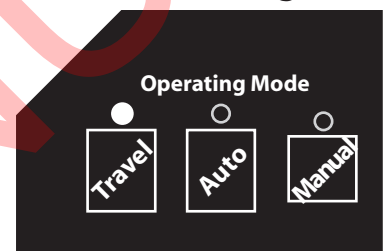
Travel Mode

Travel mode is used when the vehicle is in motion. This mode gives control of the vehicle's air suspension system back to the vehicle's normal suspension system. The hydraulic controls do not work in travel mode; instead, the hydraulic jacks are stored away when the vehicle is in motion.

To Use Travel Mode

Press TRAVEL (See Figure 6). If the Air+ Hydraulic Leveling System is turned off or in any mode other than travel, it will automatically turn on and switch to Travel mode if the vehicle speed exceeds 10 mph.

Figure 6



Tag Lift Mode

Tag Lift Feature

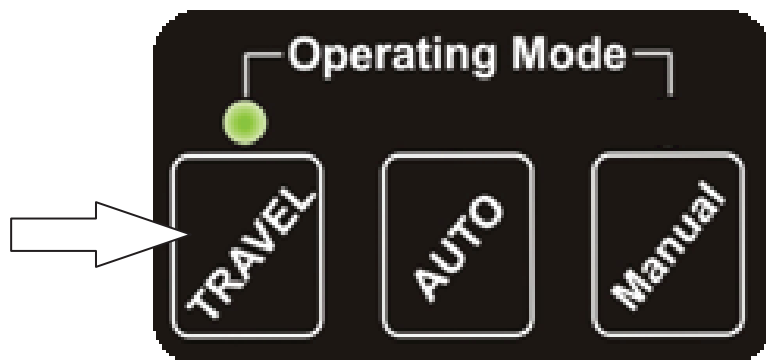
To support a lifting tag axle, Valid Manufacturing Ltd. has integrated a Tag Lift feature into some versions of the air-only and air/hydraulic leveling systems.

An optional trailer detector module will prevent the tag axle from lifting anytime a trailer is connected.

The tag axle is down during leveling. On each side of the coach, the drive and tag axle air bags are connected together so both axles are used to raise and lower the rear of the coach.

The Tag Lift feature is not available within the first 2-minutes after turning on the ignition. This is to ensure that there is sufficient air supply.

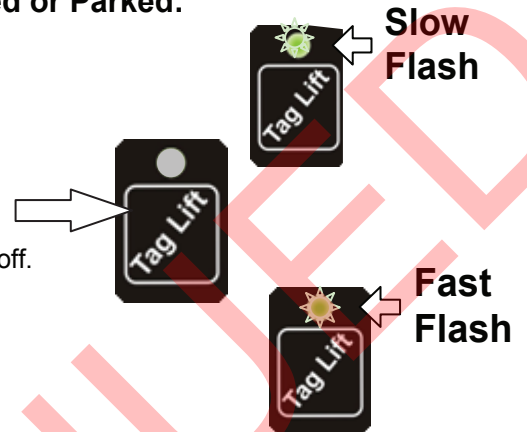
The Tag Lift feature is only available when in **Travel Mode**



Tag Lift Mode, cont.

To Operate Tag Lift When Stopped or Parked:

1. Start the engine. The controller will automatically turn on.
2. Press and release **TRAVEL**
3. Wait until the Tag Lift indicator stops slow-flashing (once per second) and turns off.
4. Press and release **TAG LIFT**
5. The Tag Lift indicator will fast-flash (3 times a second). This indicates the Tag axle lift actuators are active.



The drive axle air bags will automatically inflate for 10 seconds after activating the tag lift actuators. This is to compensate for the extra load being put on the drive axle.

Driving with Tag Lift active

1. As soon as the speed of the coach reaches 2 mph the buzzer will start to beep once per second. It will continue to beep until the speed reaches 10 mph. The Tag Lift indicator will continue to fast-flash.



2. Once the speed exceeds 10 mph the tag axle will automatically lower, the tag lift indicator will be on solid and beeping will cease.



3. As soon as the speed is reduced below 10mph, the tag axle will automatically lift and the indicator will begin to fast-flash. The buzzer will start to beep once per second while the speed remains between 2 mph and 10 mph.



4. Once the speed of the coach falls below 2 mph, the beeping will cease and the tag lift indicator will continue to fast-flash. The tag axle remains lifted.



IMPORTANT NOTE: If the ignition is turned off while the tag axle is lifted, it will remain up. Battery drain will occur because all tag valves will be energized. Turn on the ignition and press **TRAVEL** to lower the tag axle then turn off the ignition.

NOTE: TAG LIFT can be pressed at any time to turn off the indicator. If the tag axle is already lifted, it will be lowered. The tag axle will now remain lowered at all speeds.



NOTICE

TAG LIFT WILL ACT DIFFERENTLY WITH A TRAILER ATTACHED.

Preventative Maintenance

1. Check the fluid level every month. Fill the reservoir with the jacks in the fully retracted position. On vertical pump assemblies, the fluid should be within .25" of the fill port lip and checked only with all jacks retracted. On horizontal pump assemblies, the fluid level should be approximately 1.75" on the dipstick and checked only with all jacks retracted.
2. Change fluid every 24 months.
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 spray exposed chrome rods with a silicone lubricant every seven days for protection. 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.
6. Drain water from the auxiliary air tank every 3 months by opening the plug on the bottom of the tank or by using the shut off valve if equipped in your vehicle.

Recommended Hydraulic Fluids for Your Power Gear Leveling System

The fluids listed here are acceptable to use in your pump assembly. Contact your coach manufacturer or selling dealer for information about what specific fluid was installed in your system. Please consult factory before using any other fluids. 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 leveling systems operating in environments with large temperature swings. Operating in cold temperatures (less than 10°F) may cause the jacks to extend and retract slowly. For cold weather operation, fluid specially 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.

Power Gear Limited Warranty

This document has been modified from the original Power Gear Rev. 0C JUL07 release. All former references to the Power Gear warranty and contact information were removed.

**For all concerns or questions, please contact
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