

HWH® BI-AXIS® LEVELING COMMENTARY

A typical HWH® system consists of four hydraulic leveling jacks, a central pump/power unit, a level sensing unit and control valving. The leveling jacks are mounted by means of brackets at the proper suspension points of the frame. The systems are controlled either by a direct-acting lever-controlled valve or an electric solenoid manifold. In either case, a single hydraulic line runs from the valve to each individual leveling jack.

HWH® Leveling Jacks

HWH® manufactures two basic styles of leveling jacks, the **kick-down** type and the **straight-acting** type. Either style of jack can be used with any of the control systems, although straight-acting and kick-down jacks can not be combined in the same system. The kick-down jacks are much easier to mount in tight situations, and they are not usually damaged if the motorhome is inadvertently moved with the jacks down.



Straight-Acting Jack



Kick-Down Jack

The straight-acting jacks provide more stability, plus a much larger footpad. HWH® offers different configurations of both jack styles in capacities ranging from 3,000 lbs. per jack up to 24,000 lbs. per jack. Consult your RV retailer for the best combination of leveling jacks for your application.

BI-AXIS® Leveling

Perhaps the single most important feature that an RVer should consider when choosing a leveling system is how the jacks are deployed during the leveling process. That's because a motorhome chassis is designed to have a certain amount of flexibility in order to survive the rigors of the open road. But a leveling system that's improperly designed, improperly installed or improperly operated, can cause excessive flexing of the coach structure. This can lead to annoyances like jammed slide outs, pinched doors or cabinets that won't stay shut. HWH® developed **BI-AXIS®** leveling as a way to minimize coach structure flexing caused by improper operation of the system. Under BI-AXIS® principles, a vehicle is leveled by raising sides or ends, using pairs of jacks, as opposed to raising corners with single jacks. The BI-AXIS® leveling procedure raises low corners by leveling side-by-side first (bringing both jacks of the low end into plane with the other two jacks), and then raises the low end, with both jacks, into level.

Because coaches normally have twice the weight on the rear wheels as the front wheels and the jacks are operating in pairs, the lifting capacity of the jacks must be matched to the weight they are lifting to avoid over extension or under extension. HWH® offers the widest range of jack sizes of any manufacturer, facilitating the matching. Thus, the BI-AXIS® method works to keep the frame rails in a common plane, greatly reducing the possibility of structure twist.

Three-Jack Systems vs. Four-Jack Systems

A closely related question being asked by many RVers these days is the issue of **three-jack systems vs. four-jack systems**. The theory behind a three-point system goes something like this: a single front jack levels the vehicle front to rear, while the two rear jacks level the vehicle side to side; thus, saving the cost of a fourth jack although sacrificing some front end stability. Although HWH® produces both four-point and three-point systems, we strongly recommend four-point systems with BI-AXIS® control. In practice, three-point systems perform adequately as long as the vehicle is parked on fairly level ground and the system is operated according to the instructions of the motorhome manufacturer. In our experience, however, a typical RVer will often find it very hard to level his rig with a three-point system without twisting the structure in the process.

Jack Equalization

All HWH® BI-AXIS® systems feature **jack equalization**, that is, the pair of jacks being operated at any given time are tied together hydraulically in the valve. This means that as the jacks are extended, the first jack to hit the ground stops until the second jack hits the ground, then both jacks raise together. Jack equalization is an important part of the BI-AXIS® leveling process and enables the RVer to level their rig quickly and easily, with minimal structure twist.



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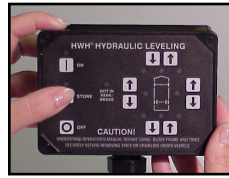
HWH® BI-AXIS® LEVELING COMMENTARY continued

HWH Control Systems

HWH® offers two basic different types of BI-AXIS control systems: The **200 Series, Joy Stick-Controlled Leveling System** is a single-lever, direct-acting valve. To operate the system, the two smaller levers are moved to the 'operate' position. The arrows on the control panel light up one at a time, prompting the operator which way to move the joy stick. The red lights at the corners indicate which jacks have been extended. When the arrow light disappears, the vehicle is level. The next step is to visually check and see which jacks are not firmly on the ground. Then the vehicle is stabilized by extending those jacks until all four jacks are firmly on the ground. To retract the jacks, simply move the two small levers to the 'store' position.



HWH® also offers a **600 Series, Computer-Controlled Leveling System for Fifth Wheels and Travel Trailers.**



This particular system features a hand-held pendant type controller, and is especially recommended for towables with room extension systems. Both the motorhome and towable versions of the 600 Series, Computer-Controlled leveling systems feature BI-AXIS® leveling.



The **600 Series, Computer-Controlled Leveling System** is the ultimate in hydraulic leveling systems. The heart of the 600 Series system is the BI-AXIS® computer. The computer is programmed in BI-AXIS® leveling logic



and automatically selects a fast, efficient way to level the vehicle. The BI-AXIS® leveling computer deploys differing jack combinations to efficiently level and stabilize your RV with minimum flexing

of the coach structure. Also available in our Computer-Controlled line is a **"Single-Step"** option that allows you to level the coach with the touch of one button and an **air leveling** option.



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