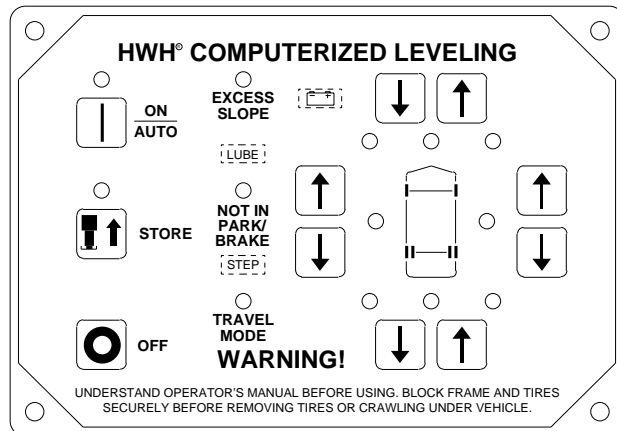




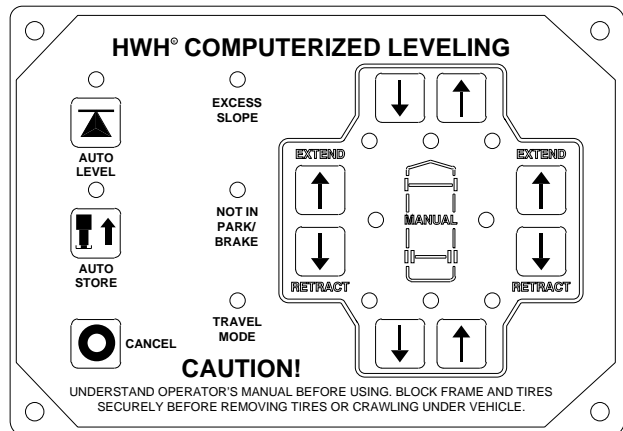
COMPONENT SELECTION AND INSTALLATION MANUAL

HWH COMPUTER-CONTROLLED 725 SERIES LEVELING SYSTEMS FOR MOTORIZED VEHICLES

725 WITH KICK-DOWN JACKS



725 WITH STRAIGHT-ACTING JACKS



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COMPONENT SELECTION AND INSTALLATION MANUAL

HWH HYDRAULIC LEVELING JACKS

725 SERIES LEVELING SYSTEMS

THE FOLLOWING INFORMATION IS OFFERED AS SUGGESTIONS ONLY. VARIATIONS IN VEHICLE DESIGN, CHASSIS, SUSPENSIONS, TIRES AND COACH WEIGHTS MAKE IT IMPOSSIBLE TO ANTICIPATE AND ADDRESS ALL SELECTION OR INSTALLATION PROBLEMS AND POSSIBILITIES. SOME VEHICLE BUILDERS OR CHASSIS BUILDERS MAY USE PRACTICES DIFFERENT FROM THOSE IN THIS MANUAL. CONSULT HWH CORPORATION OR THE VEHICLE BUILDER FOR INFORMATION CONCERNING CORRECT SYSTEM CAPACITY AND TYPE FOR THE VEHICLE, INSTALLATION QUESTIONS, AND INSTALLATION OF OTHER HWH EQUIPMENT.

ONLY QUALIFIED TECHNICIANS SHOULD INSTALL OR REPAIR LEVELING SYSTEMS ON VEHICLES. A KNOWLEDGE OF HYDRAULICS, WELDING, THE VEHICLE'S SUSPENSION AND ELECTRICAL SYSTEM, AS WELL AS AN UNDERSTANDING OF THE LEVELING SYSTEM'S HYDRAULICS AND ELECTRONICS IS REQUIRED.

NOTE - HWH Corporation assumes no liability for damages or injuries resulting from the installation of this product.

WARNING !

READ THE ENTIRE INSTALLATION PROCEDURE BEFORE STARTING INSTALLATION.

BLOCK FRAME AND TIRES BEFORE CRAWLING UNDER VEHICLE. DO NOT USE 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.

DO NOT TURN ON POWER UNTIL INSTALLATION IS COMPLETE.

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

KICK-DOWN JACKS MAY ABRUPTLY SWING UP WHEN THE FOOT CLEARS THE GROUND OR WHEN JACK REACHES FULL EXTENSION.

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

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

DO NOT OVER EXTEND THE REAR JACKS. IF THE WEIGHT OF THE VEHICLE IS REMOVED FROM ONE OR BOTH REAR WHEELS, THE VEHICLE MAY ROLL FORWARD OR BACKWARD OFF THE JACKS.

SECTION I

725 SERIES LEVELING SYSTEMS

COMPONENT SELECTION

This manual is designed to aid in the selection of the correct jacks or mounting brackets and the installation of the leveling system components including mounting brackets and/or jacks, pump/manifold control units, touch panels, harnesses and hoses.

O.E.M. and specialty installers working with vehicles that incorporate HWH room extension mechanisms should work directly with HWH Corporation to determine total room and leveling system requirements.

It is important to carefully read both sections of the manual before ordering or installing components. The information in the first section, Component Selection Guide, will aid you in obtaining the necessary information needed to order systems or system components. The second section, Installation Guide, will discuss installation of components including: mounting heights and locations, welding procedures, hose and harness routings, pump mounting, and adjustments including level sensing unit adjustments, jack adjustments and jack pressure switch adjustments.

Failure to read and understand this manual may result in ordering the wrong components which will delay the installation or possibly cause improper installation of system components which may cause improper system operation or component failure.

SECTION I: COMPONENT SELECTION

HWH has information available to aid in the selection of system components for many of the more common applications. This information is available on the HWH web site at www.hwh.com. The information can be printed off or downloaded as necessary. In the "**Product Information & Brochures**" section on the HWH home page, there is a link to "**Aftermarket Products**". This link has information for ordering complete leveling systems for different classes of motor homes and chassis types. These systems are generic in nature and designed to fit a wide range of vehicle configurations. From "**Aftermarket Products**" you can link to the "**HWH Matchmaker Aftermarket Leveling System Configurator**". This area has Class A system information for different chassis and specific information for some Sprinter, Class C and Class B coach models. You can also link to "**Miscellaneous Aftermarket Brackets**" from this page. There is quite a bit of information concerning older and present day kick-down, straight-acting pivoting and straight-acting fixed mounting brackets. If you click on the "Diagram" for the bracket, the diagram will show specific mounting locations with comprehensive measurements or dimensions for mounting heights and clearances. This can be helpful in determining the suitability of a jack/bracket combination for a vehicle.

Kick-Down or Straight-Acting jacks. Basically, this is a matter of personal preference but due to available mounting locations or mounting space and height requirements, certain vehicles will not accommodate the straight-acting or kick-down jacks. Straight-acting jacks provide somewhat better stability and are recommended if the vehicle has a room extension. The kick-down style jacks offer a drive-off feature in case of a retract failure or in the event you forget to retract the jacks. Straight-acting jacks are also preferable on vehicles with an air suspension

WARNING: DO NOT CRAWL UNDER A VEHICLE WITHOUT PROPERLY SUPPORTING THE FRAME OF THE VEHICLE IF THE VEHICLE IS SUPPORTED ON THE SUSPENSION AIR BAGS. THE VEHICLE WILL RAPIDLY DROP SEVERAL INCHES WHEN THE AIR IS EXHAUSTED FROM THE AIR BAGS. MAKE SURE THERE IS ADEQUATE CLEARANCE TO WORK UNDER THE VEHICLE WITH THE AIR BAGS DEFLATED.

HWH Corporation has numerous jack and bracket arrangements for both straight and kick-down style jacks listed in "**Product Information & Brochures**" section of the website. If you are not sure what is needed for your application or cannot find equipment suitable for your application, contact HWH Corporation for assistance. The following information is needed to assist us in the selection process:

- 1.) Coach make, model and year.
- 2.) Chassis manufacturer and model
- 3.) Spring or air suspension.
- 4.) Front and rear axle weights. (Actual not GVW)
- 5.) Tire size. (Height 19.5", 22.5" etc.)
- 6.) Frame rail height
- 7.) Distance from ground to bottom of frame rail. If the vehicle has an air suspension, measure with air bags empty if possible.)
- 8.) Distance from bottom of frame rail to floor or main vehicle platform.
- 9.) Available mounting area. (Refer to the Clearance and Mounting Dimension Chart- -Straight-acting jacks)
- 10.) Tag Axle?

SECTION I

725 SERIES LEVELING SYSTEMS

COMPONENT SELECTION

The following chart shows the available capacities for kick-down and straight-acting jacks:

Weight capacity	3,000#	4,000#	6,000#	9,000#	12,000#	16,000#	24,000#
Kick-down style			X	X		X	X
Straight-acting style	X	X	X	X	X	X	X

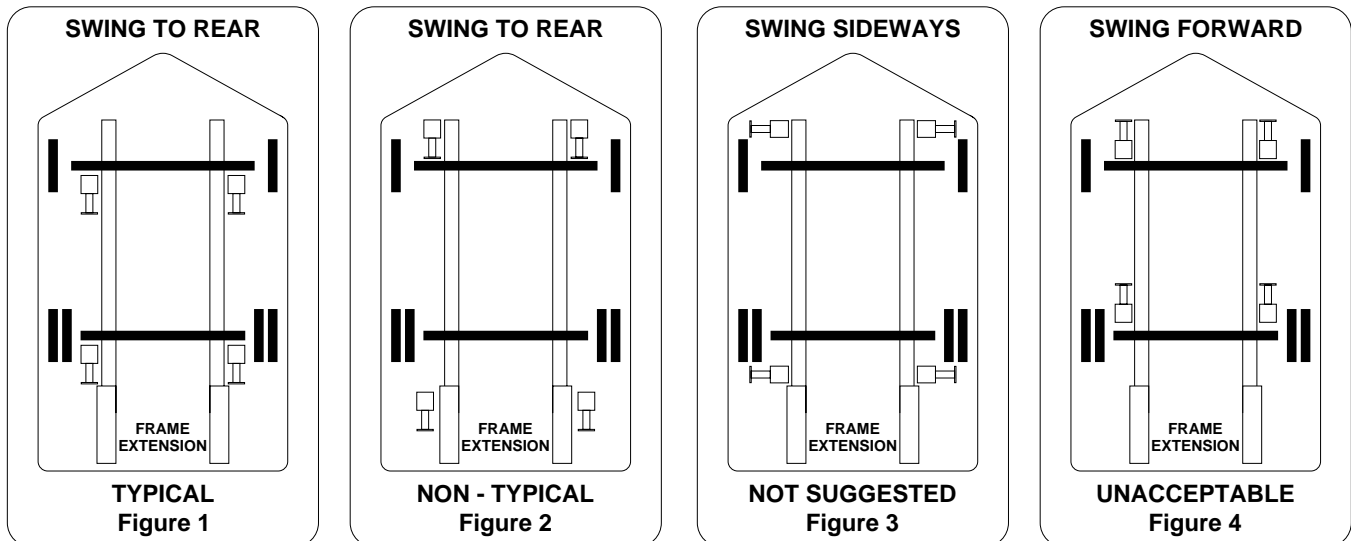
To select the proper components for your application, especially when selecting mounting brackets and/or jacks, the vehicle must be available for inspection. Ordering system components without first inspecting and measuring the vehicle for critical component mounting and location information may result in receiving components that may not work properly for your application.

Refer to the kick-down, straight-acting pivoting or straight-acting fixed "**CLEARANCE AND MOUNTING DIMENSION CHART**" in this section for information needed to check available mounting locations for adequate clearance to mount and operate the jacks. **Combine this information with information in the Aftermarket Leveling System Configurator and/or the Miscellaneous Aftermarket Bracket section to determine a proper mounting location with adequate mounting and operational clearance BEFORE ordering equipment.** Remember, operating clearance includes mounting height. HWH offers both kick-down and straight-acting jacks in different stroke capabilities. Use the charts, system Configurator and bracket information to determine which stroke jack is needed for your application. Information contained in these different sections is vehicle generic in nature and primarily used in aftermarket installations. Because compartments and vehicle equipment locations can vary on vehicles of the same manufacturer and model, it is important to **ALWAYS** inspect the vehicle before ordering equipment. O.E.M. installations are normally more vehicle specific. O.E.M.s should contact HWH sales or engineering for specific information or drawings.

Vehicles with spring suspensions. The ground clearances listed in the Dimension Charts apply to vehicles with a full load of fuel, water and equipment. If the vehicle is empty, typically 1 inch should be added to the listed dimensions. Also, if the vehicle is new, the vehicle may settle down 3/4 of an inch or more in the first year or 10,000 miles.

Vehicles with air suspensions. Typically, straight-acting jacks are used on vehicles with an air suspension. If the vehicle is at normal ride height when mounting heights are set, you must remember the chassis will lower between 2 and 3 inches when the suspension air bags are emptied. Ground clearances listed in the Dimensions Charts are typically figured with the suspension air bags empty. If possible measure the difference between the bottom of the frame and the ground with the vehicle at normal ride height and with the bags empty. This dimension is how far the vehicle will lower when the air bags are exhausted. Add this dimension to the suggested ground clearance listed for the jacks in the dimension charts. Example: A 13" stroke jack is typically mounted with 7 to 9 inches of ground clearance. A vehicle with an air suspension drops 3 inches from normal ride height when the suspension air bags are emptied. The typical ground clearance for this installation should be 10 to 12 inches with the vehicle at normal ride height.

The correct mounting location for the jacks is important for the proper functioning of the leveling system and to reduce stress to the vehicle while leveling. Refer to Figures 1 thru 4 for typical, non-typical, not suggested and unacceptable mounting configurations. Figures 3 and 4 refer to kick-down style jacks only.



SECTION I

725 SERIES LEVELING SYSTEMS

COMPONENT SELECTION

System Controls, Hoses and Harnesses. Components such as control systems used for after market installations on motor homes are predetermined by HWH once the type of vehicle and jacks are determined. There are generic hose kits and harnesses for class C and class A vehicles. The control systems and power unit / control box assemblies are determined by the type of chassis and the jacks used with the installation. O.E.M. or specialty installers should contact HWH for specific control system, power unit / control box assemblies, hose and harness information. There are different size pump / motor / tank assemblies available if mounting space is limited.

The following dimensions show how much space is needed to mount a standard power unit assembly for the Sprinter chassis, class C and class A style vehicles:

Sprinter Power Unit / Control Assembly

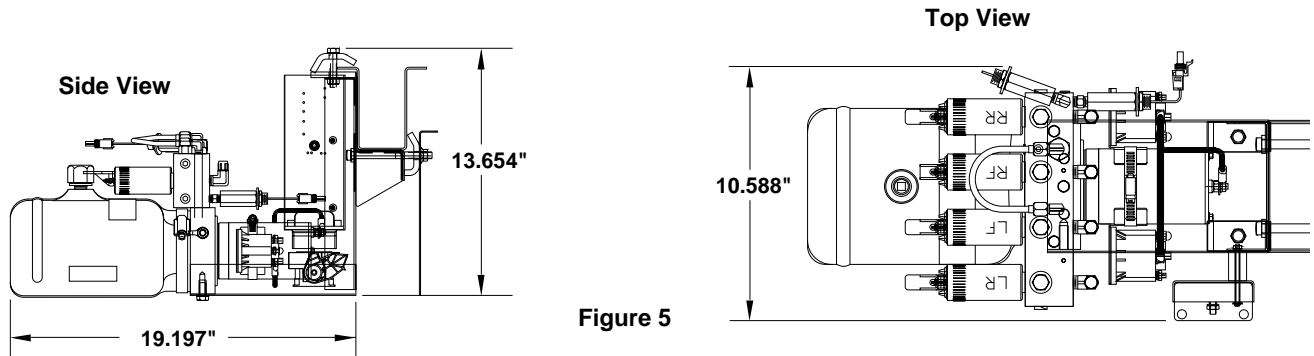


Figure 5

Class A or Class C Power Unit / Control Assembly

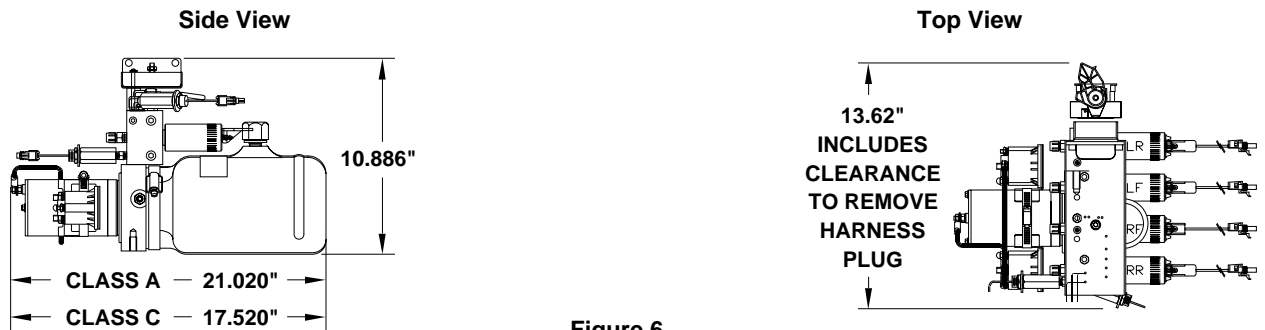


Figure 6

The standard class C style power unit / control assembly is typically used with systems that incorporate 6,000# capacity jacks and smaller. The standard class A style power unit / control assembly is typically used with systems that incorporate 6,000# jacks and larger. Examples: The class C power unit would be used with a system that has four 6,000# jacks or a system with two 4,000# and two 6,000# jacks. The class A power unit would be used with a system that has two 6,000# and two 9,000# jacks. **If the above dimensions do not allow the installation of the power unit / control assembly, contact HWH Corporation for other options.**

Important: Generic hose and harness kits are designed to mount the power unit/control assembly between the front and rear tires on the outside of the frame rail. Driver or passenger side is ok. If mounted clear to the front or rear of the vehicle, hoses and/or harnesses may not be long enough. Due to heat and access issues, the power unit/control assembly should NEVER be mounted between the frame rails.

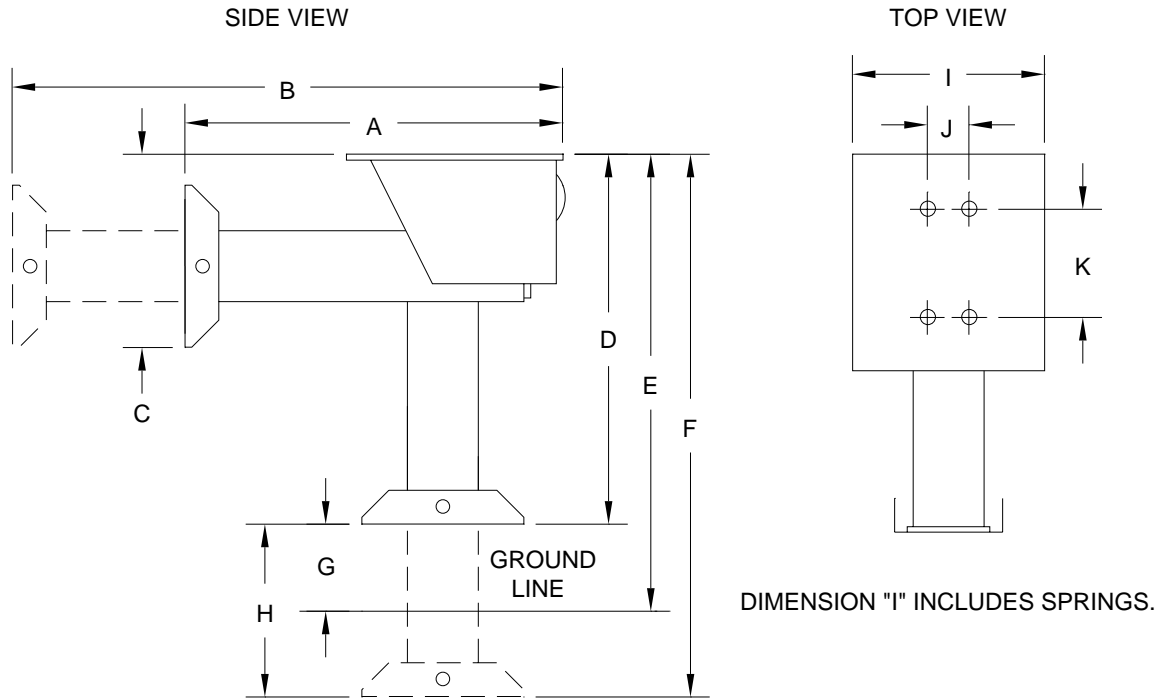
Air Suspension Air Dump System. If the vehicle is equipped with an air suspension, an air bag air dump system is needed. Some vehicles will be equipped with a pilot air dump system. Most likely, if a pilot air dump system is used, there will be a dump switch or button supplied by the chassis manufacturer. If the chassis has no air dump system, an HWH air dump system will have to be used. This will have electrically controlled solenoid valves, a different touch panel, and necessary harnesses. Contact HWH with specific chassis information to obtain the proper air dump kit.

Due to variations in chassis's, vehicle construction and vehicle equipment, typical systems, mounting brackets and components offered by HWH may not fit every application, even when a specific application is listed. It is the installers responsibility to address mounting requirements and issues before starting the installation. When variations are encountered that require custom brackets or components, or typical mounting locations are not available, contact HWH Corporation for assistance.

SECTION I

CLEARANCE AND MOUNTING DIMENSION CHART

KICK - DOWN JACKS



JACK	RETRACTED DIMENSIONS			EXTENDED DIMENSIONS				STROKE	MOUNTING WIDTH	MOUNTING BOLT PATTERN	
	A	B	C	D	E	F	G			H	I
6000# SHORT	12.5"	19.5"	4.5"	12.0"	MIN 14.0" MAX 16.0"	19.0"	MIN 2.0" MAX 4.0"	7.0"	6.5"	1.5"	4.5"
6000# TALL	14.0"	22.0"	4.5"	13.5"	MIN 15.5" MAX 17.5"	21.5"	MIN 2.0" MAX 4.0"	8.0"	6.5"	1.5"	4.5"
9000# SHORT	14.5"	23.0"	6.5"	13.5"	MIN 16.5" MAX 18.0"	22.0"	MIN 3.0" MAX 4.5"	8.5"	8.5"	1.5"	4.5"
9000# TALL	15.5"	24.5"	6.5"	14.5"	MIN 17.5" MAX 19.0"	23.5"	MIN 3.0" MAX 4.5"	9.0"	8.5"	1.5"	4.5"
16000#	18.0"	26.0"	7.0"	16.75"	MIN 19.75" MAX 21.25"	24.75"	MIN 3.0" MAX 4.5"	8.0"	12.5"	4.0"	4.0"

Dimension E is the suggested mounting height.

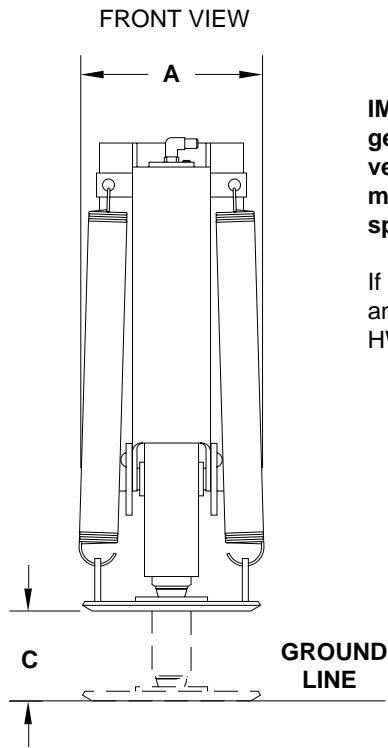
Dimension G is the suggested ground clearance when the jack is vertical but not extended.

* If using kick - down jacks on vehicles with full airbag suspensions, add 2 inches to this dimension.

SECTION I

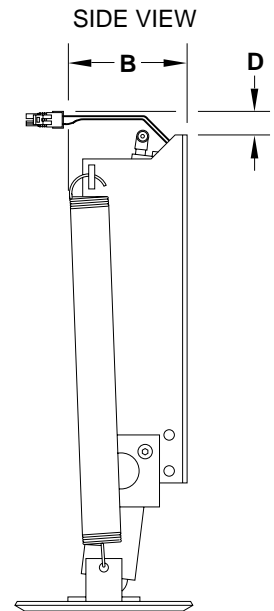
CLEARANCE AND MOUNTING DIMENSION CHART

STRAIGHT-ACTING PIVOTING JACKS WITH SINGLE ACTING CYLINDERS



IMPORTANT: Dimensions listed here are for typical generic style jacks installed in the after market. For vehicle specific jacks, contact HWH Corporation for mounting and clearance dimensions or drawings of specific jacks.

If needed, jacks with different mounting dimensions and spring arrangements may be available. Contact HWH Corporation for information.



* If the vehicle is equipped with an air suspension that will be dumped, add a minimum of 2" to the ground clearance dimension. For new and or unloaded vehicles with spring suspension, add a minimum of 1" to the clearance dimensions to allow for settling of the vehicle.

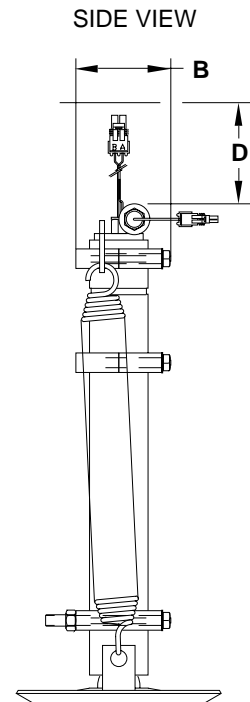
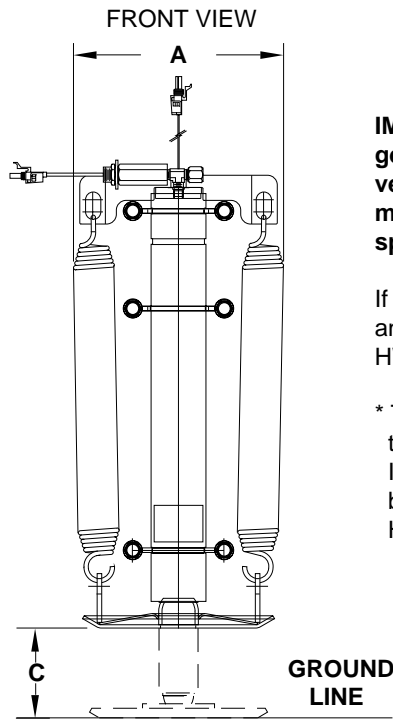
JACK CAPACITY AND STROKE	MOUNTING WIDTH		GROUND CLEARANCE C *	TOP CLEARANCE D **
	A	B		
3,000# x 13" STROKE	8.00"	3.75"	7.00" MIN. - 9.00" MAX	2.00"
4,000# x 13" STROKE	8.00"	4.75"	7.00" MIN. - 9.00" MAX	2.00"
6,000# x 13" STROKE	8.00"	5.00"	7.00" MIN. - 9.00" MAX	2.00"
6,000# x 16" STROKE	8.00"	5.00"	10.00" MIN. - 12.00" MAX	2.00"
9,000# x 13" STROKE	8.50"	5.50"	7.00" MIN. - 9.00" MAX	2.00"
9,000# x 16" STROKE	8.50"	5.50"	10.00" MIN. - 12.00" MAX	2.00"
12,000# x 13" STROKE	10.00"	6.00"	7.00" MIN. - 9.00" MAX	2.00"
12,000# x 16" STROKE	10.00"	6.00"	10.00" MIN. - 12.00" MAX	2.00"
16,000# x 13" STROKE	12.00"	6.50"	7.00" MIN. - 9.00" MAX	2.00"
16,000# x 16" STROKE	12.00"	6.50"	10.00" MIN. - 12.00" MAX	2.00"
24,000# x 13" STROKE	13.25"	7.50"	7.00" MIN. - 9.00" MAX	2.00"
24,000# x 16" STROKE	13.25"	7.50"	10.00" MIN. - 12.00" MAX	2.00"

** This is figured from the highest point of the cylinder or component mounted to the top of the cylinder. If the hose comes into a straight fitting, 6 to 8 inches of clearance may be needed.

SECTION I

CLEARANCE AND MOUNTING DIMENSION CHART

STRAIGHT-ACTING FIXED JACKS WITH SINGLE ACTING CYLINDERS



IMPORTANT: Dimensions listed here are for typical generic style jacks installed in the after market. For vehicle specific jacks, contact HWH Corporation for mounting and clearance dimensions or drawings of specific jacks.

If needed, jacks with different mounting dimensions and spring arrangements may be available. Contact HWH Corporation for information.

* The "B" measurement includes clearance to remove the clamps and bolts so the cylinder can be replaced. It does not include clearance for any mounting plate or brackets. Brackets are available from HWH. Contact HWH for assistance and information.

** If the vehicle is equipped with an air suspension that will be dumped, add a minimum of 2" to the ground clearance dimension. For new and or unloaded vehicles with spring suspension, add a minimum of 1" to the clearance dimensions to allow for settling of the vehicle.

JACK CAPACITY AND STROKE	MOUNTING WIDTH		GROUND CLEARANCE C **	TOP CLEARANCE D ***
	A	B*		
4,000# x 13" STROKE	VEHICLE SPECIFIC - CONTACT HWH CORPORATION			
6,000# x 13" STROKE	8.75"	4.25"	7.00" MIN. - 9.00" MAX	2.00"
6,000# x 16" STROKE	8.75"	4.25"	10.00" MIN. - 12.00" MAX	2.00"
9,000# x 13" STROKE	9.75"	5.12"	7.00" MIN. - 9.00" MAX	2.00"
9,000# x 16" STROKE	9.75"	5.12"	10.00" MIN. - 12.00" MAX	2.00"
12,000# x 13" STROKE	10.00"	5.12"	7.00" MIN. - 9.00" MAX	2.00"
12,000# x 16" STROKE	10.00"	5.12"	10.00" MIN. - 12.00" MAX	2.00"
16,000# x 13" STROKE	12.25"	5.90"	7.00" MIN. - 9.00" MAX	2.00"
16,000# x 16" STROKE	12.25"	5.90"	10.00" MIN. - 12.00" MAX	2.00"

*** This is figured from the highest point of the cylinder or component mounted to the top of the cylinder to the bottom of the vehicle floor. If the hose comes into a straight fitting, 6 to 8 inches of clearance may be needed.

SECTION II

725 SERIES LEVELING SYSTEMS

COMPONENT INSTALLATION

1.) PRE - INSTALLATION CHECKS

THESE ARE ITEMS THE INSTALLER SHOULD CHECK BEFORE STARTING THE INSTALLATION:

- 1.) Do the jacks have the proper lifting capacity for the axle weights of the vehicle?
- 2.) Do the jacks have the proper stroke for the mounting heights available?
- 3.) Does the pump have the proper reservoir capacity for the jacks being used?
- 4.) Are acceptable mounting locations available for the jacks and other system components?
- 5.) Will the mounting brackets or jacks interfere with any vehicle components or structure?
- 6.) If the vehicle is equipped with an air suspension, an air dump system must be used for proper leveling. If the vehicle is not equipped with an air dump system, an air dump system must be installed. Contact HWH Corporation for assistance.
- 7.) Are all components necessary for the installation, including mounting brackets, hardware kits, hoses, etc. present?
Do not start the installation only to find the touch panel is missing.
- 8.) Any vehicle exhaust modification that needs to be done should be done before the installation is started.
- 9.) Does the vehicle have a good set of batteries that are fully charged?

IMPORTANT: Jacks used with 725 series leveling systems need a pressure switch on each jack. Generic jack kits may not come equipped with pressure switches. Make sure the appropriate jack pressure switches have been ordered and are present for the installation.

NOTE: Do not use kick-down style jacks and straight-acting jacks on the same vehicle.

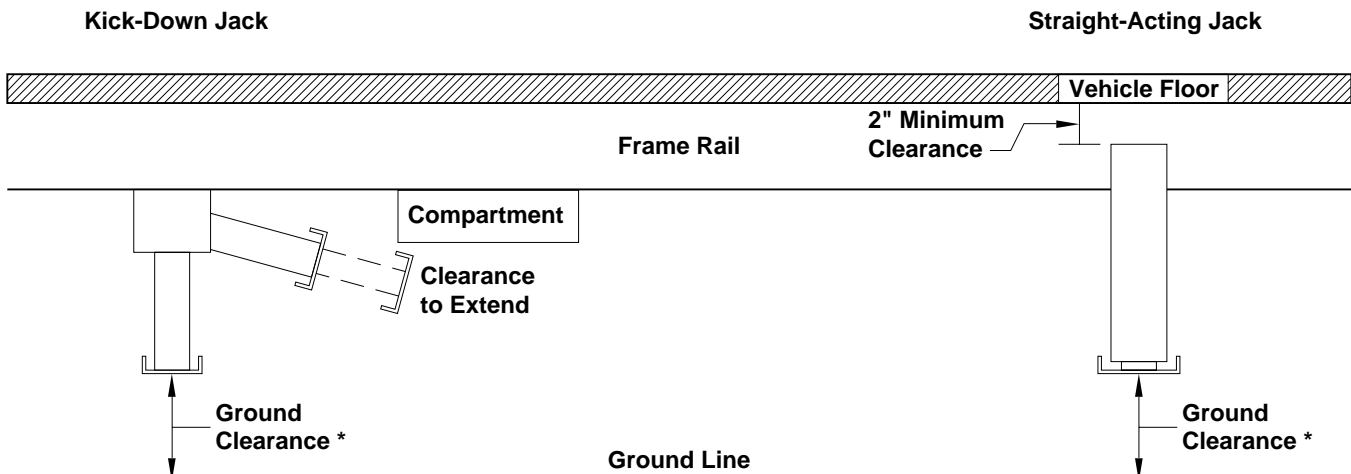
IF THERE ARE ANY PROBLEMS WITH ANY OF THE ABOVE ITEMS, CONTACT HWH CORPORATION BEFORE STARTING THE INSTALLATION.

2.) MOUNTING THE JACKS

This section contains general mounting location and arrangement information along with information specific to kick-down style or straight-acting style jacks. **Read this section thoroughly. Mounting the jacks properly is essential to the correct operation of the leveling system.**

General Information: Refer to the "CLEARANCE AND MOUNTING DIMENSION CHARTS" in SECTION I of this manual information needed to check available mounting locations for adequate clearance to mount and operate the jacks. Refer to "Miscellaneous Aftermarket Brackets" (ML44100M5F5_BRACKETS) for specific information concerning bracket and mounting dimensions or jack / mounting bracket locations on frames. Information in this section is mainly vehicle generic in nature and is primarily used in aftermarket installations. O.E.M. installations will usually be more vehicle specific. O.E.M.s should contact HWH sales or engineering for specific information or drawings. **Use the combined information from the charts in SECTION I and the Aftermarket Bracket section to determine a proper mounting location with adequate mounting and operational clearance before starting the installation.** Having the front jacks mounted only to find there is not an acceptable location for the rear jacks will be a frustrating experience.

Check mounting bracket or jack mounting heights before continuing with mounting bracket / jack installation. Mounting the brackets or jacks at an improper height may interfere with correct operation of the leveling system.



* Refer to "CLEARANCE AND MOUNTING DIMENSION CHARTS" in SECTION I of this manual.

Figure 7

SECTION II

725 SERIES LEVELING SYSTEMS

COMPONENT INSTALLATION

Vehicles with spring suspensions. The ground clearances listed in the Dimension Charts apply to vehicles with a full load of fuel, water and equipment. If the vehicle is empty, typically 1 inch should be added to the listed dimensions. Also, if the vehicle is new, the vehicle may settle down 3/4 of an inch or more in the first year or 10,000 miles.

WARNING: DO NOT CRAWL UNDER A VEHICLE WITHOUT PROPERLY SUPPORTING THE FRAME OF THE VEHICLE IF THE VEHICLE IS SUPPORTED ON THE SUSPENSION AIR BAGS. THE VEHICLE WILL RAPIDLY DROP SEVERAL INCHES WHEN THE AIR IS EXHAUSTED FROM THE AIR BAGS. MAKE SURE THERE IS ADEQUATE CLEARANCE TO WORK UNDER THE VEHICLE WITH THE AIR BAGS DEFLATED.

Vehicles with air suspensions. Typically, straight-acting jacks are used on vehicles with an air suspension. If the vehicle is at normal ride height when mounting heights are set, you must remember the chassis will lower between 2 and 3 inches when the suspension air bags are emptied. Ground clearances listed in the Dimension Charts are typically figured with the suspension air bags empty. If possible, measure the difference between the bottom of the frame and the ground with the vehicle at normal ride height and with the air bags empty. Add this dimension to the suggested ground clearance for the jacks listed in the dimension charts. Example: A 13 inch stroke jack is typically mounted with 7 to 9 inches of ground clearance. A vehicle with an air suspension drops 3 inches from normal ride height when the suspension air bags are emptied. The typical ground clearance for this installation should be 10 to 12 inches with the vehicle at normal ride height.

The following are some general rules to follow for a typical installation of leveling jacks on a vehicle:

- 1.) The front and rear jacks should be mounted behind the front and rear axles as close to the axles as possible. Jacks are not typically mounted in front of either the front or rear axles.
- 2.) The rear jacks are not typically mounted behind the end of the main frame rails on frame rail extensions.
- 3.) If the vehicle is equipped with a tag axle, the rear jacks are typically mounted between the drive axle and the tag axle.
- 4.) Front or rear jacks may be staggered several inches to accommodate vehicle equipment and compartments. If a cross tie is required, staggering the jacks more than an inch or two may not be possible.
- 5.) Most mounting brackets and straight-acting jack pivot brackets are designed with specific mounting hole arrangements. Some brackets are designed with a flange or finger that bolts to the bottom flange of the frame rail. When a mounting bracket or pivot bracket has a specific mounting hole arrangement, use of all bolt holes, including the flange holes is important. When mounting brackets or pivot brackets have multiple hole arrangements, the widest possible set of holes should be used. Always bolt brackets as close to the top and bottom of the frame rail as the brackets allow.
- 6.) Jacks and/or mounting brackets must be mounted so they do not interfere with suspension components, springs, air bags, linkages, etc. when retracted or extended.
- 7.) Front jacks and/or mounting brackets must be mounted so they do not interfere with the front tires when the tires are turned from stop to stop. Remember as a vehicle moves up and down, the geometry of the suspension can change. Clearance with the vehicle at rest may change as the vehicle moves up or down.
- 8.) Jacks should not be exposed to high temperatures such as exhaust components. Heat shields must be installed when necessary. If heat shields are supplied with jacks or brackets, both sides should be installed. Aftermarket exhaust systems may be installed at a later date.
- 9.) Normally, modification of the vehicle exhaust is not needed but if modification is needed, this should be done before the installation of the leveling jacks.

Welding and drilling frame rails. Typically, HWH mounting brackets and jacks are designed with holes to allow a bolt on installation. Welding to HWH supplied mounting brackets or a straight-acting jack pivot bracket is allowable but all acceptable welding practices must be followed. Here are some basic guidelines ***BUT before any welding is done on the frame rail, the chassis manufacturer must be contacted for authorization and specific procedures.***

- 1.) Disconnect all battery cables. **Always disconnect the ground cables first.**
- 2.) Disconnect computer modules.
- 3.) Attach welding ground cable to the part to be welded or keep the welding ground as close to the welding area as possible.
- 4.) Never attach welding ground cables to any suspension part.
- 5.) Keep welding cables away from electrical systems.

When drilling holes: ***Do not*** drill in the radius of the frame rail.

Do not drill closer than one bolt diameter to the edge of the frame rail flange.

Do not drill next to an existing bolt hole. Maintain a one bolt diameter distance.

As with welding, contact the frame manufacturer for specific drilling information and procedures.

WHEN DRILLING OR WELDING, ALWAYS CHECK BEHIND THE OBJECT YOU ARE WELDING OR DRILLING ON FOR OBSTRUCTIONS OR EQUIPMENT SUCH AS WIRING, HOSES, BATTERIES OR HOLDING/FUEL TANKS. THESE OBJECTS MUST BE PROTECTED FROM WELDING HEAT OR DRILLING.

SECTION II

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Mounting kick-down style jacks: Refer to drawings in "Miscellaneous Aftermarket Brackets" for frame placement and mounting dimensions of the different brackets. Pre-punched or drilled and tapped mounting plates are available when on-site fabricating of a mounting system is required. Minor modification to brackets, such as making a small notch, is acceptable but HWH Corporation should be contacted if major modification or moving the bracket to a different mounting location is needed. Punch plates and kick-down brackets are designed for use with 6000# and 9000# jacks. If 16,000# kick-down jacks are to be used and an existing mounting bracket on the frame is not available, a mounting bracket will have to be fabricated. Drilled and tapped mounting plates are available from HWH Corporation.

Refer to figures 1 thru 4 in SECTION I, COMPONENT SELECTION, for typical to unacceptable mounting locations for the jacks. Kick-down jacks must be mounted so they swing upward to the rear or the vehicle when retracting to the horizontal position. **NEVER MOUNT KICK-DOWN JACKS SO THEY SWING TO THE FRONT OF THE VEHICLE (Figure 4).** Swinging jacks to the side of the vehicle is not suggested. (Figure 3)

Ample clearance behind the jacks must be maintained in case a jack extends before swinging to the vertical position. A horizontal adjustment is supplied with all kick-down style jacks. Jacks can be adjusted downward slightly to avoid contact with compartments or any vehicle or chassis equipment such as tanks and suspension components in case the jack extends before swinging vertical. These adjustments are discussed later in the manual.

Maintaining the correct ground clearance as listed in the "Clearance and Mounting Dimension Chart" for a kick-down jack is important. This allows for parking on uneven ground and also allows the use of a pad or block under the jack when parked on soft ground or asphalt. You must also allow for the vehicle to sag when loaded or as the vehicle ages. **It is important to follow the guidelines in the Clearance and Mounting Dimensions Chart for Kick-down Jacks.** If the jacks have too much clearance, 1-1/2 and 3 inch spacer kits are available. Each kit will do two jacks.

Typical installation of kick-down mounting brackets does not require welding to the vehicle frame rail. If any welding on the vehicle frame rail is to be done, the vehicle or chassis manufacturer should be contacted for authorization and procedures before proceeding. Welding to jack mounting brackets is allowable but all acceptable welding and safety procedures should be followed. Refer to "Welding and Drilling Frame rails" in SECTION II of COMPONENT INSTALLATION. **IN NO CASE SHOULD A KICK-DOWN JACK PIVOT BRACKET BE WELDED DIRECTLY TO A FRAME RAIL OR A MOUNTING BRACKET.**

6,000# and 9,000# kick-down jacks and mounting brackets have slotted mounting holes so the jacks can be rotated slightly. This allows the jack to be mounted so it swings up and down in line with the vehicle. 16,000# jack mounting holes are not slotted. The brackets need to be installed as square in line with the vehicle frame as possible.

Some means of preventing the frame rail from twisting must be provided. Typically, the jack mounting brackets are mounted near a suspension bracket or a frame rail cross tie.

Mounting brackets and jacks should be bolted using hardware supplied by HWH Corporation. Make sure all bolts are properly tightened. A minimum of grade 5 bolt should be maintained if substituting for hardware supplied by HWH Corporation. Any flat and/or lock washers must be used when supplied in hardware kits. **Before the installation is complete, all mounting bolts for the mounting brackets and jacks should be rechecked for tightness.**

WARNING: JACKS WILL SWING UP ABRUPTLY FROM THE VERTICAL POSITION WHEN RELEASED. BODILY INJURY CAN OCCUR WHEN CONTACT IS MADE WITH A SWINGING JACK.

The kick-down jack will have to pivot to the vertical position to access all mounting bolts. Loosely fasten the two rearward pivot bracket mounting bolts first. Pull the jack to the vertical position and secure the jack so it cannot swing to the horizontal position. A small strap or chain works the best. **DO NOT jam a wrench or bar between the jack cylinder and pivot bracket. If the bar slips, the jack will abruptly swing up.** When the jack is completely fastened and the mounting bolts properly tightened, release the retaining strap or chain and allow the jack to pivot to the horizontal position.

Mounting straight-acting and straight-acting pivoting style jacks: The main concerns when mounting straight-acting jacks are the ground clearance, clearance above the jack to the vehicle floor and making sure the jack is mounted straight up and down with the vehicle so it does not push forward or backwards as it lifts the vehicle. If a jack cylinder incorporates a straight fitting for the hose connection, more clearance will be needed to attach the hose. Refer to the Clearance and Mounting Dimensions Chart. Straight-acting Jacks, for typical ground clearance when the jacks are retracted. If the vehicle is equipped with an air suspension, the vehicle will lower between 2 and 3 inches when the air is dumped from the air bags. Remember to allow for this when determining mounting heights. Typically, we like the jack to have between 5 and 6 inches of lift. This should be taken into account when determining mounting heights.

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Example: A 13 inch stroke jack should be mounted with 7 to 8 inches of ground clearance. Also remember there has to be clearance above the jacks to access hose and electrical connections. When determining the mounting height it is also important to maintain an adequate bolting pattern for mounting the jacks. A minimum of four bolts should be used to fasten each jack to the frame rail: two upper bolts and two lower bolts.

Bolt Mounting Hole Patterns

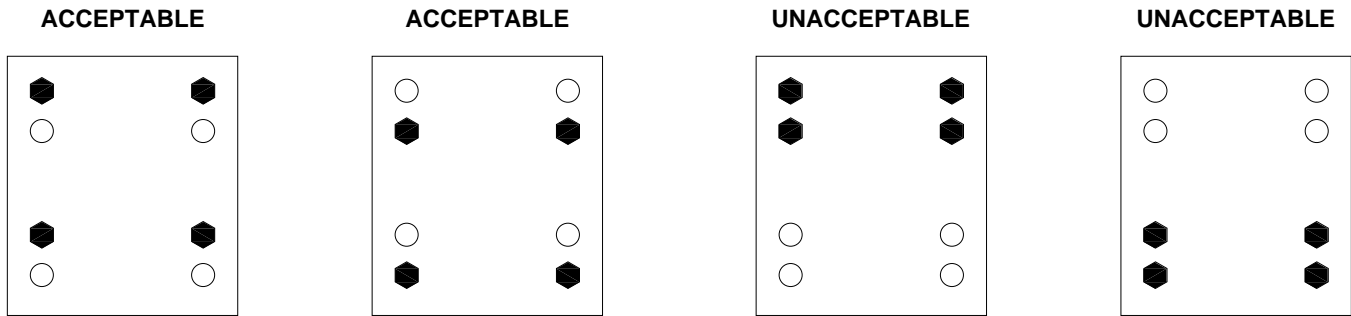


Figure 8

Mounting Straight Acting Pivoting Jacks

Mounting holes are normally provided on the jack pivot bracket or if a weld on style pivot bracket is used, the mounting plate for that style jack has pre-drilled mounting holes. Some frames may have pre-drilled holes that can be used. Typically, we like a minimum of 3 inches between the top and bottom mounting holes for 4,000# and 6,000# jacks with a minimum of 4 ½ inches between the top and bottom mounting holes for 9,000# and 12,000# jacks. HWH Corporation should be contacted for applications requiring 16,000# or 24,000# capacity jacks.

Due to variations in vehicle weight, jack capacities, frame width and construction, HWH cannot address all mounting possibilities and variations. It is the responsibility of the installer to recognize possible mounting issues such as mounting hole patterns or mounting positions on the frame rail. Anytime an issue is suspected, please contact HWH Corporation for assistance.

If using a jack with a weld-on style pivot bracket, a mounting plate that bolts to the vehicle frame rail should be used. First, determine the proper mounting height of the jack and fasten the mounting plate to the frame rail in the appropriate position. The jack can then be welded to the mounting plate. It may be best to tack the jack in place and then remove it from the frame rail to complete the welding of the pivot bracket to the plate in a flat position instead of a vertical position. **WHEN WELDING TO A PLATE THAT IS FASTENED TO THE FRAME RAIL, PROTECT ANY TUBES, WIRES, HOSES, ETC. ON EITHER SIDE OF THE FRAME RAIL FROM WELDING HEAT AND SPLATTER.**

The jacks or jack mounting plates should be bolted using hardware supplied by HWH Corporation. Make sure all bolts are properly tightened. A minimum of grade 5 bolt should be maintained if substituting for hardware supplied by HWH Corporation. Any flat and/or lock washers must be used when supplied in hardware kits. **Before the installation is complete, all mounting bolts for the jacks should be rechecked for tightness.**

When installing the front and rear jacks, some means of preventing the frame rail from twisting must be provided. Some jack assemblies have a cross tie assembly built into the pivot bracket arrangement. HWH Corporation offers an assortment of cross tie assemblies to tie the lower section of the jack pivot brackets together. If necessary, a cross tie assembly or some type of frame rail support may need to be fabricated on site. It is allowable to weld gussets and other components of a cross tie assembly. The cross tie assembly should not be welded to the jack pivot bracket in case the cross tie has to be removed to access other vehicle equipment.

Mounting Straight Acting Jacks with Clamp Style Brackets

There are several brackets available for straight-acting jacks that clamp on . There are also bolt on or weld on clamps available that can be used with a plate or channel bracket supplied by the installer. The clamps should not be welded directly to the frame. They should be welded to a plate or channel bracket that can be bolted to the frame. Bolt mounting hole patterns are shown in Figure 8. **WHEN WELDING TO A PLATE THAT IS FASTENED TO THE FRAME RAIL, PROTECT ANY TUBES, WIRES, HOSES ETC. ON EITHER SIDE OF THE FRAME RAIL FROM WELDING HEAT AND SPLATTER.**

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There are also brackets for the clamp style straight-acting jacks that clamp directly to the frame for the Ford F-450 chassis and different Sprinter chassis's. There are diagrams at the end of this manual showing different bracket arrangements for the clamp style jacks.

The barrel of the clamp style jacks will have grooves for clamps. Normally there will be two at the top and one at the bottom but some will have only one on the top and some three. The multiple top grooves allow the jack to be positioned higher or lower to adjust the ground clearance. The bottom groove is for the cross tie clamp. Like the straight-acting pivoting jacks, the clamp style straight-acting jacks should use a cross tie. Cross tie kits are available or can be fabricated but the cross tie clamp for the bottom groove should be used.

There will also be a center clamp used. There is no groove for this clamp and it can be positioned higher or lower as needed. This clamp must be used to stabilize the jack from pivoting forward or backward. **Not using this center clamp will cause damage to the jack, bracket and/or vehicle frame.**

The clamps are designed to allow a slight clearance when fully tightened. The groove clamps, inner and outer are a smaller diameter than the clamps used around the non-grooved part of the barrel. Using a groove clamp on the main barrel will cause "squeeze". This will cause the jack to not work properly. Using a barrel clamp in a groove position can allow the jack to shift up or down, causing damage to the jack, bracket or vehicle. Check the jack grooves for debris that could cause a "squeeze" when the clamps are tightened. You should actually be able to twist the jack slightly with the clamp bolts tight.

Comon Mounting Configuration

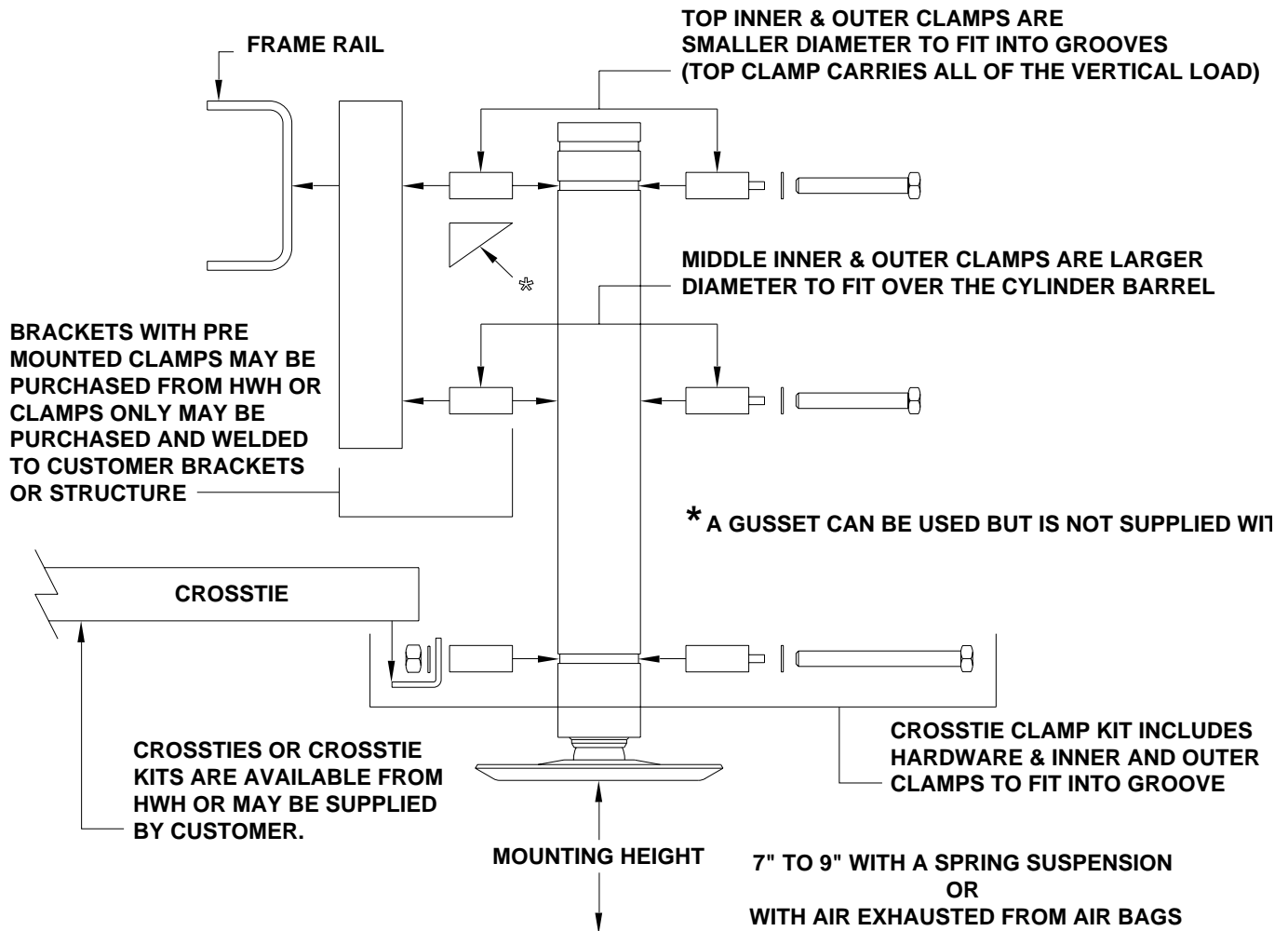


Figure 9

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If the clamps need to be mounted to a plate or channel supplied by the installer, follow the welding instructions below. The clamps can be put on the jack and then the assembly positioned for tack welding.

After tacking and before welding, remove the cylinder. Welding with the cylinder in place can damage the jack seals.

Gussets, not included with kits, can be used to help position and keep the top inner clamp from "pulling" while welding the clamp. The gussets must be on the bottom of the clamp so they do not interfere with the spring bracket at the top of the jack.

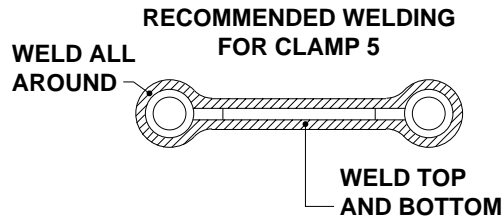


Figure 10

The mounting brackets and/or clamps should be bolted using hardware supplied by HWH Corporation. Make sure all bolts are properly tightened. A minimum of grade 5 bolts should be maintained if substituting for hardware supplied by HWH Corporation. Any flat and/or lock washers must be used when supplied in the hardware kit. **Before installation is complete, all mounting bolts for the jacks should be rechecked for tightness.**

IMPORTANT FOR ALL JACK STYLES: BEFORE INSTALLATION IS COMPLETE MAKE SURE ALL BRACKETS, JACKS AND JACK FEET DO NOT INTERFERE WITH ANY SUSPENSION COMPONENT OR TIRES WITH THE SUSPENSION IN ANY POSITION AND ON THE FRONT WITH THE WHEELS TURNED STOP TO STOP.

WARNING: DO NOT CRAWL UNDER A VEHICLE WITHOUT PROPERLY SUPPORTING THE FRAME OF THE VEHICLE IF THE VEHICLE IS SUPPORTED ON THE SUSPENSION AIR BAGS. THE VEHICLE WILL RAPIDLY DROP SEVERAL INCHES WHEN THE AIR IS EXHAUSTED FROM THE AIR BAGS. MAKE SURE THERE IS ADEQUATE CLEARANCE TO WORK UNDER THE VEHICLE WITH THE AIR BAGS DEFLATED.

3.) AIR SUSPENSION - AIR DUMP INSTALLATION (NON PILOT DUMP EQUIPPED VEHICLES)

Before deflating the air bags, the vehicle's frame must be securely blocked so it cannot drop when the air is released from the air bags. Suspension components can also move when the air is released. Make sure there is ample room to work under the vehicle without interference from any moving suspension or vehicle component.

The air bags can be deflated by disconnecting the air line that goes from the height control valve to the air bag. The best access to accomplish this is probably at the height control valve. The air dump solenoid valve tees in between the height control valve and the air bag. The kit will contain air dump solenoid valves as needed, a tee fitting for each air dump valve and a length of 3/8 inch air line. The tee will be 3/8" by 3/8" by 3/8". If the air line between the height control valve and the air bag is a different size than 3/8 inch, you will have to supply the correct tee fitting. **ALL AIR LINE FITTINGS USED MUST BE DOT APPROVED.** Typically, the dump valve is located fairly close to the height control valve. The valve should be mounted solidly to some type of frame member if possible. Ample air line is supplied to move the dump valve where it can be mounted properly. The valve has 2 mounting screws on the bottom of the valve that can be used to attach the valve to a mounting bracket. It is best if the valve is mounted so the exhaust port is protected from road splash. This will help keep the exhaust port free from dirt which could interfere with the operation of the valve. **IT IS IMPORTANT TO KEEP THE DUMP VALVE AND AIR LINES AWAY FROM ANY HEAT SOURCES SUCH AS THE ENGINE EXHAUST.**

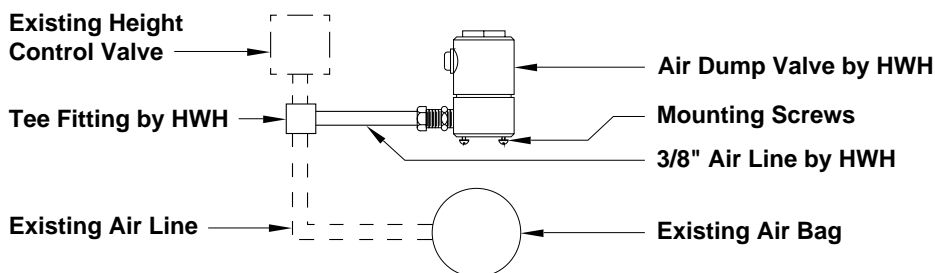


Figure 11

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4.) POWER UNIT ASSEMBLY INSTALLATION

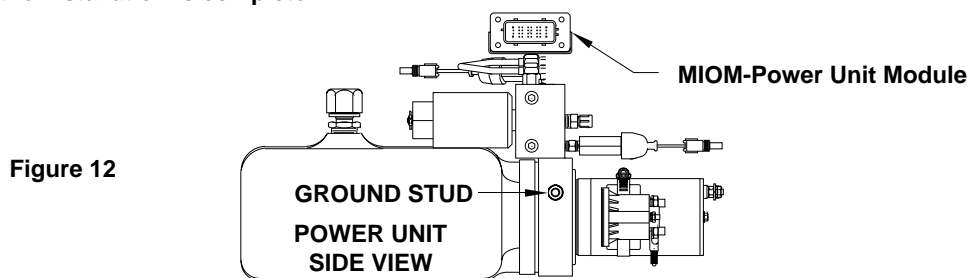
The power unit assembly can be mounted virtually anywhere on the vehicle there is room including a compartment, in the nose or rear of the vehicle or under the vehicle mounted to the frame rail. The limiting factors are the harness and hose lengths. **If the assembly is to be mounted in an area that is going to require longer hoses or harnesses, contact HWH Corporation before beginning the installation.** Refer to figures 5 and 6 in "Component Selection", Section 1 for mounting dimensions. There are specific clamp on mounting brackets for Sprinter installations. Most other kits come with a mounting channel that can be welded to a strong frame member. **It is not suggested to weld the mounting channel directly to the vehicle frame. If desired, another piece of channel can be used to weld an L shaped bracket together that can then be bolted to the frame. DO NOT weld the mounting channel directly to the bottom flange of the frame rail.**

IMPORTANT: DO NOT mount the power unit between the frame rails. Exhaust heat can and will cause issues. The solenoid valves on the power unit assembly are equipped with valve release cams for emergency retract of the jacks. The valves must be accessible without crawling under the vehicle.

Other things to consider when determining a mounting location for the power unit assembly is access to check and add fluid, accessibility for service and protection from direct road spray. Make sure hydraulic lines can be routed to the power unit without using extreme bends. You must allow 3.5" past the end of the *manifold* for installation and removal of the power unit module harness connector. See figure 6 for power unit assembly dimensions.

For Sprinter chassis, the power unit assembly should be mounted somewhere between the front and rear tires. Then the hose and harness lengths should be adequate. **The solenoid valves must be accessible without crawling under the vehicle.**

Make sure all bolts used to fasten the mounting bracket to the vehicle and the power unit to the bracket are properly tightened before the installation is complete.



Proper grounding of the power unit assembly. PROPER GROUNDING OF THE POWER UNIT ASSEMBLY IS CRITICAL. Grounding for all the system components including the pump motor, the MIOM module, touch panel, valves, pressure switches and warning switches is accomplished with the mounting of the power unit assembly to the vehicle. For class A vehicles, if the power unit mounting bracket is attached directly to the frame or a good, solid frame member, this will usually supply an adequate ground for the system. For installations using the clamp style mounting brackets, it is recommended to add a ground cable. One end of the ground cable can attach to the pump mounting bolts or better, the ground stud on the side of the pump. Refer to Figure 12. The other end of the cable should go directly to the frame rail. The cable size should be a minimum of a No. 2 cable or the same gauge cable used to supply battery power to the master relay.

When adding a ground cable by using an existing hole or drilling a new hole, grind a small area around the hole down to bare metal. Attach the cable using a star washer between the frame and cable end. Make sure the bolt is tight and then paint the connection, both sides, so it cannot rust. **IF DRILLING A NEW HOLE, MAKE SURE YOU DO NOT DAMAGE ANY HOSE, WIRE, CABLE, ETC. ON THE INSIDE OF THE FRAME RAIL.** When attaching the ground cable to the pump ground stud or pump mounting bolt, again use a star washer against clean, bare metal, make sure all bolts and/or nuts are tight and coat the connection with paint or some type of sealant such as Red Air Dry Enamel (RANVAR), number B6-685, made by P.D. George Company. Refer to MI95.54 Information Bulletin which can be found in the "Bulletin" section on the HWH website. It is recommended to paint all brackets, attachment points and mounting hardware to protect connections from rust and corrosion.

When mounting the power unit assembly in a compartment, it is necessary to use a ground cable no matter what material the compartment or compartment structure is made of. **It is highly recommended to use a ground cable in all installations to ensure a proper ground for the system.**

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5.) TOUCH PANEL INSTALLATION

The touch panel can be mounted anywhere inside the vehicle but in the drivers area may be the most desirable when possible. The mounting location of the touch panel should be discussed with the vehicle owner. Remember to take into account the length of the touch panel cable when determining a mounting location for the touch panel. A spacer box is available to surface mount the touch panel on a flat surface. The touch panel may also be flush mounted on most flat surfaces. A template is available in the diagram section of this manual to mark the cutout for a flush mount application. Do not flush mount the panel on any surface that is not flat. Tightening the panel down to a curved surface will damage the panel. An angled bezel plate is available to mount the touch panel to a slightly curved surface.

It is suggested to not cut through the floor to mount the touch panel. If the panel is to be mounted on the floor, use the spacer box to house the touch panel. When mounting the touch panel on the floor, locate the panel in an area that will protect it from being stepped on. **Seal any holes to the outside of the vehicle to protect the touch panel from dirt and water.**

Before drilling or cutting holes in any surface, check for obstructions such as wires or hoses behind the surface. Protect wires or other equipment from damage when cutting or drilling. Several inches of clearance should be allowed behind the touch panel mounting surface. The back of the touch panel must not contact any metal object or surface.

Make sure the touch panel cable is securely plugged in before installing the touch panel. Do not over tighten the four touch panel screws. Over tightening the screws will damage the touch panel.

6.) HYDRAULIC HOSE ROUTING AND CONNECTIONS

General Information: Improper hose routing or tightening of the hose ends can cause improper system operation and harm the integrity of the hydraulic connections. Dirt and other contamination are huge contributors to system malfunction.

Keep hose ends plugged and hydraulic fittings capped until you are ready to attach the hose end to the component fitting. If you are swaging your own hose, plug or seal the hose ends before routing the hose. Hoses supplied by HWH Corporation have a part number tag near each hose end. This can be used to check that a hose connects the correct jack and manifold fitting. If you swag your own hoses or have hoses of the same length (they will have the same part number), it is suggested to mark the hose to ease making proper connections at the manifold. Colored tape or wire ties make good permanent markers. Follow the hydraulic line connection diagram in this manual. Improper hose connections will cause improper system operation.

The following rules are for proper hose routing:

1.) Do not pull hoses taut. Leave a small amount of slack when routing a hose. BUT do not leave so much slack a hose can dangle and possibly be snagged while the vehicle is moving. Allow for jack movement when necessary. Straight-acting jacks with pivot brackets can move several inches when they pivot. Pulling a hose taut with the jack at the normal retracted position can cause hose or fitting damage when the jack pivots. Kick-down jacks must be free to pivot from the horizontal position to 45 degrees past the vertical position and back. Make sure hoses are routed properly and not so tight as to interfere with the swinging motion or moving parts of the jack. For proper hose routing and connections for kick-down jacks, refer to the "Hose Routing for Kick-down Jacks" page in this section.

2.) When possible, avoid sharp bends, loops or coiling hose. If making a loop or coiling excess hose is necessary, make as big of loops or coils as possible. Fasten the loops or coils securely so they cannot dangle or rub. Swaging equipment is available to custom fit hoses but approved HWH procedures must be followed when swaging hose. **Crimping of hose ends is not allowed.** Contact HWH Corporation or refer to ML24976 under "Information Bulletins" on the HWH web site for hose swaging information.

3.) Avoid twisting the hose. Twisting a hose can put a strain on the fitting connection. Use a backup wrench when necessary to avoid twisting the hose when tightening the hose end.

4.) Do not allow the hoses to rub. Make sure hoses will not come in contact with moving parts such as suspension or engine components. Use an adequate number of hose clamps, wire ties, etc. to prevent hoses from moving or drooping. Avoid sharp edges when routing hoses. Dull the edge if possible and protect the hose with hose guard such as split loom.

5.) Stay away from heat sources. The general rule of thumb is to have **"no direct line of sight between a hose and exhaust or heat component."** Use properly installed heat shields when necessary. Areas with a constant ambient temperature of 180 degrees Fahrenheit, such as the engine compartment or close to the radiator, should be avoided. Be cautious of enclosed compartments that may be too warm due to the proximity of an exhaust, turbo charger or engine cooling component.

6.) Never fasten the hydraulic hoses to any fuel, brake or propane line.

Tightening of hose ends. When 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). It is best to mark the hose end and fitting to ensure the hose end has been properly tightened. Refer to MP642104 at the back of this manual for proper hose end tightening procedures. If re-tightening a hose end, refer to MP642104.

HOSE ROUTING FOR KICK-DOWN JACKS AND JACK PRESSURE SWITCH INSTALLATION

KICK DOWN JACKS:

6000# KICK DOWN JACK- A short hose is attached to the jack at the factory. The hose is clamped to the pivot bracket. It can be moved to the opposite side of the jack if necessary to avoid heat sources or other obstacles.

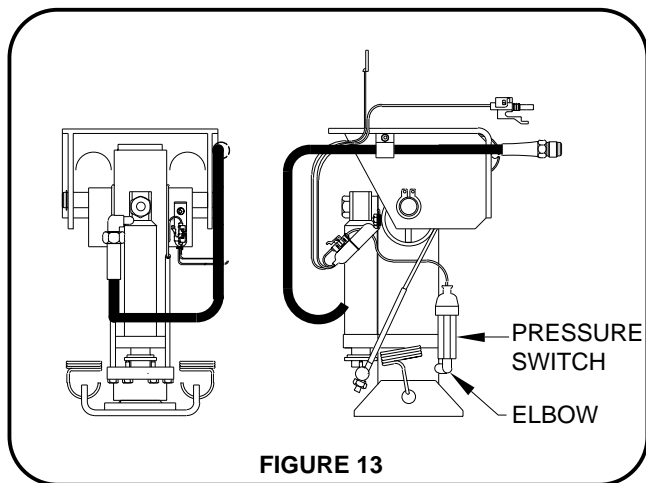


FIGURE 13

9000# KICK DOWN JACK - When connecting the hose to the jack, the hose should go in the upper left-hand corner, over the pivot area and down the front of the jack. After connecting the hose to the fitting, the hose should be clamped with a 1/4" bolt to the left side of the pivot bracket. Be sure the hose is snug against the jack in the retracted (horizontal) position.

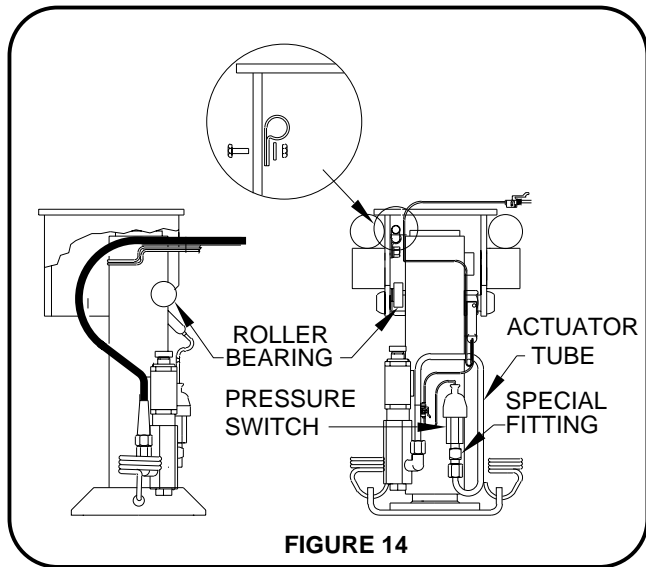


FIGURE 14

16000# KICK DOWN JACK- Route the hose around the left pivot, then across the back side of the cylinder and connect to the actuator fitting. Attach the hose to the pivot bracket using a hose clamp. There should be no slack in the hose.

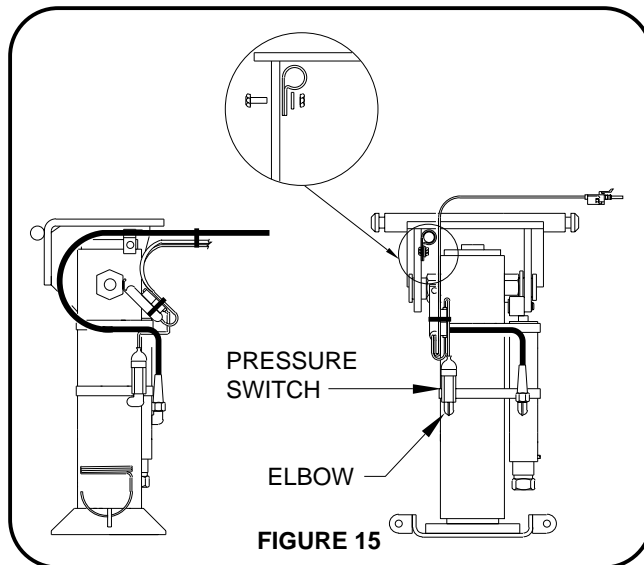


FIGURE 15

STRAIGHT ACTING JACKS :

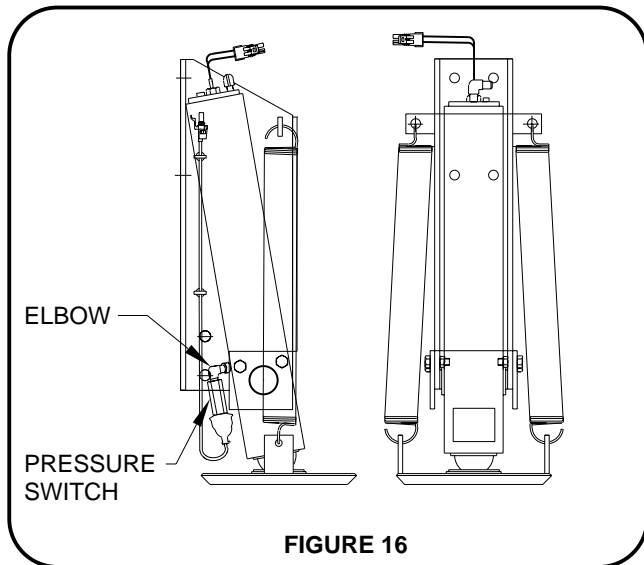


FIGURE 16

PRESSURE SWITCHES : All automatic, computerized systems require a pressure switch on each jack. In most cases the pressure switch will need to be installed on the jack. It may be easier to install the switch before mounting the jack. Refer to FIGURES 13,14, 15 & 16 for proper pressure switch locations.

On the 6000# and 16000# kick down jacks and straight acting jacks there is a plug that needs to be removed. Then install the elbow and pressure switch as shown. Be sure to use Teflon tape on all pipe threads.

On 9000# kick down jacks, remove the actuator line. Then remove the existing elbow. Install the special fitting and pressure switch as shown. Then reinstall the actuator tube. Be sure to use Teflon tape on all pipe threads.

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7.) HARNESS OR WIRE ROUTING AND CONNECTIONS

General Information: Refer to the wiring diagrams in this manual for connection information. Wiring harnesses supplied with aftermarket kits are usually adequate for most installations. O.E.M. installers should work directly with HWH Corporation to obtain specific harness lengths that are needed. All installation connections are a plug in type connection except the main battery cable to the master relay and the connection to ignition power for the MIOM, the master warning light and the warning buzzer.

We do not suggest altering harness lengths. **The touch panel harness must never be altered for any reason. If a different length touch panel harness is needed, contact HWH Corporation.** If you choose to alter the length of other HWH harnesses, all connections should be soldered and then protected with a glue filled shrink tube. It is important to maintain correct wire size with insulation rated for 125 deg. Celsius (257 deg. F). If adding length to a harness, a larger gauge wire may be needed to maintain proper current carrying capabilities. **Do not eliminate harness and equipment plugs for solenoid valves, warning switches, pressure switches or other HWH equipment.** If altering a harness length, don't cut all the wires at once. Working on one wire at a time will eliminate the possibility of reconnecting wires incorrectly. All connectors are labeled with numbers or letters for wire position. Wires are labeled with numbers to indicate wire function and position. Refer to the appropriate wiring diagrams in this manual for correct wire positions in connectors when altering a harness. **Maintaining correct wire positions in all plugs or connectors is essential to the proper operation of the leveling system.**

The following rules are for proper harness or wire routing:

- 1.) Do not pull harness or wires taut.** Leave a small amount of slack when routing wiring. BUT do not leave so much slack wiring can dangle and possibly be snagged while the vehicle is moving. Allow for jack movement when necessary. Straight-acting jacks with pivot brackets can move several inches when they pivot. Pulling wires taut with the jack at the normal retracted position can cause wire or connection damage when the jack pivots. Kick-down jacks must be free to pivot from the horizontal position to 45 degrees past the vertical position and back. Make sure wires are routed properly and not so tight as to interfere with the swinging motion or moving parts of the jack.
- 2.) Do not allow the harness or wires to rub.** Make sure wiring will not come in contact with moving parts such as suspension or engine components. Use an adequate number of wire ties to prevent harnesses or wires from moving or drooping. Avoid sharp edges when routing wiring. Dull the edge if possible and protect wiring with a guard such as split loom.
- 3.) Stay away from heat sources.** The general rule of thumb is to have "no direct line of sight between wiring and exhaust or heat component." Use properly installed heat shields when necessary.
- 4.) Never fasten harnesses or wiring to any fuel, brake or propane lines.**

Fuse, battery cable and wire information.

IT IS THE INSTALLERS RESPONSIBILITY TO DETERMINE FUSING REQUIREMENTS WHEN FIELD CONNECTIONS OF WIRES OR CABLES ARE NEEDED. FOR SPECIFIC FUSING OR WIRE STANDARDS AND GUIDELINES REFER TO THE MOST RECENT EDITION OF "ANSI/RVIA - STANDARD FOR LOW VOLTAGE SYSTEMS IN CONVERSION AND RECREATIONAL VEHICLES". CONTACT RVIA (RECREATION VEHICLE INDUSTRY ASSOCIATION), FOR ASSISTANCE OR THE MOST RECENT EDITION OF THIS PUBLICATION.

Most of the power outputs for the leveling system equipment are protected by the MIOM on the power unit assembly. The 6120 wire in the touch panel harness is ACC/IGN power for the MIOM, touch panel and the level sensing unit. The connection of the 6120 wire to ACC/IGN power is made by the installer and should go to the ACC side of the ignition switch. HWH supplies a 15 amp blade fuse on this wire. This fuse must be used unless the 6120 wire is connected directly to an ACC/IGN power source fused at 15 amps.

HWH has several different size pump motors, a 3 inch dia and a 4.5 inch dia. motor. When the power unit has a 3 inch motor a minimum number 2 gauge battery cable should be used to connect the power supply to the pump motor relays. A 150 amp fuse or circuit breaker should be used if circuit protection is required. Most aftermarket systems utilize the 3 inch motor and a 5 foot number 2 gauge battery cable is usually supplied with these power units. A longer cable may be used, but depending on the length of cable needed, the gauge size of the cable may need to be increased to limit voltage drop. If a 4.5 inch dia. motor is used, the battery cable size should be increased to a minimum number 1 gauge cable with a 200 amp fuse or circuit breaker used when circuit protection is required.

It is the installer's responsibility to determine the necessary wire gauge size needed to maintain a minimum voltage drop when the length of the cable is increased. When it is necessary to increase the wire gauge size and circuit protection is required, the fuse or circuit breaker size should not be increased.

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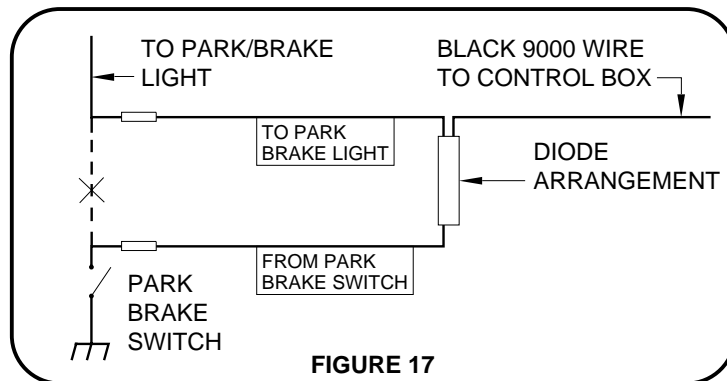
COMPONENT INSTALLATION

8.) PARK BRAKE/JACK INHIBIT CIRCUIT

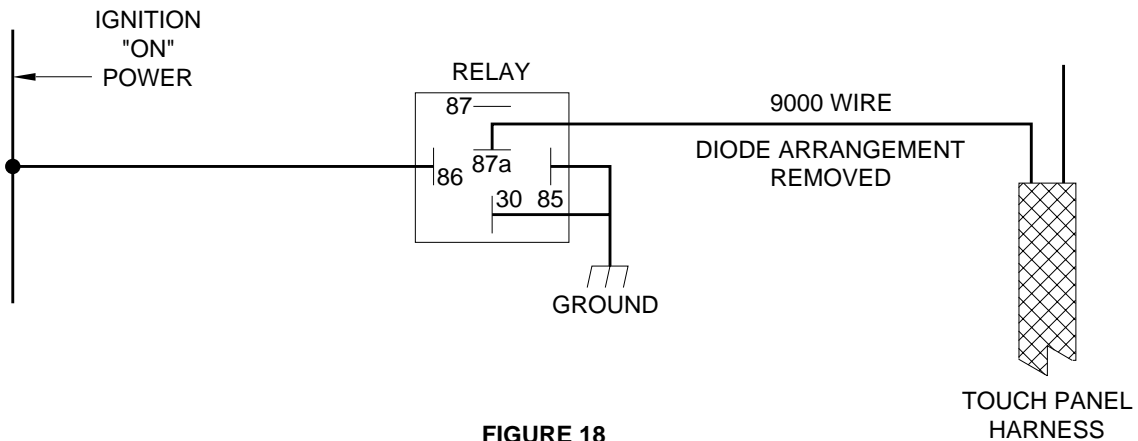
IMPORTANT: The park brake circuit inhibits the system from extending the jacks while the vehicle is moving. It is important that the park brake circuit is installed as explained. It is also important that the correct function of the park brake circuit is checked before the installation is completed.

The control box is looking for a ground signal on the #9000 park brake wire. Although most applications will have a ground signal from the park brake switch for the dash park brake light, it is not impossible to have a + voltage signal. We will explain an installation method that will work with a + voltage park brake signal.

Normal installation for a ground park brake signal. The park brake wire is a black wire labeled with the number 9000. This wire is in the touch panel harness. The end of the wire has two butt connectors and shrink tube. There is also a diode assembly at the end of the wire. **Do not eliminate the diode assembly.** The butt connector assembly splices into the wire between the park brake switch and the dash park brake light. See the figure below. If necessary, contact the chassis or vehicle manufacturer for information about the correct wire to splice the HWH park brake wire into. After cutting the park brake wire, use the butt connectors to connect the diode assembly to the existing park brake wire. Cut the wire ties and use the shrink tube to seal the butt connector connections.



Installation for a + voltage park brake signal. If the vehicle park brake signal is a + voltage, it is still important that the park brake wire is installed in such a way that it will inhibit the leveling system from being able to extend the jacks while the vehicle is moving. The diagram below shows how to use a Bosch relay to switch a ground for the HWH park brake wire using the "ON" or "RUN" side of the vehicle's ignition switch. For this installation, the diode assembly can be eliminated. Connect the HWH #9000 park brake wire to terminal 87a (normally closed contact). Install a ground wire on terminals 30 and 85. Install a wire from the "ON" side of the vehicle ignition switch to terminal 86 of the relay. When the ignition is on, there should be no ground on the HWH #9000 park brake wire. With the ignition off, there should be a ground on the #9000 wire. The HWH #6120 wire in the touch panel harness should be connected to the "ACC" side of the ignition switch. If this arrangement will not work for a particular vehicle, HWH should be contacted to help make sure the HWH park brake circuit is installed properly.



SECTION II

725 SERIES LEVELING SYSTEMS

COMPONENT INSTALLATION

9.) MASTER WARNING LIGHT/BUZZER INSTALLATION

A MASTER JACKS DOWN WARNING LIGHT SHOULD BE USED WITH ALL SYSTEMS. A BUZZER MUST BE USED WITH SYSTEMS USING STRAIGHT-ACTING JACKS. The master warning light and buzzer will warn the driver that one or more jacks are extended slightly (straight-acting jacks) or in the vertical position (kick-down jacks) with the ignition on. The master warning light should be mounted in the dash in a location highly visible to the driver. If a buzzer is required or used, the buzzer will be mounted behind the dash, close to the master warning light.

If kick-down jacks are used, there are two wires supplied for the warning light. The warning light harness plugs into the 6 pin UML connector on the back of the touch panel. The 6121 wire in the harness supplies +12 voltage for the light. The 7699 wire controls the light with a switched ground. Do not supply power to the HWH MIOM until the master warning light is complete. There will be +12 on the 6121 wire anytime the ignition is in the "ON" or "ACC" position.

Warning light installation (light only). Drill a 1/2 inch hole in the dash for the master warning light. **Be careful to protect wires or equipment behind the dash where the hole is being drilled.** Apply the jacks down legend to the master warning light. The master warning light is marked "+" and "-". Attach the 6121 wire to the terminal marked "+" and 7699 wire to the terminal marked "-". Remove the protective film from the legend and push the warning light into the 1/2 inch hole.

If straight-acting jacks are used, a pigtail arrangement is supplied by HWH that enables the installer to supply power to the warning light and buzzer from the "ON" side of the ignition switch and supply power to the control box from the "ACC" side of the ignition switch. This way the jacks can be extended without the buzzer sounding unless the ignition is on. The pigtail has a fuse and a diode arrangement and should not be altered. (Any of the pigtail wires can be lengthened as long as the fuse/diode arrangement is not altered.) The master warning harness has one wire, 7699. This is a switched ground to control the warning light and buzzer. This harness plugs into the 6 pin UML connector on the back of the touch panel.

Warning light/buzzer installation. Drill a 1/2 inch hole in the dash for the master warning light. **Be careful to protect wires or equipment behind the dash where the hole is being drilled.** Apply the jacks down legend to the master warning light. **Make sure the ignition switch remains off until the master warning light/buzzer installation is complete.** Connect the fused pigtail to the "ON" side of the ignition switch. Both the buzzer and the warning light are marked with a "+" and a "-". The buzzer connection is the ring terminal and the light is the fast on. Run the wire with the faston through the hole in the dash. Attach the ring terminal to the "+" side of the buzzer and the faston to the "+" side of the warning light. The 7699 wire in the master warning harness from the touch panel splits into two wires, one with a ring terminal and one with a faston. Attach the ring terminal to the "-" side of the buzzer. Run the wire with the faston through the hole in the dash and attach the faston to the "-" side of the warning light. Remove the protective film from the legend and push the light into the 1/2" hole. Make sure the buzzer is securely mounted with a bracket or wire ties so it is not left dangling from the wires.

SEE THE MASTER LIGHT/BUZZER CONNECTION DIAGRAM IN SECTION IV OF THIS MANUAL FOR A DETAILED VIEW OF BOTH STYLES OF INSTALLATION.

10.) FLUIDS

It is recommended to use HWH Specialty Hydraulic oil in HWH leveling systems. If not available, a good multipurpose or Dexron automatic transmission fluid can be used. **DO NOT USE** brake fluid or hydraulic jack oils. These fluids can damage seals. Fill the fluid reservoir tank to within 1 inch of the top of the tank. During start up, the fluid level will drop as the hoses fill with oil. **It is important to check the fluid level before completing the installation. Top off the fluid reservoir as necessary.**

SECTION II

725 SERIES LEVELING SYSTEMS

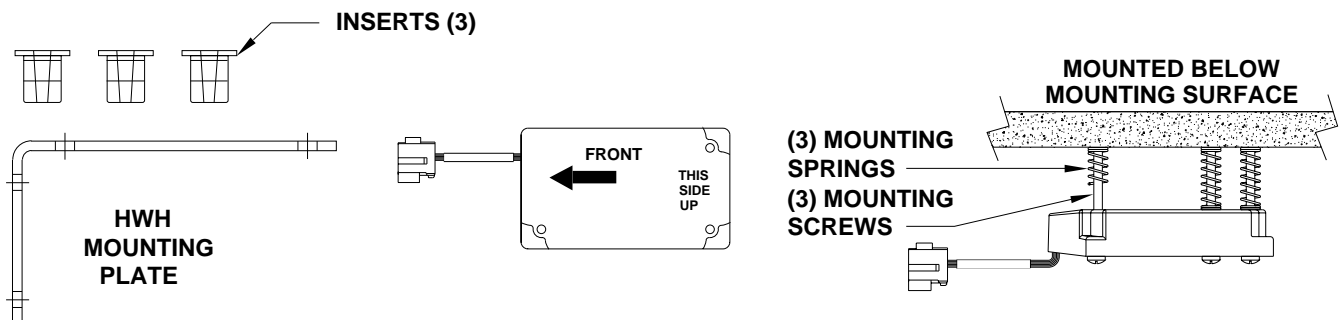
COMPONENT INSTALLATION

11.) LEVELING SENSING UNIT INSTALLATION

The harness for the sensing unit is part of the main harness going to the MIOM on the power unit. The sensing unit harness for aftermarket systems is approximately 8 feet long. So, the sensing unit must be mounted within about 8 feet or less of the power unit. The sensing unit can be mounted about anywhere but closer to the center of the vehicle is best. In the same area as the power unit is ok. It can also be mounted in a compartment. The sensing unit is water tight but it is best if it is protected from direct road spray. **DO NOT** mount the sensing unit in a direct line of sight of any exhaust component. Use a properly mounted heat shield if necessary. If mounting the sensing unit in a compartment, protect the sensing unit from being hit by objects "thrown" in or stored in the compartment.

The sensing unit needs to be mounted to a solid, rigid surface. Stay away from flimsy metal, fiberglass or plastic surfaces that may flex and move. This would change the sensing unit adjustment. The sensing unit can be mounted below the mounting surface as shown in Figure 19 or above the mounting surface. If mounting above the surface, there is an adjustment feature that will be harder to access. The three mounting springs go between the sensing unit and mounting surface no matter which side the sensing unit is mounted on. **It is highly recommended to use the bracket and plastic inserts provided.** **When using the bracket provided, make sure it is attached to a rigid, solid surface.**

The top of the sensing unit is marked "THIS SIDE UP" and "FRONT" with an arrow. The sensing unit must be mounted with the proper orientation or it will not function properly. The screws need to go into a good solid surface so they don't back out. The plastic inserts used with the provided bracket work the best. The mounting screws are also the adjustment screws. The screws should be tightened to compress the springs at least 1/2 inch but **DO NOT tighten the screws to the point of coil binding the springs.** Refer to the sensing unit adjustment sheet in Section III for adjustment procedures.



12.) INSTALLATION CHECK LIST:

- 1.) CHECK ALL MOUNTING BOLTS AND BRACKETS FOR TIGHTNESS.
- 2.) CHECK THAT ALL HOSES ARE SECURELY CLAMPED OR TIE WRAPPED.
- 3.) CHECK THAT ALL WIRES ARE SECURELY CLAMPED OR TIE WRAPPED.
- 4.) CHECK THE OIL LEVEL BEFORE OPERATING THE SYSTEM.
- 5.) CHECK THE HYDRAULIC CIRCUIT.
 - a. Hoses are connected to corresponding valves and jacks.
 - b. All fittings and hose ends are properly tightened.
- 6.) CHECK THE WIRING CIRCUIT.
 - a. All connectors going to the right component.
 - b. All cables and ground wires are securely fastened.
 - c. All open connections protected from moisture and dirt.
- 7.) CHECK THAT PROPER HEAT SHIELDS ARE INSTALLED AS NEEDED.

SECTION III

725 SERIES LEVELING SYSTEMS

SYSTEM START-UP AND ADJUSTMENTS

At any time the system will not function, refer to ML48380, the 725 series repair manual in the service manual section of the HWH website.

1.) PARK BRAKE CHECK

The park brake circuit must function properly for the leveling system to function properly. The test is different between the Kick-Down Jack system and the Straight-Acting Jack system. **CHOCK THE WHEELS DURING THIS TEST SO THE VEHICLE CAN NOT ROLL WHEN THE PARK BRAKE IS RELEASED.**

Kick-down Jack park brake test. Turn the ignition switch to the "ACC" position. Push the "I" button one time. The light above the "I" button should come on. The "NOT IN PARK/BRAKE" light should not be on. Push the "OFF" button. Push and hold the main vehicle brake and release the park brake. Push and hold the "I" button. The "NOT IN PARK/BRAKE" light should be on while the "I" button is being pushed. Release the "I" button. The "NOT IN PARK/BRAKE" light should go out. Set the park brake and release the main vehicle brake.

Straight-Acting Jacks park brake test. Turn the ignition switch to the "ACC" position. Make sure the park brake is set. Push any manual UP ARROW, the pump should run. Release the UP ARROW. Push on the foot brake and release the park brake. Again, push any UP ARROW. The "NOT IN PARK BRAKE" light should come on while pushing the UP ARROW and the pump should not run. If the pump runs or the "NOT IN PARK / BRAKE" light will not come on with the park brake released, refer to the 725 repair manual, Part 5 page MI91.327E.

2.) HYDRAULIC START-UP

Kick-down jacks. Make sure the ignition is in the "ACC" position and the park brake is set. Push the "I" button one time. Make sure the ON light is lit. Push the "I" button a second time. The pump should run. The jacks should try to swing vertical, starting with the left front jack, then the right front jack, then the right rear jack and finally the left rear jack. The pump should run no more than 15 to 20 seconds then shut off. The first time the system is run, the jacks may or may not swing vertical. This is due to the priming of the pump and filling the hydraulic lines. Push the "OFF" button then the "STORE" button. Make sure all jacks have retracted. Repeat the procedure until all four jacks have swung vertical. After 2 or 3 times at the most, all the jacks should be swinging vertical. The individual red warning lights on the touch panel should be on when the appropriate jack is in the vertical position. The master warning light should be on if any jack is in the vertical position. With the jacks fully retracted to the horizontal position, the touch panel warning lights and the master warning light should be out. Check the reservoir fluid level and fill as needed.

If all of the jacks will not swing vertical, check the hydraulic circuit and the touch panel warning lights. Make sure the warning lights are off when the jacks are in the horizontal position. With the touch panel on, pull each jack to the vertical position and make sure the appropriate touch panel warning light comes on. The warning lights must work correctly for the jacks to swing to the vertical position and for the system to function properly. Make sure the hoses are connected to the correct fittings.

Chock the tires so the vehicle cannot roll. Push the "I" button twice to put the jacks in the vertical position. Push the front UP ARROW to extend the front jacks to the ground and lift the vehicle 1 or 2 inches. Push the rear UP ARROW to extend the rear jacks to the ground and lift the vehicle 1 or 2 inches. **Do not raise the rear of the vehicle high enough to lift the rear tires off the ground. The vehicle will roll forward or backwards off the jacks if the rear tires leave the ground** Push the "OFF" button. Push the "STORE" button. When the jacks have fully retracted repeat the procedure at least once more. With the jacks retracted to the horizontal position, check the fluid level and fill as necessary. The system should now be ready to make adjustments and test the automatic function of the system.

Straight-acting jacks. Make sure the ignition is in the "ACC" position and the park brake is set. Push and release the front UP ARROW at 5 second intervals until both front jacks reach the ground and lift the vehicle 1 or 2 inches. When the jacks have extended approximately 1 inch, the front red warning lights on the touch panel should be on. Push and hold the front DOWN ARROW until both front jacks have fully retracted. The touch panel warning lights should go out. The master warning light should be out. Check the reservoir fluid level and fill as necessary. Repeat this with the rear up arrow and check the fluid level and fill as necessary. Repeat the complete procedure at least once more. Now extend the front jacks then with the front jacks extended, extend the rear jacks. Push the "Store" button and check that all the jacks will fully retract. Check and fill the reservoir as necessary. The system should now be ready to make adjustments and test the automatic function of the system.

SECTION III

725 SERIES LEVELING SYSTEMS

SYSTEM START-UP AND ADJUSTMENTS

3.) PLUMBING AND WARNING LIGHT/BUZZER CHECK

With kick-down jacks, when all of the jacks will swing to the vertical position and the four touch panel jack down warning lights are working, it can be assumed the plumbing and wiring is correct. Check that the master warning light works with any one jack in the vertical position. The ignition switch should be in the "ACC" position. If a warning buzzer is also used, with any one jack in the vertical position, the master warning light and buzzer should not work if the ignition is in the "ACC" position but should work if the ignition is in the "ON" position.

With straight-acting jacks, use each set of UP and DOWN ARROW buttons. Along with checking the touch panel warning lights, visually check the jacks when using each set of UP and DOWN ARROWS make sure that only the pair of jacks for the button that is being pushed is extending and retracting. It is important to use all four sets of buttons for this test, not just the front and rear buttons. With the ignition in the "ON" position and any one jack extended about 1 inch, the master warning light and buzzer should work.

4.) KICK-DOWN JACK ADJUSTMENTS

Each jack should be checked to be sure that it is vertical when it swings down. To do this, kick the jacks vertical then extend the jacks until they are close to, but not touching the ground. Each jack must also be adjusted so it can extend in the horizontal position without interfering with any suspension components, tanks, etc.

The following figures show the horizontal and vertical adjustment points for the 6000#, 9000#, 16000# and 24000# jacks.

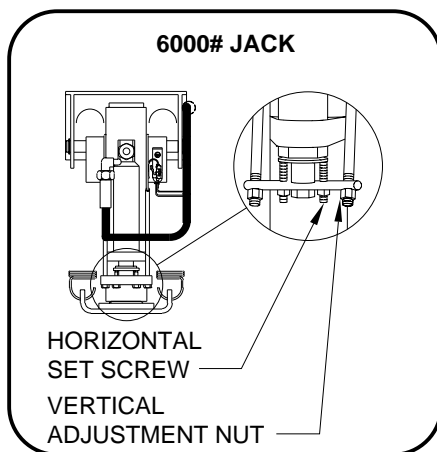


Figure 20

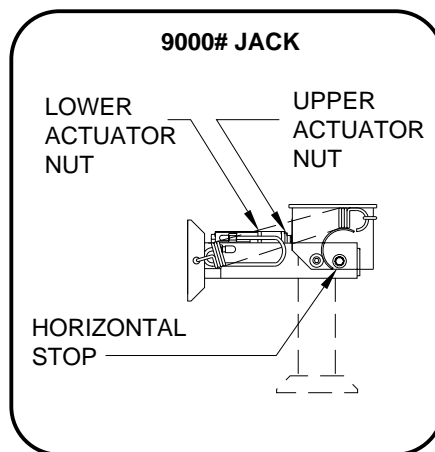


Figure 21

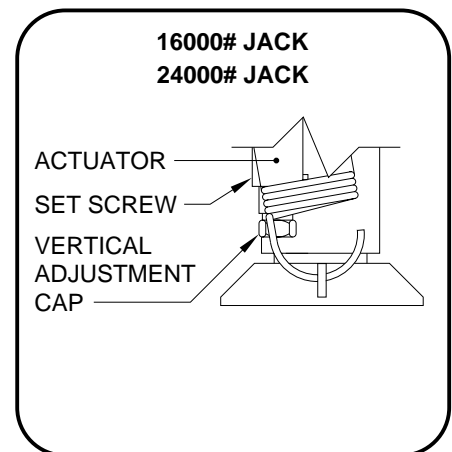


Figure 22

1. 6000# JACKS: Always make the vertical adjustment first. If the vertical adjustment is changed at any time, be sure to check the horizontal adjustment. The vertical adjustment is changed by adjusting the lock nuts on the actuator cable. If the jack stopped short of vertical, tighten the lock nuts. If the jack goes past vertical, back the lock nuts off. Be sure to adjust each nut of the actuator cable the same number of turns. Hold the actuator cable with a vice grip while turning the vertical adjustment nuts so the cable can not twist.

The horizontal stop is adjusted by turning the set screws located just inside the cable lock nuts. Loosen the jam nuts before turning the set screws. Tighten the set screws to move the jack down more. Loosen the set screws to move the jack up more. Make sure to turn each set screw an equal amount. The jack can be adjusted down to provide clearance for objects which may interfere with the operation of the jacks. The horizontal stop must be adjusted to provide clearance in case the jack extends in the horizontal position. The jack must be able to fully extend in the horizontal position without interfering with suspension components, tanks, etc.

2. 9000# JACKS: If the jack stopped short of being vertical it can be adjusted by loosening the lower actuator nut and tightening the upper actuator nut. If the jack goes past vertical, loosen the upper actuator nut and tighten the lower actuator nut.

The horizontal stop can be adjusted up or down in the slot to provide clearance for objects which may interfere with the operation of the jack. The stop must be adjusted so that the jack can be fully extended in the horizontal position without interfering with suspension components or tank, etc.

SECTION III

725 SERIES LEVELING SYSTEMS

SYSTEM START-UP AND ADJUSTMENTS

3. 16000# AND 24000# JACKS: If the jack stopped short of being vertical, loosen the set screw at the bottom of the actuator and turn the adjusting cap clockwise. If the jack goes beyond vertical, loosen the set screw and turn the adjusting cap counterclockwise. After each counterclockwise adjustment, the weight of the coach must be applied to the jack to make the adjustment effective. Do NOT adjust the cap more than one turn without cycling the jack.

The horizontal stop for the 16000# and 24000# jacks is a urethane bushing the jack hits when it swings to the horizontal position. If the jack needs to be adjusted down, add washers under the urethane stop. Use a longer bolt if necessary.

5.) LEVEL SENSING UNIT ADJUSTMENT AND CHECK

The level sensing unit adjustment instructions are on page MP44.1514 in SECTION IV of this manual. The four yellow lights on the touch panel are the level indicator lights. If a yellow light is on, that side or end is low. When all four yellow indicator lights are off, the vehicle is level within the tolerance of the level sensing unit. Follow all of the instructions, including the use of the adjustment enhancement pin, to properly adjust the level sensing unit. **Make sure to check the operation of the leveling sensing unit in several different out of level positions.**

WHEN THE SYSTEM HAS KICK-DOWN JACKS, CHOCK THE FRONT WHEELS OF THE VEHICLE FOR THE FOLLOWING TEST. IF THE REAR WHEELS OF THE VEHICLE ARE LIFTED OFF THE GROUND THE VEHICLE CAN ROLL FORWARD OR BACKWARD OFF THE JACKS.

After the level sensing unit is adjusted, make sure the yellow level indicator lights are functioning properly. Use the manual UP and DOWN ARROWS to raise one side or end of the vehicle at a time. Make sure the correct level indicator light comes on. Example: Use the front UP ARROW to lift the front of the vehicle until the rear yellow light comes on. If the yellow level lights are not indicating the correct low side or end, check the touch panel lights against the yellow LEDs on the level sensing unit. If the lights on the sensing unit do not match the touch panel level indicator lights, the sensing unit is most likely not mounted correctly. Check that the sensing unit is properly orientated.

IMPORTANT: Discuss the tolerance of the sensing unit with the vehicle owner. It is important that the owner understands the vehicle may not be perfectly level after every level procedure. Make sure the owner understands how to manually operate the system to make minor level adjustments if desired.

6.) JACK PRESSURE SWITCH ADJUSTMENT AND STABILIZING CHECK

The jack pressure switches only affect the leveling system when it is operated in the automatic mode. The jack pressure switches signal the system processor when the jacks are on the ground for stabilizing after an automatic leveling procedure. The jack pressure switches need to be adjusted so the jacks lift the vehicle no more than ½ inch when stabilizing.

Stabilizing Check.

- a.) Move the vehicle to a level location so no yellow level indicator lights are on.
- b.) Swing the jacks to the vertical position and/or manually dump the air from the air bags if so equipped.
- c.) Manually extend the jacks until they touch the ground but do not lift.
- d.) Mark the jack rod at the bottom of the jack barrel with a felt pen.
- e.) Start the automatic leveling process.
- f.) Check each jack to see how far it lifted the vehicle in the stabilize mode.
- g.) Adjust switches and repeat process as necessary.

Pressure Switch Adjustment.

Loosen the jam nut. If the jack needs to lift more, turn the threaded pressure adjust body clockwise. If the jack lifts too far, turn the pressure adjust body counterclockwise. Only make about ¼ turn max. before testing. When the adjustment is complete, make sure to tighten the jam nut. There is a view of the jack pressure switch on the next page.

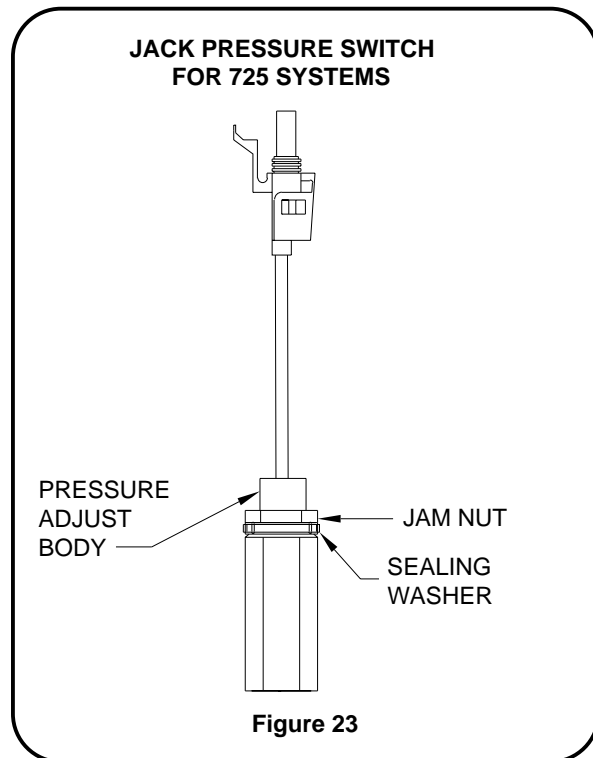
SECTION III

725 SERIES LEVELING SYSTEMS

SYSTEM START-UP AND ADJUSTMENTS

7.) FINAL CHECK LIST

- 1.) With all jacks fully retracted, check the oil level. The oil level should be within 1 inch of the top of the reservoir.
- 2.) Check all hose connections for leaks and check hose routings for heat or rubbing issues. Make sure all hoses are fastened or supported properly.
- 3.) Check all wiring connections for tightness and make sure all exposed connections are protected against moisture and corrosion. Check harness routings for heat or rubbing issues. Make sure harnesses and wires are fastened or supported properly.
- 4.) Check all mounting bolts and brackets for the jacks, and the power unit are tight.
- 5.) Check that all indicator lights including the master warning light and buzzer (if so equipped) are functioning properly.
- 6.) Run the system with the owner to explain the correct operation and function of the leveling system in both the manual and automatic mode.
- 7.) Show the owner the level sensing unit and explain the leveling tolerances.
- 8.) Show the owner the valve release cam levers and explain their correct operation.
- 9.) Make sure the owner receives the owner's manual. Review the manual, especially cautions, with the owner.



SECTION IV: INSTRUCTION SHEETS - PLUMBING DIAGRAMS - WIRING DIAGRAMS

THE FOLLOWING PAGES ARE PLUMBING DIAGRAMS FOR THE HYDRAULIC LINES
AND THE HWH AIR DUMP SYSTEM, ELECTRICAL CONNECTION DIAGRAMS
AND INSTRUCTION SHEETS FOR THE LEVEL SENSING UNIT PROGRAMMING AND ADJUSTMENT.

SECTION IV

SENSING UNIT MAINTENANCE/SERVICE

REMOTE MOUNTED "POTTED" ELECTRONIC SENSING UNIT

SENSING UNIT ACCURACY TOLERANCE

The sensing unit has an accuracy tolerance of ± 5.4 inches front to rear and ± 1 inch side to side on a 36 foot vehicle. Typical leveling results will be better.

SENSING UNIT ADJUSTMENT / WITH ADJUSTING ENHANCEMENT

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. It is best if the level is placed close to the mounting area of the sensing unit. 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.

The ignition (motorized units) or master power switch (towable units) must be on. Remove the "Adjusting Enhancement Cap". **DO NOT LOSE THIS CAP.** There is a small pin beneath the cap. Use a jumper wire with an alligator clip to apply a ground to the pin. This will make the sensing unit very sensitive. The yellow lights may "jump" around while adjusting the sensing unit. Let the lights settle down after each adjustment. Small, gentle turns will work best. Turn mounting screws 1 and 3 to adjust the sensing unit. Turn screws as instructed to turn out all the yellow LEDs. When all the LEDs are out, remove the jumper wire and replace the adjusting enhancement cap. **DO NOT** over tighten.

Move the vehicle to an unlevel position and level the vehicle according to the yellow level sensing lights on the touch panel. Readjust if necessary.

IMPORTANT: THE SENSING UNIT MOUNTING SPRINGS SHOULD BE COMPRESSED ABOUT 1/2 THEIR FREE LENGTH. SCREW NUMBER 2 SHOULD NOT BE TURNED WHILE ADJUSTING THE SENSING UNIT. AFTER ADJUSTING THE SENSING UNIT, BUMP THE SENSING UNIT TO SEE THAT IT IS SETTLED TIGHT AGAINST ALL THREE SCREW HEADS AND STILL INDICATES THAT THE UNIT IS LEVEL.

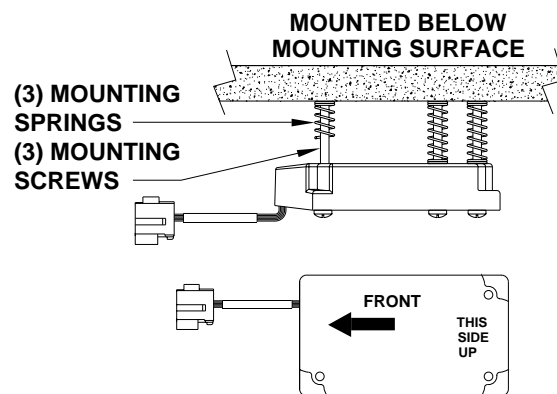
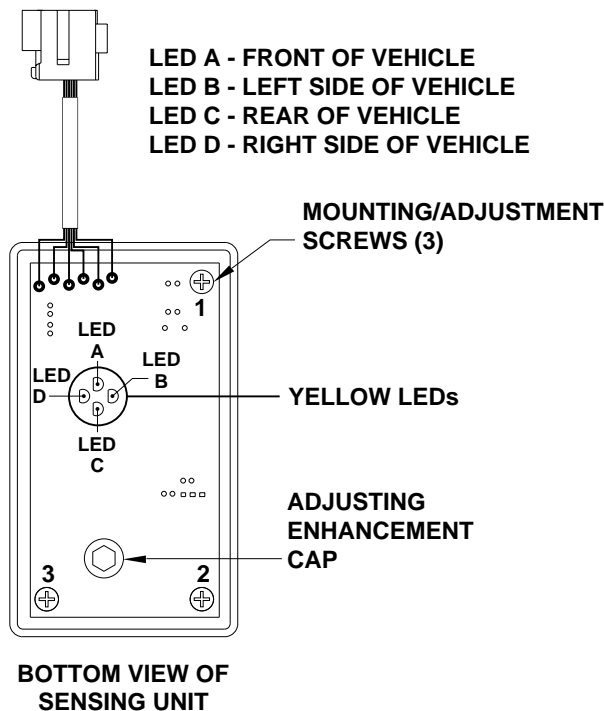
NOTE: If opposing LED's are lit, there is a problem with the Sensing Unit.

If LED (A) is lit: Tighten adjustment screw number 1 until the LED is off.

If LED (C) is lit: Loosen adjustment screw number 1 until the LED is off.

If LED (B) is lit: Loosen adjustment screw number 3 until the LED is off.

If LED (D) is lit: Tighten adjustment screw number 3 until the LED is off.



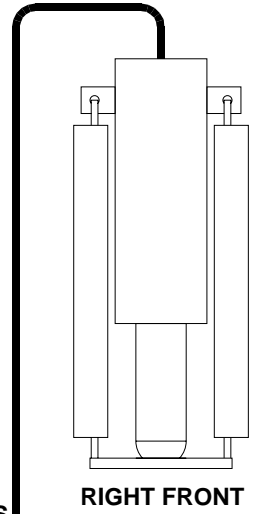
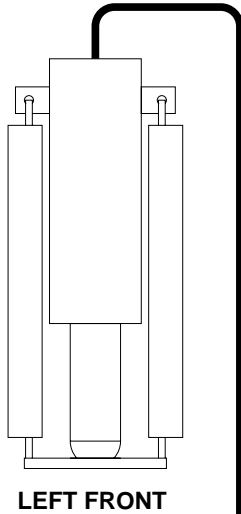
SECTION IV - HYDRAULIC LINE CONNECTION DIAGRAM

725 SERIES LEVELING SYSTEM

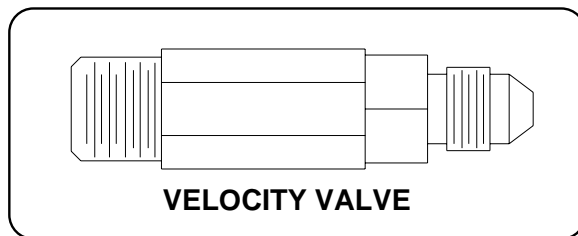
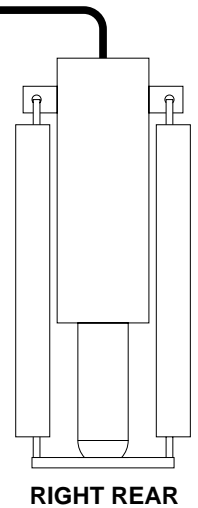
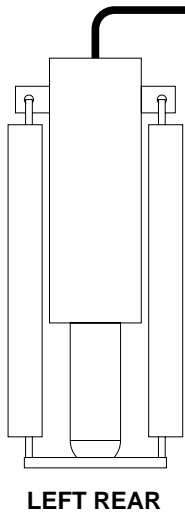
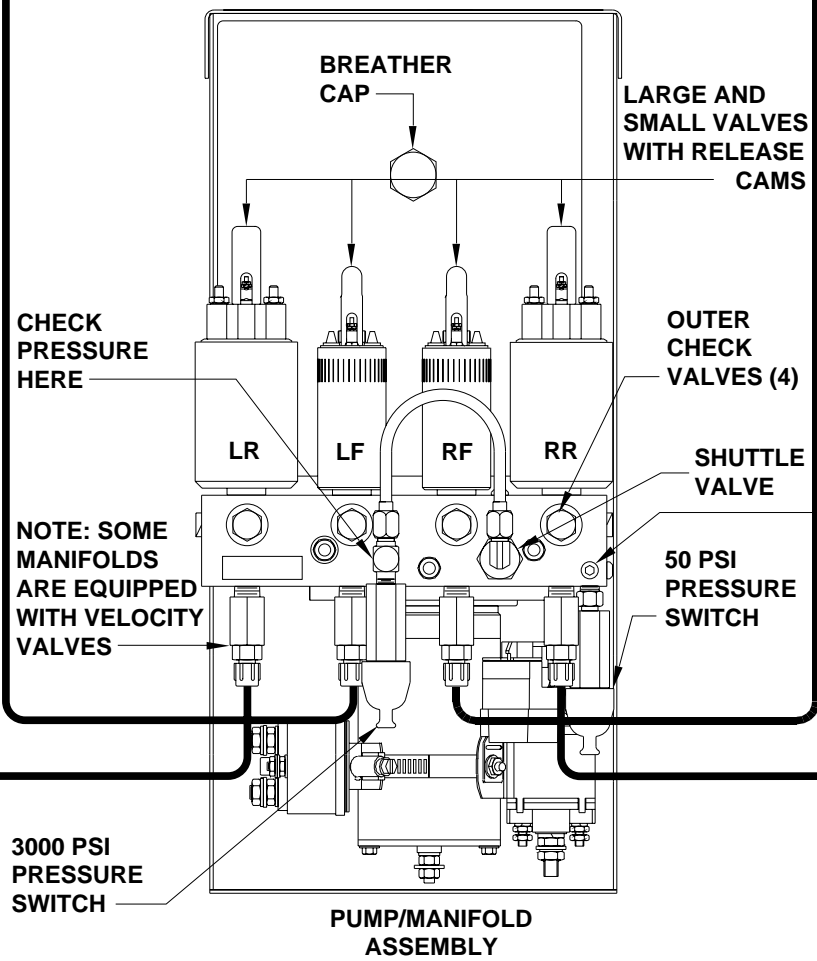
(WITH 4 STRAIGHT-ACTING JACKS)

MANIFOLDS MAY HAVE FOUR (4) LARGE VALVES OR FOUR (4) SMALL VALVES

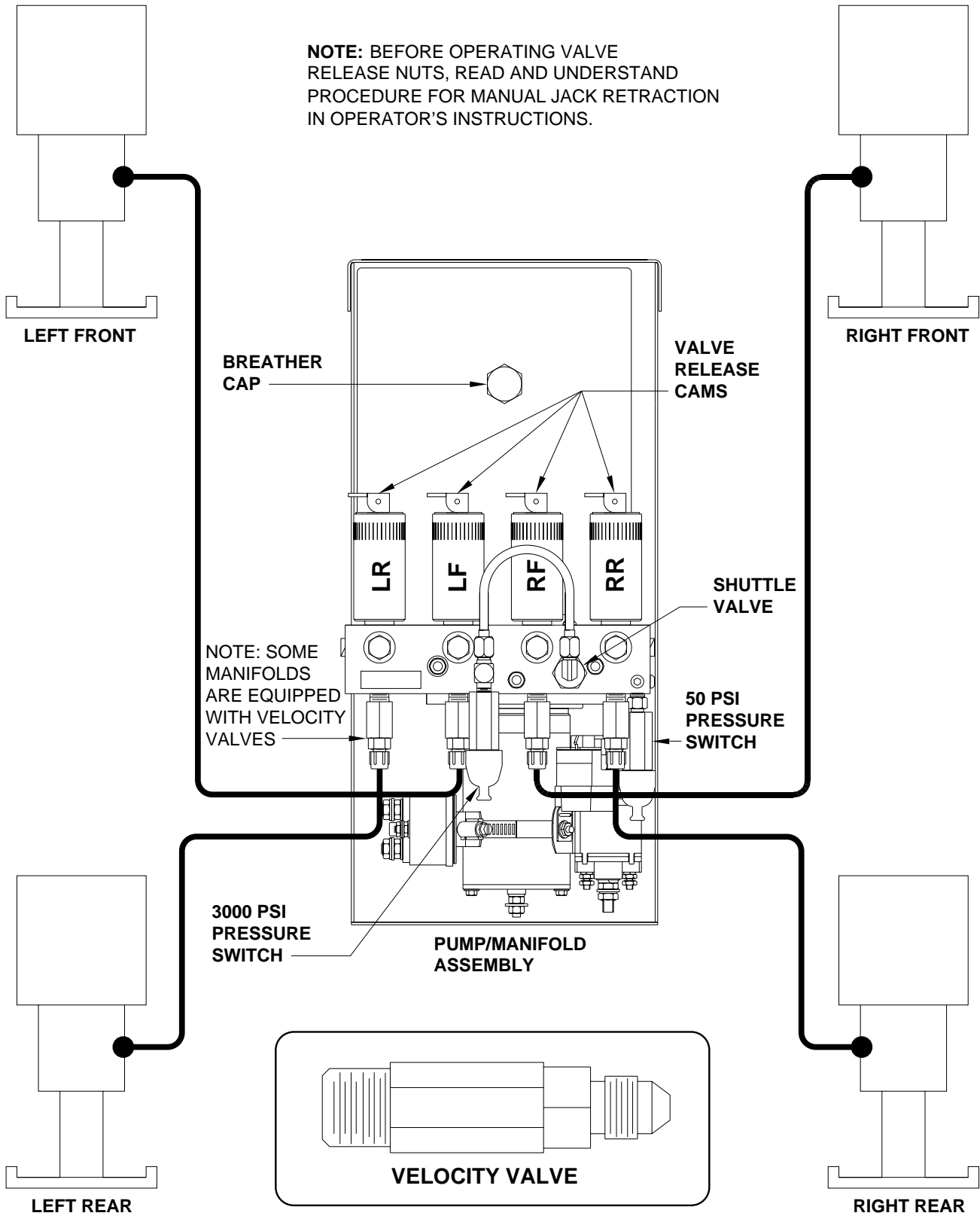
NOTE: BEFORE OPERATING MANUAL VALVE RELEASE, READ AND UNDERSTAND PROCEDURE FOR MANUAL JACK RETRACTION IN OPERATOR'S INSTRUCTIONS.



NOTE: Load center is not shown, load center may need to be removed to access shuttle valve and shuttle valve tube.



SECTION IV - HYDRAULIC LINE CONNECTION DIAGRAM
725 SERIES LEVELING SYSTEM
(WITH 4 KICK-DOWN JACKS)

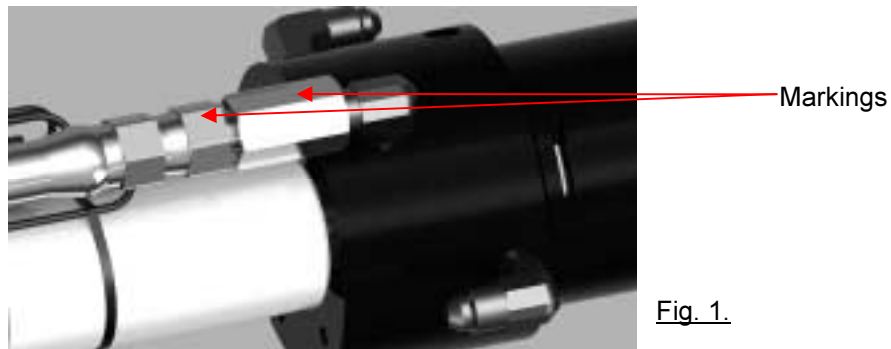


SECTION IV HYDRAULIC FITTING TIGHTENING INSTRUCTIONS

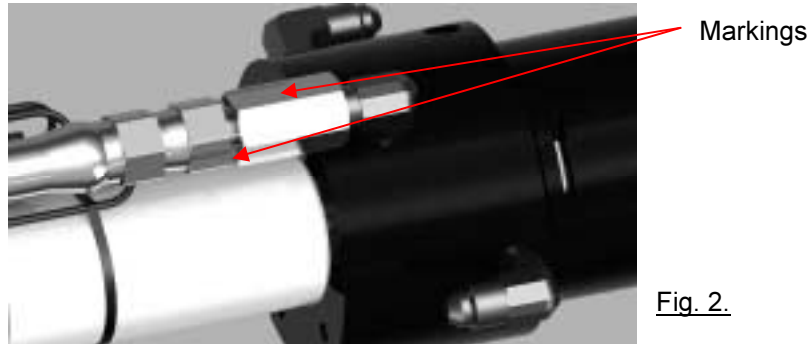
Tightening of 37° Hydraulic Fittings

Proper tightening of hose ends is important. If too loose, the connection will leak. If the connection is over tightened, (four flats or more) it will damage the hose end and fitting. The hose end and the fitting will have to be replaced. Over tightening can cause the swivel end to separate from a hose end.

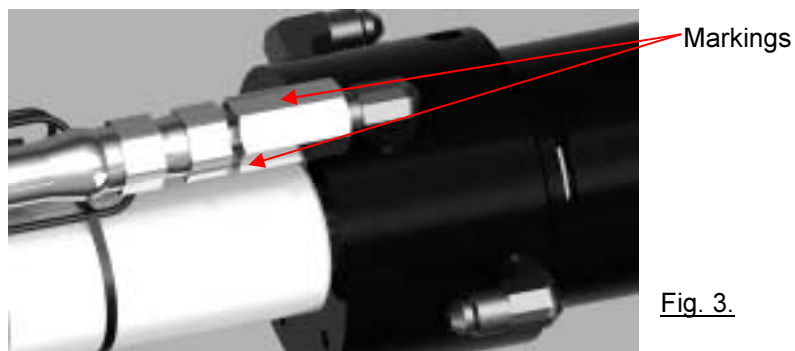
Parker also recommends that whenever possible, the step of marking the nut position relative to the body should be done. This step serves as a quick quality assurance check for joint tightening. To do this, at the initial wrench resistance position, make a longitudinal mark on one of the flats of the nut and continue it on to the mating connector with a permanent type ink marker as shown in Fig. 1.



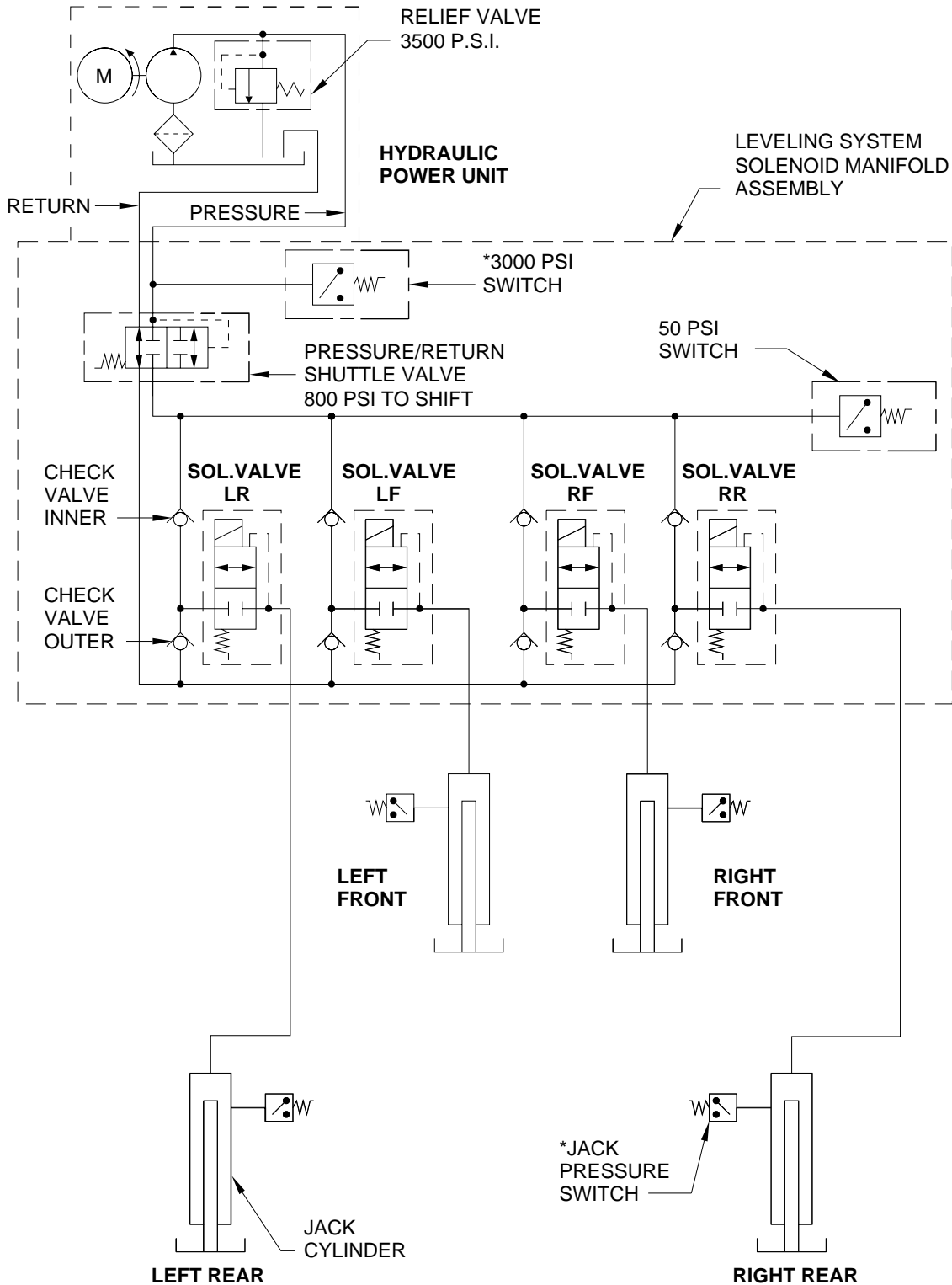
Tighten the hose swivel approximately two flats as shown in Fig. 2.



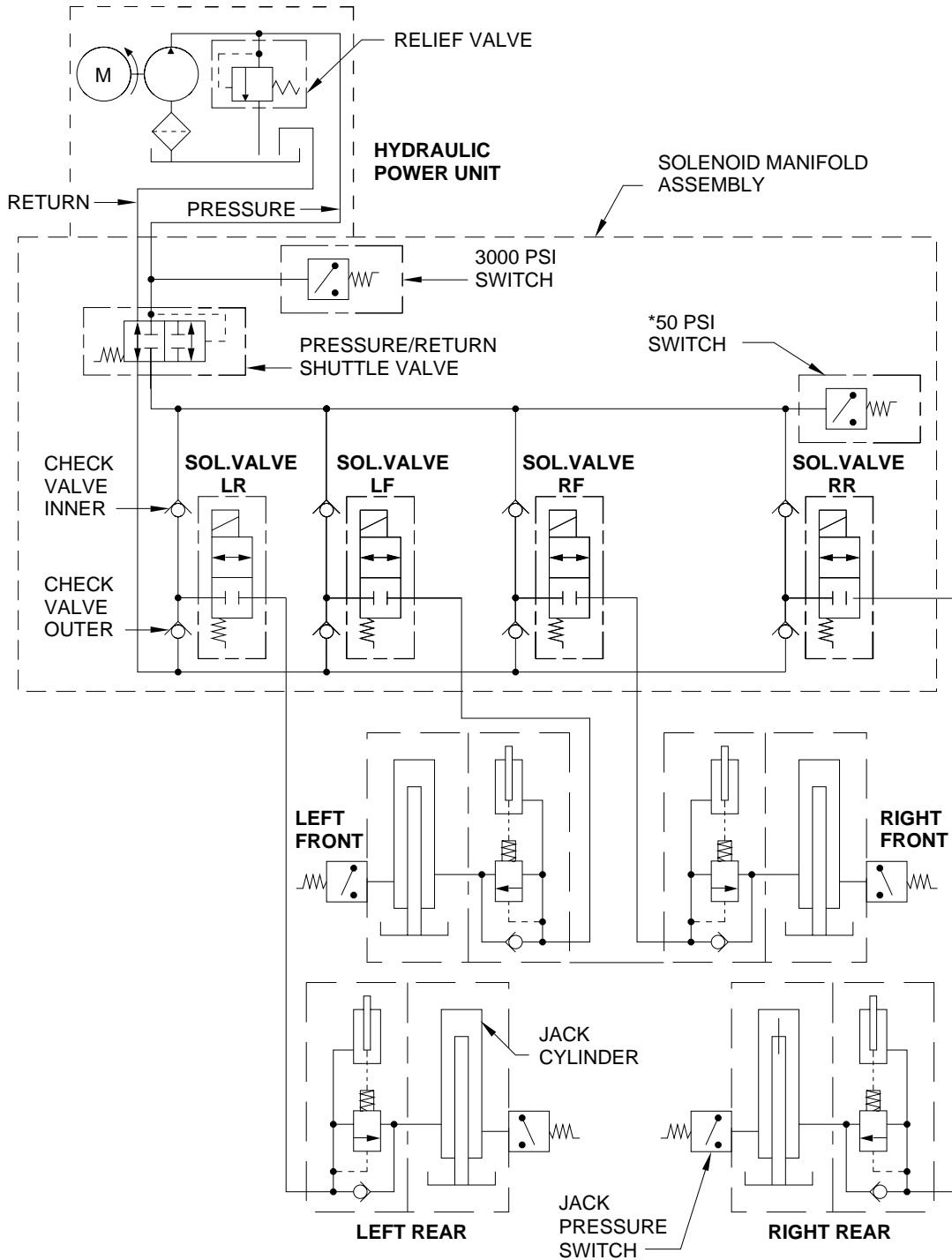
If Hose is removed and reinstalled, use the original mark on the nut and tighten it just past two flats. See Fig. 3.



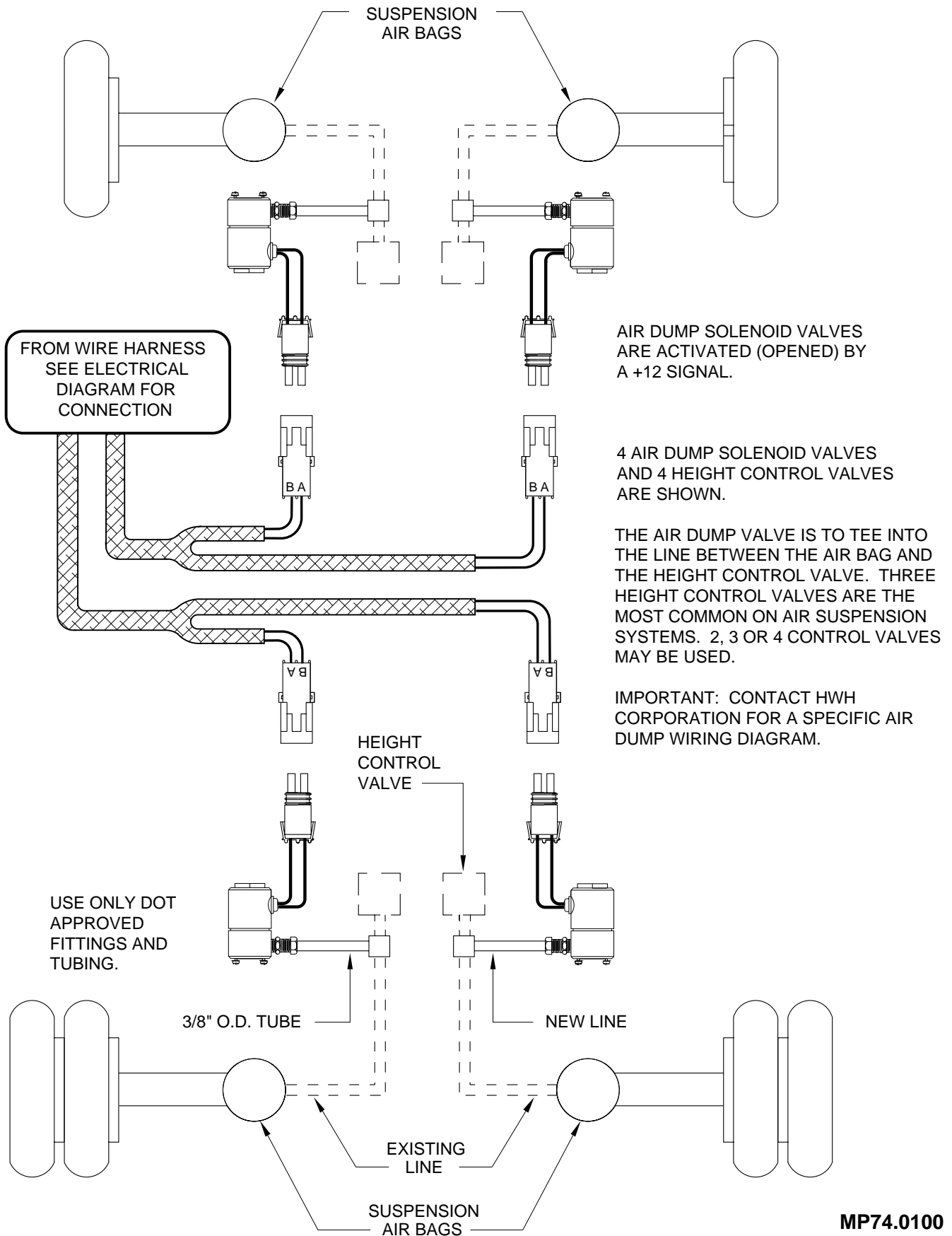
SECTION IV - HYDRAULIC SCHEMATIC DIAGRAM
725 SERIES LEVELING SYSTEM
BI-AXIS LEVELING WITH STRAIGHT-ACTING JACKS



SECTION IV - HYDRAULIC SCHEMATIC DIAGRAM
725 SERIES LEVELING SYSTEM
BI-AXIS LEVELING WITH KICK-DOWN JACKS



SECTION IV AIR LINE CONNECTION DIAGRAM

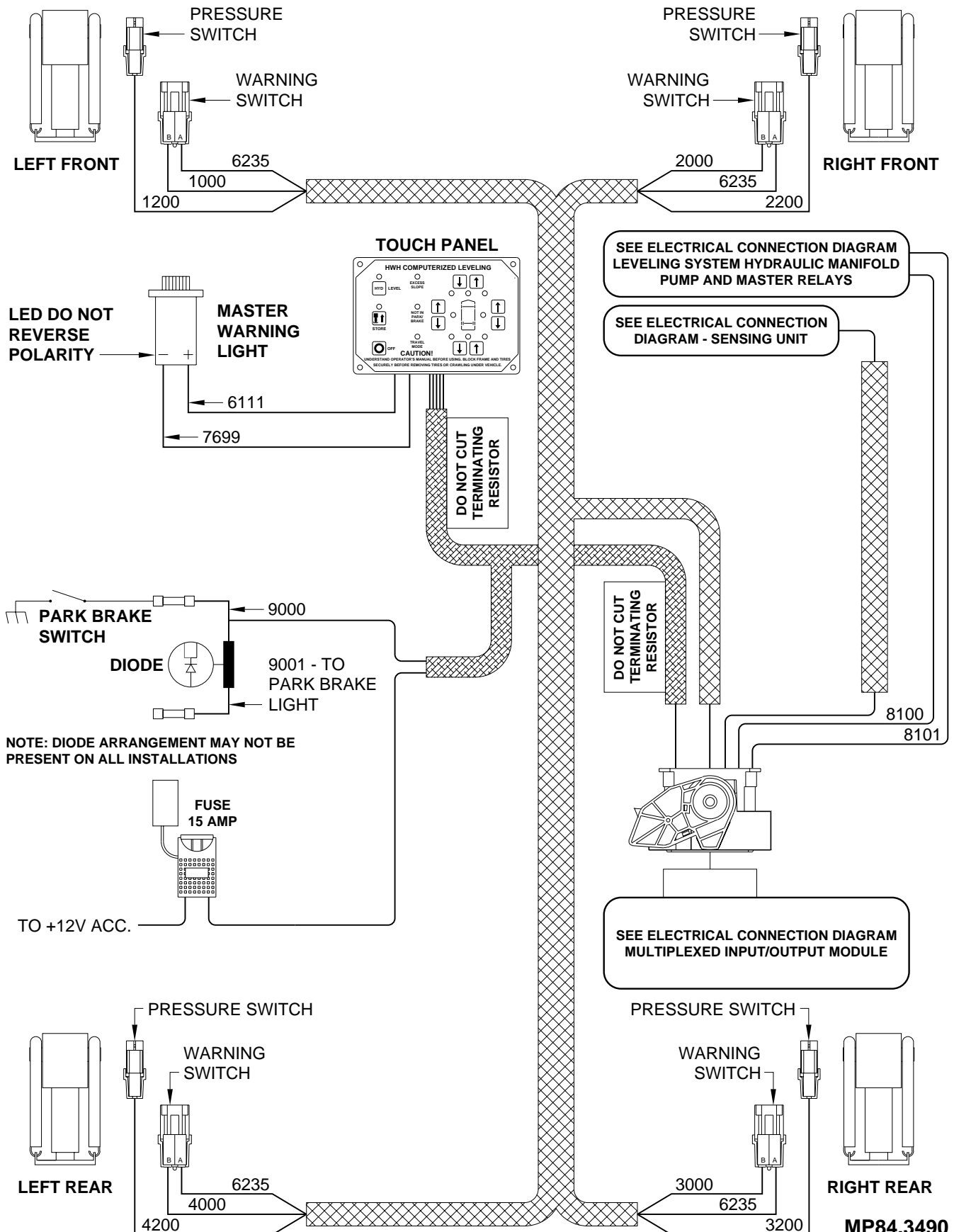


SECTION IV - ELECTRICAL CONNECTION DIAGRAM

725 SERIES SINGLE STEP LEVELING SYSTEM - KICK-DOWN JACKS

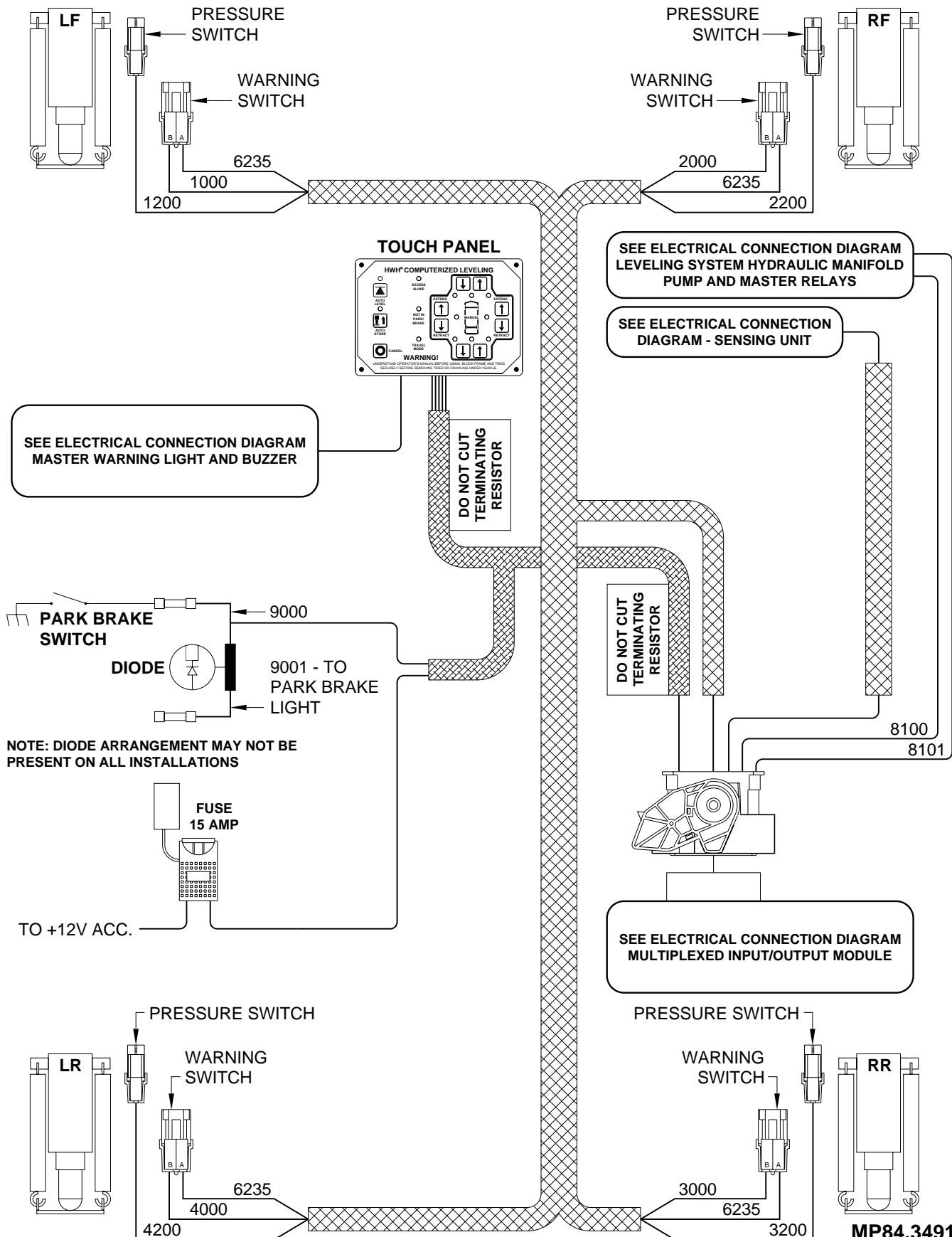
PARK BRAKE - MASTER WARNING LIGHT - TOUCH PANEL

JACK WARNING LIGHTS AND PRESSURE SWITCHES



SECTION IV - ELECTRICAL CONNECTION DIAGRAM

725 SERIES SINGLE STEP LEVELING SYSTEM - STRAIGHT-ACTING JACKS JACK WARNING SWITCHES, PRESSURE SWITCHES & PARK BRAKE

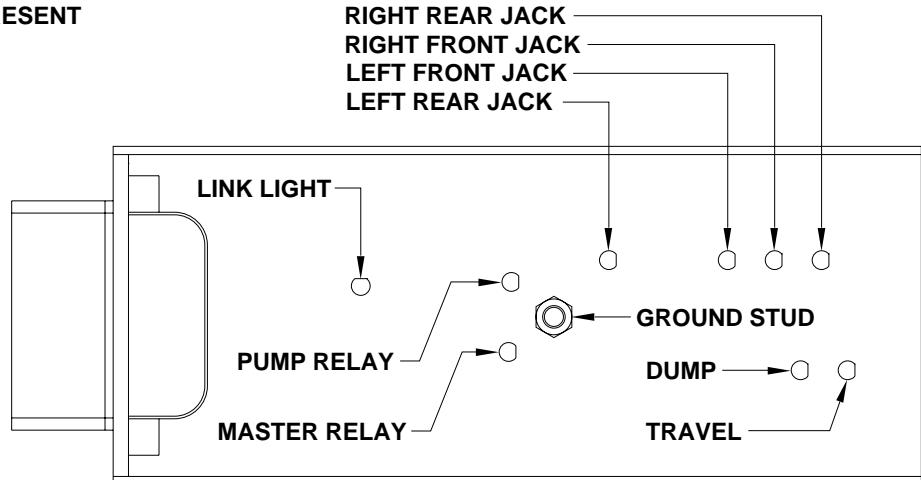


SECTION IV - ELECTRICAL CONNECTION DIAGRAM

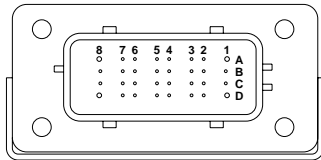
MULTIPLEXED INPUT/OUTPUT MODULE

LED AND WIRE/CONNECTION INFORMATION

NOTE: DUMP AND TRAVEL LEDS PRESENT BUT NOT ALWAYS USED



FRONT VIEW OF I/O MODULE CONNECTOR



A LIT RED LED INDICATES THERE SHOULD BE +12 VOLTS ON THE CORRESPONDING WIRE.

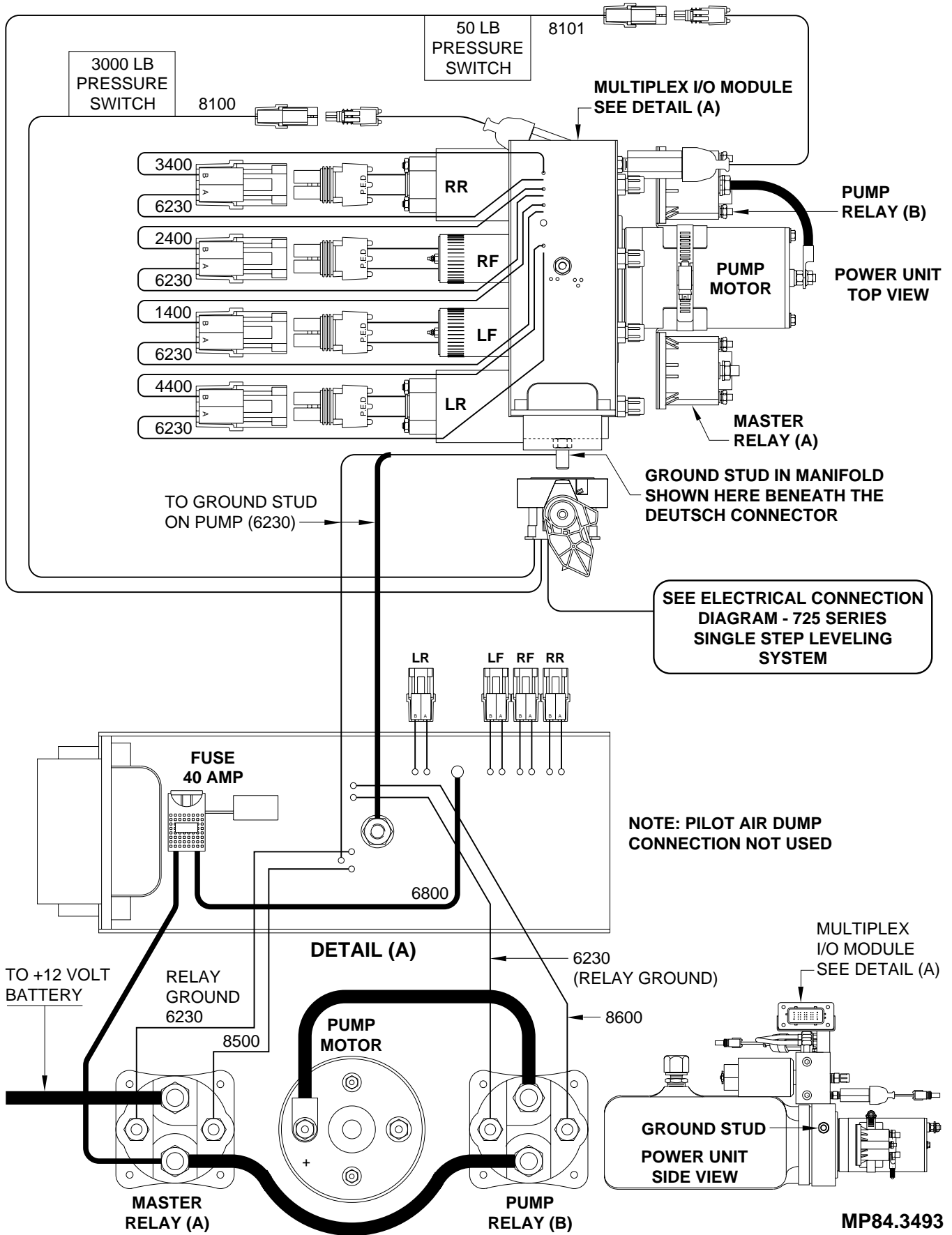
LINK LIGHT: LINK LIGHT FLASHING INDICATES PROPER COMMUNICATION BETWEEN THE I/O MODULE AND THE TOUCH PANEL. LINK LIGHT ON SOLID OR OFF INDICATES A FAILURE.

PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
A1	(+12 BLACK WIRE 8601)	INPUT WHEN EXTENSION DEVICES ROOMS, GEN SLIDE, STEP COVER ECT. ARE USED	
A2	YELLOW	N/A	CAN HIGH COMMUNICATION WIRE
A3 AND A4			NO CONNECTION
A5	BLACK	2000	SWITCHED GROUND FROM RIGHT FRONT JACK WARNING SWITCH
A6	BLACK	2200	SWITCHED GROUND FROM RIGHT FRONT JACK PRESSURE SWITCH
A7	BLACK	3200	SWITCHED GROUND FROM RIGHT REAR JACK PRESSURE SWITCH
A8	BLACK	8101	SWITCHED GROUND FROM 50 PSI MANIFOLD PRESSURE SWITCH
B1	RED	6800	+12 VOLT POWER TO THE TOUCH PANEL
B2	GREEN	N/A	CAN LOW COMMUNICATION WIRE
B3	WHITE	6230	GROUND TO THE TOUCH PANEL
B4			NO CONNECTION
B5	BLACK	3000	SWITCHED GROUND FROM RIGHT REAR JACK WARNING SWITCH
B6	BLACK	4200	SWITCHED GROUND FROM LEFT REAR JACK PRESSURE SWITCH
B7			NO CONNECTION
B8	BLACK	8100	SWITCHED GROUND FROM 3000 PSI MANIFOLD PRESSURE SWITCH
C1	RED	6121	+12 VOLT POWER FOR LEVEL SENSING UNIT
C2	N/A	N/A	SHIELD WIRE FOR GREEN & YELLOW CAN COMMUNICATION WIRES
C3	WHITE	6231	GROUND FOR LEVEL SENSING UNIT
C4	BLACK	0400	SWITCHED GROUND FROM SENSING UNIT - REAR
C5	BLACK	4000	SWITCHED GROUND FROM LEFT REAR JACK WARNING SWITCH
C6 AND C7			NO CONNECTION
C8	BLACK	0300	SWITCHED GROUND FROM SENSING UNIT - RIGHT SIDE
D1	RED	6120	+12 VOLT ACCESSORY POWER FOR I/O MODULE
D2	WHITE	6235	GROUND FOR JACK WARNING SWITCHES
D3			NO CONNECTION
D4	BLACK	1000	SWITCHED GROUND FROM LEFT FRONT JACK WARNING SWITCH
D5	BLACK	1200	SWITCHED GROUND FROM LEFT FRONT JACK PRESSURE SWITCH
D6	BLACK	0100	SWITCHED GROUND FROM SENSING UNIT - LEFT SIDE
D7	BLACK	0200	SWITCHED GROUND FROM SENSING UNIT - FRONT
D8	BLACK	9000	GROUND FROM PARK BRAKE SWITCH

SECTION IV - ELECTRICAL CONNECTION DIAGRAM

725 LEVELING SYSTEM HYDRAULIC LEVELING MANIFOLD

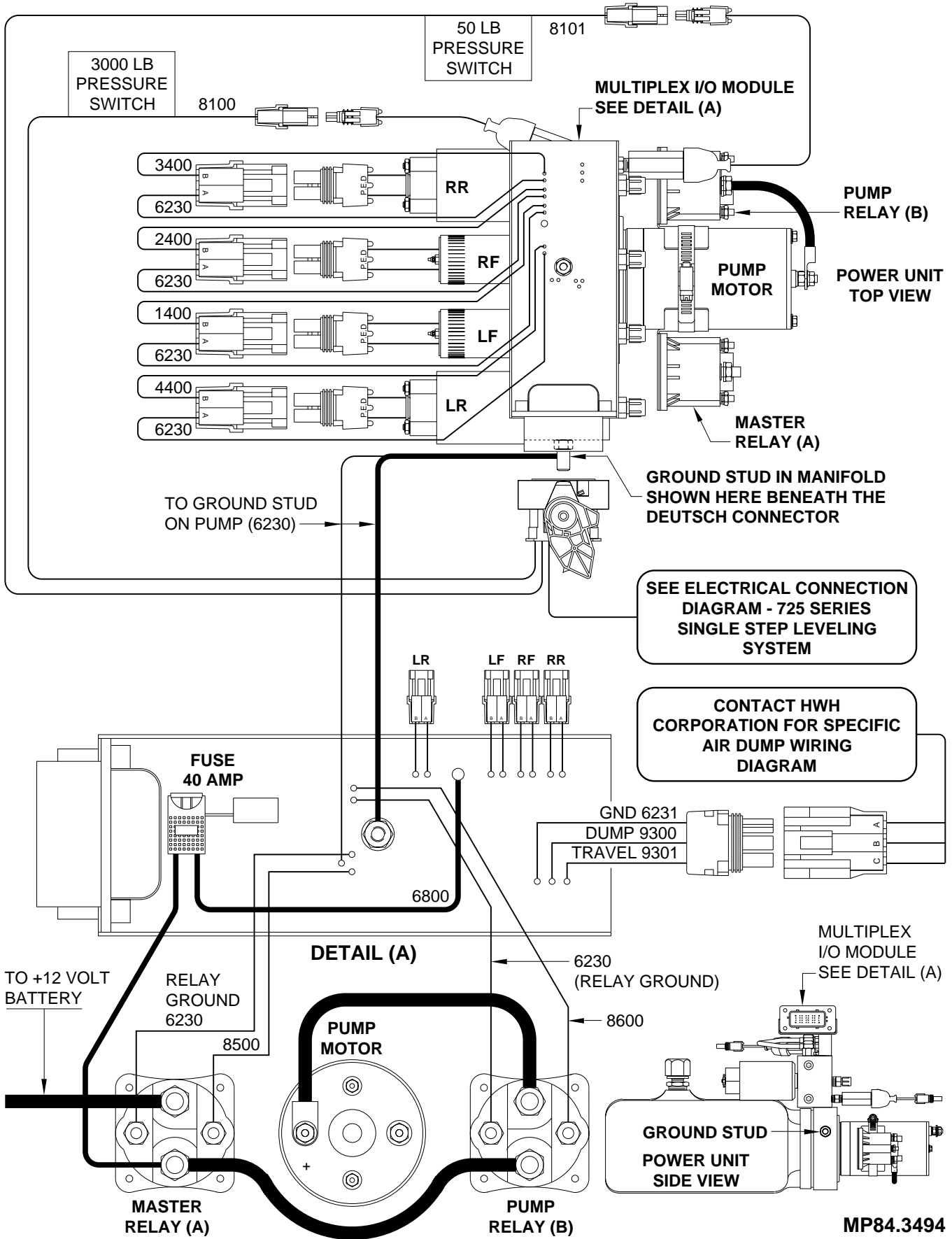
PUMP AND MASTER RELAYS



SECTION IV - ELECTRICAL CONNECTION DIAGRAM

LEVELING SYSTEM HYDRAULIC MANIFOLD W/AIR DUMP

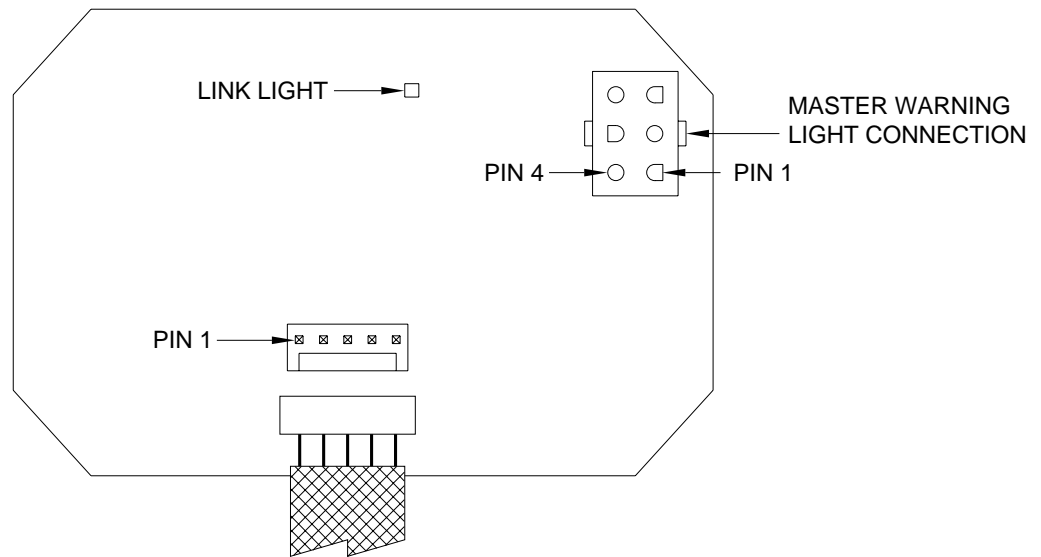
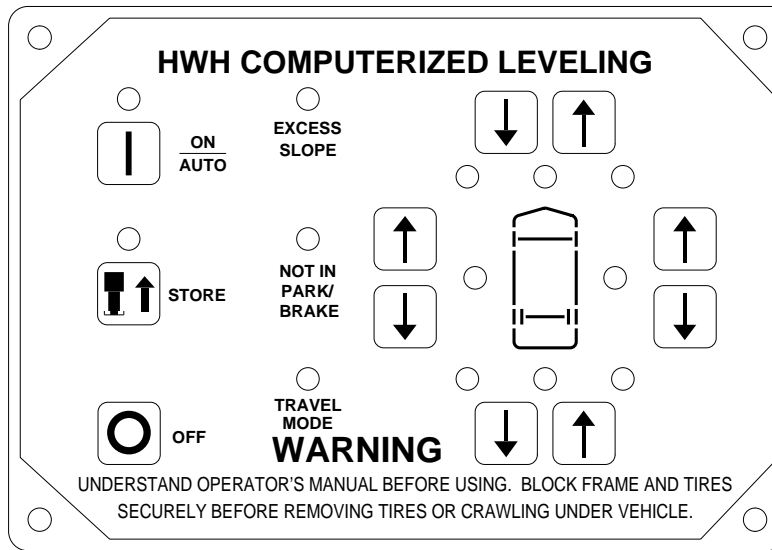
PUMP AND MASTER RELAYS



SECTION IV - ELECTRICAL CONNECTION DIAGRAM

725 SERIES LEVELING SYSTEM

TOUCH PANEL CONNECTIONS



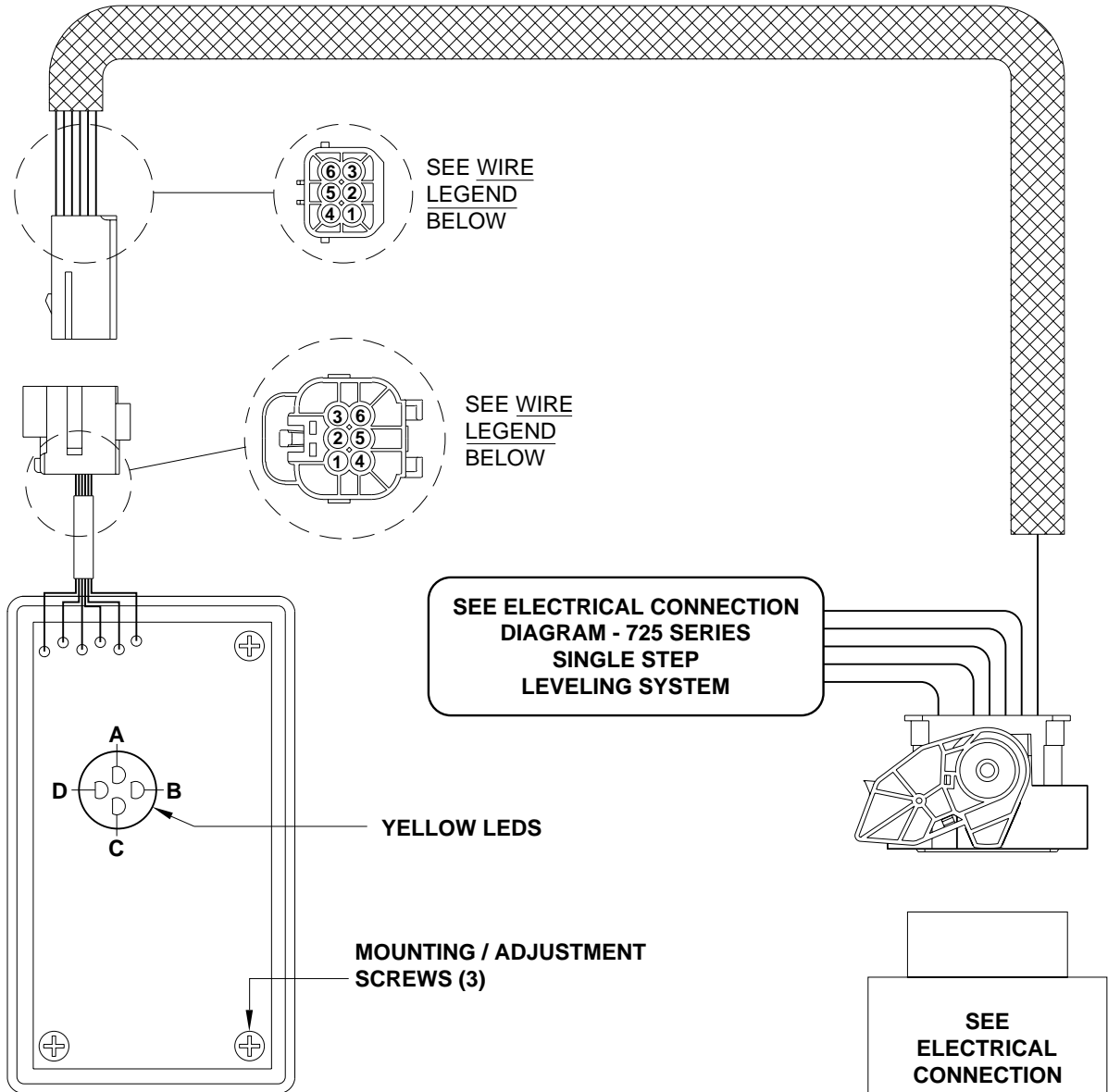
PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
5 PIN MTA CONNECTOR			
1	YELLOW	---	CAN HIGH
2	GREEN	---	CAN LOW
3	---	---	CAN SHIELD
4	WHITE	6230	GROUND FROM CONTROL BOX
5	RED	6800	+12 VOLTS FROM INPUT/OUTPUT MODULE
6 PIN UML CONNECTOR			
1	---	---	NO CONNECTION
2	RED	6110	+12 SUPPLY FOR MASTER WARNING *
3	---	---	NO CONNECTION
4	---	---	NO CONNECTION
5	BLACK	7699	SWITCHED GROUND FOR MASTER WARNING
6	---	---	NO CONNECTION

* NOT USED WHEN WARNING BUZZER IS USED

SECTION IV

ELECTRICAL CONNECTION DIAGRAM

LEVEL SENSING UNIT



BOTTOM VIEW OF SENSING UNIT

- LED A - FRONT OF VEHICLE
- LED B - LEFT SIDE OF VEHICLE (DRIVER SIDE)
- LED C - REAR OF VEHICLE
- LED D - RIGHT SIDE OF VEHICLE (PASSENGER SIDE)

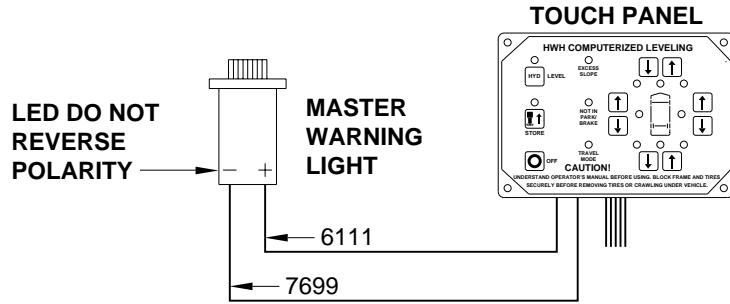
WIRE LEGEND -

SENSING UNIT PLUG	HARNESS PLUG	
PIN 1 - ORANGE	BLACK - 0400	SWITCHED GROUND WHEN REAR IS LOW
PIN 2 - WHITE - - -	WHITE - 6231	GROUND FROM SENSING UNIT
PIN 3 - RED - - - - -	RED - 6121	+12 VOLT FOR SENSING UNIT
PIN 4 - YELLOW	BLACK - 0100	SWITCHED GROUND WHEN LEFT SIDE IS LOW
PIN 5 - BLACK - - -	BLACK - 0200	SWITCHED GROUND WHEN FRONT IS LOW
PIN 6 - GREEN - -	BLACK - 0300	SWITCHED GROUND WHEN RIGHT SIDE IS LOW

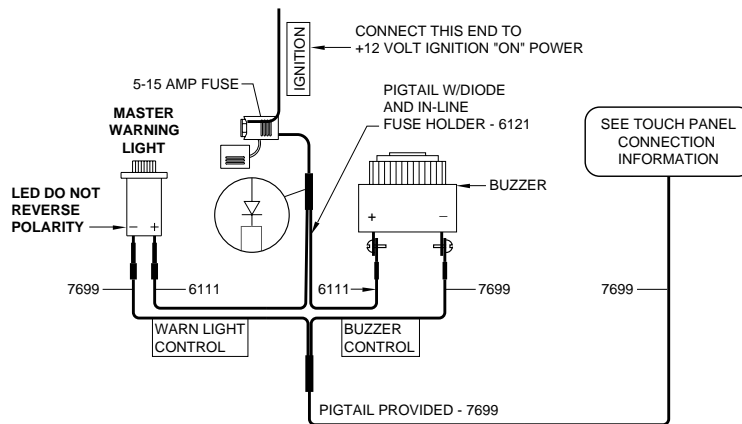
SECTION IV MASTER LIGHT/BUZZER CONNECTION DIAGRAM

725 SERIES LEVELING SYSTEM

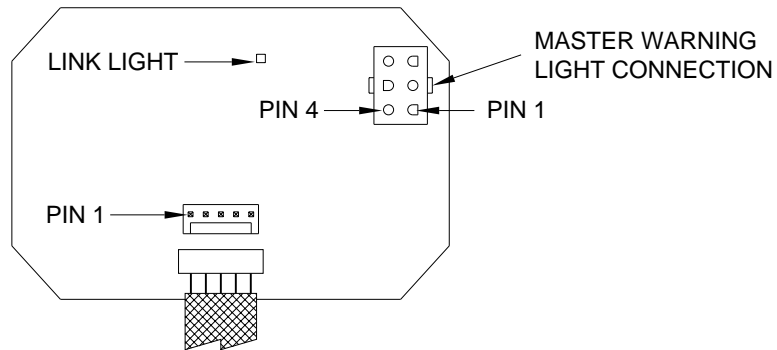
MASTER WARNING LIGHT/BUZZER CONNECTION INFORMATION



WITH KICK-DOWN JACKS



WITH STRAIGHT-ACTING JACKS



TOUCH PANEL CONNECTIONS - MASTER WARNING

PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
6 PIN UML CONNECTOR			
1	---	---	NO CONNECTION
2	RED	6110	+12 SUPPLY FOR MASTER WARNING
3	---	---	NO CONNECTION
4	---	---	NO CONNECTION
5	BLACK	7699	SWITCHED GROUND FOR MASTER WARNING
6	---	---	NO CONNECTION

SECTION IV - INFORMATION INSERT

HYDRAULIC SOLENOID VALVE

IDENTIFICATION - MANUAL OPERATIONS - REPLACEMENT

REPLACEMENT VALVES MAY HAVE A VALVE RELEASE NUT OR RELEASE CAM

SOLENOID VALVES WITH CAM RELEASE

The cam release style valves are direct replacements for all previous styles of HWH hydraulic solenoid valves.

Valve size and voltage are still factors to be considered when replacing any HWH hydraulic solenoid valve. Replace a small style 12 volt valve with a small style 12 volt valve. Replace a large style 12 volt valve with a large style 12 volt valve. This is true for 24 volt valves also.

Valve installation has not changed, simply turn out the old valve, confirm that no o-ring debris has been left in the manifold block and turn in the new valve.

After installing the valve and without creating stress on the wires at the point where they exit the valve body. Use a wire tie to secure the wires to the valve body to keep the wires from being pinched beneath the cam mechanism during operation.

