



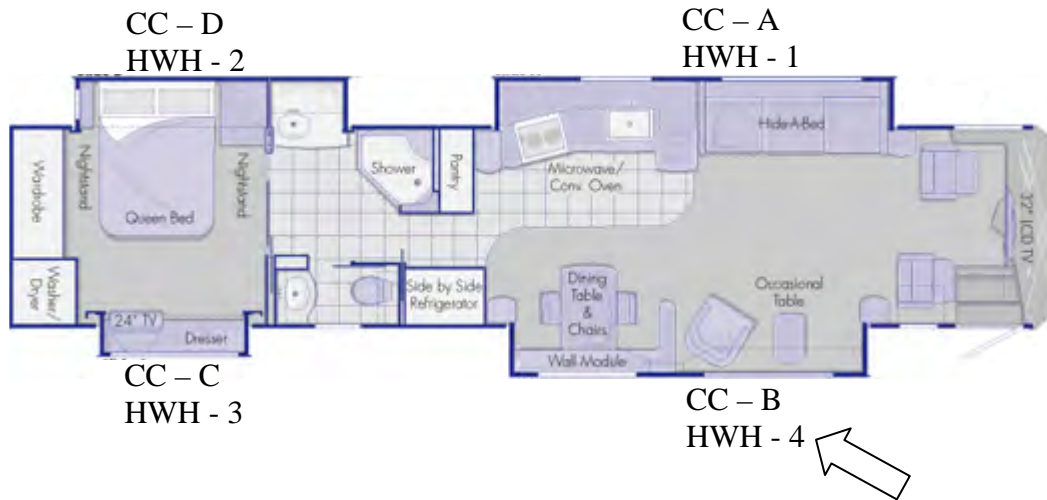
## Section 2: Leveling & Suspension

### Service Technician Workshop

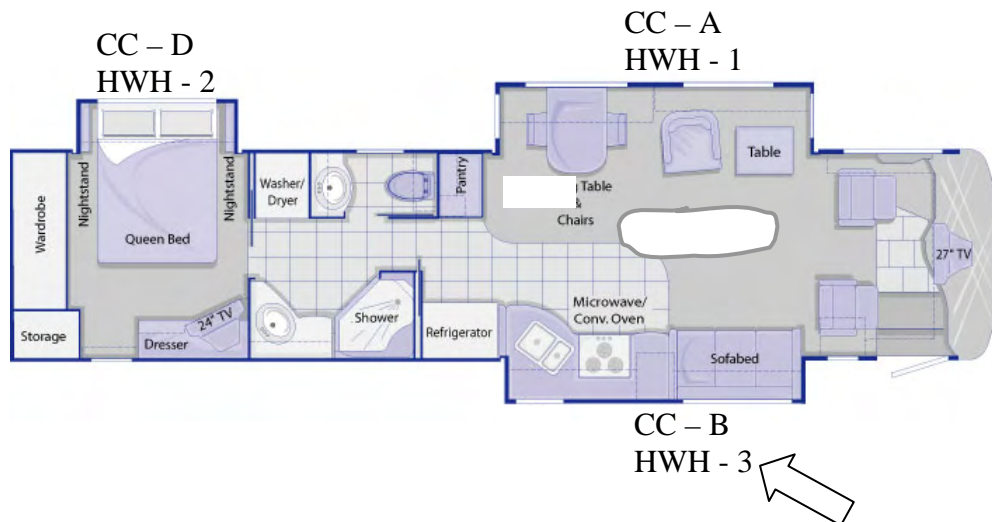
January 2008

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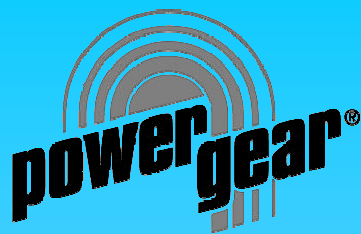
## Slide Room Designation Schemes



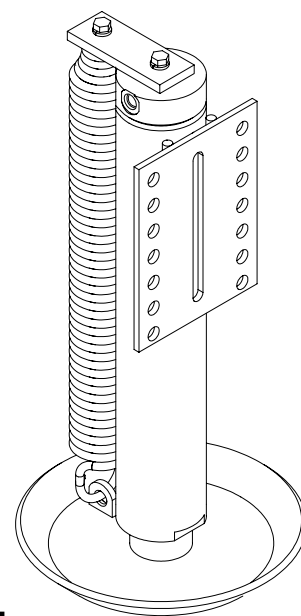
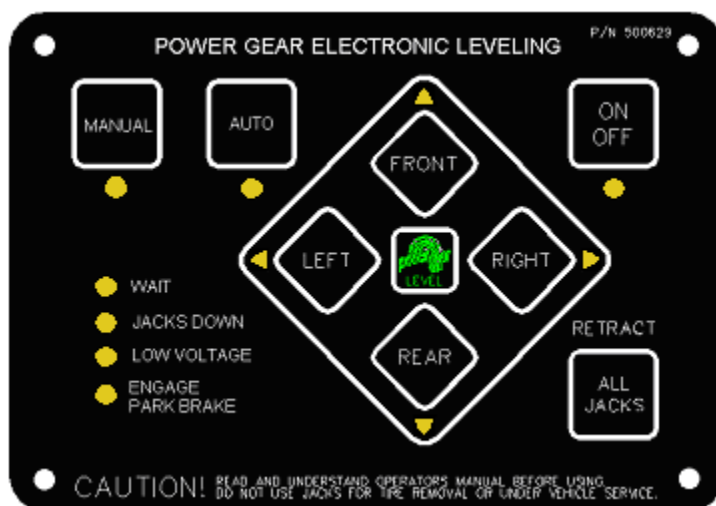
Country Coach uses an alphabetical designation that is applied in a clockwise pattern. Each letter is permanently assigned to the location on the coach as shown above, regardless of the physical presence of a slide room. HWH uses a numerical designation that is applied in a counter-clockwise pattern. Each number is sequentially assigned to the location on the coach where a slide room is physically present.



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# OPERATION MANUAL for AUTOMATIC LEVELING SYSTEMS WITH TOUCH PAD # 500629- CONTROL BOX # 500630



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1217 E. 7th St.  
Mishawaka IN  
46544  
800-334-4712  
fax (574) 256-6743

[www.powergearus.com](http://www.powergearus.com)

82-L0XXX

## Before You Level Your Coach

- Park brake must be set and transmission must be in “park” (“neutral” for diesel coaches) before jacks will operate.
- Check leveling site to make sure obstructions have been cleared away for proper jack operation.
- Selecting a site: When the coach is parked on an excessive slope the leveling requirements may exceed the jack lift stroke capability. If the coach is parked on an excessive slope, the coach should be moved to a more level surface before the leveling system is deployed.



--CAUTION--

**Keep people clear of coach prior to turning the leveling system on and while leveling system is in use.**



--CAUTION--

**Never expose hands or other parts of the body near hydraulic leaks. High-pressure oil leaks may cut and penetrate the skin causing serious injury.**



--CAUTION--

**If your coach is equipped with a slide out(s) always level your unit first, and then operate the slide out room(s). When retracting the slide(s), always retract the room(s) first then retract the leveling jacks. Following this procedure will produce the least amount of stress on your chassis.**



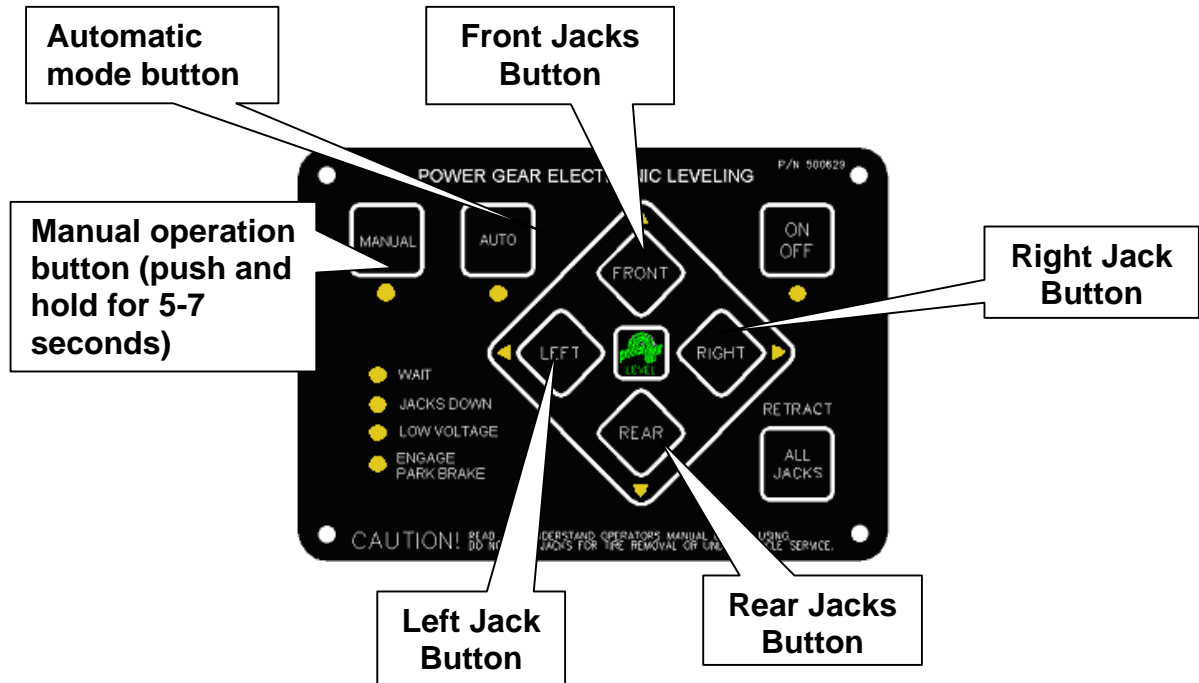
--CAUTION--

**Please read the owners' manual from the manufacturer who built and designed your motor home for further leveling and slide out room operating information and safety features.**

### **WARNING**

**THIS IS A LEVELING SYSTEM ONLY AND IS NOT INTENDED TO LIFT YOUR COACH'S TIRE OR TIRES COMPLETELY OFF THE GROUND. ATTEMPTING TO LIFT YOUR COACH COMPLETELY OFF THE GROUND (FOR EXAMPLE, TO USE THIS LEVELING SYSTEM TO CHANGE A TIRE) COULD CAUSE DAMAGE TO THE SYSTEM AND SERIOUS INJURY TO THE PARTIES INVOLVED. IF A TIRE SHOULD REQUIRE CHANGING PLEASE HAVE THE PROPER EQUIPMENT AND CONTACT A PROFESSIONAL.**

# Operating Instructions



## LEVELING YOUR COACH

1. Turn on the ignition and start the coach. Your leveling control will start a self check sequence indicated by the lights on the panel blinking in a rotating pattern. It will turn off when it has finished its self check.
2. Push the "On/Off" button on control panel. The system is now operational and the "On/Off" LED will turn on.
3. Check to see that the engage park brake light is not illuminated. If so, engage the parking brake. (Your coach will have to be in neutral or park to operate the system).
4. Push the "AUTO" button. The automatic leveling system will begin its leveling procedure. Please avoid movement in the coach during automatic leveling as it can cause errors in the results. It will signal that it has completed the process by illuminating the center green "LEVEL" light. Check to make sure that all jacks are on the ground. Also check to make sure that no tire is off the ground. If so, your leveling process is complete. If further adjustments are needed, refer to the "Manual Operation" section.
5. You can then turn the system off by pushing the on/off button again.

## Retracting Your Leveling Jacks

1. Turn on the ignition
2. Turn on the system by pushing the "on/off" button. The system is now operational and the "On/Off" LED will turn on.
3. Push the "RETRACT-ALL JACKS" button. When the "JACKS DOWN" light turns off, visually check to make sure that all jacks have fully retracted. If so, your coach leveling system is ready to travel.

# Manually Operating Your Leveling Jacks

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

1. Turn on the ignition and start the coach.
2. Push the "On/Off" button to turn on the system.
3. Push and hold the "MAN" button for 5-7 seconds in order for the system to switch to the manual mode. It will signal that it is in the manual mode when the light under the "MAN" button is illuminated.
4. Push "FRONT" button until the front of the coach rises at least 3 ". This is important and necessary to allow the coach to pivot when leveling side to side. If there is insufficient jack stroke to lift the front of the coach at least 3 inches the coach will have to be moved to an area with less front to back slope, or a weight distribution block will have to be placed under the jack.
5. Push the "REAR" button until jacks contact the ground.
6. Level the coach from front to rear by pushing the "REAR" button if the light under the "REAR" button is illuminated. If the light is illuminated above the "FRONT JACKS" button, push the "FRONT" button. In either case, keep button depressed until the green center "LEVEL" light is illuminated, or both front and rear lights are dark.
7. Level the coach from side to side by pushing the "RIGHT" button if the light beside the "RIGHT" button is illuminated. If the light beside the "LEFT" button is illuminated, push the "LEFT" button until the "LEVEL" light is illuminated.

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

8. Repeat steps 6 and 7 if needed.
9. Turn power off to leveling system by pushing "ON/OFF" button.
10. Visually inspect jacks to ensure all pads are touching ground. Should one of the rear jacks not be touching the ground, press the corresponding left or right rear jack buttons to lower the appropriate jack to the ground. **Never lift the wheels off the ground to level the coach. This can lead to an unsafe condition and damage to the leveling system or coach.**

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



# PREVENTATIVE MAINTENANCE

## POWER GEAR LIMITED WARRANTY

Power Gear warrants to the original retail purchaser that the product will be free from defects in material and workmanship for a period of (2) years following the retail sales date. Power Gear will, at its option, repair or replace any part covered by this limited warranty which, following examination by Power Gear or its authorized distributors or dealers, is found to be defective under normal use and service. No claims under this warranty will be valid unless Power Gear or its authorized distributor or dealer is notified in writing of such claim prior to the expiration of the warranty period. Warranty is transferable pending documentation of original sale date of product.

### THIS WARRANTY SHALL NOT APPLY TO:

- Failure due to normal wear and tear, accident, misuse, abuse, or negligence.
- Products which are modified or altered in a manner not authorized by Power Gear in writing.
- Failure due to misapplication of product.
- Telephone or other communication expenses.
- Living or travel expenses.
- Overtime labor.
- Failures created by improper installation of the product's slide out system or slide out room to include final adjustments made at the plant for proper room extension/retraction; sealing interface between slide out rooms and side walls; synchronization of inner rails; or improper wiring or ground problems.
- Failures created by improper installation of leveling systems, including final adjustments made at the plant, or low fluid level, wiring or ground problems.
- Replacement of normal maintenance items.

There is no other express warranty other than the foregoing warranty. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL POWER GEAR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. Some states do not allow the limitations of implied warranties, or the exclusion of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

For service contact your nearest Power Gear authorized warranty service facility or call 1-800-334-4712. Warranty service can be performed only by a Power Gear authorized service facility. This warranty will not apply to service at any other facility. At the time of requesting warranty service, evidence of original purchase date must be presented.

**Power Gear**  
1217 E. 7<sup>th</sup> Street  
Mishawaka, IN 46544  
800/334-4712  
[www.powergearus.com](http://www.powergearus.com)

## WARNING

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

1. Check and/or fill the reservoir with the jacks and room(s) in the fully **retracted** position, each month. The fluid should be  $\frac{3}{4}$ " onto the dipstick (on models so equipped) or to the bottom of the fill port on models without dipsticks.
2. Change fluid every 24 months.
3. Inspect and clean all hydraulic pump electrical connections every 12 months.
4. Remove dirt and road debris from jacks as needed.
5. If jacks are down for extended periods, it is recommended to spray exposed leveling jack chrome rods with a silicone lubricant every 5 to 7 days for protection.
6. If your coach is located in a salty environment (within 60 miles of coastal areas), it is recommended to spray the rods every 2 to 3 days with a silicone lubricant.
7. Grease the fitting on the bottom of each jack cylinder with Lithium grease every 20-30 uses.

## RECOMMENDED HYDRAULIC FLUIDS FOR YOUR HYDRAULIC PUMP

The fluids listed here are acceptable to use in your pump assembly. Contact coach manufacturer or selling dealer for information about what specific fluid was installed in your system.

It is not recommended that hydraulic fluid and automatic transmission fluids be mixed in the reservoir.

In most applications, Type A automatic transmission fluid (ATF, Dexron III, etc.) will work satisfactorily. Mercon V is also recommended as an alternative fluid for Power Gear hydraulic systems.

If operating in cold temperatures (less than -10° F) the jacks may extend and retract slowly.

For cold weather operation, fluid specially-formulated for low temperatures may be desirable. Mobil DTE 11M, Texaco Rando HDZ-15HVI, Kendall Hyden Glacial Blu, or any Mil. Spec. H5606 hydraulic fluids are recommended for cold weather operation.

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

# TROUBLESHOOTING TIPS

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

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

SYSTEM WILL NOT TURN ON, INDICATOR LIGHT DOES NOT LIGHT		
PROBABLE CAUSE		CORRECTIVE ACTION
COACH IGNITION NOT IN RUN POSITION		TURN IGNITION TO RUN POSITION
TRANSMISSION NOT IN PARK OR NEUTRAL		PLACE TRANSMISSION IN PARK OR NEUTRAL
PARKING BRAKE NOT SET		SET BRAKE
CONTROL HAS BEEN LEFT ON FOR MORE THAN FOUR MINUTES, AUTO SHUT OFF		PUSH ON/OFF BUTTON TWICE
JACKS WILL NOT EXTEND, PUMP IS NOT RUNNING		
PROBABLE CAUSE		CORRECTIVE ACTION
BATTERY VOLTAGE IS LOW		RECHARGE BATTERY
JACKS WILL NOT EXTEND, PUMP IS RUNNING		
PROBABLE CAUSE		CORRECTIVE ACTION
FLUID LEVEL LOW		FILL TANK TO PROPER LEVEL WITH AUTOMATIC TRANSMISSION FLUID SEE TIP SHEET 140

ALL JACKS WILL NOT RETRACT OR WILL NOT RETRACT FULLY		
PROBABLE CAUSE		CORRECTIVE ACTION
SYSTEM OVERFILLED WITH FLUID		DRAIN FLUID TO RECOMMENDED LEVEL- SEE TIP 140

ANY ONE OR TWO JACKS WILL NOT RETRACT AT ALL		
PROBABLE CAUSE		CORRECTIVE ACTION
BROKEN JACK SPRING (S)		REPLACE JACK SPRING SEE TIP SHEET 34
JACK ROD GUIDE IS RUSTED OR DIRTY		CLEAN CHROME ROD, GREASE ROD GUIDE IF EQUIPPED WITH GREASE FITTINGS. OTHERWISE LUBRICATE WITH SILICONE FLUID. IT MAY BE NECESSARY TO RESEAL JACK OR REPLACE.

ANY JACK RETRACTS VERY SLOWLY		
PROBABLE CAUSE		CORRECTIVE ACTION
JACK ROD GUIDE IS RUSTED OR DIRTY		CLEAN CHROME ROD, GREASE ROD GUIDE IF EQUIPPED WITH GREASE FITTINGS. OTHERWISE LUBRICATE WITH SILICONE FLUID. IT MAY BE NECESSARY TO RESEAL JACK OR REPLACE.

ANY JACK RETRACTS WITH NO POWER, WITH POSSIBLE POPPING SOUND		
PROBABLE CAUSE		CORRECTIVE ACTION
AIR IN SYSTEM		CHECK FOR COILS IN HOSE. REMOVE THE COIL IF PRESENT THEN EXTEND ALL JACKS TO FULL EXTENSION, THEN RETRACT FULLY, REPEAT 4 CYCLES WAITING A FEW MINUTES BETWEEN CYCLES, CHECK FLUID LEVEL IN BETWEEN CYCLES
CONTAMINATED FLUID		REPLACE FLUID, SEE PAGE A3, TIP SHEET 140 AND 141.
JACK LEGS CREATE POPPING SOUND		EXTEND JACK LEGS, CLEAN ROD, LUBRICATE WITH LIGHT WEIGHT GREASE IF EQUIPPED WITH GREASE FITTINGS OR LUBRICATE WITH SILICONE SPRAY
		DUE TO CHANGES IN TEMPERATURE, EXPANDING AND CONTRACTING OF FLUID WILL MAGNIFY THE PROBLEM OF POPPING JACKS, TO HELP MINIMIZE THIS REPLACE FLUID WITH MERCON V FLUID

PANEL JACKS DOWN LIGHT ILLUMINATED, BUZZER IS ON- JACKS ARE RETRACTED		
PROBABLE CAUSE		CORRECTIVE ACTION
LOW FLUID LEVEL		FILL TANK WITH DEXRON III AUTOMATIC TRANSMISSION FLUID SEE PAGE TIP SHEET 140

PANEL JACKS DOWN LIGHT AND ALARM WILL GO ON WHILE DRIVING, JACKS RETRACTED		
PROBABLE CAUSE		CORRECTIVE ACTION
LOW FLUID LEVEL		FILL TANK WITH DEXRON III AUTOMATIC TRANSMISSION FLUID SEE TIP SHEET 140

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**OPERATORS AND SERVICE  
MANUAL**  
for  
**AUTOMATIC RV SYSTEM**

82-L0330 Rev. 0  
May, 2002

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## OPERATION AND MAINTENANCE

- The Power Gear leveling system on your coach is designed and built to give you years of trouble free leveling and stabilizing operation. The Power Gear system reflects the latest state of the art technology in both hydraulic and electronic components. **Please read and study this manual before you operate the leveling system.**

**SYSTEM DESCRIPTION** - The Power Gear automatic electro-hydraulic leveling system consists of the following major components:

(A) Power Gear supplies spring return jacks rated at a lifting capacity appropriate for your coach. Each jack has a large diameter shoe for maximum surface area on soft surfaces.

(B) Each jack is powered from a central 12VDC motor/pump assembly which also includes the hydraulic oil reservoir tank, control valve manifold, and solenoid valves.

(C) The system is controlled by the solid state touch pad located by the driver and a control box mounted on the top of a storage bin, centrally located in the coach.

<b>WARNING</b>
----------------

**DO NOT USE LEVELING JACKS (OR AIR SUSPENSION) TO SUPPORT VEHICLE WHILE UNDER COACH OR CHANGING TIRES. THE HYDRAULIC LEVELING SYSTEM IS DESIGNED AS A LEVELING SYSTEM ONLY. DO NOT USE AS A JACK OR IN CONJUNCTION WITH A JACK. IT IS HIGHLY RECOMMENDED THAT, SHOULD A TIRE CHANGE BE REQUIRED, THAT IT BE PERFORMED BY A KNOWLEDGEABLE, TRAINED PROFESSIONAL. ATTEMPTS TO CHANGE TIRES WHILE SUPPORTING THE VEHICLE WITH THE HYDRAULIC SYSTEM COULD RESULT IN DAMAGE TO THE MOTOR HOME AND RISK CAUSING SERIOUS INJURY OR DEATH.**

### OPERATION CAUTION NOTES!

**CAUTION - CHECK THAT POTENTIAL JACK CONTACT LOCATIONS ARE CLEAR OF OBSTRUCTIONS OR DEPRESSIONS BEFORE OPERATION.**

**CAUTION - KEEP PEOPLE CLEAR OF COACH PRIOR TO TURNING THE LEVELING SYSTEM ON AND WHILE LEVELING SYSTEM IS IN USE.**

**CAUTION - NEVER EXPOSE HANDS OR OTHER PARTS OF THE BODY NEAR HYDRAULIC LEAKS. HIGH PRESSURE OIL LEAKS MAY CUT AND PENETRATE THE SKIN CAUSING SERIOUS INJURY.**

**CAUTION - PARK COACH ON REASONABLY SOLID SURFACE OR JACKS MAY SINK INTO GROUND. ON EXTREMELY SOFT SURFACES USE LOAD DISTRIBUTION PADS UNDER EACH JACK.**

**CAUTION - NEVER LIFT THE WHEELS OFF THE GROUND TO LEVEL THE COACH.**

## **BEFORE YOU OPERATE THE SYSTEM**

The leveling system shall only be operated under the following conditions:

- (A) The coach is parked on a reasonably level surface.
- (B) The coach "PARKING BRAKE" is engaged.
- (C) The coach transmission is engaged in "Neutral or Park".
- (D) The coach engine is running.

## **EXCESS SLOPE**

When the coach is parked on an excessive slope the leveling requirements may exceed the jack lift stroke capability. When this occurs, the 4 orange jack lights and the center all level green light will blink. The coach must be moved to a more level surface before the leveling jacks are deployed.

## **LEVELING PROCEDURES**

STEP 1 - Push "ON/OFF" pad on control panel. The system is now operational and the electronic level lights will become active.

STEP 2 - Check to see that the touch-pad parking brake light is not flashing.

**NOTE: Engage parking brake if parking brake light is flashing.**

STEP 3 - Push the "Auto" pad to begin the automatic leveling cycle.

**CAUTION: After starting the automatic leveling cycle it is very important that you do not move around in the coach until the unit is level and the green Power Gear Level light illuminates in the center of the touch pad. Failure to remain still during the leveling cycle could have an affect on the performance of the leveling system.**

STEP 4 - If further adjustments are necessary, simply push and hold the "MAN" pad for approximately 5 seconds until the light under this button is illuminated. Push the appropriate leg pad to override the system and level the coach to your liking.

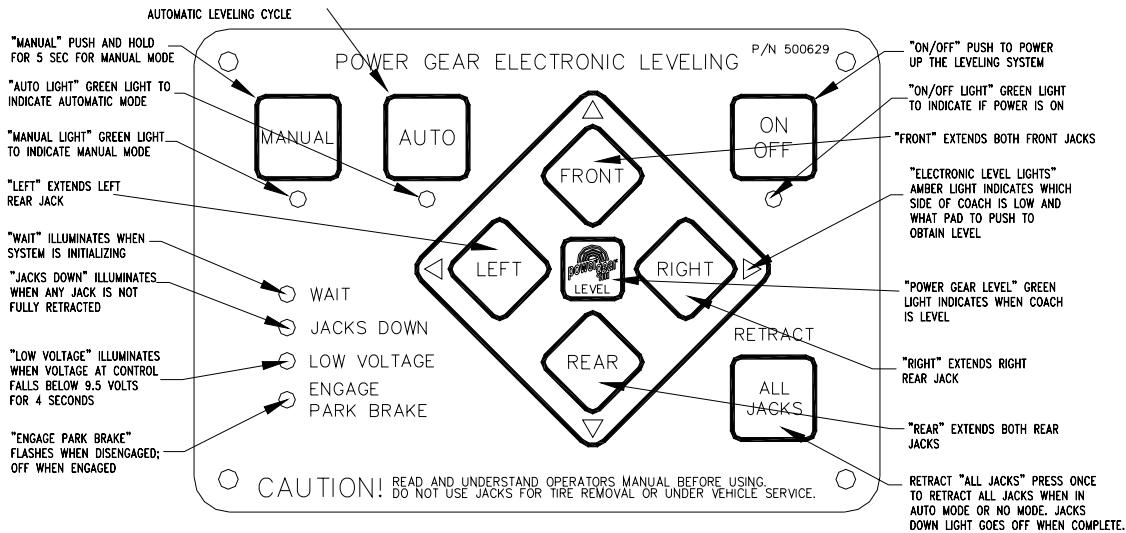
**CAUTION: Never lift the wheels off the ground when leveling the motorhome.**

STEP 5 - Push "ON/OFF" pad to de-energize the system.

**NOTE: When in the manual mode, if the retract button is pushed the jacks will only retract as long as the button is depressed.**



## CONTROL TOUCH PAD #500629



### JACK RETRACT PROCEDURES

NOTE: Coach ignition must be on.

STEP 1 - Energize the system by pushing "ON/OFF" pad on control panel. The "ON/OFF" and "JACKS DOWN" lights will be lit.

STEP 2 - Push and release the "RETRACT ALL JACKS" pad. All the jacks will start to retract and return to the full retract position automatically. When all jacks return to full retract position the "JACKS DOWN" light will go out.

STEP 3 - When the "JACKS DOWN" light goes out push the "ON/OFF" pad on the control panel to de-energize the system. After a visual inspection around the coach to verify the jacks are fully retracted, you may proceed to travel.

### AUTOMATIC SAFETY SHUTOFF FEATURE

If the touch panel is left on and inactive for four minutes it will shut off automatically.

To reset the system the coach ignition must be turned off, then back on.

## **DRIVE AWAY PROTECTION SYSTEM**

If the ignition is in the "RUN" position, jacks are down, and the operator takes the transmission out of neutral or park, or releases the parking brake, the "JACKS DOWN" indicator will flash and the alarm beeper will activate. The system will then automatically retract the jacks until the jacks are fully retracted.

## **RECOMMENDED HYDRAULIC FLUIDS FOR YOUR POWER GEAR LEVELING SYSTEM**

In most applications, Type A automatic transmission fluid (ATF, Dexron III, etc.,) will work satisfactorily. Mercon V is also recommended as an alternative fluid for Power Gear leveling systems

If operating in cold temperatures (less than -10° F) the jacks may extend and retract slowly.

For cold weather operation, fluid specially-formulated for low temperatures may be desirable. Mobil DTE 11M, Texaco Rando HDZ-15HVI, Kendall Hyden Glacial Blu, or any Mil. Spec. H5606 hydraulic fluids are recommended for cold weather operation.

Please consult factory before using any other fluids.

## **PREVENTATIVE MAINTENANCE PROCEDURES**

### **1. Change fluid every 36 months.**

- Fill the reservoir with the jacks in the fully retracted position.
- On 1998 - PRESENT model year coaches, the fluid should be within 1/4 inch of the fill port lip and checked only with all jacks retracted. On pre-1998 model year coaches the fluid level should be approximately 1/8 inch on the dipstick and checked only with all jacks retracted.

### **2. Check the fluid level every month.**

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

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

### **WARNING:**

**Your coach should be supported at both front and rear axles with jack stands before working underneath.**

5. If jacks are down for extended periods, it is recommended to spray exposed chrome rods with a silicone lubricant every seven days for protection. If your coach is located in a salty environment, it is recommended to spray every 2 to 3 days.

**REQUIRED INFORMATION FOR ORDERING PARTS FROM YOUR LOCAL DEALER**

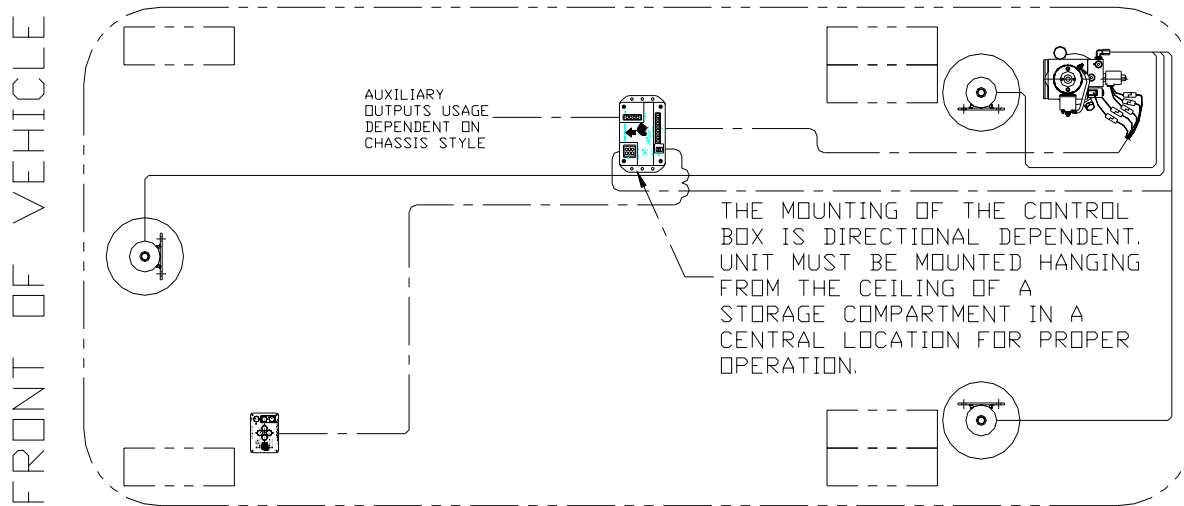
When ordering parts, please provide the following information:

- 1) Your Name
- 2) Company Name
- 3) Phone Number
- 4) Shipping Address
- 5) Billing Address
- 6) Purchase Order Number

For each part needed

- 1) Coach
  - I.D.#
  - Make
  - Model
  - Wheel Base
  - Mileage
- 2) Part Number
- 3) Description
- 4) Quantity

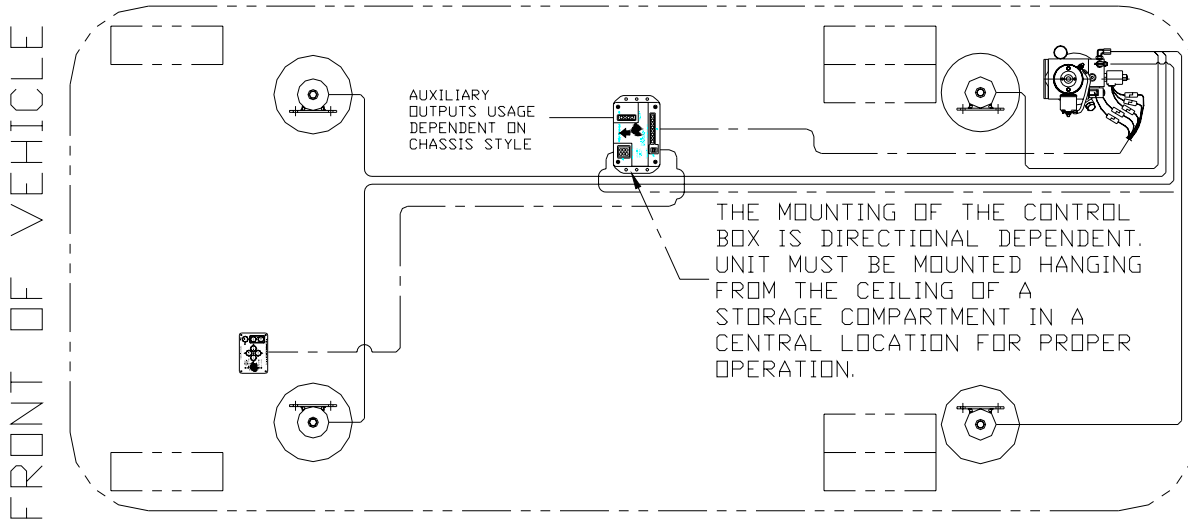
**ALL REPAIRS MUST BE MADE BY AN AUTHORIZED SERVICE CENTER. SYSTEMS THAT HAVE BEEN TAMPERED WITH, MODIFIED, ADJUSTED OR REPAIRED BY ANY PARTY OTHER THAN AN AUTHORIZED SERVICE CENTER WILL VOID ALL WARRANTIES.**



ITEM	PART NO	DESCRIPTION	QTY
1	500629	TOUCHPAD CONTROL - AUTO SYSTEM	1
2	500630	CONTROL CENTER - AUTO. SYSTEM	1
3	NOTE 1	PUMP / MOTOR ASSEMBLY	1
4	NOTE 2	REAR JACKS	2
5	NOTE 2	FRONT JACK	1

NOTE 1: THE PUMP / MOTOR ASSEMBLY AND HOSES USED VARY BY COACH MODEL. PLEASE REFER TO YOUR COACH MAKE, MODEL AND YEAR WHEN ORDERING.

NOTE 2: THE PARTICULAR JACKS USED VARY BY COACH MODEL. PLEASE INDICATE THE MODEL AND YEAR OF YOUR COACH TO IDENTIFY WHICH JACKS ARE USED.

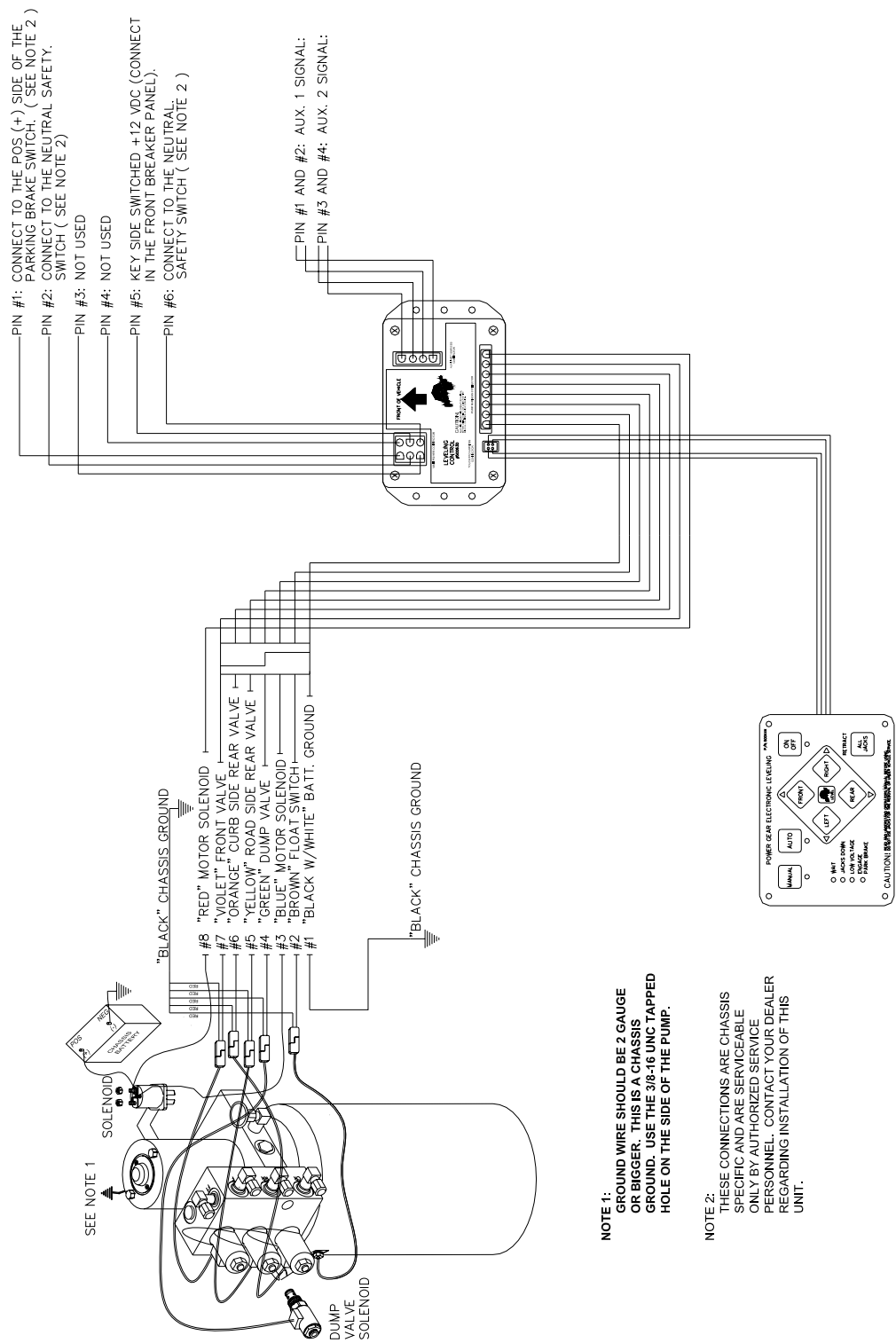


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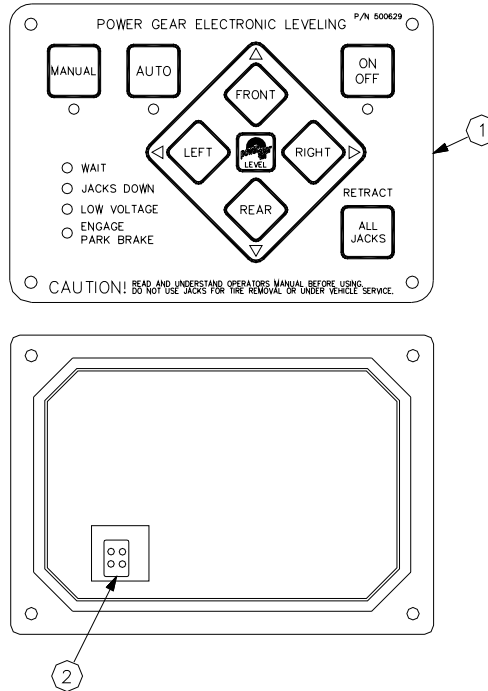
NOTE 2: THE PARTICULAR JACKS USED VARY BY COACH MODEL. PLEASE INDICATE THE MODEL AND YEAR OF YOUR COACH TO IDENTIFY WHICH JACKS ARE USED.

# WIRING DIAGRAM



# AUTOMATIC TOUCH PAD CONTROL

March 2002 - Present

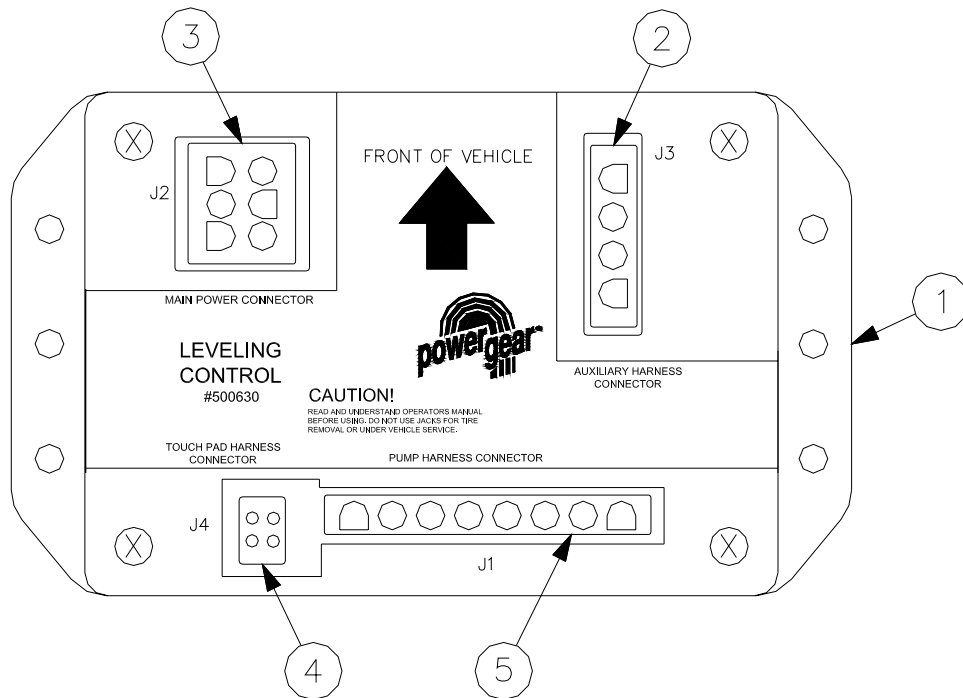


<u>ITEM</u>	<u>NOTE</u>	<u>P/N</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>APPLICATION</u>
1		500629S	AUTOMATIC CONTROL PANEL	1	03/2002 - Present
2	N		TOUCH PAD WIRE HARNESS	1	03/2002 - Present

**N - NOT SHOWN**

# **AUTOMATIC CONTROL BOX**

**March 2002 - Present**

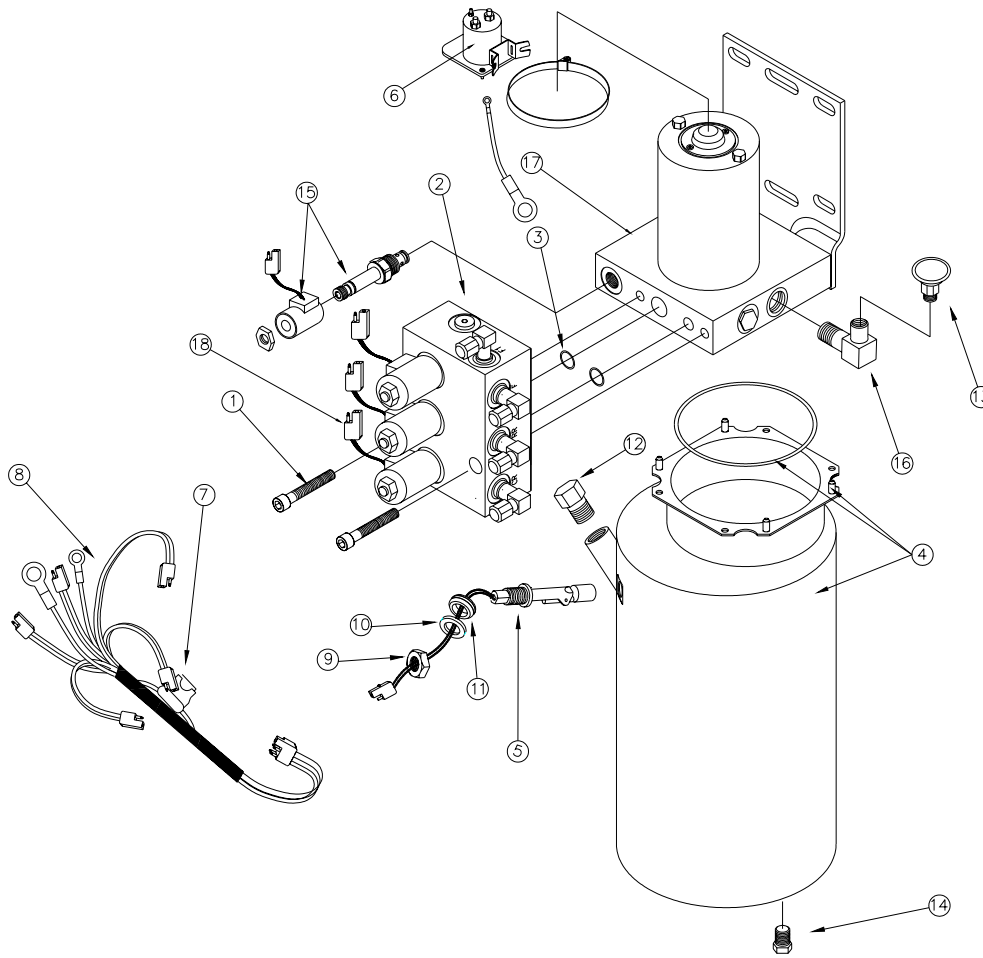


<b><u>ITEM</u></b>	<b><u>NOTE</u></b>	<b><u>P/N</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QUANTITY</u></b>	<b><u>APPLICATION</u></b>
1		500630S	AUTOMATIC CONTROL BOX	1	03/2002 - Present
2	N	500663	AUXILIARY HARNESS	1	03/2002 - Present
3	N	5020-XXX	MAIN POWER COACH HARNESS	1	03/2002 - Present
4	N		TOUCH PAD WIRE HARNESS	1	03/2002 - Present
5	N	500661	PUMP HARNESS	1	03/2002 – Present

**N - NOT SHOWN**



# PUMP DIAGRAM

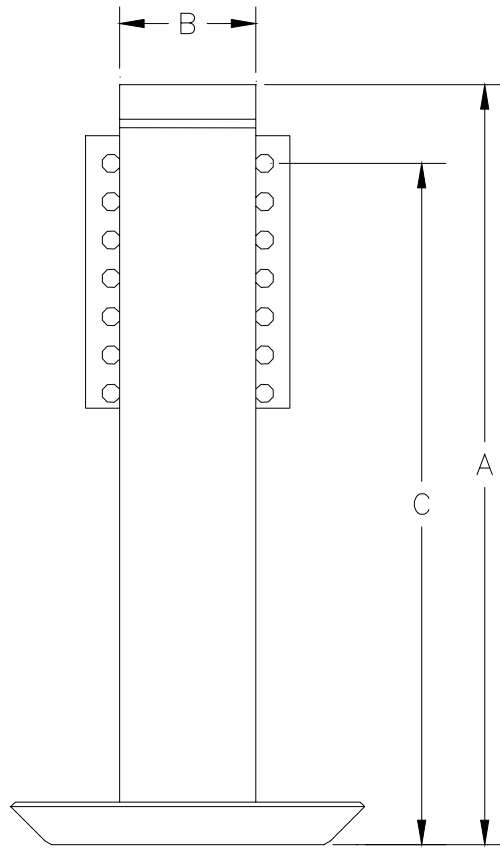


ITEM	P/N	DESCRIPTION	QTY EACH	APPLICATION
1-18	see note	COMPLETE POWER UNIT	1	2001 - PRESENT
1,2,3	see note	VALVE BLOCK ASSEMBLY	1	SEE PAGE 12
4,12,14	see note	TANK, FILL PLUG, DRAIN PLUG	1	2001 - PRESENT
12	07-1238	FILL PLUG	1	2001 - PRESENT
14	07-1239	DRAIN PLUG	1	2001 - PRESENT
5,9,10,11	14-1136	FLOAT SWITCH ASSEMBLY	1	2001 - PRESENT
7,8	500661	PUMP HARNESS	1	2001 - PRESENT
15	500633	DUMP VALVE SOLENOID	1	2001 - PRESENT
6	500310	MOTOR SOLENOID	1	2001 - PRESENT
13,16	500511	AIR BREATHER	1	2001 - PRESENT
17	see note	MOTOR/PUMP ASSEMBLY	1	2001 - PRESENT
18	500634	LEG VALVE AND SOLENOID	1	2001 - PRESENT

NOTE: Contact authorized service facility or Power Gear for correct part number.

**ORDER BY MODEL AND YEAR**

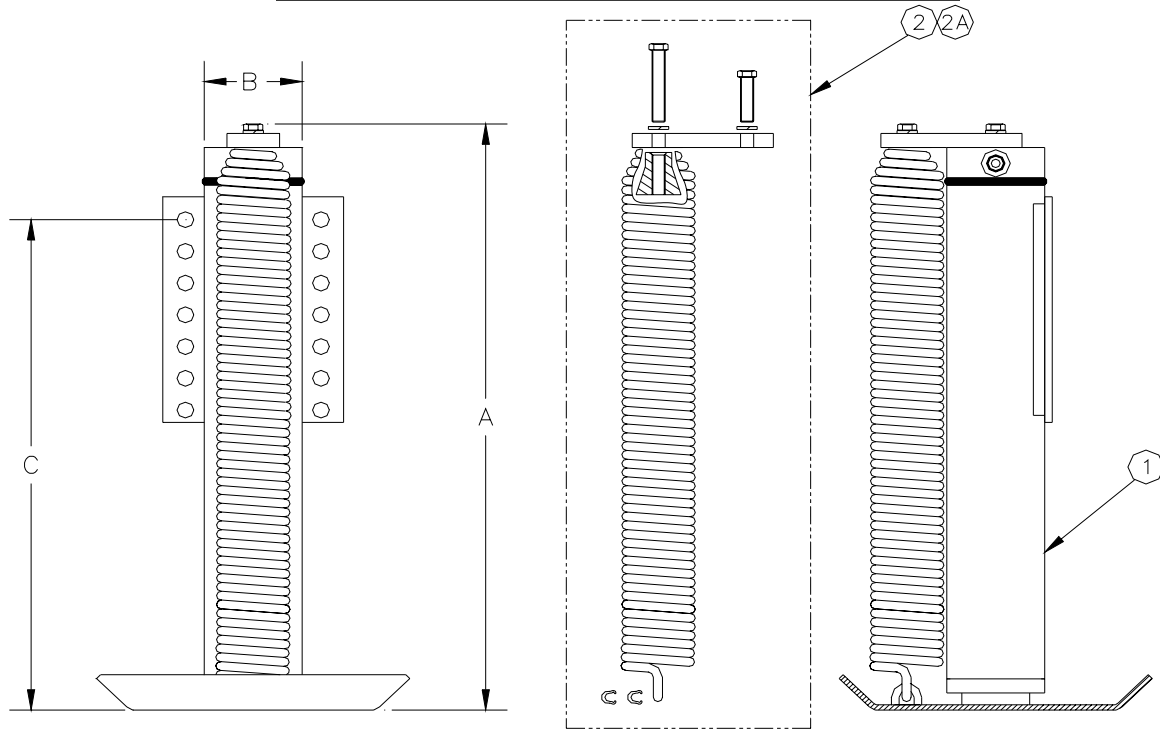
## REPLACEMENT JACKS (LEGS)



ITEM	P/N	NOTE	DESCRIPTION	QTY EACH	APPLICATION
1	500145	N	16,000 LBS. JACK (LEG) ASSY. 16" STROKE A=22-5/16" B=4" C=20"	1	1994 - PRESENT MODEL YEAR
1	500385TH	N	12,000 LBS. JACK (LEG) ASSY. 16" STROKE A=22-5/16" B=3-5/8" C=20-1/8"	1	1999 - PRESENT MODEL YEAR
1	500620	N	24,000 LBS. JACK (LEG) ASSY. 16" STROKE A=22-3/8" B=4-1/2" C=20-3/32"	1	1999 - PRESENT MODEL YEAR

**N - ORDER BY MODEL, YEAR, AND WHEEL BASE OR BY DIMENSIONS A, B, C  
NO SERVICEABLE PARTS, ORDER COMPLETE JACK (LEG)**

## REPLACEMENT JACKS (LEGS)



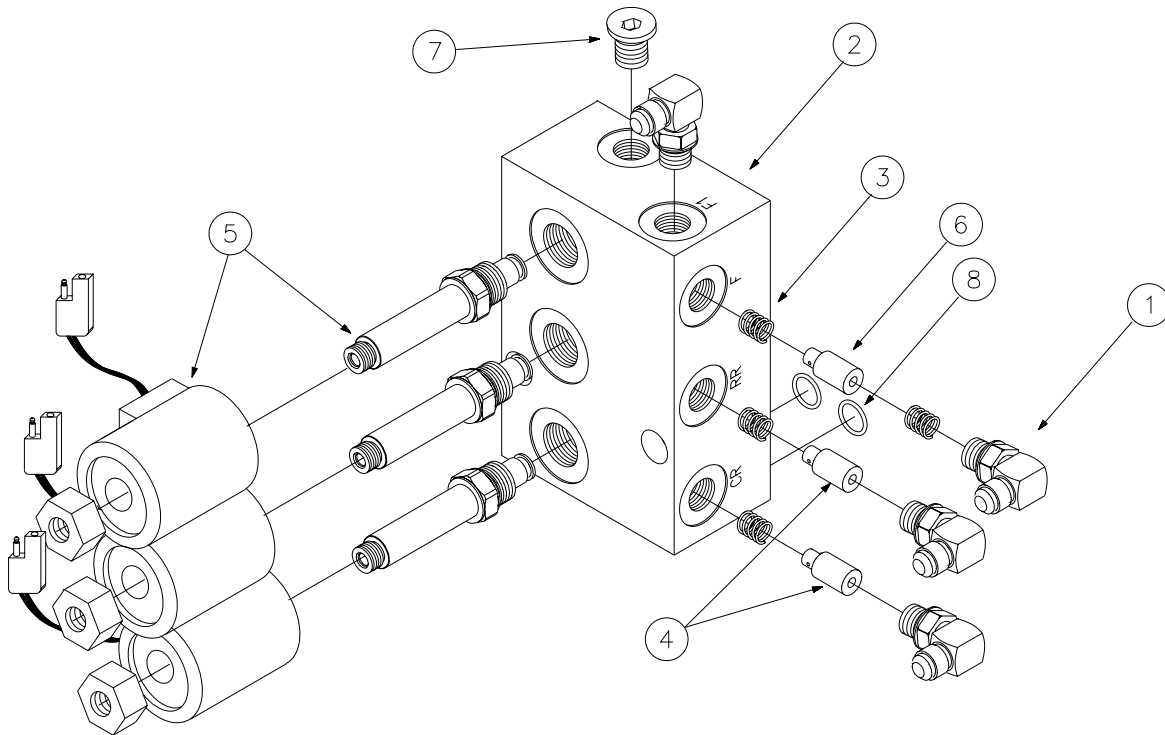
ITEM	P/N	NOTE	DESCRIPTION	QTY EACH	APPLICATION
1	500146	N	9,000 LBS. JACK (LEG) ASSY. 15" STROKE - A=20-3/4" B=3-1/4" C=17-3/8"	1	1994 - PRESENT MODEL YEAR
1	500235	NN	9,000 LBS. JACK (LEG) ASSY. 12" STROKE - A=18-15/16" B=3-1/4" C=17-3/8"	1	1994 - PRESENT MODEL YEAR
1	500384H	N	6,000 LBS. JACK (LEG) ASSY. 14" STROKE - A=21-5/16" B=2-7/8" C=17-15/16"	1	1999 - PRESENT MODEL YEAR
1	500482H	NN	6,000 LBS. JACK (LEG) ASSY. 12" STROKE - A=18" B=2-5/8" C=15-3/8"	1	1999 - PRESENT MODEL YEAR
2	500094		SPRING KIT FOR 15" STROKE JACK (LEG) ASSY.	1	1994 - PRESENT MODEL YEAR
2A	500252		SPRING KIT FOR 12" STROKE JACK (LEG) ASSY.	1	1994 - PRESENT MODEL YEAR

N - ORDER BY MODEL, YEAR AND WHEEL BASE OR BY DIMENSIONS A, B, C  
NO SERVICEABLE PARTS, ORDER COMPLETE JACK (LEG)

N - INCLUDES ITEM 2 OR 2A

NN - INCLUDES ITEM 2 OR 2A

# JACK (LEG) VALVE ASSEMBLY 2001 - PRESENT



## **3 JACK WITH MANUAL OVERRIDE**

ITEM	P/N	DESCRIPTION	QTY EACH	APPLICATION
1, 3, 4	500636S	REAR HOSE CONNECTOR KIT	1	2001 - PRESENT
1, 3, 6	500637S*	FRONT HOSE CONNECTOR KIT	1	2001 - PRESENT
5	500634	LEG VALVE SOLENOID	1	2001 - PRESENT
7		PLUG		
8	500523	O-RING KIT	2	2001 - PRESENT
1-8	500633	VALVE BLOCK ASSEMBLY	1	2001 - PRESENT

\* - "F" PORT HAS TWO SPRINGS

**ORDER BY MODEL AND YEAR**

## TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
System will not turn on and ON/OFF indicator light does not light	Coach ignition not in run position.	Turn ignition to run position.
	Transmission not in neutral or park.	Place transmission in neutral or park.
	Parking brake not set.	Set parking brake.
	Panel has been left on for more than four minutes. Auto time out has occurred.	Turn ignition key off and back on.
Touch pad turns on, but, turns itself off when leg button is pushed.	Low voltage.	Start coach to charge batteries.
Touch pad turns on, but, coach will not level using the automatic feature Jacks down light is on, even though all of the jacks are retracted	Low fluid level	Check fluid level in the reservoir, if fluid is low fill to port rim with recommended fluid. If jacks down light remains on with fluid level full see service center for repair.
Jacks will not extend to ground, pump is running.	No fluid or not enough fluid in reservoir.	Fill reservoir with Dexron III automatic transmission fluid. See page 4.
Any one or two of the jacks will not retract.	Broken spring(s).	Secure jack in retracted position. See service center for repair.
"JACKS DOWN" light does not go out when all jacks are retracted.	Low fluid level.	Fill reservoir to proper level with recommended fluid. See page 4.
Alarm sounds and "JACKS DOWN" light starts flashing while traveling. The jacks are fully retracted.	Low fluid level.	Fill reservoir to proper level with recommended fluid. See page 4.

## POWER GEAR LIMITED WARRANTY

Power Gear warrants to the original retail purchaser that the product will be free from defects in material and workmanship for a period of one (1) year following the retail sales date. Power Gear will, at its option, repair or replace any part covered by this limited warranty which, following examination by Power Gear or its authorized distributors or dealers, is found to be defective under normal use and service. No claims under this warranty will be valid unless Power Gear or its authorized distributor or dealer is notified in writing of such claim prior to the expiration of the warranty period. Warranty is non-transferable.

### **THIS WARRANTY SHALL NOT APPLY TO:**

- Failure due to normal wear and tear, accident, misuse, abuse, or negligence.
- Products which are modified or altered in a manner not authorized by Power Gear in writing.
- Failure due to misapplication of product.
- Telephone, telegraph, teletype or other communication expenses.
- Living or travel expenses of person performing service.
- Overtime labor.
- Failures created by improper installation of the product's slideout system or slideout room to include final adjustments made at the plant for proper room extension/retraction; sealing interface between slideout rooms and side walls; synchronization of inner rails; or improper wiring or ground problems.
- Failures created by improper installation of leveling systems, including final adjustments made at the plant, or low fluid level, wiring or ground problems.
- Replacement of normal maintenance items including lubricants and fuses.

There is no other express warranty other than the foregoing warranty. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL POWER GEAR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow the limitations of implied warranties, or the exclusion of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

For service contact your nearest Power Gear authorized warranty service facility or call 1-800-334-4712. Warranty service can be performed only by a Power Gear authorized service facility. This warranty will not apply to service at any other facility. At the time of requesting warranty service, evidence of original purchase date must be presented.

**Power Gear**  
**1217 East Seventh Street**  
**Mishawaka, IN 46544**

**800/334-4712**



1217 E. 7<sup>th</sup> Street  
Mishawaka, IN 46544  
Phone: 1-800-334-4712  
1-888-339-2539  
Fax: 574-256-6743

# **T.I.P. Troubleshooting Information on Power Gear**

## **AUTOMATIC LEVELING SYSTEM SET-UP PROCEDURE**

### **Initial Zero Mode:**

Zero mode is indicated on the control touch pad by all lights on the pad flashing.

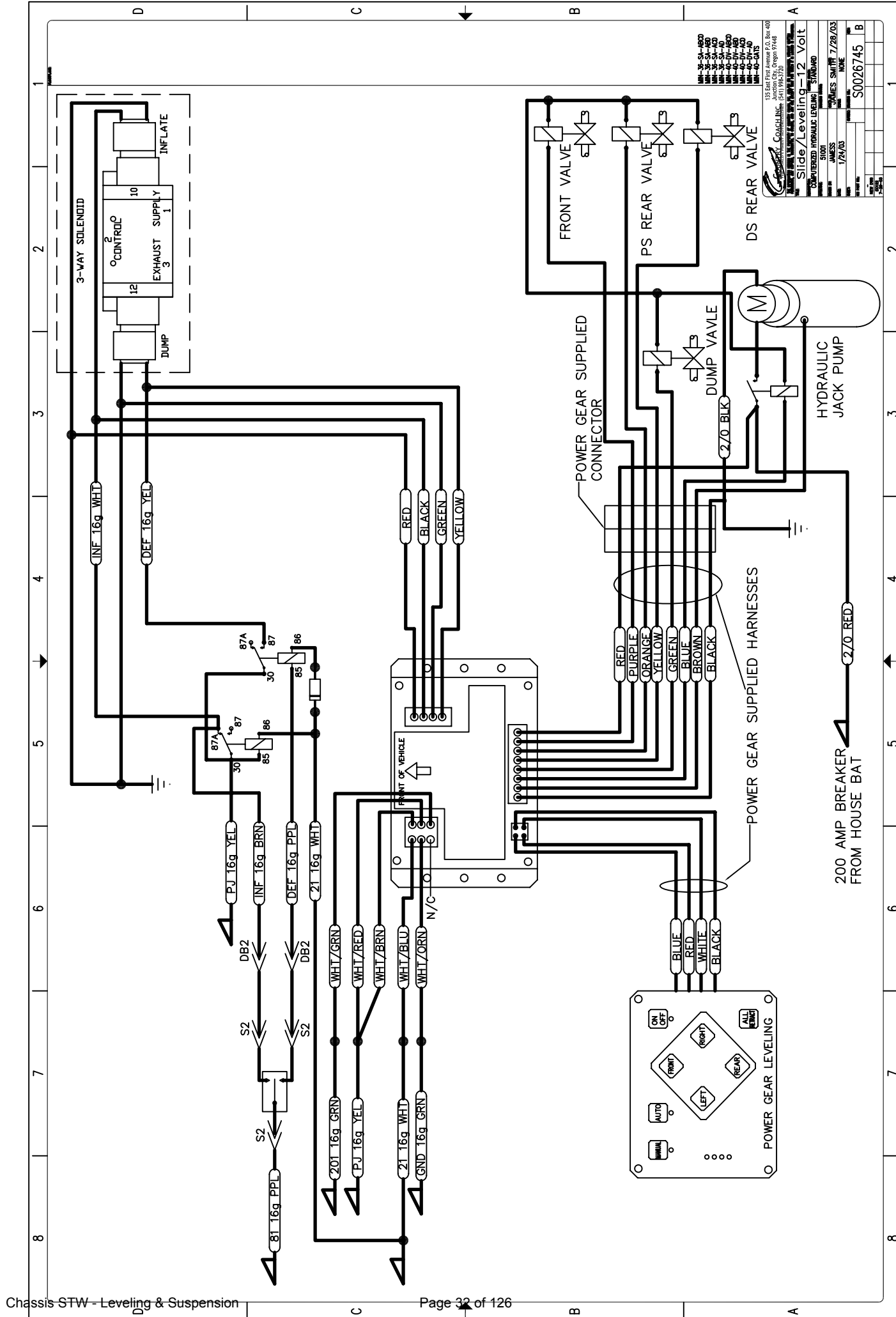
- 1) First, place a carpenter's level on the floor in the center of the coach
- 2) Next, manually level the coach:
  - Push the front leg button until the jacks contact the ground
  - Push the rear leg button until jacks contact the ground
  - Push the left and the right button to verify all of the jacks are on the ground
  - Using the carpenter's level complete the leveling process manually by pushing the appropriate buttons on the touch pad.
- 3) After it has been verified that the coach is level the zero level point (this is the point that the control sees as level) can be set
  - To set zero level, push the retract button three consecutive times
  - After the "retract" button has been pushed three times all of the lights on the touch pad will stop blinking except the on off light.
  - The on off button light will flash for 20 seconds. This mode is prompting the user to tell the automatic control box if the chassis has a air bag suspension system.
  - **If the chassis has an air bag suspension system** press the RETRACT button again three times within 20 seconds from the time the zero level position was programmed ( during the time the on off light is blinking
  - **If the unit does not has air bag suspension system** DO NOT TOUCH ANY BUTTONS within the 20 seconds the on off light is blinking.

### **Resetting initial zero point**

If the zero point has been set and the control is functioning normally, the user can reset the zero point by following the steps below.

- 1) First, the control box has to be put back into the zero mode.
  - This is done by pushing the front button 5 consecutive times followed by the rear button 5 consecutive times within 10 seconds.
  - All of the lights on the touch pad will begin flashing. This indicates that you have successfully returned the control box to zero mode.
- 2) Last, follow the instructions above to set the new zero point.

TIP Sheet #153  
82-L0317-T-Rev1  
08-02







**3-Way air control valve for Inspire  
w/ Powergear leveling system**

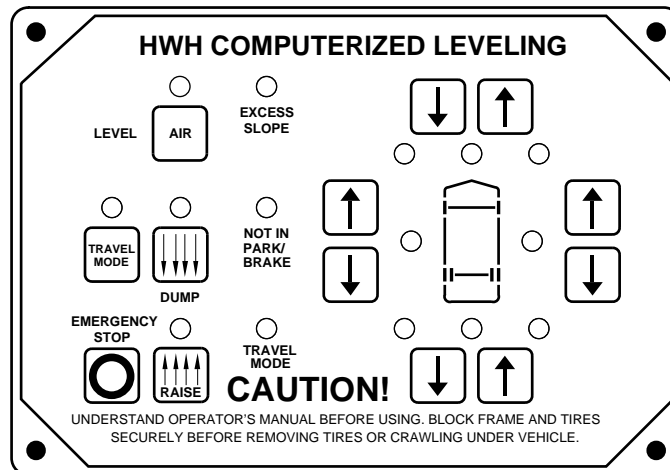
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# OPERATOR'S MANUAL

## HWH® COMPUTER-CONTROLLED 2000 SERIES LEVELING SYSTEM AND SPACEMAKER® ROOM EXTENSION SYSTEMS

**FEATURING:**  
*Touch Panel Leveling Control*  
*Air Leveling (With Tag Axle)*  
*Four Room Extensions*



**HWH CORPORATION**  
(On I-80, Exit 267 South)  
2096 Moscow Road | Moscow, Iowa 52760  
Ph: 800/321-3494 (or) 563/724-3396 | Fax: 563/724-3408  
[www.hwh.com](http://www.hwh.com)

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## OPERATOR'S MANUAL

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### CAUTION !

**READ THE ENTIRE OPERATOR'S MANUAL BEFORE OPERATING.**

**BLOCK FRAME AND TIRES SECURELY 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.**

**KEEP ALL PEOPLE CLEAR OF VEHICLE WHILE LEVELING SYSTEM AND ROOM EXTENSION ARE BEING OPERATED.**

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

**DO NOT OPERATE THE LEVELING SYSTEM OR USE THE DUMP OR RAISE BUTTONS IF THE VEHICLE IS MOVING IN EXCESS OF 5 MPH.**

**WEAR SAFETY GLASSES WHEN INSPECTING OR SERVICING THE SYSTEM TO PROTECT EYES FROM DIRT, METAL CHIPS, OIL LEAKS, ETC. FOLLOW ALL OTHER APPLICABLE SHOP SAFETY PRACTICES.**

**IMPORTANT: IF COACH IS EQUIPPED WITH A ROOM EXTENSION, READ ROOM EXTENSION SECTION BEFORE OPERATING LEVELING SYSTEM.**

## HOW TO OBTAIN WARRANTY SERVICE

### THIS IS NOT TO BE INTERPRETED AS A STATEMENT OF WARRANTY

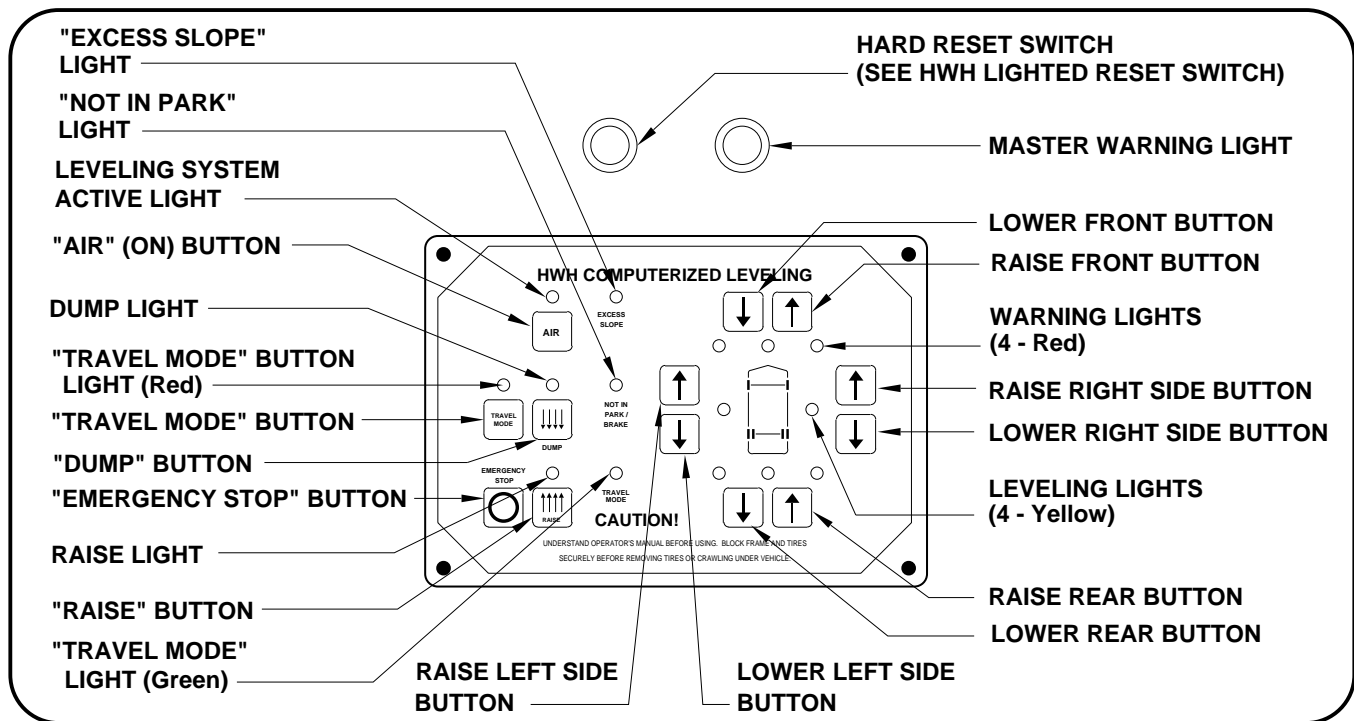
HWH CORPORATION strives to maintain the highest level of customer satisfaction. Therefore, if you discover a defect or problem, please do the following:

**FIRST:** Notify the dealership where you purchased the vehicle or had the leveling system installed. Dealership management people are in the best position to resolve the problem quickly. If the dealer has difficulty solving the problem, he should immediately contact the Customer Service Department, at HWH CORPORATION.

**SECOND:** If your dealer cannot or will not solve the problem, notify the Customer Service Department:  
HWH CORPORATION 2096 Moscow Rd. Moscow IA. 52760  
(563) 724-3396 OR (800) 321-3494. Give your name and address, coach manufacturer and model year, date the coach was purchased, or the date of system installation,

description of the problem, and where you can be reached during business hours (8:00 a.m. till 5:00 p.m. c.s.t.). HWH CORPORATION personnel will contact you to determine whether or not your claim is valid. If it is, HWH CORPORATION will authorize repair or replacement of the defective part, either by appointment at the factory or by the authorization of an independent service facility, to be determined by HWH CORPORATION. All warranty repairs must be performed by an independent service facility authorized by HWH CORPORATION, or at the HWH CORPORATION factory, unless prior written approval has been obtained from proper HWH CORPORATION personnel.

# CONTROL IDENTIFICATION



## CONTROL FUNCTIONS

### CONTROL BUTTONS

**"AIR" BUTTON:** This is the system active and automatic operation button. It works if the ignition is in the "ON" position.

**"EMERGENCY STOP" BUTTON:** This button turns the system OFF but does NOT control power to the "DUMP" or "RAISE" buttons. Pushing this button will NOT put the system in the TRAVEL mode.

**"TRAVEL MODE" BUTTON:** This button will put the Leveling System in the TRAVEL mode. The ignition must be "ON" for the vehicle to return to proper ride height for traveling.

**"DUMP" BUTTON:** This button will lower the whole coach by dumping air from the suspension system.

**"RAISE" BUTTON:** This button will raise the whole coach by adding air to the suspension system.

**IMPORTANT:** Read "DUMP AND RAISE FUNCTIONS" before using the "DUMP" or "RAISE" buttons.

**UP ARROWS (RAISE BUTTONS):** These momentary buttons are used for manually operating the air leveling systems. Sides or ends of the vehicle will raise while these buttons are pushed.

**DOWN ARROWS (LOWER BUTTONS):** These momentary buttons are used for manually operating the air leveling systems. Sides or ends of the vehicle will lower while these buttons are pushed.

### INDICATOR LIGHTS

**LEVEL SYSTEM ACTIVE LIGHT:** ON when the system is active, and flashes during automatic leveling.

**DUMP LIGHT:** Flashes when "DUMP" button is pushed.

**RAISE LIGHT:** Flashes when "RAISE" button is pushed.

**"EXCESS SLOPE" LIGHT:** ON if the leveling system can NOT level the coach.

**"TRAVEL MODE" BUTTON LIGHT (RED):** Light flashes for 3 seconds after the "TRAVEL MODE" button is pushed.

**"TRAVEL MODE" LIGHT (GREEN):** ON if the ignition is in the "ON" position, the system is not being used, and there is sufficient air pressure in the suspension. See PREPARATION FOR TRAVEL.

**WARNING LIGHTS:** Function with the ignition in the "ON" position. ON when the LEVELING SYSTEM ACTIVE LIGHT is ON. See PREPARATION FOR TRAVEL.

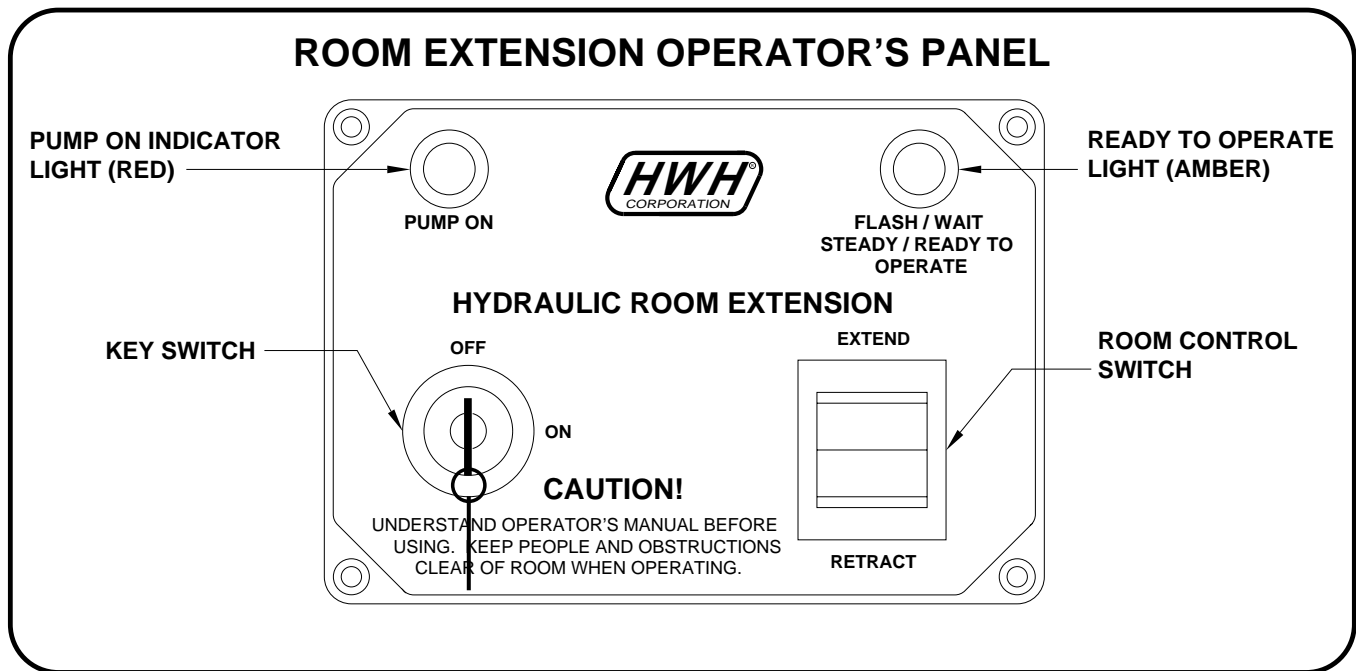
**LEVELING LIGHTS:** One or two yellow lights can be on indicating the side, end or corner of the coach is low.

**"NOT IN PARK/BRAKE" LIGHT:** ON while the "AIR" button is being pushed if the Park Brake is NOT set. The light will go out when the "AIR" button is released.

**MASTER WARNING LIGHT:** ON any time the "TRAVEL" light is not ON, if the ignition is in the "ON" position.

**MP25.998D  
31OCT02**

## CONTROL IDENTIFICATION



## CONTROL FUNCTIONS

**KEY SWITCH:** The KEY SWITCH controls power to the ROOM CONTROL SWITCH. When the KEY SWITCH is in the "ON" POSITION the room can be operated, and the key cannot be removed. When the KEY SWITCH is in the "OFF" position the room cannot be operated, and the key can be removed.

**NOTE:** Any time the KEY SWITCH is ON, the network will be active and will not power down.

**ROOM CONTROL SWITCH:** The ROOM CONTROL SWITCH is a two position momentary switch. Pressing the switch in the EXTEND POSITION will extend the room. Pressing the switch in the RETRACT POSITION will retract the room. Releasing the ROOM CONTROL SWITCH will halt the operation of the room.

**PUMP ON INDICATOR LIGHT:** This light will be on when the pump is running.

**READY TO OPERATE LIGHT:** After the KEY SWITCH is turned on the READY TO OPERATE LIGHT will glow steady. Except for EXCESS SLOPE situations, the room cannot be extended or retracted if this light is flashing.

If the "EXCESS SLOPE" light on the leveling system control panel is on, the READY TO OPERATE light will flash continuously after the key switch is turned ON. The room will not extend. The room will retract if the room control switch is pushed to "RETRACT".

If the PARK BRAKE is not set, the READY TO OPERATE light will not turn on and flash when the KEY SWITCH is turned "ON".

If a RAISE or LOWER function of the Leveling System is in use, MANUAL or AUTOMATIC operation, the READY TO OPERATE light will flash if the KEY SWITCH is in the "ON" position. The room will not operate.

## MASTER WARNING LIGHT

This light is on the dash, separate from the control panels. It can be on only if the ignition key is in the "ON" position.

The light will be on if a HWH low air pressure switch is on, if the Leveling System is on, or if the Leveling System is not in the TRAVEL mode.

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# OPERATING PROCEDURES

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## NETWORK INFORMATION

The HWH 2000 series CAN system is a computerized modular network. It controls all functions of the leveling system and the room extensions. The network is active any time the ignition is in the "ON" or "ACC" position or when any room extension control panel key is "ON". Certain functions and indicator lights for the leveling system will work when the network is active. Certain functions and lights will work **ONLY** if the the ignition is in the "ON" or "ACC" position to start the function.

**NOTE:** The network will stay active for 10 minutes after the ignition key and all room extension control panel keys have been turned "OFF". If the leveling system was turned "ON", the network will stay active for 10 minutes after automatic leveling is complete or the system goes "EXCESS SLOPE". If manual leveling buttons were used, the network stays active for 10 minutes after the last manual button is released.

## GENERAL INSTRUCTIONS

Maintain adequate clearance in all directions for vehicles, room extensions, doors, steps, etc.. Vehicle may move in any direction due to raising or lowering of vehicle during leveling, settling of vehicle, equipment malfunction, etc..

The MASTER WARNING LIGHT will be on if an air bag has low pressure, if the ignition is in the "ON" position.

**CAUTION: DO NOT MOVE THE VEHICLE IF A ROOM IS EXTENDED. DO NOT MOVE THE VEHICLE AT SPEEDS IN EXCESS OF 5 MPH IF THE MASTER WARNING LIGHT IS ON.**

The "DUMP" and "RAISE" buttons will function with the leveling system and park brake off, if the ignition is in the "ON" or "ACC" position or if the network is active. See AIR DUMP AND RAISE FUNCTIONS section of this manual.

If the Park Brake is not set, the Leveling System cannot be turned ON and the room extension will not operate.

If a ROOM CONTROL SWITCH is being pushed, no other room or the Leveling System can be operated. If any Leveling System raise or lower function is being operated, no room control switch will work.

## HWH LIGHTED RESET SWITCH

The HWH lighted reset switch is located on the vehicle dash. If there is a failure at any time in the HWH CAN network, the network will shut down. The leveling system and all room extensions will not operate. If the ignition is off, no indicator lights will come on. If the ignition is in the "ON" or "ACC" position, the lighted reset switch and the MASTER WARNING Light will come on.

If the lighted reset switch is on, the switch must be pushed before any room or the leveling system can be operated.

A network problem with one room will not inhibit the use of the other rooms or leveling system after the reset switch is pushed.

A network problem with the leveling system will not inhibit the use of the room extensions after the reset switch is pushed.

If the lighted reset switch will not go out when pushed, there is a problem with the central control module of the network system. No rooms or the Leveling System will operate. The vehicle suspension will return to the travel mode if the ignition key is in the "ON" position.

**CAUTION: IF THE IGNITION IS IN THE "ON" POSITION AND THE LIGHTED RESET SWITCH IS ON, THE VEHICLE CAN RETURN TO RIDE HEIGHT WITHOUT RELEASING THE PARK BRAKE.**

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# OPERATING PROCEDURES

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## PREPARATION FOR TRAVEL

Check that all room extensions are fully retracted.  
DO NOT move the vehicle unless the room extensions are retracted.

Visually check that the vehicle is at the proper ride height for traveling.

The ignition must be in the "ON" position for the vehicle suspension to be in the travel mode. Also the "TRAVEL MODE" button must be pushed or the park brake released for the suspension to be in the travel mode if the Leveling System was used.

A lit **"TRAVEL MODE" LIGHT** indicates that the HWH Leveling System is in the TRAVEL MODE. It does not indicate that the suspension is at ride height or that the coach is ready to travel.

**CAUTION: IT IS THE OPERATOR'S RESPONSIBILITY TO CHECK THAT THE VEHICLE IS AT PROPER RIDE HEIGHT AND THE SLIDE-OUT IS FULLY RETRACTED BEFORE TRAVELING.**

Before traveling, the MASTER WARNING light must be off and the "TRAVEL MODE" light must be ON.

**NOTE: Low air pressure can turn the green "TRAVEL MODE" light off and turn the MASTER WARNING light on.**

Refer to "DUMP" and "RAISE" FUNCTIONS operating procedures when moving the vehicle with the suspension NOT at the proper ride height.

## AUTOMATIC AIR OPERATION

**NOTE: The ignition must be in the "ON" or "ACC" position to use the "AIR" button. Once the operation is started, the ignition can be moved to the "OFF" position and the operation will continue. If a ROOM CONTROL switch is being pushed, the Leveling System can not be operated.**

1. Place the transmission in the proper position for parking and set the park brake. The air leveling system can only be turned on if the ignition is in the "ON" or "ACC" position. Leaving the engine running during leveling is recommended. This will provide a better air supply for leveling.

**NOTE: If the TAG DUMP SWITCH is in the DUMP position, it is recommended that it is returned to the TRAVEL position before starting the leveling procedure.**

2. Press the "AIR" button once to enter the air mode. The LEVELING SYSTEM ACTIVE LIGHT will glow steady. The four red WARNING lights on the panel will come on. This indicates that the height control valves have been locked out. The vehicle should not be moved when these lights are on.

**NOTE: If the park brake is not set, the "NOT IN PARK/BRAKE" light will be on while the "AIR" button is being pushed.**

3. Press the "AIR" button a second time. The LEVELING SYSTEM ACTIVE LIGHT will start flashing and air leveling will begin. The system will attempt to level the vehicle by exhausting air from the air bags. If a level position is not achieved by lowering the vehicle, the low side and/or end of the vehicle will be raised by adding air to the air bags. When all four yellow LEVEL SENSING lights are out the leveling is complete.

**NOTE: Only one or two yellow LEVEL SENSING lights may be ON at one time.**

4. When all four yellow level lights are out, the LEVELING SYSTEM ACTIVE LIGHT will stop flashing and start pulsating dimly. The Leveling System is now in the SLEEP MODE. The vehicle's engine/ignition may now be turned OFF.

**NOTE: After the ignition and all room extension KEY SWITCHES are turned OFF, the CAN Network stays active for 10 minutes before shutting down. Leveling System touch panel lights will stay ON during this time and go out when the CAN Network shuts down. If the Leveling System is in the SLEEP MODE when the Network shuts down, the computer will stay ON. The Leveling System touch panel lights will all be OFF, but the Leveling System will still be in the SLEEP MODE.**

5. During the Sleep Mode, after 30 minutes the processor checks the Level Sensing Unit inputs. If no input for a yellow level light is seen, the processor remains dormant and will recheck the level unit inputs every 30 minutes. If the yellow light input stays on for one minute continuously, the processor will relevel the vehicle. If a yellow level light input is flickering, the processor will monitor the level sensing unit inputs continuously. If the yellow light input stays off for one minute, the processor reverts to checking the inputs every 30 minutes.

**NOTE: No lights, including yellow level lights, on the Touch Panel will be ON unless the Network is actively trying to level the vehicle.**

6. If the vehicle needs to be releveled, the CAN Network will become active. The LEVELING SYSTEM ACTIVE LIGHT will flash. One or two yellow LEVELING LIGHTS will be ON. When the yellow LEVELING LIGHTS are all out, the LEVELING SYSTEM ACTIVE LIGHT will stop flashing and start pulsating dimly. The Leveling System will remain in the SLEEP MODE with the computer monitoring the LEVELING SENSING UNIT every 30 minutes, releveled the vehicle as needed.

**MP35.203C  
12DEC03**



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## OPERATING PROCEDURES

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### AUTOMATIC AIR OPERATION (Continued)

**NOTE:** The CAN Network will stay active for 10 minutes after releveling the vehicle and then shut down, turning the touch panel lights OFF. This happens every time the system relevels the vehicle.

7. The SLEEP MODE will continue until the "EMERGENCY STOP" button is pushed or the park brake is released, if the ignition is in the "ON" position.

**EXCESS SLOPE:** The system will attempt to level the vehicle for approximately 15 to 20 minutes. After the 15 to 20 minutes, if a LEVEL SENSING light is still on, the "EXCESS SLOPE" light will come on. The LEVEL LIGHT indicator light will go out. The "EXCESS SLOPE" light will be on whenever the network is active.

The "EXCESS SLOPE" light will be on whenever the network is active until the vehicle is leveled with all yellow LEVEL indicator lights off.

### TAG AXLE DUMP

The tag axle dump switch is supplied by Country Coach.

**IMPORTANT:** Refer to Country Coach for proper use of the TAG DUMP feature.

The tag dump switch will work only with the ignition switch in the "ON" position and the Leveling System panel off. The transmission must be in the R, N or 1 position.

**NOTE:** If the TAG DUMP switch is in the DUMP position and the ignition key is turned ON (with the Leveling System panel OFF) the tag axle air bags will go into the dump mode.

The TAG DUMP switch, in either the DUMP or TRAVEL position, will not interfere with any air leveling operations.

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# OPERATING PROCEDURES

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## MANUAL AIR OPERATION

**NOTE:** The ignition must be in the "ON" or "ACC" position to use the "AIR" button. Once the operation is started, the ignition can be moved to the "OFF" position and the operation will continue.

1. Place the transmission in the proper position for parking and set the park brake. The air leveling system can only be turned on if the ignition is in the "ON" position. Running the vehicle engine during leveling is recommended. This will provide a better air supply for leveling. The vehicle will level with the engine shut off, however more time will be required for leveling.

**NOTE:** If the "NOT IN PARK/BRAKE" light is on, the leveling system cannot be turned on.

2. Press the "AIR" button once to enter the air mode. The LEVELING SYSTEM ACTIVE LIGHT indicator light will glow steady. When the ignition is in the "ON" position, the four red WARNING lights on the panel will come on. This indicates that the height control valves have been locked out. The vehicle should not be moved when these lights are on.

3. The vehicle can now be leveled using the RAISE (up arrow) and LOWER (down arrow) buttons on the right half of the

panel in conjunction with the yellow LEVEL indicator lights. **Any side to side leveling should be done, if needed, before leveling the vehicle front to rear.** The yellow LEVEL indicator light indicates that side or end is low. When all yellow lights are out the vehicle is level. Try leveling the vehicle by lowering the high side or end (opposite of the lit yellow level lights). If a level position is not achieved use the RAISE (up arrow) button to raise the low side or end.

**NOTE:** In either manual or automatic leveling when either front air manifold air bag pressure switch is on a front lower procedure is halted. When either rear air manifold air bag pressure switch is on, a rear lower procedure is halted. Air bag pressure switches will not interfere with either a right or left lower procedure.

4. Turn the ignition to the "OFF" position.

5. Turn the system off.

**NOTE:** If the "DUMP" or "RAISE" buttons are pushed while manually leveling the vehicle with air and the ignition is in the "ON" position, the system will latch into the dump or raise mode until the "EMERGENCY STOP" button is pushed or the ignition is turned off.

## "DUMP" AND "RAISE" FUNCTIONS

The "DUMP" and "RAISE" functions are provided for operator convenience for purposes such as dumping the air suspension when parked.

Leave the engine running if the "RAISE" function is to be used. The park brake does not have to be set to use the "DUMP" or "RAISE" buttons.

**IMPORTANT:** If the ignition is ON and the park brake is OFF, the "DUMP" and "RAISE" features will latch in and remain on. If the vehicle exceeds 10 MPH, the "DUMP" or "RAISE" functions will automatically turn off and the system will return to the TRAVEL MODE. If the park brake is set, the "TRAVEL MODE" button must be pushed before the vehicle can return to ride height.

**CAUTION:** REREAD CAUTIONS ON THE FIRST PAGE OF THIS MANUAL. THE VEHICLE MAY DROP OR RAISE AND/OR MOVE FORWARD OR BACKWARD WITHOUT WARNING CAUSING INJURY OR DEATH.

DO NOT OPERATE THE VEHICLE UNLESS THE AIR SUSPENSION IS AT THE PROPER HEIGHT FOR TRAVEL.

The "RAISE" and "DUMP" buttons can be used at any time the network is active. The park brake does not have to be on.

If the ignition is in the "ON" position and the park brake is off, the "RAISE" or "DUMP" buttons will latch in. The vehicle will raise or lower completely and stay in that position. The vehicle can not return to ride height until the "TRAVEL MODE" button or the "EMERGENCY STOP" button is pushed or the vehicle exceeds 10 M.P.H, putting the system in the TRAVEL MODE.

If the ignition is in the "OFF" position the "RAISE" and "DUMP" buttons will not latch in. The vehicle will remain in the position it was when the button was released. The vehicle can return to ride height when the ignition is turned to "ON" if the park brake is released or the "TRAVEL MODE" button is pushed.

**DO NOT** operate the vehicle for extended distances unless the air suspension is at the proper height for travel. The vehicle can not return to ride height until the "EMERGENCY STOP" button is pushed or the vehicle exceeds 10 MPH, putting the system in the TRAVEL MODE.

**CAUTION:** IT IS THE OPERATOR'S RESPONSIBILITY TO CHECK THAT THE VEHICLE IS AT PROPER RIDE HEIGHT BEFORE TRAVELING.

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# OPERATING PROCEDURES

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## ROOM EXTEND PROCEDURE

**IMPORTANT:** It is recommended to level and stabilize the vehicle before extending the room.

**IMPORTANT:** Extending or retracting any leveling jacks when the room is extended is not recommended.

1. The park brake must be set for the room to be operated.

**IMPORTANT:** If the "EXCESS SLOPE" light is ON, the vehicle should be re-leveled so all yellow LEVEL indicator lights on the touch panel are OFF. If any of the four yellow LEVEL indicator lights cannot be put out, the vehicle should be moved to a more level location before using the room extension.

**CAUTION:** KEEP PEOPLE AND OBSTRUCTIONS CLEAR OF ROOM WHEN OPERATING.

**NOTE:** Make sure there is adequate clearance to fully extend the room.

2. Insert the KEY into the KEY SWITCH on the room extension operator's panel and turn it to the "ON" position. The READY TO OPERATE light will come on steady.

**NOTE:** If the Leveling System is being operated, the room will not extend. If the room panel KEY SWITCH is on, the "READY TO OPERATE" light will flash while the Leveling System is being operated.

3. To extend the room, push and hold the ROOM CONTROL SWITCH in the "EXTEND" position. The red "PUMP ON" light will come on. Hold the ROOM CONTROL SWITCH to "EXTEND" until the room is fully extended. Releasing the switch will halt room operation and turn the "PUMP ON" light off.

**NOTE:** Hold the switch to "EXTEND" three or four seconds after the room is fully extended. This assures proper pressurization of the cylinders. **During normal operation of the room, do not reverse direction of the room until the room is fully extended. If necessary, the direction of the room may be reversed, but watch for binding of the room. If the direction of the room has been reversed, DO NOT re-extend the room until the room has been fully retracted.**

**IMPORTANT:** Do not hold the ROOM CONTROL SWITCH in the "EXTEND" position for more than ten seconds after the room is fully extended or stops moving. **If either side of the room stops moving, release the room control switch immediately. DO NOT force the room. DO NOT reverse direction of the room, contact HWH Customer Service for assistance 1-800-321-3494.**

4. Turn the KEY SWITCH to the "OFF" position and remove the key. The READY TO OPERATE light will go out.

**NOTE:** If the KEY SWITCH is left "ON" The Network will stay active and not power down.

## ROOM RETRACT PROCEDURE

**CAUTION:** KEEP PEOPLE AND OBSTRUCTIONS CLEAR OF ROOM WHEN OPERATING.

1. The park brake must be set for the room to be operated.

**IMPORTANT:** It is recommended that the room is level before retracting the room.

2. Insert the KEY into the KEY SWITCH on the room extension operator's panel and turn it to the "ON" position. The READY TO OPERATE light will come on steady.

**NOTE:** If the Leveling System is being operated, the room will not retract. If the room panel KEY SWITCH is ON, the READY TO OPERATE light will flash while the Leveling System is being operated.

3. To retract the room, push and hold the ROOM CONTROL SWITCH in the "RETRACT" position. The red "PUMP ON" light will come on. Hold the ROOM CONTROL SWITCH to "RETRACT" until the room is fully retracted. Releasing the switch will halt room operation and turn the "PUMP ON" light off.

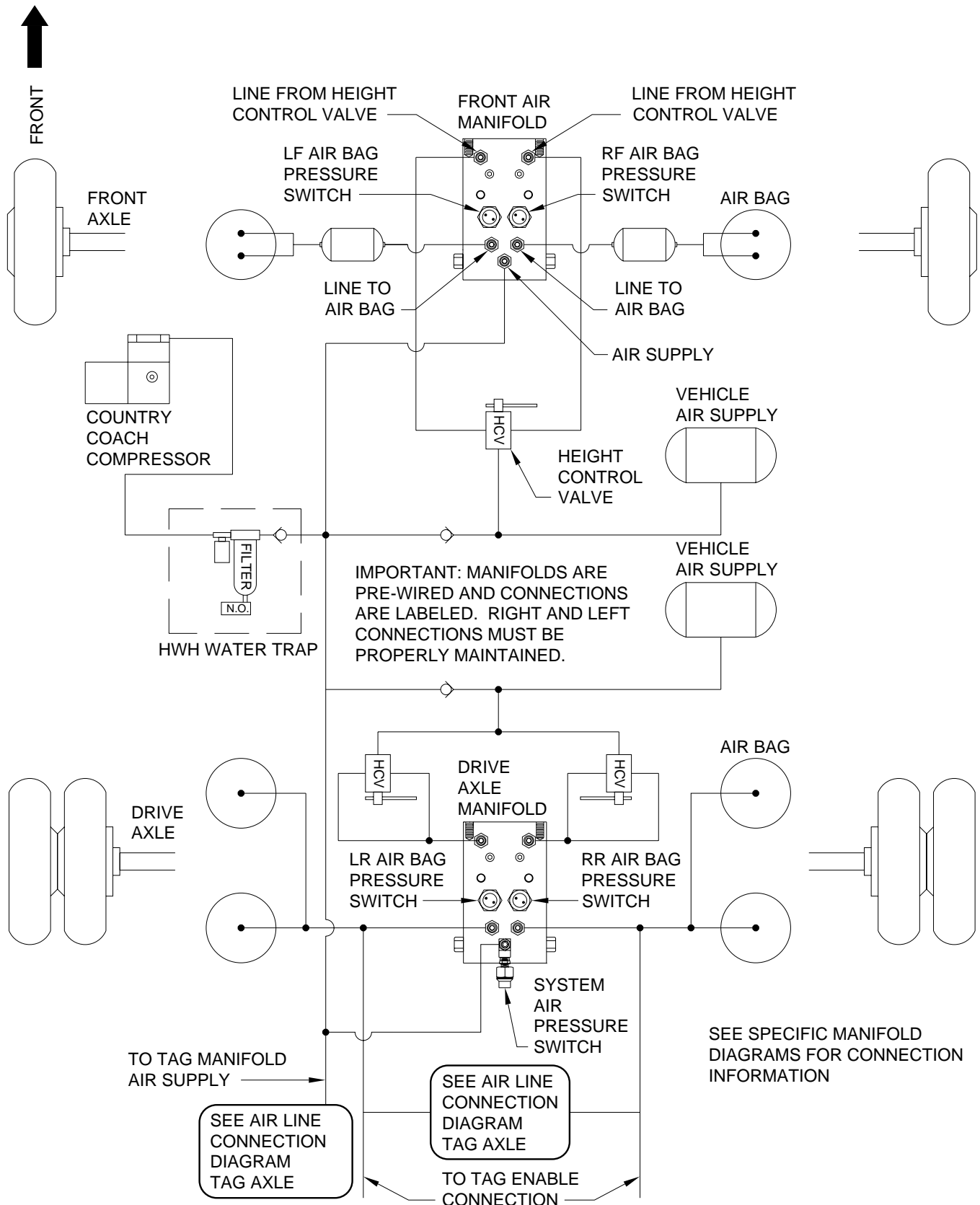
**NOTE:** Hold the switch to "RETRACT" three or four seconds after the room is fully retracted. This assures proper pressurization of the cylinders. **During normal operation of the room, do not reverse direction of the room until the room is fully retracted. If necessary, the direction of the room may be reversed, but watch for binding of the room. If the direction of the room has been reversed, DO NOT retract the room until the room has been fully extended.**

**IMPORTANT:** Do not hold the ROOM CONTROL SWITCH in the "RETRACT" position for more than ten seconds after the room is fully retracted or stops moving. **If either side of the room stops moving, release the room control switch immediately. DO NOT force the room. DO NOT reverse direction of the room, contact HWH Customer Service for assistance 1-800-321-3494.**

4. Turn the KEY SWITCH to the "OFF" position and remove the key. The READY TO OPERATE light will go out.

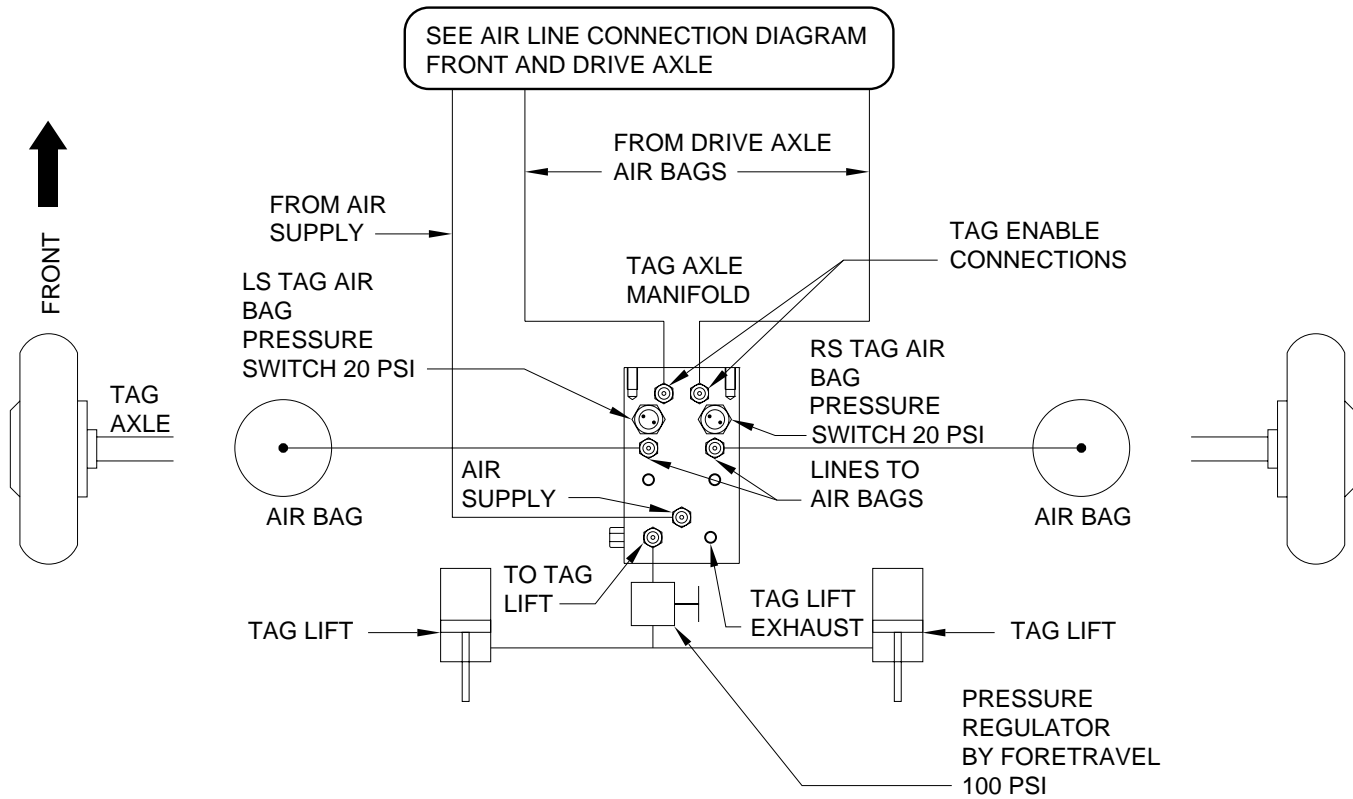
**NOTE:** If the KEY SWITCH is left "ON" The Network will stay active and not power down.

# AIR LINE CONNECTION DIAGRAM FRONT AND DRIVE AXLE



# AIR LINE CONNECTION DIAGRAM

## TAG AXLE



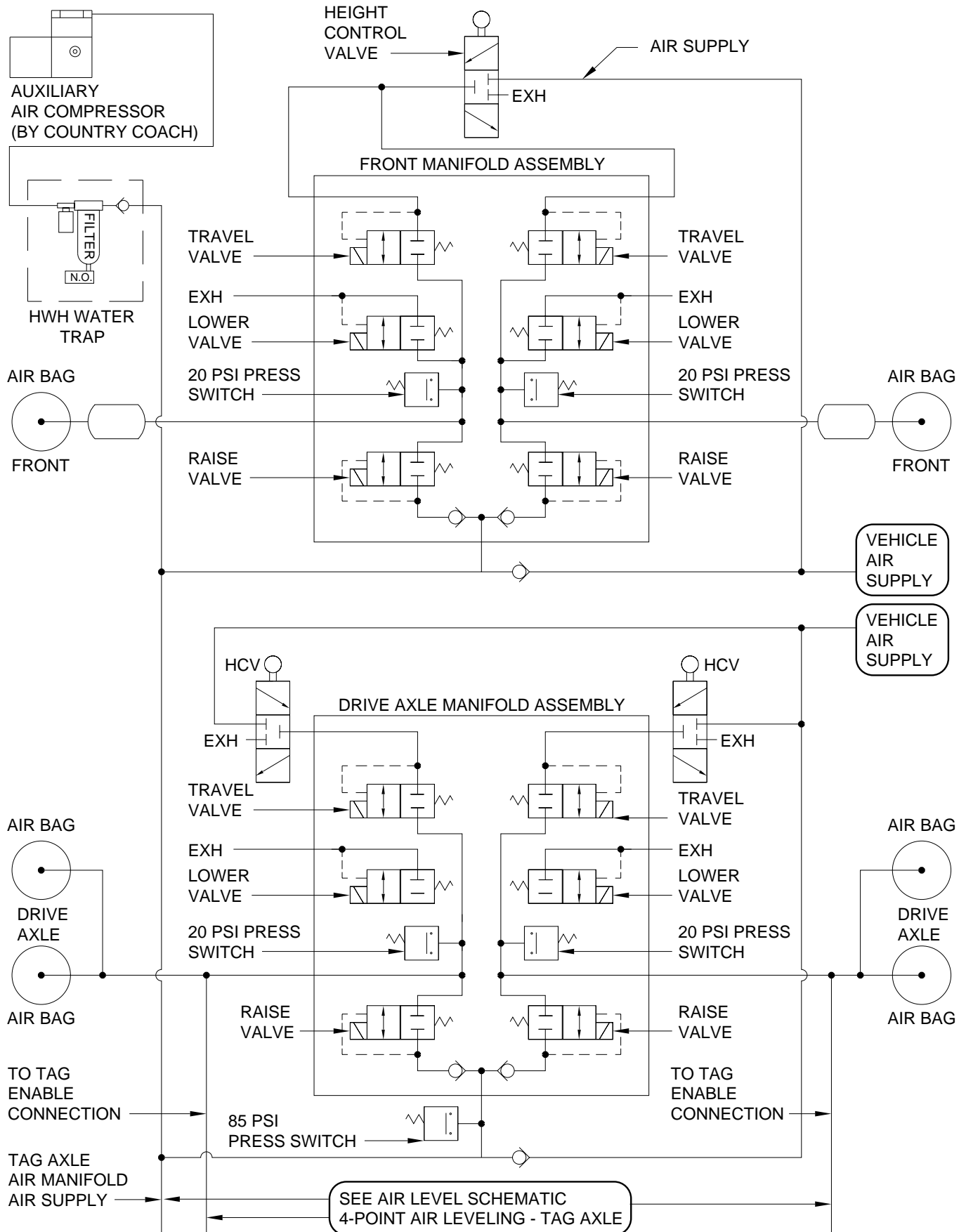
**IMPORTANT:** MANIFOLDS ARE PRE WIRED AND CONNECTIONS ARE LABELED. RIGHT AND LEFT CONNECTIONS MUST BE PROPERLY MAINTAINED

SEE SPECIFIC MANIFOLD DIAGRAMS FOR CONNECTION INFORMATION

**VALVE REPLACEMENT NOTE:** THE TAG DUMP/LOWER AIR SOLENOID VALVES ARE A DIFFERENT VALVE THAN THE OTHER VALVES ON THE MANIFOLD. ALL OTHER AIR SOLENOID VALVES ON THE FRONT, DRIVE AND TAG MANIFOLD ASSEMBLIES ARE THE SAME.

# AIR LEVEL SCHEMATIC

## 4-POINT AIR LEVELING - FRONT AND DRIVE AXLE PRESSURE SWITCHES FRONT, REAR AND TAG

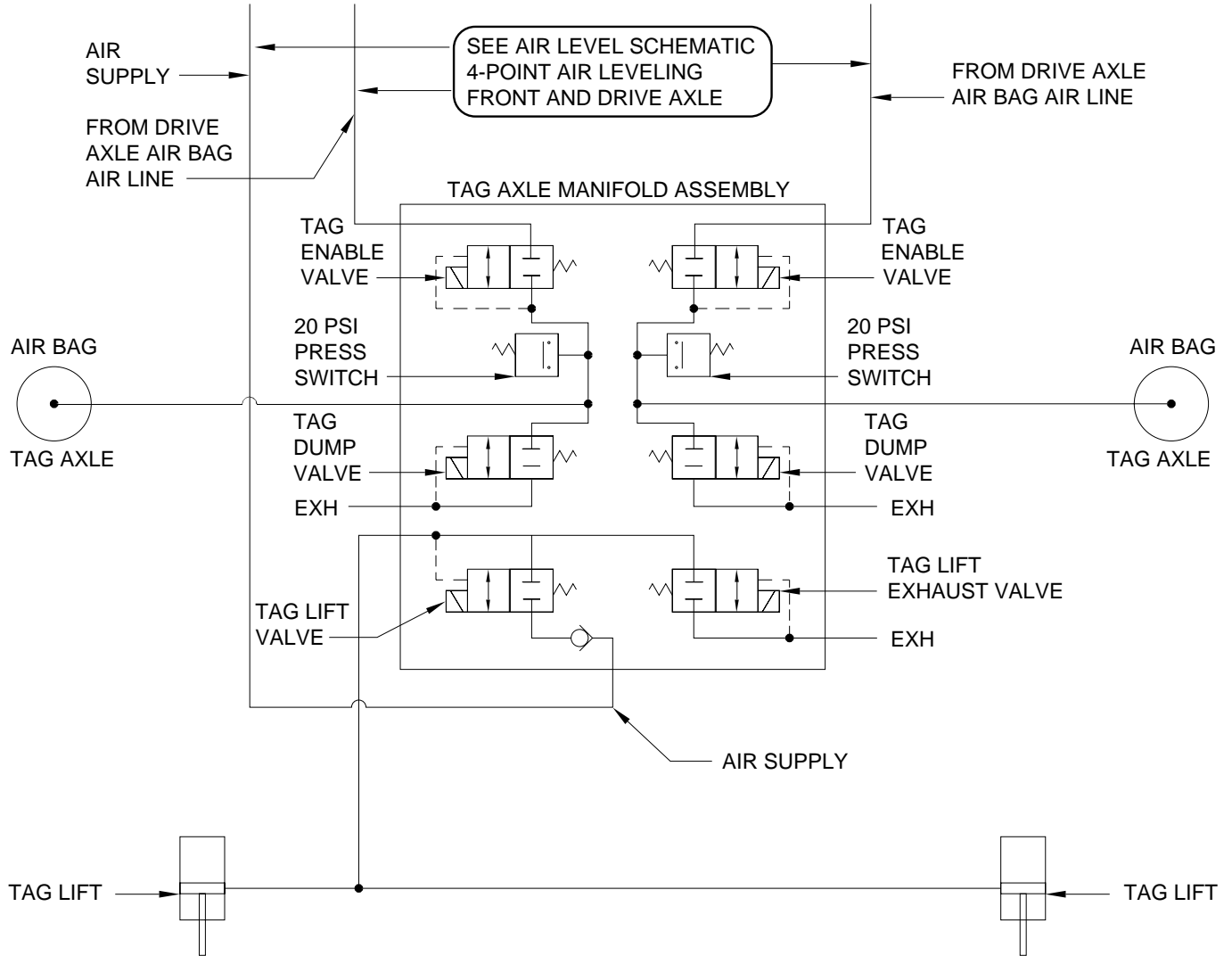


**MP75.210J**  
**04APR02**

# AIR LEVEL SCHEMATIC

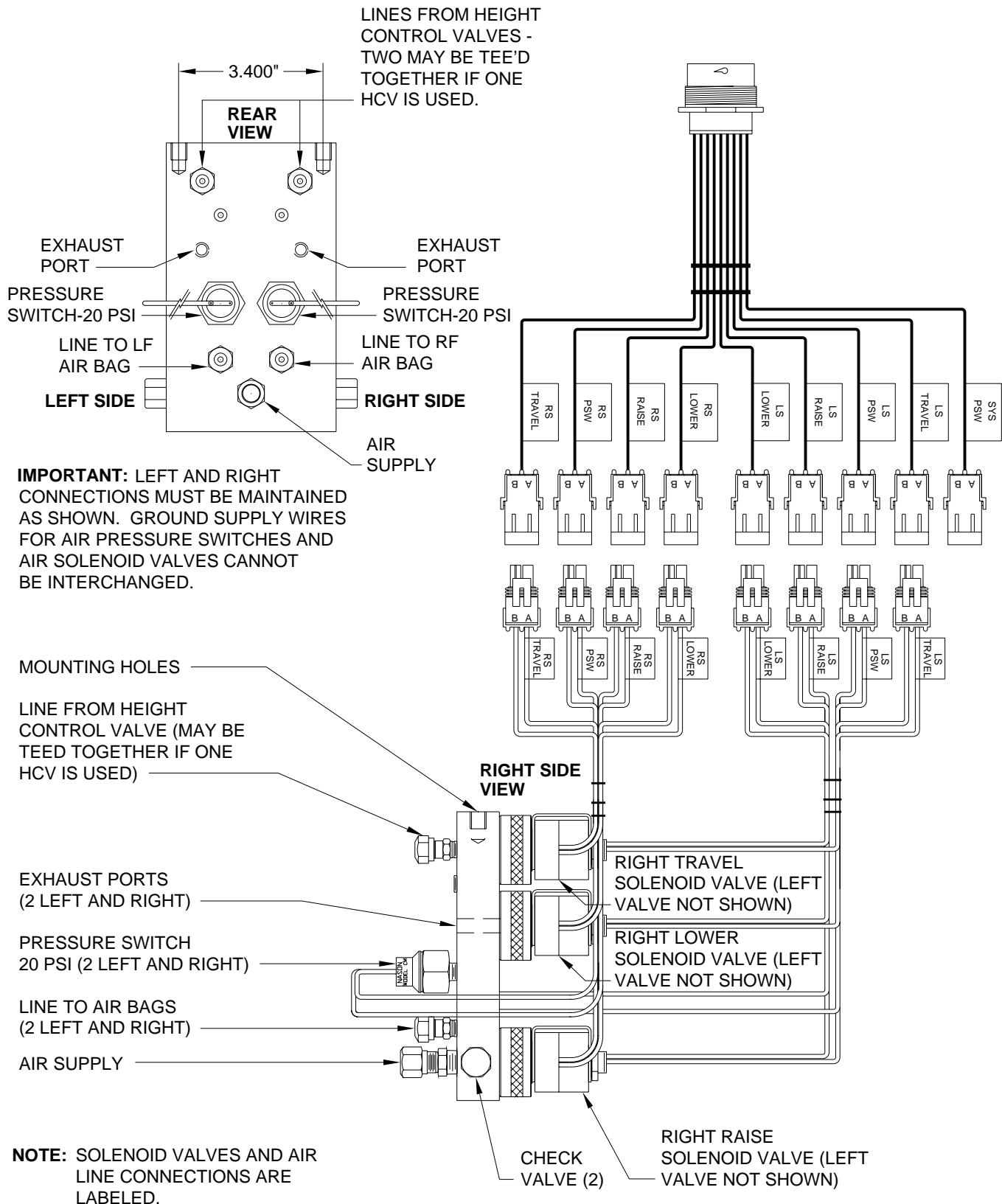
## 4-POINT AIR LEVELING - TAG AXLE

### PRESSURE SWITCHES FRONT, REAR AND TAG



## FRONT AIR SOLENOID MANIFOLD CONNECTIONS

### 6 VALVE WITH TWO PRESSURE SWITCHES

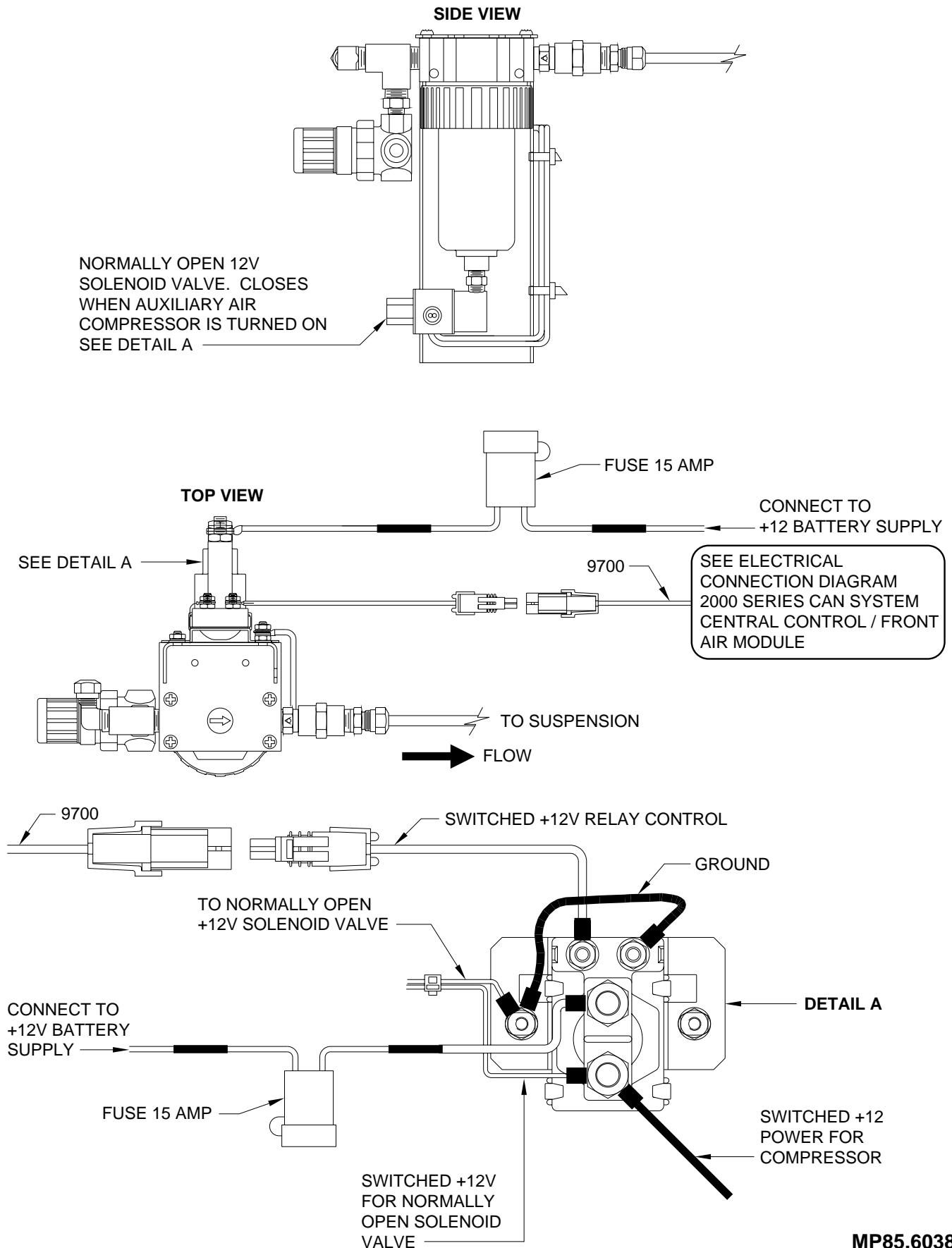






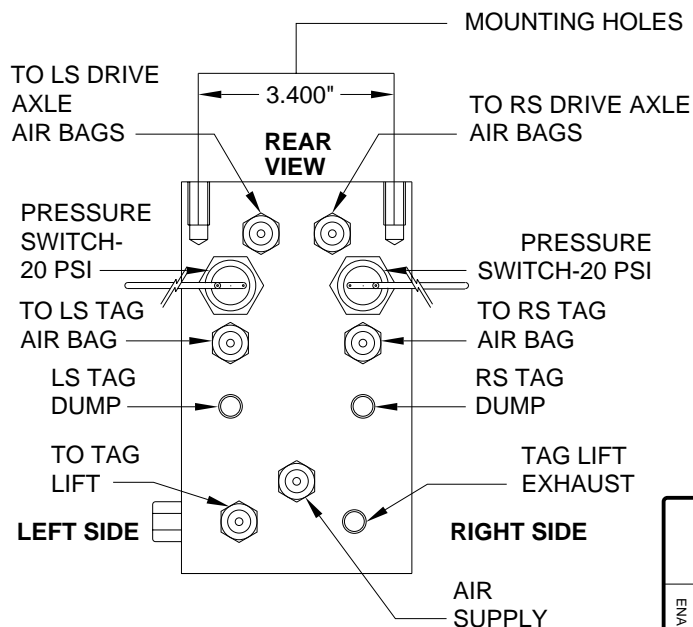
# ELECTRICAL CONNECTION DIAGRAM

## WATER TRAP ASSEMBLY



# TAG AIR SOLENOID MANIFOLD CONNECTIONS

## 6 VALVE WITH TWO PRESSURE SWITCHES

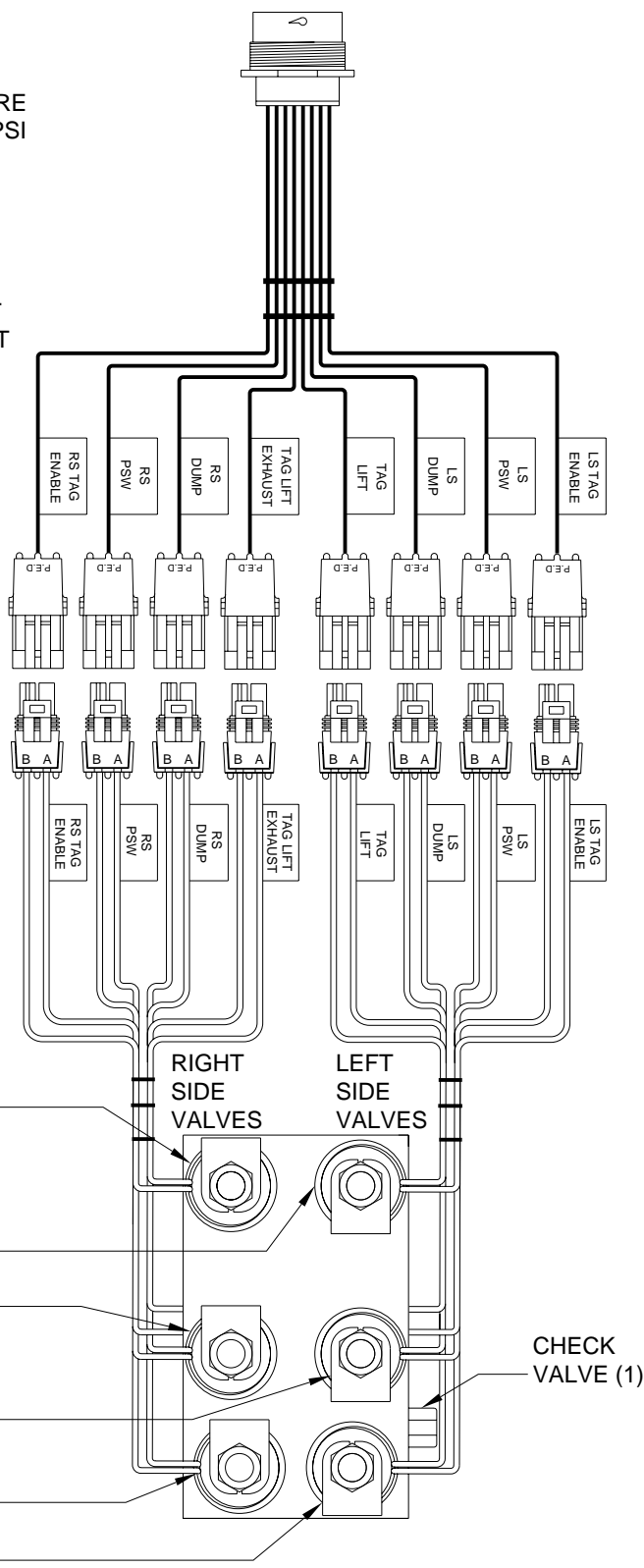


**NOTE:** SOLENOID VALVES AND AIR LINE CONNECTIONS ARE LABELED.

**NOTE:** PRESSURE SWITCHES ON TAG AXLE MANIFOLD ARE NOT USED ON ALL SYSTEMS.

**IMPORTANT:** LEFT AND RIGHT CONNECTIONS MUST BE MAINTAINED AS SHOWN. GROUND SUPPLY WIRES FOR AIR PRESSURE SWITCHES AND AIR SOLENOID VALVES CANNOT BE INTERCHANGED.

**NOTE:** THE TWO TAG DUMP SOLENOID VALVES ARE A DIFFERENT VALVE THEN THE OTHER FOUR VALVES ON THE MANIFOLD. MAKE SURE THE CORRECT VALVE IS OBTAINED FOR REPLACEMENT.



RIGHT SIDE TAG ENABLE SOLENOID VALVE

LEFT SIDE TAG ENABLE SOLENOID VALVE

RIGHT SIDE TAG DUMP SOLENOID VALVE

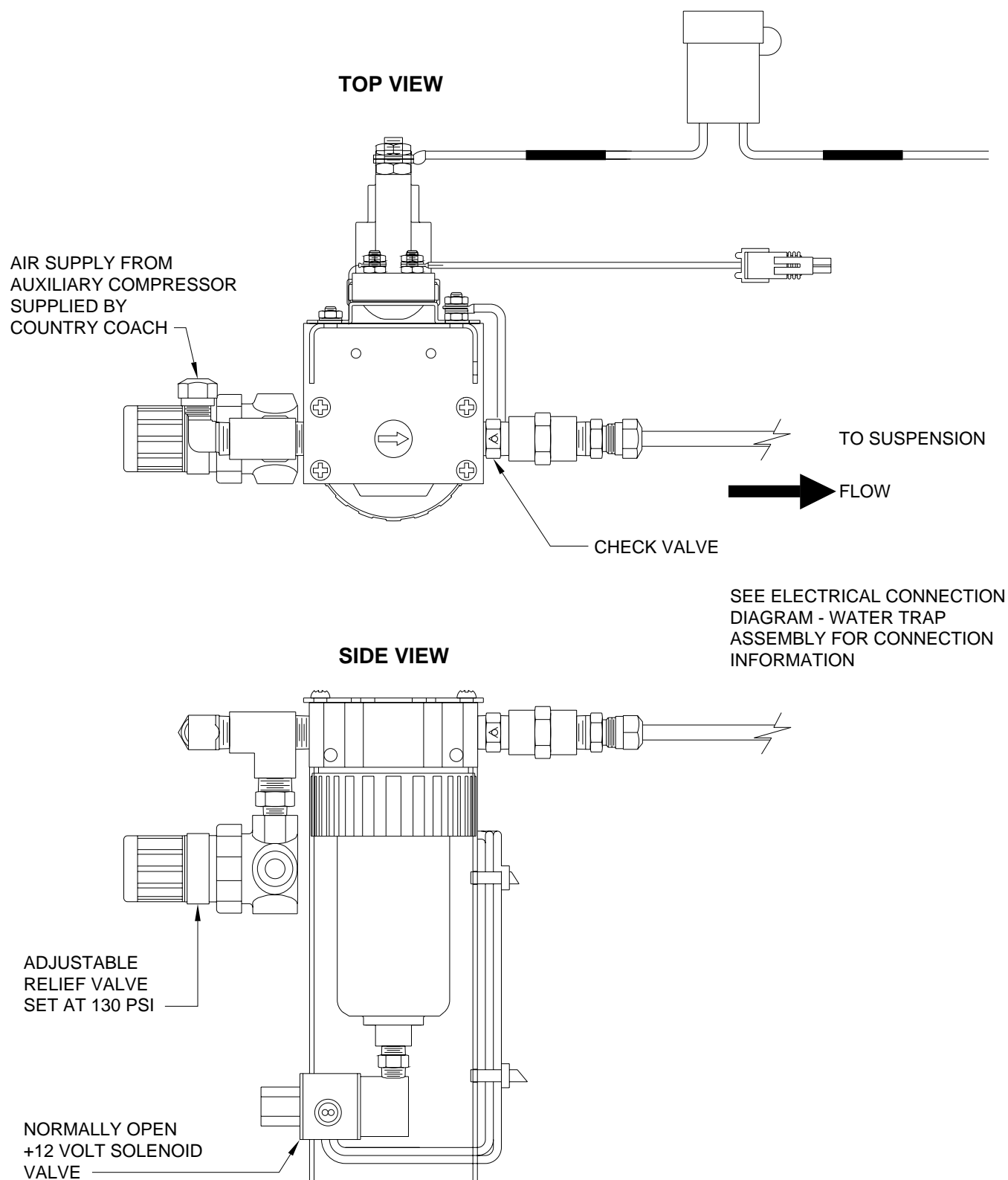
LEFT SIDE TAG DUMP SOLENOID VALVE

TAG LIFT EXHAUST SOLENOID VALVE

TAG LIFT SOLENOID VALVE

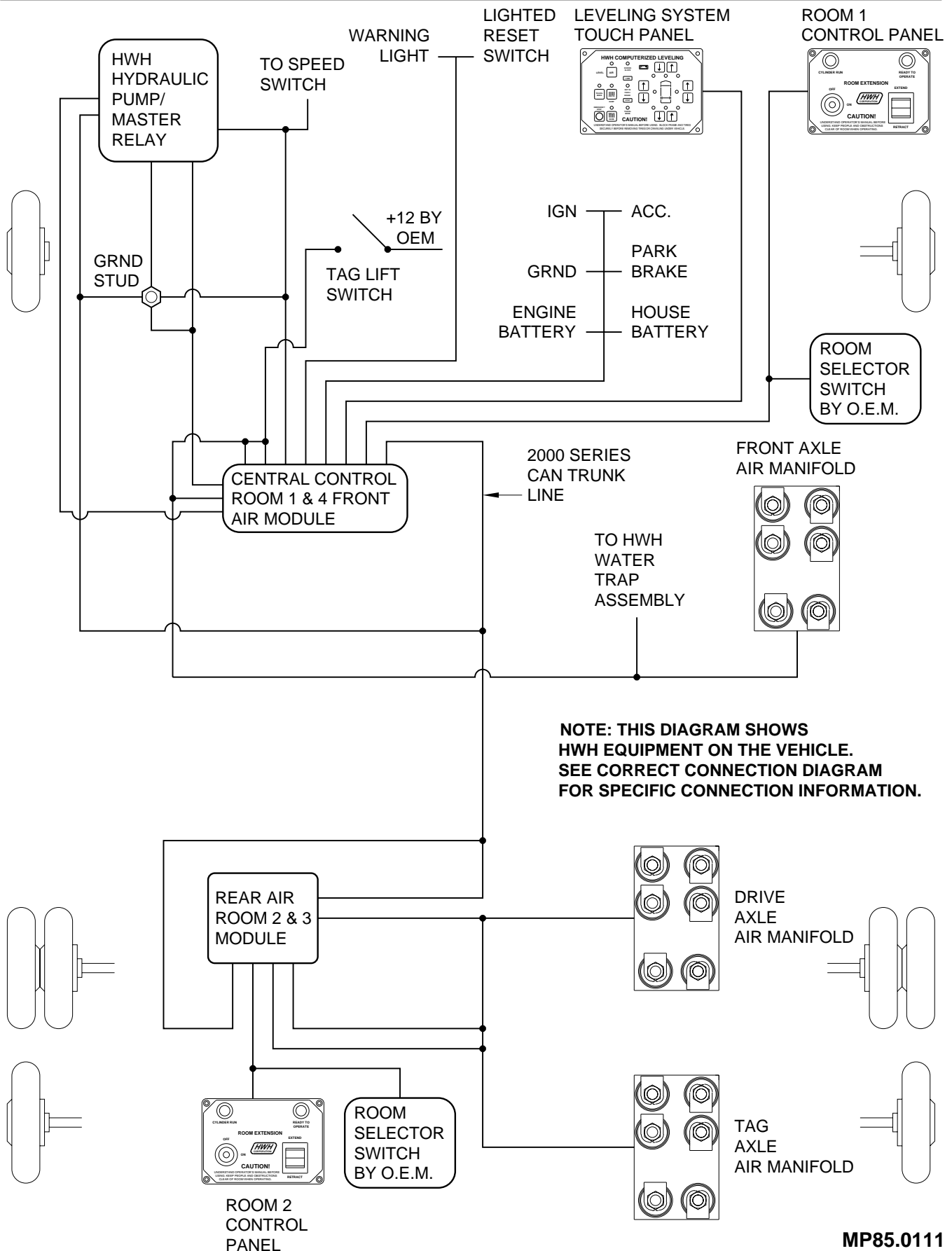
MP75.610J  
04APR02

# AIR LINE CONNECTION DIAGRAM WATER TRAP ASSEMBLY



# ELECTRICAL CONNECTION DIAGRAM

## 2000 SERIES CAN SYSTEM

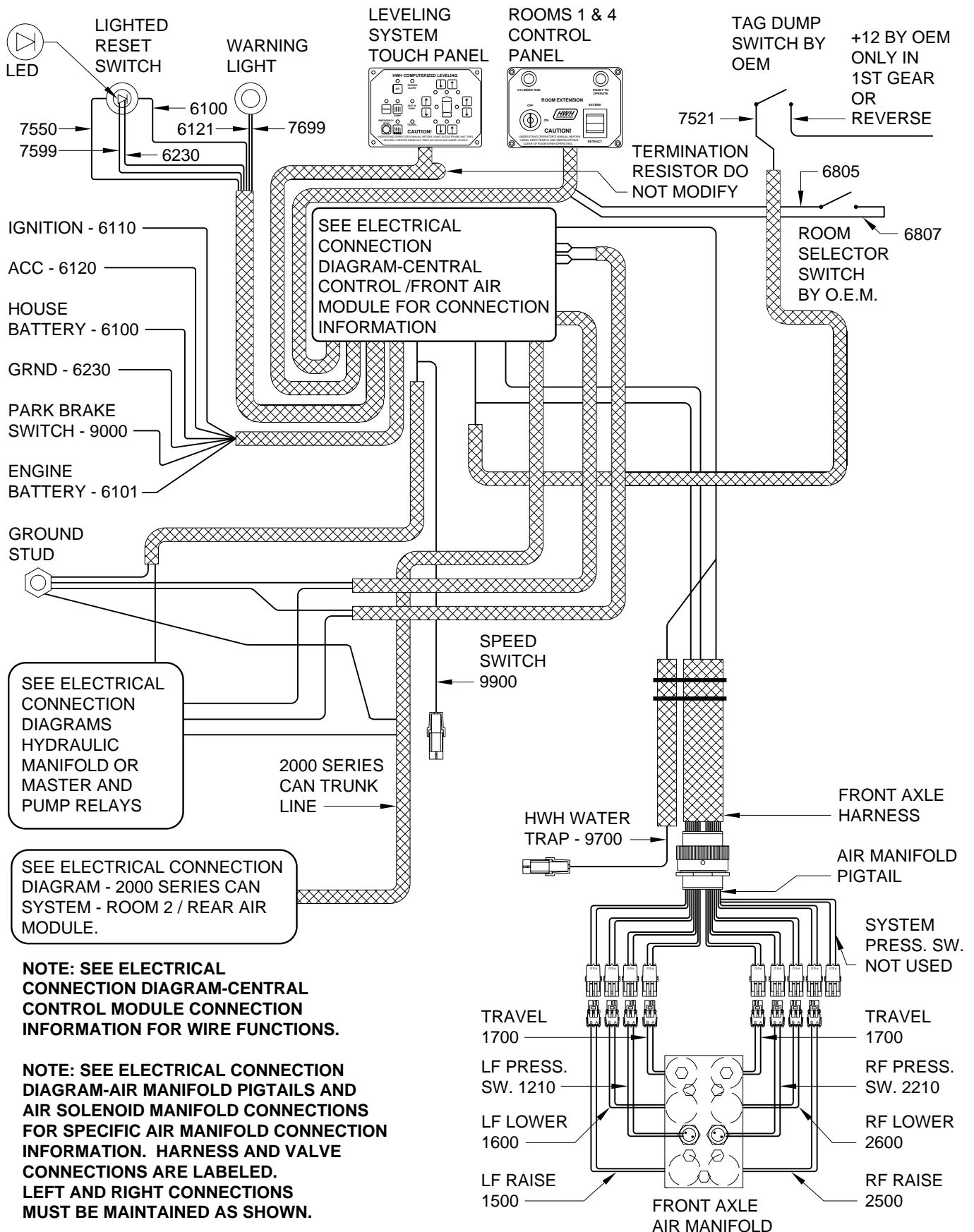


# ELECTRICAL CONNECTION DIAGRAM

## 2000 SERIES CAN SYSTEM

### AIR LEVELING - WITH TAG AXLE - 4 ROOM EXTENSIONS

### CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE



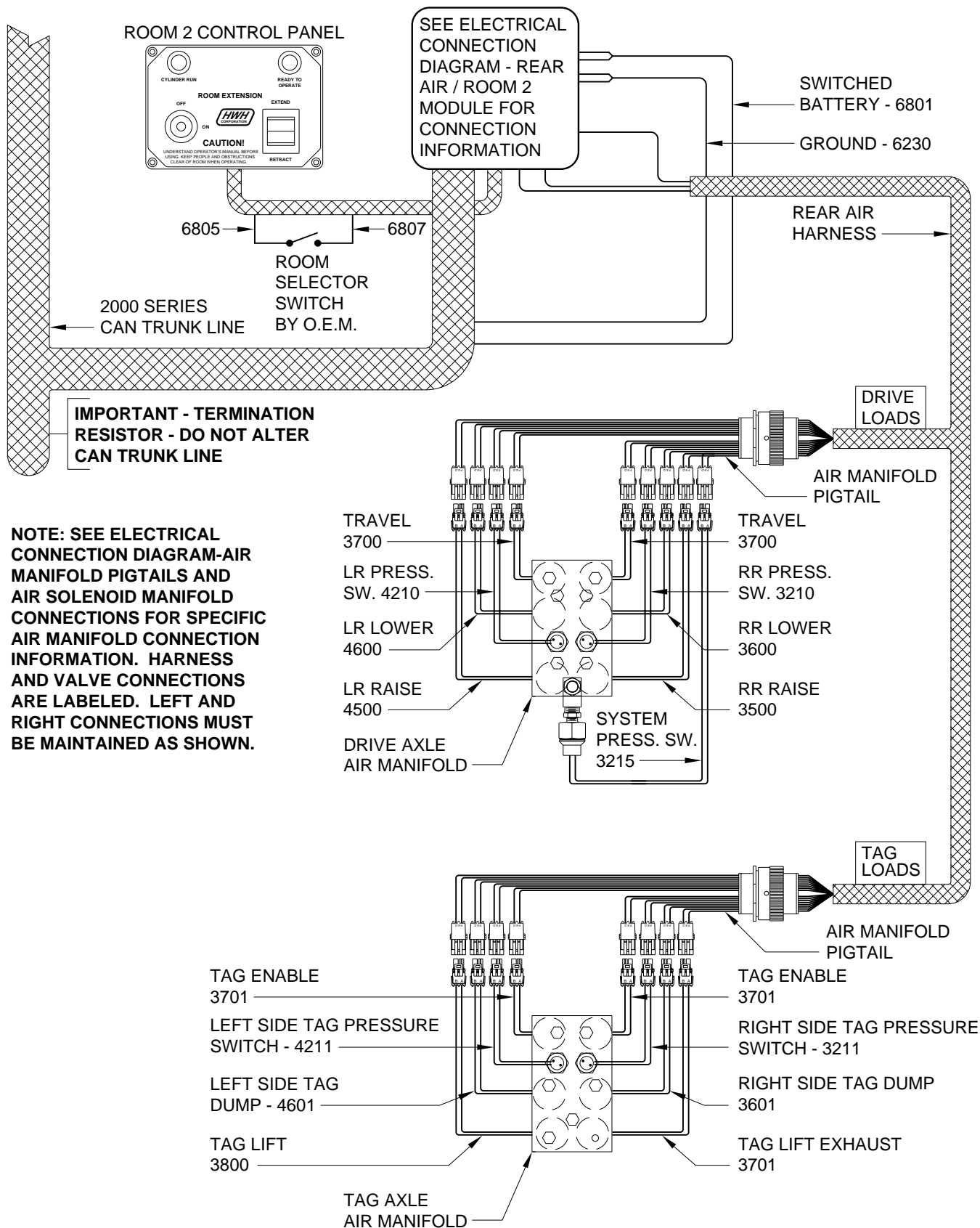
**MP85.0115**  
**22SEP04**

# ELECTRICAL CONNECTION DIAGRAM

## 2000 SERIES CAN SYSTEM

### AIR LEVELING - WITH TAG AXLE - 4 ROOM EXTENSIONS

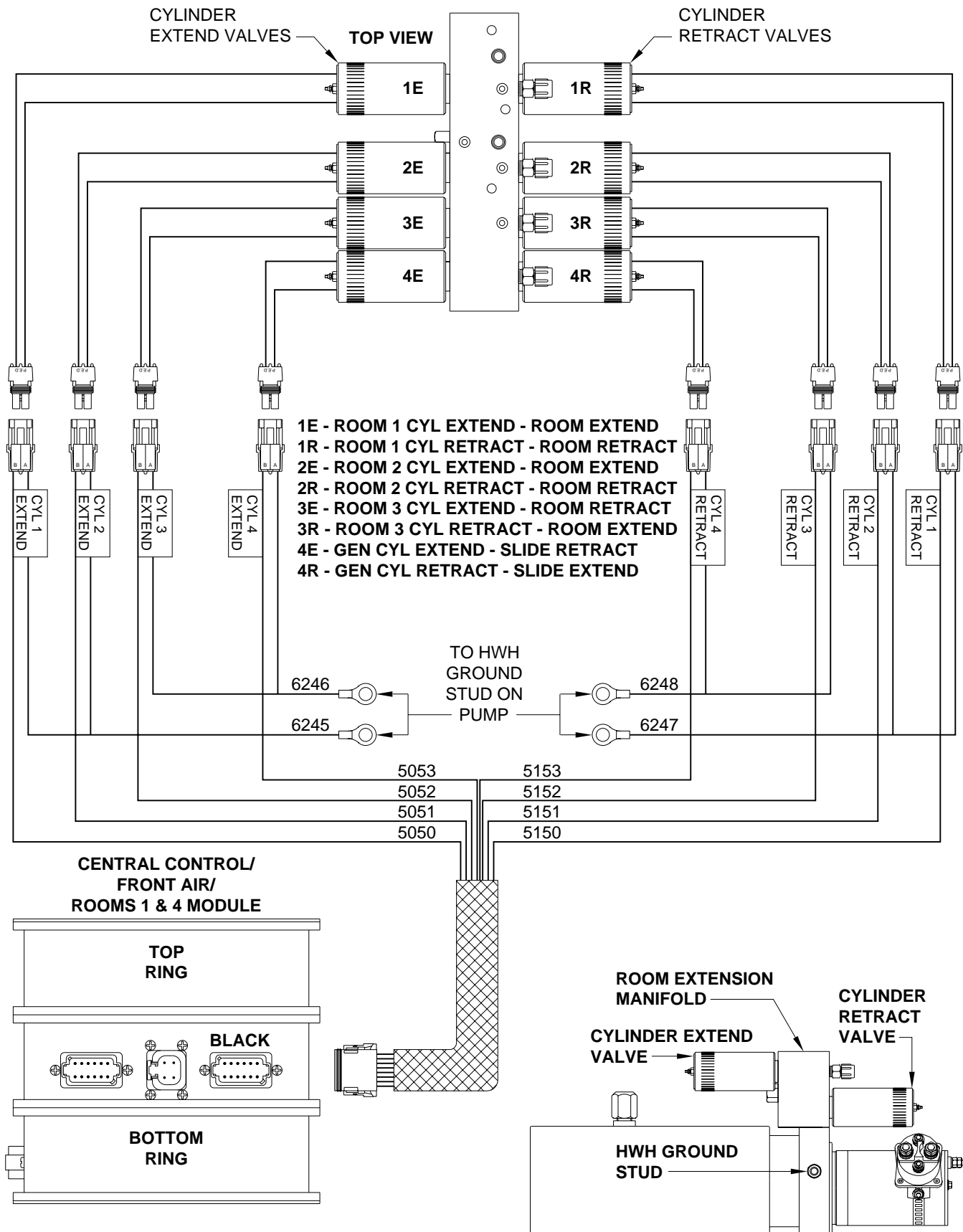
### REAR AIR / ROOMS 2 & 3 MODULE



# ELECTRICAL CONNECTION DIAGRAM

## HYDRAULIC MANIFOLD CONNECTIONS

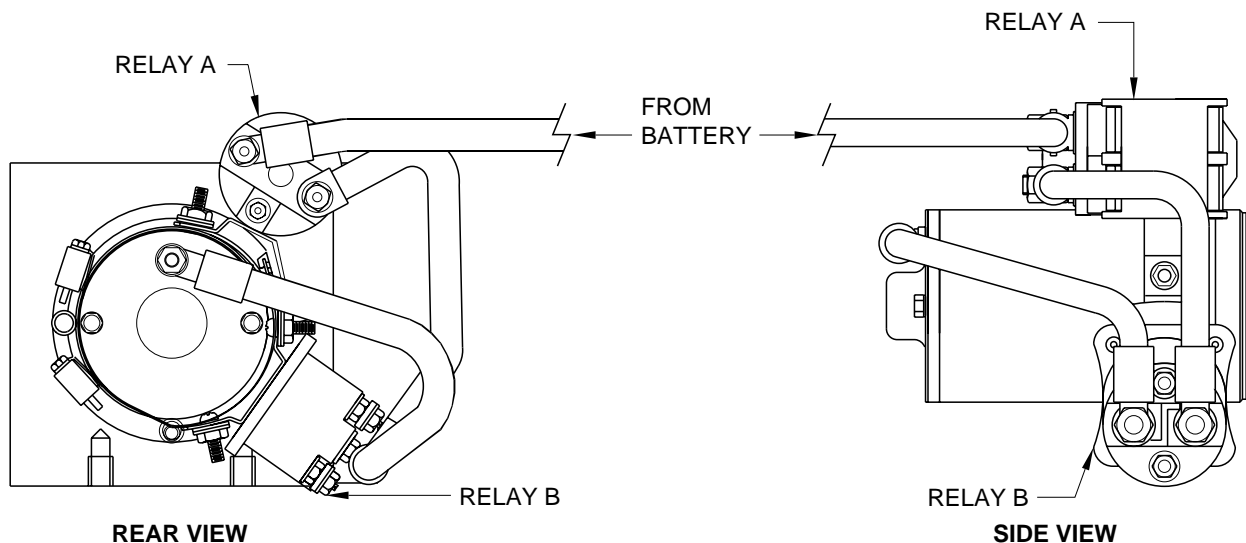
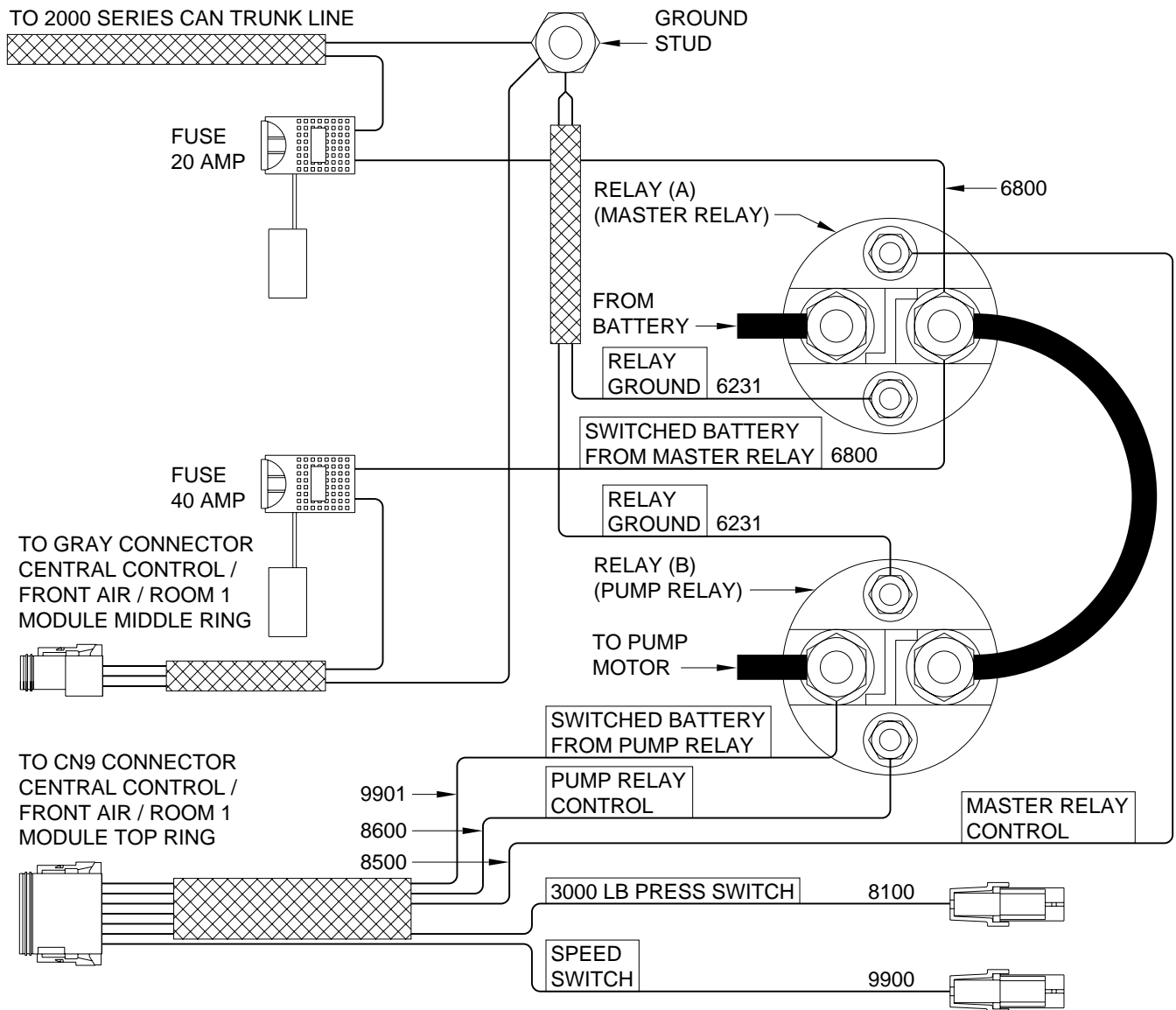
### ROOM 1 - ROOM 2 - ROOM 3 - ROOM 4



**MP85.0131**  
**22SEP04**



# ELECTRICAL CONNECTION DIAGRAM 2000 SERIES ROOM EXTENSION SYSTEM MASTER AND PUMP RELAY

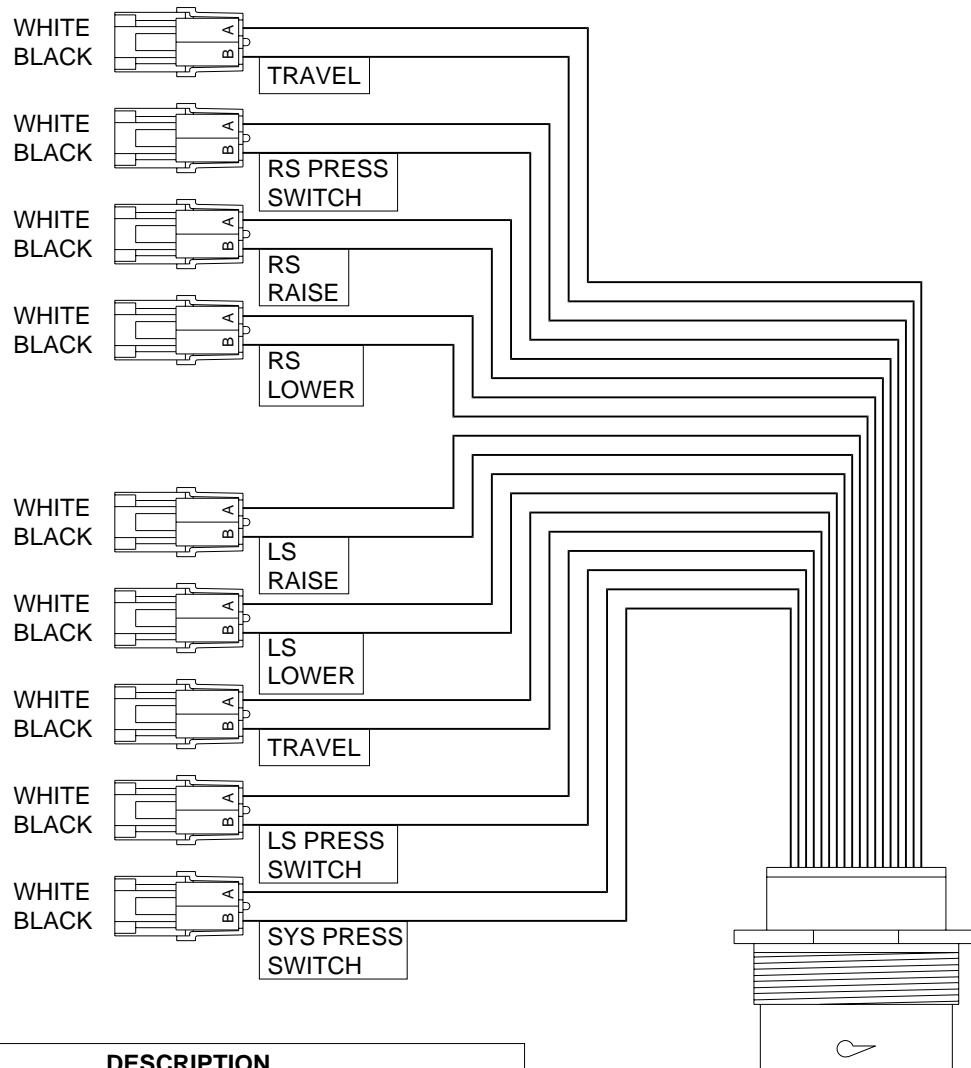


**MP85.035K  
22SEP04**

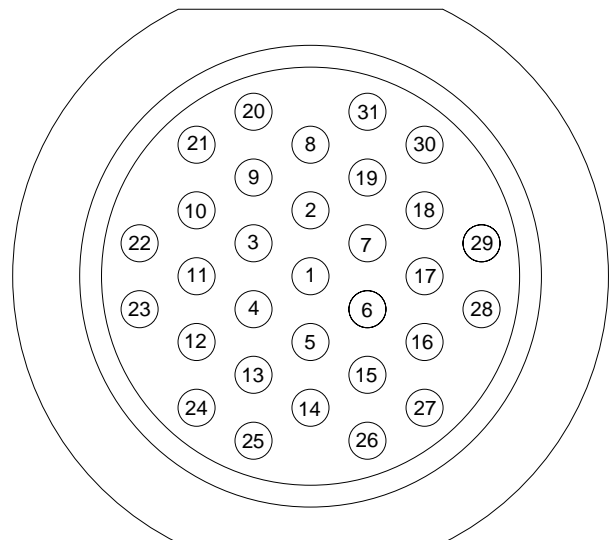
# ELECTRICAL CONNECTION DIAGRAM

## AIR MANIFOLD PIGTAIL

### FRONT AND DRIVE AXLES



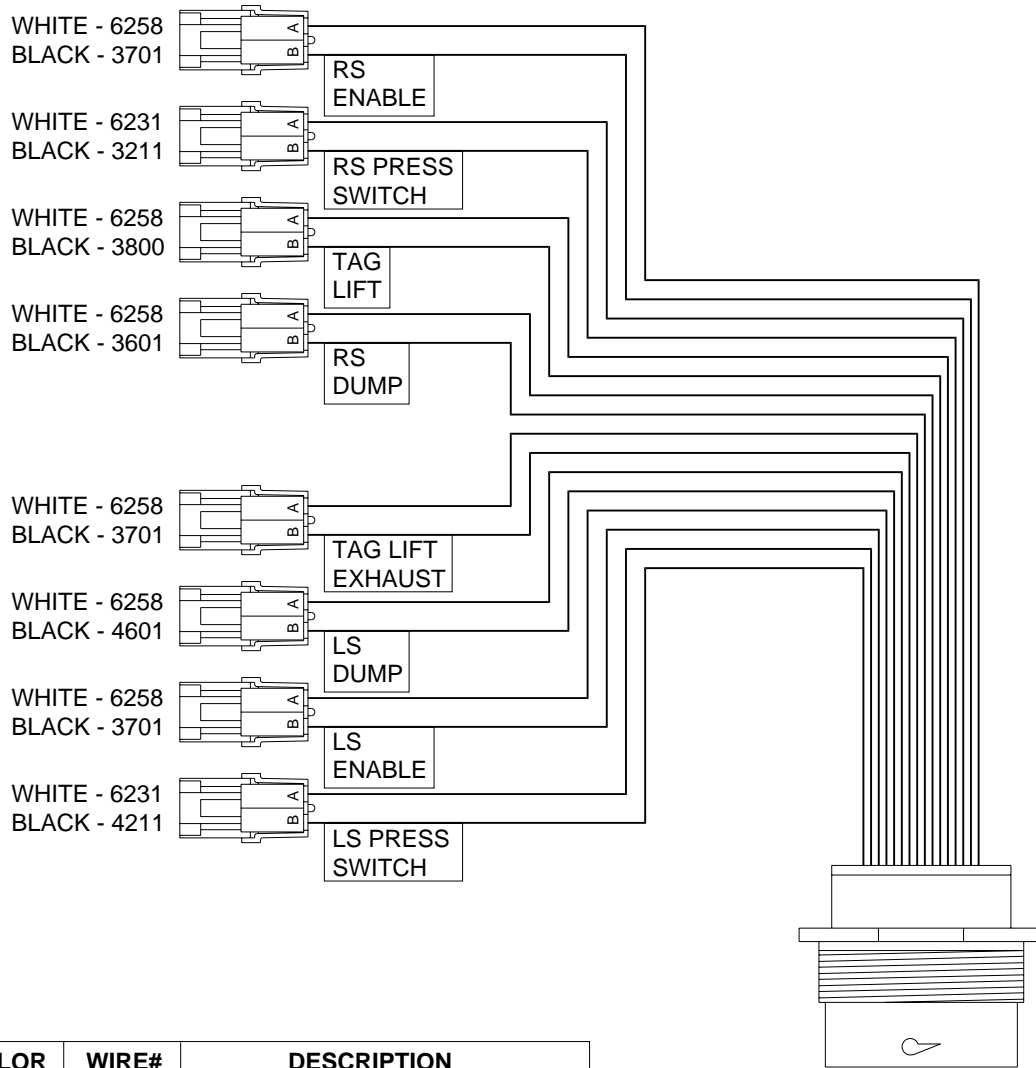
PIN	COLOR	DESCRIPTION
1	BLACK	TRAVEL
2	WHITE	GROUND
3	BLACK	RIGHT SIDE PRESSURE SWITCH
4	WHITE	GROUND
5	BLACK	RIGHT SIDE RAISE
6	WHITE	GROUND
7	BLACK	RIGHT SIDE LOWER
8	WHITE	GROUND
9	BLACK	LEFT SIDE RAISE
10	WHITE	GROUND
11	BLACK	LEFT SIDE LOWER
12	WHITE	GROUND
13	BLACK	TRAVEL
14	WHITE	GROUND
15	BLACK	LEFT SIDE PRESSURE SWITCH
16	WHITE	GROUND
17	BLACK	SYSTEM PRESSURE SWITCH
18	WHITE	GROUND
19 THROUGH 31 NOT USED		



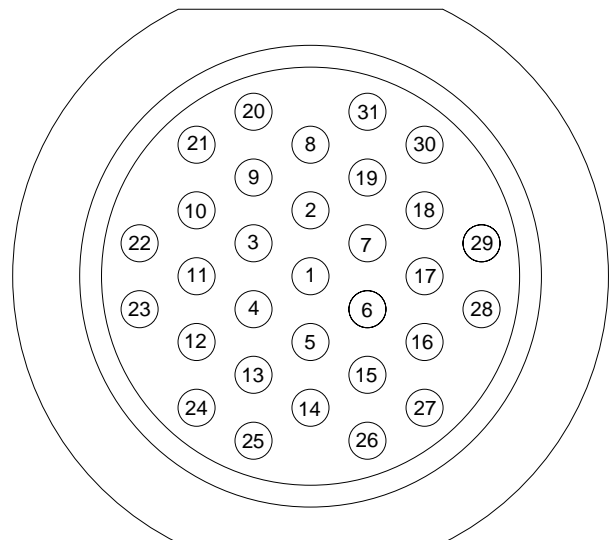
# ELECTRICAL CONNECTION DIAGRAM

## AIR MANIFOLD PIGTAIL

### TAG AXLE



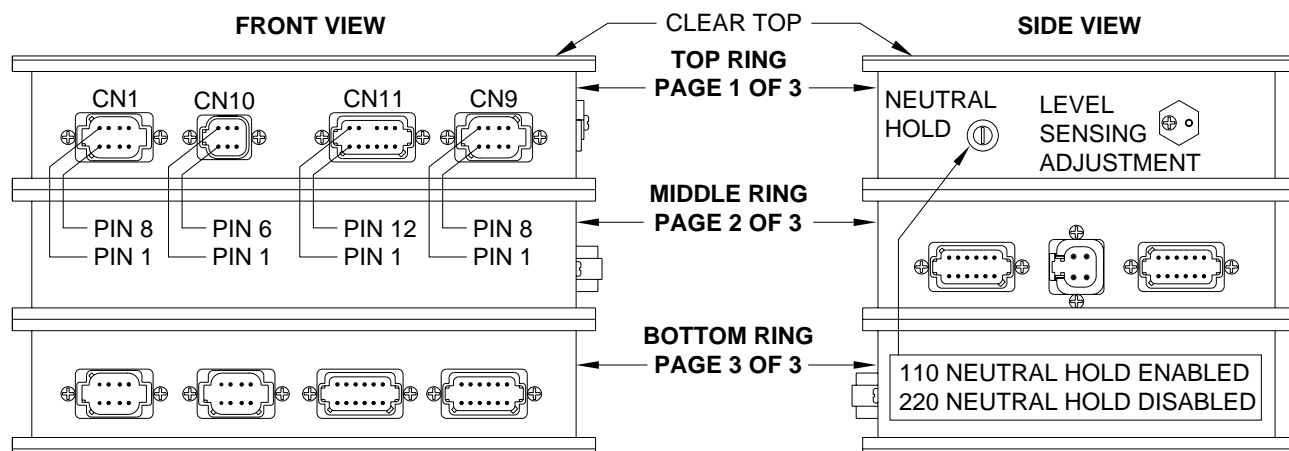
PIN	COLOR	WIRE#	DESCRIPTION
1	BLACK	3701	RIGHT SIDE ENABLE
2	WHITE	6258	GROUND
3	BLACK	3211	RIGHT SIDE PRESSURE SWITCH
4	WHITE	6231	GROUND
5	BLACK	3800	TAG LIFT
6	WHITE	6258	GROUND
7	BLACK	3601	RIGHT SIDE DUMP
8	WHITE	6258	GROUND
9	BLACK	3701	TAG LIFT EXHAUST
10	WHITE	6258	GROUND
11	BLACK	4601	LEFT SIDE DUMP
12	WHITE	6258	GROUND
13	BLACK	3701	LEFT SIDE ENABLE
14	WHITE	6258	GROUND
15	BLACK	4211	LEFT SIDE PRESSURE SWITCH
16	WHITE	6231	GROUND
17 THROUGH 31 NOT USED			



# ELECTRICAL CONNECTION DIAGRAM

## CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE

### PAGE 1 OF 7

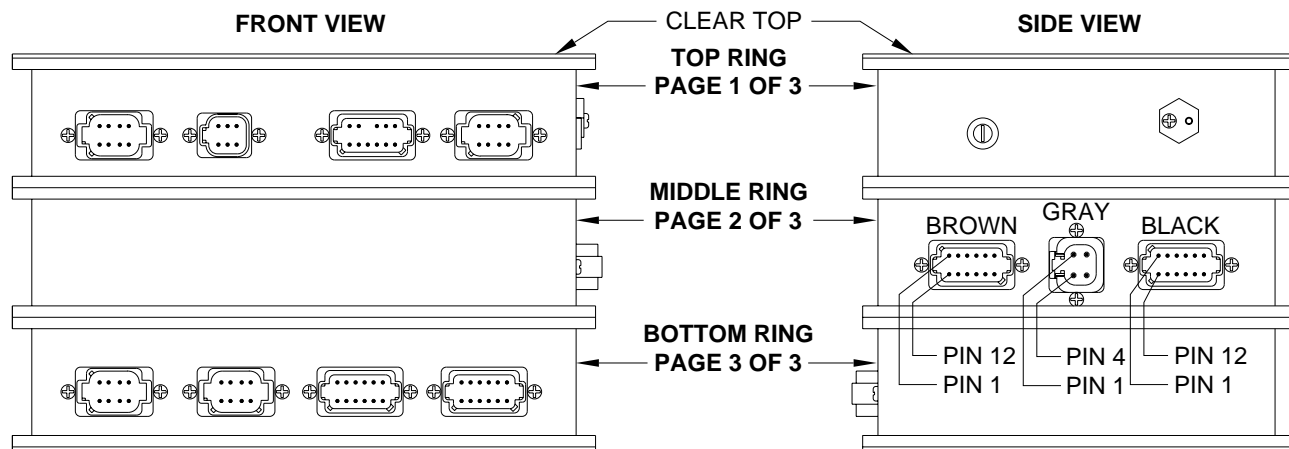


PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
<b>CN1</b>			
1 AND 2			8 PIN BLACK CONNECTOR
3	RED	6800	NO CONNECTION
4	WHITE	6230	SWITCHED +12 BATTERY TO TOUCH PANEL
5			GRND TO TOUCH PANEL
6			SHIELD WIRE FOR CAN CABLE
7	GREEN		NO CONNECTION
8	YELLOW		CAN DATA LINE LOW-DO NOT MODIFY
<b>CN10</b>			
1	BLACK	7599	CAN DATA LINE HIGH-DO NOT MODIFY
2	RED	6100	6 PIN GRAY CONNECTOR
3	BLACK	7550	RESET SWITCH LIGHT CONTROL-SWITCHED +12
4	RED	6121	RESET SWITCH SUPPLY +12
5	WHITE	6230	RESET SWITCH OUTPUT +12
6	BLACK	7699	WARNING LIGHT SUPPLY +12
<b>CN11</b>			
1	RED	6110	RESET SWITCH LIGHT GROUND
2 THRU 4			WARNING LIGHT CONTROL - SWITCHED GROUND
5	RED	6120	12 PIN GRAY CONNECTOR
6	RED	6100	SWITCHED +12 FROM IGNITION
7	WHITE	6230	NO CONNECTION
8 THRU 10			SWITCHED +12 FROM ACCESSORY
11	BLACK	9000	HOUSE BATTERY +12
12	RED	6101	GROUND FOR PROCESSOR FROM GROUND STUD
<b>CN9</b>			
1	BLACK	8500	NO CONNECTION
2	BLACK	8100	8 PIN GREEN CONNECTOR
3			MASTER RELAY CONTROL - SWITCHED +12
4	BLACK	8600	SYSTEM PRESSURE SWITCH-SWITCHED GROUND
5	BLACK	9900	NO CONNECTION
6	BLACK	9901	PUMP RELAY CONTROL - SWITCHED +12
7 AND 8			SPEED SWITCH - ( +12 WITH IGN ON BELOW 5MPH)
			PUMP MONITOR-SWITCHED +12 FROM PUMP RELAY
			NO CONNECTION

# ELECTRICAL CONNECTION DIAGRAM

## CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE

### PAGE 2 OF 7

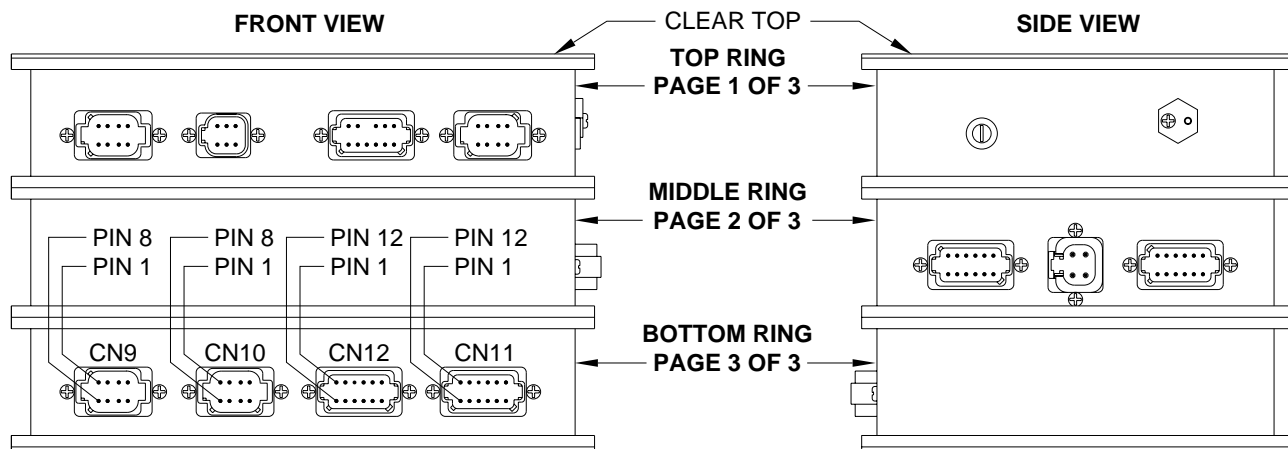


PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
<b>BROWN</b>			
<b>12 PIN BROWN CONNECTOR</b>			
1			NO CONNECTION
2	BLACK	1500	LEFT FRONT RAISE AIR VALVE CONTROL - SWITCHED +12
3	BLACK	1600	LEFT FRONT LOWER AIR VALVE CONTROL - SWITCHED +12
4	BLACK	2500	RIGHT FRONT RAISE AIR VALVE CONTROL - SWITCHED +12
5	BLACK	2600	RIGHT FRONT LOWER AIR VALVE CONTROL - SWITCHED +12
6	BLACK	9700	AUXILARY AIR COMPRESSOR CONTROL - SWITCHED +12
7			NO CONNECTION
8	BLACK	1700	FRONT AIR MANIFOLD TRAVEL VALVES CONTROL - SWITCHED +12
9			NO CONNECTION
10			NO CONNECTION
11	WHITE	6254	GROUND FOR AIR SOLENOID VALVES
12			NO CONNECTION
<b>GRAY</b>			
<b>4 PIN GRAY CONNECTOR</b>			
1	BLACK	6800	SWITCHED +12 FROM MASTER RELAY
2	BLACK	6800	SWITCHED +12 FROM MASTER RELAY
3	WHITE	6230	GROUND FROM GROUND STUD - FOR SOLENOID VALVES
4	WHITE	6230	GROUND FROM GROUND STUD - FOR SOLENOID VALVES
<b>BLACK</b>			
<b>12 PIN BLACK CONNECTOR</b>			
1	BLACK	5050	ROOM 1 CYLINDER EXTEND SOLENOID VALVE SWITCHED +12
2	BLACK	5150	ROOM 1 CYLINDER RETRACT SOLENOID VALVE SWITCHED +12
3	BLACK	5051	ROOM 2 CYLINDER EXTEND SOLENOID VALVE SWITCHED +12
4	BLACK	5151	ROOM 2 CYLINDER RETRACT SOLENOID VALVE SWITCHED +12
5	BLACK	5052	ROOM 3 CYLINDER EXTEND SOLENOID VALVE SWITCHED +12
6	BLACK	5152	ROOM 3 CYLINDER RETRACT SOLENOID VALVE SWITCHED +12
7 & 8			NO CONNECTION
9	BLACK	5153	ROOM 4 CYLINDER RETRACT SOLENOID VALVE SWITCHED +12
10	BLACK	5053	ROOM 4 CYLINDER EXTEND SOLENOID VALVE SWITCHED +12
11 & 12			NO CONNECTION

# ELECTRICAL CONNECTION DIAGRAM

## CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE

### PAGE 3 OF 7



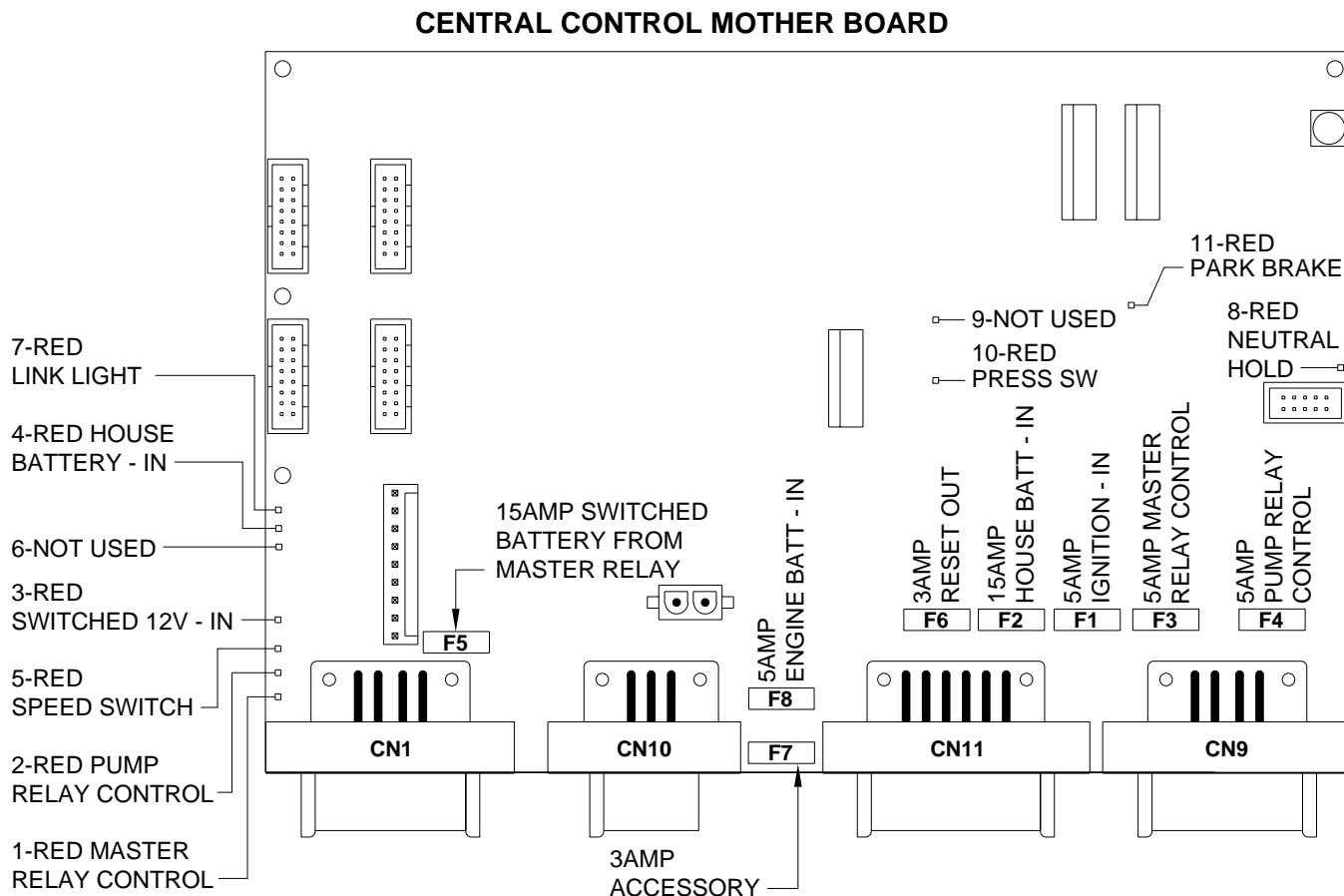
PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
<b>CN9 — 8 PIN BLACK CONNECTOR</b>			
1	BLACK	7696	SYSTEM WAKE UP SWITCHED GROUND
2			NO CONNECTION
3	RED	6800	SWITCHED +12 BATTERY
4	WHITE	6230	GROUND
5			SHIELD WIRE FOR CAN CABLE
6	RED	6110	IGNITION +12
7	GREEN		CAN DATA LINE LOW - DO NOT MODIFY
8	YELLOW		CAN DATA LINE HIGH - DO NOT MODIFY
<b>CN10 — 8 PIN GRAY CONNECTOR</b>			
1	BLACK	6807	SWITCHED +12 FROM FRONT ROOM SELECT SWITCH
2	BLACK	7510	READY TO OPERATE LIGHT CONTROL SWITCHED +12
3	BLACK	7530	PUMP ON LIGHT CONTROL - SWITCHED +12
4	BLACK	7501	ROOM EXTEND SWITCHED +12
5	BLACK	7502	ROOM RETRACT SWITCHED +12
6	RED	6805	SWITCHED +12 BATTERY TO ROOM PANEL KEY SWITCH
7	BLACK	7696	SYSTEM WAKE UP - SWITCHED GROUND
8	WHITE	6230	GROUND TO ROOM PANEL KEY SWITCH
<b>CN12 — 12 PIN GRAY CONNECTOR</b>			
1 THRU 5			NO CONNECTION
6	WHITE	6236	GROUND FOR AIR MANIFOLD PRESSURE SWITCHES
7	BLACK	6800	SWITCHED +12 FOR TAG DUMP SWITCH (NOT USED)
8 AND 9			NO CONNECTION
10	BLACK	2210	RIGHT FRONT AIR PRESSURE SWITCH INPUT SWITCHED GROUND
11	BLACK	7521	TAG LIFT-SWITCHED +12 FROM TAG DUMP SWITCH
12			NO CONNECTION
<b>CN11 — 12 PIN GREEN CONNECTOR</b>			
1 THRU 5			NO CONNECTION
6	WHITE	6235	GROUND FOR AIR MANIFOLD PRESSURE SWITCHES
7 THRU 9			NO CONNECTION
10	BLACK	1210	LEFT FRONT AIR PRESSURE SWITCH INPUT SWITCHED GROUND
11 AND 12			NO CONNECTION

# ELECTRICAL CONNECTION DIAGRAM

## LED - FUSE LOCATION AND DESCRIPTION

### CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE (TOP RING)

#### PAGE 4 OF 7



LED	DESCRIPTION	CN AND PIN	FUSE DESCRIPTION
1-RED	MASTER RELAY CONTROL	CN 9 - PIN 1	F1 - 5AMP IGNITION - IN
2-RED	PUMP RELAY CONTROL	CN 9 - PIN 4	F2 - 15AMP HOUSE BATTERY - IN
3-RED	SWITCHED 12V FROM MASTER RELAY	CN 1 - PIN 3	F3 - 5AMP MASTER RELAY CONTROL
4-RED	ENGINE BATTERY - IN	CN 11 - PIN 12	F4 - 5AMP PUMP RELAY CONTROL
5-RED	SPEED SWITCH	CN 9 - PIN 5	F5 - 15AMP SWITCHED BATTERY - IN
6-NOT USED	NOT USED	NOT USED	F6 - 3AMP RESET OUT
7-RED	LINK LIGHT	CN 1 - PIN 7 & 8	F7 - 3AMP IGNITION - IN
8-RED	NEUTRAL HOLD	CN 11 - PIN 8 & 9	F8 - 5AMP ENGINE BATTERY - IN
9-NOT USED	NOT USED	NOT USED	
10-RED	3000 LBS PRESS SWITCH - ON	CN 9 - PIN 2	
11-RED	PARK PRAKE - ON	CN 11 - PIN 11	

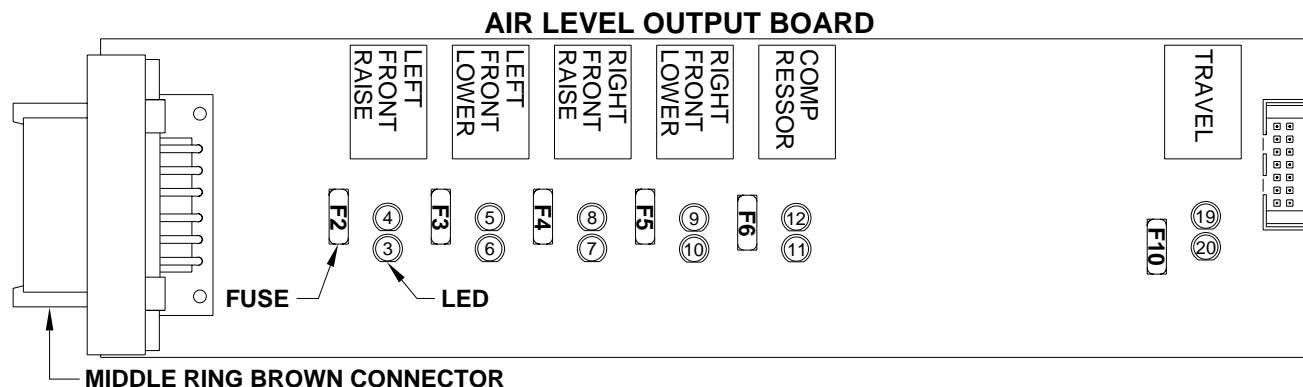
**NOTE: FOR DETAILED INPUT / OUTPUT INFORMATION ABOUT PIN CONNECTIONS SEE ELECTRICAL CONNECTION DIAGRAM - CENTRAL CONTROL / ROOM 1 MODULE CONNECTION INFORMATION - PAGE 1 OF 7.**

# ELECTRICAL CONNECTION DIAGRAM

## LED - FUSE LOCATION AND DESCRIPTION

### CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE (MIDDLE RING)

#### PAGE 5 OF 7



LED	RELAY DESCRIPTION	FUSE	BROWN
3-RED	LEFT FRONT RAISE	F2-5 AMP	PIN 2
4-YELLOW	LEFT FRONT RAISE		
5-YELLOW	LEFT FRONT LOWER		
6-RED	LEFT FRONT LOWER	F3-5 AMP	PIN 3
7-RED	RIGHT FRONT RAISE		
8-YELLOW	RIGHT FRONT RAISE	F4-5 AMP	PIN 4
9-YELLOW	RIGHT FRONT LOWER		
10-RED	RIGHT FRONT LOWER	F5-5 AMP	PIN 5
11-RED	COMPRESSOR		
12-YELLOW	COMPRESSOR	F6-5 AMP	PIN 6
19-YELLOW	TRAVEL		
20-RED	TRAVEL	F10-7.5 AMP	PIN 8

**NOTE: THE TRAVEL RELAY IS WIRED AS A NORMALLY CLOSED RELAY. WHEN THE YELLOW LED (19) IS ON THE RELAY CONTACTS WILL OPEN. THE RED LED (20) WILL NOT BE ON. THE RED LED WILL BE ON IF THE LEVELING SYSTEM IS IN THE TRAVEL MODE AND THE IGNITION IS ON.**

**NOTE: FOR DETAILED INPUT / OUTPUT INFORMATION ABOUT PIN CONNECTIONS SEE ELECTRICAL CONNECTION DIAGRAM - CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE CONNECTION INFORMATION - PAGE 2 OF 7.**

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

**A LIT RED LED INDICATES THERE IS VOLTAGE ON IT'S CORRESPONDING CN1 PIN.**

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

**IF THE YELLOW LEDS ARE WORKING BUT NO RED LED IS COMING ON THERE IS A PROBLEM WITH INPUT VOLTAGE IN THE 4-PIN CONNECTOR ON THE TOP RING.**

**IF A YELLOW LED IS NOT LIT, THIS INDICATES A PROBLEM WITH A MODULE.**



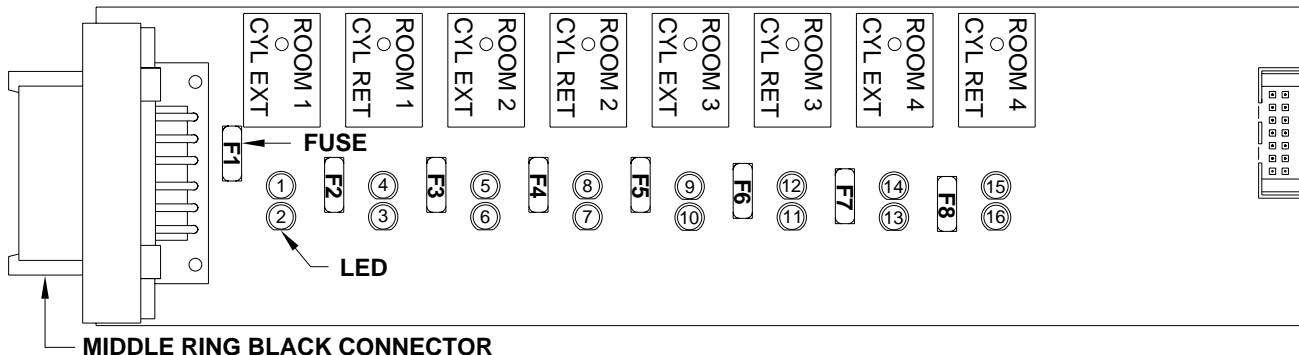
# ELECTRICAL CONNECTION DIAGRAM

## LED - FUSE LOCATION AND DESCRIPTION

### CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE (TOP RING)

#### PAGE 6 OF 7

#### ROOM 1 AND 2 OUTPUT BOARD



LED	RELAY DESCRIPTION	FUSE	CN1
1-YELLOW	ROOM 1 CYL EXTEND	F1-15 AMP	PIN 1
2-RED	ROOM 1 CYL EXTEND	F2-15 AMP	PIN 2
3-RED	ROOM 1 CYL RETRACT		
4-YELLOW	ROOM 1 CYL RETRACT		
5-YELLOW	ROOM 2 CYL EXTEND	F3-15 AMP	PIN 3
6-RED	ROOM 2 CYL EXTEND	F4-15 AMP	PIN 4
7-RED	ROOM 2 CYL RETRACT		
8-YELLOW	ROOM 2 CYL RETRACT		
9-YELLOW	ROOM 3 CYL EXTEND	F5-15 AMP	PIN 5
10-RED	ROOM 3 CYL EXTEND	F6-15 AMP	PIN 6
11-RED	ROOM 3 CYL RETRACT		
12-YELLOW	ROOM 3 CYL RETRACT		
13-RED	ROOM 4 CYL EXTEND	F7-15 AMP	PIN 10
14-YELLOW	ROOM 4 CYL EXTEND		
15-YELLOW	ROOM 4 CYL RETRACT		
16-RED	ROOM 4 CYL RETRACT	F8-15 AMP	PIN 9

**NOTE: FOR DETAILED INPUT / OUTPUT INFORMATION ABOUT PIN CONNECTIONS SEE ELECTRICAL CONNECTION DIAGRAM - CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE CONNECTION INFORMATION - PAGE 2 OF 7.**

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

**A LIT RED LED INDICATES THERE IS VOLTAGE ON IT'S CORRESPONDING CN1 PIN.**

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

**IF THE YELLOW LEDS ARE WORKING BUT NO RED LED IS COMING ON THERE IS A PROBLEM WITH INPUT VOLTAGE IN THE 4-PIN CONNECTOR ON THE TOP RING.**

**IF A YELLOW LED IS NOT LIT, THIS INDICATES A PROBLEM WITH A MODULE.**

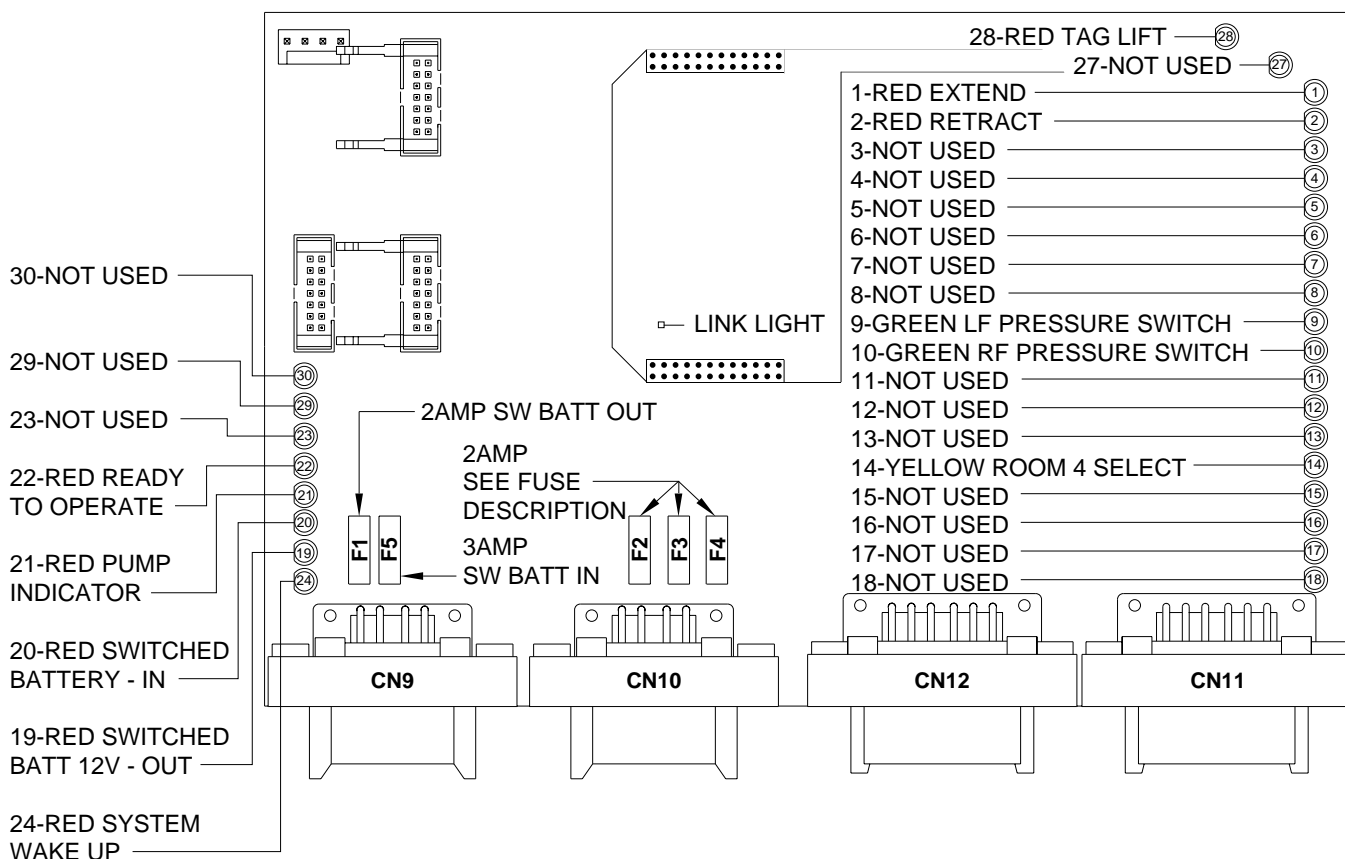
# ELECTRICAL CONNECTION DIAGRAM

## LED - FUSE LOCATION AND DESCRIPTION

### CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE (BOTTOM RING)

#### PAGE 7 OF 7

#### ROOM 2 I/O BOARD



LED	DESCRIPTION	CN AND PIN
1-RED	EXTEND	CN 10 - PIN 4
2-RED	RETRACT	CN 10 - PIN 5
3 THRU 8-NOT USED	NOT USED	NOT USED
9-GREEN	LEFT FRONT PRESS SW	CN 11 - PIN 10
10-GREEN	RIGHT FRONT PRESS SW	CN 12 - PIN 10
11 THRU 13-NOT USED	NOT USED	NOT USED
14-YELLOW	ROOM 4 SELECT	CN 10 - PIN 1
15 THRU 18-NOT USED	NOT USED	NOT USED
19-RED	SWITCHED BATT 12V - OUT	CN 11 & CN12 - PIN 7
20-RED	SWITCHED BATTERY - IN	CN 9 - PIN 3
21-RED	PUMP INDICATOR	CN 10 - PIN 3
22-RED	READY TO OPERATE	CN 10 - PIN 2
23-NOT USED	NOT USED	NOT USED
24-RED	SYSTEM WAKE UP	CN 10 - PIN 7
27-NOT USED	NOT USED	NOT USED
28-RED	TAG LIFT SWITCH	CN 12 - PIN 11
29-NOT USED	NOT USED	NOT USED
30-NOT USED	NOT USED	NOT USED
LINK LIGHT		

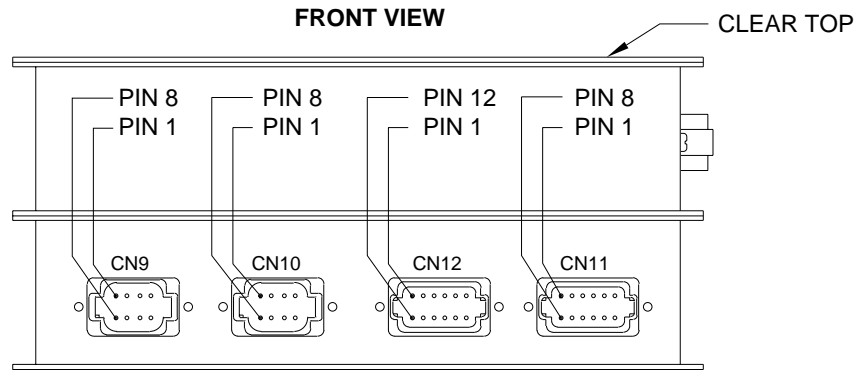
FUSE DESCRIPTION
F1 - 2AMP SW BATTERY OUT
F2 - 2AMP NOT USED
F3 - 2AMP READY TO OPERATE LIGHT
F4 - 2AMP PUMP ON INDICATOR LIGHT
F5 - 3AMP SWITCHED BATTERY IN

**NOTE: FOR DETAILED INPUT / OUTPUT INFORMATION ABOUT PIN CONNECTIONS SEE ELECTRICAL CONNECTION DIAGRAM - CENTRAL CONTROL / FRONT AIR / ROOMS 1 & 4 MODULE CONNECTION INFORMATION - PAGE 3 OF 7.**

# ELECTRICAL CONNECTION DIAGRAM

## REAR AIR / ROOMS 2 & 3 MODULE

### PAGE 1 OF 4

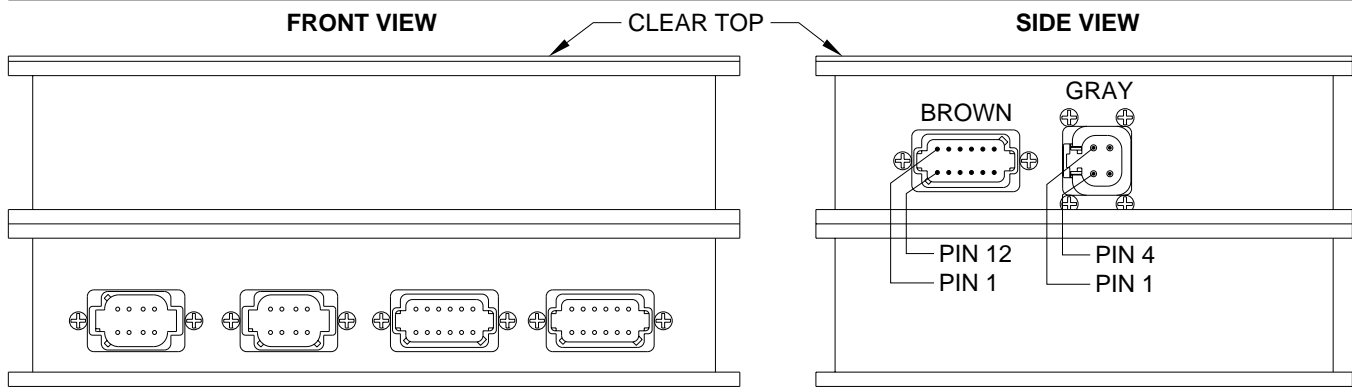


PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
<b>CN9 — 8 PIN BLACK CONNECTOR</b>			
1	BLACK	7696	SYSTEM WAKE UP - SWITCHED GROUND
2			NO CONNECTION
3	RED	6800	SWITCHED +12 BATTERY
4	WHITE	6230	GRND TO TOUCH PANEL
5			SHIELD WIRE FOR CAN CABLE
6	RED	6110	IGNITION +12
7	GREEN		CAN DATA LINE LOW-DO NOT MODIFY
8	YELLOW		CAN DATA LINE HIGH-DO NOT MODIFY
<b>CN10 — 8 PIN GRAY CONNECTOR</b>			
1	BLACK	6807	SWITCHED +12 FROM REAR ROOM SELECT SWITCH
2	BLACK	7510	READY TO OPERATE LIGHT CONTROL SWITCHED +12
3	BLACK	7530	ACTUATOR RUN LIGHT CONTROL SWITCHED +12
4	BLACK	7501	ROOM EXTEND SWITCHED +12
5	BLACK	7502	ROOM RETRACT SWITCHED +12
6	RED	6805	SWITCHED +12 BATTERY TO ROOM PANEL KEY SWITCH
7	BLACK	7631	SYSTEM WAKE UP - SWITCHED GROUND
8	WHITE	6230	GROUND TO ROOM PANEL KEY SWITCH
<b>CN12 — 12 PIN GRAY CONNECTOR</b>			
1	BLACK	4211	LEFT SIDE TAG PRESSURE SWITCH INPUT SWITCHED GROUND
2	BLACK	3211	RIGHT SIDE TAG PRESSURE SWITCH INPUT SWITCHED GROUND
3	BLACK	3215	SYSTEM PRESSURE SWITCH INPUT SWITCHED GROUND
4 AND 5			NO CONNECTION
6	WHITE	6231	GROUND FOR PRESSURE SWITCHES
7 THRU 12			NO CONNECTION
<b>CN11 — 12 PIN GREEN CONNECTOR</b>			
1			NO CONNECTION
2	BLACK	4210	LEFT REAR PRESSURE SWITCH INPUT SWITCHED GROUND
3	BLACK	3210	RIGHT REAR PRESSURE SWITCH INPUT SWITCHED GROUND
4 AND 5			NO CONNECTION
6	WHITE	6232	GROUND FOR REAR PRESSURE SWITCHES
7 THRU 12			NO CONNECTION

# ELECTRICAL CONNECTION DIAGRAM

## REAR AIR / ROOMS 2 & 3 MODULE

### PAGE 2 OF 4



PIN #	WIRE COLOR	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
<b>BROWN 12 PIN BROWN CONNECTOR</b>			
1	BLACK	3800	TAG LIFT SWITCHED +12 FROM TAG DUMP SWITCH
2	BLACK	4500	LEFT REAR RAISE SWITCHED +12
3	BLACK	4600	LEFT REAR LOWER SWITCHED +12
4	BLACK	3500	RIGHT REAR RAISE SWITCHED +12
5	BLACK	3600	RIGHT REAR LOWER SWITCHED +12
6			NO CONNECTION
7	BLACK	3701	TAG ENABLE SWITCHED +12
8	BLACK	3700	REAR TRAVEL SWITCHED +12
9	BLACK	3601	RIGHT SIDE TAG DUMP SWITCHED +12
10	BLACK	4601	LEFT SIDE TAG DUMP SWITCHED +12
11	WHITE	6258	GROUND FOR SOLENOID VALVES
12			NO CONNECTION
<b>GRAY 4 PIN GRAY CONNECTOR</b>			
1	BLACK	6800	SWITCHED +12 FROM MASTER RELAY
2	BLACK	6800	SWITCHED +12 FROM MASTER RELAY
3	WHITE	6230	GROUND FROM GROUND STUD
4	WHITE	6230	GROUND FROM GROUND STUD

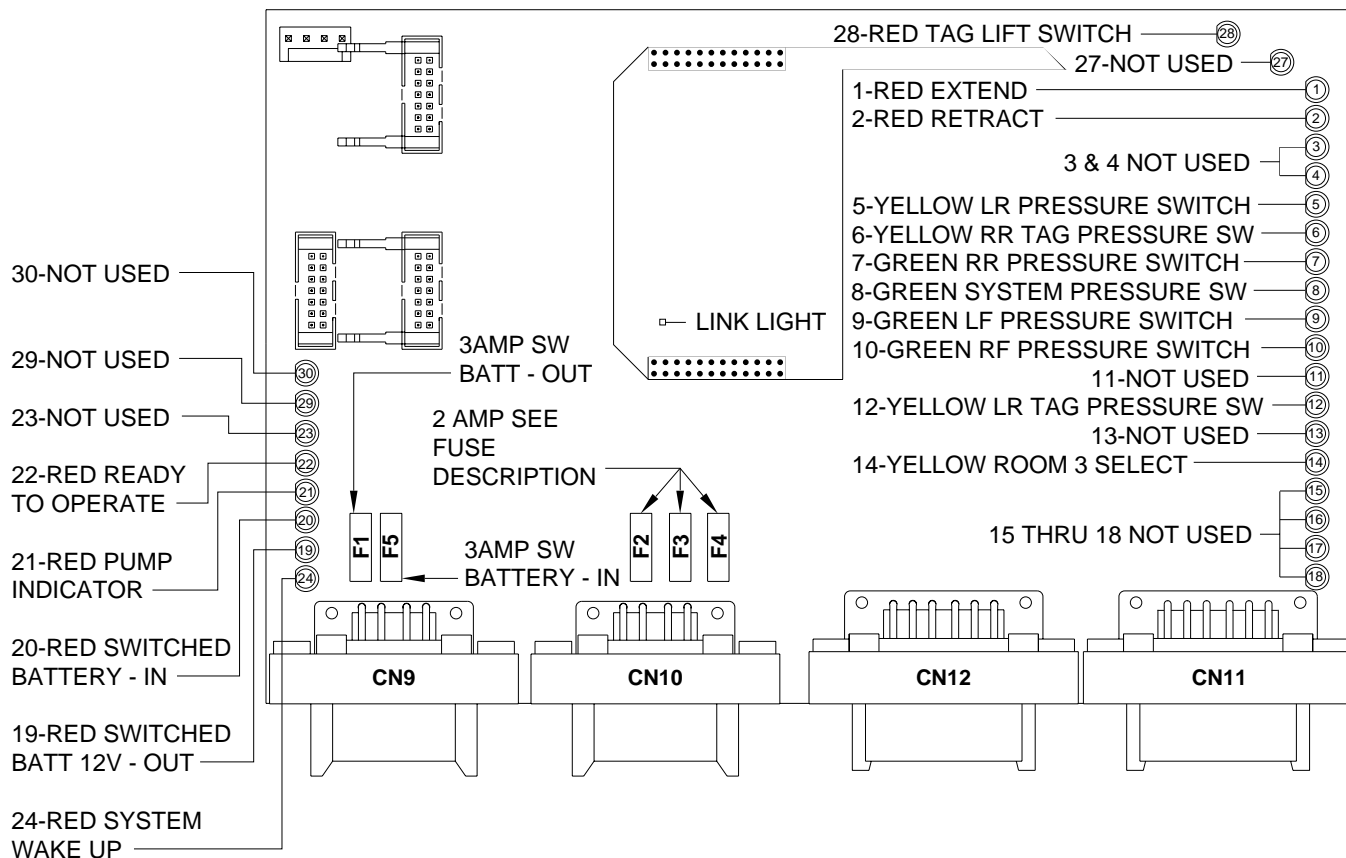
# ELECTRICAL CONNECTION DIAGRAM

## LED - FUSE LOCATION AND DESCRIPTION

### REAR AIR / ROOM 2 & 3 MODULE (BOTTOM RING)

#### PAGE 3 OF 4

#### ROOM 1 I/O BOARD



LED	DESCRIPTION	CN AND PIN	FUSE DESCRIPTION
1-RED	EXTEND	CN 10 - PIN 4	F1 - 3AMP SW BATTERY OUT
2-RED	RETRACT	CN 10 - PIN 5	F2 - 2AMP NOT USED
3 & 4-NOT USED	NOT USED	NOT USED	F3 - 2AMP READY TO OPERATE LIGHT
5-YELLOW	LR PRESSURE SWITCH	CN11 - PIN 2	F4 - 2AMP PUMP ON INDICATOR LIGHT
6-YELLOW	RR TAG PRESS SWITCH	CN12 - PIN 2	F5 - 3AMP SWITCHED BATTERY IN
7-GREEN	RR PRESSURE SWITCH	CN 11 - PIN 3	
8-GREEN	SYSTEM PRESSURE SW	CN 12 - PIN 3	
9-GREEN	LF PRESSURE SWITCH	CN 11 - PIN 10	
10-GREEN	RF PRESSURE SWITCH	CN 12 - PIN 10	
11-NOT USED	NOT USED	NOT USED	
12-YELLOW	LR TAG PRESSURE SW	CN 12 - PIN 1	
13-NOT USED	NOT USED	NOT USED	
14-YELLOW	ROOM 3 SELECT	CN 10 - PIN 1	
15 THRU 18-NOTUSED	NOT USED	NOT USED	
19-RED	SWITCHED BATT 12 - OUT	CN 11/CN 12 - PIN 7	
20-RED	SWITCHED BATTERY	CN 9 - PIN 3	
21-RED	PUMP INDICATOR	CN 10 - PIN 3	
22-RED	READY TO OPERATE	CN 10 - PIN 2	
23-NOT USED	NOT USED	NOT USED	
24-RED	SYSTEM WAKE UP	CN 10 - PIN 7	
27-NOT USED	NOT USED	NOT USED	
28-RED	TAG LIFT SWITCH	CN 12 - PIN 11	
29 & 30-NOT USED	NOT USED	NOT USED	
LINK LIGHT			

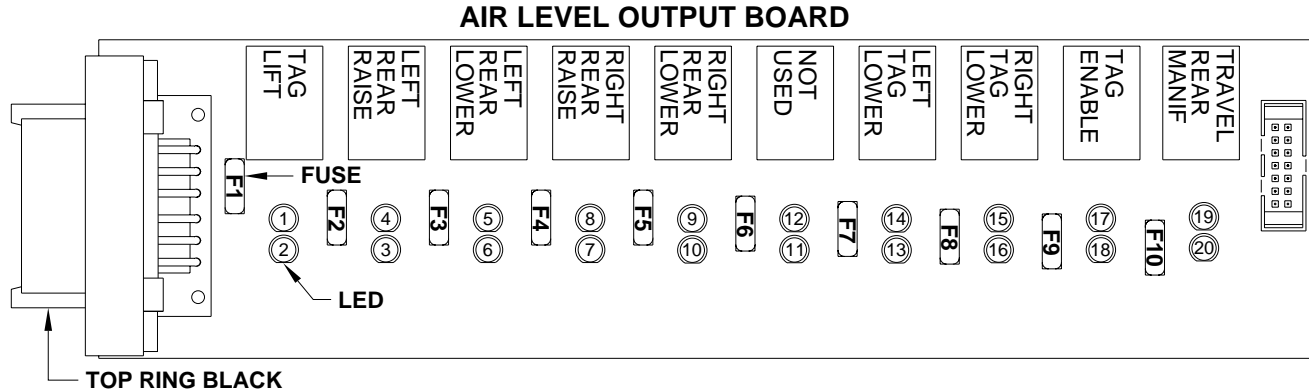
**NOTE: FOR DETAILED INPUT / OUTPUT INFORMATION ABOUT PIN CONNECTIONS SEE ELECTRICAL CONNECTION DIAGRAM - REAR AIR/ ROOMS 2 & 3 MODULE CONNECTION INFORMATION - PAGE 1 OF 4.**

# ELECTRICAL CONNECTION DIAGRAM

## LED - FUSE LOCATION AND DESCRIPTION

### REAR AIR / ROOM 2 & 3 MODULE (TOP RING)

#### PAGE 4 OF 4



LED	RELAY DESCRIPTION	FUSE	BLACK
1-YELLOW	TAG LIFT	F1-5 AMP	PIN 1
2-RED	TAG LIFT	F2-5 AMP	PIN 2
3-RED	LEFT REAR RAISE		
4-YELLOW	LEFT REAR RAISE		
5-YELLOW	LEFT REAR LOWER		
6-RED	LEFT REAR LOWER	F3-5 AMP	PIN 3
7-RED	RIGHT REAR RAISE	F4-5 AMP	PIN 4
8-YELLOW	RIGHT REAR RAISE		
9-YELLOW	RIGHT REAR LOWER		
10-RED	RIGHT REAR LOWER	F5-5 AMP	PIN 5
11-RED	NOT USED	F6-5 AMP	PIN 6
12-YELLOW	NOT USED		
13-RED	LEFT TAG LOWER	F7-5 AMP	PIN 10
14-YELLOW	LEFT TAG LOWER		
15-YELLOW	RIGHT TAG LOWER		
16-RED	RIGHT TAG LOWER	F8-5 AMP	PIN 9
17-YELLOW	TAG ENABLE		
18-RED	TAG ENABLE	F9-3 AMP	PIN 7
19-YELLOW	TRAVEL - REAR MANIFOLD		
20-RED	TRAVEL - REAR MANIFOLD	F10-3 AMP	PIN 8

**NOTE: FOR DETAILED INPUT / OUTPUT INFORMATION ABOUT PIN CONNECTIONS SEE ELECTRICAL CONNECTION DIAGRAM - REAR AIR / ROOM 2 & 3 MODULE CONNECTION INFORMATION - PAGE 2 OF 4.**

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

**A LIT RED LED INDICATES THERE IS VOLTAGE ON IT'S CORRESPONDING CN1 PIN.**

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

**IF THE YELLOW LEDS ARE WORKING BUT NO RED LED IS COMING ON THERE IS A PROBLEM WITH INPUT VOLTAGE IN THE 4-PIN CONNECTOR ON THE TOP RING.**

**IF A YELLOW LED IS NOT LIT, THIS INDICATES A PROBLEM WITH A MODULE.**

**NOTE: THE TWO TRAVEL RELAYS ARE WIRED AS NORMALLY CLOSED RELAYS. WHEN THE YELLOW LED (19) IS ON THE RELAY CONTACTS WILL OPEN. THE RED LED (20) WILL NOT BE ON. THE RED LED WILL BE ON IF THE LEVELING SYSTEM IS IN THE TRAVEL MODE AND THE IGNITION IS ON.**

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## MAINTENANCE

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### OIL LEVEL

All maintenance should be done as part of the normal servicing of the coach.

The oil level should be checked when the vehicle is first purchased and then once every two years. More often if there is an oil leak in the system.

Refer to the "HYDRAULIC LINE CONNECTION DIAGRAM - MULTIPLE ROOM EXTENSIONS" page for information concerning the correct position of each room before checking the oil level.

The oil reservoir is part of the pump/manifold assembly. The oil level is checked and filled through the breather cap. Clear any dirt away from the breather/filler cap before removing. The oil level should be within one inch of the top of the reservoir. Most breather caps have a dipstick.

**NOTE: Overfilling the tank can cause leakage of oil through the breather cap.**

**FLUID:** HWH Specialty Hydraulic Oil is recommended. In an emergency Dexron automatic transmission fluid can be used.

**NOTE:** Dexron automatic transmission fluid contains red dye and can cause staining should a leak occur. **DO NOT USE** brake fluid or hydraulic jack fluid. Use of these can damage seals.

### ELECTRICAL SYSTEM

The batteries should be in good condition and fully charged. Weak batteries can cause erratic operation. Battery cable terminals and battery posts and connections should be kept clean.

All electrical connections, especially ground connections, should be clean, tight, free from corrosion and protected from weathering.

### ROOM EXTENSIONS

The HWH room mechanisms need no maintenance. **DO NOT** grease or lubricate any parts of the HWH mechanism.

Any visible mechanism can be kept clean by washing with water. Refer to the vehicle manufacturer for correct maintenance of the room seals.

### OPERATIONAL CHECK

Review the OPERATOR MANUAL. Run the system according to the SYSTEM OPERATION (LEVELING) Section. Note any abnormal operation.

Check that all lights work according to the "INDICATOR LIGHT" Section. Correct function of the red "WARNING" light is important.

# MAINTENANCE

## NOT IN PARK/BRAKE CHECK

**CAUTION:** WHEN MAKING THIS CHECK, BLOCK THE COACH WHEELS SECURELY SO THE COACH CANNOT ROLL FORWARD OR BACKWARD.

Set the park/brake. Switch the ignition to the "ACC" or "ON" position. Push the "ON/OFF" switch toward "ON". Release the parking brake and confirm that the "PARK" indicator light comes on. Reset the parking brake. The "PARK" indicator light should go out. Switch the ignition to "OFF".

If any of the above checks or inspections reveal a problem or if there are other problems or questions, consult a qualified RV repair center, your vehicle or coach manufacturer, or HWH CORPORATION for service or repair.

## SENSING UNIT ADJUSTMENT

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

When the vehicle is level according to the bubble level, if there are no yellow lights lit on the Touch Panel, the sensing unit is properly adjusted.

If there are yellow LEVEL lights lit on the Touch Panel, manual adjustments to the Sensing Unit are needed. A 7/8" socket w/driver and a philips screw driver will be needed.

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

There are four LED's on the Sensing Unit, A,B,C and D. Refer to the drawing below. The Sensing Unit is adjusted by turning the adjustment nut to turn out LED's B and D. The adjustment screw will turn out LED's A and C. If the adjustment nut has to be turned more than 1/2 flat to turn

the LED out, there may be a problem with the Sensing Unit or the mounting of the Control Box. Be careful to not turn the adjustment screw out to far or over tighten it. If two LED's are on, either adjustment may be made first.

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

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

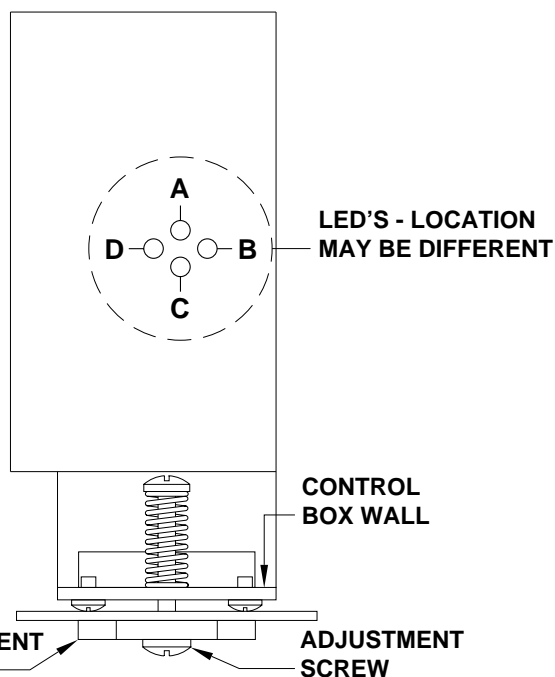
**If LED (C) is lit: Turn the adjustment screw CLOCKWISE until the LED is off.**

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

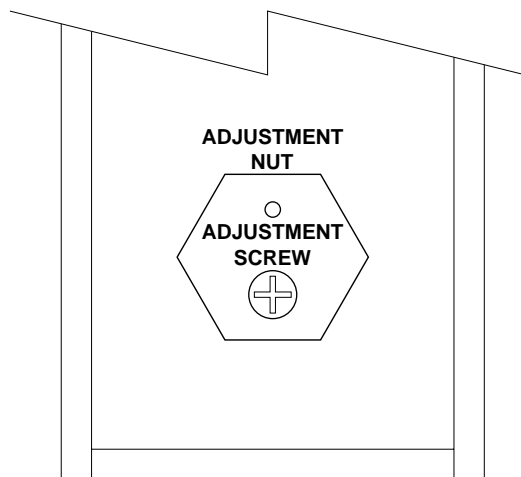
**If LED (D) is lit: Turn the adjustment nut CLOCKWISE until the LED is off.**

**When all 4 LED's are off, the Sensing Unit is adjusted.**

TOP VIEW - SENSING UNIT



SIDE VIEW - CONTROL BOX





# TROUBLE SHOOTING

## TROUBLE SHOOTING BASICS

Please read before continuing.

When trouble shooting the 2000 series leveling system, it is best to run the system in the manual mode to check individual functions before operating the system in the automatic mode.

Start the engine and push the "TRAVEL" button. Let air pressure build and allow the vehicle to return to travel height. If the vehicle is equipped with a tag axle, make sure the TAG DUMP switch is in the normal travel position. This will make the following procedures easier to perform. If the vehicle will not return to ride height see step 1c.

When trouble shooting raise, lower or travel mode problems, do not watch the vehicle. Watch the air bags. Make sure air bags will deflate completely when dumping or re-inflate when raising. Check all four sets of up and down arrows. Do a lower then raise check for one set of arrows at a time. It is important to do only one set of arrows at a time to avoid twisting unless this manual calls for a specific operating procedure.

Each air manifold is equipped with two 20 P.S.I. pressure switches. The contacts in these switches will close if the air pressure in the corresponding bag(s) is 20 P.S.I. or less. These switches are used as low air warning devices and also protect the vehicle from twisting while air is being dumped during manual or automatic leveling. Any time either front pressure switch is on, a manual or automatic front lower procedure will cease. Any time either rear (drive axle) pressure switch is on, a manual or automatic rear lower procedure will cease. Side lower procedures, either manual or automatic will not be affected by low air pressure in any air bag(s).

If the vehicle is equipped with a tag axle, there will be an air manifold for the tag axle also. The two pressure switches on

the tag manifold are used as low air warning devices only and will not affect any leveling procedures.

The drive axle manifold has a pressure switch that monitors the air pressure in the suspension system. This switch is also used only as a low air warning device.

If the vehicle is on a reasonably flat surface, unplug the pressure switch connector (CN100) at the control box. This will allow the air bags to deflate completely when using down arrows in the manual mode.

**IMPORTANT: Do not run the system in the automatic mode with the pressure switches unplugged. Be careful to not twist the vehicle when manually operating the down arrows.**

The control box is equipped with LED's to indicate inputs and outputs. Lit LEDs are not used to indicate a problem. Refer to the ELECTRICAL CONNECTION DIAGRAM - LED - FUSE LOCATION AND DESCRIPTION for LED functions.

**IMPORTANT: Unplug the power connectors, CN98 and CN11, before separating the rings at the control box to check fuses or perform tests. This eliminates the possibility of shorting interior components of the control box.**

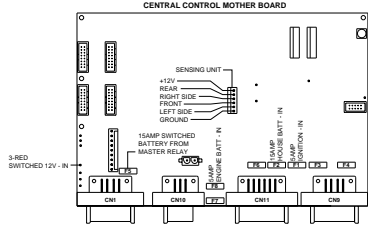
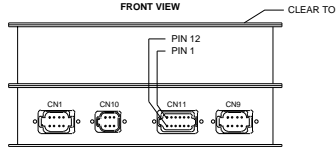
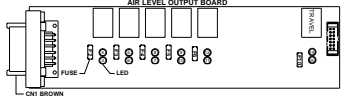
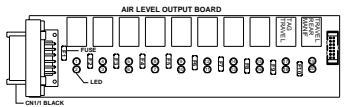
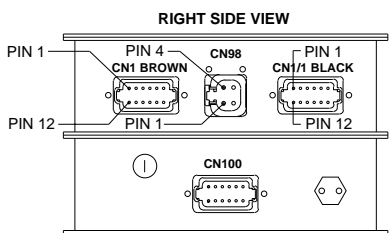
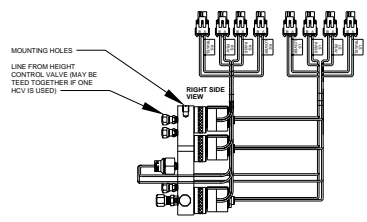
In the following repair guide, each "Part" describes an operation or function of the leveling system. Below each "Part" there are three columns. The left hand column describes a possible symptom. The center column gives a diagnostic procedure and solution. The right hand column shows a diagram or refers to a diagram in the diagram section.

It is important to remember it is possible to encounter a problem not listed in this guide. If this occurs, contact HWH Corporation Customer Service for assistance.

**Part 1.** With the engine running, push the "TRAVEL MODE" button. The "TRAVEL MODE" light should flash a few times. The vehicle should return to travel height.

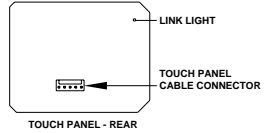
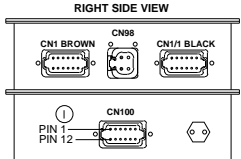
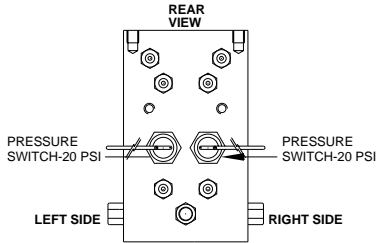
PROBLEM	SOLUTION	DIAGRAM
1a. The (red) "TRAVEL MODE" button light will not flash. The HWH reset switch light is on.	Push the reset switch. If the reset light comes back on or comes back on after pushing the "TRAVEL MODE" button, replace the control box. <b>CAUTION: The vehicle will return to travel height if the reset switch light is on and the ignition is in the "ON" position.</b>	

# TROUBLE SHOOTING

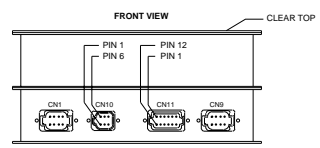
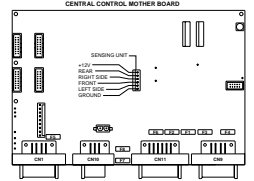
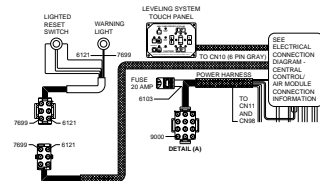
PROBLEM	SOLUTION	DIAGRAM
1b. The (red) "TRAVEL MODE" button light will not flash, the HWH reset switch light is not lit.	LED #3 on the central control module should be lit. <b>If LED #3 is lit</b> , replace the touch panel. <b>If LED #3 is not lit</b> , check fuse F5 on the Central Control Module. If F5 is blown, there is a problem with the touch panel or the touch panel cables. If F5 is not blown, check fuses F1, F2, F6 (or F8) on the Central Control Module. If F1, F2, F6 (or F8) are blown the problem is most likely the control box. If F1, F2, F6 (or F8) are OK, check that there is +12 volts power on pins 1,6 and 12 of CN11 gray connector. If power is present on all pins, replace the box. If power is not present on a pin, trace that wire to it's source and repair.	 <p><b>REFER TO MP85.050V</b></p>  <p><b>REFER TO MP85.030C</b></p>
1c. The (red) "TRAVEL MODE" button light flashes, the vehicle will not return to ride height.	Check LED's 19 (YELLOW) and 20 (RED) on both air level output boards. If the vehicle is equipped with a tag axle, check LED's 17 (YELLOW) AND 18 (RED) on the rear output board. The (YELLOW) LED's should NOT be lit. The (RED) LED's should be lit. If any (YELLOW) Travel LED (or LED 17) is lit replace the control box. If any (RED) Travel LED is not lit, check fuse F10 for that board. If LED 18 (RED) for Tag Axle is not lit check fuse 9. If the fuse is OK, replace the box. If the fuse is blown, there is a short in the harness or one of the travel valves on that fuse. If all (RED) Travel LED's (and LED 18) are lit, check for +12 volts power on pin 8 of the 12 pin CN1 brown connector and pins 7 and 8 of the 12 pin CN1 black connector. Pin 7 is for Tag Axle Travel. Check for ground on pin 11 of these connectors. The harness can be unplugged to check these pins. If there is a problem with any of these pins, replace the control box. (Make sure there is a good ground on the two white wires in the 4 pin CN98 connector). If the proper pins have power and ground, the problem is the harness, harness connectors or the travel valves. Check for +12 volts power and ground at the travel valves. If power and ground is present, the travel valve may be bad. This can be checked by removing an air line from the height control valve or the air bag at the HWH manifold. Air should flow through the manifold when the travel valve is open. If the travel valve is OK, the problem is in the suspension or height control valve. Refer to the vehicle manufacturer for assistance.	 <p><b>REFER TO MP85.060V</b></p>  <p><b>REFER TO MP85.080V</b></p>  <p><b>REFER TO MP85.040C</b></p>  <p><b>REFER TO MP75.030C</b></p> <p><b>SEE ALSO MP75.040C</b> <b>SEE ALSO MP75.050C</b></p>

**CAUTION:** The vehicle will drop quickly when an air line is removed. The vehicle frame must be supported properly before crawling under the vehicle or removing any air lines.

# TROUBLE SHOOTING

PROBLEM	SOLUTION	DIAGRAM
<p>1d. The (green) "TRAVEL MODE" light will not come on, the vehicle is at ride height and all air bags are inflated.</p> <p>NOTE: Either the (green) "TRAVEL MODE" light should be on or the MASTER WARNING light should be on any time the ignition key is in the "ON" position.</p>	<p>If the <b>MASTER WARNING light is off and the (green) "TRAVEL MODE" light is off</b>, remove the touch panel. If the link light is not blinking, there is a problem with the touch panel cable or the control box. If the link light is blinking, replace the control box. <b>If the MASTER WARNING light is on and the (green) "TRAVEL MODE" light is off</b>, unplug the CN100 connector from the control box. If the (green) "TRAVEL MODE" light remains off, replace the control box. If the (green) "TRAVEL MODE" light comes on, an air pressure switch on one of the air manifolds is on. The air bag pressure switch will come on if an air bag has less than 20 p.s.i. The system air pressure switch will come on if the system pressure is below 85 p.s.i. Make sure there is ample air bag and system air pressure. There should be no continuity between pin 6 (pressure switch ground supply) and pins 2,3,4,5 and 8 (individual air pressure switches) of connector CN100. Also pins 9 and 10 if the vehicle is equipped with a tag axle. Replace any pressure switch that has continuity to pin 6.</p>	 <p>REFER TO MP85.030C</p>  <p>REFER TO MP85.040C</p>  <p>REFER TO MP75.030C</p> <p>SEE ALSO MP75.040C SEE ALSO MP75.050C</p>

**Part 2.** With the vehicle engine running push the "AIR" button one time. The Leveling System Active light should come on steady. The four red warning lights should come on. The "TRAVEL MODE" light should go out. One or two yellow level lights may be on (opposing lights should not be on). The master warning light should come on.

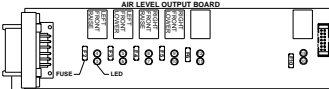
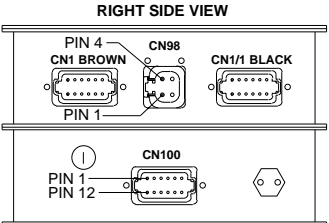
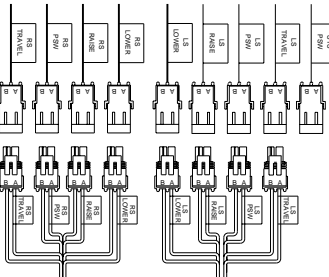
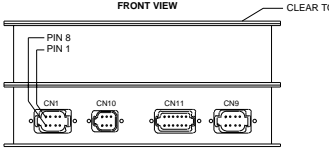
PROBLEM	SOLUTION	DIAGRAM
<p>2a. The System Active light will not come on.</p>	<p>Make sure there is power and ground to the control box in the 12 pin gray connector CN11. There is a link light on the back of the touch panel. This light should be flashing whenever the ignition is on. If the link light is not blinking, replace the control box. If the link light is blinking, replace the touch panel.</p>	 <p>REFER TO MP85.030C</p>  <p>REFER TO MP85.050V</p>  <p>REFER TO MP85.010C</p>
<p>2b. The "NOT IN PARK/BRAKE" light comes on while the "AIR" button is being pushed.</p>	<p>There should be a ground on the number 11 pin of connector CN11 at the control box. With CN11 plugged in there should be a minimum of 7.5 volts between pin 1 and pin 11 of CN11. If a ground is present, replace the control box. If there is no ground, the problem is the 9000 wire or the park brake switch.</p>	
<p>2c. More than 2 yellow lights are lit or opposing yellow lights are lit.</p>	<p>The sensing unit is inside the control box. Unplug the sensing unit. Use a test light to apply a ground to pins 2,3,4 and 5. The appropriate yellow light should come on when it's pin is grounded. If the yellow lights do not work properly, replace the control box. If the yellow light work correctly, replace the sensing unit.</p>	
<p>2d. The Master Warning light does not come on.</p>	<p>Check for +12 volts power on pin 4 of connector CN10. Check for a ground on pin 6 of connector CN10. If +12 power or ground is present the problem is with wire 6121 (+12V), wire 7699 (GROUND) or the light itself. If +12 power or ground is not present, the problem is the Control Box.</p>	

## TROUBLE SHOOTING

**Part 3.** Unplug CN100, see page MP85.xxxx. Be careful to not twist the frame of the vehicle while operating the leveling system manually. **Only operate one set of LOWER then RAISE buttons at a time.**

Push a LOWER (Down Arrow) button. Hold until all of the air is exhausted from the air bags. Check that the appropriate air bags are completely deflated. Push the corresponding RAISE (Up Arrow) button. Check that the appropriate air bags have inflated raising the vehicle. Repeat this process for the other three sets of LOWER and RAISE buttons. When pushing a manual button, it will always operate two corners of the vehicle at the same time, both front, both rear, right front and rear or left front and rear.

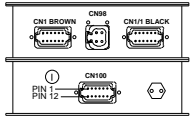
**NOTE: FOR VEHICLES EQUIPPED WITH A TAG AXLE.** The tag axle manifold valves work in conjunction with the drive axle manifold valves. The tag axle manifold raise valves, are tied together in the harness with the drive axle manifold raise valves. The tag axle manifold dump valves each have it's own relay on the output board in the control box. When pushing either side LOWER button, there will be three sets of yellow and red LED's. When pushing the rear LOWER button, there will be four sets of yellow and red LED's. When pushing the front LOWER button, there will be two sets of yellow and red LED's. When pushing any RAISE button, there will be four sets of yellow and red LED's. This includes a red and yellow LED for the auxiliary air compressor on each output board.

PROBLEM	SOLUTION	DIAGRAM
<p><b>3a. The air bags will not deflate when the LOWER (Down Arrow) button is pushed.</b></p> <p><b>OR</b></p> <p><b>The air bags will not inflate when the RAISE (Up Arrow) button is pushed.</b></p>	<p>Check the yellow and red LED's on the output boards for the solenoid valves that are being operated. Both LED's should be lit while a LOWER or RAISE button is being pushed. <b>If a yellow LED is not lit</b>, replace the control box. <b>If no red LED's are lit</b>, check for +12 power on pins 1 and 2 of CN98. If power is not present, trace the wires to their source or repair the wires. If power is present, check the fuses for these relays. If the fuses are OK, replace the control box. If the fuses are blown, the wires or solenoid valves are shorted.</p> <p><b>If not all the proper red LED's are lit</b>, check the fuse for that relay. If the fuse is OK replace the control box. If the fuse is blown the wire or solenoid valve is shorted.</p> <p><b>If the proper yellow and red LED's are lit</b>, check for +12 and ground at the solenoid valve on the manifold. If ground is not present, check for a ground on pin 11 in the black or brown CN1 connector at the control box if ground is not present, check for a ground on pins 3 and 4 of CN98. If ground is present replace the control box. If ground is not present, the problem is the 6231 (white) wires or their connection to the ground studs. If ground is present on pin 11 of the CN1 connectors, the problem is in the harness or harness plugs.</p> <p>If +12 is not present at the solenoid valve, the problem is the harness or the harness plugs.</p> <p>If +12 and ground is present at the solenoid valve the problem is the valve.</p> <p><b>NOTE: If using a DOWN button, check that the exhaust port at the manifold is not plugged. If using a RAISE button, make sure that there is good air pressure to the manifold.</b></p>	 <p><b>REFER TO MP85.060V</b></p> <p><b>SEE ALSO MP85.080V</b></p>  <p><b>REFER TO MP85.040C</b></p>  <p><b>REFER TO MP75.030C</b></p>  <p><b>REFER TO MP85.030C</b></p>
<p><b>3b. The correct air bags will not deflate when a LOWER button is pushed.</b></p>	<p>The problem is either an air line connection or electrical connection that is not in the correct position. Check all air line connections, electrical connections and wire locations in plugs according to the proper diagrams.</p>	
<p><b>3c. The correct air bags will not inflate when a RAISE button is pushed.</b></p>	<p>Because the correct air bags deflate when the LOWER button is pushed, it can be assumed the air line plumbing is correct. Check the electrical connections and wire locations in plugs according to the proper diagrams.</p>	

# TROUBLE SHOOTING

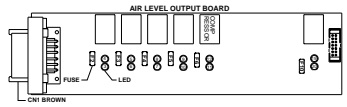
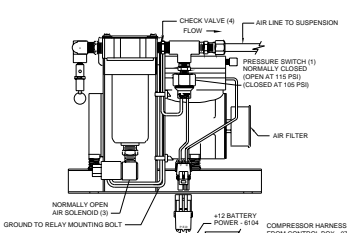
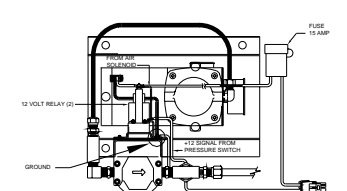
## PRESSURE SWITCH TEST

**Part 4.** Plug in the pressure switch connector, CN100. Make sure the vehicle is at ride height and all air bags have adequate air pressure. Push either side LOWER button until the air bags for that side are deflated. Push the front LOWER button. Nothing should happen. Push the rear LOWER button. Nothing should happen. Allow the vehicle to return to ride height and repeat the process with the other side LOWER button. If the vehicle is equipped with a tag axle, the tag axle lower solenoid valves will work with the drive axle valves. The tag axle pressure switches will not effect the lowering procedure.

PROBLEM	SOLUTION	DIAGRAM
<b>4a. The air bags will deflate completely with CN100 plugged in when the front or rear LOWER button is pushed.</b>	Make sure all air bags are completely deflated. Unplug CN100. Check for continuity between pin 6 (ground) and pins 2 (left front pressure switch), 3 (right front pressure switch), 4 (right rear pressure switch) and 5 (left rear pressure switch). If there is no continuity between pin 6 and another pin, there is a bad pressure switch or a problem with the wire or connection to that pressure switch.	 <p><b>REFER TO MP85.040C</b>  <b>SEE ALSO MP75.030C</b>  <b>SEE ALSO MP75.040C</b>  <b>SEE ALSO MP75.050C</b></p>

**Part 5.** Any time a raise function is performed, there is a +12 volt signal to turn the HWH auxiliary air compressor on. Push any RAISE (UP ARROW) button to check the air compressor. Some compressors have a pressure switch which will not allow the compressor to run if the vehicle has adequate air pressure in the suspension. Check the air compressor with the engine off and the system air pressure below 90 p.s.i.

This manual shows a common compressor arrangement used. Other compressors may be used. Consult the owners manual or HWH Technical Service for specific diagrams.

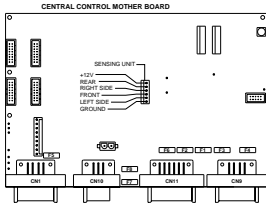
PROBLEM	SOLUTION	DIAGRAM
<b>5a. The compressor will not run when a RAISE button is pushed.</b>	<p><b>Check the yellow LED (12) and red LED (11) on the front air output board</b>, both LEDs should be on. If the yellow LED is not lit, replace the control box. If the yellow LED is lit but the red LED is not, check fuse 6. If fuse 6 is OK, replace the control box. If fuse 6 is blown, there is a short on the 9700 wire or the relay on the compressor is bad.</p> <p><b>If both LED's are lit</b>, check for +12 power on the 9700 wire at the compressor. If power is not present, there is a problem with the 9700 wire. If +12 power is present, check for +12 battery power on the 6104 wire at the compressor relay. Check the 15 amp fuse. The compressor and compressor relay are grounded through the compressor mounting bracket. Make sure the bracket has a good frame ground. If the 9700 wire goes to a pressure switch before the relay, make sure there is power through the pressure switch. If there is +12 battery power to the relay and +12 power and ground to the coil of the relay but no power through the relay, the relay is bad. If there is +12 power through the relay and a good ground for the compressor, the compressor is bad.</p>	 <p><b>REFER TO MP85.060V</b></p>  <p><b>REFER TO MP75.060C</b></p>  <p><b>REFER TO MP75.060C</b></p>
<b>5b. The compressor will not shut off.</b>	Some compressors have auxiliary control which allows the compressor to run at times other than when leveling. Refer to the owners manual or HWH Technical Services for specific compressor wiring diagrams. Check LED's 11 and 12 on the front air output board. If the LED's are lit, and the leveling system is not in the automatic mode, replace the control box. If the LED's are not lit, the compressor relay is stuck and should be replaced.	
<b>5c. The compressor will not build pressure.</b>	There is a +12 volt normally open solenoid on the compressor water trap. Any time the compressor is turned on, this solenoid will close. Check for +12 and ground to the solenoid when the compressor is running. If either is not present, there is a problem with the wiring. If +12 and ground is present, replace the solenoid.	

# TROUBLE SHOOTING

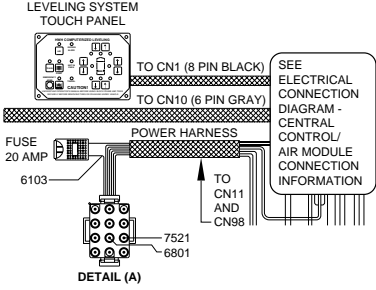
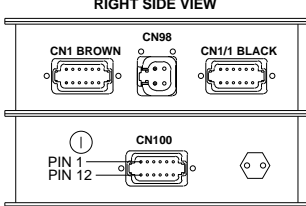
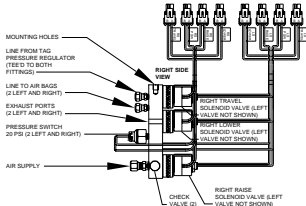
**Part 6 Sensing unit diagnostics.** The sensing unit is mounted in the control box and must be working properly and be adjusted properly for the system to function in the automatic mode. Refer to MPxxxxxx for proper adjustment procedures.

A lit yellow level light indicates a side or end of the vehicle is low. When all yellow level lights are out, the vehicle should be level within the tolerances of the sensing unit, about 1 inch side to side and about 3 to 4 inches front to rear.

Use the manual buttons or move the vehicle to different locations to make sure each yellow level light will come on and can be made to go out.

PROBLEM	SOLUTION	DIAGRAM
<p><b>6a. One or more yellow level lights will not come on</b></p> <p><b>OR</b></p> <p><b>One or more yellow level lights will not go out.</b></p>	<p>Unplug the sensing unit. Pin 1 supplies ground for the sensing unit. Pins 2,3,4 and 5 supply a ground from the sensing unit to turn the yellow lights on. Pin 6 supplies +12 power for the sensing unit. Use a test light to check pin 1 for ground and pin 6 for +12. Use the test light connected to ground to apply a ground to pins 2,3,4 and 5 one at a time. Ground one pin and one yellow light should come on. If any pin does not function correctly, replace the control box. If the pins function correctly replace the sensing unit.</p>	 <p><b>REFER TO MP85.050V</b></p>

**Part 7 Tag Dump diagnostics.** The tag dump switch is supplied by the vehicle manufacturer. Power for the tag dump switch is supplied +12 power by the HWH control box on wire 6801. The tag dump signal is wire number 7521. The tag dump switch will only work with the ignition on and the leveling system off. When the tag dump switch is in the DUMP position the tag axle manifold travel valves are turned off and the tag axle manifold lower valves are turned on.

PROBLEM	SOLUTION	DIAGRAM
<p><b>7a. The tag axle will not dump.</b></p>	<p>With the engine running put the tag dump switch in the DUMP position. The red LED 18 for tag travel should be off. The yellow LED 17 should be on. The left tag lower yellow LED 14 and red LED 13 along with the right tag lower yellow LED 15 and red LED 16 should be on. If the LED's are correct there is a problem with the connections, wires or valves on the tag axle manifold. If the LED's are not correct, check for +12 on wire 7521, connector CN100, pin 11 at the control box. If +12 is present replace the control box. If +12 is not present, check for +12 on pin 7 of CN100. If +12 is not present, replace the control box. If +12 is present, the problem is wire 6801, the tag dump switch or wire 7521.</p>	 <p><b>REFER TO MP85.010C</b></p>
<p><b>7b. The tag axle will not lift.</b></p>	<p>Not all coaches will use the 3800 wire supplied by HWH for the Tag Lift.</p> <p>If the HWH 3800 wire is used, check that there is power on the 7521 wire, connector CN 100 pin 11. If there is no power on the 7521 wire refer to 7a. If there is power on the 7521 wire, check LED's 1 (YELLOW) and 2 (RED). If both are on, there should be power on the 3800 wire. If not, there is a problem with the connectors or wire. If there is power on the 3800 wire at the box, the problem is with the wire, connection to the Tag lift or the Tag lift.</p> <p>If LED 1 (YELLOW) is on and not LED 2 (RED), check fuse F1. If the fuse is good replace the box. If the fuse is blown, there may be a problem with the 3800 wire or the Tag lift. If LED 1 (YELLOW) is not on, replace the control box.</p>	 <p><b>REFER TO MP85.040C</b></p>  <p><b>REFER TO MP75.050C</b></p>

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# TROUBLE SHOOTING

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## AUTOMATIC LEVELING

**Part 8 Automatic Leveling Procedures and Diagnostics.** Push the "LEVEL" (AIR) button once to turn the panel on. Push the "LEVEL" button a second time. This will start the automatic leveling process. The system will attempt to level the vehicle by lowering the high side and/or end of the vehicle (opposite side/end of lit yellow level indicators). If a pair of "LOWER" valves are on continuously for 45 seconds, the system will attempt to finish leveling by raising the low side or end of the vehicle (lit yellow level indicators). Once the system is in the raise mode it will not try to lower the vehicle again in that leveling sequence. If the front or rear of the vehicle is being lowered, and a pressure switch for that end comes on indicating low air pressure, the system will stop lowering the vehicle and go immediately into raise mode. It will not wait for the 45 second timer.

When all yellow level indicators are out the "LEVELING SYSTEM ACTIVE LIGHT" will stop flashing and start pulsating dimly. The system is now in the sleep mode. There is no delay between the yellow lights going out and the SYSTEM ACTIVE light pulsating dimly. The ignition key can be turned off. The SYSTEM ACTIVE light will continue to pulsate for 10 minutes. At that time the panel will turn off but the system will remain in the SLEEP mode.

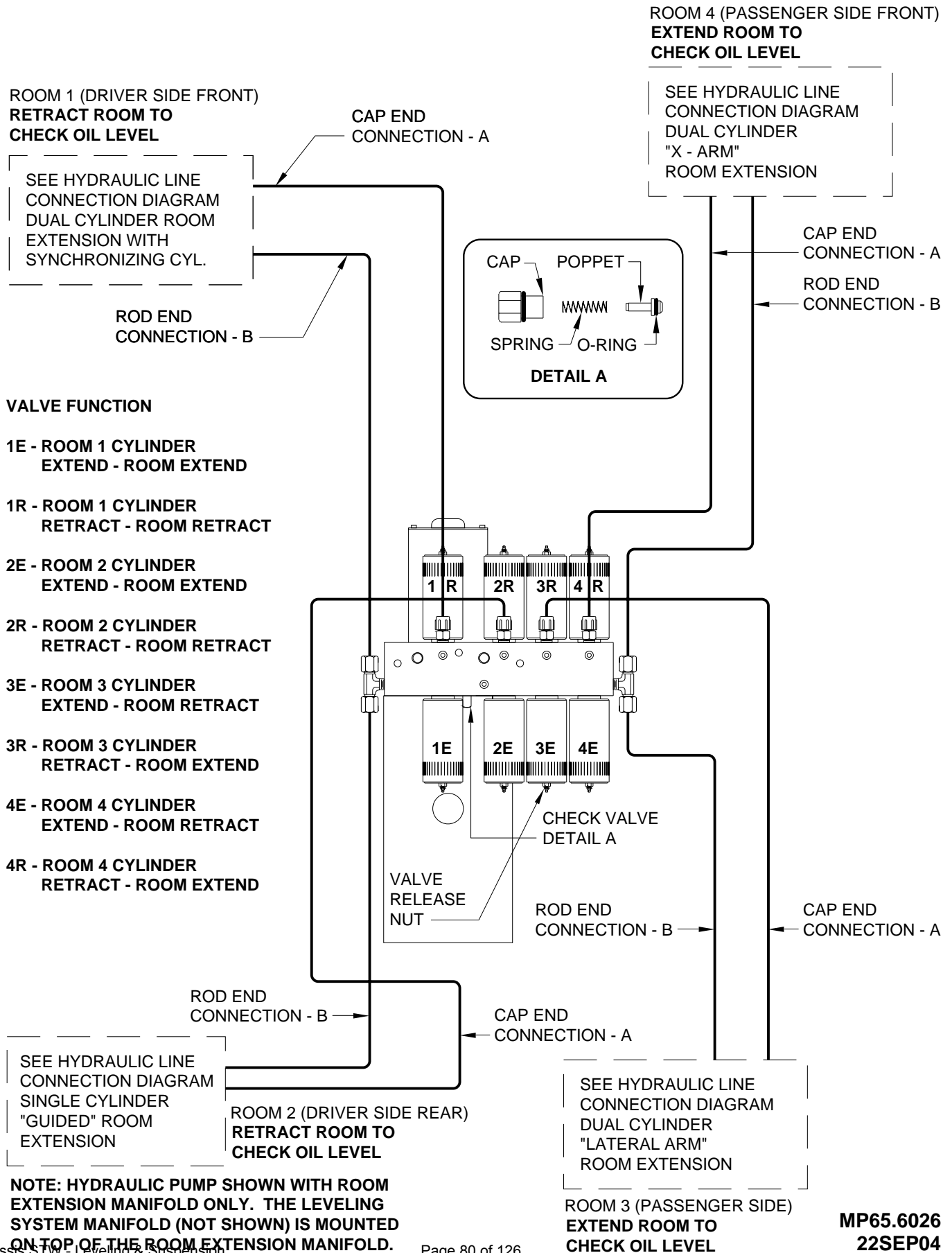
**SLEEP MODE:** After all yellow lights have gone out, the system may be turned off or left in the SLEEP MODE. In the SLEEP MODE the touch panel will be off but the processor will check the level sensing unit every half hour. If an input for a yellow level indicator is on continuously for 1 minute, the processor will wake up the system, turn the touch panel on and relevel the vehicle according to lit yellow indicators. The system will attempt to level the vehicle by first lowering, then raising the vehicle as necessary. When a level position is achieved the system will return to the SLEEP MODE with the touch panel turning off 10 minutes after leveling is achieved.

**EXCESS SLOPE:** During any leveling sequence, if a level position is not achieved, the EXCESS SLOPE light will come on. EXCESS SLOPE is when any pair of raise valves have been on continuously for 15 minutes. 10 minutes after the EXCESS SLOPE light comes on the panel will turn off if the ignition is off. Any time the ignition is turned on the EXCESS SLOPE light will come on until the "TRAVEL" button is pushed, the Park Brake is released if the ignition is on, or the vehicle is leveled using manual air leveling.

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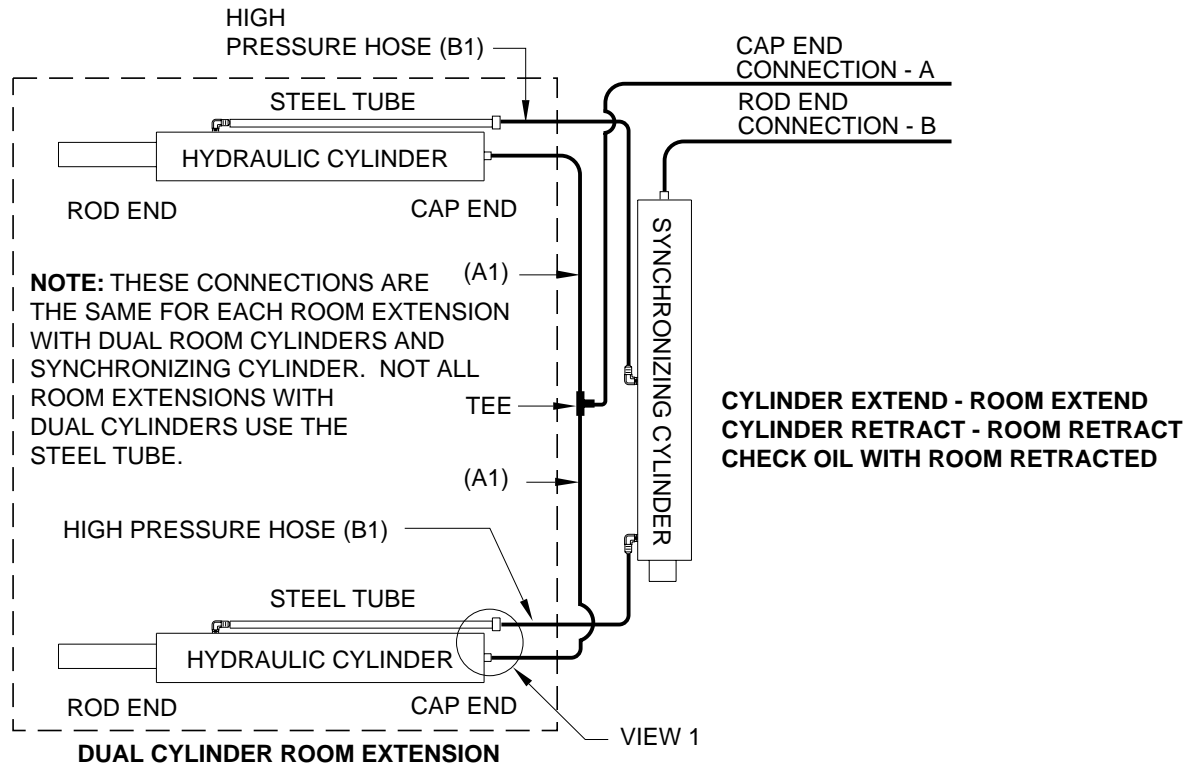
**If the leveling system does not operate properly in the Automatic mode, recheck the system in the Manual mode starting with Part 1. If the system works properly in the Manual Mode, it should work in the Automatic mode. After rechecking the system, if it works manually but not automatically, contact HWH customer service for assistance.**

## HYDRAULIC LINE CONNECTION DIAGRAM MULTIPLE EXTENSIONS



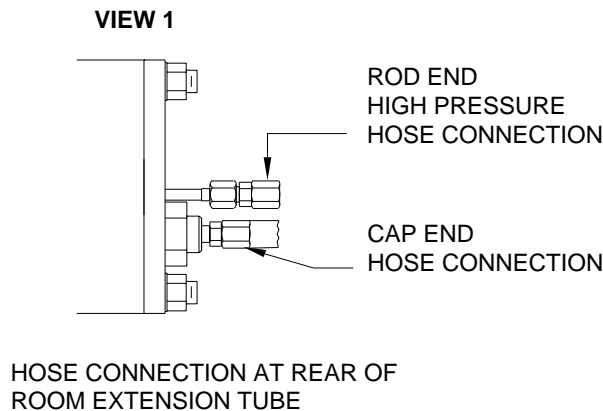


# CYLINDER CONNECTION DIAGRAM DUAL CYLINDER ROOM EXTENSIONS (WITH SYNCRONIZING CYLINDER)



**IMPORTANT:** THE LINES (A1) BETWEEN THE CAP END OF THE HYDRAULIC CYLINDERS AND THE TEE MUST BE THE SAME LENGTH AND DIAMETER. THE LINES (B1) BETWEEN THE ROD END OF THE HYDRAULIC CYLINDERS AND THE SYNCRONIZING CYLINDER MUST BE THE SAME LENGTH AND DIAMETER. THE B1 LINES MUST BE HIGH PRESSURE HOSE.

**NOTE:** DIFFERENT TYPES OF HOSE, ESPECIALLY HIGH PRESSURE HOSE, HAS BEEN USED. THE PRINTING ON A 1/8" OR 3/16" HOSE BEING REPLACED MUST MATCH THE ORIGINAL HOSE. ALL HWH 1/4" HOSE IS THE SAME.



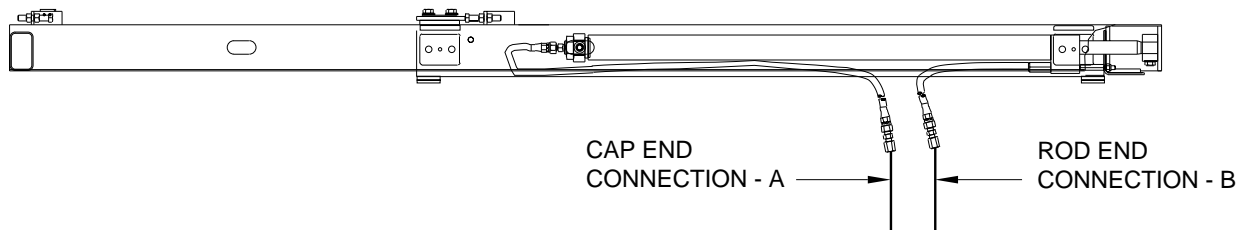
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## HYDRAULIC LINE CONNECTION DIAGRAM

### REAR SINGLE CYLINDER "GUIDED" ROOM EXTENSION

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**NOTE:** THE ROD END CONNECTION FROM THE MANIFOLD TO THE ROOM CYLINDER IS ALWAYS PRESSURIZED.



**CYLINDER EXTEND - ROOM EXTEND  
CYLINDER RETRACT - ROOM RETRACT  
CHECK OIL LEVEL WITH ROOM RETRACTED.**

The diagram illustrates a hydraulic synchronizing system for two vertical cylinders. A central horizontal component, labeled "SYNCHRONIZING CYLINDER", is connected to two vertical cylinders. The left vertical cylinder is labeled "ROD END CONNECTION - B" and the right vertical cylinder is labeled "CAP END CONNECTION - A". The synchronizing cylinder has two ports: "B ROD END" and "A CAP END". The left vertical cylinder has two ports: "B ROD END" and "A CAP END". The right vertical cylinder has two ports: "A CAP END" and "B ROD END". The diagram shows the hydraulic lines connecting these ports. The lines from the "B ROD END" of both vertical cylinders connect to the "B ROD END" of the synchronizing cylinder. The lines from the "A CAP END" of both vertical cylinders connect to the "A CAP END" of the synchronizing cylinder. The diagram also includes two callouts: (A) HOSES MUST MAINTAIN EQUAL LENGTH AND DIAMETER. and (B) HOSES MUST BE HIGH PRESSURE HOSES OF EQUAL LENGTH AND DIAMETER.

(A) HOSES MUST MAINTAIN EQUAL LENGTH AND DIAMETER.

(B) HOSES MUST BE HIGH PRESSURE HOSES OF EQUAL LENGTH AND DIAMETER.

SYNCHRONIZING CYLINDER

ROD END CONNECTION - B

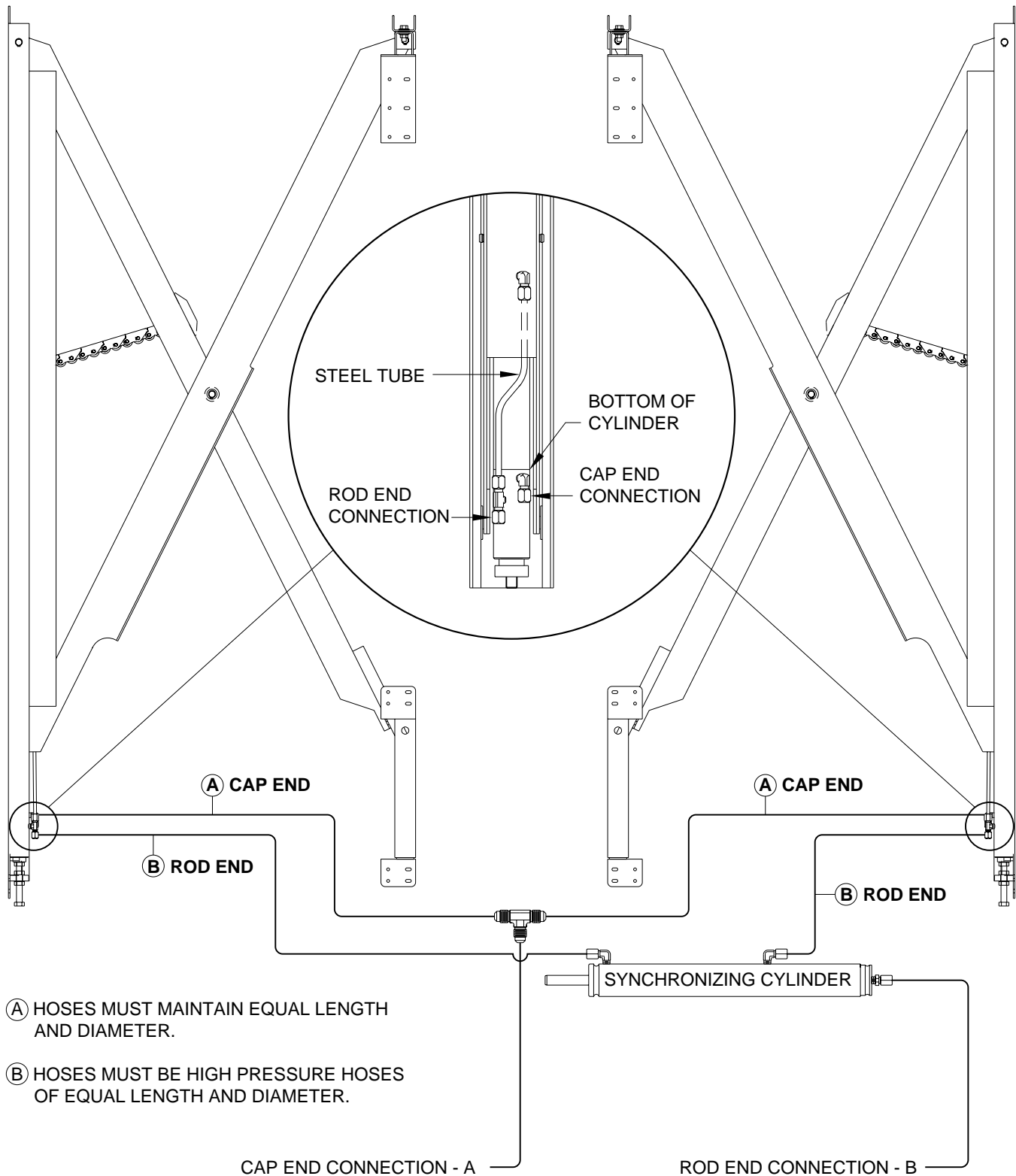
CAP END CONNECTION - A

## Chassis STW - Leveling & Suspension

# HYDRAULIC LINE CONNECTION DIAGRAM

## X-SLIDE ROOM EXTENSION

### (WITH SYNCHRONIZING CYLINDER)

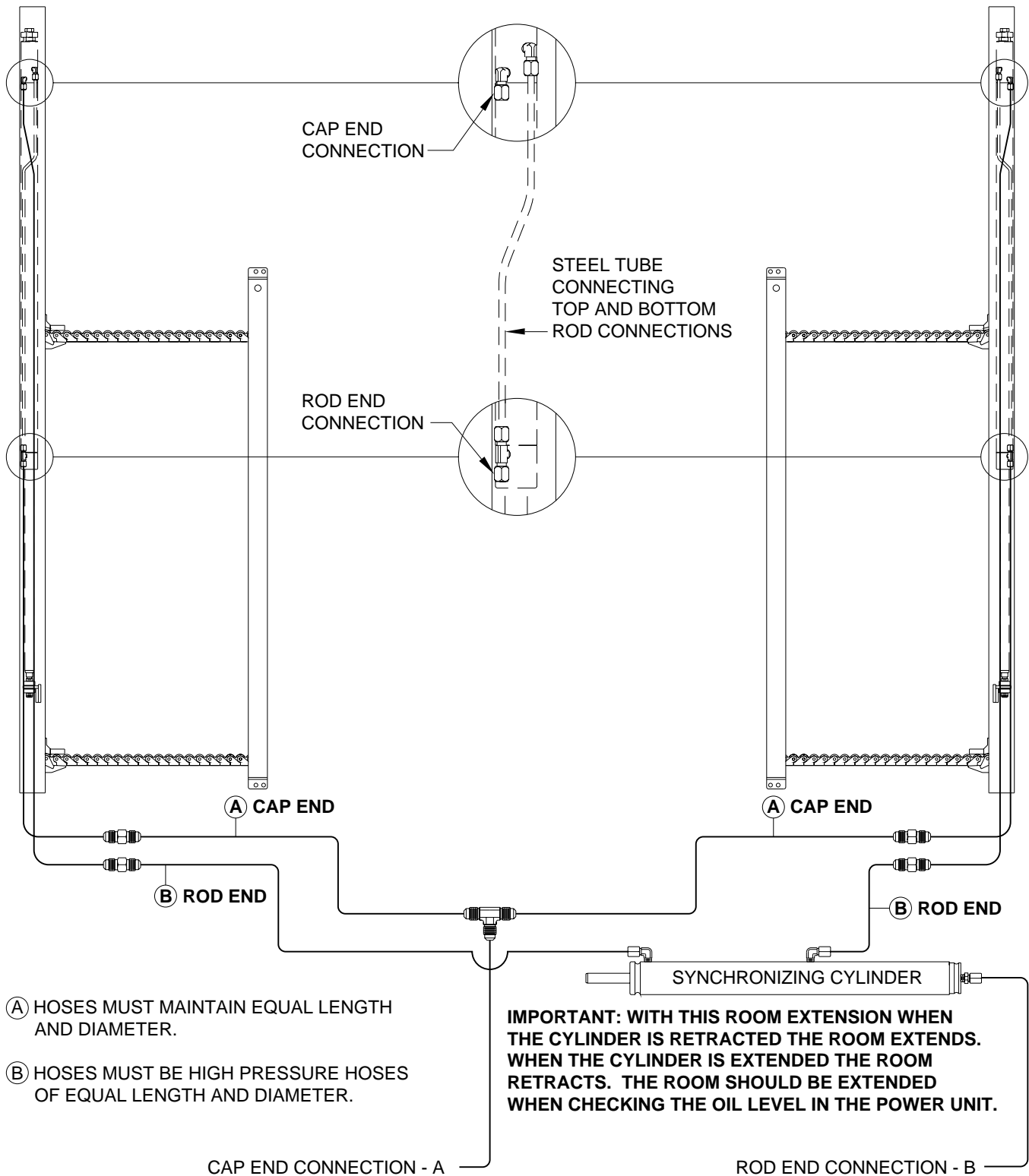


**CYLINDER EXTEND - ROOM RETRACT**  
**CYLINDER RETRACT - ROOM EXTEND**  
**CHECK OIL LEVEL WITH ROOM EXTENDED**

# HYDRAULIC LINE CONNECTION DIAGRAM

## UNIVERSAL (USO) ROOM EXTENSION

### (WITH SYNCHRONIZING CYLINDER)



**CYLINDER EXTEND - ROOM RETRACT**  
**CYLINDER RETRACT - ROOM EXTEND**  
**CHECK OIL LEVEL WITH ROOM EXTENDED**

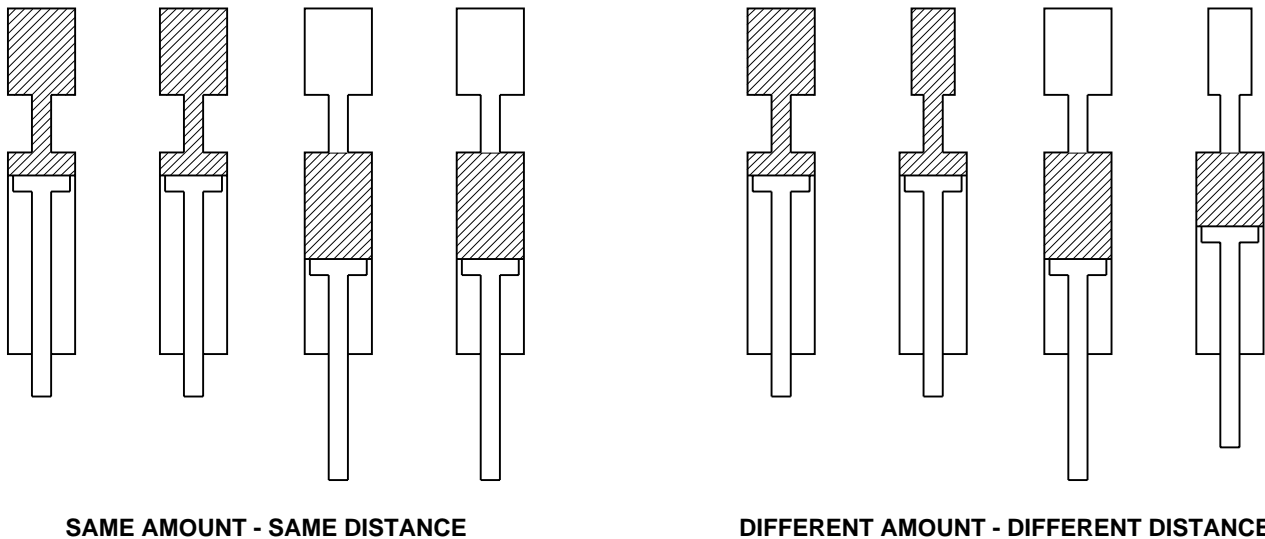
**MP65.945D**  
**30SEP05**

## HWH SYNCHRONIZING CYLINDER

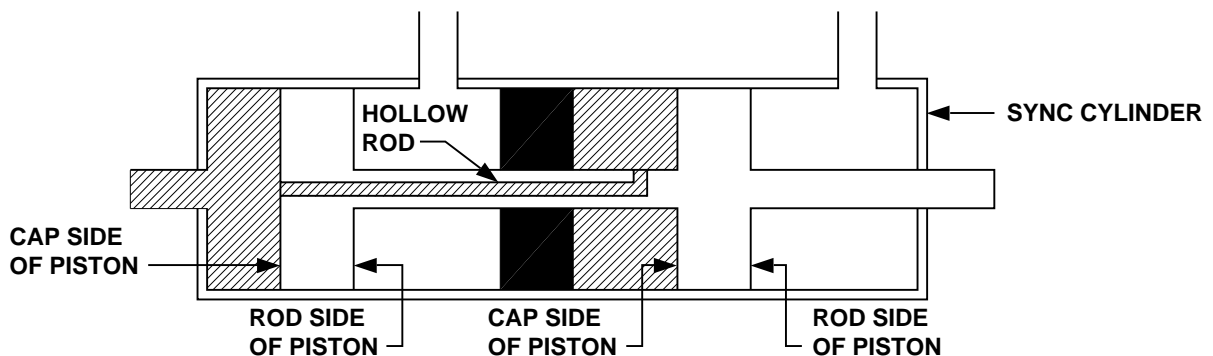
The synchronizing cylinder is used in most multiple cylinder room extension mechanisms manufactured by HWH Corporation. The cylinder is most often referred to as the SYNC cylinder. **The purpose of the sync cylinder is to keep all the cylinders in a mechanism moving at the same speed.**

There are many issues that can have an effect on the movement of a room extension. Trying to make two cylinders move at the same speed, even when not attached to anything, can be difficult. Adding a room to the equation compounds these issues. Hose size and routing techniques can cause problems. The weight of the room from end to end or top to bottom is a major problem. Even the manufacturing of the cylinders due to manufacturing tolerances will create problems. Other things such as room seals or wipers and room awnings will add to the problem.

The theory behind the sync cylinder is really very simple. If you make the same volume of fluid move at the same rate of flow to or allow coming from the each cylinder in the mechanism, all cylinders in that mechanism have to move the same distance at the same speed. The hydraulic property that allows this to be possible is that fluid, for practical purposes, cannot be compressed. **If you put the exact same volume of fluid into each cylinder of the exact same diameter, those cylinders will move the exact same distance. If the fluid is put in the cylinders at the same rate of flow, those cylinders will move at the same speed.**



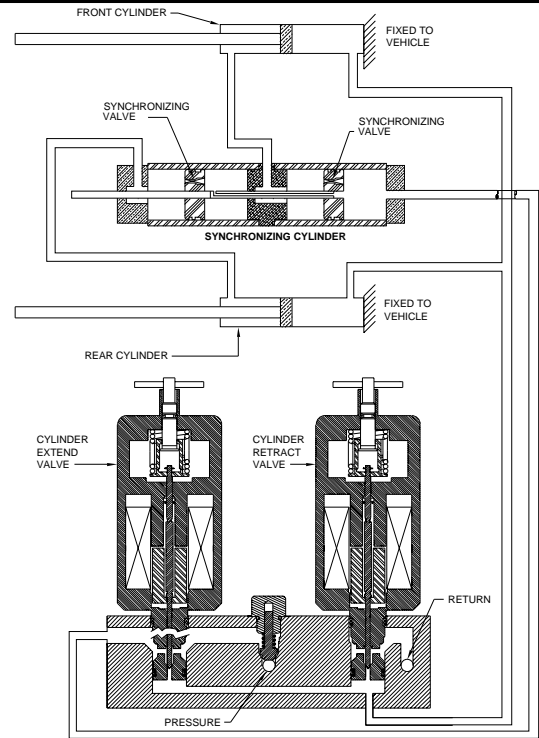
The sync cylinder is actually several cylinders all tied together in one unit. There is one cylinder or chamber in the sync cylinder for each room mechanism cylinder. There is a piston in each chamber to move the fluid. The pistons are tied together with a rod. When one piston moves, the other piston has to move the exact same distance at the same speed. The "cap" sides of the sync cylinder pistons are tied together hydraulically. The rods connecting the pistons are hollow, which allows fluid to flow, to or from the cap sides of the sync cylinder pistons. The rod sides of the sync cylinder pistons are isolated. **When the sync cylinder moves, the same volume of fluid has to move to or from the rod sides of the sync cylinder. The room mechanism cylinders have to move the same distance at the same speed.**



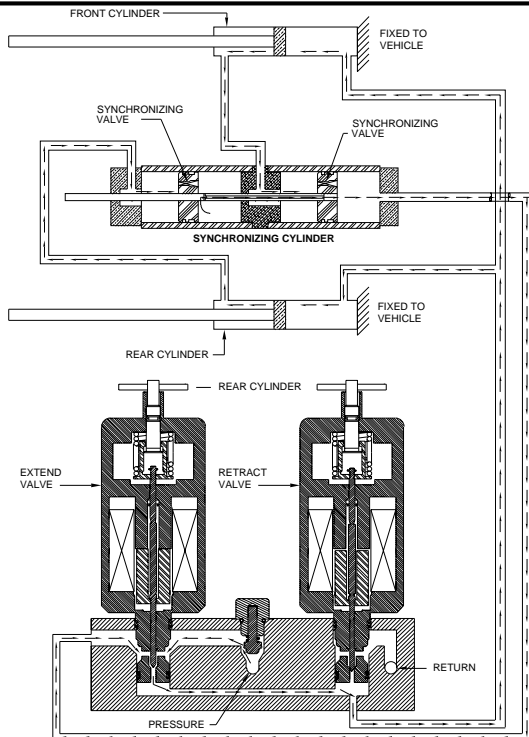
# HWH SYNCHRONIZING CYLINDER

Note the sync cylinder is connected to the rod end of the room cylinders. When the room cylinders are extended, fluid is forced from the rod end on the room cylinders to the sync cylinder. The sync cylinder retracts as the room cylinders extend. When the room cylinders are retracted, the manifold directs fluid to the cap end of the sync cylinder. The sync cylinder pushes fluid to the rod end of the room cylinders. This retracts the room cylinders. **The sync cylinder extends when the room cylinders are retracting.**

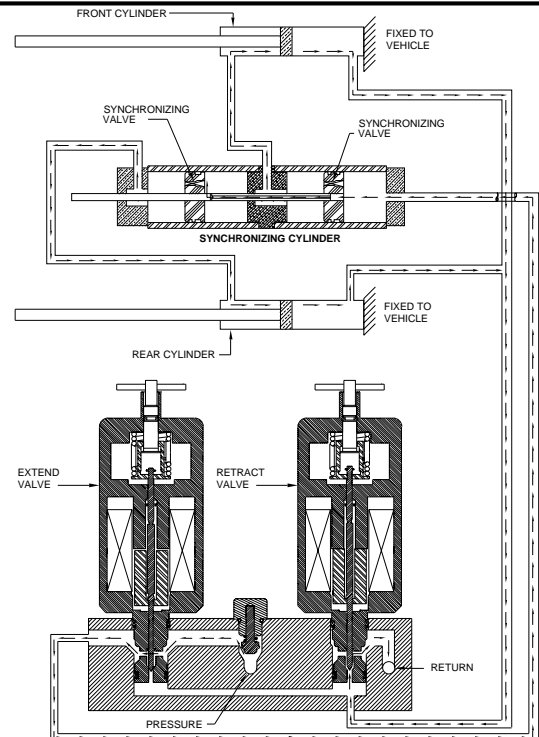
HYDRAULIC FLOW DIAGRAM  
VERTICAL ARM OR DUAL CYLINDER ROOM EXTENSION  
WITH SYNCHRONIZING CYLINDER  
STATIONARY POSITION



HYDRAULIC FLOW DIAGRAM  
VERTICAL ARM OR DUAL CYLINDER ROOM EXTENSION  
WITH SYNCHRONIZING CYLINDER  
EXTEND POSITION

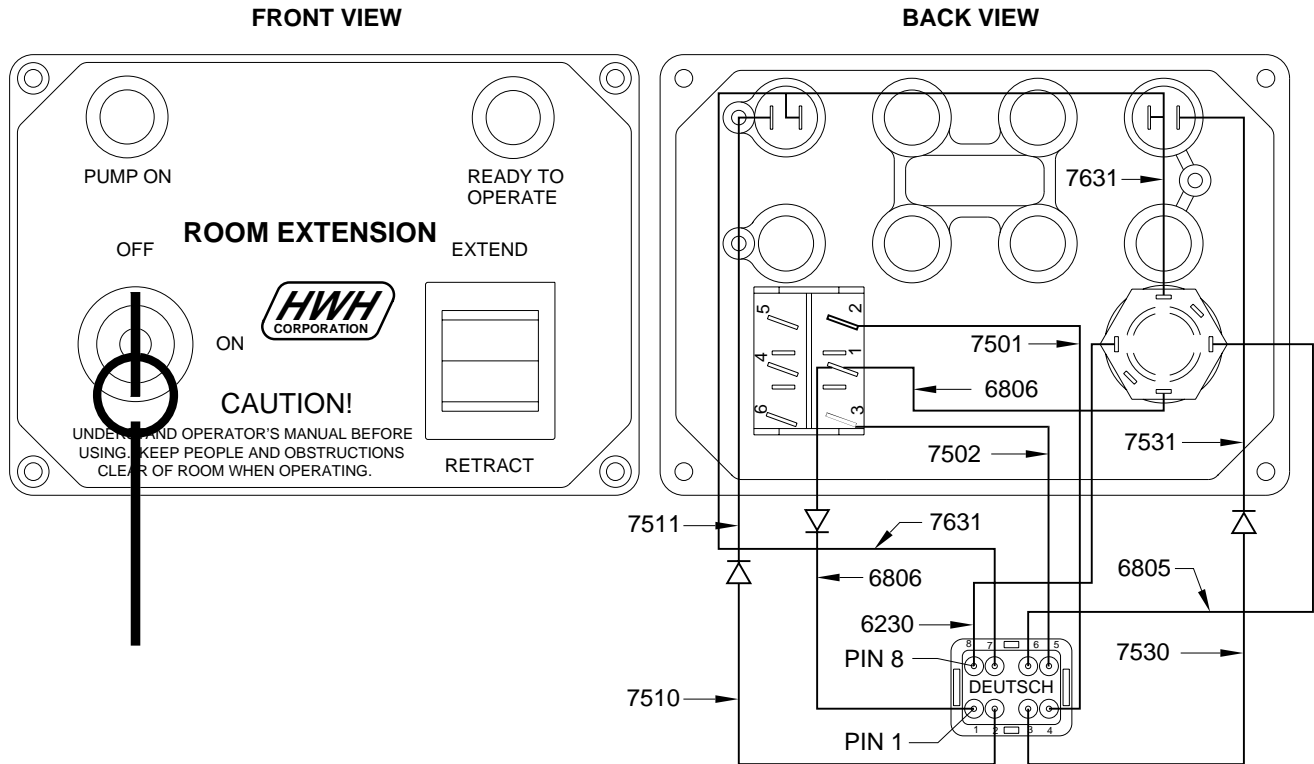


HYDRAULIC FLOW DIAGRAM  
VERTICAL ARM OR DUAL CYLINDER ROOM EXTENSION  
WITH SYNCHRONIZING CYLINDER  
RETRACT POSITION



# ELECTRICAL CONNECTION DIAGRAM

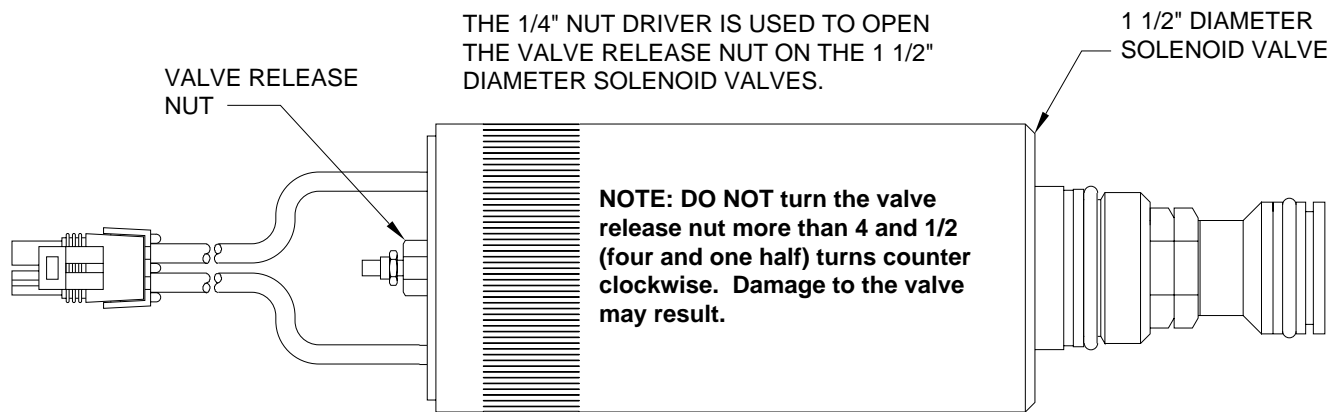
## ROOM EXTENSION PANEL



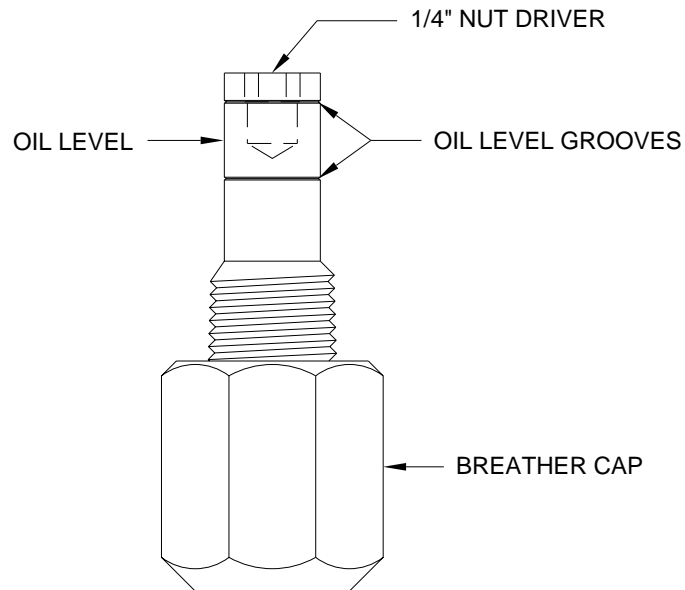
CONNECTOR PIN #	WIRE NUMBER	WIRE DESCRIPTION AND FUNCTION
1	6806	SWITCHED +12 FROM KEY SWITCH FOR ROOM CONTROL SWITCH
2	7510/7511	READY TO OPERATE LIGHT CONTROL WIRE SWITCHED +12V
3	7530/7531	PUMP ON LIGHT CONTROL WIRE SWITCHED +12
4	7501	ROOM EXTEND - SWITCHED +12V FROM ROOM CONTROL SWITCH
5	7502	ROOM RETRACT - SWITCHED +12V FROM ROOM CONTROL SWITCH
6	6805	SWITCHED +12V TO ROOM PANEL KEY SWITCH
7	7631	SWITCHED GROUND FROM ROOM PANEL KEY SWITCH FOR PANEL INDICATOR LIGHTS AND SYSTEM WAKE UP
8	6230	GROUND SUPPLY FOR ROOM PANEL KEY SWITCH



## BREATHER CAP - DIPSTICK - 1/4" NUT DRIVER



**NOTE: THE BREATHER CAP IS LOCATED ON THE TOP SIDE OF THE POWER UNIT RESERVOIR.**



**IMPORTANT: PRIOR TO REMOVING THE BREATHER CAP, EITHER TO CHECK THE OIL LEVEL OR TO USE THE 1/4" NUT DRIVER, CLEAN ANY DEBRIS FROM THE TOP OF THE RESERVOIR. BEFORE RETURNING THE BREATHER CAP TO THE RESERVOIR, REMOVE ANY PAINT CHIPS OR OTHER DEBRIS FROM THE DIPSTICK INCLUDING DEBRIS INSIDE THE 1/4" NUT DRIVER.**

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## HWH Latching Raise and Dump Feature – Pre 2008 (with VIM)

HWH leveling system provides the ability to temporarily adjust the height, up or down, of a coach thus allowing the operator to avoid obstacles, either on the ground or above the coach, encountered during low speed maneuvers.

Below is a brief description of how the latching, raise & dump feature on the HWH control board works, and what is needed to incorporate this feature, now available on all coaches that use the HWH Part No. AP22070 boards (HWH500 Series).

In the past manual dump and raise actions have been momentary functions. All current HWH AP22070 Leveling Control Boards contain the logic and wiring necessary to latch and hold any manual height adjustments made at the control panel. In order to provide for this feature an output from the transmission must be used in conjunction with a relay.

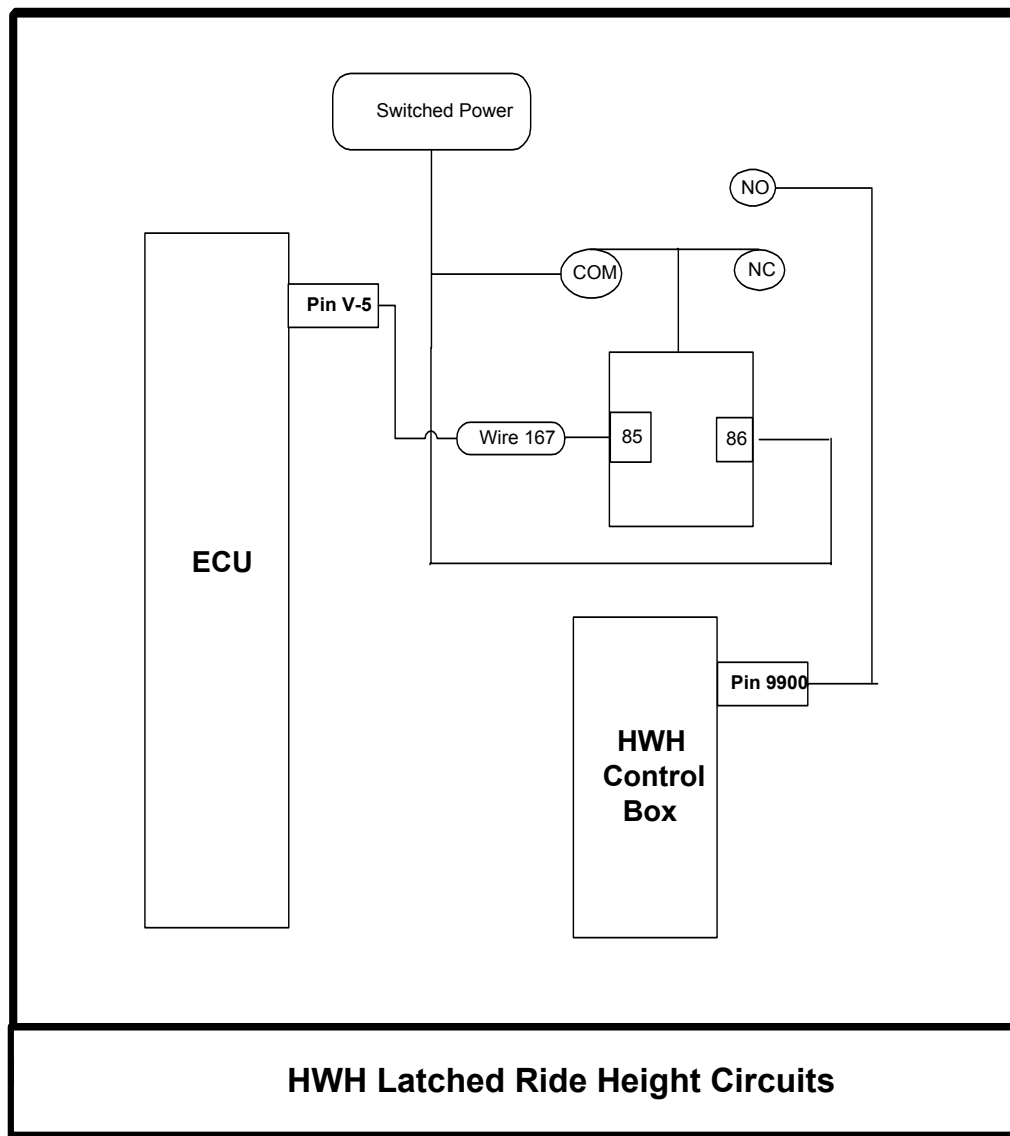
This procedure will require splicing into the transmission output wire (V-5) (Pin V), wire no. 167 (White), in the VIW-V connector loom, located in the front steering compartment, running this wire to terminal 85 of a high quality SPDT Relay. Pin 87 of the relay is then wired to pin 9900 of the HWH control board. Pin 86 is connected to a 12 volt switched power source and jumpered to terminal 30 of the relay.

The system will operate as follows:

Below the programmed speed "set point", the transmission ECU output pin V-5 is open which allows the relay to apply a 12 volt signal to the HWH "Speed Switch - 9900" pin on the Leveling Control Board. This signals the leveling control board to allow manually adjusted heights to be latched without the operator holding either the raise or dump button. Above the programmed speed set-point, the V-5 pin is grounded, energizing the relay and removing the 12 volt signal from the 9900 pin, allowing the leveling controller to release the hold feature, returning the coach to normal (travel) ride height.

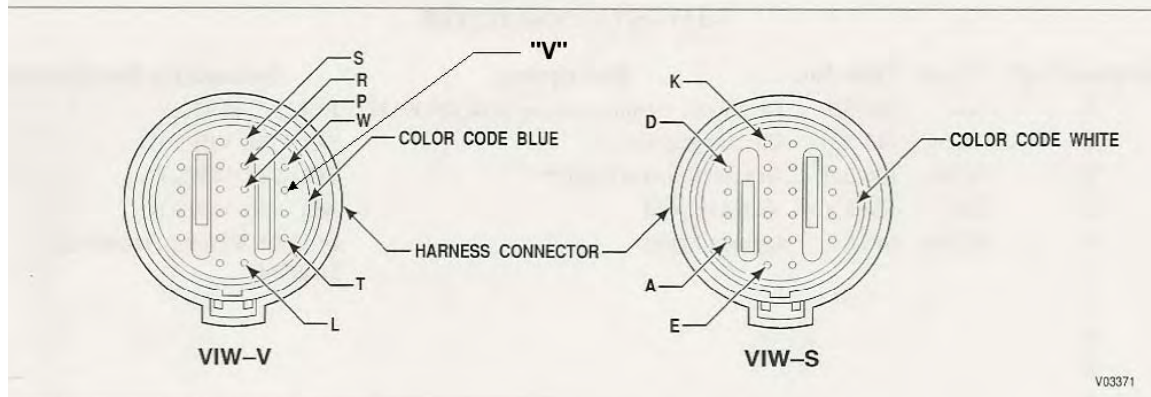
Programming the Transmission requires turning on the appropriate output and setting the speed at which the switching to ground will occur. This set point is calculated using transmission tail shaft RPM, differential gear ratio, and tire revolutions per mile (available from the tire manufacture). In this case a calculated set point for the recommended 15 MPH. will be 541 for the MAC products and 610 for the Allure.

The transmission harness output wire (V-5) used to signal the HWH control board terminates at the blue VIW-V connector in the front run board compartment at pin "V". See the included detail sheets for both the VIW Connector and the Harnesses.



Transmission Connector VIW-V and Harness showing wire 167

## APPENDIX D — WIRE/CONNECTOR CHART



V03371

Figure D-13. VIW Connector (Packard Micro Pack)

### VIW-V CONNECTOR

Terminal No.*	Color	Wire No.	Description	Termination Point(s)*
A	Green	155-V11	General Purpose Input 1	ECU-V11, VIWV-A
B	Yellow	153-V12	General Purpose Input 2	ECU-V12, VIWV-B
C	Blue	118-V13	General Purpose Input 3	ECU-V13, VIWV-C
D	White	154-V27	General Purpose Input 5	ECU-V27, VIWV-D
E	Green	105-V19	General Purpose Output 5	ECU-V19, VIWV-E
F				
G				
H				
J				
K				
L	Yellow	161-V31	Digital Ground (GPI)	ECU-V31, VIWV-L
M	Blue	179-V9	Engine Water Temperature	ECU-V9, VIWV-M
N	Green	135-V24	Analog Ground	ECU-V24, TPS-A, VIWV-N
P	Green	117-V30	General Purpose Input 8	ECU-V30, VIWV-P
R	Orange	178-V28	General Purpose Input 11	ECU-V28, VIWV-R
S	Tan	177-V14	General Purpose Input 10	ECU-V14, VIWV-S
T				
U	Orange	137-V29	General Purpose Input 7	ECU-V29, VIWV-U
V	White	167-V5	General Purpose Output 8	ECU-V5, VIWV-V
W				

## **Checking & Adjusting the HWH Leveling Disc.**

---

01. Verify the current leveling adjustment by placing the coach in an off level condition with the HWH touch pad. If the coach has a slide out room, extend the room fully.
02. Place a bubble level on the floor directly in front of the refrigerator or on a level edge of the refrigerator cabinet.
03. Initiate an auto level sequence on the HWH touch pad.
04. Once the sequence is complete, check the bubble level and note the low points. It will be necessary to move the level to three different tiles or wood planks to get an average level.
05. If an adjustment is necessary, access the level disc on Intrigues and Allures in the second storage bay passenger side on the ceiling between the frame rails. On Magna, Affinity and Concepts, the disc is located on the ceiling in the electrical compartment . In Prevost buses, the Disc is located on the floor in the generator bay behind the wall access panel.
06. The disc is adjusted by tightening or loosening the three spring loaded mount screws.
07. Loosen the disc mount screws which correspond to the coaches low points. Adjustments are made in 1/4" turn increments. Retest the system in the same manner until the coach is level.

# Country Coach Ride Height Specifications

## BACKGROUND:

Accurate ride height settings and maintenance are critical to proper coach operation.

Industry standard definition of Ride Height is the vertical distance between the center of the wheel and the bottom of the frame rail over top of the axle.

Since this theoretical dimension is never easy to measure, other corresponding measurements are given to easily set the suspension to the position that the theoretical specification dictates.

All late model Country Coaches use a tripod arrangement of three height control valves: with one valve controlling the front suspension, and two valves on the rear drive axle.

Tag axles are not individually set, but rather are regulated to correspond to the drive axle.

Ride Heights are given per the suspension used, regardless of the coach it is installed on.

## BASIC REQUIREMENTS:

- Coach tires are on a level even surface
- Tires and pressures correspond to the "Federal Tire Tag"
- Coach is loaded and fueled in a normal operating (traveling) state
- Leveling system is in the "**TRAVEL MODE**"
- Ignition key is "ON"
- Air system is pressurized to air governor cut out pressure

## PROCEDURE:

Follow procedure *Country Coach MPGENERAL82004 Ride Height Adjustment* procedure when setting ride height.

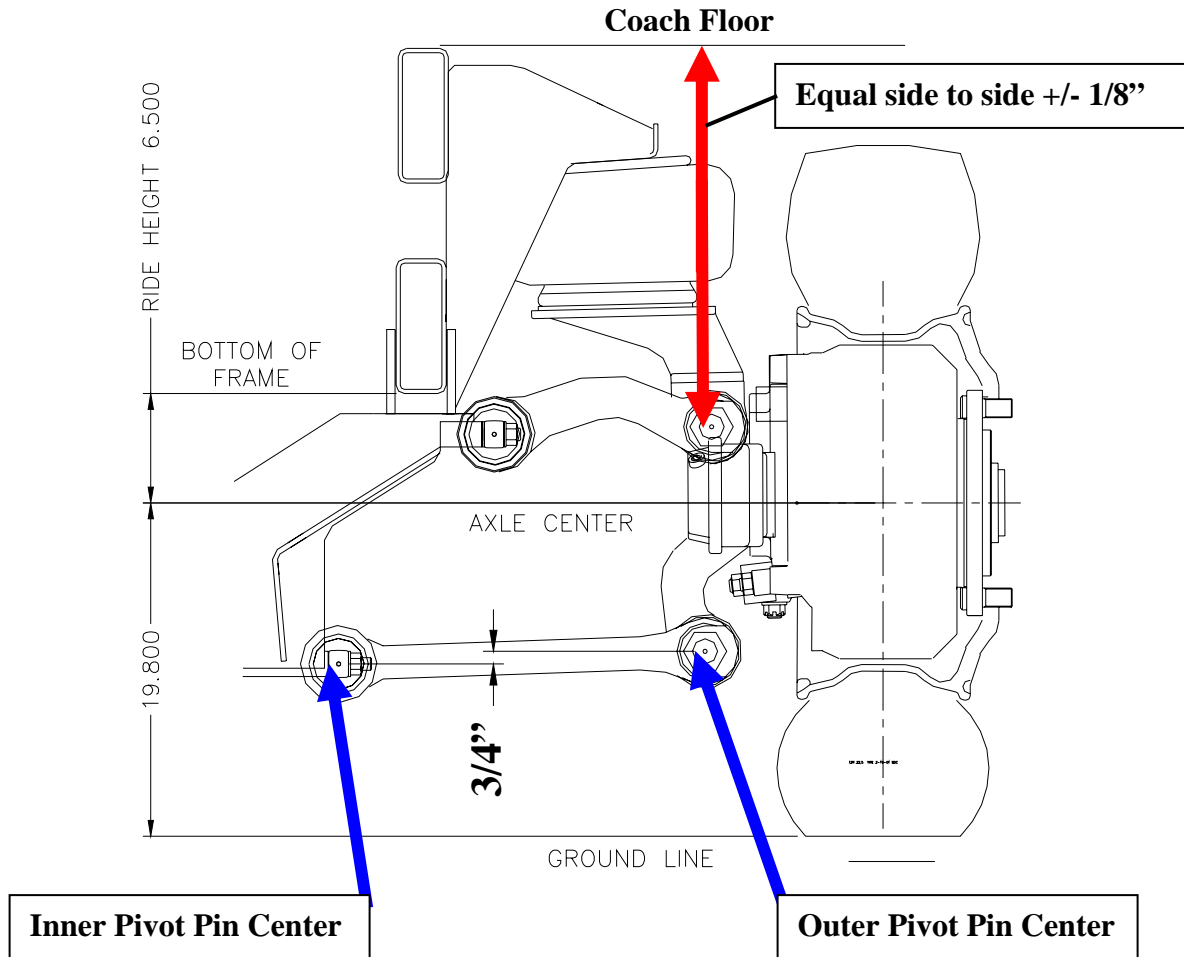
## INDEX:

Ridewell IFS 284 Suspensions	Page 2
Holland/Neway IFS-114-CC Independent Front Suspension	Page 3
Tuthill IFS1260 Front Suspension	Page 4
Tuthill IFS 1660S-SB Independent Front Suspension	Page 5
Liquid Spring IS200C IFS	Page 6
Neway AD-200 Drive Axle Suspensions	Page 7
Neway ADL-120 & ADL-123 Drive Axle Suspensions	Page 8
Tuthill RD2300 Rear Suspension	Page 9
Ridewell 227 Series Drive Axle Suspensions	Page 10
Ridewell 246 Series Two Air Spring - Drive/Tag Axle Suspensions	Page 11
Ridewell 246 Series Four Air Spring - Drive/Tag Axle Suspensions	Page 12
Ridewell 246 Series Four Air Spring - Drive/Steerable Tag Axle Suspensions	Page 13

# Country Coach Ride Height Specifications

## RIDEWELL IFS 284 SUSPENSION

As used on Magna, Affinity, Concept, Lexa



Looking Forward

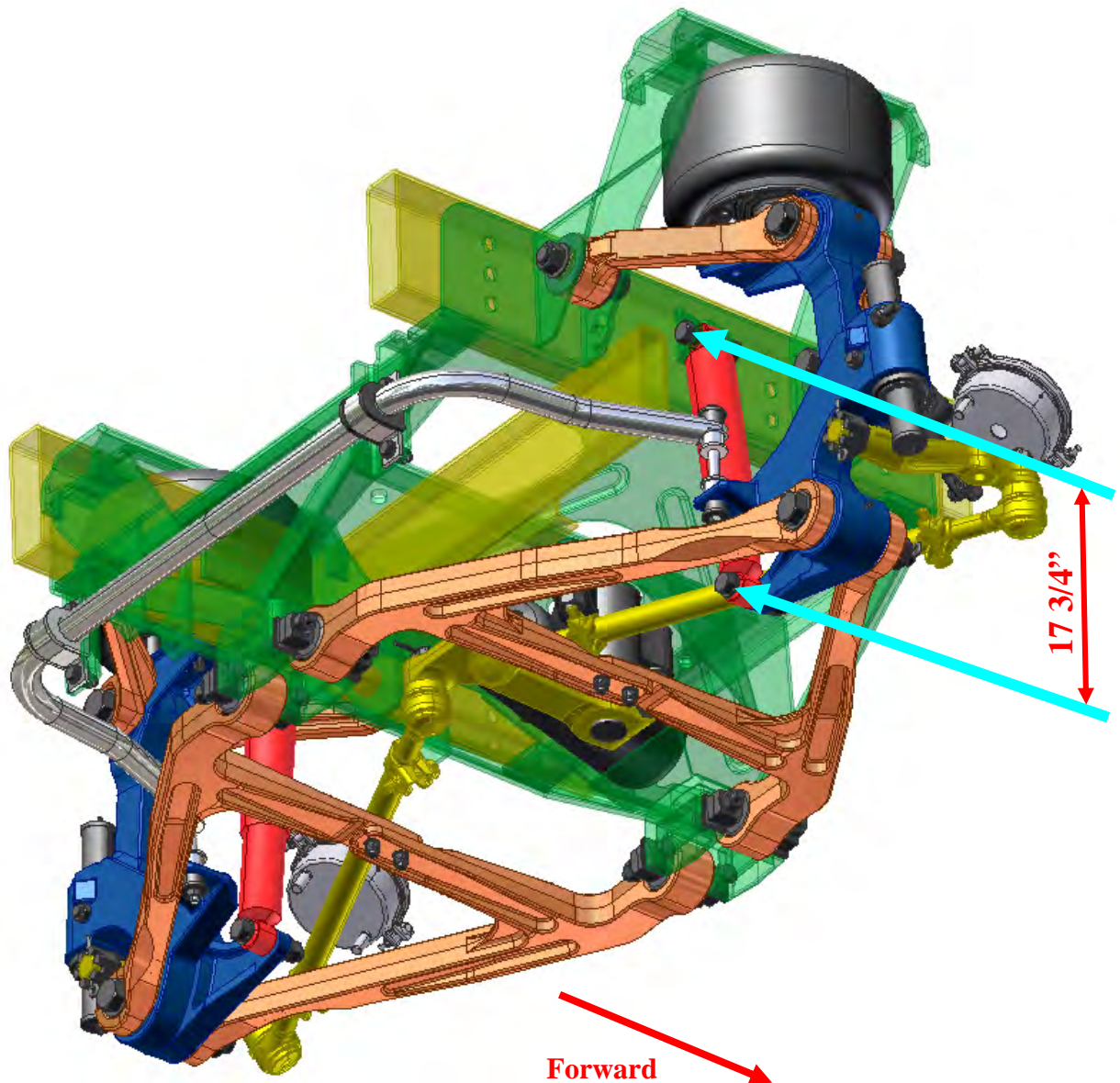
3/4 inch - Inner Pivot Pin Centers to Outer Pivot Pin Centers  
Floor Bottom to Upper Pivot Pin Center, Equal from Side to Side +/- 1/8"



# Country Coach Ride Height Specifications

## HOLLAND/NEWAY IFS-114-CC INDEPENDENT FRONT SUSPENSION

As used on some Tribute, Allure, Inspire, and Intrigue models

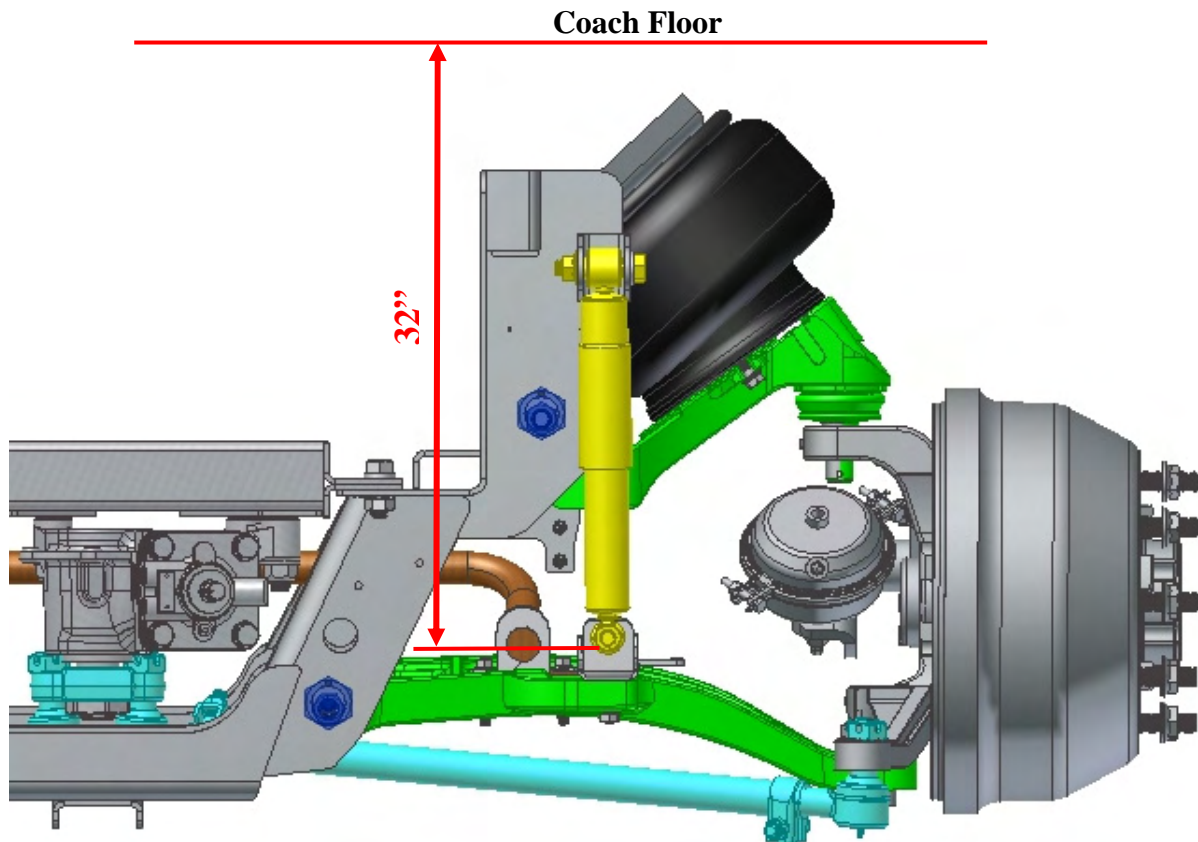


17 3/4 inch - Center-to-Center Front Shock Length  
Shock Length to be Equal from Side to Side +/- 1/16"

# Country Coach Ride Height Specifications

## TUTHILL IFS1260 FRONT SUSPENSION

As used on some Tribute models



Viewed from Front

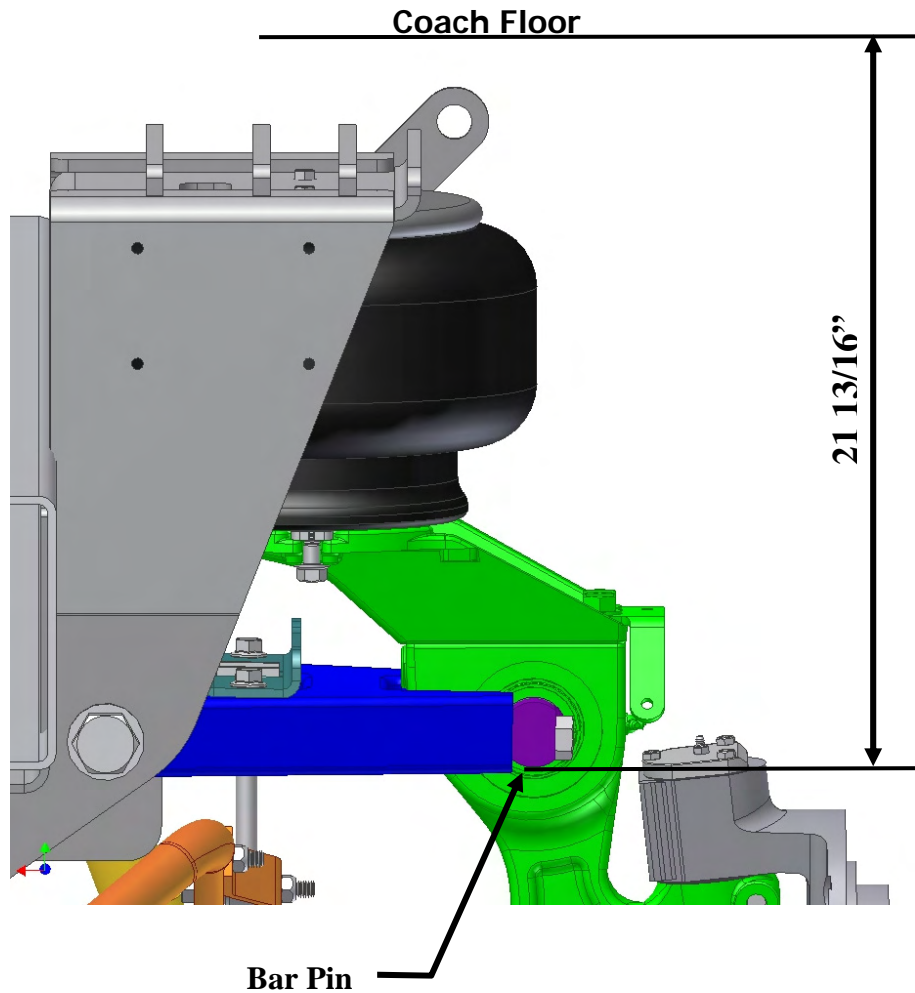
32" Bottom of Floor to Lower Quadrant of Lower Shock Bolt  
Measurement to be Equal from Side to Side  $\pm 1/16"$

This 32" dimension is for coaches equipped with Bilstein shocks installed with limit straps and for coaches equipped with Koni FSD gold shocks.

# Country Coach Ride Height Specifications

## TUTHILL IFS 1660-SB INDEPENDENT FRONT SUSPENSION

As used on some Intrigue and Allure models



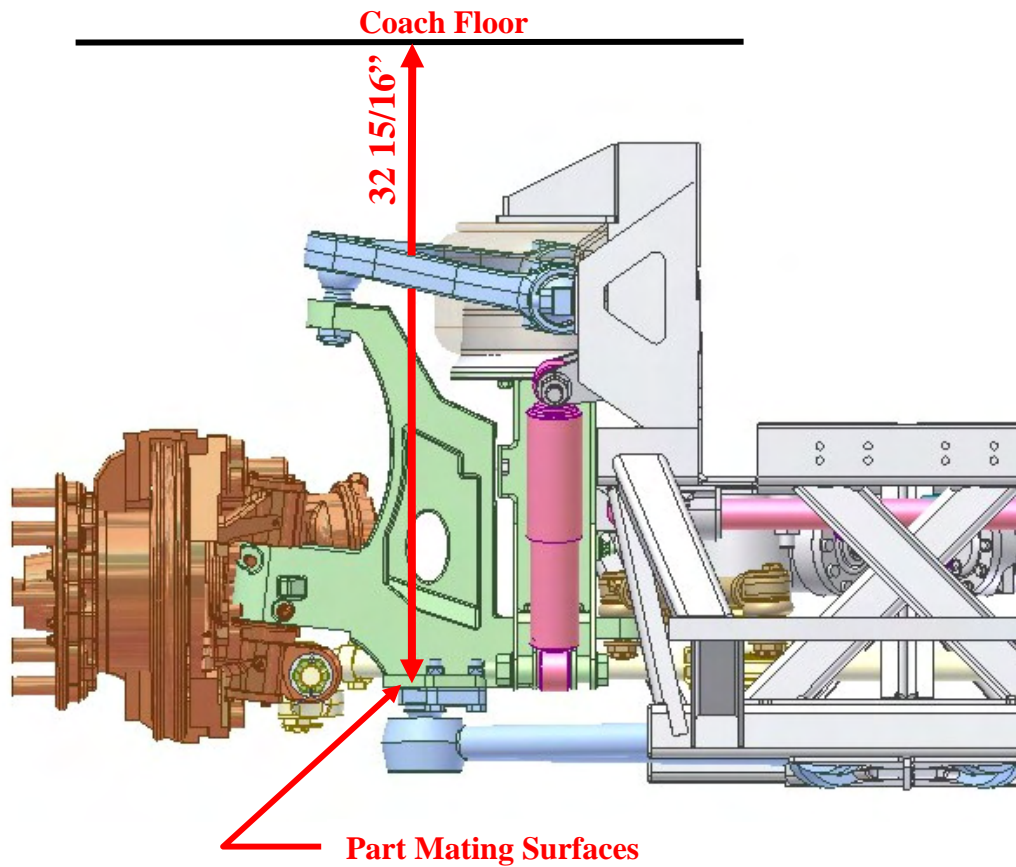
As viewed from the Front

21 13/16" from Bottom of Coach Floor to Lower Quadrant of Upper A-arm Bar Pin  
Measurement to be Equal from Side to Side +/- 1/16"

# Country Coach Ride Height Specifications

## LIQUIDSPRING IS002-C INDEPENDENT FRONT SUSPENSION

As used on Rhapsody models



As viewed from the Rear

$32 \frac{15}{16}"$  from Bottom of Coach Floor to Part Mating Surfaces  
Measurement to be Equal from Side to Side  $\pm 1/16"$

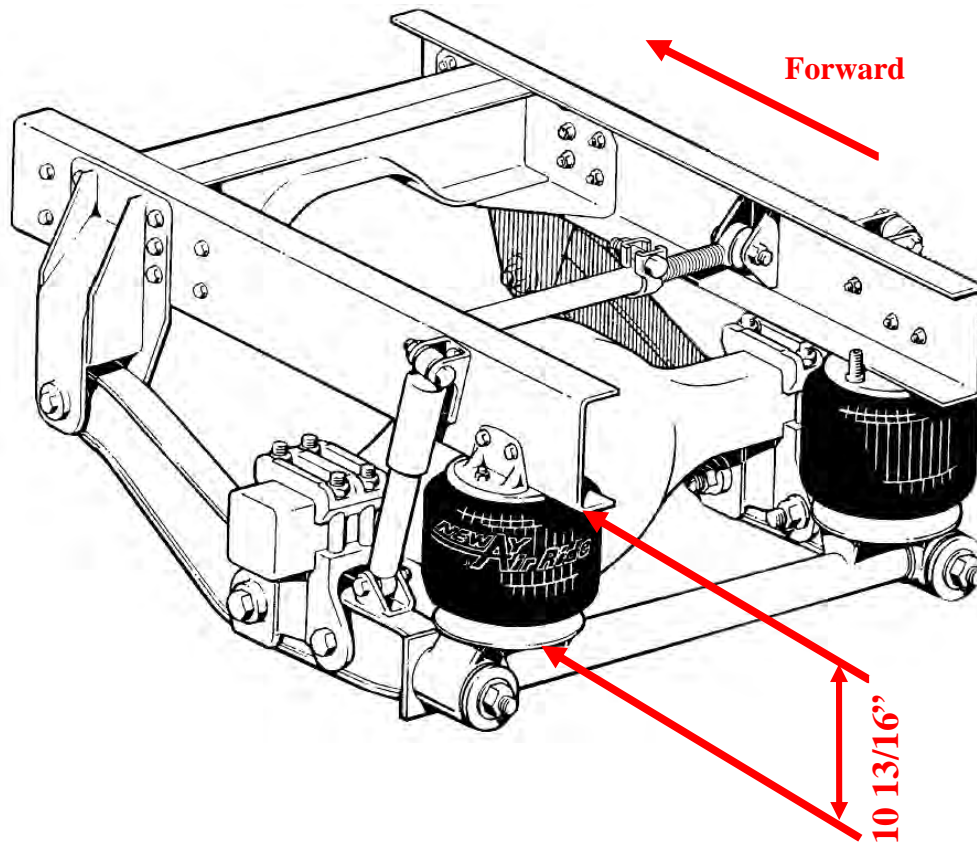
**IMPORTANT:** Measure to the floor **AHEAD** of the axle  
(The floor behind the axle may be stepped down)



# Country Coach Ride Height Specifications

## NEWAY AD-200 DRIVE AXLE SUSPENSION

As used on some Allure and Intrigue models



10 13/16 inches nominal- Bottom of Frame Rail to Bottom of Air Spring Piston

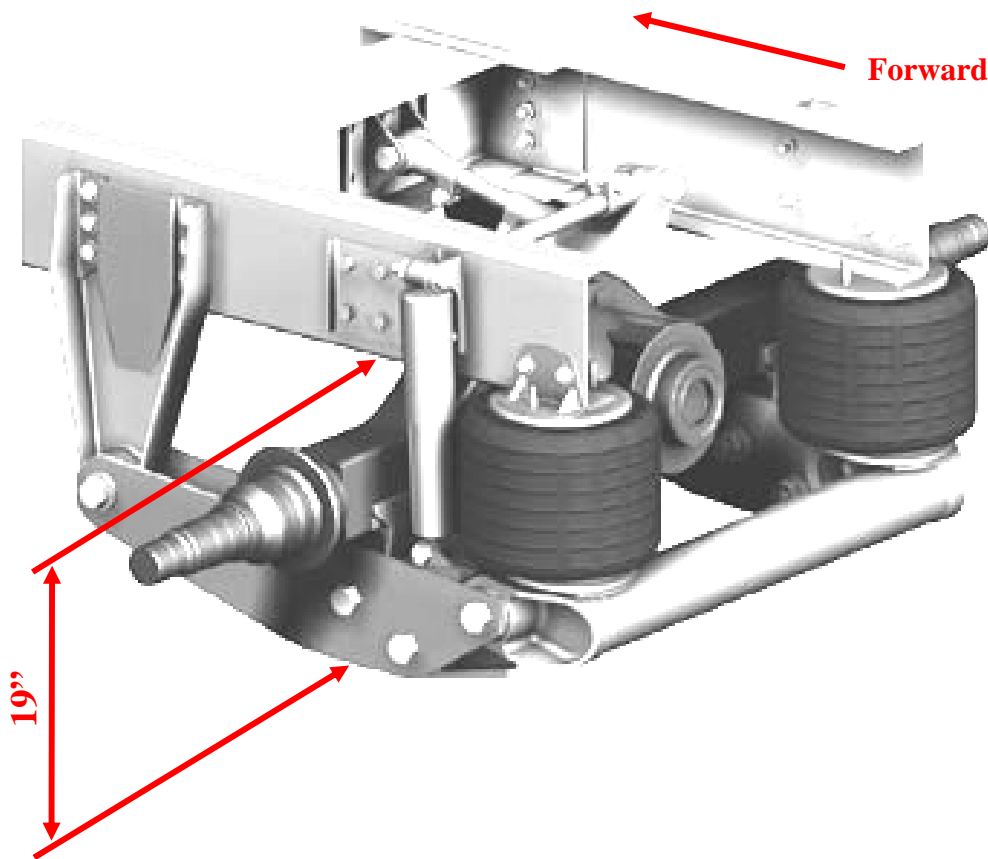
Measured vertically adjacent to, and behind of, the air spring  
Bottom of Frame Rail to Bottom of Air Spring Piston to average 10 13/16" between left and right side

Each side to be more than 10 3/8" and less than 11 13/16" as necessary to adjust front suspension to level

# Country Coach Ride Height Specifications

## NEWAY ADL-120 & ADL-123 DRIVE AXLE SUSPENSION

As used on some Allure, Inspire, and Tribute models.



19 inches nominal - Bottom Frame Rail to Bottom of Equalizing Beam near axle

Measured vertically adjacent to, and behind of, the axle tube

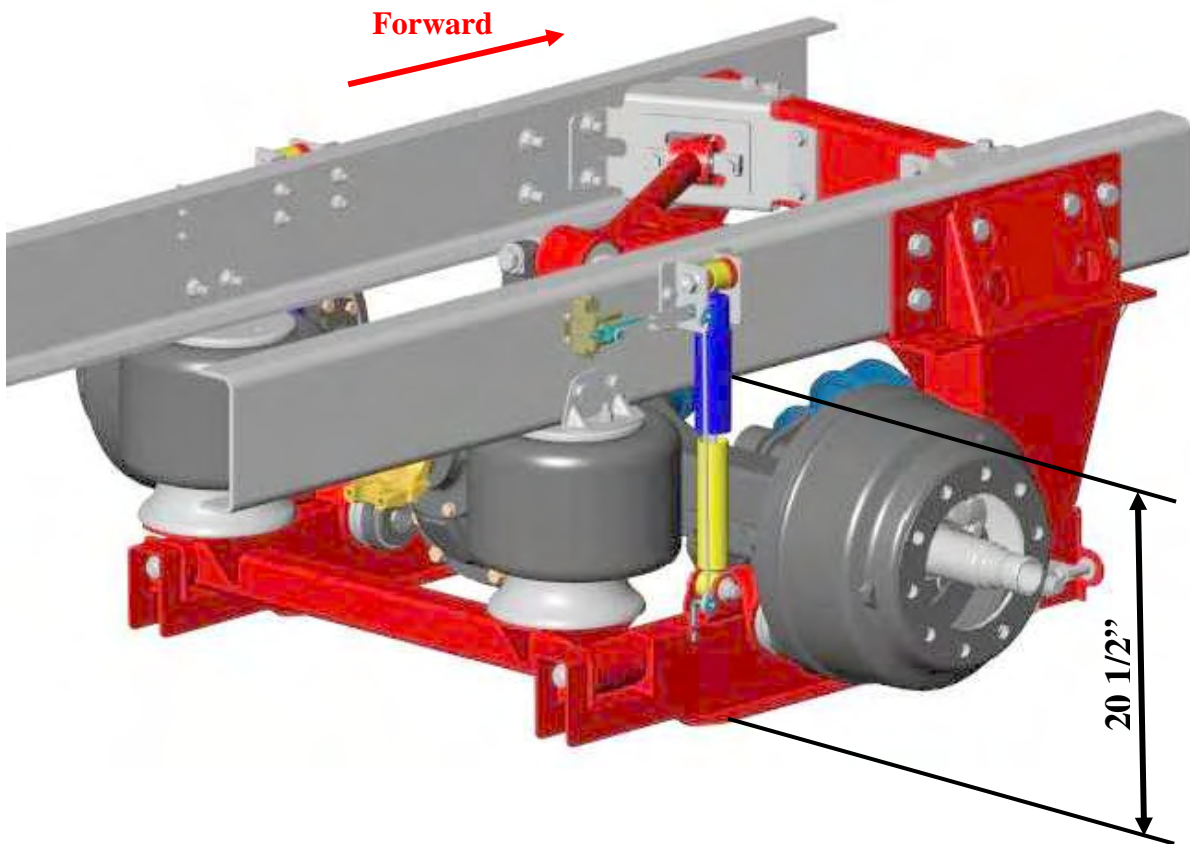
Bottom Frame Rail to Bottom of Equalizing Beam height to average 19" between left side and right side

Each side to be more than 18 1/2" and less than 19 1/2" as necessary to adjust front suspension to level

# Country Coach Ride Height Specifications

## TUTHILL RD2300 REAR SUSPENSION

As used on some Tribute models



20 1/2" Bottom of Frame Rail to Bottom of Equalizing Beam

Measured vertically just rearward of drive axle

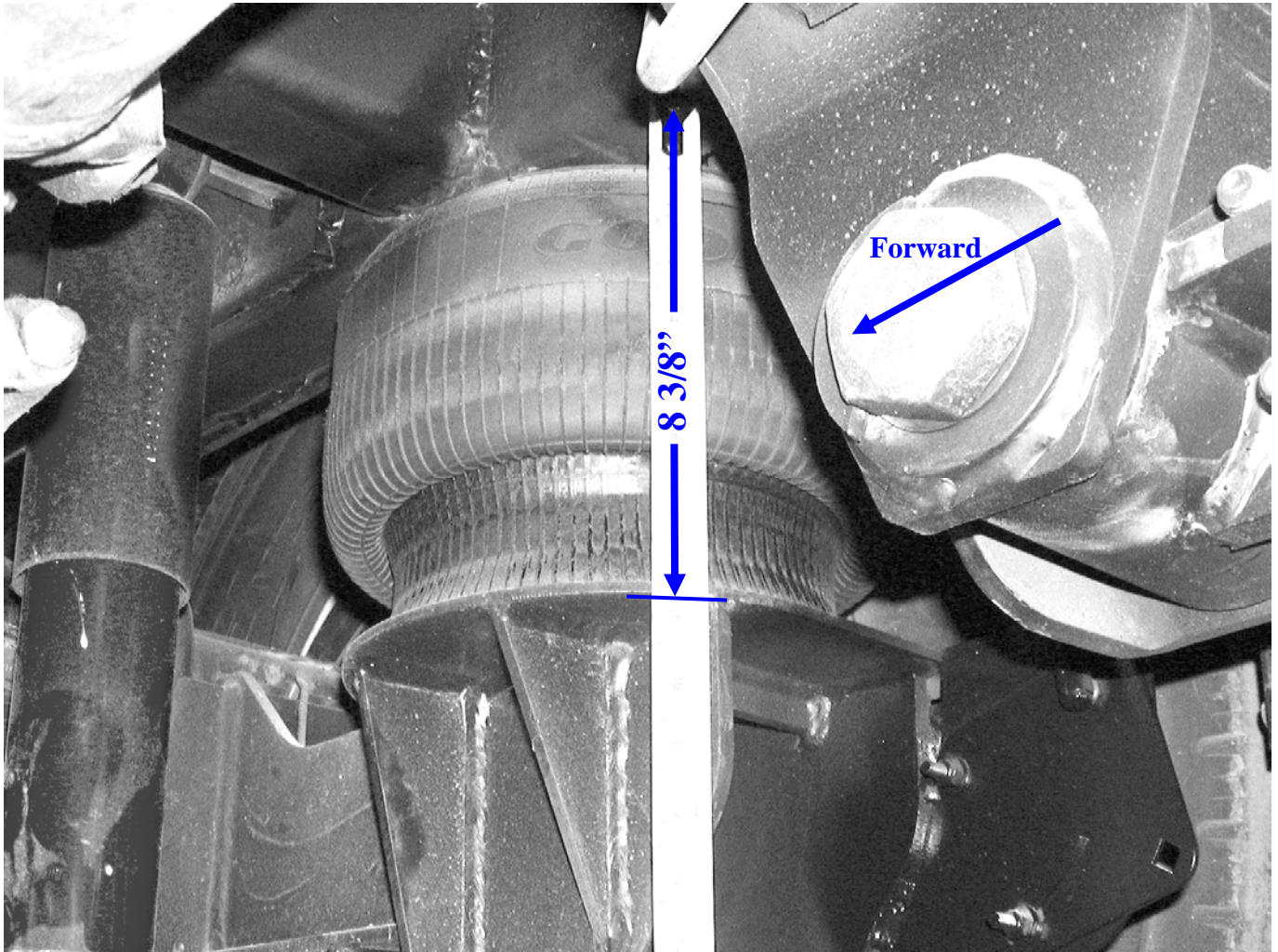
Bottom of Frame Rail to Bottom of Equalizing Beam to average 20 1/2" between left and right side

Each side to be more than 20" and less than 21" as necessary to adjust front suspension to level

# Country Coach Ride Height Specifications

## **RIDEWELL 227 SERIES DRIVE AXLE SUSPENSIONS**

As used on Lexa and some Intrigue, Magna, Affinity, and Concept, models



8 3/8 inches nominal - Bottom of Frame Rail to Bottom of Lower Air Spring Mounting Plate

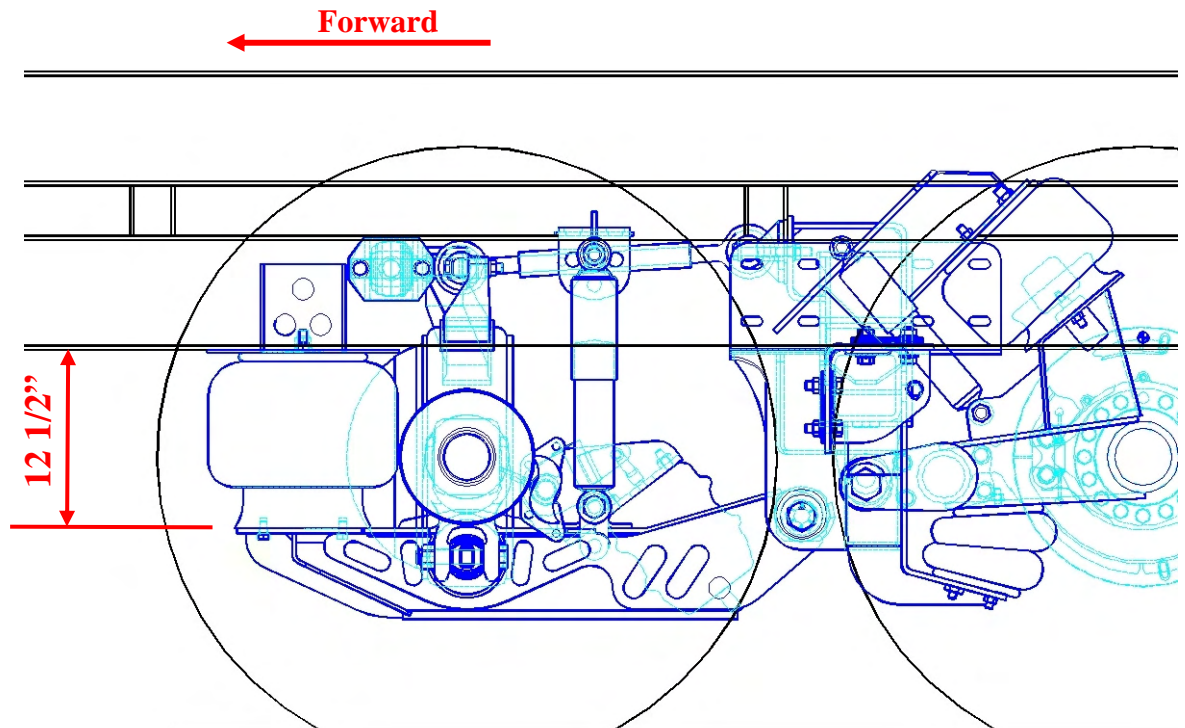
Drive Axle Measurement to average 8 3/8" between left and right.  
Each side to be more than 8" and less than 9" as necessary to adjust front suspension to level



# Country Coach Ride Height Specifications

## RIDEWELL 246 TWO AIR SPRING-DRIVE/TAG AXLE SUSPENSIONS

As used on some Allure, Intrigue and Tribute models



12 1/2 inches nominal- Bottom of Frame Rail to Bottom of Air Spring Piston

Measured vertically adjacent to, and behind of, the air spring

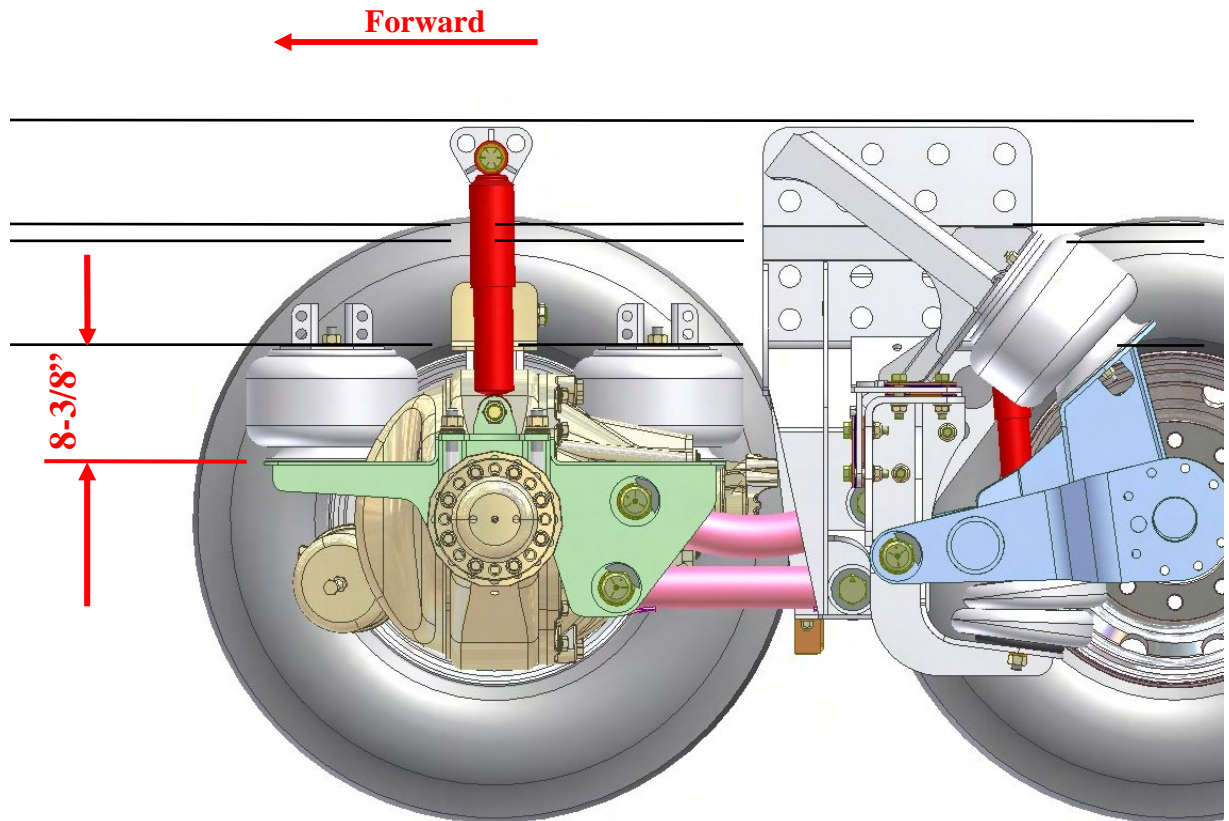
Bottom of Frame Rail to Bottom of Air Spring Piston to average 12 1/2" between left and right side

Each side to be more than 12" and less than 13" as necessary to adjust front suspension to level

# Country Coach Ride Height Specifications

## RIDEWELL 246 FOUR AIR SPRING-DRIVE/TAG AXLE SUSPENSIONS

As used on some Affinity, Magna, Intrigue and Allure models



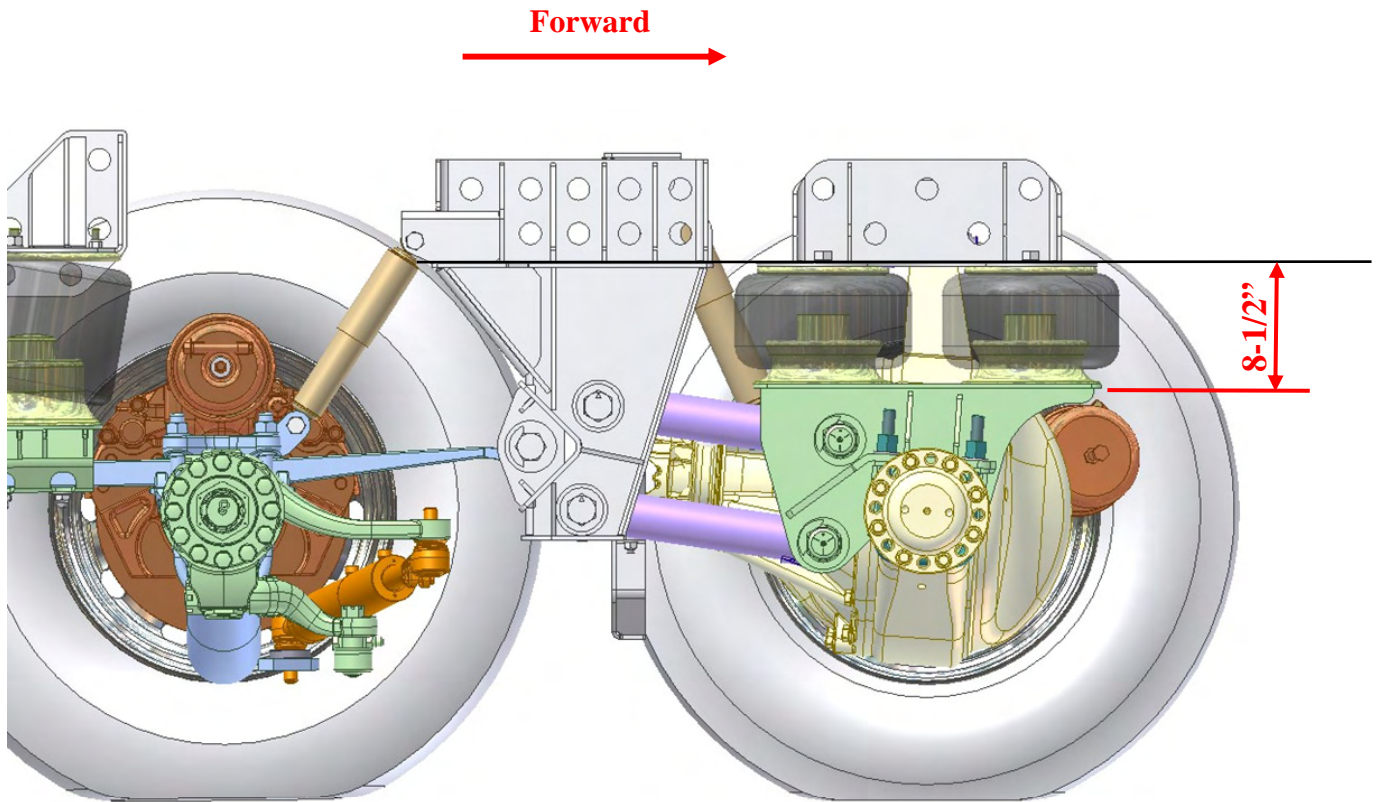
8 3/8 inches nominal - Bottom of Frame Rail to Bottom of Lower Air Spring Mounting Plate

Drive Axle Measurement to average 8 3/8" between left and right.  
Each side to be more than 8" and less than 9" as necessary to adjust front suspension to level

# Country Coach Ride Height Specifications

## RIDEWELL 246 DRIVE/STEERABLE TAG AXLE SUSPENSIONS

As used on Rhapsody models



8 1/2 inches nominal - Bottom of Frame Rail to Bottom of Lower Air Spring Mounting Plate

Drive Axle Measurement to average 8 1/2" between left and right.  
Each side to be more than 8" and less than 9" as necessary to adjust front suspension to level

## RHAPSODY

		Target	Min.	Max.
Front:	Ride Height (bottom of frame to wheel center)	6 7/16" **		
<b>LiquidSpring IS200C-A</b>	Front Shock length cen-cen	16 3/4"	Reference	
	Floor Bottom to Lower Knuckle Post Surface **	32 15/16"	32 7/8"	33"
	Camber (Left and Right)	0.26°	0.01°	0.51°
	Cross Camber	0°	-0.5°	0.5°
	Caster (Left and Right)	3.60°	3.01°	4.01°
	Cross Caster	0°	-0.75°	0.50°
	Toe (Left and Right)	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.25	5.25	7.25
	Included Angle	6.5	5.5	7.5
	Front Set Back	0.00°	-0.50°	+0.50°
	Moment Link Length (set back determinant)	26.8"	preadjusted & marked	
	Turning Angle (Inside Wheel)	55°	53°	55
	Center Tie-Rod Length cen-cen	19.00"	18 7/8"	19 1/8"
Rear Drive:	Ride Height (bottom of frame to wheel center)	16 3/4"		
<b>Ridewell RADT 246</b>	Drive Axle Airspring Height ***	8 7/16"	8"	9"
	Thrust Angle	0.00°	-0.02°	+0.02°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle:	Ride Height (bottom of frame to bottom air spring plate)	11.375	Reference	
	Tag Camber (Left and Right)	0.75	0.25	1.00
	Caster (Left and Right)	0.70°	0.00°	1.70°
	Cross Caster	0°	-1.00°	1.00°
	Tag Toe (Left and Right)	0.02"	0.01"	0.03"
	Tag Total Toe	0.04"	0.03"	0.05"
	Tag Scrub Angle	0.00°	-0.01°	+0.01°

\*\* Front Ride Height can be set by setting the 'Bottom of Coach Floor' (measured in front of the axle to avoid a step) to the 'Lower Knuckle Post Part Mating Surface' to 32 15/16".

\*\*\* Drive Axle Airspring Height should average 8 7/16" between the left and right, measured from 'Bottom of Frame Rail' to "Bottom of Lower Air Spring Mounting Plate'. Each side to be more than 8" and less than 9" as necessary to level the front end side to side.

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

Front Hubs	Westport
Front Susp.	LiquidSpring IS200C-A
Drive Axle	Dana S23-190, 4.30:1 pn 0888251
Drive/Tag Susp.	Ridewell RADT-246-20/14 FS 2460017, 2460022 or 2460028
Tag Axle	Weweler IM-097 ETS

Revised 10-12-07

## 2008 INTRIGUE, ALLURE

		Target	Min.	Max.
Front: <b>Tuthill IFS 1660</b>	Ride Height	6.61"		
	Air Spring Height	9.25"	9.25"	9.25"
	Floor Bottom to Upper A-arm Bar Pin Lower Quadrant	21 13/16"	21 13/16"	21 13/16"
	Camber, Left and Right	0.25°	0.15°	0.40°
	Cross Camber	0.00°	-0.40°	0.40°
	Caster, Left and Right	3.00°	2.50°	3.50°
	Cross Caster	0°	-0.50°	0.50°
	Toe, Left and Right	.06"	.05"	.07"
	Total Toe	.12"	.11"	.13"
	SAI *****	6.50°	6.00°	7.00°
	Included Angle	6.75°	6.15°	7.40°
	Front Set Back	0.00°	-0.30°	+0.30°
	Turning Angle	55°	54°	55°
Drive Axle: <b>Ridewell RADT 2460024 RADT 2460027</b>	Ride Height (bottom of frame to wheel center)	12"		
	Drive Axle Airspring Height	8 3/8" **	8"	9"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle:	Tag Camber (Left and Right)	0.75°	0.50°	1.00°
	Tag Toe (Left and Right)	0.04"	0.02"	0.06"
	Tag Total Toe	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\*\* Drive Axle Airspring Height should average 8 3/8" between the left and right, measured from bottom of frame rail to bottom of air spring mounting plate. Each side to be more than 8" and less than 9" as necessary to level the front end from

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

**MIT**  
**Front Susp. Tuthill IFS 1660S-SB**  
**Engine Caterpillar C-13**  
**Drive Axle Dana S23-190 or S25-170**  
**Drive/Tag Susp. Ridewell RADT-2460024 or RDT-2460027**

Revised 6-14-2007

## 2008 MAGNA, AFFINITY

Coach #6850 thru

		Target	Min.	Max.
Front: <b>Ridewell</b> <b>IFS 284</b> <b>Dana/Kirkstall</b>	Ride Height (bottom of frame to wheel center)	6 1/2"		
	Floor Bottom to Knuckle Post Upper Pivot Center	22 5/8" **	22 9/16"	22 3/4"
	Camber (Left and Right)	0.50°	0.25°	0.75°
	Cross Camber	0°	-0.5°	0.5°
	Caster (Left and Right)	2.75°	2.00°	3.50°
	Cross Caster	0°	-1.00°	1.00°
	Toe (Left and Right)	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.00°	5.25°	7.00°
	Included Angle	6.50°	5.50°	7.50°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	55°	54°	55°
	Center Tie-Rod Length (cen-cen)	22 5/8"	22 1/2"	22 3/4"
Rear: <b>Ridewell</b> <b>RADT 2460020</b> <b>RADT 2460023</b> <b>RADT 2460026</b>	Ride Height (bottom of frame to wheel center)	12"		
	Drive Axle Airspring Height	8 3/8" ***	8"	9"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle:	Tag Camber (Left and Right)	0.75°	0.50°	1.00°
	Tag Toe (Left and Right)	0.04"	0.02"	0.06"
	Tag Total Toe	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\* To set ride height equal from side to side, a plumb bob measurement, from the bottom of the house floor to the knuckle post upper pivot center, can be made on each side in the front wheel wells.

To reference correct ride height; the centers of the Outer Pivot Pins of the Lower A-Arms, should be 3/4" higher than the centers of the Inner Pivot Pins.

\*\*\* Drive Axle Airspring Height should average 8 3/8" between the left and right, measured from bottom of frame rail to bottom of air spring mounting plate. Each side to be more than 8" and less than 9" as necessary to level the front end from side to side.

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

### MMT- MAT

Front Axle Dana / Kirkstall IFS 84U F5017E  
 Front Susp. Ridewell 2840006  
 Drive Axle Dana S23-190 or S25-170  
 Drive/Tag Susp. Ridewell RADT 2460020, 2460023, 2460026

Revised 6-15-2007



## INSPIRE, TRIBUTE w/ADL-123

		Target	Min.	Max.
Front: Neway IFS 144	Ride Height	6 1/2"		
	Shock Length	17 3/4"	17 3/4"	17 7/8"
	Left Camber	0.50°	0.30°	0.70°
	Right Camber	0.50°	0.30°	0.70°
	Cross Camber	0.00°	-0.40°	0.40°
	Left Caster	2.75°	1.75°	3.75°
	Right Caster	2.75°	1.75°	3.75°
	Cross Caster	0°	-1.00°	1.00°
	Left Toe	.02"	.02"	.02"
	Right Toe	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.50°	5.50°	7.50°
	Included Angle	7.00°	5.75°	8.00°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	50°	49°	50°
Rear: Neway ADL-123	Ride Height	7 1/2"		
	Equalizing Beam Bottom to Frame Bottom**	19"	18.5"	19.5"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"

**\*\* Equalizing Beam Bottom to Frame Bottom height should average 19" between left side and right side, measured adjacent to and behind the axle tube. Each side to be more than 18 1/2" and less than 19 1/2" as necessary to adjust both front shocks to 17 3/4" length.**

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

Revised 6-14-2007

## 2007 TRIBUTE

		Target	Min.	Max.
Front: <b>Tuthill IFS1260</b>	Ride Height (bottom of frame to wheel center)	6.75"		
	Shock Length Center to Center	16.36	16.36	16.36
	Floor to Bottom of Shock Bolt ***	32"	32"	32"
	Left Camber	0.25°	0.15°	0.40°
	Right Camber	0.25°	0.15°	0.40°
	Cross Camber	0.00°	-0.15°	0.15°
	Left Caster	3.00°	2.50°	3.50°
	Right Caster	3.00°	2.50°	3.50°
	Cross Caster	0°	-.30°	0.30°
	Left Toe	.06"	.05"	.07"
	Right Toe	.06"	.05"	.07"
	Total Toe	.12"	.11"	.13"
	SAI *****	6.50°	5.50°	7.50°
	Included Angle	7.00°	5.75°	8.00°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	57°	55°	57°
<b>Tuthill RD 2300</b>	Ride Height	8.25"		
	Equalizing Beam Bottom to Frame Bottom**	20.5	19.5"	21.5"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"

**\*\* Equalizing Beam Bottom to Frame Bottom height should average 20 1/2" between left side and right side, measured adjacent to and behind the axle tube. Each side to be more than 19 1/2" and less than 21 1/2" as necessary to adjust both sides of front to 32"**

**\*\*\* Front ride height measurement was 31 1/4" for early coaches with Bilstein shocks and no limit straps. All coaches with front shock limiting straps OR Koni FSD shocks to be set to 32"**

**\*\*\*\*\* SAI difference from left to right may not exceed 0.75°**

Revised 6-14-2007



## 2007 INTRIGUE 16600

Coach #12119 to #12193

		Target	Min.	Max.
Front: <b>Tuthill IFS 1660</b>	Ride Height	6.61"		
	Air Spring Height	9.25"	9.25"	9.25"
	Floor Bottom to Upper A-arm Bar Pin Lower Quadrant	21 13/16"	21 13/16"	21 13/16"
	Camber, Left and Right	0.25°	0.15°	0.40°
	Cross Camber	0.00°	-0.40°	0.40°
	Caster, Left and Right	3.00°	2.50°	3.50°
	Cross Caster	0°	-0.50°	0.50°
	Toe, Left and Right	.06"	.05"	.07"
	Total Toe	.12"	.11"	.13"
	SAI *****	6.50°	5.75°	7.25°
	Included Angle	6.75°	5.90°	7.65°
	Front Set Back	0.00°	-0.30°	+0.30°
	Turning Angle	55°	54°	55°
Drive Axle: <b>Ridewell RD2270007</b>	Ride Height (bottom of frame to wheel center)	7 1/2" Nominal		
	Drive Axle Airspring Height ***	8 3/8"	8"	9"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle: <b>Ridewell RIT2070002</b>	Tag Camber (Left and Right)	0.75°	0.50°	1.00°
	Tag Toe (Left and Right)	0.04"	0.02"	0.06"
	Tag Total Toe	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\*\* Drive Axle Airbag Height should average 8 3/8" between left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to adjust both sides of front to 21 13/16".

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

<b>MIT</b>	
Front Susp.	Tuthill IFS 1660-SB
Engine	Caterpillar C-13
Drive Axle	Meritor 23165
Drive Susp.	Ridewell RD-2270007
Tag Axle Assy.	Ridewell RIT-2070001

Revised 6-14-2007

## MHI, MHL, MIN w/ADL-120

		Target	Min.	Max.
Front: Neway IFS 144	Ride Height	6 1/2"		
	Shock Length	17 3/4"	17 3/4"	17 7/8"
	Left Camber	0.50°	0.30°	0.70°
	Right Camber	0.50°	0.30°	0.70°
	Cross Camber	0.00°	-0.40°	0.40°
	Left Caster	2.75°	1.75°	3.75°
	Right Caster	2.75°	1.75°	3.75°
	Cross Caster	0°	-1.00°	1.00°
	Left Toe	.02"	.02"	.02"
	Right Toe	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.50°	5.50°	7.50°
	Included Angle	7.00°	5.75°	8.00°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	50°	49°	50°
Rear: Neway ADL-120	Ride Height	7 1/2"		
	Equalizing Beam Bottom to Frame Bottom**	19"	18.5"	19.5"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"

\*\* Equalizing Beam Bottom to Frame Bottom height should average 19" between left side and right side, measured adjacent to and behind the axle tube. Each side to be more than 18 1/2" and less than 19 1/2" as necessary to adjust both front shocks to 17 3/4" length.

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

Used through Model Year 2006  
Model Year 2007 uses ADL-123

Revised 6-14-2007

**INTRIGUE, ALLURE, INSPIRE, TAG AXLE COACHES**  
**with Ridewell 2 Air Spring 246 rear suspensions**

		Target	Min.	Max.
Front: Neway IFS 144	Ride Height	6 1/2"		
	Shock Length	17 3/4"	17 3/4"	17 7/8"
	Camber, Left and Right	0.50°	0.30°	0.70°
	Cross Camber	0.00°	-0.40°	0.40°
	Caster, Left and Right	2.75°	1.75°	3.75°
	Cross Caster	0°	-1.00°	1.00°
	Toe, Left and Right	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.50°	5.50°	7.50°
	Included Angle	7.00°	5.75°	8.00°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	50°	49°	50°
Drive Axle: Ridewell RADT 2460014 RADT 2460016	Ride Height	7 1/2"		
	Drive Axle Airbag Height ***	12 1/2"	12"	13"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle:	Tag Camber (Left and Right)	0.75°	0.50°	1.00°
	Tag Toe (Left and Right)	0.04"	0.02"	0.06"
	Tag Total Toe	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\*\* Drive Axle Airbag Height should average 12 1/2" between left and right, measured from bead plate to bead plate. Each side to be more than 12" and less than 13" as necessary to adjust both front shocks to 17 3/4" length. Coincidentally, the bottom of the air bag should be parallel to the ground

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

	<b>MIT- MLT</b>
Front Susp.	NEWAY IFS-114-CC
Engine	Cummins 6 ISL (325-400)
	Caterpillar C9
Drive Axle	Meritor/Rockwell RS-21145
Drive/Tag Susp.	Ridewell RADT-2460014 and RADT-2460016
Tag Axle	Meritor/Rockwell TR3671LH2325

Revised 6-14-2007

# MHI, MHL, MIN, NRV w/AD200

		Target	Min.	Max.
Front: Neway IFS 144	Ride Height	6 1/2"		
	Shock Length	17 3/4"	17 3/4"	17 7/8"
	Left Camber	0.50°	0.30°	0.70°
	Right Camber	0.50°	0.30°	0.70°
	Cross Camber	0.00°	-0.40°	0.40°
	Left Caster	2.75°	1.75°	3.75°
	Right Caster	2.75°	1.75°	3.75°
	Cross Caster	0°	-1.00°	1.00°
	Left Toe	.02"	.02"	.02"
	Right Toe	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.50°	5.50°	7.50°
	Included Angle	7.00°	5.75°	8.00°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	50°	49°	50°
Rear: Neway AD200	Ride Height	7 1/2"		
	Drive Axle Airbag Height **	10 13/16"	10 5/16"	11 13/16"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"

\*\* Drive Axle Airbag Height should average 10 13/16" between left and right, measured from bead plate to bead plate. Each side to be more than 10 3/8" and less than 11 13/16" as necessary to adjust both front shocks to 17 3/4" length.

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°  
Used through July 2003

- - - EARLY SPECIFICATIONS- - -

NEWAY I.F.S. ALIGNMENT SPECIFICATIONS

CASTER:

CAMBER:

TOE IN:

RIDE HEIGHT:

AIR BAG RIDE HEIGHT:

SHOCK ABSORBER LENGTH @ RIDE HEIGHT:

SUSPENSION TRAVEL:

3° + 1° (NON-ADJUSTABLE)

1/2° POSITIVE (ADJUSTABLE)

1/32" + 1/32" (ADJUSTABLE)

7"

9"

17.75" EYE TO EYE

3" UP & 3" DOWN

Revised 6-14-2007

## INTRIGUE TAG with CAT ENGINE to #12118

		Target	Min.	Max.
Front: <b>Neway IFS 144</b>	Ride Height	6 1/2"		
	Shock Length	17 3/4"	17 3/4"	17 7/8"
	Camber, Left and Right	0.50°	0.30°	0.70°
	Cross Camber	0.00°	-0.40°	0.40°
	Caster, Left and Right	2.75°	1.75°	3.75°
	Cross Caster	0°	-1.00°	1.00°
	Toe, Left and Right	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.50°	5.50°	7.50°
	Included Angle	7.00°	5.75°	8.00°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	50°	49°	50°
Rear: <b>Ridewell RD2270007</b>	Ride Height (bottom of frame to wheel center)	7 1/2" Nominal		
	Drive Axle Airspring Height ***	8 3/8"		
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle: <b>Ridewell RIT2070002</b>	Tag Camber (Left and Right)	0.75°	0.50°	1.00°
	Tag Toe (Left and Right)	0.04"	0.02"	0.06"
	Tag Total Toe	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\*\* Drive Axle Airbag Height should average 8 3/8" between left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to adjust both front shocks to 17 3/4" length.

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

	<b>MIT</b>
Front Susp.	NEWAY IFS-114-CC
Engine	Caterpillar C-12 & C-13
<b>Drive Axle</b>	<b>Meritor 23165</b>
Drive Susp.	Ridewell RD-2270007
Tag Axle Assy.	Ridewell RIT-2070001

Revised 6-14-07

# **MAT, MMT, MHX, (DANA-KIRKSTALL I.F.S.)**

**Coach #6255 thru #6850**

		Target	Min.	Max.
Front:	Ride Height (bottom of frame to wheel center)	6 1/2" **		
	Camber (Left and Right)	0.50°	0.25°	0.75°
	Cross Camber	0°	-0.5°	0.5°
	Caster (Left and Right)	2.75°	2.00°	3.50°
	Cross Caster	0°	-1.00°	1.00°
	Toe (Left and Right)	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	SAI *****	6.00°	5.25°	7.00°
	Included Angle	6.50°	5.50°	7.50°
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	55°	54°	55°
	Center Tie-Rod Length cen-cen	22 1/2"	22 1/4"	22 3/4"
Rear:	Ride Height (bottom of frame to wheel center)	7 1/2" Nominal		
	Drive Axle Airspring Height ***	8 3/8"	8"	9"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle:	Tag Camber (Left and Right)	0.75°	0.50°	1.00°
	Tag Toe (Left and Right)	0.04"	0.02"	0.06"
	Tag Total Toe	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\* To set ride height equal from side to side, a plumb bob measurement, from the bottom of the house floor to the ground line, can be made from similar locations in the front wheel wells,

To reference correct ride height; the centers of the Outer Pivot Pins of the Lower A-Arms, should be 3/4" higher than the centers of the Inner Pivot Pins.

\*\*\* Drive Axle Airspring Height should average 8 3/8" between the left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to level the front end side to side.

\*\*\*\*\* SAI difference from left to right may not exceed 0.75°

## **MMT- MAT**

Front Axle Dana / Kirkstall IFS 84U F5017E  
 Front Susp. Ridewell 2840006  
 Drive Axle Rockwell 61143WX295 456  
 Drive Axle Meritor 23165  
 Drive Susp. Ridewell RD-2270007  
 Tag Axle Assy. Ridewell RIT-2070001

## **MHX**

Dana / Kirkstall IFS 84U F5017E  
 Ridewell 2840006  
 Rockwell 61143WX295 456 before 3-03  
 Meritor 23165 after 3-03  
 Ridewell RD-2270045  
 Ridewell RIT-2070004

Checked 6-15-2007

**MAT, MMT, MHX, MC (DANA-KIRKSTALL I.F.S.)**

		Target	Min.	Max.
Front:	<u>Ride Height (bottom of frame to wheel center)</u>	6 1/2" **		
	<u>Camber (Left and Right)</u>	0.50°	0.25°	0.75°
	<u>Cross Camber</u>	0°	-0.5°	0.5°
	<u>Caster (Left and Right)</u>	2.75°	2.00°	3.50°
	<u>Cross Caster</u>	0°	-1.00°	1.00°
	<u>Toe (Left and Right)</u>	.02"	.02"	.02"
	<u>Total Toe</u>	.04"	.04"	.04"
	<u>Front Set Back</u>	0.00°	-0.20°	+0.20°
	<u>Turning Angle</u>	55°	54°	55°
	<u>Center Tie-Rod Length cen-cen</u>			
	96 inch Track vehicles	25 1/4"	25 3/16"	25 5/16"
	94 inch Track vehicles	23 1/4"	23 3/16"	25 5/16"
Rear:	<u>Ride Height (bottom of frame to wheel center)</u>	7 1/2" Nominal		
	<u>Drive Axle Airspring Height ***</u>	8 3/8"	8"	9"
	<u>Thrust Angle</u>	0.00°	-0.06°	+0.06°
	<u>Rear Offset</u>	0.00"	-1/8"	+1/8"
	<u>Rear Camber (Left and Right)</u>	0.00°	-0.50°	+0.50°
	<u>Rear Toe (Left and Right)</u>	0.00"	-0.15"	+0.15"
	<u>Rear Total Toe</u>	0.00"	-0.30"	+0.30"
Tag Axle:	<u>Tag Camber (Left and Right)</u>	0.75°	0.50°	1.00°
	<u>Tag Toe (Left and Right)</u>	0.04"	0.02"	0.06"
	<u>Tag Total Toe</u>	0.08"	0.04"	0.12"
	<u>Tag Scrub Angle</u>	0.00°	-0.06°	+0.06°

\*\* To set ride height equal from side to side, a plumb bob measurement, from the bottom of the house floor to the ground line, can be made from similar locations in the front wheel wells,

To reference correct ride height; the centers of the Outer Pivot Pins of the Lower A-Arms, should be 3/4" higher than the centers of the Inner Pivot Pins.

\*\*\* Drive Axle Airspring Height should average 8 3/8" between the left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to level the front end side to side.

**MMT- MAT - MC**  
 Dana / Kirkstall IFS 84  
 Ridewell 2840001  
 Rockwell 61143WX295 456  
 Ridewell RD-2270007  
 Ridewell RIT-2070001

**MHX**  
 Dana / Kirkstall IFS 84  
 Ridewell 2840006  
 Rockwell 61143WX295 456  
 Ridewell RD-2270045  
 Ridewell RIT-2070004

UPDATED 10-03-02

## **NON-TAG MAGNA, AFFINITY (DANA-KIRKSTALL I.F.S.)**

		Target	Min.	Max.
Front:	<u>Ride Height (bottom of frame to wheel center)</u>	6 1/2" **		
	<u>Camber (Left and Right)</u>	0.50°	0.25°	0.75°
	<u>Cross Camber</u>	0°	-0.5°	0.5°
	<u>Caster (Left and Right)</u>	2.75°	2.00°	3.50°
	<u>Cross Caster</u>	0°	-1.00°	1.00°
	<u>Toe (Left and Right)</u>	.02"	.02"	.02"
	<u>Total Toe</u>	.04"	.04"	.04"
	<u>Front Set Back</u>	0.00°	-0.20°	+0.20°
	<u>Turning Angle</u>	55°	54°	55°
	<u>Center Tie-Rod Length cen-cen</u>			
	96 inch Track vehicles	25 1/4"	25 3/16"	25 5/16"
Rear:	<u>Ride Height (bottom of frame to wheel center)</u>	7 1/2" Nominal		
	<u>Drive Axle Airspring Height ***</u>	8 3/8"	8"	9"
	<u>Thrust Angle</u>	0.00°	-0.06°	+0.06°
	<u>Rear Offset</u>	0.00"	-1/8"	+1/8"
	<u>Rear Camber (Left and Right)</u>	0.00°	-0.50°	+0.50°
	<u>Rear Toe (Left and Right)</u>	0.00"	-0.15"	+0.15"
	<u>Rear Total Toe</u>	0.00"	-0.30"	+0.30"

\*\* To set ride height equal from side to side, a plumb bob measurement, from the bottom of the house floor to the ground line, can be made from similar locations in the front wheel wells,

To reference correct ride height; the centers of the Outer Pivot Pins of the Lower A-Arms, should be 3/4" higher than the centers of the Inner Pivot Pins.

\*\*\* Drive Axle Airspring Height should average 8 3/8" between the left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to level the front end side to side.

### **MMT- MAT - MC**

Front Axle	Dana / Kirkstall IFS 84
Front Susp.	Ridewell 2840001
Drive Axle	Rockwell 61143WX295 456
Drive Susp.	

UPDATED 10-03-02



**MHM, MHA, (DANA-KIRKSTALL I.F.S.)****OBSOLETE**

		Target	Min.	Max.
Front:	Ride Height	6 1/2"		
	Shock length	16 7/8"	16 7/8"	17"
	Left Camber	0.50°	0.25°	0.75°
	Right Camber	0.50°	0.25°	0.75°
	Cross Camber	0°	-0.5°	0.5°
	Left Caster	2.75°	2.00°	3.50°
	Right Caster	2.75°	2.00°	3.50°
	Cross Caster	0°	-1.00°	1.00°
	Left Toe	.02"	.02"	.02"
	Right Toe	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	55°	54°	55°
Rear:	Ride Height	7 1/2"		
	Drive Axle Airbag Height ***	8 3/8"	8"	9"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"

\*\*\* Drive Axle Airbag Height should average 8 3/8" between left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to adjust both front shocks to 16 7/8" length.

**MAT, MMT, MHX, MC (DANA-KIRKSTALL I.F.S.)**

**OBSOLETE**

		Target	Min.	Max.
Front:	Ride Height	6 1/2" **		
	<u>Camber (Left and Right)</u>	0.50°	0.25°	0.75°
	Cross Camber	0°	-0.5°	0.5°
	<u>Caster (Left and Right)</u>	2.75°	2.00°	3.50°
	Cross Caster	0°	-1.00°	1.00°
	<u>Toe (Left and Right)</u>	.02"	.02"	.02"
	Total Toe	.04"	.04"	.04"
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	55°	54°	55°
Rear:	<u>Ride Height</u>	7 1/2" Nominal		
	<u>Drive Axle Airbag Height ***</u>	8 3/8"	8"	9"
	<u>Thrust Angle</u>	0.00°	-0.06°	+0.06°
	<u>Rear Offset</u>	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle:	<u>Tag Camber (Left and Right)</u>	0.75°	0.50°	1.00°
	<u>Tag Toe (Left and Right)</u>	0.04"	0.02"	0.06"
	<u>Tag Total Toe</u>	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\* At Ride Height, the lower A-Arms should have the centers of the Outer Pivot Pins 3/4" higher than the centers of the Inner Pivot Pins

\*\*\* Drive Axle Airbag Height should average 8 3/8" between left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to level front end left to right.

**MMT- MAT - MC**

Front Axle Dana / Kirkstall IFS 84  
 Front Suspension Ridewell 2840001  
 Drive Axle Rockwell 61143WX295 456  
 Drive Suspension Ridewell RD-2270007  
 Tag Axle Assy Ridewell RIT-2070001

**MHX**

Dana / Kirkstall IFS 84  
 Ridewell 2840006  
 Rockwell 61143WX295 456  
 Ridewell RD-2270045  
 Ridewell RIT-2070004

### **MHM MHA I-BEAM AXLE** (NON I.F.S.)

		Target	Min.	Max.
Front:	Ride Height	7 1/2"		
	<u>Camber (Left and Right)</u>	0.25°	-0.25°	0.75°
	Cross Camber	0°	-1.0°	1.0°
	<u>Caster (Left and Right)</u>	3.00°	2.50°	3.50°
	Cross Caster	0°	-.50°	.50°
	<u>Toe (Left and Right)</u>	.04"	.04"	.04"
	<u>Total Toe</u>	.08"	.08"	.08"
	Front Set Back	0.00°	-0.20°	+0.20°
	<u>Turning Angle</u>	45°	42°	45°
	King Pin Inclination Angle	6.25°		
	Front Axle Travel Up	3.18"		
	Front Axle Travel Down	3.75"		
Rear:	Ride Height	7 1/2"		
	<u>Drive Axle Airbag Height ***</u>	8 3/8"	8"	9"
	<u>Thrust Angle</u>	0.00°	-0.06°	+0.06°
	<u>Rear Offset</u>	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"

### **CONCEPT (MC) I-BEAM AXLE (NON I.F.S.)**

		Target	Min.	Max.
Front:	Ride Height	7 1/2"		
	Camber (Left and Right)	0.25°	-0.25°	0.75°
	Cross Camber	0°	-1.0°	1.0°
	Caster (Left and Right)	3.00°	2.50°	3.50°
	Cross Caster	0°	-.50°	.50°
	Toe (Left and Right)	.04"	.04"	.04"
	Total Toe	.08"	.08"	.08"
	Front Set Back	0.00°	-0.20°	+0.20°
	Turning Angle	45°	42°	45°
	King Pin Inclination Angle	6.25°		
	Front Axle Travel Up	3.18"		
	Front Axle Travel Down	3.75"		
Rear:	Ride Height	7 1/2"		
	Drive Axle Airbag Height ***	8 3/8"	8"	9"
	Thrust Angle	0.00°	-0.06°	+0.06°
	Rear Offset	0.00"	-1/8"	+1/8"
	Rear Camber (Left and Right)	0.00°	-0.50°	+0.50°
	Rear Toe (Left and Right)	0.00"	-0.15"	+0.15"
	Rear Total Toe	0.00"	-0.30"	+0.30"
Tag Axle:	Tag Camber (Left and Right)	0.75°	0.50°	1.00°
	Tag Toe (Left and Right)	0.04"	0.02"	0.06"
	Tag Total Toe	0.08"	0.04"	0.12"
	Tag Scrub Angle	0.00°	-0.06°	+0.06°

\*\*\* Drive Axle Airbag Height should average 8 3/8" between left and right, measured from bead plate to bead plate. Each side to be more than 8" and less than 9" as necessary to adjust front.

Front Axle	Dana 161BN204
Front Suspension	Ridewell 227008
Drive Axle	Rockwell 61143WX295 456
Drive Suspension	Ridewell RD-227
Tag Axle Assy	Ridewell RIT-207

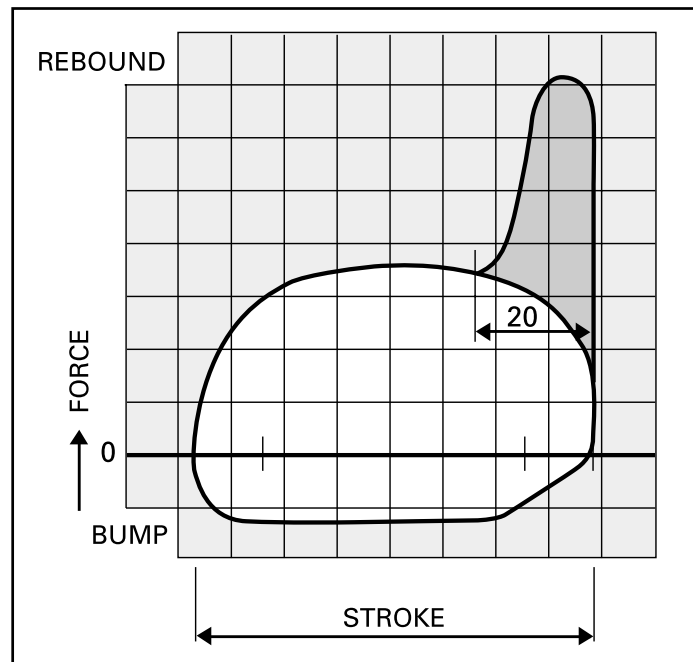


### HYDRAULIC REBOUND STOP (88, 90, 91, AND 92 SERIES)

Our hydraulic rebound stop is designed to protect the components of today's low friction suspensions, including the shock mounts, air springs (on an air suspension), and the shocks themselves.

#### Benefits of Koni Hydraulic Rebound

- No dead length is added to the shock
- Insignificant weight penalty for this feature
- Velocity and position sensitive, which reduces stress on the shock and chassis frame
- Dramatically increases the forces in the last 3/4" (20mm) of travel. This reduces the force at which the piston tops out.



### KONI ADJUSTABILITY

Koni shock absorbers have up to 100% reserve damping that can be applied by simple adjustment procedures. Through this adjustment, it is possible to compensate for loss of damping force and lengthen the optimal service life two to three times.

This adjustment feature can also be used to compensate for added weight on a vehicle.

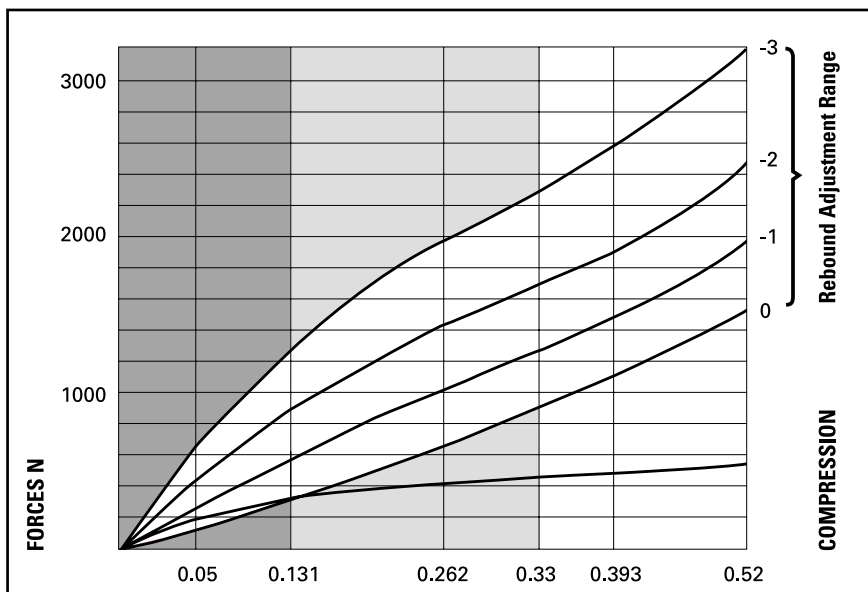
Unique to Koni, each adjustment position represents increased damping forces over the entire force/velocity range.

This feature allows proportionate damping at low and high speeds. Below is a force velocity graph of a Koni shock absorber.

Koni shocks are designed for optimal performance at minimum position, and should be fitted as received. Once you have tested your vehicle, you can modify the damping characteristics as necessary.

Remember that adjustments must always be carried out in pairs. Failure to adjust the shocks the same amount on one axle will lead to problems such as uneven tire wear.

Please follow the procedures on the following page to adjust Koni shock absorbers.





### ADJUSTMENT PROCEDURES – 30 SERIES

1. This adjustment is made with the shock fully extended. Remove the plastic dust cover to expose the adjusting button as in figure 1.
2. Hold the damper body by hand where the piston rod emerges from the cylinder. Push the button carefully and hold it in (excessive force is not needed) see fig. 2.
3. The adjusting device operates with four distinct clicks, each of which marks an adjustment position (figure 4).
4. The damper may have already been adjusted, so check to see if it is at minimum position. Gently turn it counterclockwise until a stop is felt. **Do not use force.**
5. To increase rebound, turn the piston rod one or more clicks to the right, and release the adjusting button.
6. Be sure that the adjusting button fully springs back into position. Once the button has retracted, the piston rod may be turned freely, and the damper can be refitted.

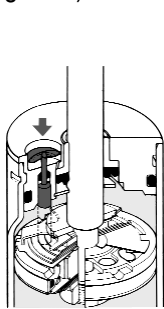


figure 1



figure 2

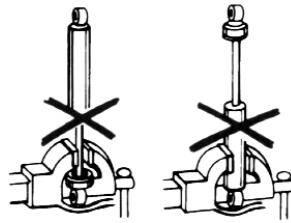


figure 3

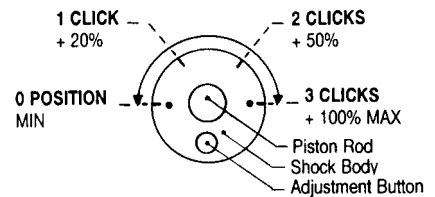


figure 4

### ADJUSTMENT PROCEDURES – 88, 90 AND 92 SERIES

In many cases, the twin tube shock can be adjusted while still on the vehicle. Remove the lower mount (you may have to loosen the upper mount), and follow the steps below.

1. Fully collapse the shock absorber while turning it counterclockwise until you feel the cams of the adjusting nut engage in the recesses of the footvalve (figure 1).
2. The damper may have already been adjusted so check to see if it is set at minimum position. Gently turn it counterclockwise, keeping track of half turns, until a stop is felt (figure 2). **Do not use force.**
3. Increase the force in the damper by turning it clockwise in increments of half-turns. If the damper had been previously adjusted, add the number of half turns found in step two (figure 3 & 4).
4. Pull the shock absorber apart vertically without turning for at least 1/2" to disengage the adjusting mechanism. The piston rod may now be turned freely and the shock absorber can be refitted.

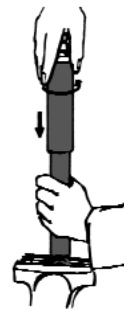


figure 1

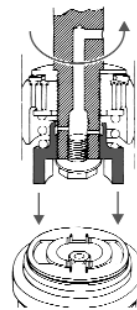


figure 2

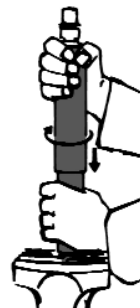


figure 3

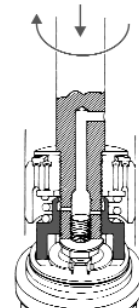


figure 4