

SmartValve™
Electronic Height Control

LINK®

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**QUESTIONS?
CALL CUSTOMER
SERVICE
1-800-222-6283**

INSTALLATION INSTRUCTIONS

**SMARTVALVE
P4 PDI RETRO FIT KIT**

TWO DASH SWITCHES—H00700R27A



IMPORTANT: IT IS IMPORTANT THAT THE ENTIRE INSTALLATION INSTRUCTIONS BE READ THOROUGHLY BEFORE PROCEEDING WITH THE INSTALLATION.






1. INTRODUCTION

Thank you for choosing a Link SmartValve. We want to help you get the best results from this height control valve and to operate it safely. This instruction contains information to assist in the installation of the SmartValve. This instruction is intended solely for use with this product.

All information in this instruction is based on the latest information available at the time of printing. Link Manufacturing reserves the right to change its products or manuals at any time without notice.

Damaged components should be returned to Link with a pre-arranged Returned Materials Authorization (RMA) number through the Customer Service Department. The damaged component may then be replaced if in compliance with warranty conditions.

2. SAFETY SYMBOLS, TORQUE SYMBOL, and NOTES

	DANGER indicates a hazardous situation which if not avoided, will result in death or serious injury.
	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE indicates a potentially hazardous situation which, if not avoided, may result in property damage.
	TORQUE indicates named fasteners are to be tightened to a specified torque value.
NOTE:	A Note provides information or suggestions that help you correctly perform a task.

3. SAFE WORKING PRACTICES

CAUTION

When handling parts, wear appropriate gloves, eye-glasses, ear protection, and other safety equipment.

CAUTION

Proper tightening of fasteners is important to the performance and safety of the suspension. Follow all torque specifications throughout the instructions.

4. CAN BUS AND SETUP TOOL NOTICE

4.1

The vehicle must be equipped with a functioning J1939 CAN BUS (250KBPS) network for proper operation of the SmartValve Kit.

4.2

A Link H00700PK kit is required to properly install the SmartValve.

4.3

The SmartValve setup tool must be pre-installed on a Windows based computer.

4.4

If in doubt, consult with a local dealer or SmartValve service for more information.

5. TOOLS REQUIRED

- Wire Cutter
- Wire Stripper
- Drill bits 35/64": Pushbutton, Letter "D": LED
- Drill
- Tubing Cutter
- Screwdriver
- Tape Measure
- Wrenches 7/16", 1/2"
- Multi-meter Volt-Ohm Tester
- Crimping Tool (Red Barrel Connector)
- Center Punch
- Soap Solution (For Leak Tests)
- Deburring Tool (For Pushbutton Switch Holes)
- Torque Wrench With 7/16" Socket

6. MATERIALS REQUIRED

- Nylon cable ties
- Electrical tape
- Heat shrink tubing (if required)
- Misc. air fittings
- Dielectric grease (recommended: DeoxIT grease Type L260Np)-for electrical connections.
- Alcohol cleaner– for cleaning of dash surface prior to installation of decal detail.

7. SYSTEM OVERVIEW

The H00700RxA retrofit kit provides control of the chassis suspension for International Class 8 trucks in a 6X4 configuration. The following features are provided:

- Accurate maintenance of Standard Ride height with reduced air consumption relative to mechanical valves.
- Dump the rear suspension for trailer coupling operations.
- Raise the rear suspension to a settable height above standard height to improve trailer coupling operations.

The OEM installed dump switch and a two switch is used to control the system and a LED provides status.

The SmartValve system limits the dump and raise features to when the truck is stopped or moving at slow speeds. The system will automatically return from the over-height setting to standard height when wheel speed exceeds 7 mph. The SmartValve system can be set to over-ride OEM dump switch automatically and return to vehicle Standard Ride Height when wheel speed exceeds 17 mph.

8. VEHICLE PREPARATION PROCEDURE

8.1

Suspension Ride Height

1. Measure tractor suspension ride height per manufacturer's instructions.
2. Compare to manufacturers recommended dimension.
3. Measure tractor ride height at lowered (dumped) position.
4. These dimensions will be used in later adjustments.

8.2

Air Leak Check

1. Check for air leaks at the tube ends and air spring connections using a soap solution before removing the air lines.

8.3

Valve Removal

▲WARNING Vehicle must be in park and the engine turned off.

NOTE: Before removing the airlines, mark or label each line (supply, air springs, dump pilot, etc.)

For vehicles equipped with a dash mounted suspension dump switch:

1. Exhaust the air from the suspension air springs using the "Dump" control switch.
 2. Exhaust all air from the reservoir that supplies air pressure to the height control valve.
3. Make sure the tractor suspension is fully lowered to the stops and all suspension air springs are unpressurized before continuing.
4. Disconnect and plug the dump pilot line at the height control valve.
5. Disconnect the supply and suspension air lines from the height control valve.
6. Remove the linkage bolt at the end of the height control valve lever (Save this fastener)
7. Remove the valve mounting fasteners. (Usually two)
8. Remove the valve from the mounting bracket.
9. Set the valve aside for reference.

8.4

Harness Routing

1. Locate harness, on "material supplied page" for your truck brand for part number.
2. Cover or tape loose wires at the end of the harness to make the wires easier to route.
3. Route the harness along the inside of the tractor frame from the valve bracket to the cab firewall.

▲CAUTION

The harness must be routed away from moving parts. Avoid any pinch points or heat sources that may damage the harness.

8.5

Valve Air Line Preparation

- Inspect the valve air lines for damage and replace if necessary.
- Using a tubing cutter, squarely trim about 1/2" length from the end of each tube.
- Make sure the end of the airline tubes are clean and cut squarely on the ends.

NOTE: Preparing the tube ends is required to create a good seal between the airline tubing and valve fittings.

9. SMARTVALVE INSTALLATION

9.1

NOTE: Refer to the installation diagram

9.2

1. Install the SmartValve Assembly to the existing valve bracket.
2. Torque the mounting studs between 70 to 80 in-lbs using a 7/16" wrench or socket.
3. Clean the ends of the air tubes before assembly into the new valve.
4. The supply line from the reservoir connects to the port at the end of the valve labeled
5. "SUPPLY".
6. There are two ports labeled "SUSP". The suspension air spring lines will be inserted into these ports.

NOTE: It may be necessary to change direction of linkage bolt/pin for added clearance or for straighter alignment of the linkage rod.

9.3

Electrical/Harness Connections

NOTE: Refer to page 6 to connect the SmartValve and auxiliary components to the harness.

NOTE: Apply DeoxIT Grease Type L260Np or equivalent to the 12 pin valve connector as shown in figure 1.

1. Plug the 12 pin gray SmartValve electrical connector into the gray connector at the end of the harness – Be sure to push the connectors completely together until they "click".
2. Wrap electrical tape around the connector seam.



Figure 1.
Apply grease on the socket and pin area of the connector.

9.4

Dash Preparation: LED and Switch Mounting

NOTE: Prepare the dash in the cab as shown on page 7.

1. Locate a convenient place on the dash to mount the LED and two switches.
2. Drill the hole for the dual LED using drill size D (.246")
3. Drill the holes for the pushbutton switches below the LED hole using a 35/64" drill bit

NOTE: If necessary use a de-burring tool to clean the holes.

NOTE: Allow room for the decals in figure 2 (H17082) between the drilled holes.



Figure 2.
Decal Detail

Includes 4 Decals



Decal PN:
H17082



4. Push the LED and switches into the dash until they click into place. (no hardware needed)

NOTE: Clean dash surface with alcohol to ensure a good bond between dash and decal.

5. Apply the "SMARTVALVE STATUS" decal above the LED.
6. Apply the "SUSP RAISE" decal above the raise switch.
7. Apply the "SUSP LOWER" decal above the lower switch.
8. Apply the "SmartValve Instructions" decal within view of the driver.

9.5

Cab Wiring: Interface Box Connections

NOTE: Refer to the wiring drawing on page 7 for these connections.

Pin terminal information:

1. The red pin terminals are crimped to the ends of the SmartValve harness and hook-up wires. The terminals are used to connect the harness and other wires to the interface box. The wires, with terminals attached, are pushed into the appropriate contacts on the front of the green connectors as shown on the interface box wire drawing.
2. The pin terminals can be disconnected from the green connectors by fully depressing the release tab on the top of the connector.

NOTE: All wires should be stripped ¼" to accommodate the pin terminals (H18195) and splice terminals.

9.6

Harness Wiring

1. Locate the end of the main SmartValve harness. Cut the harness to desired length or coil up the excess length. Leave enough length to connect to the interface module.
2. Prepare the SmartValve harness wires and attach the pin terminals.
3. Attach the SmartValve harness wires to the proper connector locations on the interface module.

9.7

Dash Control Wiring

Use the supplied installation wires (H18211) for the following steps:

1. Locate the pushbutton switches and LED assembly as shown in the drawing.
2. Use the pin terminals, hook-up wire, and wire splices to complete the wiring to the interface module (H18130).
3. Locate a convenient place behind the dash or lower trim for the interface module (H18130). Secure the interface module using the included cable ties or other fasteners.

9.8

Power and Ground Wiring

NOTE: Refer to page 7 for connections.

Using the splices, H17641 and M15724 provided in the HPB700-28 kit, wire the following:

NOTE: If auxiliary circuits are available on the vehicle power panel, they may be used with the appropriate connectors and 10 amp fuses instead of the supplied fuse taps. Use the wire splice connectors if needed to connect the wires to the fuse assembly.

1. Locate the 12-volt fuse panel.
2. A red wire (battery) is spliced to the wire from the fuse tap. This wire connects to the un-switched 12VDC battery power.
3. An orange wire (ignition) is spliced to the wire from the other fuse tap. This wire connects to the switched 12VDC ignition power.
4. Plug the fuses into available/appropriate slots in the 12-volt fuse panel.
5. **NOTE:** Battery and ignition power must not time out or drop out during starting
6. Cut the red, orange and black wire to the proper length.
7. Attach the pin terminals to the red, orange, and black hook-up wire.
8. Connect the red wire from pin 1 on the interface panel to fused 12VDC battery power.
9. Connect the orange wire from pin 2 on the interface panel to a fused ignition power signal.
10. Connect the black ground wire from pin 3 on the interface panel to chassis ground*. A ring terminal is provided if needed.

NOTE: The black ground wire must be connected to a known "good" chassis ground. The resistance must be no greater than 2 ohms as measured from the selected ground connection point to the negative battery terminal.

9.9

Can Bus Wiring

NOTE: Refer to page 8 for connections.

1. Locate the CAN bus wires on the tractor. SmartValve must be connected to a 250kb rated Can Bus signal. The wire colors are typically yellow and green.
2. Connect the yellow and green (twisted pair) from the harness to these two wires.

NOTE: A "Y" harness is included in the kit. This harness can be used on most vehicles to improve the installation process.

9.10

SmartValve Setup Tool

1. Refer to H00700PK Instructions (H17640) to install software or set desired ride heights.
 - a. **NOTE:** The SmartValve setup tool must be pre-installed on a Windows based computer before setting these options.



Figure 4.
SmartValve Decal

9.11

SmartValve Decal and Reference Card

A SmartValve decal is included with this kit. The decal may be placed on the outside of the tractor to identify which vehicles are equipped with the SmartValve. Make sure the area is clean and dry before installation.

The SmartValve quick reference card should be placed in an accessible location within the cab of the vehicle. Note: The card is punched for installation into a standard binder.

LINK SmartValve™
Electronic Height Control

Lowering Rear Suspension

- Press and release the **SUSP LOWER** push button while moving less than 10 MPH¹ to dump the rear suspension.
- Press and release either push button to return to normal height.
- The truck will return to normal height if the truck exceeds 17 MPH¹ while dumped.

Raising Rear Suspension

- Press the **SUSP RAISE** switch while moving less than 10 MPH¹ to raise the rear suspension about 2 inches for increased ground clearance during drop and hook operation.
- To return to normal ride height press either switch for one second.
- The truck will return to standard ride height automatically if the truck speed is greater than 10 MPH¹ when raised.
- If the ignition is turned "off" and the truck is left in the raised mode, the vehicle will remain in the raised mode until the ignition is turned "on" and a pushbutton is pressed.

Reducing Tag Axle Pressure For Traction

- Press and hold the **SUSP LOWER** push button for 3 seconds while moving less than 10 MPH¹ to dump the tag axle suspension only.
- The tag axle will return to normal when the truck exceeds 17 MPH¹

Operation Summary

Current Status	Desired Mode	Action Required
Normal	Dump	Press SUSP LOWER button
Dump	Normal	Press either switch for about 1 second
Normal	Raise	Press SUSP RAISE button
Raise	Normal	Press either switch for about 1 second
Normal	Tag Axle Dumped	Press SUSP LOWER button until LED is on
Tag Axle Dumped	Normal	Press SUSP LOWER button until LED is off

¹Note: Speed thresholds are typical but may vary in some cases.

H18203
LINK MFG. 8/20/21

Figure 5.
Quick Reference Card

9.11 Electrical/Harness Connections Diagrams

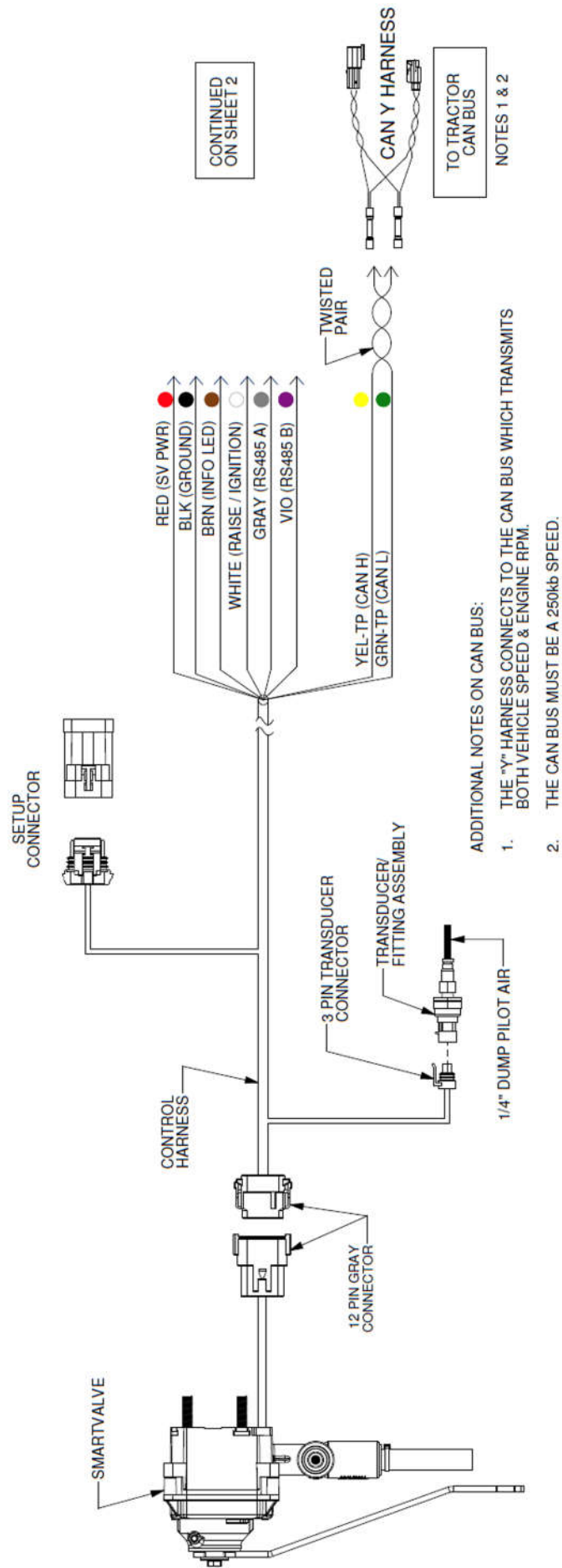
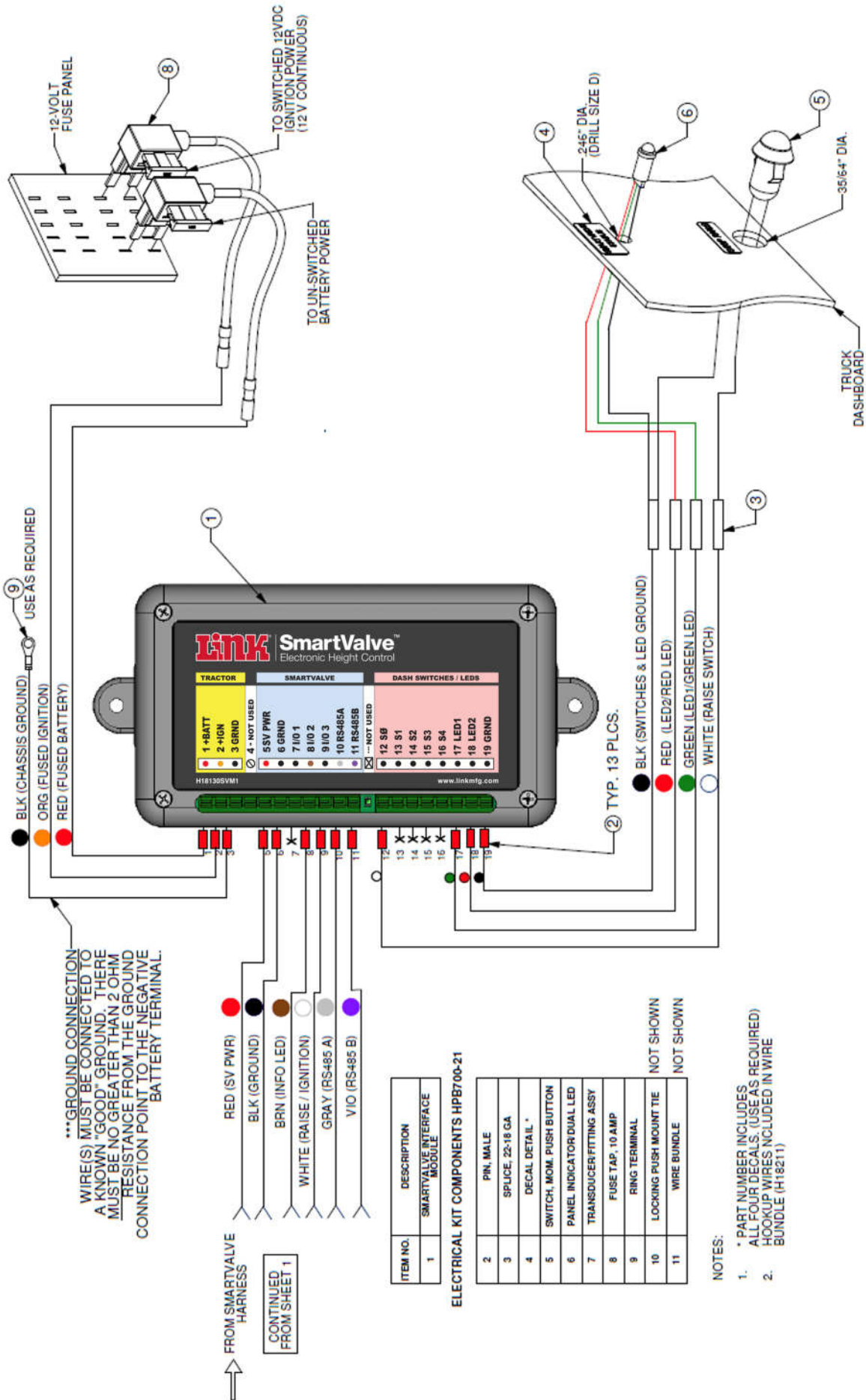


Figure 6.
Setup Connector

Figure 7. Electrical/Harness Connections



10.H00700R27A SMARTVALVE RETROFIT KIT MATERIALS SUPPLIED

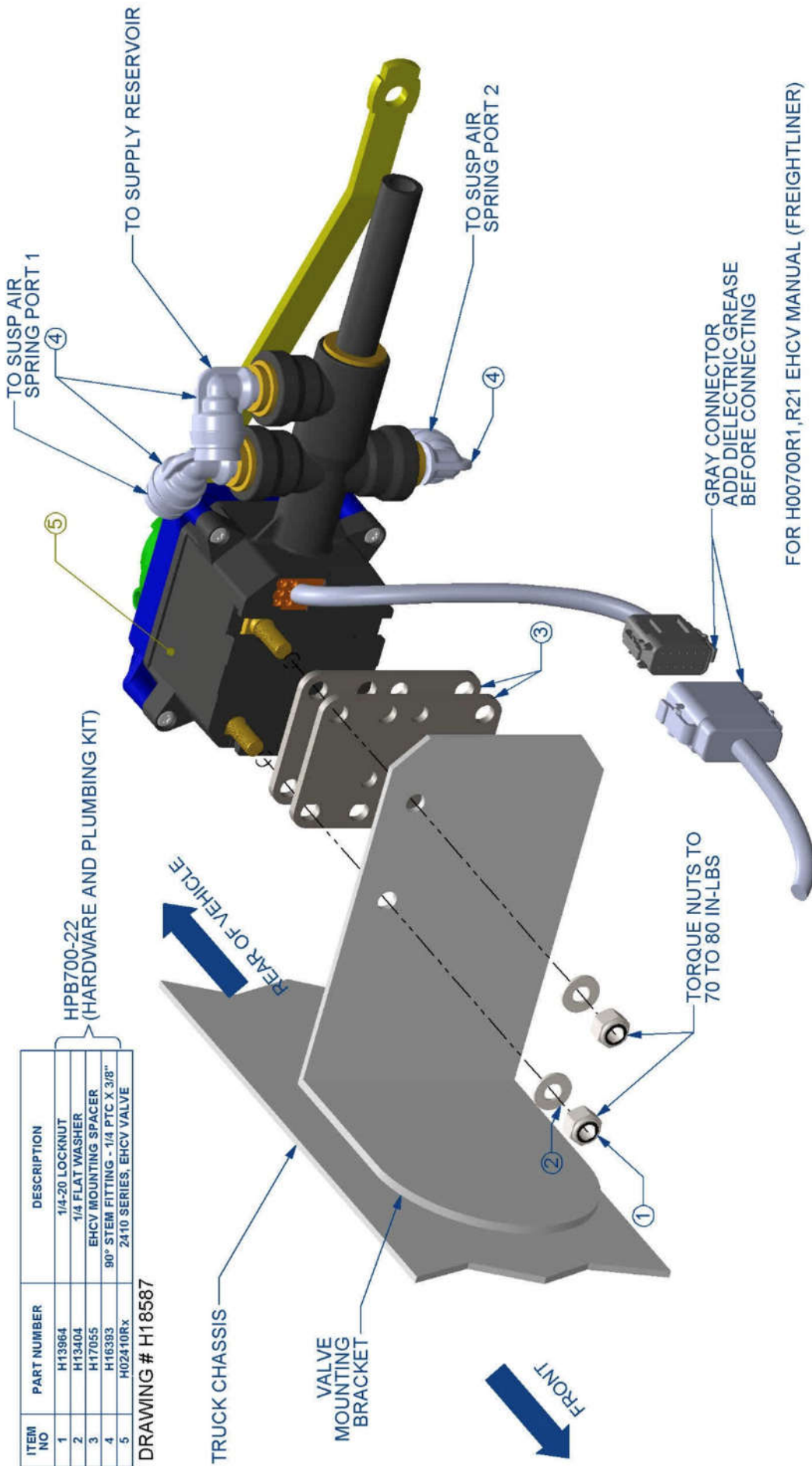
H02410RF (2410 SERIES, EHCV VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
1	1	H02410RF	LEVER POS. A. / STUD POS. A, B
2	1	H16060-08	SOFTWARE (CURRENT REVISION)

H00700R27A (2410 SERIES, EHCV KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
1	1	H02410RF	2400 SERIES, EHCV VALVE
2	1	H18130SVM1	INTERFACE MODULE
3	1	HPB700-28	ELECTRICAL KIT
4	1	HPB700-55	HARDWARE & PLUMBING KIT
5	1	H18007	HARNESS, CONTROL
6	1	H18087S	CAN Y HARNESS
6	1	HPB700-76	INSTALLATION/DECAL KIT

HPB700-28 (ELECTRICAL KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
1	1	H17628	PANEL INDICATOR (DUAL LED)
2	2	H17629	SWITCH, MOMENTARY PUSHBUTTON
3	8	H17641	BUTT CONNECTOR, 22-18 GA, CLEAR
4	4	M15724	BUTT CONNECTOR, 16-14 GA, BLUE
5	2	H18776	FUSE TAP, 10 AMP
6	1	H18783	MINI FUSE, 10 AMP
7	1	H17082	DECAL DETAIL
8	16	H18195	PIN, MALE
9	1	H14610	RING TERMINAL
10	2	H18210	LOCKING PUSH MOUNT TIE
11	1	H18211	WIRE BUNDLE

HPB700-55 (HARDWARE & PLUMBING KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
1	3	H16393	90° STEM ELBOW FITTING, 1/4" PTC X 3/8"
2	2	H17055	EHCV MOUNTING SPACER
3	2	H13404	1/4" FLAT WASHER
4	2	H13964	1/4-20 LOCKNUT

Figure 8. Retrofit Kit (H00700R27A)



FOR H00700R1, R21 EHCV MANUAL (FREIGHTLINER)

15. INSTALLATION TROUBLESHOOTING GUIDE

SmartValve		
Symptom	Cause	Solution
H0700PK data link (no response from SmartValve)	SmartValve® "Ride Setup" tool is not running on computer	Install and initiate Start SmartValve set-up tool software
	Vehicle ignition is not switched "on"	Switch ignition to "ON"
	Interface cable not plugged into SmartValve® harness	Plug the three pin connector into Smart-Valve harness. Refer to H0700PK manual
	Interface cable not plugged into computer	Plug USB connector into the computer. Refer to H0700PK manual
	Damaged interface cable (check wires)	Check wire connections or check USB interface cable function on another vehicle if available
	See " Power Issues " section at the end of this guide	
SmartValve® will not raise vehicle to "Ride Height" on startup	Vehicle ignition is not switched "on"	Switch ignition to "ON"
	Suspension reservoir air pressure below 90 PSI	Start engine to raise air pressure to greater than 90 PSI
	SmartValve® clocking is set to wrong direction (clockwise or counterclockwise)	Use H0700PK "Setup Tool" to reverse the direction. Refer to H0700PK manual
	See " Power Issues " section at the end of this guide	
Communication failed:	Verify comport is a USB com port	Open file tab, release com port, open drop down menu or refresh, select com port ending in USB, open com port

SmartValve		
Symptom	Cause	Solution
SmartValve will not raise vehicle to "over ride height position"	Vehicle ignition is not switched "on"	Switch ignition to "ON"
	J1939 CAN bus wires not connected	Connect CAN bus to the vehicle. Refer to the SmartValve manual for proper connection.
	J1939 CAN bus wires reversed	Refer to the SmartValve manual for proper connection.
	J1939 CAN speed signal not available	Use H0700PK "Ride Setup" tool to read speed status. Refer to H0700PK manual
	Suspension reservoir air pressure below 90 PSI	Start engine to raise air pressure to greater than 90 PSI
	"Raised angle" incorrectly set in Smart-Valve® setup tool	Use H0700PK "Setup tool" to set the raised height. Refer to H0700PK
	If vehicle is moving, speed exceeds 10 mph	Reduce speed to below 10 MPH
	Pushbutton or wiring failed	Use H0700PK "Setup tool" to verify the Raise Switch signal while pressing button. Refer to H0700PK manual
	See " Power Issues " section at the end of this guide	

SmartValve		
Symptom	Cause	Solution
SmartValve will not lower vehicle to "Dumped position"	Vehicle ignition is not switched "on"	Switch ignition to "ON"
	If vehicle is moving, speed exceeds 10 mph	Reduce speed to below 10 MPH
	Pushbutton or wiring failed	Use H0700PK "Ride Set-up" tool to verify the Dump Switch signal while pressing button. Refer to H0700PK manual Verify wiring connections
	See " Power Issues " section at the end of this guide	
SmartValve constantly exhausts air	SmartValve air lines plumbed incorrectly	Verify all plumbing connections (refer to SmartValve manual for plumbing information)
Vehicle raises to maximum suspension height and stays at this level	SmartValve air lines plumbed incorrectly	Verify all plumbing connections (refer to SmartValve manual for plumbing information)
Vehicle continually raises and lowers the suspension while near the ride height setting	One or more of the air lines or fittings are leaking air.	Verify that all plumbing connections are airtight. Spray a soap and water solution on the suspension fittings and air lines to detect leakage. Tighten or repair as necessary.

SmartValve		
Symptom	Cause	Solution
<u>Power Issues</u>		
	Battery voltage low or not present	Voltage reading on battery wire should be greater than 10 VDC
	Ignition voltage low or not present	Voltage reading on the ignition wire should be greater than 10 VDC continuous when the ignition is switched "on"
	Battery fuse not installed or "open"	Check fuse assembly , replace if necessary
	Ignition fuse not installed or "open"	Check fuse assembly , replace if necessary
	Connectors not attached	Check all harness connectors for proper attachment
	Connectors not fully inserted	Check all harness connectors for proper engagement. The connectors should lock together when properly installed.
	Improper grounding	Resistance must be less than 2 ohms from SmartValve ground wire to the negative battery terminal
	Intermittent battery or ignition voltage	Power may be connected to a "timed out" power source on vehicle panel (timeout intervals can be several minutes)

16. SMARTVALVE LED OPERATION DESCRIPTION – RETROFIT VALVES/ FAULT CODES

The SMARTVALVE STATUS indicator contains both red and green LEDs.

The red LED flashes quickly if power or communication is lost to the valve.

The green LED indicates the mode and faults detected during operation. A repeating pattern indicates a system mode or condition. A series of blinks arranged in pairs of groups are used to indicate system faults. This section summarizes these codes.

See Table on page 16 for full code summary.

If the red flashing LED or fault codes are present, DO NOT DRIVE until verifying suspension is in a safe state to allow safe travel.

16.1

Green LED—Mode Indication

A uniformly repeating pattern indicates the current mode of operation.

Steady On –SmartValve Initialization, Tag Dump, or Fault

A steady on light occurs for a short time after initial ECU power is applied. A steady light which does not turn off for even a few seconds after initialization may occur if the processor is not running or a short to ground is present in the LED wiring.

Short Blinks – Raise Mode

Steady ¼ second blink every two seconds show the valve is in Raised mode.

Long Blinks - Dump Mode

A steady blinking of one second on and one second off shows the valve is in Dump mode.

16.2

Green LED—Fault Codes

The system identifies several fault conditions using two groups of 1-4 blinks for each condition detected. For example, one blink followed by two blinks indicates fault code 12. All active fault conditions are repeatedly shown one after another. As described below, most faults cause changes in the system operation. All fault codes are initialized to clear during system power up.

17. SMARTVALVE OPERATING INSTRUCTIONS

Two momentary pushbutton switches and a LED have been added to the dash to select the valve's operating mode.

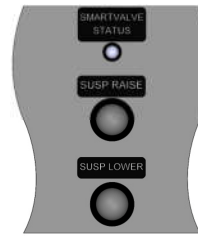


Figure 16.
Pushbutton Switch

17.1

Lowering Rear Suspension

- To dump the rear suspension: Press the “SUSP LOWER” pushbutton once..
- To return to standard ride height: Press either pushbutton
- If the “Auto Return to Ride Height” feature is enabled (default) there are speed restrictions on the dump mode:
 - The vehicle must be moving less than 10 MPH to enter the dump mode.
 - If dumped, the vehicle will return to normal ride height when the speed exceeds 17 MPH for 5 seconds.

17.2

Raising Rear Suspension

The “SUSP RAISE” switch will raise the rear suspension approximately 2 inches to allow for increased ground clearance during drop and hook operation.

- To raise the vehicle from standard height: Press the “SUSP RAISE” pushbutton.
- To return to standard ride height: Press either pushbutton.
- There are speed restrictions on the raised mode:
 - The speed of the vehicle must be less than 10 MPH to allow switching to the raised mode.
 - If raised, the vehicle will return to standard ride height automatically if the speed is greater than 10 MPH for 5 seconds.

17.3

Additional Notes

- If the ignition is turned “off” and the truck is left in the raised or lowered mode, the vehicle will remain in that mode until either button is pressed with the ignition on.
- The switches need to be pressed and held for at

Green LED operation Summary		
Symptom	Description 1	Description 2
Mode Indicators		
Steady On	Initial power on.	Lights during initial power up for approximately 5 seconds.
	Tag axle dumped	Not used.
	Program error	Indicates an error if neither condition above applies.
	Ignition fuse not installed or "open"	Check fuse assembly, replace if necessary
¼ sec. per 2 secs.	Raise mode	Vehicle raised above ride height
1 sec. on - 1 sec. off	Dump mode	Vehicle is lowering or sitting at lower suspension limit.
Fault Codes		
11: 1 blink, 1 blink	Angle sensor error	Internal valve fault or a lever installed 180 degrees out of position
12: 1 blink, 2 blinks	Angle out of range	The lever is more than 65 degrees from center. May be a linkage failure.
13: 1 blink, 3 blinks	Pressure Sensor Fault	The pressure sensor used to sense the dump signal is disconnected, open, or shorted.
14: 1 blink, 4 blinks	5 VDC fault	Indicates internal valve problem.
21: 2 blinks, 1 blink	CAN data missing	No CAN bus signals are being received. Raise feature is disabled.
22: 2 blinks, 2 blinks	Low Supply	Supply voltage is too low to reliably operate valve. Poor ground connection(s).
23: 2 blinks, 3 blinks	Ign/raise signal	Voltage out of range.
24: 2 blinks, 4 blinks	Extreme Board Temperature	Indicates extreme temperature
31: 3 blinks, 1 blink	Motor Feedback Fault	Internal valve fault
32: 3 blinks, 2 blinks	Motor driver fault	Internal valve fault
33: 3 blinks, 3 blinks	Motor not reaching target	Internal valve fault
34: 3 blinks, 4 blinks	Motor Centering out of range	Internal valve fault
41: 4 blinks, 1 blink	Suspension too high	Indicates the suspension is higher than expected. Valve is not able to correct.
42: 4 blinks, 2 blinks	Suspension not raising	Suspension is not rising due to air pressure, leakage, or other issues.
43: 4 blinks, 3 blinks	Unable to close valve	Internal valve fault
44: 4 blinks, 4 blinks	Valve not responding	Internal valve fault