

SmartValve™
Electronic Height Control

Link®

Link Mfg. Ltd.
223 15th St. N.E.
Sioux Center, IA USA
51250-2120
www.linkmfg.com

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

INSTALLATION INSTRUCTIONS

SMARTVALVE

6X4 WITH PRESSURE SENSOR

FREIGHTLINER	H00700R1A
KENWORTH	H00700R2A
INTERNATIONAL	H00700R3A
PETERBILT	H00700R4A
VOLVO	H00700R5A
MACK	H00700R6A



Step by step installation videos of SmartValve at www.youtube.com.
Search "Installing Link SmartValve".

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 document contains information to assist in the installation of a SmartValve. These instructions are intended solely for use by qualified personnel and with the products listed on the first page. Operation instructions are also provided at the end.

For additional information or assistance, please refer to the Link Manufacturing website and contact Link Customer Service.

2 SYSTEM OVERVIEW

The H00700RxA retrofit kits provide control of the chassis air suspension for Class 8 trucks in a 6X4 axle configuration utilizing an existing rear suspension dump switch control. 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 ease trailer coupling operations.



The OEM-installed suspension lower (dump) switch and a second suspension raise switch are used by the driver to command the system. An indicator lamp provides system status. A pressure sensor is used to detect the dump pilot air pressure rather than adding a second pushbutton switch.




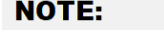
The SmartValve system limits the dump and raise features to when the truck is stopped or moving at slow speeds. The system will automatically return from the over-height setting to standard height when wheel speed exceeds 7 mph. The SmartValve system can be set to override the OEM dump switch automatically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

Major components of the SmartValve kit include:

- SmartValve
- Interface Module
- Wiring Harness

3 DOCUMENT SYMBOLS

	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.

4 SAFE WORKING PRACTICES

CAUTION

When handling parts, wear appropriate gloves, eyeglasses, 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.

5 CAN BUS, VEHICLE WIRING, AND SETUP TOOL NOTICES

SmartValve must be installed on a vehicle equipped with a functioning 250 kbit/s SAE J1939 Controller Area Network (CAN bus). The J1939 bus provides active information, such as vehicle speed, required by SmartValve for safe operation.

Vehicles having only a 500 kbit/s network must use a Link H00701SDC CAN Bus Data Converter to provide 250 kbit/s communication. The lower speed is required for both for message rate compatibility and because of the cable length restriction in the 500 kbit/s standard. Refer to Link document H19054 for installation information regarding the H00701SDC.

SmartValve may be connected to the vehicle wiring using the provided fuse taps and CAN Y-cable or through an RP1226 Vehicle Accessory Connector, if available.

A Link H00700PK Setup Tool is required to properly configure the SmartValve.

The SmartValve Setup Tool is a USB interface cable and software application that must be installed on a computer running Microsoft Windows.

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

6 TOOLS REQUIRED

- Wrenches 7/16", 1/2"
- Torque Wrench with 7/16" socket set to 70 in-lb
- Soap Solution (for leak testing)
- Wire cutter

- Wire stripper
- Drill bits 3/8": pushbutton, Letter "D": LED
- Drill
- Sharp air hose (tubing) cutter
- Screwdrivers
- Tape measure
- Multimeter (volt-ohm) tester
- Crimping tool (for insulated wire terminals)
- Heat gun (optional, for crimp terminals)
- Center punch
- Deburring tool (for pushbutton switch holes)
- Link H00700PK SmartValve Setup Tool

7 MATERIALS REQUIRED

Replacement and Installation

- Nylon cable ties
- Non-silicone waterproof grease (recommended: DeoxIT grease Type L260Np)-for external electrical connections.

Installation

- Electrical tape
- Heat shrink tubing (if required)
- Misc. DOT air fittings (as needed)
- Alcohol wipe (to prep dash for decal adhesive)

8 VEHICLE PREPARATION PROCEDURE

IMPORTANT: READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE INSTALLATION.

8.1 Electrical Connection Locations

1. Determine the location of connection points to these vehicle wiring circuits: battery, ignition, ground, and CAN. These could be at a fuse panel, behind cab trim, or through an RP-1226 connector. Additional wiring details are provided later in this document.
2. Determine a location to mount the SmartValve operator button(s) and status lamp.
3. Determine an in-cab location to mount the Smart Valve interface module that will facilitate connection of wires to these locations and the SmartValve harness.

8.2 Suspension Ride Height

1. Measure and record tractor suspension ride height per manufacturer's instructions.
2. Compare measurement to the manufacturer's recommended dimension and resolve any difference.
3. Optional: Measure and record tractor ride height at lowered (dumped) position.

These dimensions will be used in later adjustments when the SmartValve programming is configured.

8.3 Valve Removal

⚠ WARNING

Vehicle must be in park with the engine off.

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 pressure from the reservoir that supplies the height control valve.

⚠ CAUTION

Make sure the tractor suspension is fully lowered to the stops and all suspension air springs are unpressurized before continuing.

NOTE:

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

3. Disconnect and plug the dump pilot line at the height control valve.
4. Disconnect the supply and suspension air lines from the height control valve.
5. Remove the linkage bolt at the end of the height control valve lever. (Save this fastener)
6. Remove the valve mounting fasteners. (Usually two)
7. Remove the valve from the mounting bracket.
8. Set the valve aside for reference.

8.4 Valve Air Line Preparation

SmartValve is designed to connect to 3/8" Plastic Air Brake Tubing conforming to DOT FMVSS 106.

The dump pilot sensor is designed to connect to 1/4" Plastic Air Brake Tubing conforming to DOT FMVSS 106.

- Inspect the valve air lines for damage and replace if necessary.
- Using an air tubing cutter, squarely trim about 1/2" length from the end of each tube. (This should provide an undistorted area that has not previously engaged a fitting.)
- Make sure the end of each air tube is clean, cut squarely, and without sharp points.

NOTE:

Preparing the tube ends is required to create an effective seal between the exterior surface of the air tubing and the internal surface of the valve fittings. Roughness, scrapes, sharp edges, or kinks can prevent seal contact or damage the seal surface.

9 SMARTVALVE INSTALLATION

IMPORTANT: READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE INSTALLATION.

9.1 Mechanical Assembly

NOTE:

Refer to sections 11 through 16 and review the diagram that applies to your vehicle model.

- FREIGHTLINER
- KENWORTH-OPTION 1 & 2
- INTERNATIONAL
- PETERBILT-OPTION 1 & 2
- VOLVO
- MACK

Assembly Process:

1. Install the SmartValve Assembly to the valve bracket according to the vehicle model diagram.
2. Torque the mounting studs to 70 to 80 in-lbs.
3. Connect the SmartValve lever to the linkage that was removed from the original height control valve.

NOTE:

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

4. Torque the linkage fastener to 70 to 80 in-lbs.
5. Clean the ends of the air tubes before assembly into the new valve.
6. Connect the air supply tube from the reservoir to the port on the valve labeled "SUPPLY".
7. Connect the air tubes from the suspension air springs each to one of the two ports labeled "SUSP".

NOTE:

The air tubing connections should be leak tested after the SmartValve programming is configured.

9.2 Harness Routing

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

CAUTION

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

9.3 Electrical Connection to Valve and Pressure Sensor

NOTICE

Before making electrical connections, disconnect power by removing fuses, or other means. Ensure all wiring is correct before applying power. Equipment may be permanently damaged if power is applied incorrectly or if energized circuits are shorted.

NOTE:

Refer to section 10 ELECTRICAL CONNECTION REFERENCE for electrical wiring diagrams.

NOTE:

Apply a non-silicone water displacing sealant such as DeoxiT Grease Type L260Np to the 12-pin valve connector as shown below.

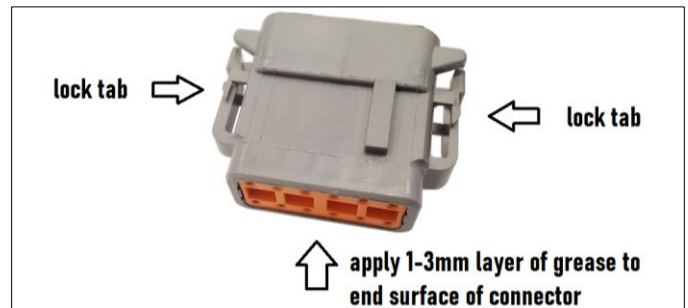


Figure 1 Connector Detail

1. Plug the 12 pin SmartValve electrical connector into the corresponding connector at the end of the harness – Be sure to push the connectors completely together until both lock tabs engage with a "click".
2. Locate the pressure sensor and fitting assembly (H17636-01). See Figure 2.



Figure 2 Pressure sensor assembly with cable disconnected.

3. Locate the dump pilot tube and push tube completely into the pressure sensor air fitting.
4. Locate the black 3-pin connector on the harness and connect to the pressure sensor.
5. Secure the pressure sensor and harness to the cable bundle along the vehicle frame. Ensure the assembly is away from moving parts and pinch points.

9.4 LED and Switch Installation

See Figure 3 SmartValve Dash Components for the intended arrangement of the SmartValve control button, status lamp, and Electronic Height Control function label.

NOTE:

Provide space around the pushbutton switch and lamp hole locations to apply the decals. Pass the switch and lamp wires through the mounting holes before splicing.

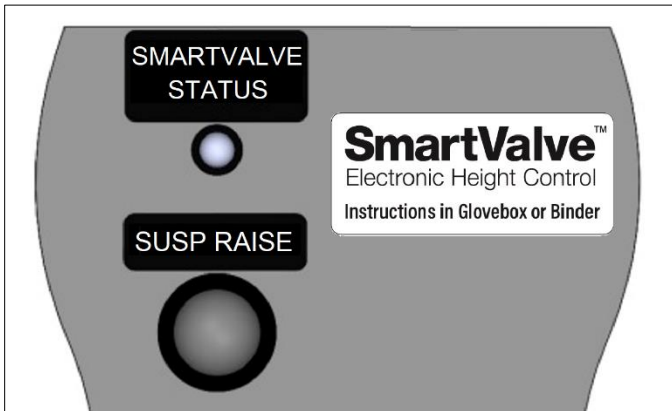


Figure 3 SmartValve Dash Components

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

NOTE:

If necessary, use a deburring tool to clean the holes. Keep the inside edge of the holes square so that the switch and lamp retaining clips remain secure.

4. Push the LED and switches into the dash until they click into place. (no fasteners 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 "SmartValve Instructions" decal within view of the driver.

9.5 Electrical Interface Module Installation

NOTE:

Refer to Section 10 ELECTRICAL CONNECTION REFERENCE for electrical connection diagrams and instructions for use of the crimp terminals and terminal blocks.

A red pin terminal must be crimped to the end of each wire before insertion into the Interface Module terminal block.

After verifying all electrical connections, mechanically secure the Interface Module and all wiring to prevent loosening or abrasion during vehicle motion or service work.

9.6 Harness Wiring

1. Locate the end of the main SmartValve harness that was routed to the cab. Leave enough length to connect to the interface module and CAN bus and cut the harness wires or coil up the excess.
2. Prepare the SmartValve harness wires and attach the pin terminals according to the directions in Section 10.1 Pin Terminal Wire Attachment.
3. Connect the SmartValve harness wires to the proper connector locations on the interface module according to the directions in Section 10.2 Pin Terminal Block Connection.

9.7 Dash Control Wiring

Use the hook-up wire (H18211) for the following steps:

1. Reference the provided connection diagrams and route wires to the installed pushbutton switch(es) and LED assembly.
2. Use the pin terminals, hook-up wire, and wire splices to complete the wiring to the interface module (H18130SVM1).
3. Locate a convenient place behind the dash or lower trim for the interface module (H18130SVM1). Secure the interface module using the included cable ties or other fasteners.
4. Secure wiring to prevent loosening or abrasion during vehicle motion or service work.

9.8 CAN Bus Wiring

NOTE:

Refer to section 10 ELECTRICAL CONNECTION REFERENCE for electrical connection diagrams and instructions for use of the crimp terminals and terminal blocks. Installations utilizing the H00701SDC CAN Bus Data Converter should also use the instructions provided with that product.

1. Locate the CAN bus wires on the tractor. SmartValve must be connected to a 250kb CAN bus (network). The wire colors are typically yellow and green and will be twisted together. (Twisting of the wire pair supports high speed data transfer by creating a more consistent wire spacing and uniform exposure to the electromagnetic environment.)
2. Connect the yellow and green (twisted pair) from the harness to these two wires.
3. Secure wiring to prevent loosening or abrasion during vehicle motion or service work.

NOTE:

A “Y” harness is included in the kit. This harness can be used on many vehicles to connect to the vehicle network at an existing connector pair.

9.9 Power and Ground Wiring

NOTICE

Before making connections to the vehicle electrical system, disconnect power by removing fuses, or other means. Ensure all wiring is correct before applying power. Equipment may be permanently damaged if power is applied incorrectly or if energized circuits are shorted.

NOTE:

Refer to section 10 ELECTRICAL CONNECTION REFERENCE for electrical connection diagrams and instructions for use of the crimp terminals and terminal blocks

NOTE:

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

Installations utilizing the H00701SDC CAN Bus Data Converter can supply both the SmartValve and Converter from the same fuses and ground point.

When using the CAN Bus Converter, connections to vehicle power, ignition, ground and 500k CAN may also be possible through an RP1226 connector using Link part H19038. Refer to the instructions provided with H00701SDC CAN Bus Data Converter.

1. Locate the 12-volt fuse panel. Locate a fuse that provides constant battery power. Locate a fuse that provides power when the ignition switch is on.
2. Connect the harness red wire (battery) to the wire from a fuse tap. This will connect to the unswitched 12VDC battery power.
3. Connect the harness orange wire (ignition) to the wire from another fuse tap. This wire will connect to the switched 12VDC ignition power.
4. Plug the fuse taps into appropriate slots in the 12-volt fuse panel, but do not install fuses yet. Route the wires to the Interface Module and cut the red, orange, and black wire to a proper length.
5. Attach the pin terminals to the red, orange, and black wire.
6. Connect the red wire to pin 1 on the interface panel to fused 12VDC battery power.
7. Connect the orange wire from pin 2 on the interface panel to a fused ignition power signal.

8. Connect the black ground wire from pin 3 on the interface panel to chassis ground. A ring terminal is provided if needed.

NOTE:

The ground wire must be connected to a terminal or structure that has adequate electrical continuity to the negative battery terminal. Adequate continuity can be determined by confirming that, from the selected ground connection point to the negative battery terminal, the measured voltage is less than 0.01 volts, and the measured resistance is less than 2 ohms.

9.10 SmartValve Setup Tool

1. Refer to H00700PK Instructions (H17640) to use the USB adapter with a PC to configure the Smart Valve height settings.
2. Set the ride height to the OEM specifications.

NOTE:

The SmartValve setup tool must be installed on a Windows based computer before setting these options.

9.11 Air Leak Check

Check for air leaks at the tube ends near the SmartValve and air springs using a soap solution. Completely rinse soap residue.

9.12 SmartValve Decal & 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.



Figure 4 SmartValve Decal

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. A copy of the card is shown in section 21 SmartValve Quick Reference.

10 ELECTRICAL CONNECTION
REFERENCE

10.1 Pin Terminal Wire Attachment

Crimping instructions for Link H18195 pin terminals used with H18130SVM1 SmartValve Interface Module.

Strip wire insulation 5.2 – 6.0 mm (.20 -.23 in). This is approximately the outer diameter of the terminal insulator.

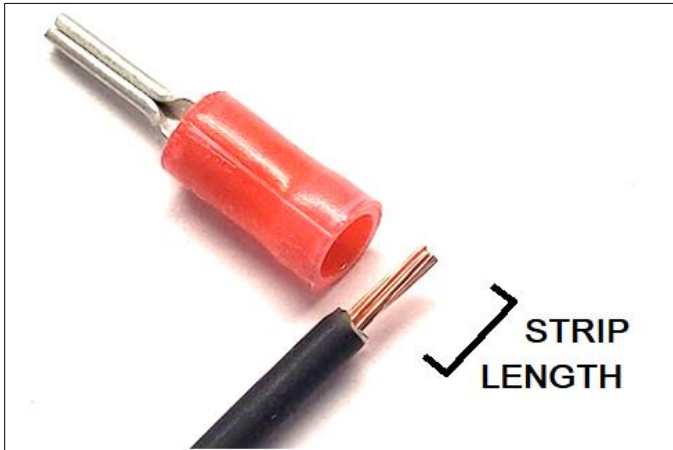


Figure 5 Pin Terminal Wire Preparation

Insert wire into terminal and crimp the wire area as shown below.

Use a non-indenting crimp tool designed for plastic insulated terminals.

Confirm that the wire extends to the end of the plastic insulator but not to the pin and that the wire is securely attached to the terminal.

A properly crimped terminal should withstand 89 N (20 pounds) force pulling straight back on the wire. Do not allow wire strands to extend past the terminal.

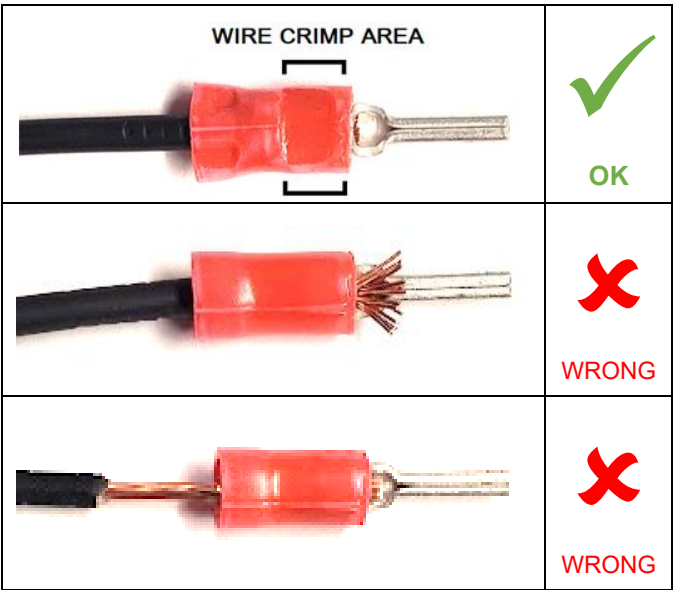


Figure 6 Pin Terminal Crimp Guide

10.2 Pin Terminal Block Connection

The pin terminals attach to the interface module terminal block by simply inserting the pin into the terminal block. They are retained by an internal spring.

The pin terminals can be disconnected from the connector blocks by fully depressing the green release tab on the top of the connector. See Figure 7.

In some rare circumstances, such as if the release tab is misaligned or damaged, sufficient retraction of the pin locking spring is prevented. In such a scenario, pin removal can be attempted by rotating the pin while gently pulling it outward. It should release in 2 to 3 turns.

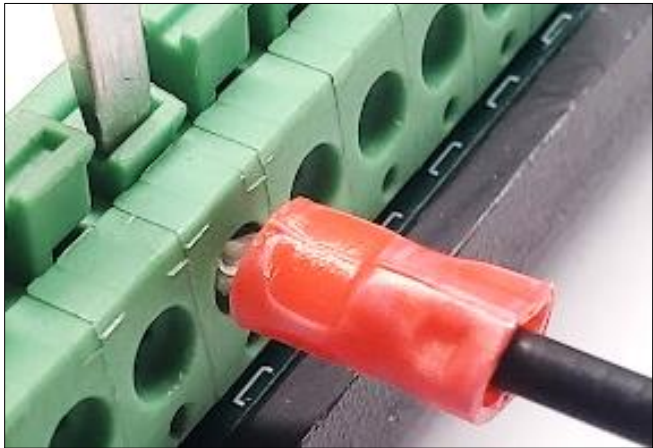


Figure 7. Terminal block with connected pin and 3mm (1/8") screwdriver blade positioned on release tab.

10.3 Wire Splice Connectors

The installation kit includes butt splice connectors (H17641) for connecting 22-18 AWG wires. These crimp connectors have clear heat-shrinkable insulation and wire-position windows to enable visible confirmation of complete wire insertion.

To splice SmartValve wiring with H17641, strip wire insulation 6 – 9 mm (.24– .35 in), insert into terminal, and crimp at the red lines using a non-indenting tool designed for heat-shrink insulated terminals. Heating the shrink tube with an appropriate heat source is recommended to provide strain relief to the connection.

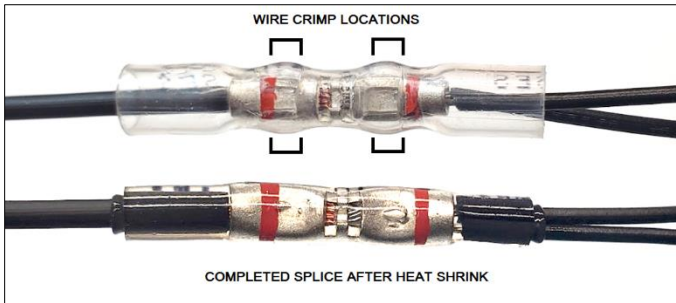


Figure 8 Crimp Splice with Heat Shrink Insulation.

10.4 RP1226 Connection

The RP1226 connector is a standardized electrical interface optionally provided by vehicle manufacturers to facilitate connection of the vehicle J1939 CAN bus to aftermarket vehicle accessories such as Electronic Logging Devices.

An RP1226 connector can be used in place of the fuse taps and CAN Y-cable.

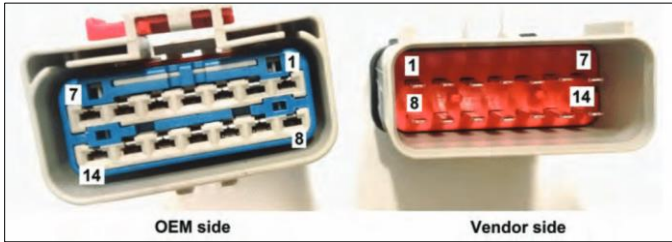


Figure 9. RP1226 Connectors

The OEM may provide multiple RP1226 connectors to support additional accessory devices. Connecting multiple devices to the CAN signals of an RP1226 connector using Y-adaptors or splices is a violation of the TMC RP1226 and SAE J1939 standards because doing so could cause signal interference.

Some SmartValve installation kits includes crimp terminals (H18999) that are compatible with the connector body that is used on the non-OEM side of the RP1226 connector pair. The housing (Aptiv 10757673) is not provided by Link Mfg. An empty connector housing may be provided as a cover for the OEM-side RP-1226 connector.

The Link H18999 terminals can be crimped to installation kit wires and assemble into the connector housing.

To attach the H18999 terminals, strip the wire insulation back 3 to 5 mm and use a crimp tool that creates a B-shaped cross section to create an assembly as shown below.



Figure 10 RP1226 Terminal Crimp Guide

To assemble the RP1226 connector, ensure that the terminal retainer wedge is pulled out to the unlocked position, as shown in figure below. Then insert the terminal and wire at the appropriate position. Push it through the end seal until it latches into a fixed position with the terminal end near the face of the retainer wedge. See Figure 12 RP1226 Connector Terminal Insertion.

Push the wedge into the connector housing to secure the terminal latches.

To remove a terminal from the connector housing, use a narrow pliers to pull the wedge completely out and then

use a pick next to the pin to pry the terminal latch while pulling the wire back.

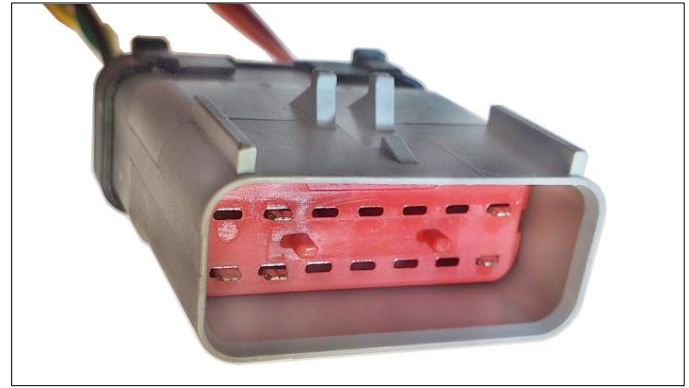


Figure 11 RP1226 Connector Terminals Unlocked



Figure 12 RP1226 Connector Terminal Insertion

The RP1226 Connector terminals used for connection to SmartValve are identified in the figure below. The graphical arrangement corresponds to the wire side of the connector.

SmartValve Wire Color					
Rp1226 Circuit					
		PIN			
RED	BATT	14	7	IGN	ORANGE
		13	6		
		12	5		
		11	4		
		10	3		
GREEN	CAN-L	9	2	CAN-H	YELLOW
BLACK	GND	8	1		

Figure 13 RP1226 Connector Pinout

10.5 Ring terminal for grounding screw

When a suitable ground terminal is not available near the selected interface module location, ring terminal is provided to facilitate attachment of the ground wire to a #10 screw. The installer must ensure that the ground screw connection is electrically conductive and mechanically secure. To attach the H14610 terminal, strip the wire insulation back 5.2 – 6.0 mm (.20 - .23 in). and use a crimp tool that creates a B-shaped cross section to create an assembly as shown below.



Figure 14 B-form Terminal Crimping



Figure 15 H14610 Terminal Crimped to Wire

10.6 Interface Module Mounting

Insert the provided push lock zip ties into the mounting flanges of the interface module. Use the ties to secure the module to an appropriate structure.



Figure 16 Push Lock Tie on Interface Module

10.7 WIRING DIAGRAMS

The diagrams on the following pages indicate the intended electrical connections among the SmartValve components.

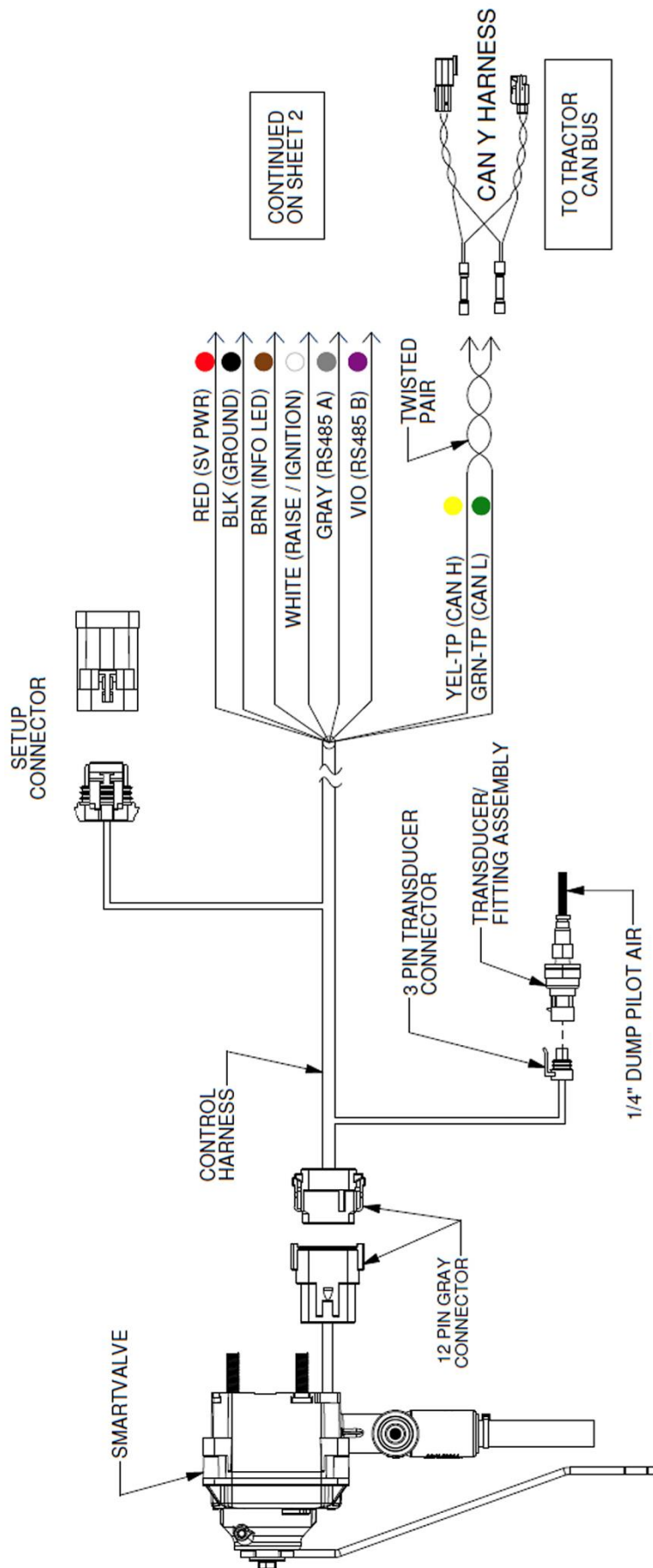
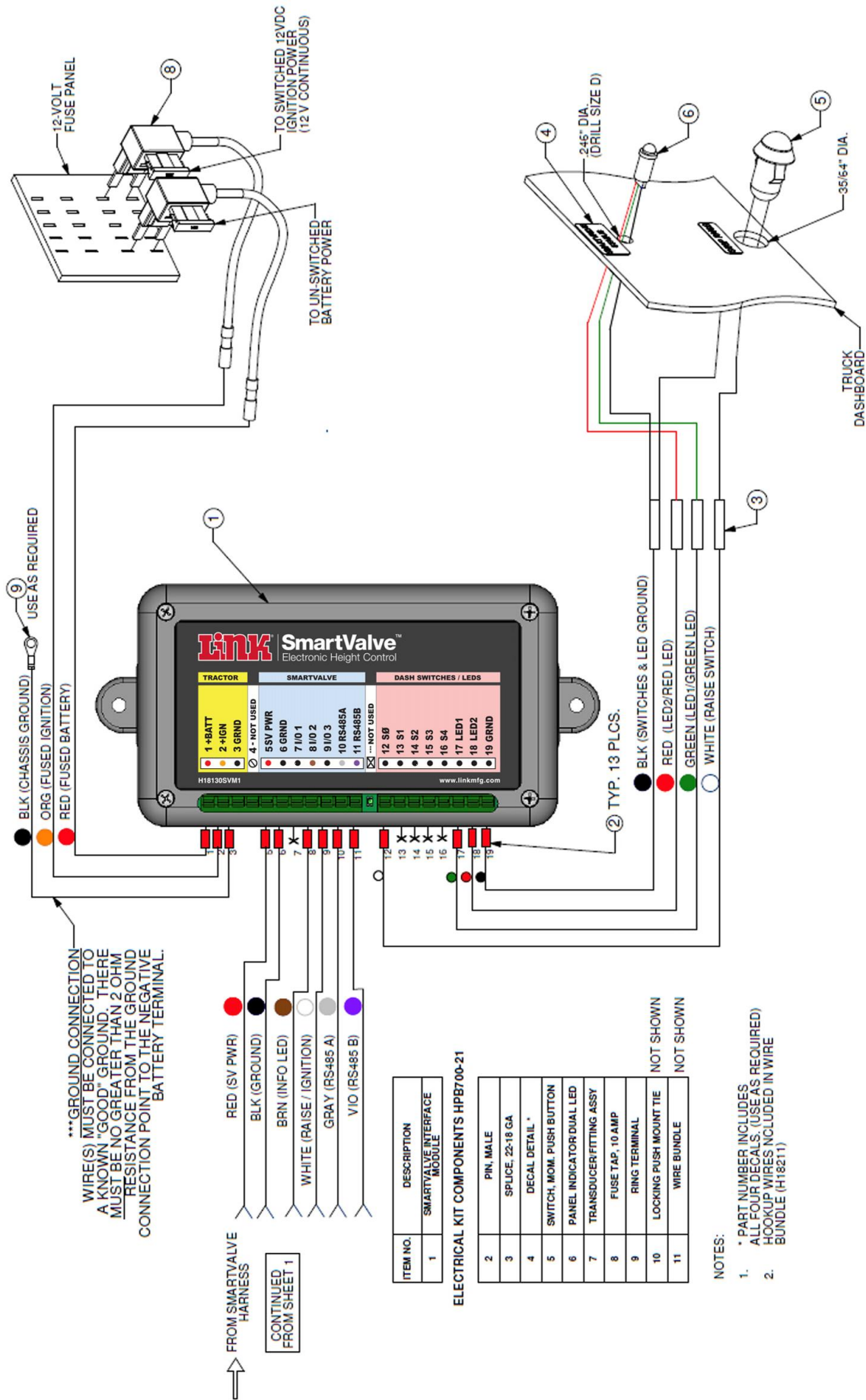


Figure 17 Electrical Harness Connections



11 FREIGHTLINER (H00700R1A) MATERIALS SUPPLIED

H00700R1A (2410 SERIES, EHC VALVE KIT SMARTVALVE & DUMP VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
1.1	1	H02410RA-1	2410 SERIES, EHC VALVE
1.2	1	H18130SVM1	SMARTVALVE INTERFACE MODULE
1.3	1	HPB700-61	ELECTRICAL KIT
1.4	1	HPB700-55	HARDWARE & PLUMBING KIT
1.5	1	H17095	HARNESS, CONTROL
1.6	1	H18087	CAN Y HARNESS
1.7	1	HPB700-50	INSTALLATION INSTRUCTIONS/DECAL KIT
1.8	5	H18999	RP1226 CONNECTOR TERMINALS

H02410RA-1 (2400 SERIES, EHC VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
2.1	1	H02410RA-1A	LEVER POS. A. / STUD POS. A, B
2.2	1	H16060-01	SOFTWARE

HPB700-61 (ELECTRICAL KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
3.1	1	H17628	PANEL INDICATOR (DUAL LED)
3.2	2	H17629	SWITCH, MOMENTARY PUSHBUTTON
3.3	6	H17641	BUTT CONNECTOR, 22-18 GA
3.4	2	H18776	FUSE TAP, 10 AMP
3.5	2	H18783	MINI FUSE, 10 AMP
3.6	1	H17636-01	TRANSDUCER/FITTING ASSEMBLY
3.7	1	H17082	DECAL DETAIL
3.8	15	H18195	PIN, MALE
3.9	1	H14610	RING TERMINAL
3.10	2	H18210	LOCKING PUSH MOUNT TIE
3.11	1	H18211	WIRE BUNDLE

HPB700-55 (HARDWARE & PLUMBING KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
4.1	3	H16393	STEM, ELBOW – 3/8"
4.2	2	H17055	SMARTVALVE MOUNTING SPACER
4.3	2	H13404	WASHER, 1/4 X 1/2"
4.4	2	H13964	1/4-20 LOCKNUT

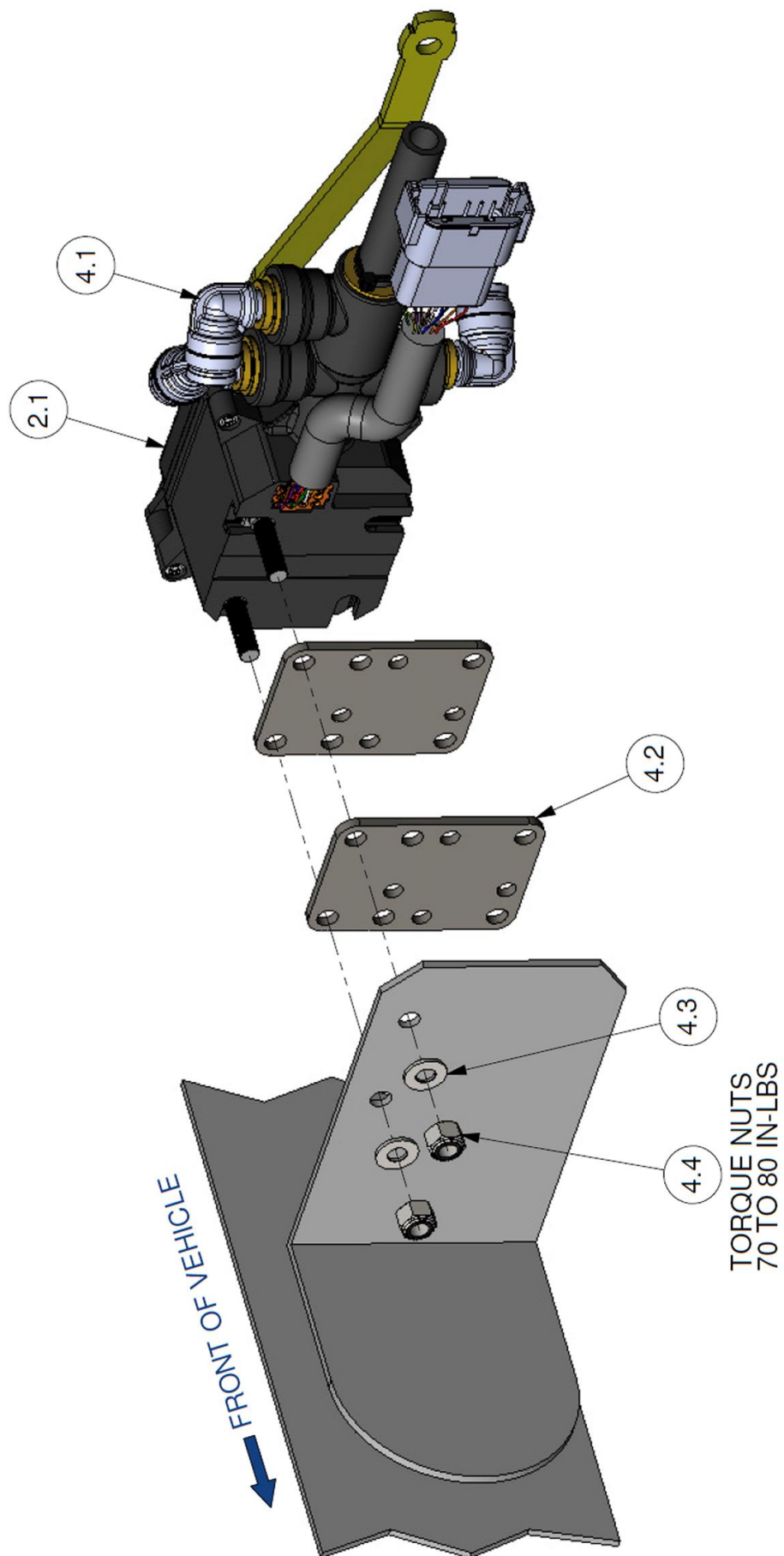


Figure 19 FREIGHTLINER (H00700R1A)

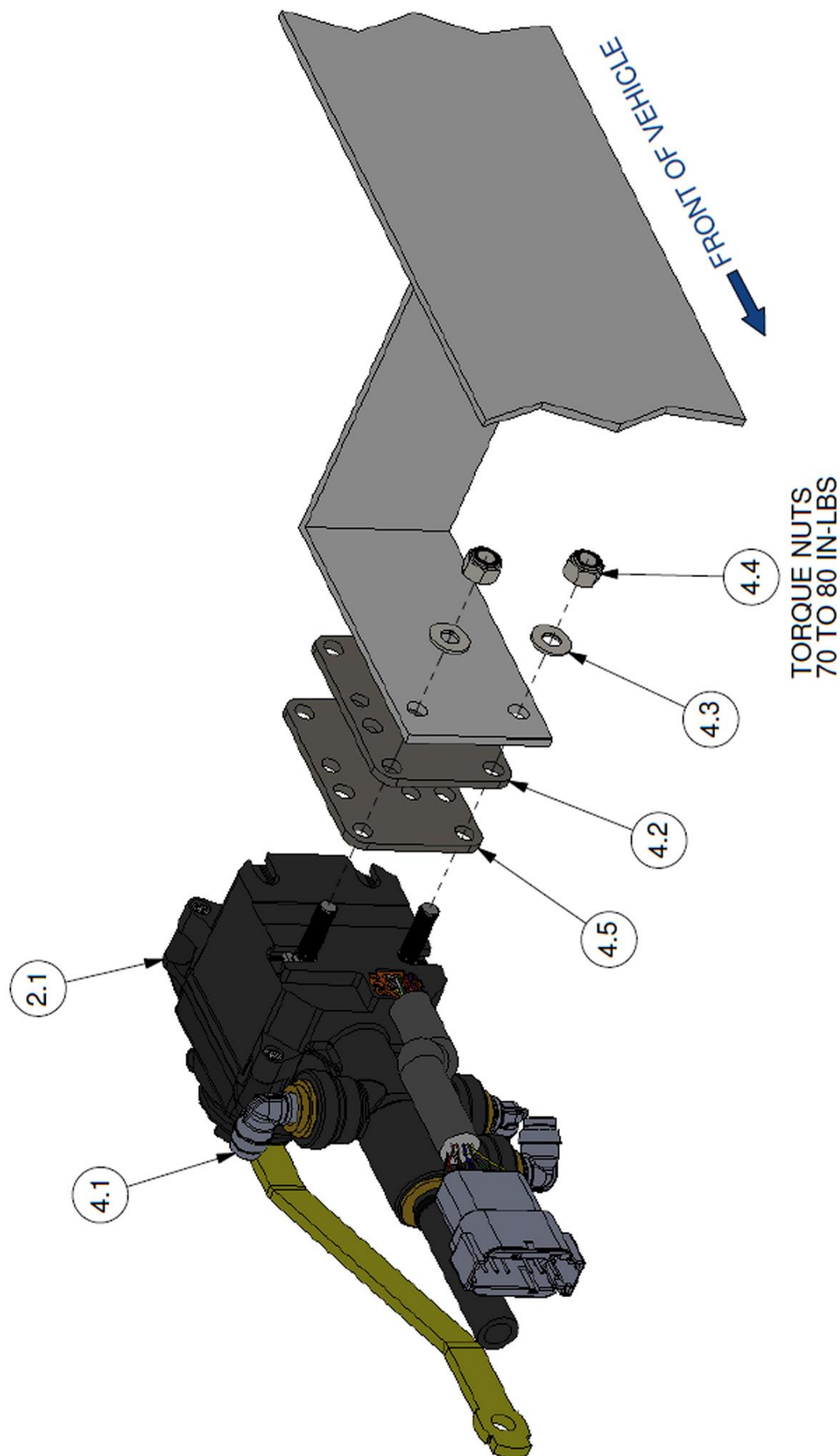
12 KENWORTH (H00700R2A)-OPTION 1 & 2 MATERIALS SUPPLIED

H00700R2A (2410 SERIES, EHCV KIT SMARTVALVE & DUMP VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
1.1	1	H02410RB-1	2410 SERIES, EHCV VALVE
1.2	1	H18130SVM1	INTERFACE MODULE
1.3	1	HPB700-61	ELECTRICAL KIT
1.4	1	HPB700-56	HARDWARE & PLUMBING KIT
1.5	1	H17095	HARNESS, CONTROL
1.6	1	H18016	CAN Y HARNESS
1.7	1	HPB700-50	INSTALLATION INSTRUCTIONS / DECAL KIT
1.8	5	H18999	RP1226 CONNECTOR TERMINALS

H02410RB-1 (2400 SERIES, EHCV VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
2.1	1	H02410RB-1A	LEVER POS. A. / STUD POS. B, C
2.2	1	H16060-08	SOFTWARE

HPB700-61 (ELECTRICAL KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
3.1	1	H17628	PANEL INDICATOR (DUAL LED)
3.2	2	H17629	SWITCH, MOMENTARY PUSHBUTTON
3.3	8	H17641	BUTT CONNECTOR, 22-18 GA
3.4	2	H18776	FUSE TAP, 10 AMP
3.5	2	H18783	MINI FUSE, 10 AMP
3.6	1	H17636-01	TRANSDUCER/FITTING ASSEMBLY
3.7	1	H17082	DECAL DETAIL
3.8	16	H18195	PIN, MALE
3.9	1	H14610	RING TERMINAL
3.10	2	H18210	LOCKING PUSH MOUNT TIE
3.11	1	H18211	WIRE BUNDLE

HPB700-56 (HARDWARE & PLUMBING KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
4.1	3	H16393	STEM, ELBOW 3/8"
4.2	1	H17055-1	MOUNTING PLATE/STUD ASSY
4.3	4	H13404	WASHER, 1/4 X 1/2"
4.4	4	H13964	1/4-20 LOCKNUT
4.5	1	H17055	SMARTVALVE MOUNTING SPACER



NOTE: IF MOUNTING KIT ON TRACTOR EQUIPPED WITH LOW AIR LEAF OPTION, INSTALL THE H00700AG400L SUSPENSION KIT.

HARDWARE/PLUMBING KIT: REMOVE STUDS IN H17055-1 FOR THIS OPTION.

Figure 20 KENWORTH (H00700R2A) Option 1

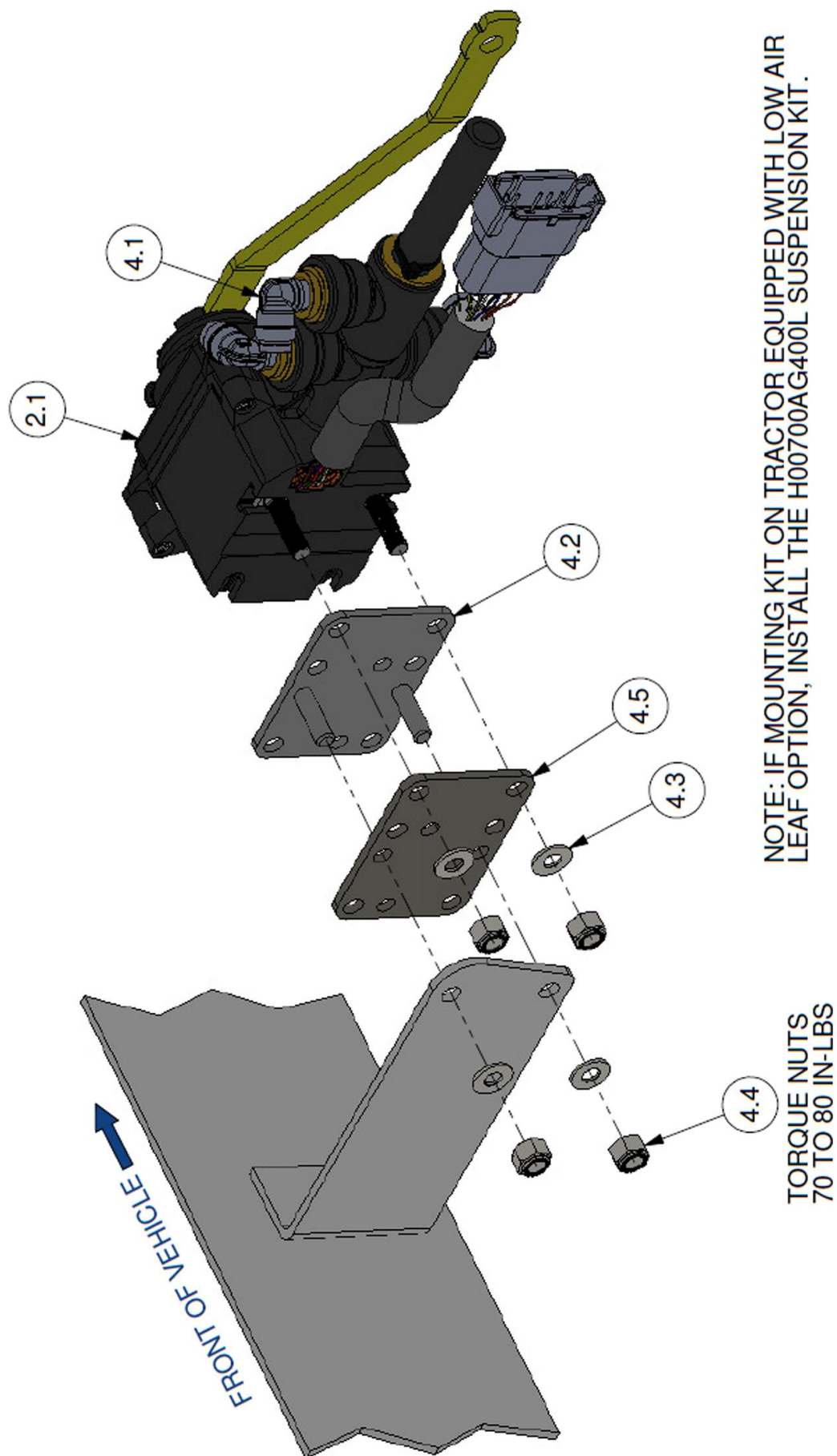


Figure 21 KENWORTH (H00700R2A) Option 2

13 INTERNATIONAL (H00700R3A) MATERIALS SUPPLIED

H00700R3A (2410 SERIES, EHCV KIT SMARTVALVE & DUMP VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
1.1	1	H02410RC-1	2410 SERIES, EHCV VALVE
1.2	1	H18130SVM1	SMARTVALVE INTERFACE MODULE
1.3	1	HPB700-61	ELECTRICAL KIT
1.4	1	HPB700-57	HARDWARE & PLUMBING KIT
1.5	1	H17095	HARNESS, CONTROL
1.6	1	HPB700-50	INSTALLATION INSTRUCTIONS & DECAL KIT
1.7	1	H18015	CAN Y HARNESS
1.8	1	H18254	CAN Y HARNESS
1.9	1	H19065	RP1226 CONNECTOR INTERFACE

H02410RC-1 (2400 SERIES, EHCV VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
2.1	1	H02410RC-1A	LEVER POS. A. / STUD POS. B, C
2.2	1	H16060-01	SOFTWARE

HPB700-61 (ELECTRICAL KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
3.1	1	H17628	PANEL INDICATOR (DUAL LED)
3.2	2	H17629	SWITCH, MOMENTARY PUSHBUTTON
3.3	8	H17641	BUTT CONNECTOR, 22-18 GA, CLEAR
3.4	2	H18776	FUSE TAP, 10 AMP
3.5	2	H18783	MINI FUSE, 10 AMP
3.6	1	H17636-01	TRANSDUCER/FITTING ASSEMBLY
3.7	1	H17082	DECAL DETAIL
3.8	16	H18195	PIN, MALE
3.9	1	H14610	RING TERMINAL
3.10	2	H18210	LOCKING PUSH MOUNT TIE
3.11	1	H18211	WIRE BUNDLE

HPB700-57 (HARDWARE & PLUMBING KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
1.1	3	H16393	STEM, ELBOW 3/8"
1.2	1	H17060-1	MOUNTING PLATE/STUD ASSEMBLY
1.3	4	H13404	WASHER, 1/4 X 1/2"
1.4	1	H13964	1/4-20 LOCKNUT

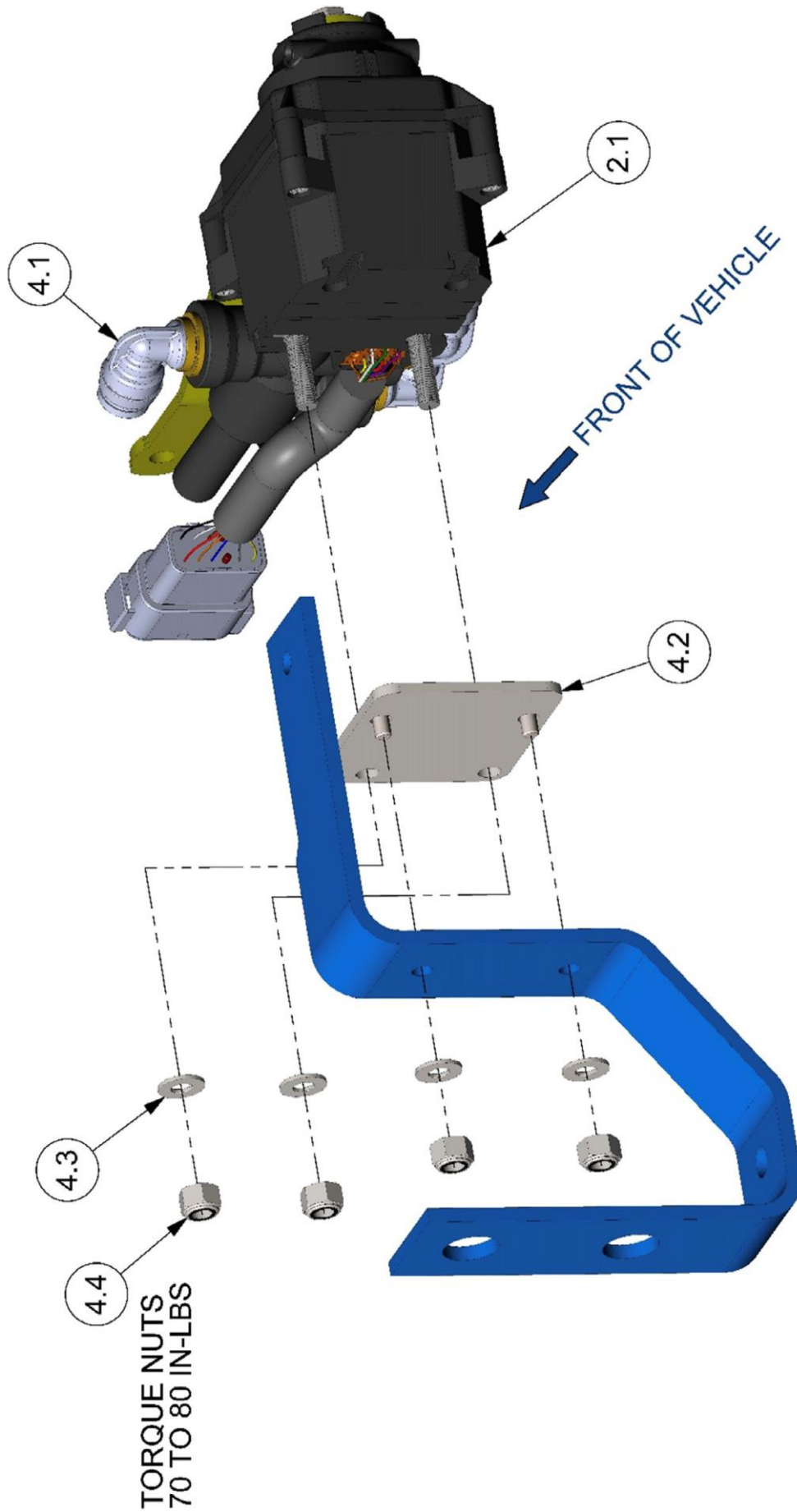


Figure 22 INTERNATIONAL (H00700R3A)

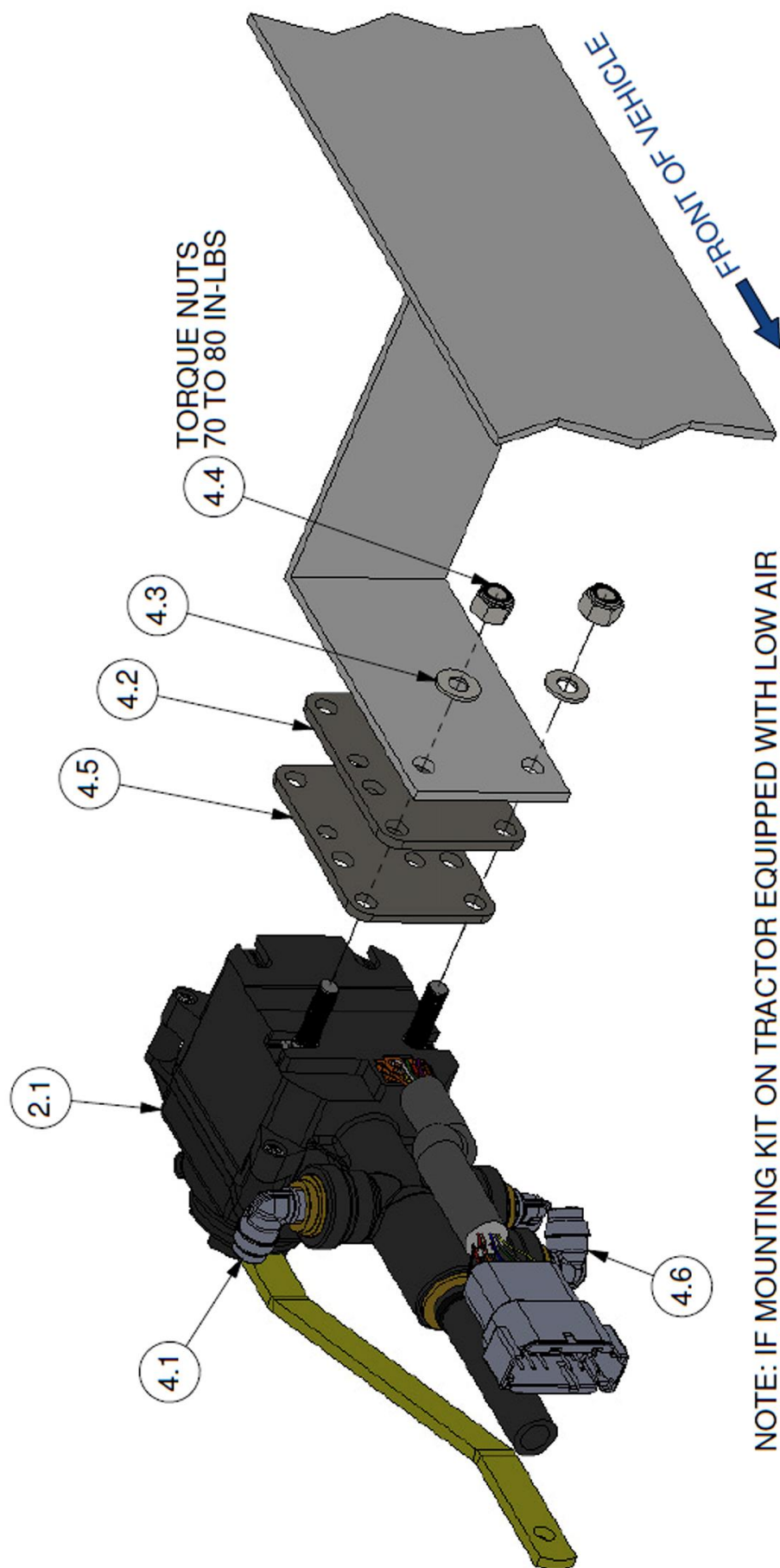
14 PETERBILT 386/388 (H00700R4A) - OPTION 1 & 2 MATERIALS SUPPLIED

H00700R4A (2410 SERIES, EHCV KIT SMARTVALVE & DUMP VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
1.1	1	H02410RD-1	2410 SERIES, SMARTVALVE
1.2	1	H18130SVM1	INTERFACE MODULE
1.3	1	HPB700-61	ELECTRICAL KIT
1.4	1	HPB700-58	HARDWARE & PLUMBING KIT
1.5	1	H17095	HARNESS, CONTROL
1.6	1	HPB700-50	INSTALLATION INSTRUCTIONS/DECAL KIT
1.7	1	H18016	CAN Y HARNESS

H02410RD-1 (2400 SERIES, EHCV VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
2.1	1	H02410RD-1A	LEVER POS. A. / STUD POS. B, C
2.2	1	H16060-01	SOFTWARE (CURRENT REVISION)

HPB700-61 (ELECTRICAL KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
3.1	1	H17628	PANEL INDICATOR (DUAL LED)
3.2	2	H17629	SWITCH, MOMENTARY PUSHBUTTON
3.3	8	H17641	BUTT CONNECTOR, 22-18 GA, CLEAR
3.4	2	H18776	FUSE TAP, 10 AMP
3.5	2	H18783	MINI FUSE, 10 AMP
3.6	1	H17636-01	TRANSDUCER/FITTING ASSEMBLY
3.7	1	H17082	DECAL DETAIL
3.8	16	H18195	PIN, MALE
3.9	1	H14610	RING TERMINAL
3.10	2	H18210	LOCKING PUSH MOUNT TIE
3.11	1	H18211	WIRE BUNDLE

HPB700-58 (HARDWARE & PLUMBING KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
4.1	3	H17119	STEM, ELBOW – 1/4"
4.2	1	H17055	SMARTVALVE MOUNTING SPACER
4.3	2	H13404	1/4" FLAT WASHER
4.4	2	H13964	1/4-20 LOCKNUT
4.5	1	H17055-1	MOUNTING PLATE/STUD ASSEMBLY
4.6	1	H16393	STEM ELBOW 3/8"



NOTE: IF MOUNTING KIT ON TRACTOR EQUIPPED WITH LOW AIR LEAF OPTION, INSTALL THE H00700AG400L SUSPENSION KIT.

HARDWARE/PLUMBING KIT: REMOVE STUDS IN H17055-1 FOR THIS OPTION.

Figure 23 PETERBILT (H00700R4A) Option 1

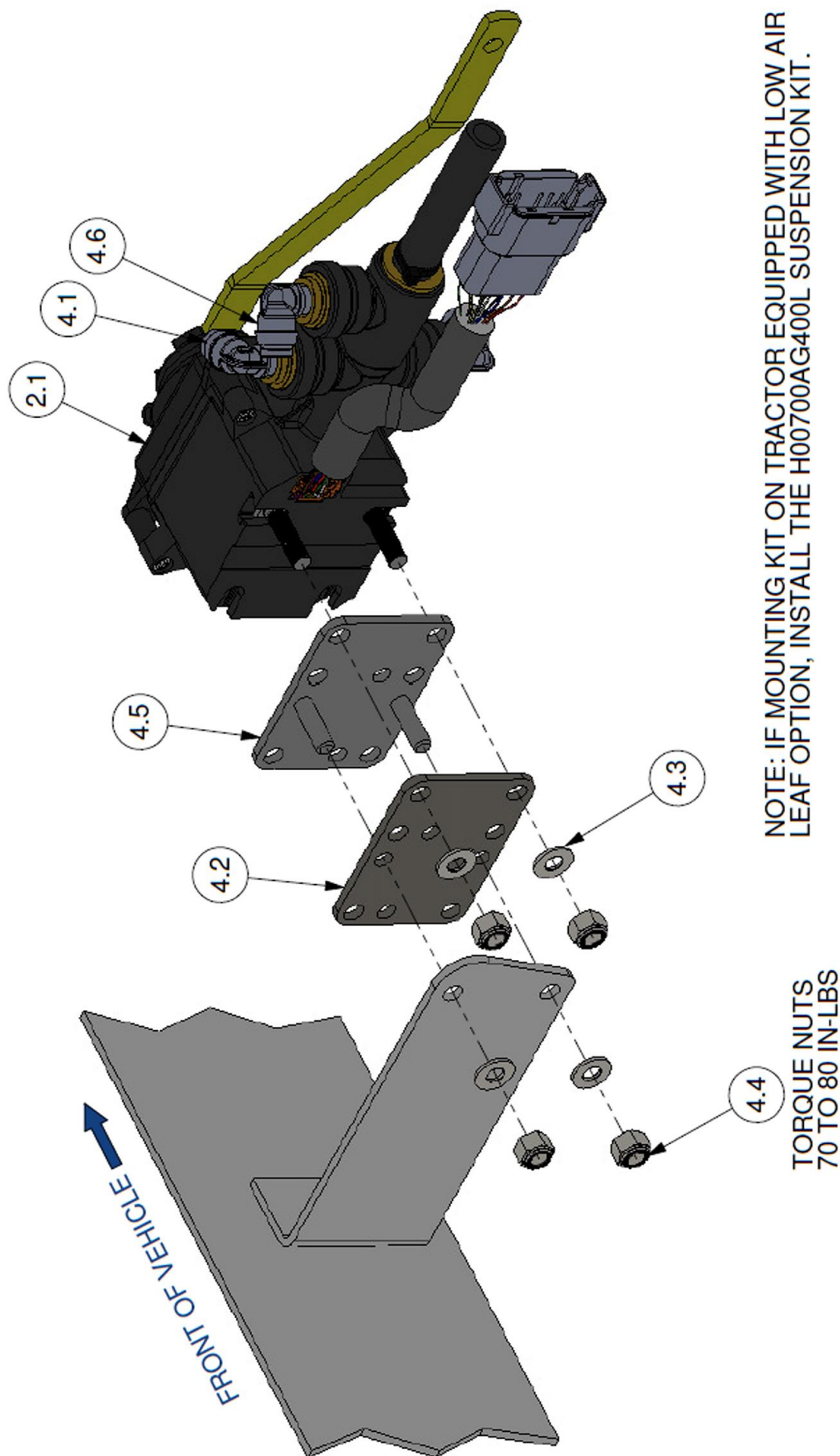


Figure 24 PETERBILT (H00700R4A) Option 2

15 VOLVO (H00700R5A) MATERIALS SUPPLIED

H00700R5A (2410 SERIES, EHC V KIT SMARTVALVE & DUMP VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
1.1	1	H02410RE-1	2410 SERIES, EHC V VALVE
1.2	1	H18130SVM1	INTERFACE MODULE
1.3	1	HPB700-61	ELECTRICAL KIT
1.4	1	HPB700-59	HARDWARE & PLUMBING KIT
1.5	1	H17095	HARNESS, CONTROL
1.6	1	HPB700-50	INSTALLATION INSTRUCTIONS/DECAL KIT
1.7	1	H18086	CAN Y HARNESS

H02410RE-1 (2400 SERIES, EHC V VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
2.1	1	H02410RE-1A	LEVER POS. A. / STUD POS. A, B, C, D
2.2	1	H16060-01	SOFTWARE (CURRENT REVISION)

HPB700-61 (ELECTRICAL KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
3.1	1	H17628	PANEL INDICATOR (DUAL LED)
3.2	2	H17629	SWITCH, MOMENTARY PUSHBUTTON
3.3	8	H17641	BUTT CONNECTOR, 22-18 GA, CLEAR
3.4	2	H18776	FUSE TAP, 10 AMP
3.5	2	H18783	MINI FUSE, 10 AMP
3.6	1	H17636-01	TRANSDUCER/FITTING ASSEMBLY
3.7	1	H17082	DECAL DETAIL
3.8	16	H18195	PIN, MALE
3.9	1	H14610	RING TERMINAL
3.10	2	H18210	LOCKING PUSH MOUNT TIE
3.11	1	H18211	WIRE BUNDLE

HPB700-59 (HARDWARE & PLUMBING KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
4.1	3	H16393	STEM ELBOW 3/8"
4.2	1	H17055	SMARTVALVE MOUNTING SPACER
4.3	4	H13404	WASHER 1/4" X 1/2"
4.4	4	H13964	LOCK NUT, 1/4-20
4.5	2	H17076	UNION Y, 3/8 TUBE
4.6	2	H15583	UNION, 3/8 TO 3/8
4.7	1	H15526-4	18" OF 3/8" TUBING

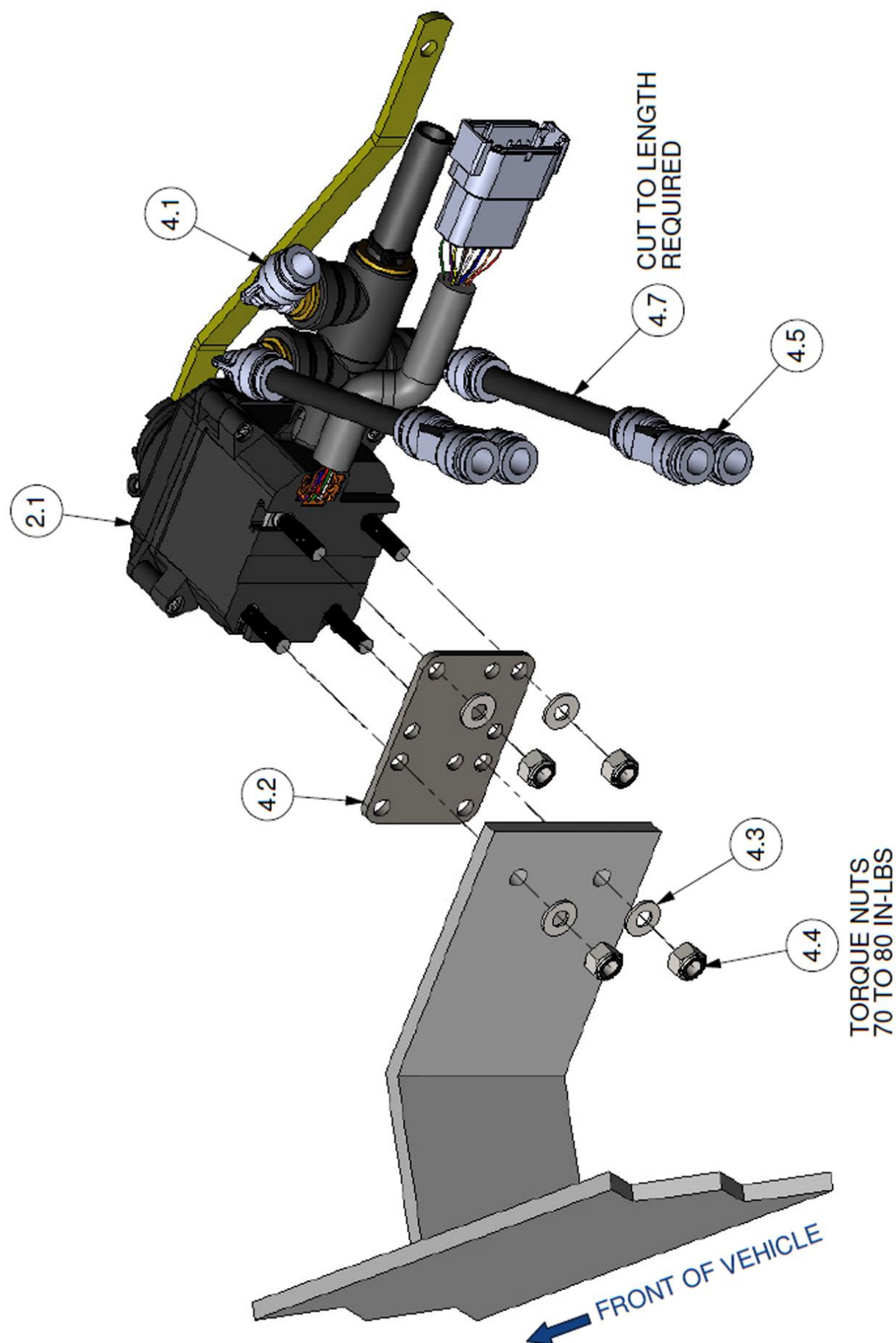


Figure 25 VOLVO (H00700R5A)

16 MACK (H00700R6A) MATERIALS SUPPLIED

H00700R6A (2410 SERIES, EHCV KIT SMARTVALVE & DUMP VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
1.1	1	H02410RE-1	2410 SERIES, SMARTVALVE
1.2	1	H18130SVM1	SMARTVALVE INTERFACE MODULE
1.3	1	HPB700-61	ELECTRICAL KIT
1.4	1	HPB700-60	HARDWARE & PLUMBING KIT
1.5	1	H17095	HARNESS, CONTROL
1.6	1	HPB700-50	INSTALLATION INSTRUCTIONS/DECAL KIT
1.7	1	H18086	CAN Y HARNESS
1.8	1	H18254	CAN Y HARNESS

H02410RE-1 (2400 SERIES, EHCV VALVE)			
ITEM	QTY	LINK PART #	DESCRIPTION
2.1	1	H02410RE-1A	LEVER POS. A. / STUD POS. A, B, C, D
2.2	1	H16060-01	SOFTWARE (CURRENT REVISION)

HPB700-61 (ELECTRICAL KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
3.1	1	H17628	PANEL INDICATOR (DUAL LED)
3.2	2	H17629	SWITCH, MOMENTARY PUSHBUTTON
3.3	8	H17641	BUTT CONNECTOR, 22-18 GA, CLEAR
3.4	2	H18776	FUSE TAP, 10 AMP
3.5	2	H18783	MINI FUSE, 10 AMP
3.6	1	H17636-01	TRANSDUCER/FITTING ASSEMBLY
3.7	1	H17082	DECAL DETAIL
3.8	16	H18195	PIN, MALE
3.9	1	H14610	RING TERMINAL
3.10	2	H18210	LOCKING PUSH MOUNT TIE
3.11	1	H18211	WIRE BUNDLE

HPB700-60 (HARDWARE & PLUMBING KIT)			
ITEM	QTY	LINK PART #	DESCRIPTION
4.1	3	H16393	STEM ELBOW 3/8"
4.2	4	H17055	SMARTVALVE MOUNTING SPACER
4.3	4	H13404	WASHER 1/4" X 1/2
4.4	1	H13964	LOCK NUT, 1/4-20

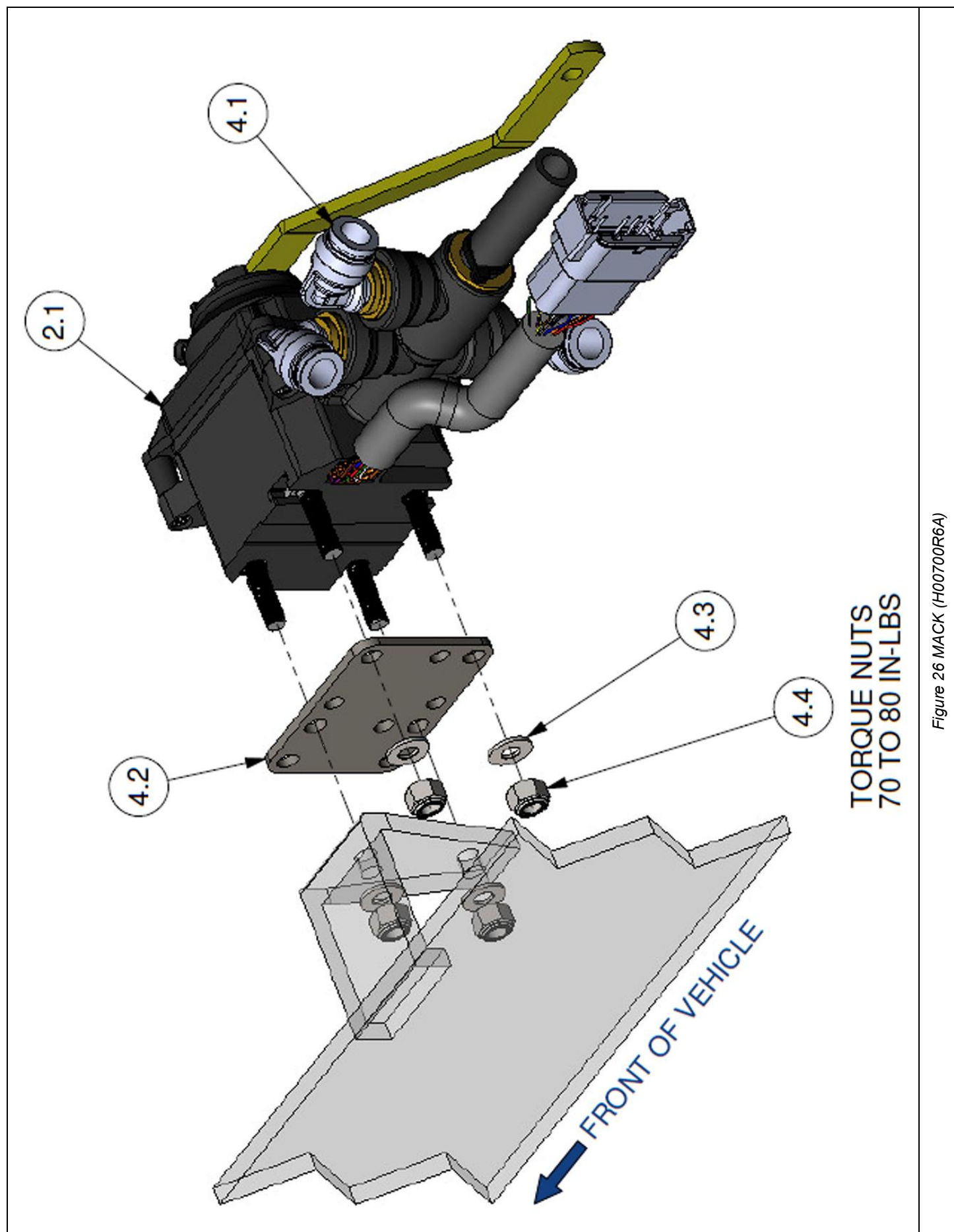


Figure 26 MACK (H00700R6A)

17 INSTALLATION TROUBLESHOOTING GUIDE

SmartValve		
Symptom	Cause	Solution
H00700PK data link (no response from SmartValve)	SmartValve "Ride Setup" tool is not running on computer	Start Smart Valve tool
	Vehicle ignition is not switched "on"	Switch ignition to "ON"
	Interface cable not plugged into SmartValve harness	Plug the three-pin connector into SmartValve harness. Refer to H00700PK manual
	Interface cable not plugged into computer	Plug USB connector into the computer. Refer to H00700PK 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
	Vehicle dump switch in "Dump position"	Switch to "OFF" position
	SmartValve clocking is set to wrong direction (clockwise or counterclockwise)	Use H00700PK "Ride Setup" tool to reverse the direction. Refer to H0700PK manual
	See "Power Issues" section at the end of this guide	

SmartValve		
Symptom	Cause	Solution
SmartValve will not raise vehicle to "override 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	Refer to the SmartValve manual for proper connection.
	Suspension reservoir air pressure below 90 PSI	Start engine to raise air pressure to greater than 90 PSI
	Incorrect "raised angle" incorrectly set in SmartValve setup tool	Use H00700PK "Ride Setup" tool to set the raised height. Refer to H00700PK manual
	If vehicle is moving, speed exceeds 10 mph	Reduce speed to below 5 MPH
	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"
	Suspension reservoir air pressure below 90 PSI	Start engine to raise air pressure to greater than 90 PSI
	Vehicle dump switch not in "Dump position"	Switch to "DUMP" position
	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.
Communication failed:	Verify com port 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
Power Issues		
	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)

18 SMARTVALVE STATUS LAMP

The SMARTVALVE STATUS indicator lamp 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 operational mode or faults detected. 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 Section 20 SMARTVALVE STATUS LAMP PATTERNS for full code summary.

⚠ WARNING

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

18.1 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 indicates the tag axle is dumped. A steady on light also 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.

18.2 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.

19 SMARTVALVE OPERATING INSTRUCTIONS

One momentary pushbutton switch and a status lamp have been added to the dash to select and indicate the valve's operating mode.

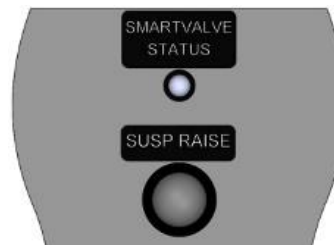


Figure 27 Status Lamp and Pushbutton Switch

19.1 Lowering Rear Suspension

- To dump the rear suspension: Use the existing dump switch.
- To return to standard ride height: Return dump switch to neutral position.
- 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.

19.2 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.

19.3 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 least a half second to change the mode.

20 SMARTVALVE STATUS LAMP PATTERNS

Red Light		
The indicator lamp flashes red if the Interface Module detects loss of communication with the valve. DO NOT DRIVE until verifying suspension is in a safe condition for travel.		
Green Light		
Pattern	Condition	Description
Mode Indicators		
Steady On	Initial Power On.	Lights during initial power up for approximately 5 seconds.
	Tag Axle Dumped	(Not used in 6x4 configuration.)
	Program Error	Indicates an error if neither condition above applies.
	Ignition Fuse Not Installed Or "Open"	Fuse may need to be replaced.
¼ sec. on per 2 secs.	Raise Mode	Vehicle raised above ride height
1 sec. on, 1 sec. off	Dump Mode	Vehicle is lowering or 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. Possible linkage failure.
13: 1 blink, 3 blinks	Pressure Sensor Fault	If configured to detect a dump signal, the pressure sensor 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. Possible poor ground connection(s).
23: 2 blinks, 3 blinks	Ignition /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

Lowering Rear Suspension

- Use the existing dash control switch to dump the rear suspension.
- If the "Auto Return to Ride Height" feature is enabled the dump switch will be overridden by either:
 - Attempting to dump at speeds faster than 10 MPH¹.
 - Exceeding 17 MPH¹ while dumped.

When overridden, the green LED will flash quickly until the dump switch is turned off. This feature may be disabled or enabled using the setup tool.

Raising Rear Suspension

- The **SUSP RAISE** switch will raise the rear suspension about 2 inches giving increased ground clearance during drop and hook operation.
- To raise the vehicle: Press the switch once for one second.
- To return to standard ride height: Press the switch again for one second.

Notes Regarding The Raise Function

- The **SUSP RAISE** switch will not operate if the suspension is in the dump mode. The dump mode has priority.
- The speed of the vehicle must be less than 10 MPH¹ to allow switching to the "raised" mode.
- The truck will return to standard ride height automatically if the truck is raised and the speed is greater than 10 MPH¹.
- 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 the button is pressed.

Operation Summary

Current Status	Desired Mode	Action Required
Dump	Normal	Set suspension switch to normal height
Normal	Dump	Set suspension switch to dump/lower
Normal	Raise	Press SUSP RAISE button
Dump Switch Overridden	Normal	Set suspension switch to normal height
Raise	Normal	Press SUSP RAISE button
Raise	Dump	Set suspension switch to dump/lower

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

H18205
LINK MFG. 1/17/22

LED Indications

- A red and green LED are used to give mode and error status of the system. If the red flashing light or error codes are present continue driving only after verifying the suspension is in a state to allow safe travel. Refer to the manual for more information.
- Green LED indicates operating mode using a repeating pattern and error codes by blinking two groups of blinks for each error detected.

Indication Summary

Red LED	
Flashing	Indicates the valve is not operating normally and may not have power.
Green LED	
Steady On	ECU Initialization or Fault The LED is on for a short time after the ignition is turned on. A steady light after a few seconds indicates a problem with the valve or wiring.
Short Blinks	Raise Mode (1/4 second on every two seconds)
Long Blinks	Dump Mode (one second on, one second off)
Fast Blinks	Dump Switch Overridden (1/4 sec. on, 1/2 sec. off) The dump switch has been overridden due to vehicle speed and the suspension is at standard ride height.
Error Codes - Two Groups of Blinks	
The system identifies several fault conditions using two groups of 1-4 blinks for each condition detected. For example, 1 blink followed by 2 blinks indicates error code 12. All active error conditions are repeatedly shown in sequence.	

For Technical Assistance Contact

Link Manufacturing, Ltd.
223 15th St NE, Sioux Center, IA 51250
Phone: 1-800-222-6283 (Ask for SmartValve Service)
Email: info@linkmfg.com www.linkmfg.com

H18205
LINK MFG. 1/17/22

This page is intentionally blank.



LINK MANUFACTURING, LTD.
223 15TH ST. NE, SIOUX CENTER, IA 51250
1-800-222-6283 www.linkmfg.com