



**Haldex**

MODI ABS  
Systems  
Quick  
Reference  
Catalog

Installation  
and  
Service  
Manual

L30027  
Rev. 1/99

# Quick Ref. Guide

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This Quick Reference Guide shows a typical installation of components for the Mod I and Mod I-FFABS systems. You must follow your company's safety procedure when you install or service this equipment. Be sure you understand all procedures and instructions before you begin servicing equipment. Haldex uses the following types of illustrations to give you a brief overview of an ABS system. Contact your local representative for application and part number assistance.

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# System Operation

## ABS (Anti-Lock Brake System)

The Mod I ABS is made up of Wheel Speed Sensors, an ABS Relay Valve (either with or without an integral Spring Brake Control function), and an integral ECU (Electronic Control Unit; mounted on the ABS relay valve). The ECU monitors wheel speeds through the use of 2 wheel speed sensors mounted on the hubs of a trailer axle. An exciter, also referred to as a tone ring, is a required component of the wheel speed sensing system and is usually included on the axle as received from the axle supplier.

When the ECU detects that a wheel is stopping too fast during a brake application the air pressure in the brake chambers of the controlled wheel is reduced via the ABS relay valve, allowing the wheel to recover, a "controlled wheel" is one which has its service brake hose connected to the ABS relay valve. Then the ECU commands the ABS relay valve to apply additional pressure until maximum braking potential is produced. This ABS "cycle" is repeated roughly 5 times per second as needed, or until the vehicle is traveling at less than 6 MPH.

### Mod I - 2S/1M ABS Systems:

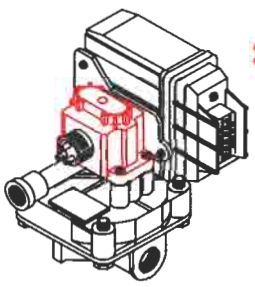
Mod I is a 2S/1M system. This means there are only 2 sensors and 1 ABS relay valve (modulator) in the system. The Mod I system meets the FMVSS 121 ABS requirements for semi-trailers and dollies, and is designed to work on 1,2, or 3 axle trailers, or dollies. The Mod I 2S/1M system does not offer as much protection against flat spotting tires on trailers with 2 or more axles as ABS configurations with additional sensors and a relay valve. A single Mod I 2S/1M system is not legal on full trailers where 4S/2M is the minimum allowed.

The Mod I system is available in 2 versions: Mod I-FFABS - 2S/1M or Mod I - 2S/1M. The difference is that Mod I-FFABS 2S/1M uses a single valve to provide the ABS function, and control the spring (emergency) brakes as well as the service brakes (along with pressure protection and anti-compounding features). The Mod I - 2S/1M system is a 2 valve system which requires a separate spring brake control valve such as an RT-4. Installation of both Mod I ABS Systems can be completed in 4 easy steps.

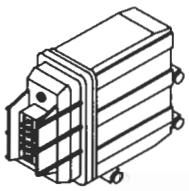
1. Installation of wheel speed sensors and related hardware (see page 10).
2. Installation of ABS relay valve and related hardware (see page 6 - 9).
3. Installation of electrical system (see page 11).
4. Final system checkout (see page 12).

# ABS System Components

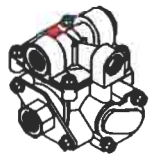
\* Service kit available for these items



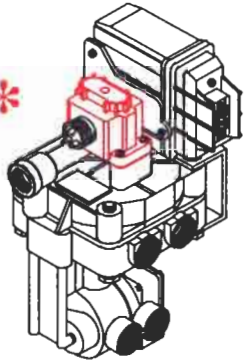
ABS Relay Valve  
W/ECU



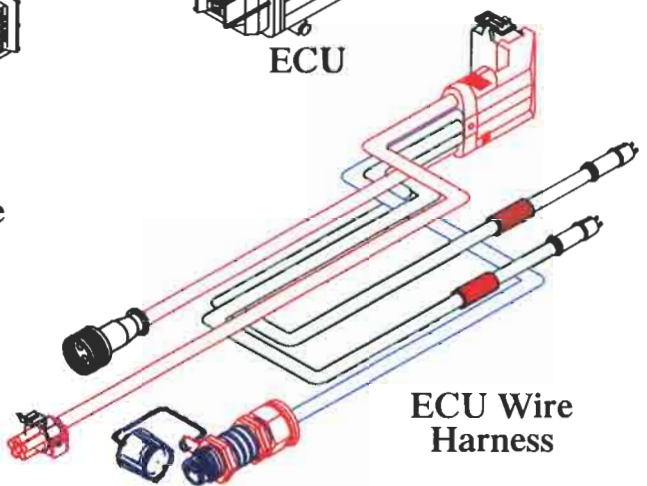
ECU



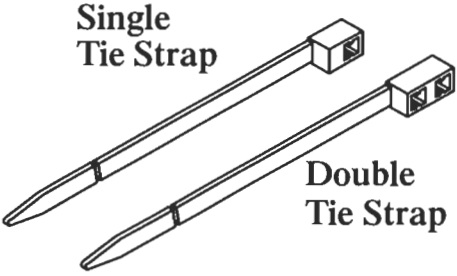
RT-4 (Spring Brake  
Control Valve)



FFABS Valve W/ECU



ECU Wire  
Harness



Single  
Tie Strap

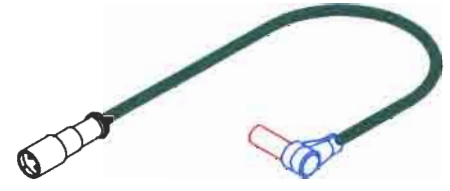
Double  
Tie Strap



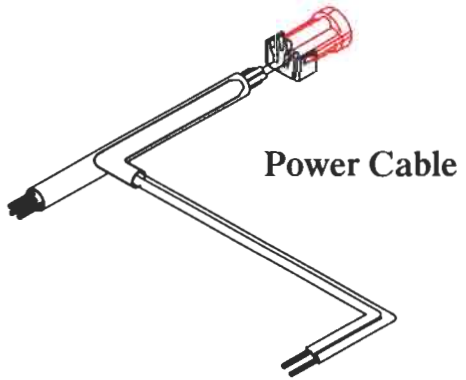
Sensor Clip



Sensor Block



Sensor



Power Cable



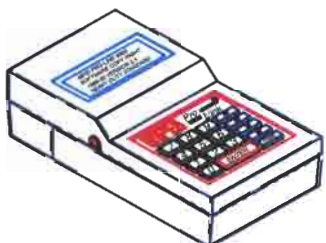
3-Way Clip  
(Optional)



ABS Lamp



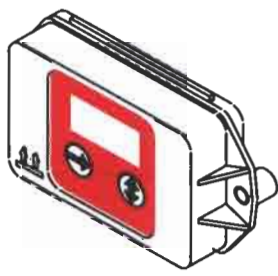
Exciter Ring



MPSI



DDU



INFO CENTRE



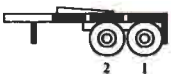
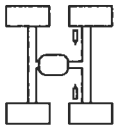



PC Diagnostics *Page 2*

# Sensor Placement




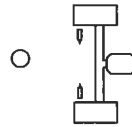



## MOD I Valve Notes:

1. 2 port valves can be used to connect to 2 brake chambers only.
2. 4 and 6 port valves can be connected to either 4 or 6 brake chambers.


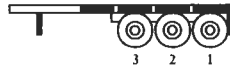
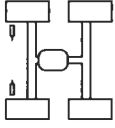
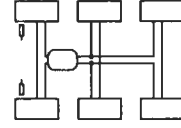




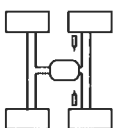
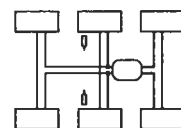
### 2S/1M Tandem Dolly

	<b>Note:</b> (Use 6 port valve)
	<ul style="list-style-type: none"> <li> = Sensor</li> <li> = Valve</li> <li> = Kingpin</li> </ul>

### 2S/1M Single Axle

	
	
<ul style="list-style-type: none"> <li> = Sensor</li> <li> = Valve</li> <li> = Kingpin</li> </ul>	<b>Note:</b> (Use 2 port valve)

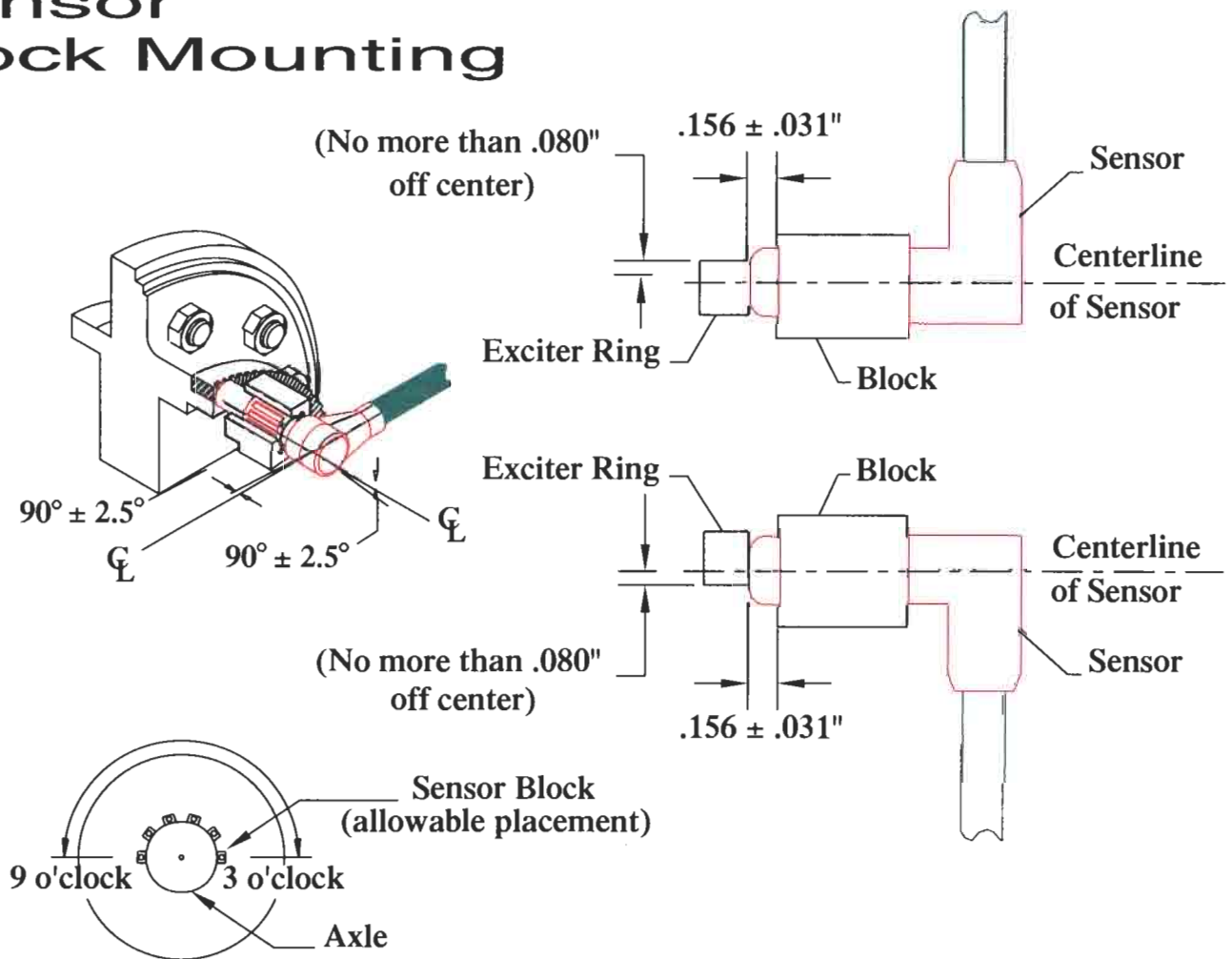
### 2S/1M Multi Axle

<b>Note:</b> (Use 4 or 6 port valve)		
	<b>Spring Suspension</b> 	<b>Spring Suspension</b> 
<ul style="list-style-type: none"> <li> = Sensor</li> <li> = Fitting</li> <li> = Valve</li> <li> = Kingpin</li> </ul>	<b>Air Suspension</b> 	<b>Air Suspension</b> 

Use this matrix to define which configuration you have.

# Wheel End (Retrofit Only)

## Sensor Block Mounting



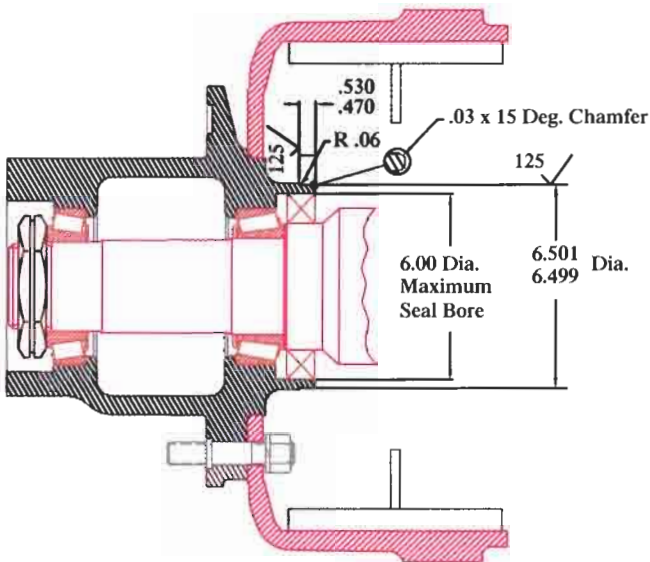
The clearance between block and exciter ring should be  $.156 \pm .031"$ . Any deviation from this clearance as a result of hub exciter ring position must be approved by the sensor manufacturer. The radial clocking position should be between 9 and 3 o'clock (see detail). While ABS performance is not affected in the lower half of the axle, the structural integrity of axle could be compromised.

In general, the position of the wheel speed sensor center axis to the exciter ring surface should be as close as possible to a  $90^\circ$  angle in both directions (see detail). Deviation will result in a reduction of the wheel speed sensor signal output (signal amplitude).

The sensor block must be mounted to provide adequate sensor to exciter ring contact. The exciter ring must extend at least  $.080"$  above and  $.080"$  below the centerline of sensor. (see detail)

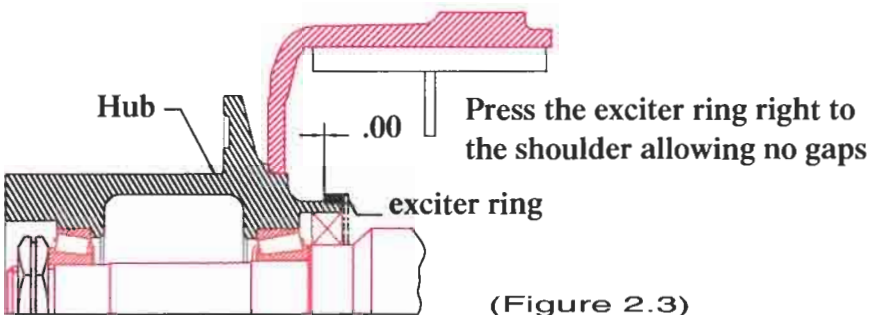
**Note:** The block is generally welded to the axle. Refer to axle manufacturer manual to ensure that welding won't affect the structural integrity of axles.

# Wheel End (Retrofit Only)



(Figure 2.2)

1. Remove the hub and drum assemblies of all wheel ends.
2. Ensure the hub has a seal bore of 6.00 inches or less (see Figure 2.2)
3. Machine area to the dimensions indicated in Figure 2.2.

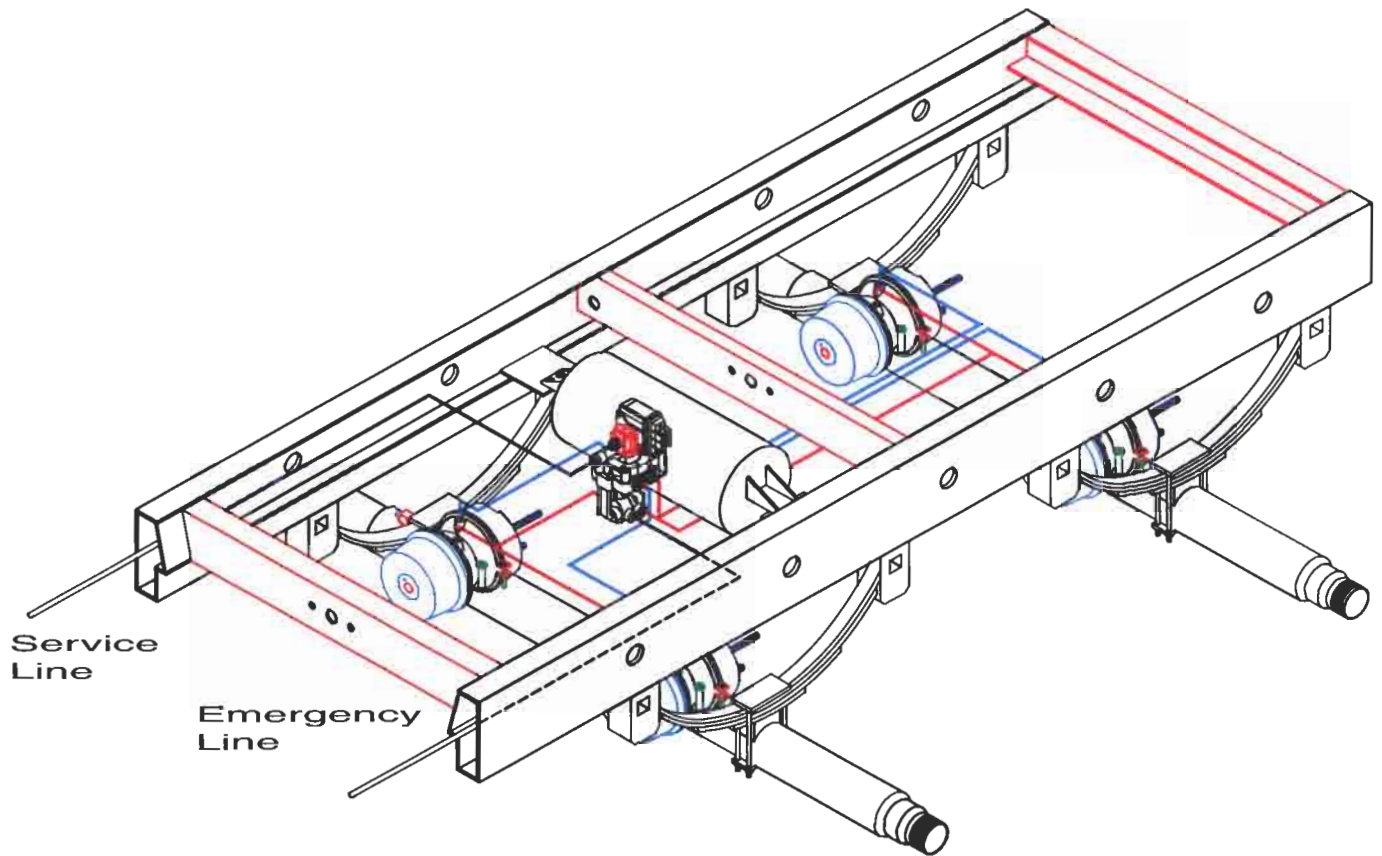


(Figure 2.3)

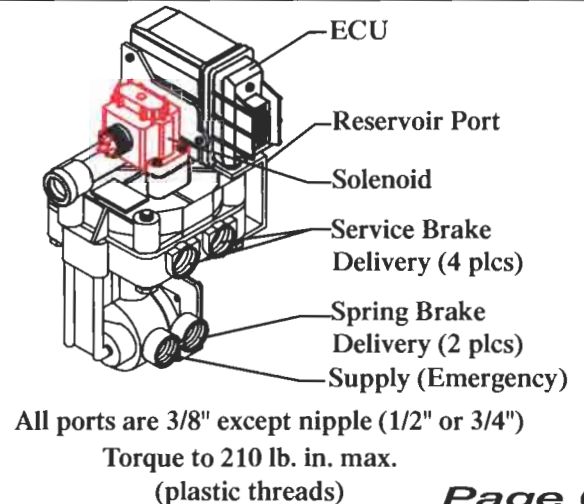
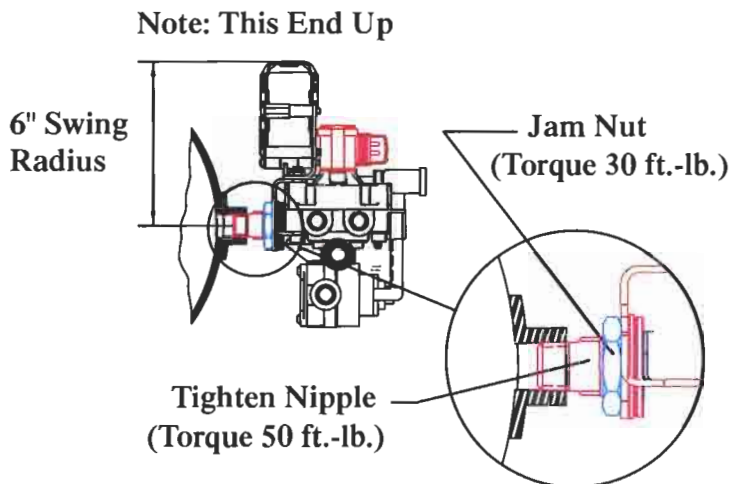
1. Heat the exciter ring uniformly to approximate 350°F.
2. Place the exciter ring on the machined area of the axle hub. (see figure 2.3)
3. Make sure the exciter ring fits squarely onto the machined surface of the hub.
4. When the exciter ring cools, it will shrink fit on the hub.
5. Make sure the exciter ring fits tightly onto the machined area and does not slip.

# System Plumbing

## Mod I-FFABS System (Tandem Axle)



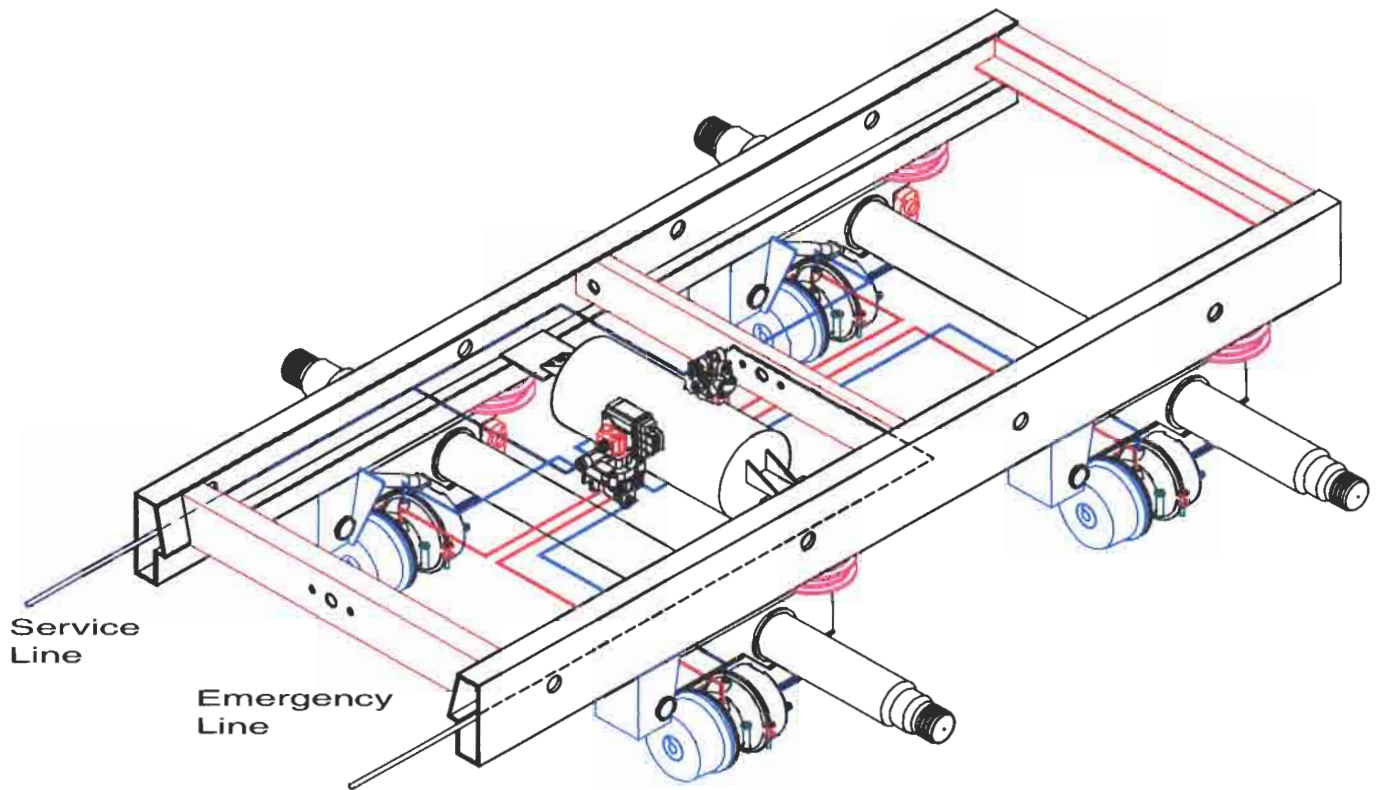
1. Install valves onto reservoir.
2. For valve orientation see detail below. Do not tighten valve by rotating it. Tighten at the nipple.
3. Apply sealant to fittings, or use fittings with preapplied sealant, and install in valve.  
Please do not use teflon tape on fittings, because it could break off and contaminate air system.
4. For plastic ports, hand tighten fittings then rotate 2-3 additional turns.
5. Attach hoses to appropriate brake chambers. Use thread sealant on all fittings (loctite PST565 or similar).
6. Go to page 10 for routing of ABS sensor cable.





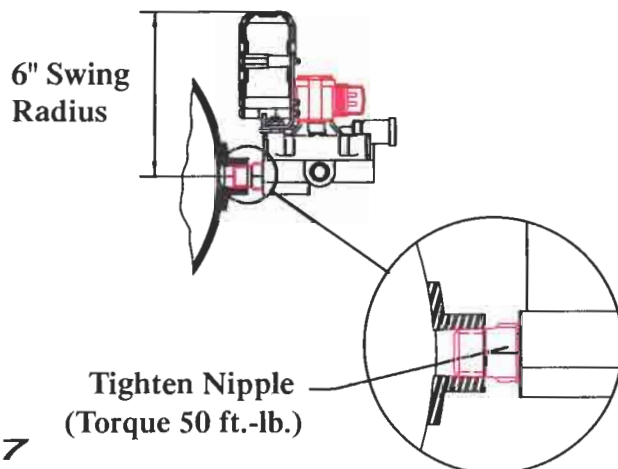
# System Plumbing

## Mod I System (Tandem Axle)



1. Apply sealant on the nipple and install valves onto reservoir.
2. For valve orientation see detail below. Do not tighten valve by rotating it. Tighten at the nipple.
3. Apply sealant to fittings, or use fittings with preapplied sealant, and install in valve.  
Please do not use teflon tape on fittings, because it could break off and contaminate air system.
4. Attach hoses to appropriate brake chambers. Use thread sealant on all fittings (loctite PST565 or similar).
5. Go to page 10 for routing of ABS sensor cable.

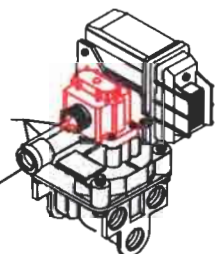
Note: This End Up



Spring Brake Delivery  
4 places

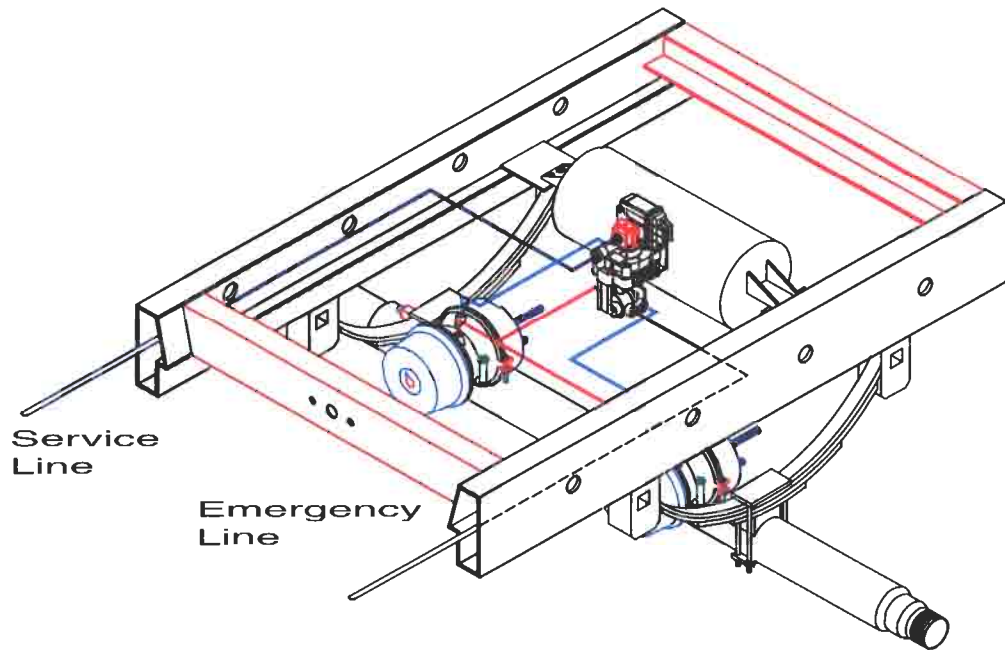
Service Brake Delivery  
(6 pcs)

Control Port

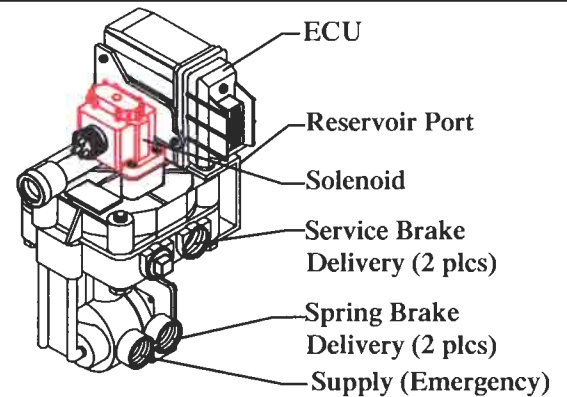
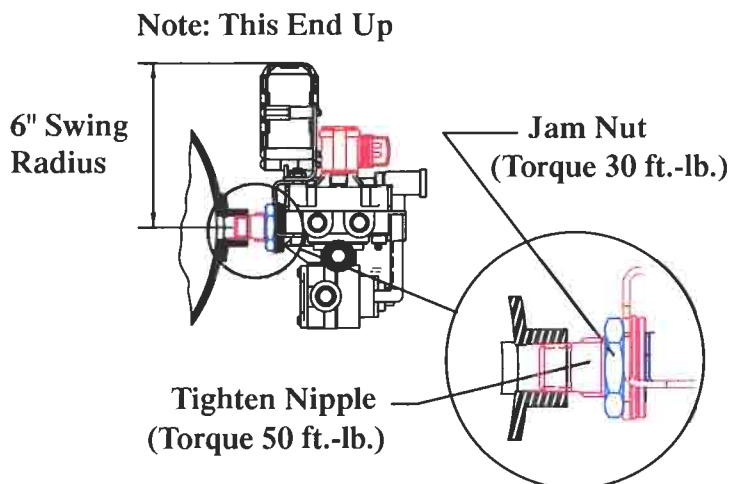


# System Plumbing

## Mod I-FFABS System (Single Axle)



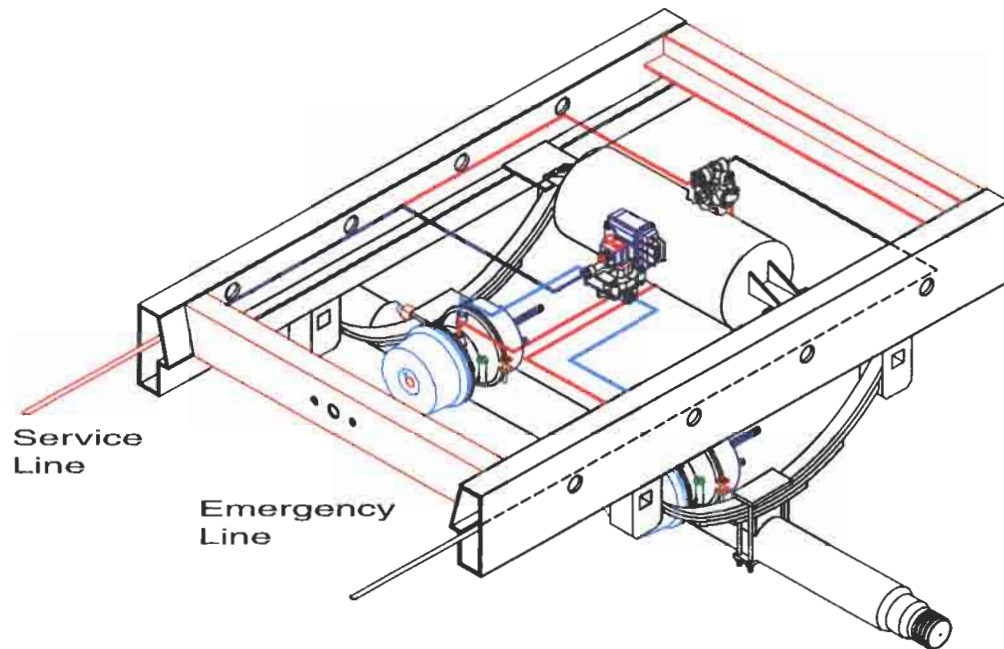
1. Install valve onto reservoir.
2. For valve orientation see detail below. Do not tighten valve by rotating it. Tighten at the nipple.
3. Apply sealant to fittings, or use fittings with preapplied sealant, and install in valve.  
Please do not use teflon tape on fittings, because it could break off and contaminate air system.
4. For plastic ports, hand tighten fittings then rotate 2-3 additional turns.
5. Attach hoses to appropriate brake chambers. Use thread sealant on all fittings (loctite PST565 or similar).
6. Go to page 10 for routing of ABS sensor cable.



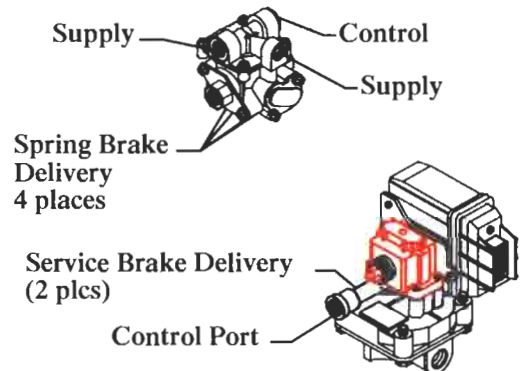
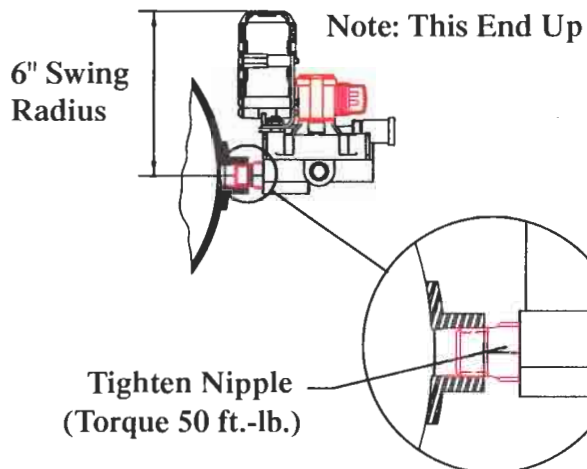
All ports are 3/8" except nipple (1/2" or 3/4")  
Torque to 210 lb. in. max.  
(plastic thread)

# System Plumbing

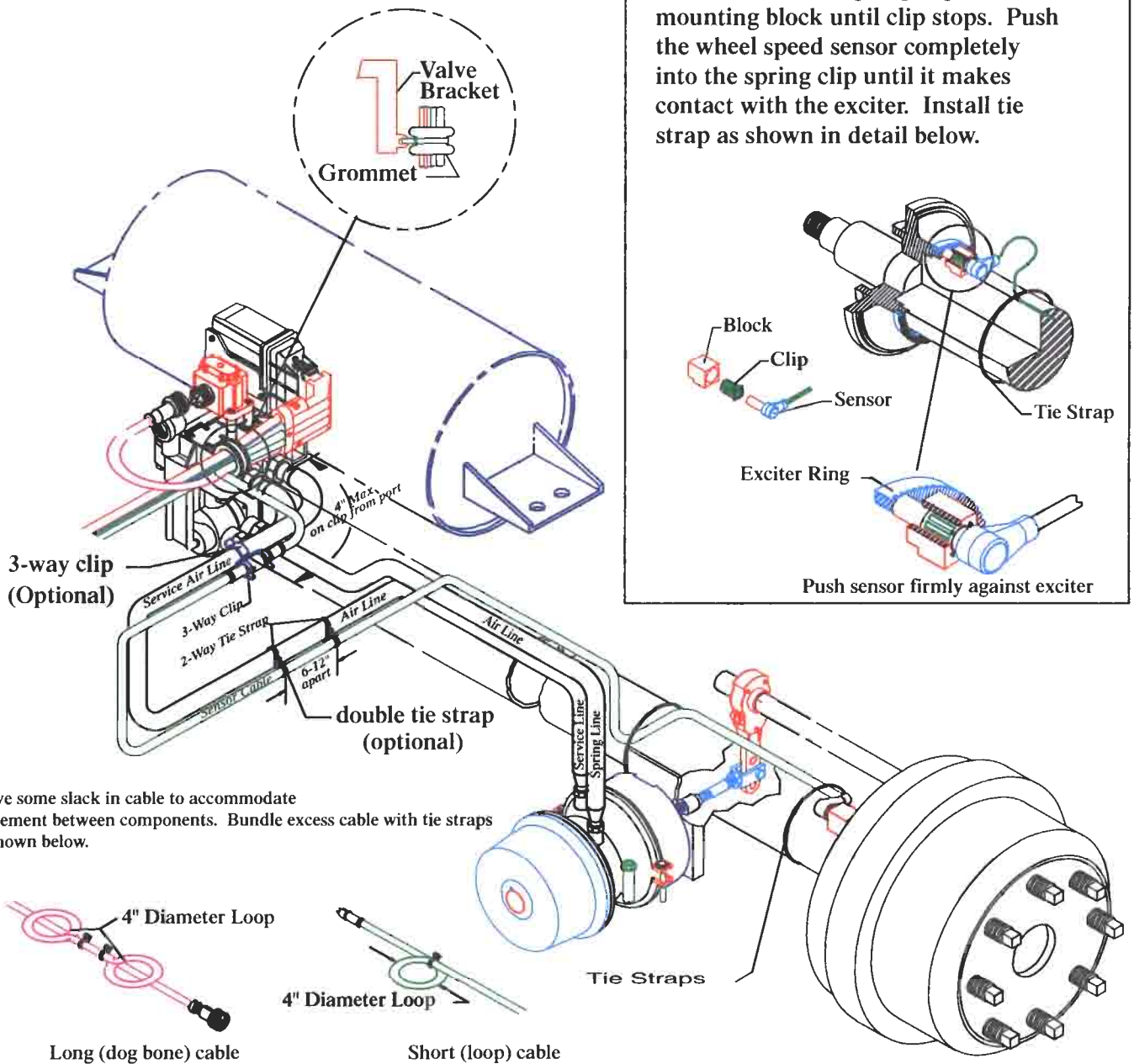
## Mod I System (Single Axle)



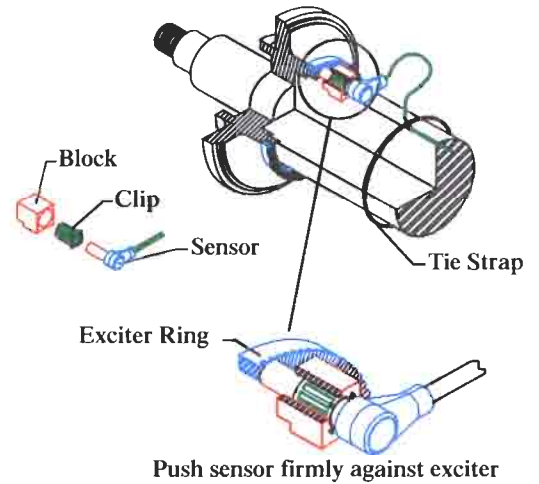
1. Apply sealant on the nipple and install valve onto reservoir.
2. For valve orientation see detail below. Do not tighten valve by rotating it. Tighten at the nipple.
3. Apply sealant to fittings, or use fittings with preapplied sealant, and install in valve.  
Please do not use teflon tape on fittings, because it could break off and contaminate air system.
4. For plastic ports, hand tighten fittings then rotate 2-3 additional turns.
5. Attach hoses to appropriate brake chambers. Use thread sealant on all fittings (loctite PST565 or similar).
6. Go to page 10 for routing of ABS sensor cable.



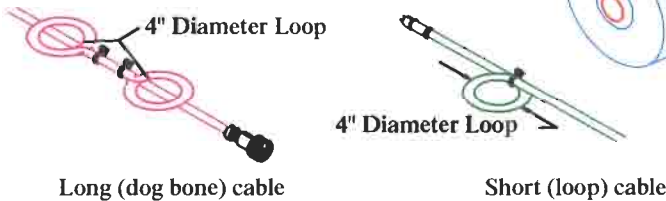
# Sensor Cable Routing



Install the sensor spring clip into the mounting block until clip stops. Push the wheel speed sensor completely into the spring clip until it makes contact with the exciter. Install tie strap as shown in detail below.



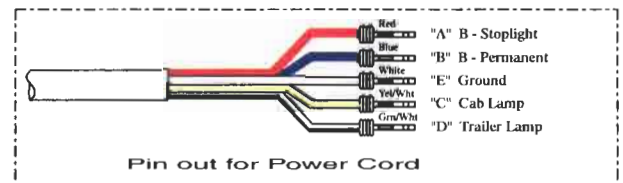
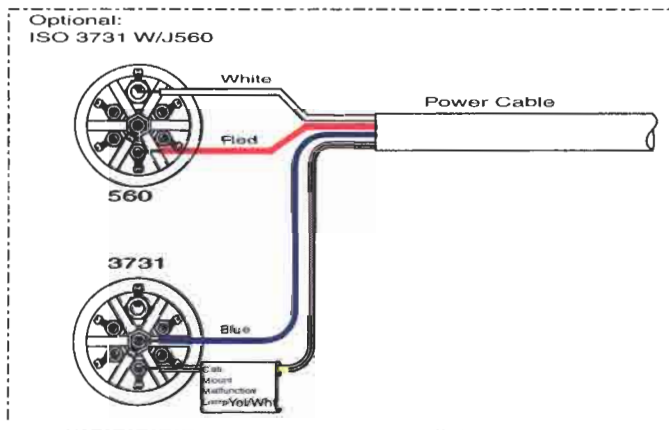
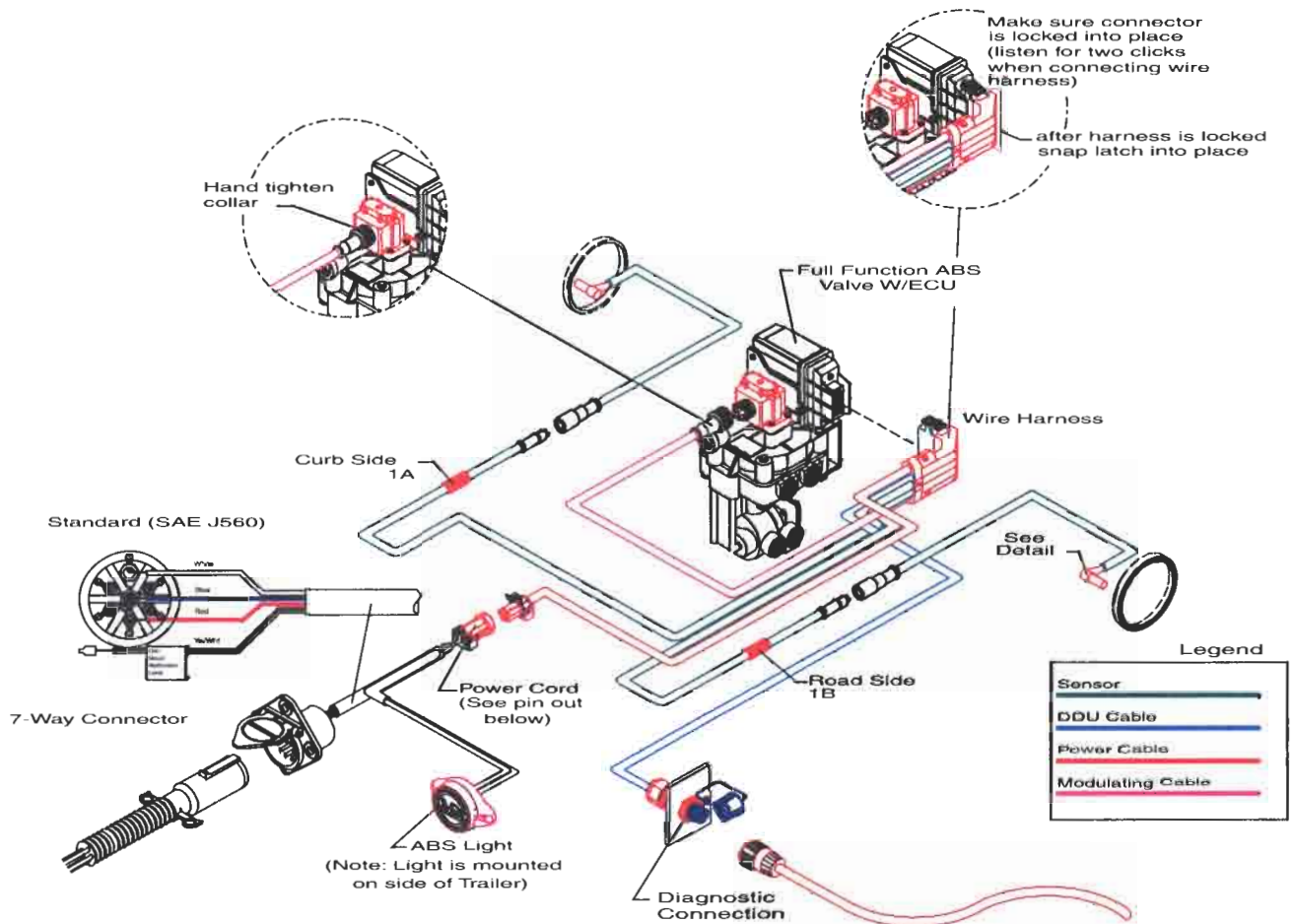
Leave some slack in cable to accommodate movement between components. Bundle excess cable with tie straps as shown below.



1. Insert the sensor clip into the sensor block.
2. Insert the sensor in the sensor clip and push firmly until it is against exciter ring.
3. Route all sensor cables through vacant bolt hole, etc. Use grommet or corrugated tubing when cable is touching sharp edges.
4. Attach cable tie as needed to assure cable is secured.
5. Typical routing of cable is along the air hoses for the chambers (see detail above).
6. Use the double tie straps when attaching the cables to the air lines. (recommended)
7. Double tie straps should be no closer than 6" inches and no farther then 12" inches apart.
8. 3-way clip should be at a maximum of 4" inches from the Service Brake Delivery port. (see detail)
9. Use pre-installed tie strap to secure harness grommet to the ABS valve bracket. (see detail)

# System Wiring Information

Typical for FFABS and Mod I



Distance of ABS Lamp from red rear clearance side marker lamp  
Min of 5.9" inches - 23.6" Max



Mandatory Location of ABS Lamp  
left side of trailer (Roadside)

Note: Cover all exposed connections before painting or undercoating

# Inspection of System

## Recommended Production Testing

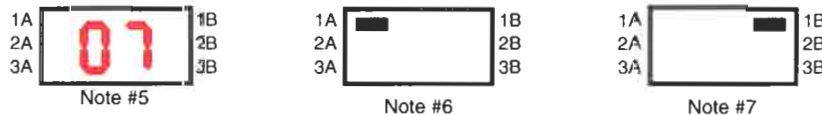
On-Line (Bogie) ABS check.

This step will ensure the ABS system minus power cable/light is functioning properly.

Test Equipment: 12VDC power source, only ABS power cable with ABS light connected, DDU.

1. Charge the supply and service air systems.
2. Connect test power cable to wiring harness power lead.
3. ABS valve should "blow-down" a brief shot of air.
4. ABS test light should flash "on, off".
5. Plug DDU into the DDU outlet; DDU should read "07".
6. Rotate "curb" side wheel slowly; DDU should read 1A (bar).
7. Rotate "road" side wheel slowly; DDU should read 1B (bar).

### DDU Screen



Reference page 16 for correcting faults

## Finished Trailer & In-service ABS check; static

Test Equipment: 12VDC power source, DDU

1. Charge the supply and service air system.
2. Apply power source to 7-way receptacle.
3. ABS valve should "blow-down" a brief shot of air.
4. ABS light should flash "on, off".
5. Plug DDU into the DDU outlet; DDU should read "07".



### NOTE:

If indicator stays illuminated during ABS checks, see code on DDU and reference Diagnostic Table on page 16.

# Using Diagnostic Tools

The ABS system is designed with built-in diagnostic checks for troubleshooting. A separate device is required for viewing faults. Below are 2 methods that can be used for checking the ABS system diagnostics. Also there is a PC based program available.



DDU

## DDU Capabilities:

1. View active & stored fault codes (2 digit code)
2. Clear stored fault codes.
3. View a bar code corresponding to each individual wheel when rotated for sensor wiring verification
4. View sensor/valve configuration code
5. View auxiliary codes.



MPSI

## MPSI Capabilities: (requires Haldex adapter cable)

1. View active and stored fault codes (text description)
2. Clear stored fault codes.
3. View SID1 or 2 and FMI 14 corresponding to each individual wheel when rotated for sensor wiring verification.  
SID 1 = Sensor S1A  
SID 2 = Sensor S1B
4. View ECU Type Mod I
5. View ECU sensor/valve configuration 2S/1M
6. View ECU auxiliary codes
7. View ECU serial number
8. Hard copy option with MPSI printer.



Cable

# Using Diagnostic Tools

**Haldex PC based ABS Diagnostic Program  
requires Haldex diagnostic kit**

**The following functions are available with the PC based version**

1. Haldex ABS ECU type
2. Sensor Configuration
3. Valve Configuration
4. ABS ECU Part Number
5. ABS ECU Serial Number
6. View archive fault codes
7. View fault descriptions and possible causes
8. View stored fault codes
9. View stored fault descriptions and possible causes
10. Option to clear stored faults codes
11. Option to verify individual wheel speed sensor status
12. Option to energize individual valve solenoid and verify valve wiring
13. Option to Save ABS diagnostic results for a print out of test verification



**Coming Soon...**

**Write and Read data internal to ABS ECU  
Odometer Reading  
Programmable tire scale factor  
Service mile reminder**

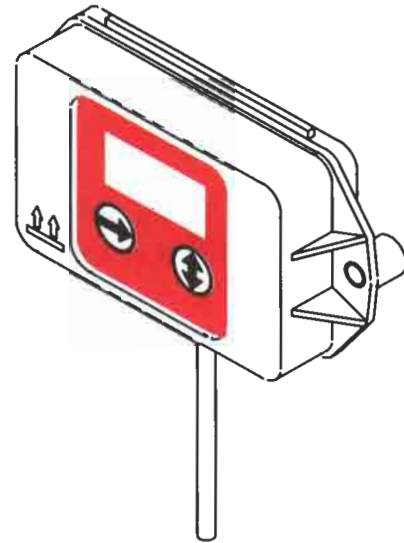
## **Minimum Software / Hardware Requirements**

- \* 486DX / 33 MHz, 8 Megabytes of RAM
- \* 10 Megabytes free hard drive space
- \* VGA monitor
- \* 3.5 inch diskette drive
- \* Standard keyboard (mouse optional)
- \* Windows 3.1 or Windows 95



# Using Diagnostic Tools

Haldex  
Info Centre



Haldex Info Centre  
(A Vehicle Mounted Display Unit)

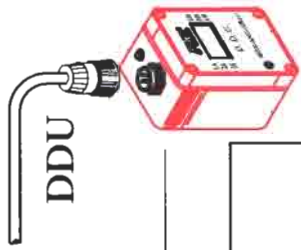
Functions that are available with the Info Centre

1. View active & stored fault codes (2 digit code)
2. Clear stored fault codes.
3. View a bar code corresponding to each individual wheel when rotated for sensor wiring verification.
4. View sensor/valve configuration code.
5. View auxiliary codes.
6. View ECU type.
7. View ECU serial number.
8. View sensor/valve text, also 2 digit code.

Coming Soon...

Odometer Reading (miles or km)  
Programmable tire scale factor (miles or km)  
Service mile reminder (miles or km)

# Mod I-FFABS - Diagnostic Codes



DDU

## Codes Descriptions Possible Causes

00	System is OK, vehicle is moving > 6 mph	Not a problem
07	System is OK, vehicle is stationary or < 6 mph	
01	1A Sensor/Wiring open or short (curb side)	Sensor loose, sensor faulty, or damage cable
02	1B Sensor/Wiring open or short (road side)	
11	1A low sensor output fault (curb side)	Sensor worn or maladjusted, damaged sensor or cable
12	1B low sensor output fault (road side)	
21	1A intermittent sensor output fault (curb side)	Wheel bearing worn, loose, maladjusted; exciter damaged, loose.
22	1B intermittent sensor output fault (road side)	Damaged or corroded sensor electrical connection
41	Slow wheel recovery	Brake drag, damaged modulator, or pinched delivery hose
61	Hold solenoid open circuit	Solenoid cable damaged, solenoid damaged, loose connection
67	Dump solenoid open circuit	
71	Hold solenoid short circuit to ground	Solenoid cable damaged, solenoid damaged
77	Dump solenoid short circuit to ground	
80	Poor insulation or output leakage	Solenoid damaged, solenoid cable damaged, or ECU damaged
81	Hold solenoid output short circuit to B+ fault	
87	Dump solenoid output short circuit to B + fault	
90	Supply voltage at the ECU < 8.5 volts	Vehicle voltage regulator malfunction, damaged power cable
92	Supply voltage at the ECU > 16 volts	Power cable wire, terminal, or splice damaged or corroded. SAE J560 - 7 way corroded, or low supply voltage from source
CO, A(x)	2S/1M system configuration	Not a problem
CA	Erase memory signal	
CC	Clear configuration (power down if this occurs)	
db	Electrical contact has been made within ECU	Not a problem
8.8	Self diagnostic check at power-up	
E0 - E9	Defective ECU	Replace ECU and retest. Code 93 could also be a bad solenoid
EA - EF	Defective ECU	
93, 99	Defective ECU	
Blank	No power to diagnostic unit	Faulty power supply, open or short in communication lines,
HI, LO	Low power or communication issue	no power to blue (perm) pin, mixed hardware

\* FOR ANY OTHER FAULT CODE NOT DISPLAYED HERE, REPLACE ECU  
**CAUTION: DO NOT USE BATTERY CHARGER TO POWER UP ABS**

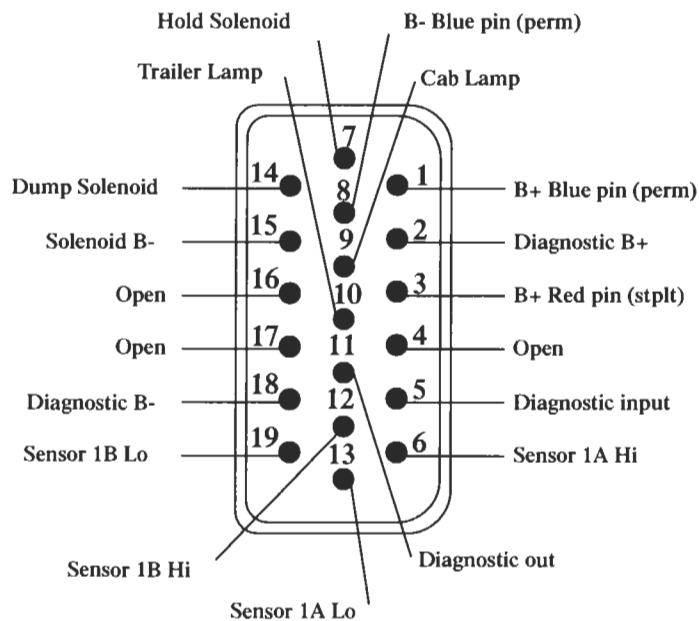
# Troubleshooting Information

## In-service ABS Check: Dynamic

**(DO NOT use a battery charger)**

To check the operation of the entire ABS system, hook a tractor to the trailer and charge the trailer's air tanks. Turn on the ignition key and ensure that the warning light comes on briefly, then goes out. Pull the trailer at a speed above ~6 mph and make a brake application until the tractor-trailer has come to a complete stop. Verify that the ABS light has remained OFF. If the light remains OFF, the system is functioning properly. If the ABS system detected an error during the stop, the warning light will be ON. If the light never comes on, then refer to the "Troubleshooting Information - No ABS Warning Light Illumination" section of this guide for assistance page 22. If the light stays on with the ignition key on, refer to the "Troubleshooting Information - ABS Warning Light Stays On Permanently" section of this guide for assistance.

### Mod I main wire harness 19 pin connector



**NOTE 1:** Disconnect power from the ABS system before testing for opens or shorts, or making any repairs.

**NOTE 2:** According to the TMC, most ABS problems are related to:  
Cut, corroded, or abraded wires.

Corroded connectors and terminals.

Connector terminals not latched or seated correctly to mating assemblies.

Excessive sensor air gap, sensor clip retention, or bearing end play.

**NOTE 3:** After making any repairs go to the "Using Diagnostic Tools" section of this guide to confirm that the fault is corrected. If a Fault # 11,12, 21, 22, or 41 has occurred, and has been corrected, the diagnostics will read an "07". The trailer must then be driven above ~6 mph for the ABS warning light to go out.

# Troubleshooting Information

## Code 00, 07, 8.8, A4, A5, A8, CO, or DB:

Indicates that the system is working OK.

- "00" with the trailer moving or "07" with the trailer not moving indicate that there are no active faults.
- "A4", "A5", and "A8" are configuration codes and may or may not be present. Ignore these.
- "8.8" is a self diagnostic test.
- "CO" indicates that the ABS is a 2S/1M (2 sensors/ 1 modulator) system
- "DB" indicates that electrical contact has been made with the ECU.

## Code 01 or 02 (Note: codes 01, 11, & 21 refer to sensor 1A, codes 02, 12, & 22 refer to 1B):

Indicates that a wheel speed sensor or its wiring has a short or open circuit.

- Disconnect the relevant sensor connector from the sensor and measure the resistance between the two pins in the sensor connector housing. The ohmmeter reading for the sensor should be between ~980 and 2350 Ohms. The sensor should be replaced if this is not the case.
- The main wire harness 19 pin connector can be disconnected at the ECU to check for open or shorts in the sensor cables. Sensor cable pins are # 6, 12, 13, & 19. Check for opens and shorts between the connector and it's related cable end. Also check for damaged harness pins. If there is a sensor extension cable attached to the wire harness, test this separately for continuity. Replace any defective hardware and retest.
- Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU. Secure the connection with the attached metal latch. NOTE: An "02" fault can result from a connector that has only been secured with one click.

## Code 11 or 12 (Occurs when the trailer is moving):

Indicates that the output of a wheel speed sensor of a moving trailer is insufficient.

- The most likely reason for this is the gap between one sensor and the exciter is too great. Measure the AC voltage at the sensor in question while rotating the wheel at a rate of ~1 revolution every two seconds. The output should be at least 200 millivolts. If this is not the case, try pushing in the sensor until it touches the exciter. If this doesn't correct the problem then replace the sensor.
- If the gap on both sensors is too great, you may not get a fault. If the ECU isn't getting any voltage from either sensor it will assume that the trailer is not moving, even when it is. If you suspect this is the case, check each wheel separately for output. Refer to the "Recommended Production Testing" section of this guide for instructions.

# Troubleshooting Information

## Code 21 or 22 (Occurs when the trailer is moving):

Indicates that there is an intermittent loss of a sensor signal when the trailer is traveling down the road. This type of fault is often difficult to diagnose.

- The most likely causes include: a broken sensor retaining clip, a damaged exciter, or excessive wheel bearing end play. Check components at the affected wheel.

Other possible causes are: a loose, damaged, or corroded sensor electrical connection or a break in the cable. Check the connectors for these items. If the connections look good, then look for visual external damage to the cable. Replace any suspect components and retest.

## Code 41 (Occurs when the trailer is moving):

Indicates that a wheel is slow to come back up to speed when ABS releases the brakes during an ABS event.

- The most likely causes include: a dragging brake, a pinched, or kinked delivery hose, or defective modulator valve. Check the brakes to ensure that they release completely. Look for visual external damage to the delivery hoses or delivery tubing. Replace any defective hardware and retest.

## Code 61 or 67:

Indicates that a solenoid or its cable has an open circuit internally.

- The most likely causes include: a bad solenoid or a loose solenoid connection. Disconnect the solenoid connector and check the resistance at the solenoid pins. Readings across the 2 bottom pins should be 7 - 9 ohms. Readings between either bottom pin and the top pin should be 3.5 - 4.5 ohms. Check the female terminals on the connector for excessive pin spread or corrosion also. Replace defective hardware as required and retest.
- Additional possible causes are: a bad solenoid cable, the main wire harness 19 pin connector not completely latched into the ECU, or a damaged harness pin. Remove the harness from the ECU and check for continuity between pins 7, 14 and 15 and their related terminals on the cable end. Repair as required and retest.
- Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU and secure the connection with the attached metal latch.

## Code 71 or 77:

Indicates that a solenoid or its cable has a short circuit to ground (Negative).

- The most likely causes include: a damaged cable or solenoid. An example of this is a worn or chafed cable that has exposed wires contacting the trailer. Disconnect the solenoid connector and check for continuity between each solenoid terminal and trailer ground. Next remove the main wire harness 19 pin connector and check for continuity between pins 7, 14, & 15 and trailer ground. If the resistance is less than 10 M $\Omega$  in any case, replace suspect hardware and retest. If the code still exists then the ECU is likely defective.
- Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU and secure the connection with the attached metal latch.

# Troubleshooting Information

## Code 81 or 87:

Indicates that the solenoid or its cable has a short circuit to B+ (positive 12 volts).

- The most likely cause is a damaged cable or solenoid. Check this by removing the harness from the ECU and test for continuity between pins 7, 14, 15 and trailer B+, with power disconnected. If the resistance is less than 10 MΩ in any case, replace suspect hardware and retest. If the code still exists then the ECU is likely defective
- Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU and secure the connection with the attached metal latch.

## Code 90:

Indicates that ABS voltage is below ~8.5 volts. This fault will disappear when the voltage exceeds 8.5 volts, without the ignition being recycled. This fault is NOT stored in the ECU history.

- The most likely causes include: a damaged or corroded wire, terminal, or splice in the ABS power supply circuit. Check the voltage drop between the SAE J560 - 7 way and the ABS ECU. The voltage drop should not exceed 2 volts.
- If power is coming from somewhere other than the tractor; make sure the tester battery is fully charged or the voltage converter has adequate voltage and current capacity. Do NOT use a battery charger.
- Another possible cause is undersized wiring. Recommended trailer wire sizes are 10 gauge for power (permanent and stoplight) and 8 gauge for ground.

## Code 92:

Indicates that the ABS voltage is above ~16 volts.

- The most likely cause is a malfunctioning voltage regulator or tester power supply set too high. If this fault occurs while troubleshooting the trailer w/o a tractor connected, verify that the tester power supply is below 16 volts before proceeding.

## Code 80, 93, 99, E0-E9, or EA-EF:

Indicates that the ECU is likely defective.

- Replace the ECU and retest to confirm problem is resolved.

## Code CA, CC:

- A "CA" code is an invitation to "clear all" faults stored in history. Note that dynamic faults will not be erased from memory until the trailer is driven above ~6 mph.
- A "CC" code will be displayed during the third consecutive time that a "Clear All" is attempted. This is an invitation to "Clear Configuration" and should be avoided. If a "CC" is displayed, power down the system and power back up.

# Troubleshooting Information

## Code "HI", "LO", or Blank Diagnostic Screen :

- A "HI" indicates that the supply voltage is below ~6.75 volts, or there is a short circuit in one of the diagnostic communication lines.

A "LO" indicates that the supply voltage is below ~3.8 volts, or there is an open circuit in one of the diagnostic communication lines.

- For either "HI" or "LO" faults, check supply voltage. If the voltage is between 9 - 14 VDC, then disconnect the main wire harness 19 pin connector and check individual diagnostic wires for opens or shorts. Pins #2 and 18, on the main wire harness 19 pin connector, power the diagnostics. Pins #5 and 11 are the communication lines. Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU and secure the connection with the attached metal latch.

- A Blank diagnostic screen indicates that there is no power to the diagnostics. Possible causes include: an open or short in the power wires of the diagnostics (See paragraph above), no power at the permanent power pin (The diagnostics can not be powered through the stoplight circuit), or an incompatible wire harness/ ECU combination (Pre-3/1/98 wire harness or ECU mixed with post 3/1/98 parts).

## ABS Warning Light Stays On Permanently:

Upon power up of the ABS system, the ABS warning light should come on for ~3 seconds, then go out. If the light stays on, it may be caused by improper light wiring, or by a fault in the ABS system.

- Check for diagnostic fault codes. If anything other than an "07" is displayed, review the "Troubleshooting Information" section of this manual for possible solutions. After the problem is repaired, clear all stored faults. (See "Using Diagnostic Tools" section, of this manual).

- If an "07" is displayed but there is an 11,12, 21, 22, or 41 stored in memory, then the trailer needs to be driven above ~6 mph to get the ABS light to go off.

- If there are no stored faults and an "07" is displayed on the diagnostics, and the ABS light is still on, then the ABS light is miswired. Remove the main wire harness 19 pin connector at the ECU and verify continuity between pin #10 and the light. The remaining light wire must be grounded to the trailer chassis or connected to the SAE J560 -7 way connector ground wire. Check for continuity between the light wire and ground. Repair as necessary and retest.

- Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU and secure the connection with the attached metal latch.

# Troubleshooting Information

## No ABS Warning Light Illumination:

- Check the bulb to verify that it is functional. If not functional, replace it.
- Verify that there is power to the ECU. Disconnect the main wire harness 19 pin connector and check for B+ (positive power) at either pin #3 or pin #1. The voltage drop between the SAE J560 - 7 way and the ECU should not exceed 2 volts. If no power exists at either pin, then check continuity between these pins and the SAE J560 - 7 way connector red and blue circuits. Make necessary repairs and retest.
- If the problem is still present, remove the main wire harness 19 pin connector at the ECU and verify continuity between pin # 10 and the light. The remaining light wire must be grounded to the trailer chassis or connected to the SAE J560 -7 way connector ground wire. Check for continuity between the light wire and ground. Repair as necessary and retest.
- Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU and secure the connection with the attached metal latch.

## For All Other Problems:

Contact Haldex Technical Support. See the following page for details.