This installation manual describes the correct installation procedures for the Haldex Mod II Anti-Lock Brake Systems for trailers. The Mod II ABS product is focused at 2 modulator (2M) applications using either 2 or 4 sensors (2S or 4S).

The information contained in this manual was current at the time of printing and is subject to change without notice or liability.

You must follow your company safety procedures when you install this equipment. Be sure you understand all procedures and instructions before you begin.

Installing the Mod II is not complex but care must be taken during each phase of the installation in order to ensure the system is installed correctly.
General Operation of Mod II

Mod II ABS, is the latest in a full line of Haldex trailer ABS systems that provide stability and control during braking by preventing wheel lock up. As with other ABS systems, Mod II uses a combination of valves, sensors, exciter rings, and the Electronic Control Unit (ECU) working in union to maximize the control of a braking trailer.

When the Mod II ECU detects the rapid decrease in speed of a wheel about to lock up, it releases the air pressure from the brake chambers of the affected wheels via one or both of the modulator valves. The release of air from the chambers prevents the wheels from locking up and ensures vehicle stability. As soon as the wheels begin to rotate again, the ECU signals the modulator valves to reapply the pressure in the affected brake chambers to maximize brake effort. If the condition that caused the lock remains, the cycle is repeated until either the vehicle is stopped, or the brake has been released. This function is totally automatic and can occur up to six times per second.

Mod II has been targeted to accommodate trailers with 2 to 6 axles. The control is provided through 2 modulator valves and either 2 or 4 sensors. The system has the flexibility to be installed as 2S/2M Side-By-Side control, 4S/2M Side-By-Side control, or 4S/2M Axle-By-Axle control. All configurations meet the requirements of FMVSS121.

Mod II can be installed on a variety of trailer configurations. Full trailers, spread axle trailers and multiple axle trailers are particularly well suited to the installation of Mod II. An important consideration of installing ABS is placement of the wheel sensors. This is especially true when an ABS modulator valve controls multiple axles. Haldex recommends that the sensors be placed on the axle most likely to lock up during a brake application.

In the event of a failure in the permanent power circuit, the system will receive power from the stoplight circuit. If the power fails in both circuits, the system reverts to a standard relay valve system.
Axle-By-Axle
vs
Side-By-Side

Axle-By-Axle

Pros:

1. Easy to install
2. Delivery hoses are short and equal in length.
3. Particularly suited to tandem, spread axle, and full trailer.
4. Slaved axles may be lifted
5. Split friction surfaces do not affect stability.
6. Provides good combination of stability and stopping power.
7. Eliminates flat spotting on two axle trailers.

Cons:

1. Sensed axles can not be lifted.
2. Location of sensors is not consistent with previous Modal 4S/2M systems.

Side-By-Side

Pros:

1. Easy to install
2. Eliminates flat spotting on two axle trailers.
3. Plumbing is typical of industry standard.
4. Provides good combination of stability and stopping power.
5. One sensed axle can be liftable.
6. Has slight performance advantage on split mu surfaces.

Cons:

1. Not well suited for spread axle trailers.
2. Plumbing typically requires unequal delivery hose lengths.
ABS System Components

- Service kit available for these items

ABS Relay Valve

Support Clip

Single Tie Strap

Double Tie Strap

ECU Wire Harness

FFABS Valve W/ECU

Sensor Clip

Sensor Block

Sensor

Power Cable

3-Way Clip (Optional)

ABS Lamp

Exciter Ring

MPSI

DDU

INFO CENTRE

PC Diagnostics
Placement of Sensors for 4S/2M Axle-By-Axle Installation

Installation of the wheel speed sensing equipment is the most critical phase of installing an ABS system because the Electronic Control Unit (ECU) adjusts the pressure in the modulator valve in response to input from the wheel speed sensors. Incorrect installation of the sensors and exciters will result in poor or no ABS operation.

The placement of the sensors at the wheel end is also an important consideration. Mod II (and all other ABS systems) requires the sensor input (that is analyzed and converted to valve control signals by the ECU) to come from the wheels that are controlled by the corresponding valve; sensors connected to yellow leads must sense wheels controlled by the valve connected to the yellow lead. Similarly, sensors connected to blue leads must sense wheels controlled by the valve connected to the blue lead.

In the case of Mod II 4S/2M Axle-By-Axle, the blue modulator lead must be connected to the valve that controls the front axle wheel ends and is sensed by the blue sensors (3A and 2A). The yellow valve cable lead must be connected to the valve that controls the rear axle wheel ends and is sensed by the yellow sensors (3B and 2B). The schematic below shows the proper placement of the sensor and valve leads (the king pin dot indicates the front to the trailer). Make sure the sensors are pushed firmly against the exciter ring (see sensor assembly in the figure below).

To check for wheel sensor output at the sensed wheels, use one of the diagnostic tools described in this manual (DDU or MPSI). For example: Using the DDU, rotate the front sensed wheel on the curb side and the 2A bar on the display should light. Likewise, when the front sensed wheel on the road side is rotated, the 3A bar on the display should light. Following this same approach on the rear sensed axle, the 3B bar should light when the sensed wheel on the road side is rotated and the 2B bar should light when the curb side rear sensed wheel is rotated. It is now only necessary to ensure that the valve cables are routed to the proper axles; blue to the front, yellow to the rear.
## System Configuration

### 4S/2M Multi Axle  
**Axle-By-Axle**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>ECU w/Valve</th>
<th>ABS Relay Valve</th>
<th>King Pin</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Spring Suspension</th>
<th>Spring Suspension</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Note:** the distance between axles should not exceed 72".

### 4S/2M Multi Axle  
**Axle-By-Axle (Spread Axle)**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>ECU w/Valve</th>
<th>ABS Relay Valve</th>
<th>King Pin</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Spring or Air Suspension</th>
<th>Spring or Air Suspension</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Note:** Axle-By-Axle installation is recommended for spreads greater than 72".

### 4S/2M Multi Axle  
**Axle-By-Axle (Full Trailer)**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>ECU w/Valve</th>
<th>ABS Relay Valve</th>
<th>King Pin</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Spring or Air Suspension</th>
<th>Spring or Air Suspension</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5" alt="Diagram" /></td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
</tbody>
</table>

Page 5  
*Use this matrix to define which configuration you have.*
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 the 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.
6. Reference cable routing section for tips on routing and securing ABS cables.
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 the 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.
6. Reference cable routing section for tips on routing and securing ABS cables.

Note: This End Up

Tighten Nipple
(Torque 50 ft.-lb.)

All ports are 3/8" except nipple (1/2" or 3/4")
Torque to 210 L.B. IN. Max.
System Plumbing
MOD II System (Tandem Axle)
4S/2M Axle-By-Axle

When only relay type valves are used a Haldex RT4 valve is required for spring brake control.

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 the 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.
6. Reference cable routing section for tips on routing and securing ABS cables.

Note: This End Up
Tighten Nipple (Torque 50 ft.-lb.)

Solenoid
Control Port
Service Brake Delivery (2 port)
Spring Brake Control Valve (RT4)
(plastic threads)
All ports are 3/8" except nipple (1/2" or 3/4")
Torque to 210 LB. IN. Max.
System Wiring Information
Typical for 4S/2M Axle-By-Axle

Legend

- Sensor
- DDU Cable
- Power Cable
- Modulating Cable

Make sure connector is locked into place (listen for two clicks when connecting wire harness)

Hand tighten collar

Rear Axle Curb Side 2B

Wire Harness

Modal Valve

Front Axle Curb Side 2A

ABS Light (Note: Light is mounted on side of trailer)

7-Way Wiring Hook-Up

Power Cord

Rear Axle Road Side 3B

Front Axle Road Side 3A

DDU Connection

Optional:
ISO 3731 WJ560

Pin out for Power Cord

<table>
<thead>
<tr>
<th>Power Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
</tr>
<tr>
<td>Blue</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Brown</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Yellow</td>
</tr>
<tr>
<td>Green</td>
</tr>
</tbody>
</table>

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

See 7-way wiring section of manual
System Wiring Information
Typical for Axle-By-Axle (4S/2M)
(requires an RT4 valve for spring brake control)

Legend
- Sensor
- DDU Cable
- Power Cable
- Modulating Cable

Make sure connector is locked into place (listen for two clicks when connecting wire harness).

Hand tighten collar

Rear Axle Curb Side 2B
Front Axle Curb Side 2A

Modal Valve

Wire Harness

Modal Valve

Rear Axle Road Side 3A
Front Axle Road Side 3A

7-Way Wiring Hook-Up
Power Cord

ABS Light
(Note: Light is mounted on side of Trailer)

DDU Connection

Optional:
ISO 3731 W/J560

See 7-way wiring section of manual

Pin out for Power Cord

"A" B - Stoplight
"B" B - Permanent
"C" Ground
"D" Cab Lamp
"E" Trailer Lamp

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

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Lift Axle Information
4S/2M Axle-By-Axle

On 4S/2M Axle-By-Axle installations, no sensed wheels can be on lift axles. Lifting a sensed axle in this configuration will create a fault in the ABS system. ABS operation will be suspended until the power has been cycled and all sensed wheels are again rolling on the road surface.

Note: Indirectly controlled axles (axles without sensors but controlled by ABS valves) may be lifted regardless of configuration.
Recommended Production Testing

Recommended Production Testing
On Line (Bogie) ABS Check
This step will ensure the ABS system (less power cable and warning lamp) is functioning properly.

Test Equipment: 12VDC power source, interface cable with Packard 5 pin male connector and ABS warning lamp attached.

Procedure for 4S/2M Axle-By-Axle
1. Charge the supply and service air system.
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 light for about 3 seconds and then go out.
5. Plug DDU into the DDU outlet; the display should read "07".
6. Slowly rotate the front sensed wheel on the curb side; the 2A bar should appear.
7. Slowly rotate the front sensed wheel on the road side; the 3A bar should appear.
8. Slowly rotate the rear sensed wheel on the curb side; the 2B bar should appear.
9. Slowly rotate the rear sensed wheel on the road side; the 3B bar should appear.

DDU Screen

Reference Troubleshooting Information section for correcting faults

End-Of-Line ABS Check

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 Troubleshooting Information section of the manual.
Placement of Sensors for 4S/2M Side-By-Side Installation

Installation of the wheel speed sensing equipment is the most critical phase of installing an ABS system because the Electronic Control Unit (ECU) adjusts the pressure in the modulator valves in response to input from the wheel speed sensors. Incorrect installation of sensors and exciters will result in poor or no ABS operation.

The placement of the sensors at the wheel end is also an important consideration. Mod II (and all other ABS systems) requires the sensor input (that is analyzed and converted to valve control signals by the ECU) to come from the wheels that are controlled by the corresponding valve; sensors connected to yellow leads must sense wheels controlled by the valve connected to the yellow lead. Similarly, sensors connected to blue leads must sense wheels controlled by the valve connected to the blue lead.

In the case of Mod II 4S/2M Side-By-Side, the blue modulator lead must be connected to the valve that controls the curb side wheel ends and are sensed by the blue sensors (3A and 2A). The yellow valve cable lead must be connected to the valve that controls the road side wheel ends and are sensed by the yellow sensors (3B and 2B). The schematic below shows the proper placement of the sensor and valve leads (the king pin dot indicates the front of the trailer). Make sure that the sensors are pushed firmly against the exciter ring (see sensor assembly in the figure below).

To check for wheel sensor output at the sensed wheels, use one of the diagnostic tools described in this manual (DDU or MPSI). For example: Using the DDU, rotate the front sensed wheel on the curb side and the 3A bar on the display should light. Likewise, when the front sensed wheel on the road side is rotated, the 3B bar on the display should light. Following this same approach on the rear sensed axle, the 2B bar should light when the sensed wheel on the road side is rotated and the 2A bar should light when the curb side rear sensed wheel is rotated. It is now only necessary to ensure that the valve cables are routed to the proper sides, blue to the curb side, yellow to the road side.
System Configuration

4S/2M Multi Axle

- Sensor
- ECU w/Valve
- ABS Relay Valve
- King Pin

Spring Suspension

Air Suspension

Side-By-Side

2S/2M Multi Axle

- Sensor
- ECU w/Valve
- ABS Relay Valve
- King Pin

Spring Suspension

Air Suspension

Use this matrix to define which configuration you have.
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 the 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.
6. Reference cable routing section for tips on routing and securing ABS cables.

Note: This End Up

Tighten Nipple
(Torque 50 ft.-lb.)

Solenoid
Control Port
Service Brake Delivery (2 port)
All ports are 3/8" except nipple (1/2" or 3/4"
Torque to 210 L.B. IN. Max.

ECU
Reservoir Port
Solenoid
Service Brake Delivery (2 port)
Spring Brake Delivery (2 port)
Supply (Emergency)
When only relay type valves are used a Haldex RT4 valve is required for spring brake control.

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 the 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.
6. Reference cable routing section for tips on routing and securing ABS cables.

Note: This End Up

Tighten Nipple (Torque 50 ft.-lb.)
System Wiring Information
Typical for 4S/2M Side-By-Side

Legend

- Sensor
- DDU Cable
- Power Cable
- Modulating Cable

Make sure connector is locked into place (listen for two clicks when connecting wire harness)

Hand tighten collar

Rear Axle Curb Side 2A

Front Axle Curb Side 3A

Modal Valve

Wire Harness

Rear Axle Road Side 2B

Front Axle Road Side 3B

DDU Connection

ABS Light
(Note: Light is mounted on side of Trailer)

7-Way Wiring Hook-Up

Power Cord

Optional:
ISO 3731 W/JS60

See 7-way wiring section of manual

Pin out for Power Cord

- Red
- Blue
- White
- Tan/Black
- Gray/White

"A" - Stoplight
"B" - Permanent
"C" - Cab Lamp
"D" - Trailer Lamp

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

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System Wiring Information
Typical for 2S/2M Side-By-Side
(requires an RT4 valve for spring brake control)

Legend

Sensor
DDU Cable
Power Cable
Modulating Cable

Wire Harness
Modal Valve
Front Axle Road Side 2B

ABS Light
(Note: Light is mounted on side of Trailer)

7-Way Wiring Hook-Up

Power Cord

Optional:
ISO 3731 W/J560

560

3731

See 7-way wiring section of manual

Pin out for Power Cord

A' B' Stoplight
B' B' Permanent
C' Ground
C' Cab Lamp
D' Trailer Lamp

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
On 4S/2M Side-By-Side installations, the sensed wheels "3A" and "3B" can be used on a lift axle. The sensed wheels "2A" and "2B" must remain on the ground at all times.

Note: Indirectly controlled axles (axles without sensors but controlled by ABS valves) may be lifted regardless of configuration.
Recommended Production Testing

On Line (Bogie) ABS Check
This step will ensure the ABS system (less power cable and warning lamp) is functioning properly.

Test Equipment: 12VDC power source, interface cable with Packard 5 pin male connector and ABS warning lamp attached.

Procedure for 4S/2M Side-By-Side
1. Charge the supply and service air system.
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 light for about 3 seconds and then go out.
5. Plug DDU into the DDU outlet; the display should read "07".
6. Slowly rotate the front sensed wheel on the curb side; the 3A bar should appear.
7. Slowly rotate the front sensed wheel on the road side; the 3B bar should appear.
8. Slowly rotate the rear sensed wheel on the curb side; the 2A bar should appear.
9. Slowly rotate the rear sensed wheel on the road side; the 2B bar should appear.

DDU Screen

Note #5

Note #6

Note #7

Note #8

Note #9

Reference Troubleshooting Information section for correcting faults

End-Of-Line ABS Check

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 Troubleshooting Information section of the manual.
Haldex recommends that the red, white, & blue wires should be 12 gauge minimum for ABS power cables.

White wire is connected to pin #1
Blue wire is connected to pin #7
Red wire is connected to pin #4

Note: If pin 7 is used other than for ABS, then use the optional connector ISO 3731 W/J560 (see detail below).

White wire is connected to pin #1
Red wire is connected to pin #4

Blue wire is connected to pin #7
Yellow/White wire is connected to pin #4
Care must be taken when attaching the wiring harness to the ECU. The support clip must be properly latched to ensure trouble-free ABS operation. Please follow the steps below for proper installation.

**Step #1**
Open the support clip by inserting a screwdriver into the clip slot and prying forward.

**Step #2**
Connect the wiring harness to the ECU (listen for 2 "clicks" as the latches fall into place).

**Step #3**
Close the support clip and lock into place. Band should completely cover the enlarged portion of the wiring harness overmold.
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 into the sensor clip and push firmly until it is against the 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 ensure 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" and no farther then 12" inches apart.
8. 3-way clip should be at a maximum of 4" and from the Service Brake Delivery port. (see detail)
The ABS system is designed with built-in diagnostic checks for troubleshooting. A separate device is required for viewing faults. Below are two methods that can be used for checking the ABS system diagnostics. Also there is an optional PC based program available.

**DDU (Diagnostic Display Unit) Capabilities:**

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

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**MPSI (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 rotation for sensor wiring verification.
   - SID 1= Sensor S1A
   - SID 2= Sensor S1B
4. View ECU type Mod 1.
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.
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

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
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.
<table>
<thead>
<tr>
<th>Codes</th>
<th>Descriptions</th>
<th>Possible Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>System is OK, vehicle is moving &gt; 6 MPH</td>
<td>Not a problem</td>
</tr>
<tr>
<td>03</td>
<td>A sensor/wiring open or short circuit axle 2 (2A)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>04</td>
<td>B sensor/wiring open or short circuit axle 2 (2B)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>05</td>
<td>A sensor/wiring open or short circuit axle 3 (3A)</td>
<td>Sensor worn or maladjusted, damaged sensor or cable</td>
</tr>
<tr>
<td>06</td>
<td>B sensor/wiring open or short circuit axle 3 (3B)</td>
<td>Sensor worn or maladjusted, damaged sensor or cable</td>
</tr>
<tr>
<td>07</td>
<td>System is OK, no sensor output. Rotate wheels to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>generate wheel signal.</td>
<td>Wheel bearing worn, loose, maladjusted; exciter damaged, loose;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damaged or corroded sensor electrical connection</td>
</tr>
<tr>
<td>13</td>
<td>Low Sensor Output Group</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>14</td>
<td>A sensor system fault, axle 2 (2A)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>15</td>
<td>B sensor system fault, axle 2 (2B)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>16</td>
<td>A sensor system fault, axle 3 (3A)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>17</td>
<td>B sensor system fault, axle 3 (3B)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>23</td>
<td>(Low Sensor Output Group)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>24</td>
<td>A sensor system fault, axle 2 (2A)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
</tr>
<tr>
<td>25</td>
<td>B sensor system fault, axle 2 (2B)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
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<td>26</td>
<td>A sensor system fault, axle 3 (3A)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
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<td>27</td>
<td>B sensor system fault, axle 3 (3B)</td>
<td>Sensor loose, sensor faulty, or damaged cable</td>
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<tr>
<td>42</td>
<td>Slow recovery of one wheel of blue channel</td>
<td>Brake drag, damaged modulator, or pinched delivery hose</td>
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<td>Slow recovery of one wheel of yellow channel</td>
<td>Brake drag, damaged modulator, or pinched delivery hose</td>
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<tr>
<td>62</td>
<td>Hold solenoid open circuit, blue channel (62),</td>
<td>Solenoid cable damaged, solenoid damaged, loose connection</td>
</tr>
<tr>
<td></td>
<td>yellow channel (64)</td>
<td>Solenoid cable damaged, solenoid damaged, loose connection</td>
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<tr>
<td>63</td>
<td>Dump solenoid open circuit, blue channel (68),</td>
<td>Solenoid cable damaged, solenoid damaged, loose connection</td>
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<td>Solenoid cable damaged, solenoid damaged, loose connection</td>
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<td>72, 73</td>
<td>Hold solenoid short circuit, blue channel (72),</td>
<td>Solenoid cable damaged, solenoid damaged, or ECU damaged</td>
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<td></td>
<td>yellow channel (73)</td>
<td>Solenoid cable damaged, solenoid damaged, or ECU damaged</td>
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<td>78, 79</td>
<td>Dump solenoid short circuit, blue channel (78),</td>
<td>Solenoid cable damaged, solenoid damaged, or ECU damaged</td>
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<td></td>
<td>yellow channel (79)</td>
<td>Solenoid cable damaged, solenoid damaged, or ECU damaged</td>
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<tr>
<td>82, 83</td>
<td>Hold solenoid circuit fault, blue channel (82),</td>
<td>Power cable wire, terminal, or splice damaged or corroded. SAE</td>
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<tr>
<td></td>
<td>yellow channel (83)</td>
<td>J560 - 7 way corroded, or low supply voltage from source</td>
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<tr>
<td>88, 89</td>
<td>Dump solenoid circuit fault, blue channel (88),</td>
<td>Power cable wire, terminal, or splice damaged or corroded. SAE</td>
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<tr>
<td></td>
<td>yellow channel (89)</td>
<td>J560 - 7 way corroded, or low supply voltage from source</td>
</tr>
<tr>
<td>90</td>
<td>Supply voltage at the controller &lt; 8.5V when a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>solenoid energizes</td>
<td>Not a problem</td>
</tr>
<tr>
<td>92</td>
<td>Supply voltage at the controller &gt; 16V</td>
<td>Not a problem</td>
</tr>
<tr>
<td>C1</td>
<td>C1 - 2S/2M configuration</td>
<td>Not a problem</td>
</tr>
<tr>
<td>C2</td>
<td>C2 - 4S/2M configuration</td>
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</tr>
<tr>
<td>CA</td>
<td>CA - Erase memory signal, CC - Clear configuration (power down if this occurs)</td>
<td>Replace ECU and retest</td>
</tr>
<tr>
<td>C(x)</td>
<td>Software options</td>
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</tr>
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<td>Electrical contact has been made within ECU</td>
<td>Faulty power supply, open or short in communication lines, No</td>
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<tr>
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</tr>
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MOD II

(DO NOT use a battery charger)

In-service ABS Check: Dynamic

To check the operation of the entire ABS system, connect 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. If the light stays on with the ignition key on, refer to the "Troubleshooting Information - ABS Warning Light Illuminates Stays On Permanently" section of this guide for assistance.

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 # 13,14, 15, 16, 23, 24, 25, 26, 42, or 43 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.
Code 00, 07, 8.8, A4, A5, C1, C2, 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" and "A5" are configuration codes and may or may not be present. Ignore these.
● "8.8" is a self diagnostic test.
● "C1", or "C2" indicates that the ABS is a 2S/2M or 4S/2M system
● "DB" indicates that electrical contact has been made with the ECU.

Code 03, 04, 05, or 06
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 28 pin connector can be disconnected at the ECU to check for opens or short in the sensor cables. Sensor cable pins are # 1, 2, 10, 11, 12, 20, 21, & 22. 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.

Code 13, 14, 15, or 16 (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.
**Code 23, 24, 25, or 26 (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 42 or 43 (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 62, 63, 68, or 69:**
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 28 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 3, 4, 13, 14, 23 and 24 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 72, 73, 78, or 79:
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 28 pin connector and check for continuity between pins 3, 4, 13, 14, 23 and 24 and trailer ground. If the resistance is less than 10 MW in any case, replace suspect hardware and retest. If the code still exists than 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 82, 83, 88, or 89:
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 3, 4, 13, 14, 23 and 24 and trailer B+, with power disconnected. If the resistance is less than 10 MW 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 vehicle harness wire sizes are 12 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 in invitation to "Clear Configuration" and should be avoided. If a "CC" is displayed, power down the system and power back up.

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 28 pin connector and check individual diagnostic wires for opens or shorts. Pins #7 and #18, on the main wire harness 28 pin connector, power the diagnostics. Pins #8 and #19 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).
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 was a 13,14, 15, 16 23, 24, 25, 26, 42, or 43 stored in memory, then the trailer needs to be driven above ~6 mph to get the ABS light to go off.
• If there were 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 28 pin connector at the ECU and verify continuity between pin #15 and the light. (Pin#15 and the light should be connected through pin D of the Delphi "Packard" 5 pin power connection.) 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.

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 28 pin connector and check for B+ (positive power) at either pin #5 or #6. 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 28 pin connector at the ECU and verify continuity between pin #15 and the light. (Pin #15 and the light should be connected through pin D of the Delphi "Packard" 5 pin power connection.) 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.