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<td>23</td>
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SECTION 1
Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of the air controller module for Hendrickson’s OPTIMAAX® Lift Axle System for Freightliner vehicles.

NOTE

Use only Hendrickson genuine parts for servicing this system.

Alteration of the OPTIMAAX system air controller module is not permitted.

It is important to read and understand the entire Technical Procedure publication prior to installation or performing any maintenance, service, repair, or rebuild of this product. The information in this publication contains parts lists, safety information, product specifications, features, proper maintenance, service, repair and rebuild instructions for the OPTIMAAX system air controller.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Contact Hendrickson Truck Tech Services for information on the latest version of this manual at 1-866-755-5968 (toll-free U.S. and Canada), 1-630-910-2800 (outside U.S. and Canada) or e-mail: truckparts@hendrickson-intl.com.

SECTION 2
Product Description

Hendrickson’s OPTIMAAX system is a 6 x 2 solution to help fleets save fuel cost, tire wear and weight with comparable handling to 6 x 4 tandem axle configurations. Operating as a liftable axle in the forward tandem position, this system provides versatility for fleets with variable loads.

The OPTIMAAX system air controller monitors air pressure in the drive axle suspension, and calculates axle load based on air pressure levels. When load reaches a set threshold (programmed by Hendrickson, where the limiting factor is typically steer axle load) the OPTIMAAX lift axle automatically deploys. The OPTIMAAX system air controller module includes the air controller manifold, electronic control unit (ECU), and the wiring harness (supplied by Freightliner).

Proprietary program logic controls lift axle movement, load transfer and braking functions.

- **Fully automated controls** — Eliminates driver intervention versus conventional 6 x 2 manual control systems. Automates axle lowering and lifting by sensing load capacities.

- **Optimized traction and handling** — Lifted axle position provides increased traction by increasing drive axle load. Improved traction when backing under trailers in soft soil or wet conditions versus traditional 6 x 2 configuration. Maintains vehicle handling characteristics by keeping the drive axle behind the fifth wheel.
FIGURE 2-1 Air Controller Manifold

FIGURE 2-2 Electronic Control Unit (ECU)

FIGURE 2-3 Air Controller Wiring Harness (Supplied by Freightliner)

Freightliner Part No. A06-95715
HARN-AXLE-LIFT, CHAS, HDR

Freightliner Part No. A06-95709
HARN-AXLE-LIFT, DASH, HDR, P4
SECTION 3
Important Safety Notice

Proper maintenance, service, and repair is important for the reliable operation of the suspension. The procedures recommended by Hendrickson and described in this technical publication are methods of performing such maintenance, service and repair.

This technical publication should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair may damage the vehicle, cause personal injury, render it unsafe in operation, or void manufacturer’s warranty.

Failure to follow the safety precautions in this manual can result in personal injury and / or property damage. Carefully read and understand all safety related information within this publication, on all decals and in all such materials provided by the vehicle manufacturer before conducting any maintenance, service or repair.

- EXPLANATION OF SIGNAL WORDS

Hazard “Signal Words” (Danger-Warning-Caution) appear in various locations throughout this publication. Information accented by one of these signal words must be observed to help minimize the risk of personal injury to service personnel, or possibility of improper service methods which may damage the vehicle or render it unsafe.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Additional Notes or Service Hints are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these signal words as they appear throughout the publication.

- DANGER
  INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN SERIOUS INJURY OR DEATH.

- WARNING
  INDICATES A POTENTIAL HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN SERIOUS INJURY OR DEATH.

- CAUTION
  INDICATES A POTENTIAL HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY, OR PROPERTY DAMAGE.

NOTE
An operating procedure, practice condition, etc. which is essential to emphasize.

SERVICE HINT
A helpful suggestion that will make the servicing being performed a little easier and / or faster.

Also note that particular service operations may require the use of special tools designed for specific purposes. These special tools can be found in the Special Tools Section of this publication.

The torque symbol alerts you to tighten fasteners to a specified torque value. Refer to Torque Specifications Section of this publication.

The warnings and cautions should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair may damage the vehicle, cause personal injury, render the vehicle unsafe in operation, or void manufacturer’s warranty.
SAFETY PRECAUTIONS

NOTE
REPLACE ANY SAFETY DECALS THAT ARE FADED, TORN, MISSING, ILLEGIBLE, OR OTHERWISE DAMAGED. CONTACT HENDRICKSON TO ORDER REPLACEMENT LABELS.

WARNING
LIFT AXLE RAPID AUTOMATIC MOVEMENT
LIFT AXLE RAPID, AUTOMATIC MOVEMENT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.
THE LIFT AXLE CONTROL SYSTEM IS PROGRAMMED TO AUTOMATICALLY:
LOWER THE LIFT AXLE IF –
■ A LOAD ON THE PRIMARY REAR SUSPENSION IS ABOVE A PRESET VALUE, OR
■ THE PARKING BRAKE IS ENGAGED, OR
■ THE IGNITION SWITCH IS OFF, OR
■ A MAJOR SYSTEM FAULT IS DETECTED
RAISE THE LIFT AXLE IF –
■ 1) THE PARKING BRAKE IS DISENGAGED, AND 2) A LOAD ON THE PRIMARY REAR SUSPENSION IS BELOW A PRE-SET VALUE.

WARNING
LIFT AXLE LOADING / UNLOADING
■ ENSURE ALL PERSONNEL ARE CLEAR OF LIFT AXLE DURING VEHICLE LOADING / UNLOADING AND OPERATION.
■ ENGAGE THE PARKING BRAKE DURING VEHICLE LOADING / UNLOADING.

WARNING
PRIOR TO SERVICE
■ EXHAUST ALL PRESSURE IN LIFT AXLE AIR SPRINGS AND VEHICLE AIR SYSTEM BEFORE WORKING ON OR AROUND LIFT AXLE.
■ REMOVE 15 AMP FUSE FROM F15 LOCATION, REFER TO THE SYSTEM OPERATION SECTION OF THIS PUBLICATION.

WARNING
AIR CONTROLLER MANIFOLD
HOT AIR CONTROLLER MANIFOLD SURFACE CAN CAUSE BURNS. DO NOT TOUCH. ALLOW MANIFOLD TO COOL BEFORE SERVICING, SEE FIGURES 3-2 AND 3-3.

WARNING
ELECTRICAL SYSTEM
DO NOT WORK ON THE VEHICLE ELECTRICAL SYSTEM WITH THE VEHICLE POWER ON. DAMAGE TO VEHICLE ELECTRICAL SYSTEM AND / OR UNEXPECTED AXLE MOVEMENT MAY RESULT.
**WIRING HARNESS**

Ensure there is sufficient free movement in air controller wiring harness to prevent wires and connections from being under tension during installation. Failure to do so may damage or fray the cables.

**SYSTEM INSTALLATION**

It is the responsibility of the installer of the air controller module and other Optimaax system components to ensure proper installation. Any installation deviations must be approved, in writing, by Hendrickson’s Product Engineering Department. Annual inspection of system pressure sensors is required to check for proper loading on drive axle and steer axle. Failure to comply with any of the above will void applicable warranties.

**AIR SPRING INFLATION AND DEFLATION**

Prior to disassembly of the suspension, air spring assemblies must be deflated. Unrestricted air spring assemblies can violently shift. Do not inflate air spring assemblies when they are unrestricted. Air spring assemblies must be restricted by suspension or other adequate structure. Do not inflate beyond pressures recommended by air spring manufacturer. Contact Hendrickson Technical Services for details. Improper use or over inflation may cause air spring assemblies to burst, causing property damage and/or severe personal injury.

Prior to and during deflation and inflation of the air suspension system, ensure all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

**AIR SPRING INFLATION**

Inflate the suspension slowly and make sure the rubber bladder of the air spring inflates uniformly and is not binding. Failure to do so can cause damage to the air spring and/or mounting brackets and void warranty.

**AIR SPRING LOWER MOUNTING STUDS**

If the air spring is being removed for an alternate repair, it is mandatory to lubricate the lower air spring fasteners with penetrating oil and remove with hand tools to prevent damage to the lower air spring mounting stud. Failure to do so can cause component damage and void warranty.

**PROCEDURES AND TOOLS**

A mechanic using a service procedure or tool which has not been recommended by Hendrickson must first satisfy himself that neither his safety nor the vehicle’s safety will be jeopardized by the method or tool selected. Individuals deviating in any manner from the instructions provided assume all risks of potential personal injury or damage to equipment involved.

**PERSONNEL PROTECTIVE EQUIPMENT**

Always wear proper eye protection and other required personal protective equipment to help prevent personal injury when performing vehicle maintenance, repair or service.

**MODIFYING COMPONENTS**

Do not modify or rework parts without authorization from Hendrickson. Do not substitute replacement components not authorized by Hendrickson. Use of modified, reworked, substitute or replacement parts not authorized by Hendrickson may not meet Hendrickson’s specifications, and can result in failure of the part, adverse vehicle handling, possible personal injury or property damage, and will void any applicable warranties. Use only Hendrickson authorized replacement parts.
SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. PRIOR TO SERVICING A VEHICLE IN THE RAISED POSITION, PROPERLY SUPPORT THE VEHICLE WITH SAFETY STANDS. DO NOT WORK AROUND OR UNDER A RAISED VEHICLE SUPPORTED ONLY WITH FLOOR JACKS OR OTHER LIFTING DEVICES, FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY OR DAMAGE TO COMPONENTS.

IMPROPER JACKING METHOD

IMPROPER JACKING METHOD CAN CAUSE STRUCTURAL DAMAGE AND RESULT IN ADVERSE VEHICLE HANDLING, SEVERE PERSONAL INJURY OR DEATH. DO NOT USE AXLE BEAM OUTBOARD OF AXLE SPRING SEATS. REFER TO VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS.

SUPPORT THE LIFT AXLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. PRIOR TO SERVICING A LIFT AXLE IN THE RAISED POSITION, (1) PROPERLY SUPPORT THE LIFT AXLE WITH SAFETY STANDS, AND (2) RELEASE ALL AIR PRESSURE IN THE LIFT AXLE AIR SPRINGS AND RIDE SPRINGS. DO NOT WORK AROUND OR UNDER A RAISED LIFT AXLE SUPPORTED ONLY WITH FLOOR JACKS OR OTHER LIFTING DEVICES, FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY OR DAMAGE TO COMPONENTS.
SECTION 4
Definitions

<table>
<thead>
<tr>
<th>DEFINITIONS</th>
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<tbody>
<tr>
<td>APU</td>
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<td>Bobtail Condition</td>
</tr>
<tr>
<td>CAN BUS</td>
</tr>
<tr>
<td>CAN Wires</td>
</tr>
<tr>
<td>Config File</td>
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<tr>
<td>Diagnostic tool Software</td>
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<td>ECU</td>
</tr>
<tr>
<td>EEPROM</td>
</tr>
<tr>
<td>OBD</td>
</tr>
<tr>
<td>sSAM</td>
</tr>
<tr>
<td>USB</td>
</tr>
<tr>
<td>VPDM</td>
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</tbody>
</table>
## SECTION 5
### Parts List

**Tightening Torque**

53 ± 9 in. lbs.

<table>
<thead>
<tr>
<th>KEY NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>VEHICLE QUANTITY</th>
<th>TORQUE VALUE</th>
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<tbody>
<tr>
<td>1</td>
<td>080924-0XX</td>
<td>*OPTIMAAX Air Controller Module, Includes Key Nos. 2-3, 8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>080692-0XX</td>
<td>Vehicles built AFTER October 1, 2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles built PRIOR TO October 1, 2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>060905-051</td>
<td>Warning Decal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>080925-0XX</td>
<td>Electronic Control Unit (ECU), Includes Key Nos. 4-7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>080427-0XX</td>
<td>Vehicles built AFTER October 1, 2019</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>Vehicles built PRIOR TO October 1, 2019</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>060905-052</td>
<td>OPTIMAAX ECU Decal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>**</td>
<td>ECU Hardware</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>**</td>
<td>**OPTIMAAX EEPROM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>**</td>
<td>**OPTIMAAX Programming Decal</td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>080860-000</td>
<td>Splash Shield Assembly, Includes Key Nos. 9-11</td>
<td>1</td>
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</tr>
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<td>9</td>
<td>060905-030</td>
<td>Manifold Heat Warning Decal</td>
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<tr>
<td>10</td>
<td>077276-000</td>
<td>Splash Shield</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>080426-000</td>
<td>Air Controller Manifold</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>**</td>
<td>**M5 x 16 mm Screw</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>**</td>
<td>**M5 Flange Hex Nut</td>
<td>6</td>
<td>53 ± 9 in lbs.</td>
</tr>
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</table>

**NOTE:**
- * Consult the vehicle manufacturer for applicable OPTIMAAX Air Controller Module.
- ** Item included in kit / assembly only, part not sold separately.
- *** Fasteners and torque value supplied by vehicle manufacturer. Contact vehicle manufacturer for additional service information.
 SECTION 6
Air Controller Module

INSTALLATION

ASSEMBLY
1. Prior to installation of air controller module, refer to Cautions and Warnings in the Important Safety Notice Section of this publication

WARNING
DO NOT WORK ON THE VEHICLE ELECTRICAL SYSTEM WITH THE VEHICLE POWER ON. DAMAGE TO VEHICLE ELECTRICAL SYSTEM AND / OR UNEXPECTED AXLE MOVEMENT MAY RESULT.

NOTE
Refer to Wiring Diagram Section of this publication for basic routing / schematic of wires.

2. Chock the wheels and exhaust all air from the vehicle supply tanks.

WARNING
PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

3. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.

4. Ensure vehicle power is off.

5. Remove 15 AMP fuse from slot F15 located in the dash board behind VPDM, see Figure 11-2 in System Operation Section of this publication.

6. Ensure the wiring harness is plugged into the ECU and air controller manifold per the vehicle manufacturer’s specifications. Harness connectors have printing (A, B, C, D, E) to indicate which manifold connectors to mate with. The manifold is engraved with matching letters, see Wiring Diagram Section of this publication.
   - The wiring harness pressure connector labeled DRIVE matches the manifold port engraved DRIVE. The harness pressure connector labeled LIFT matches with the remaining manifold port.
   - Ensure the wiring harness is secured as per vehicle manufacturer’s guidelines. For worn or frayed harness, contact the vehicle manufacturer.

WARNING
DO NOT WORK ON THE VEHICLE ELECTRICAL SYSTEM WITH THE VEHICLE POWER ON. DAMAGE TO VEHICLE ELECTRICAL SYSTEM AND / OR UNEXPECTED AXLE MOVEMENT MAY RESULT.

7. Connect the lift axle air plumbing to the OPTIMAAAX air manifold per Air Manifold Diagram Section of this publication.

8. Install splash shield over OPTIMAAAX ECU.

9. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.

10. Reconnect vehicle power and start the engine.

11. Re-insert 15 AMP fuse in slot F15 located in the dash board behind VPDM.

12. Allow compressor to generate full system pressure. With wheels still chocked, cycle vehicle parking brake to verify system operation.
   - Lift axle should always remain on the ground with the parking brake set. At bobtail condition the lift axle should raise when the parking brake is released.

13. Remove the wheel chocks.
SECTION 7
Wiring Diagram

ELECTRONIC CONTROL UNIT for AIR CONTROLS

<table>
<thead>
<tr>
<th>ECU Part Number</th>
<th>Deploy Threshold lbs</th>
<th>Retract Threshold lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicles built AFTER 10/1/2019</td>
<td>Vehicles built PRIOR TO 10/1/2019</td>
<td></td>
</tr>
<tr>
<td>080925-001</td>
<td>080427-001</td>
<td>11000</td>
</tr>
<tr>
<td>080925-002</td>
<td>080427-002</td>
<td>12000</td>
</tr>
<tr>
<td>080925-003</td>
<td>080427-003</td>
<td>13000</td>
</tr>
<tr>
<td>080925-004</td>
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<td>14000</td>
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<tr>
<td>080925-005</td>
<td>080427-005</td>
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<tr>
<td>080925-006</td>
<td>080427-006</td>
<td>16000</td>
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<tr>
<td>080925-007</td>
<td>080427-007</td>
<td>17000</td>
</tr>
<tr>
<td>080925-008</td>
<td>080427-008</td>
<td>18000</td>
</tr>
</tbody>
</table>

**WARNING**
THE ADDITION OF WEIGHT TO THE VEHICLE (APU - AUXILIARY POWER UNIT, CHAINS, ETC.) MAY CHANGE THE CORRECT OPTIMAAX DEPLOY THRESHOLD AND MAY REQUIRE REreplacement OF THE ECU. FAILURE TO DO SO WILL OVERLOAD THE LIFT AXLE.
SECTION 8
Preventive Maintenance

AIR CONTROLLER MANIFOLD
Appropriate inspection procedure is important to ensure the OPTIMAAX system is accurately measuring the system load.

- On an annual basis — the calibration of the pressure sensors, see Figure 8-1, in the air controller manifold must be checked.

INSPECTION
1. Connect the Diagnostic Tool Software.
2. Apply shop air to the drive port with a calibrated pressure gauge.
3. Displayed pressure in Diagnostic Tool Software must match pressure gauge measurement within ± 5 PSI. If not, the air controller manifold must be replaced.
4. Repeat Steps 2 and 3 for the lift port.

FIGURE 8-1
SECTION 9
Air Controller Manifold Diagram

**TUBING REPLACEMENT**

FOR THE AIR PORT EXH ON THE AIR CONTROLLER MANIFOLD, USE A FILTER RATED TO AT LEAST 40 MICRON. ANYTHING LESS CAN CAUSE DAMAGE TO THE AIR CONTROL PANEL.

1. Use only S.A.E. J844 tubing and ensure all tubes are free from kinks.
2. Ensure that the minimum bend radius is achieved on all tubes prior to assembly. Recommended minimum radius:
   - ¼" Tube – 1.0 inches
   - ⅜" Tube – 1.5 inches
   - ½" Tube – 2.0 inches
3. Use only dedicated tube cutters when preparing tube ends for insertion into push-in fittings.
4. Ensure the tube ends are square, free of damage, and clean.
5. Ensure the tube is fully inserted into the fittings (tube ends are pushed past both the grip ring and the sealing O-ring).
   - SUPPLY and LIFT ½" tubes (not supplied by Hendrickson)
   - AUX and DRIVE ⅜" tubes (not supplied by Hendrickson)
6. A spring is used to retain a mesh filter on DRIVE and SUPPLY ports. These must be retained when PTC fittings are installed (not supplied by Hendrickson). The mesh filter helps to prevent debris from entering the system.
7. Ensure the tubing is not under any tension.

---

**Diagram:**

- *⅜" AUX Tube* (Black)
- *½" LIFT Tube* (Blue)
- *½" SUPPLY Tube* (Yellow)
- *⅜" DRIVE Tube* (Blue)

---

*NPT PTC Fittings are not supplied by Hendrickson*

- **Input from Manifold:** Aux Ride Spring
- **Input from Manifold:** Lift Spring
- **Input to Manifold:** Air Supply
- **Input to Manifold:** Drive Suspension Pressure
- **Output from Manifold:** EXH Filter
OPTIMAAX® Lift Axle System Air Controller Module for Freightliner

**OPTIMAAX AIR CONTROLLER MANIFOLD**

**AIR AND ELECTRICAL PORTS**

**TOP VIEW**
- Air Port SUPPLY
- Air Port EXH
- Electrical Port A
- Electrical Port B

**BOTTOM VIEW**
- Electrical Port D
- Electrical Port E
- Air Port DRIVE

**SIDE VIEW**
- Air Port AUX
- Air Port LIFT

**FRONT VIEW**
- Electrical Port LIFT
- Electrical Port DRIVE
SECTION 11
System Operation

Prior to operating the system, refer to Safety Precautions in the Important Safety Notice Section of this publication.

SYSTEM FAULT

The OPTIMAAX is designed with features to detect a fault in system operation which is separate from the air controller module. The warning light on the dashboard, see Figure 11-1, indicates either of the following conditions:

A FLASHING WARNING LIGHT indicates a system fault. Refer to the Diagnostic Tool Software Section for reading ECU system faults and the Troubleshooting Guide Section of this publication.

A SOLID WARNING LIGHT indicates an overload condition of the suspension. It may be beneficial to weigh the vehicle to verify overload condition. The OPTIMAAX system is designed to help ensure that the lift, drive, and steer axles operate within the proper weight parameters. An overload light will indicate an overload on at least one of the axles.

Prior to service of the lift axle, adjacent components or the air controller module:

1. Turn ignition off.
2. Ensure the lift axle is on ground.
3. Remove 15 AMP Fuse, located in the dash behind the vehicle power distribution module (VPDM) in location F15, which houses the main fuse and relay center, see Figure 11-2.
4. Exhaust all pressure in lift axle air springs and vehicle air system.

NOTE

The OPTIMAAX air controller module weight thresholds to raise and deploy the lift axle are set by vehicle manufacturer.
FEATURES AND OPERATION

SYSTEM MINIMUM REQUIREMENTS AND OPERATING SYSTEMS
This Diagnostic Tool Software works with a laptop equipped with a 32-bit or 64-bit Windows® XP, Vista and Windows 7, 8 and 10 operating systems. Hendrickson provides access to software through NEXIQ, www.nexiq.com.

THE DIAGNOSTIC TOOL SOFTWARE
It is used to communicate with the lift axle controls. It allows the user to monitor system function, and troubleshoot system operation.

SERIAL PORT AND USB TO SERIAL CABLE
The serial port must be selected in the Diagnostic Tool Software. If using a USB to serial converter, the software for the USB device must be installed first and connected to the computer to check the settings.

OPENING THE DIAGNOSTIC TOOL SOFTWARE
You will need:
- USB to RS232 Cable 6.26' (2.00m) Shielded (not supplied), see Figure 12-1.
  Manufacturer: Future Technology Devices International Ltd.
  Part Number: UT232R-200

1. Locate the serial port cable, typically located in the dash behind the vehicle power distribution module (VPDM) which houses the main fuse and relay center, and plug into it using the USB to serial cable, see Figure 12-1.
2. With the ignition on and parking brake engaged, open the Diagnostic Tool Software, see Figure 12-2.
3. **DO NOT** turn off the vehicle power when the software is open. It is recommended to keep the engine running while connected so the air is available to test system operation.
4. Select a **COM port** from the pull down menu, see Figure 12-2. Select one port and click **Open**.
5. If the wrong **COM port** is selected, the software will show an Error message as shown in Figure 12-3. Select another COM port until the software opens.
6. Once the connection is made, the software version and serial number will be displayed in the white box, see Figure 12-4.
7. Click on the **History** tab to view error / fault codes, see Figures 12-4 and 12-6.
Select a **COM Port** from the pull down menu. There may be more than one com port available.

Pick one, and click **Open**.

If the wrong **COM Port** is selected, the software will show an **Error** message.

Select another COM Port until the software opens and Select **OK**.

Click on the **History** tab to view error / fault codes.

The screen will look like this when the software is communicating with the controller.
OPTIMAAX® Lift Axle System Air Controller Module for Freightliner

**FIGURE 12-5**

- Digital #2 Represents the parking brake signal

**FIGURE 12-6**

- Click on History to view ASECU current error / fault codes
- Click here to view ASECU Log Data
EXITING THE DIAGNOSTIC TOOL SOFTWARE

ALWAYS EXIT THE DIAGNOSTIC TOOL SOFTWARE PROPERLY, ONLY DISCONNECT THE CABLE AFTER EXITING THE SOFTWARE. FAILURE TO DO SO CAN CORRUPT INFORMATION STORED ON THE ECU.

Always exit and open the Diagnostic Tool Software properly.

1. Prior to exiting the Diagnostic Tool Software, ENGAGE the parking brake.
2. Press the CLOSE button on the START tab to terminate communication with the lift axle ECU, see Figure 12-7.
3. Exit the window, see Figure 12-7.

FIGURE 12-7

STEP 2
Click Close to exit

STEP 3
Exit window
SECTION 13
Troubleshooting Guide

To diagnose OPTIMAAX issues correctly, the following steps must first be performed:

1. With vehicle disconnected from the trailer (bobtail) and ignition on, release parking brake. Observe if lift axle raises.
2. Once lift axle is raised, wait 1 minute. Apply parking brake. Observe if lift axle deploys.
4. Verify fuse (15A, located in F15 in VPDM) is operational, see Figure 11-2 in System Operation Section of this publication.

OPTIMAAX LIFT AXLE SYSTEM – ELECTRONIC COMPONENTS

<table>
<thead>
<tr>
<th>PRIMARY CONDITION</th>
<th>SECONDARY CONDITION</th>
<th>POSSIBLE CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lift axle does not retract while vehicle is disconnected from the trailer (bobtail)</td>
<td>Diagnostic Tool Software cannot connect</td>
<td>Fuse is blown</td>
<td>Replace fuse</td>
</tr>
<tr>
<td></td>
<td>Diagnostic Tool Software connects, no ECU Current Faults reported</td>
<td>Wiring harness is damaged / connected incorrectly</td>
<td>Verify wiring harness connection at ECU, manifold, and firewall. Examine visually for external damage. Replace wiring harness as necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ECU is damaged</td>
<td>Replace ECU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wiring harness is damaged / connected incorrectly</td>
<td>Verify wiring harness connection at manifold. The individual solenoid connections may be incorrect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air plumbing is damaged / connected incorrectly</td>
<td>Verify air plumbing at manifold is correct, and that air lines are not crushed, damaged, or leaking. Verify PTC fittings are not leaking.</td>
</tr>
<tr>
<td></td>
<td>Parking brake signal from Single Signal-detection and Activation Module (SSAM) is incorrect</td>
<td>Parking brake signal from Single Signal-detection and Activation Module (SSAM) is incorrect</td>
<td>Open wiring harness connection at ECU 30-pin connection. Place one multimeter lead on pin 10, place other pin on chassis fastener with good ground contact. With parking brake off, and ignition on, the multimeter should read an open circuit. With parking brake on, the multimeter should read resistance below 150 ohms. If pin 10 resistance values are outside this range, replace wiring harness or relay.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mechanical components are damaged</td>
<td>Refer to Troubleshooting Guide Section in Hendrickson Literature No. 17730-309.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manifold is damaged</td>
<td>Replace manifold</td>
</tr>
<tr>
<td></td>
<td>Diagnostic Tool Software connects, ECU Current Faults reported</td>
<td>Damaged manifold or wiring harness</td>
<td>Refer to Fault Codes Section below</td>
</tr>
</tbody>
</table>
### OPTIMAAX® Lift Axle System Air Controller Module for Freightliner

#### OPTIMAAX LIFT AXLE SYSTEM – ELECTRONIC COMPONENTS

#### TROUBLESHOOTING GUIDE

(Continued)

<table>
<thead>
<tr>
<th>PRIMARY CONDITION</th>
<th>SECONDARY CONDITION</th>
<th>POSSIBLE CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lift axle does not retract with partially loaded trailer</td>
<td>Axle retracts correctly while bobtail</td>
<td>Partially loaded trailer weight exceeds Deploy Threshold of ECU</td>
<td>If axle scale is available, measure weight of drive axle with partially loaded trailer. Compare to ECU deploy threshold.</td>
</tr>
<tr>
<td>Lift axle will not fully retract</td>
<td>Diagnostic Tool Software connects, ECU Current Faults reported</td>
<td>Damaged manifold or wiring harness</td>
<td>Refer to Fault Codes Section below</td>
</tr>
<tr>
<td>Loss of traction when axle deployed</td>
<td>Diagnostic Tool Software connects, no ECU Current Faults reported</td>
<td>Air plumbing is damaged / connected incorrectly</td>
<td>Verify air plumbing at manifold is correct, and that air lines are not crushed, damaged, or leaking. Verify PTC fittings are not leaking.</td>
</tr>
<tr>
<td>Lift axle is cycling up and down</td>
<td>Diagnostic Tool Software connects, no ECU Current Faults reported</td>
<td>Wiring harness is damaged / connected incorrectly</td>
<td>Verify pressure sensors are connected to correct ports. Verify wiring harness connection at manifold. The individual solenoid connections may be incorrect.</td>
</tr>
</tbody>
</table>

#### Diagnostic Tool Software connects, no ECU Current Faults reported

- **Wiring harness is damaged / connected incorrectly**
  - Verify wiring harness connection at manifold. The individual solenoid connections may be incorrect.

- **Air plumbing is damaged / connected incorrectly**
  - Verify air plumbing at manifold is correct, and that air lines are not crushed, damaged, or leaking.
  - Verify PTC fittings are not leaking.

- **Manifold is damaged**
  - Replace manifold

- **Mechanical components are damaged**
  - Refer to Troubleshooting Guide Section in Hendrickson Literature No. 17730-309.

#### Diagnostic Tool Software connects, ECU Current Faults reported

- **Damaged manifold or wiring harness**
  - Refer to Fault Codes Section below

- **Air plumbing is damaged / connected incorrectly**
  - Verify air plumbing at manifold is correct, and that air lines are not crushed, damaged, or leaking.
  - Verify PTC fittings are not leaking.

- **Manifold is damaged**
  - Replace manifold

- **Mechanical components are damaged**
  - Refer to Troubleshooting Guide Section in Hendrickson Literature No. 17730-309.

- **Damaged manifold or wiring harness**
  - Refer to Fault Codes Section below
## OPTIMAAX LIFT AXLE SYSTEM – ELECTRONIC COMPONENTS

### TROUBLESHOOTING GUIDE

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<th>SECONDARY CONDITION</th>
<th>POSSIBLE CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTIMAAX warning light is illuminated</td>
<td>Vehicle is overloaded</td>
<td>Reduce vehicle load</td>
<td></td>
</tr>
<tr>
<td>OPTIMAAX warning light is flashing</td>
<td>Axle will not retract</td>
<td>Fault detected. Mechanical issue prevents lift axle from deploying.</td>
<td>Connect Diagnostic Tool software for detailed diagnosis. Refer to Hendrickson Literature No. 17730-309 to diagnose mechanical issue.</td>
</tr>
<tr>
<td>Drive Pressure Sensor Fault (P1)</td>
<td>Wiring harness is damaged or connected incorrectly</td>
<td>Check wiring harness, replace if needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manifold is damaged</td>
<td>Check manifold, replace if needed</td>
<td></td>
</tr>
<tr>
<td>Lift Pressure Sensor Fault (P2)</td>
<td>Wiring harness is damaged or connected incorrectly</td>
<td>Check wiring harness, replace if needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manifold is damaged</td>
<td>Check manifold, replace if needed</td>
<td></td>
</tr>
<tr>
<td>Valve Block Failure</td>
<td>Wiring harness is damaged or connected incorrectly</td>
<td>Check wiring harness, replace if needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manifold is damaged</td>
<td>Check manifold, replace if needed</td>
<td></td>
</tr>
<tr>
<td>CAN Failure</td>
<td>Wiring harness is damaged or connected incorrectly</td>
<td>Check wiring harness, replace if needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECU is damaged</td>
<td>Check ECU replace if needed</td>
<td></td>
</tr>
<tr>
<td>Battery Fault</td>
<td>Wiring harness is damaged or connected incorrectly</td>
<td>Check wiring harness, replace if needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Battery is low</td>
<td>Charge or replace vehicle battery</td>
<td></td>
</tr>
<tr>
<td>System Check 2</td>
<td>Slow leak in air system</td>
<td>Check air plumbing, and air springs, replace as needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manifold is damaged</td>
<td>Check manifold, replace if needed</td>
<td></td>
</tr>
<tr>
<td>System Check 3</td>
<td>Air plumbing is damaged or corrected improperly</td>
<td>Check air plumbing, correct as needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manifold is damaged</td>
<td>Check manifold, replace if needed</td>
<td></td>
</tr>
</tbody>
</table>