TECHNICAL PROCEDURE

OPTIMAAX® Lift Axle System Air Controller Module for Freightliner Vehicles

SUBJECT: Service Instructions
LIT NO: 17730-310
DATE: January 2024 **REVISION:** F

TABLE OF CONTENTS

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 this 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 email: truckparts@hendrickson-intl.com.

The latest revision of this publication is also available online at www.hendrickson-intl.com.

SECTION 2
Product Description

Hendrickson's OPTIMAAX system is a 6 × 2 solution to help fleets save fuel cost, tire wear, and weight with comparable handling to 6 × 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 the air pressure in the drive axle suspension and calculates axle load based on air pressure levels. When the 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, the 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 the 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)

Vehicles built **after** October 1, 2019

Freightliner Part No. A06-95748-777
HARN-AXLE-LIFT, OL, CHAS F, HDR

Freightliner Part No. A06-95749-000
HARN-AXLE-LIFT, OL, DASH, HDR, P4

Vehicles built **prior to** October 1, 2019

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 the 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 the 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 the Torque Specifications section in 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

WARNING

FASTENERS

DISCARD USED FASTENERS. ALWAYS USE NEW FASTENERS TO COMPLETE A REPAIR. FAILURE TO DO SO COULD RESULT IN FAILURE OF THE PART, OR MATING COMPONENTS, ADVERSE VEHICLE HANDLING, PERSONAL INJURY, OR PROPERTY DAMAGE.

LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUE AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED, USING A TORQUE WRENCH THAT IS REGULARLY CALIBRATED. TORQUE VALUES SPECIFIED IN THIS TECHNICAL PUBLICATION ARE FOR HENDRICKSON SUPPLIED FASTENERS ONLY. IF NON-HENDRICKSON FASTENERS ARE USED, FOLLOW TORQUE SPECIFICATIONS LISTED IN THE VEHICLE MANUFACTURER'S SERVICE MANUAL.

WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO PREVENT THE VEHICLE FROM MOVING OR ROLLING. DO NOT WORK AROUND OR UNDER A RAISED VEHICLE SUPPORTED BY ONLY A FLOOR JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH RIGID SAFETY STANDS. FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY OR DAMAGE TO EQUIPMENT.

WARNING

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.

CAUTION

PROCEDURES AND TOOLS

A TECHNICIAN USING A SERVICE PROCEDURE OR TOOL WHICH HAS NOT BEEN RECOMMENDED BY HENDRICKSON MUST FIRST SATISFY THEMSELAVES THAT NEITHER THEIR 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.

WARNING

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.

WARNING

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.

WARNING

ELECTRICAL SYSTEM

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

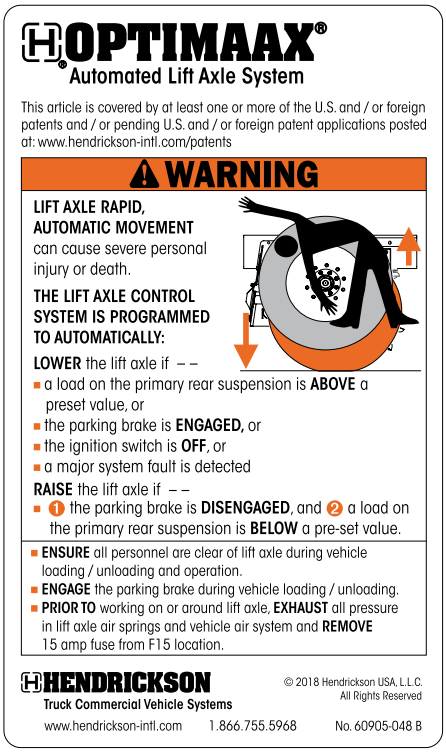
CAUTION

WIRING HARNESS

ENSURE THERE IS SUFFICIENT FREE MOVEMENT IN THE 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.

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

FIGURE 3-1 Product / Safety Decal 60905-048



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 THE LIFT AXLE DURING VEHICLE LOADING / UNLOADING AND OPERATION.
- ENGAGE THE PARKING BRAKE DURING VEHICLE LOADING / UNLOADING.

WARNING

PRIOR TO SERVICE

PRIOR TO WORKING ON OR AROUND THE LIFT AXLE:

- EXHAUST ALL PRESSURE IN LIFT AXLE AIR SPRINGS AND VEHICLE AIR SYSTEM.
- REMOVE 15 AMP FUSE FROM THE LOCATION DESIGNATED BY THE VEHICLE MANUFACTURER FOR OPTIMAAX SUSPENSION, 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.

FIGURE 3-2 Safety Decal 60905-030

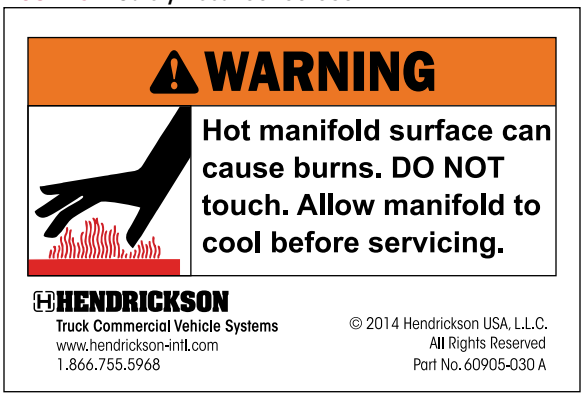


FIGURE 3-3

⚠ WARNING

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.

⚠ WARNING

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.

⚠ WARNING

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.

⚠ CAUTION

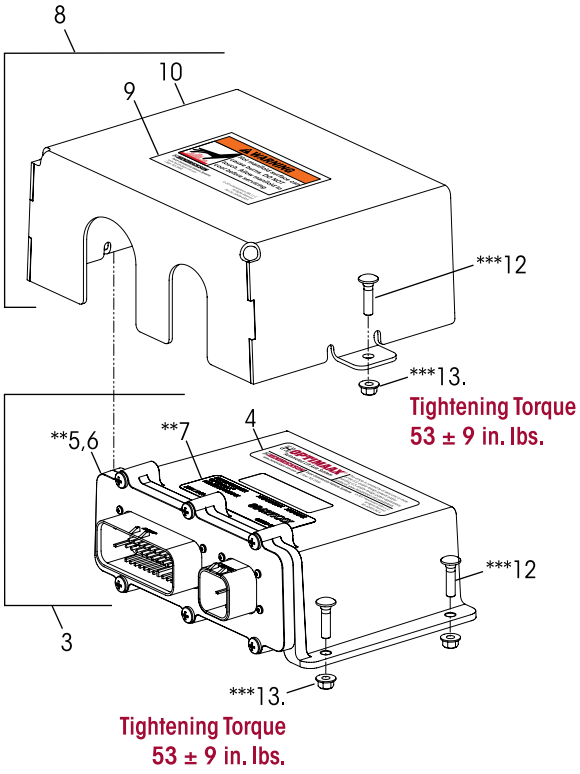
AIR SPRING INFLATION

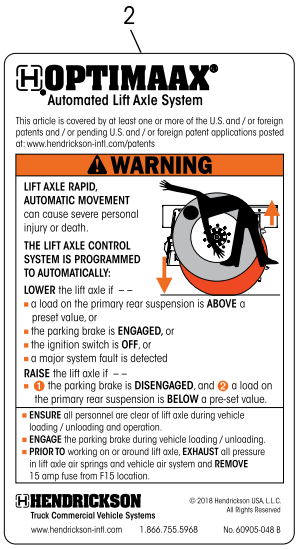
INFLATE THE SUSPENSION SLOWLY AND ENSURE THE RUBBER BLADDER OF THE AIR SPRING INFLATES UNIFORMLY AND IS NOT BINDING. FAILURE TO DO SO CAN CAUSE DAMAGE TO THE AIR SPRING AND / OR MOUNTING BRACKETS AND VOID WARRANTY.

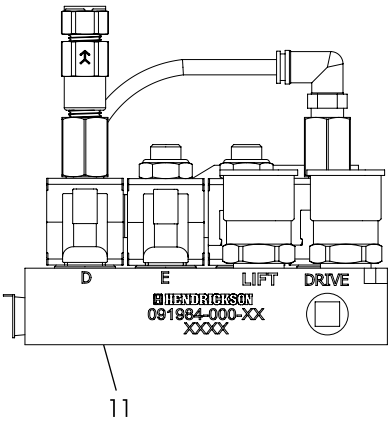
SECTION 4
Definitions

DEFINITIONS	
APU	Auxiliary Power Unit
Bobtail Condition	A bobtail truck is a semi-truck that travels from one point to another without a trailer.
CAN BUS	Controller Area Network Bus
CAN Wires	Controller Area Network Wires
Diagnostic Tool Software	Software used to communicate with the lift axle
ECU	Electronic Control Unit
EEPROM	Electrically Erasable Programmable Read-only Memory
OBD	Onboard Diagnostics
Fault Code	Diagnostic trouble codes are codes that are stored by the on-board computer diagnostic system. These are stored in response to a problem found in the vehicle by the system.
SSAM	Single Signal-detection and Activation Module
SPN	Suspect Parameter Number is a code assigned to specific parameters per SAE (Society of Automotive Engineers)
USB	Universal Serial Bus
VPDM	Vehicle Power Distribution Module

SECTION 5
Parts List







KEY NO.	PART NO.	DESCRIPTION	VEHICLE QUANTITY	TORQUE VALUE
1	093267-0XX	*OPTIMAAX Air Controller Module, Includes Key Nos. 2-3, 8, 11, *Replaces 080924-0XX and 080692-0XX*	1	
2	060905-051	Warning Decal	2	
3	093265-0XX	Electronic Control Unit (ECU), Includes Key Nos. 4-7 *Replaces 080925-0XX and 080427-0XX*	1	
4	060905-052	OPTIMAAX ECU Decal (Located on the hanger and/or fairing)	1	
5		**ECU Hardware	1	
6		**OPTIMAAX EEPROM	1	
7		**OPTIMAAX Programing Decal	1	
8	080860-000	Splash Shield Assembly, Includes Key Nos. 9-10	1	
9	060905-030	Manifold Heat Warning Decal	1	
10	077276-000	Splash Shield	1	
11	91984-000	Air Controller Manifold	1	
12		***M5 x 16 mm Screw	6	
13		***M5 Flange Hex Nut	6	53 ± 9 in lbs.

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 the vehicle manufacturer. Contact the vehicle manufacturer for additional service information.

SECTION 6
Air Controller Module

INSTALLATION

ASSEMBLY

1. Prior to installation of the 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 THE VEHICLE ELECTRICAL SYSTEM AND / OR UNEXPECTED AXLE MOVEMENT MAY RESULT.

NOTE

Refer to the 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.

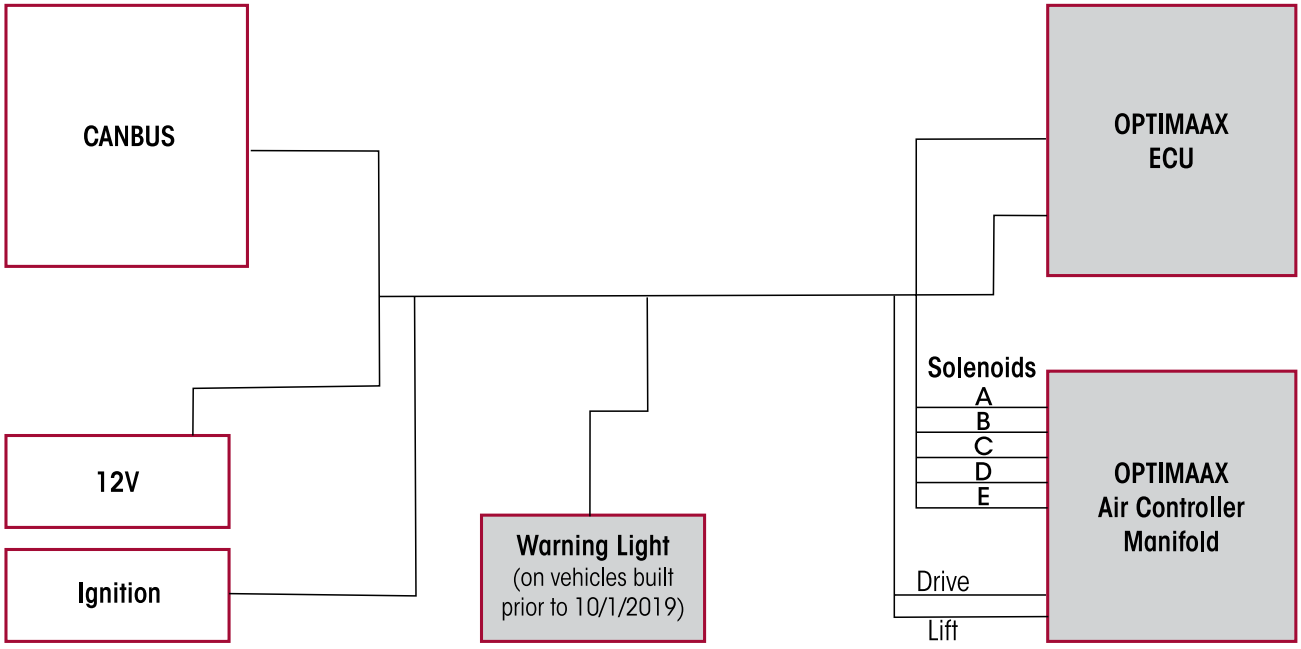
3. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.
4. Ensure vehicle power is off.
5. Remove the 15 AMP fuse from the location designated by the vehicle manufacturer for OPTIMAAX suspension in the dashboard behind the VPDM (vehicle power distribution module), see Figure 11-3 in the System Operation section of this publication.
6. Ensure the wiring harness is plugged into the ECU and the 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 the 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 the vehicle manufacturer's guidelines. For a worn or frayed harness, contact the vehicle manufacturer.

WARNING

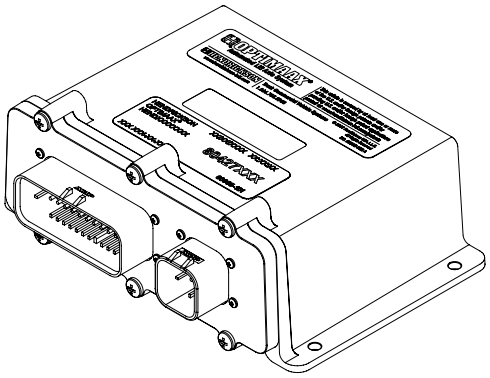
DO NOT WORK ON THE VEHICLE ELECTRICAL SYSTEM WITH THE VEHICLE POWER ON. DAMAGE TO THE VEHICLE'S ELECTRICAL SYSTEM AND / OR UNEXPECTED AXLE MOVEMENT MAY RESULT.

7. Connect the lift axle air plumbing to the OPTIMAAX air manifold per the Air Manifold Diagram section of this publication.
8. Install the splash shield over the OPTIMAAX 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 the 15 AMP fuse in the location designated by the vehicle manufacturer for OPTIMAAX suspension in the dashboard behind the VPDM.
12. Allow the compressor to generate full system pressure. With the wheels still chocked, cycle vehicle parking brake to verify system operation.
    - The 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



ECU Part Number		Deployment Threshold Lbs.	Retract Threshold Lbs.
Vehicles Built After 10/1/2019	Vehicles Built Prior To 10/1/2019		
*080925-001	080427-001	11,000	12,000
*080925-002	080427-002	12,000	13,000
**093265-003	080427-003	13,000	14,000
**093265-004	080427-004	14,000	15,000
**093265-005	080427-005	15,000	16,000
**093265-006	080427-006	16,000	17,000
**093265-007	080427-007	17,000	18,000
**093265-008	080427-008	18,000	19,000
093265-009		19,000	20,000
*093265-010		*20,000	*21,000

* No longer available, contact Hendrickson for a replacement part.
** Replaces part number 080925-0XX.

WARNING THE ADDITION OF WEIGHT TO THE VEHICLE (APU - AUXILIARY POWER UNIT, CHAINS, ETC.) MAY CHANGE THE CORRECT OPTIMAAX DEPLOYMENT THRESHOLD AND MAY REQUIRE REPLACEMENT OF THE ECU. FAILURE TO DO SO WILL OVERLOAD THE LIFT AXLE.

SECTION 8
Preventive Maintenance

AIR CONTROLLER MANIFOLD

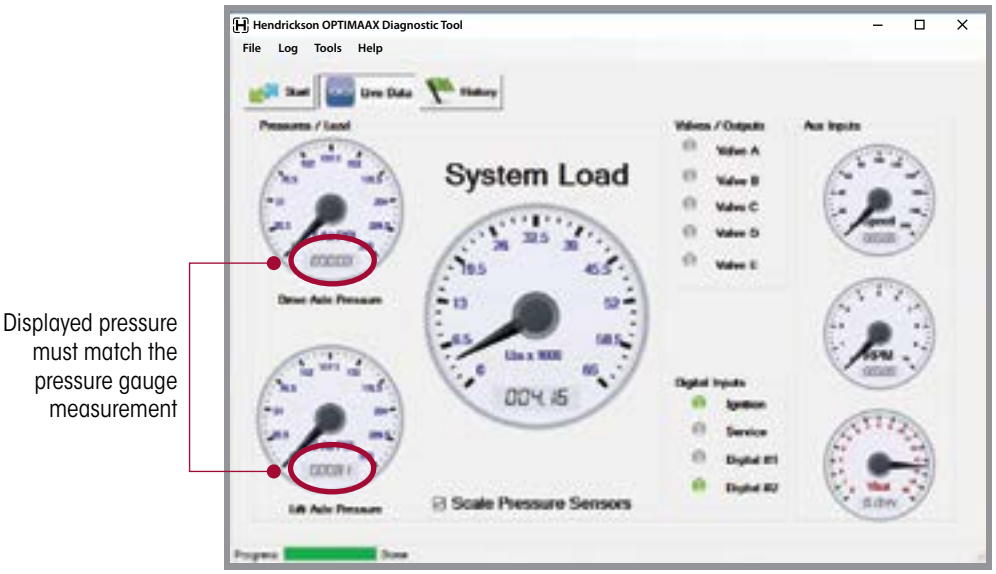
An appropriate inspection procedure is important to ensure the OPTIMAAX system is accurately measuring the system load.

- **On an annual basis** – calibrate the pressure sensors in the air controller manifold, see Figure 8-1.

CALIBRATION

1. Connect the Diagnostic Tool Software.
2. With a calibrated pressure gauge apply shop air to the drive port.
3. The displayed pressure in the 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



DRIVE AXLE AIR SPRINGS

NOTE The OPTIMAAX controller is calibrated for Freightliner OEM air springs. Air springs must be replaced with only Freightliner OEM air springs for the OPTIMAAX controller to function properly.

SECTION 9

Air Controller Manifold Diagram

TUBING REPLACEMENT

⚠ CAUTION

FOR THE AIR PORT EXH ON THE AIR CONTROLLER MANIFOLD, USE A FILTER RATED TO AT LEAST 40 MICRONS. 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, see Table 9-1.

TABLE 9-1

Tube Size	Recommended Minimum Radius
¼"	1.0"
⅜"	1.5"
½"	2.0"

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.

FIGURE 9-1

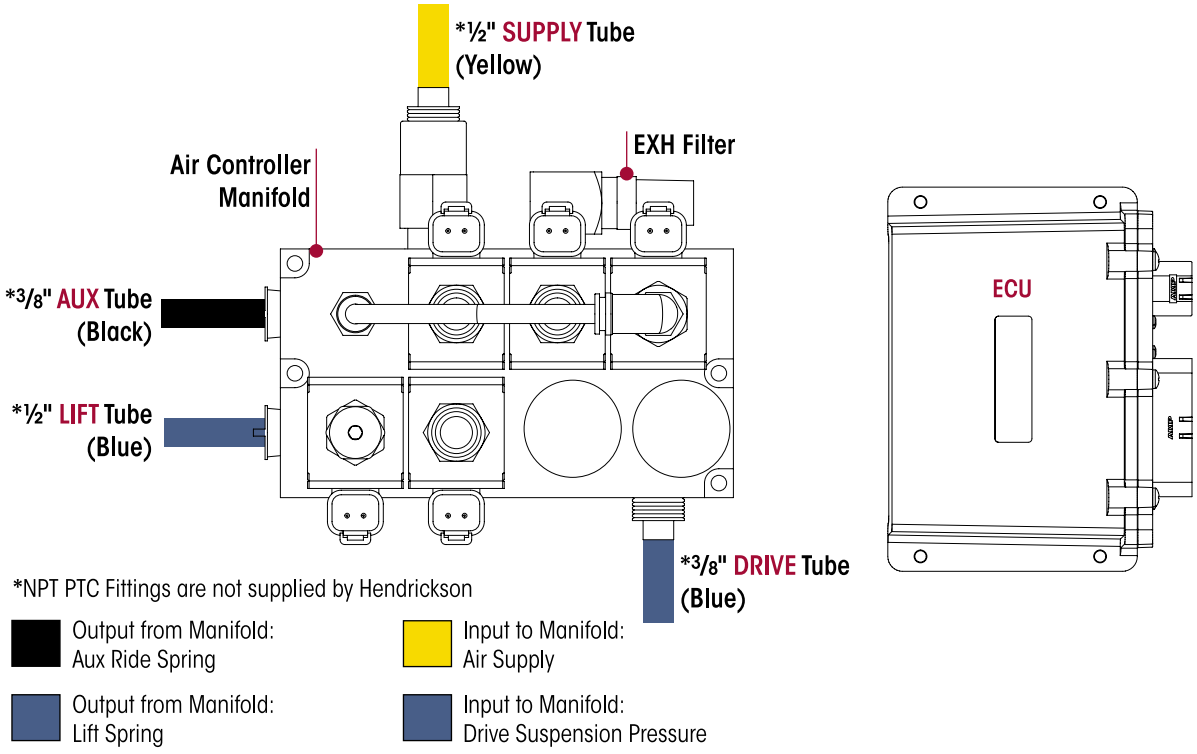
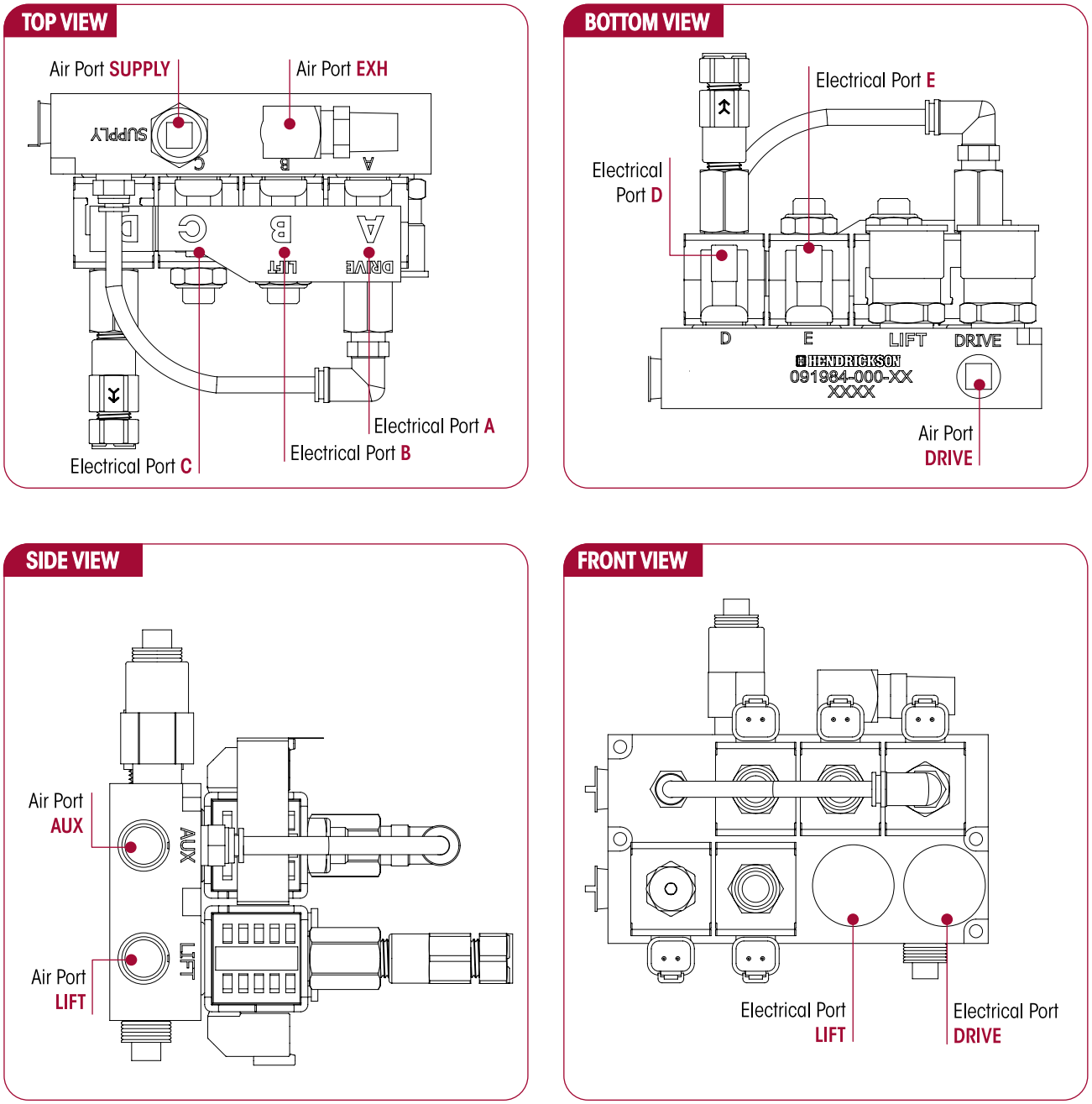


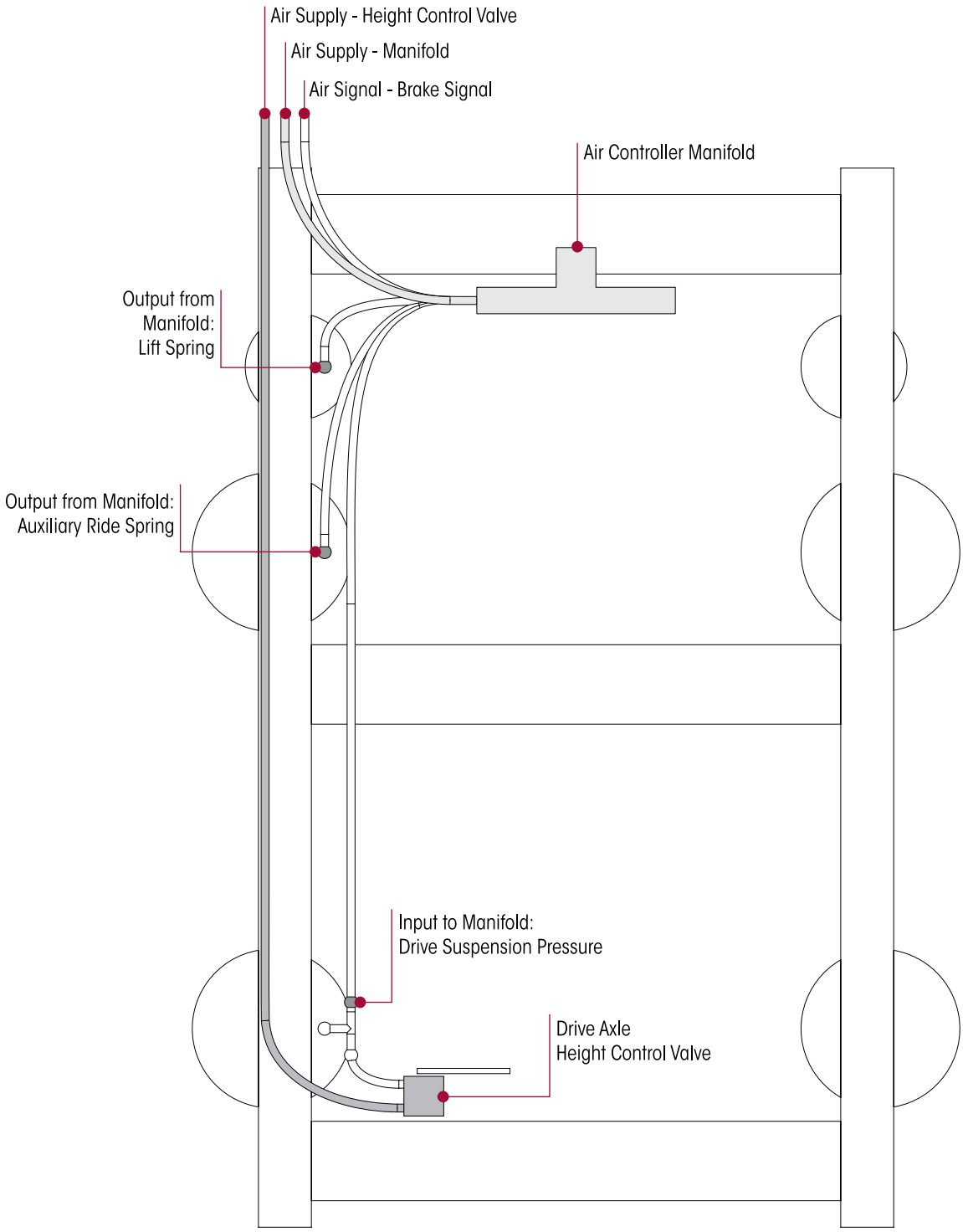
FIGURE 9-2

OPTIMAAX AIR CONTROLLER MANIFOLD AIR AND ELECTRICAL PORTS



SECTION 10

Vehicle Air Plumbing Diagram



SECTION 11
System Operation

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

- The OPTIMAAX is designed with features to detect a fault in the system operation which is separate from the air controller module.

SYSTEM FAULT

FIGURE 11-1

VEHICLES BUILT AFTER TO OCTOBER 1, 2019

The Pop Up Display in the instrument cluster, see Figure 11-1, indicates any OPTIMAAX fault.

FIGURE 11-2

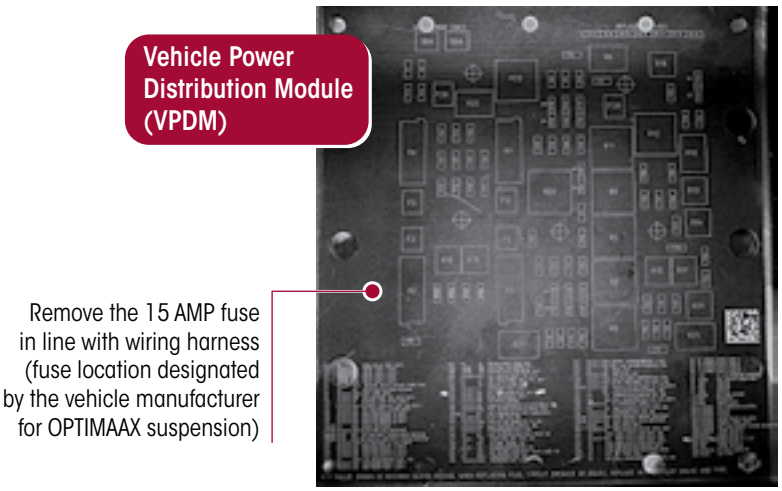
VEHICLES BUILT PRIOR TO OCTOBER 1, 2019

The warning light on the dashboard, see Figure 11-2, 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.

FIGURE 11-3



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

a. Turn the ignition off.
b. Ensure the lift axle is on the ground.
c. Remove the 15 AMP fuse from the location designated by the vehicle manufacturer for OPTIMAAX suspension in the dashboard behind the VPDM (vehicle power distribution module), which houses the main fuse and relay center, see Figure 11-3.
d. Exhaust all pressure in the 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 the vehicle manufacturer.

SECTION 12

Diagnostic Tool Software

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.

FIGURE 12-1

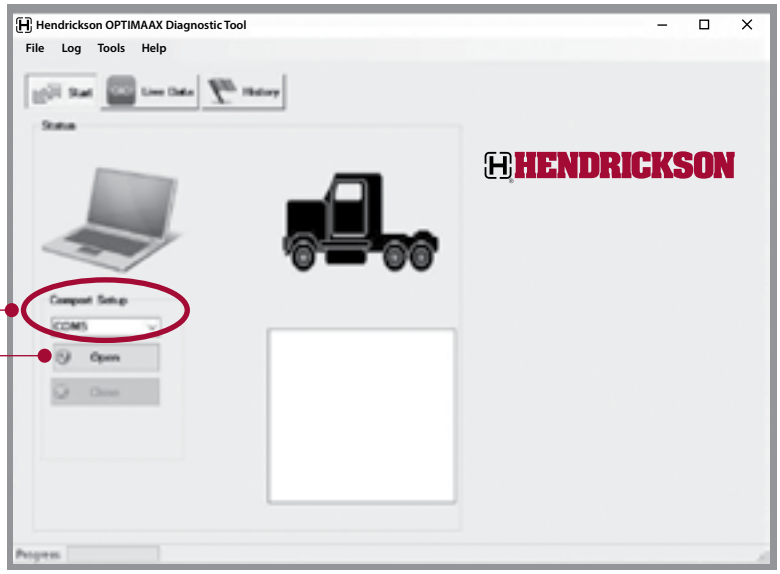
OPENING THE DIAGNOSTIC TOOL SOFTWARE

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 the 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 (also known as SPN), see Figures 12-4 and 12-6. Also, refer to OPTIMAAX Lift Axle System (OLA) – Fault Codes in the Troubleshooting section of this publication.

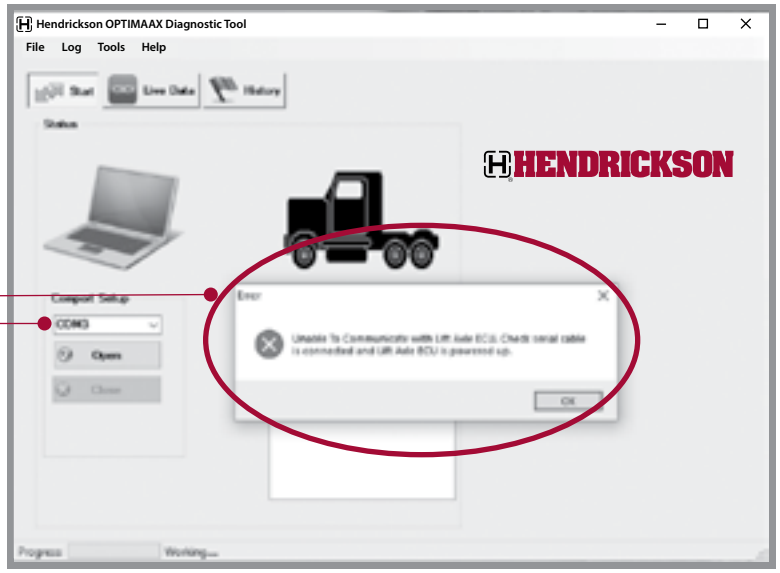
FIGURE 12-2



Select a **COM Port** from the pull down menu. There may be more than one com port available.

Pick one, and click **Open**

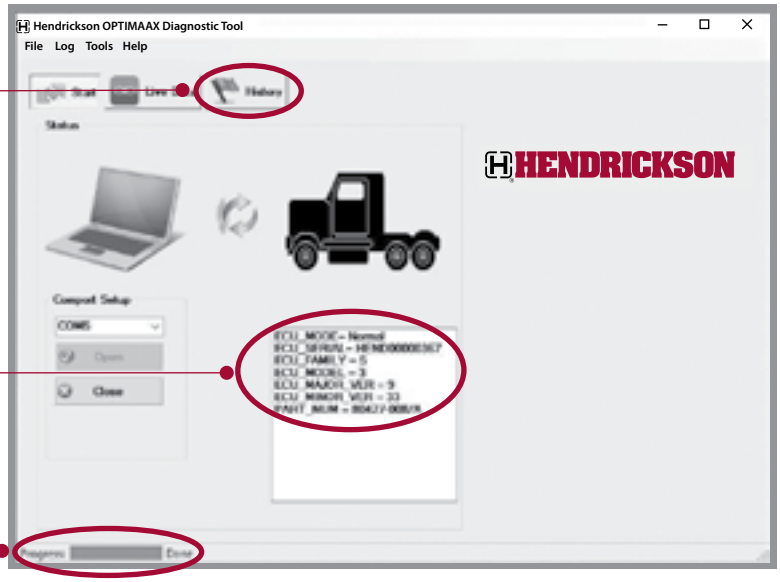
FIGURE 12-3



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

Select another COM Port untill the software opens and select **OK**

FIGURE 12-4



Click on the **History** tab to view Error / Fault Codes

The screen will look like this when the software is communicating with the controller

FIGURE 12-5

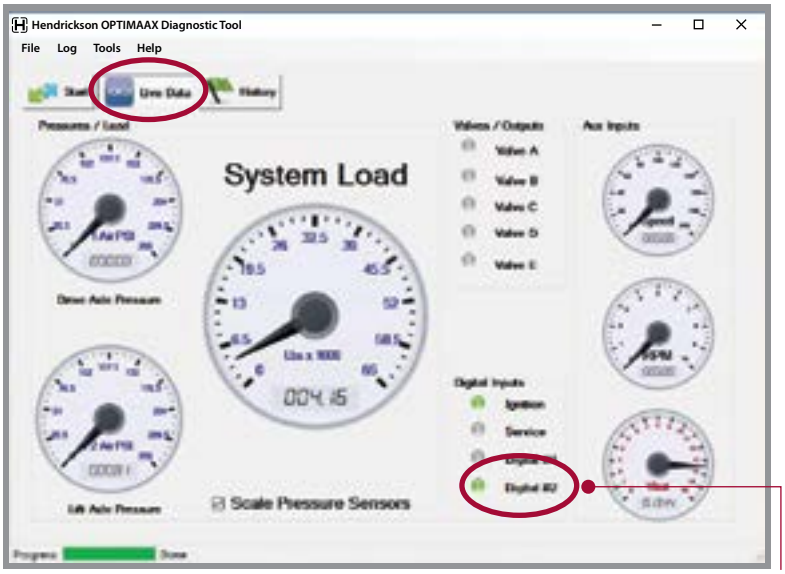
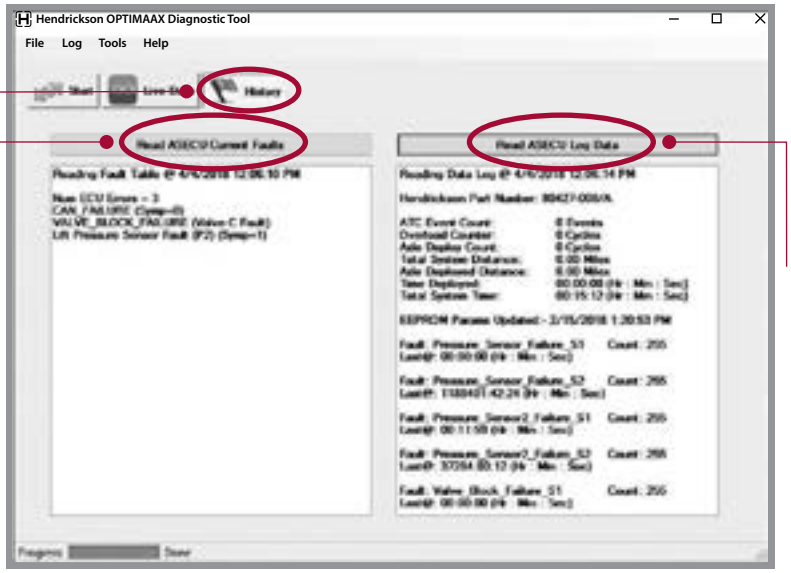


FIGURE 12-6



EXITING THE DIAGNOSTIC TOOL SOFTWARE

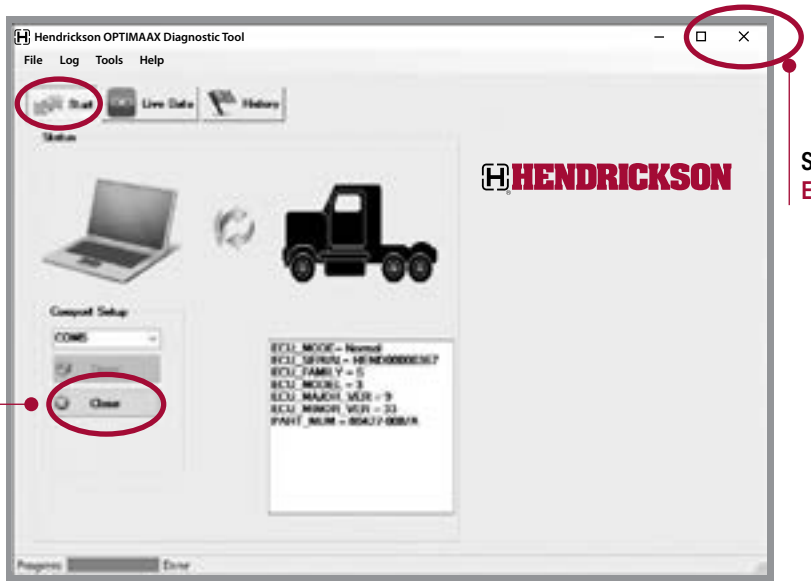
CAUTION

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



IMPROPER EXIT OF THE DIAGNOSTIC TOOL SOFTWARE

The **OPTIMAAX axle will not lift** if the Diagnostic Tool Software is not exited properly.

If this occurs, **RECONNECT** the Diagnostic Tool Software and press the **CLOSE** button to exit properly.

NOTE It may be necessary to cycle the ignition switch (key).

SECTION 13
Troubleshooting Guide

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

1. With the vehicle disconnected from the trailer (bobtail) and ignition on, release the parking brake. Observe if lift axle raises.
2. Once the lift axle is raised, wait 1 minute. Apply the parking brake. Observe if the lift axle deploys.
3. Connect Diagnostic Tool Software, and record any ECU Current Faults and Log Data.
4. Verify fuse (15A, in the location designated by the vehicle manufacturer for OPTIMAAX suspension in the VPDM) is operational, see Figure 11-3 in the System Operation section of this publication.

OPTIMAAX LIFT AXLE SYSTEM (OLA) – ELECTRONIC COMPONENTS

TROUBLESHOOTING GUIDE			
PRIMARY CONDITION	**SECONDARY CONDITION**	**POSSIBLE CAUSE**	**CORRECTION**
Lift axle does not retract while the vehicle is disconnected from the trailer (bobtail)	Diagnostic Tool Software cannot connect	Fuse is blown	Replace fuse
		Wiring harness is damaged / connected incorrectly	Verify the wiring harness connection at ECU, manifold, and firewall. Examine visually for external damage. Replace the wiring harness as necessary.
		ECU is damaged	Replace the ECU
	Diagnostic Tool Software connects, no ECU Current Faults reported	Wiring harness is damaged / connected incorrectly	Verify the wiring harness connection at manifold. The individual solenoid connections may be incorrect
		Air plumbing is damaged / connected incorrectly	Verify the air plumbing at manifold is correct, and that air lines are not crushed, damaged, or leaking. Verify the PTC fittings are not leaking.
		Parking brake signal from Single Signal-detection and Activation Module (SSAM) is incorrect	Open the 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 the parking brake off, and ignition on, the multimeter should read an open circuit. With the parking brake on, the multimeter should read resistance below 150 ohms. If pin 10 resistance values are outside this range, replace the wiring harness or relay..
		Mechanical components are damaged	Refer to the Troubleshooting Guide section in Hendrickson Literature No. 17730-309.
		Manifold is damaged	Replace the manifold.
		Diagnostic Tool Software was exited incorrectly	Exit the Diagnostic Tool Software by pressing the "Close" button.
	Diagnostic Tool Software connects, ECU Current Faults reported	Damaged manifold or wiring harness	Refer to the OPTIMAAX - Fault Codes table in this section.

OPTIMAAX LIFT AXLE SYSTEM (OLA) – ELECTRONIC COMPONENTS (Continued)

TROUBLESHOOTING GUIDE			
PRIMARY CONDITION	**SECONDARY CONDITION**	**POSSIBLE CAUSE**	**CORRECTION**
Lift axle does not retract with partially loaded trailer	Axle retracts correctly while bobtail	Partially loaded trailer weight exceeds Deployment Threshold of ECU	If axle scale is available, measure weight of drive axle with partially loaded trailer. Compare to ECU deployment threshold.
	Diagnostic Tool Software connects, ECU Current Faults reported	Damaged manifold or wiring harness	Refer to the Fault Codes table in this section.
		Diagnostic Tool Software was exited incorrectly	Exit Diagnostic Tool Software by pressing the "Close" button.
Lift axle will not fully retract	Diagnostic Tool Software connects, no ECU Current Faults reported	Wiring harness is damaged / connected incorrectly	Verify the wiring harness connection at manifold. The individual solenoid connections may be incorrect.
		Air plumbing is damaged / connected incorrectly	Verify the 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 the manifold.
		Mechanical components are damaged	Refer to the Troubleshooting Guide section in Hendrickson Literature No. 17730-309.
	Diagnostic Tool Software connects, ECU Current Faults reported	Damaged manifold or wiring harness	Refer to the Fault Codes table in this section.
Loss of traction when axle deployed	Diagnostic Tool Software connects, no ECU Current Faults reported	Air plumbing is damaged / connected incorrectly	Verify the air plumbing at the manifold is correct, and that air lines are not crushed, damaged, or leaking. Verify the PTC fittings are not leaking.
		Manifold is damaged	Replace the 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 table in this section.
Lift axle is cycling up and down	Diagnostic Tool Software connects, no ECU Current Faults reported	Wiring harness is damaged / connected incorrectly	Verify the pressure sensors are connected to the correct ports. Verify the wiring harness connection at manifold. The individual solenoid connections may be incorrect. Replace the harness if necessary.

OPTIMAAX LIFT AXLE SYSTEM (OLA) – FAULT CODES

TROUBLESHOOTING GUIDE

VEHICLES BUILT AFTER OCTOBER 01, 2019

SPN (Suspect Parameter Number)	DIAGNOSTIC MENU	PRIMARY CONDITION	SECONDARY CONDITION	POSSIBLE CAUSE	CORRECTION
N/A	Instrument Panel Diagnostic	OPTIMAAX warning light is illuminated		Vehicle is overloaded	Reduce vehicle load
		OPTIMAAX warning light is flashing	Axle will not retract	Fault detected. Mechanical issue prevents lift axle from deploying.	Connect Diagnostic Tool Software for detailed diagnosis. Refer to Hendrickson Literature No. 17730-309 to diagnosis mechanical issue.
1387	Drive axle pressure sensor circuit to OLA shorted to battery, or drive axle pressure sensor is not functioning properly. Check wiring for damage and drive axle pressure sensor for possible internal malfunction.	Drive Pressure Sensor Fault (P1)		Wiring harness is damaged or connected incorrectly	Check wiring harness, replace if needed
				Manifold is damaged	Check manifold, replace if needed
1388	Lift axle pressure sensor circuit to OLA shorted to battery, or lift axle pressure sensor is not functioning properly. Check wiring for damage and lift axle pressure sensor for possible internal malfunction.	Lift Pressure Sensor Fault (P2)		Wiring harness is damaged or connected incorrectly	Check wiring harness, replace if needed
				Manifold is damaged	Check manifold, replace if needed
523601 to 523605	OLA valve detected internal problem, and may need reprogramming or replacement.	Valve Block Failure		Wiring harness is damaged or connected incorrectly	Check wiring harness, replace if needed
				Manifold is damaged	Check manifold, replace if needed
523606	OLA detected erratic, incorrect, or intermittent data.	CAN Failure		Wiring harness is damaged or connected incorrectly	Check wiring harness, replace if needed
				ECU is damaged	Check ECU replace if needed
168	OLA detected abnormal rate of change from battery. Verify OLA is receiving 12V current.	Battery Fault		Wiring harness is damaged or connected incorrectly	Check wiring harness, replace if needed
				Battery is low	Charge or replace vehicle battery
523607 FMI 16	OLA detected air pressure that is moderately above normal operating range.	System Check 2		Slow leak in air system	Check air plumbing, and air springs, replace as needed.
				Manifold is damaged	Check manifold, replace if needed
523608	OLA detected air pressure that is moderately above normal operating range.	System Check 3		Air plumbing is damaged or corrected improperly	Check air plumbing, correct as needed
				Manifold is damaged	Check manifold, replace if needed
523607 FMI 18	OLA detected air pressure that is moderately below normal operating range.	System Check 1		Air plumbing is damaged or corrected improperly	Check air plumbing, correct as needed
				Manifold is damaged	Check manifold, replace if needed

OPTIMAAX LIFT AXLE SYSTEM (OLA) – FAULT CODES (Continued)

TROUBLESHOOTING GUIDE

VEHICLES BUILT PRIOR TO OCTOBER 01, 2019

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

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.
All applications must comply with applicable Hendrickson specifications and must be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration.
Contact Hendrickson for additional details regarding specifications, applications, capacities, and operation, service and maintenance instructions.

*Call Hendrickson at **1.866.755.5968** (toll-free) or **1.630.910.2800** for additional information.*

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www.hendrickson-intl.com

TRUCK COMMERCIAL VEHICLE SYSTEMS
800 South Frontage Road
Woodridge, IL 60517-4904 USA
1.866.755.5968 (Toll-free U.S. and Canada)
1.630.910.2800 (Outside U.S. and Canada)
Fax 1.630.910.2899

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