



Eaton® VORAD® Collision Warning System

Roadranger®

More time on the road®

Troubleshooting Guide

Eaton VORAD Collision Warning System

VOTS0032

October 2007

General Warnings

Before starting a vehicle:

1. Sit in the driver's seat.
2. Place the vehicle in neutral.
3. Set the parking brake.
4. Disengage the clutch.

Before working on the vehicle or leaving the cab with the engine running:

1. Place the vehicle in neutral.
2. Set the parking brake.
3. Block the wheels.

Do not operate the vehicle if the alternator lamp is lit or if the gauges indicate low voltage.

Suggested Tools

SPX Kent-Moore 1-800-345-2233	
Part No.	Description
5505027	Volt/Ohm Meter (Standard commercially available VOM)

For Eaton Service Parts call 1-800-826-HELP (4357).

Related Publications

For more information call 1-800-826-HELP (4357).

Section 1: Introduction
Diagnostic Procedure 1-2

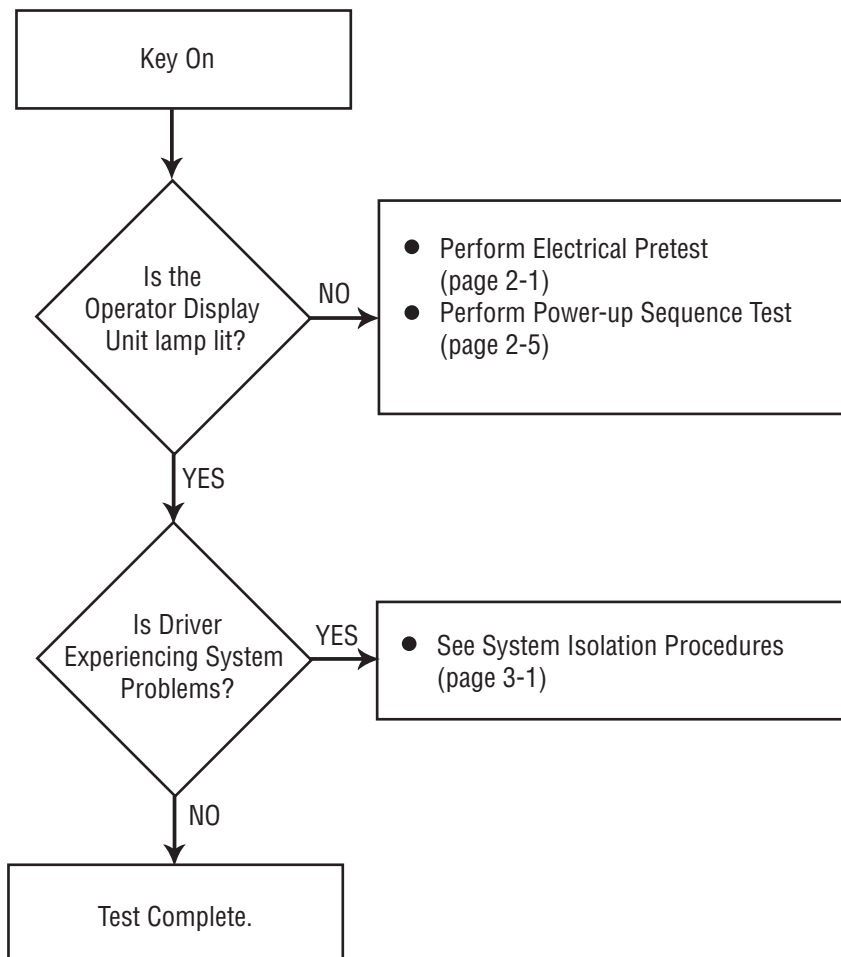
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Diagnostic Procedure

Follow the flowchart below for all VORAD failures. Perform tests and procedures as directed by the flowchart.



Electrical Pretest

Overview

The pretest verifies the basic electrical inputs before testing individual circuits.

Detection

There is no detection process specifically for the basic electrical supply. However, failures of this type are generally detected by VORAD or the driver as some other type of fault code or symptom.

Fallback

There is no fallback for the electrical pretest, however, it may affect other systems.

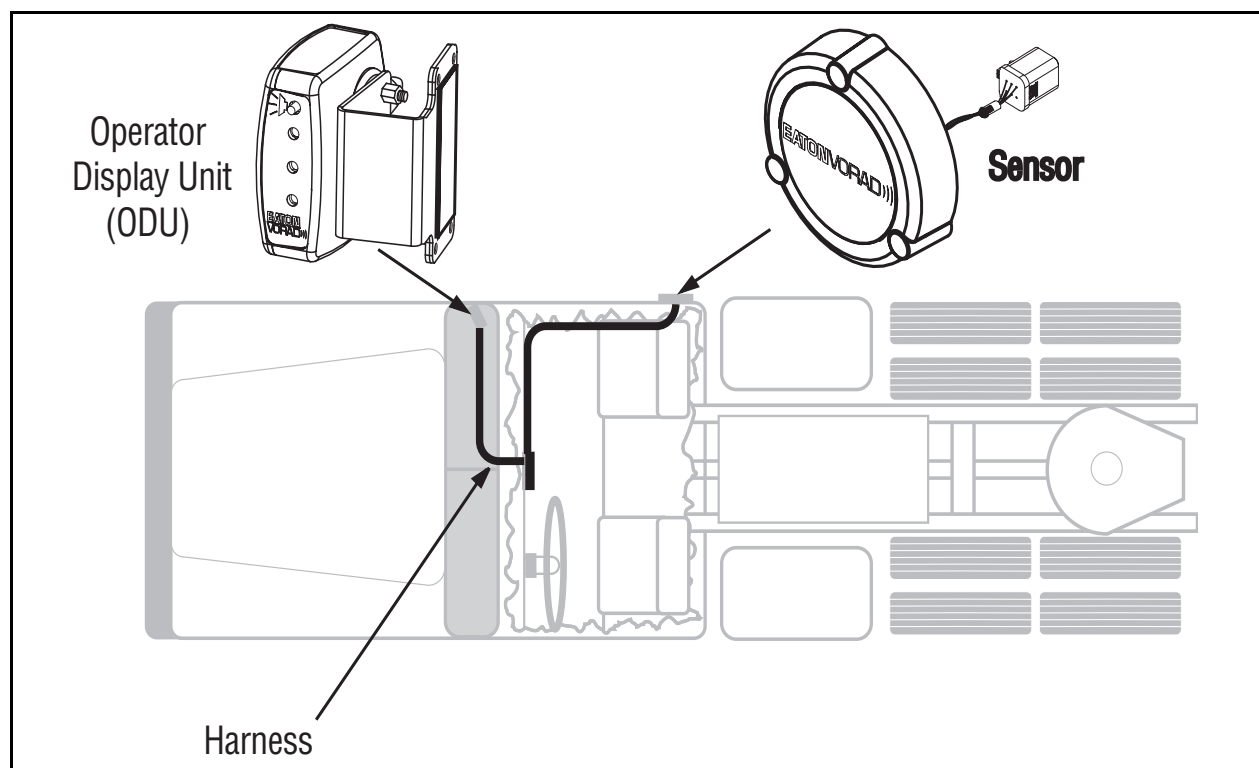
Required Tools

- Basic Hand Tools
- Digital Volt/Ohm Meter
- Troubleshooting Guide

Possible Causes

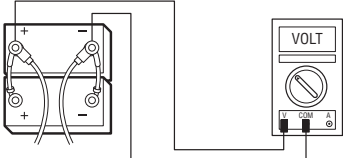
This pretest can be used for any of the following:

- Corroded Power Contacts
- Blown Fuse
- Wiring Harness
- Low Batteries

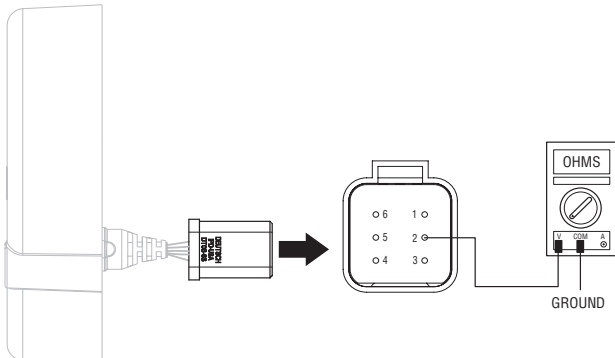


Electrical Pretest

Step A	Procedure	Condition	Action
	1. Key off.		
	2. Inspect starter/battery connections for integrity.		
	3. Measure voltage across battery.	<div>If voltage is 11 to 13 volts on a 12 volt system or 22 to 26 on a 24 volt system</div> <div>If voltage is outside of range</div>	<div>Go to Step B.</div> <div>Repair or replace batteries and charging system as required. Repeat this step.</div>

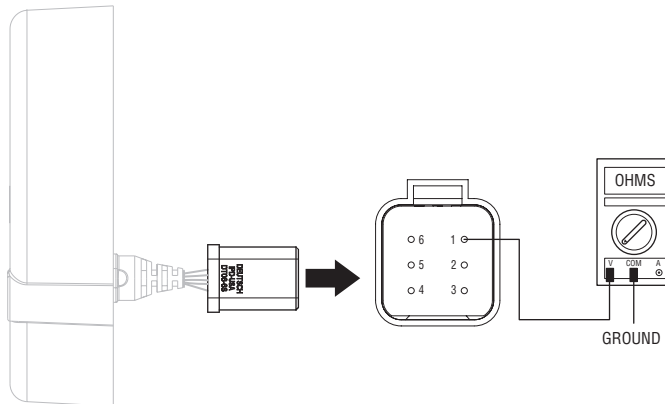


Step B	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect negative (-) battery cable.		
	3. Disconnect the sensor J2 harness.		
	4. Measure resistance between sensor harness J2 pin 2 and ground.	<div>If resistance is 0 to .5 ohms</div> <div>If resistance is outside of range</div>	<div>Go to Step C.</div> <div>Repair ground path to system. Go to Step A.</div>



Electrical Pretest, continued

Step C	Procedure	Condition	Action
	1. Key off.		
	2. Connect negative (-) battery cable.		
	3. Key on.		
	4. Measure voltage between sensor harness J2 pin 1 and ground.	If voltage is within .5 volts of battery voltage → If voltage is outside of range →	Test complete. Repair power path to system. Fuse may be blown. Reconnect all connectors. Go to Step A .



Electrical Pretest, continued

Power-Up Sequence Test

Overview

A failure during the power-up self-check indicates a system failure.

Detection

The power-up self-check is performed automatically each time the key is turned on. Turn the key on and watch the Operator Display Unit (ODU). If lights on the ODU remain on after 15 seconds, or never come on, the self-check has failed.

Fallback

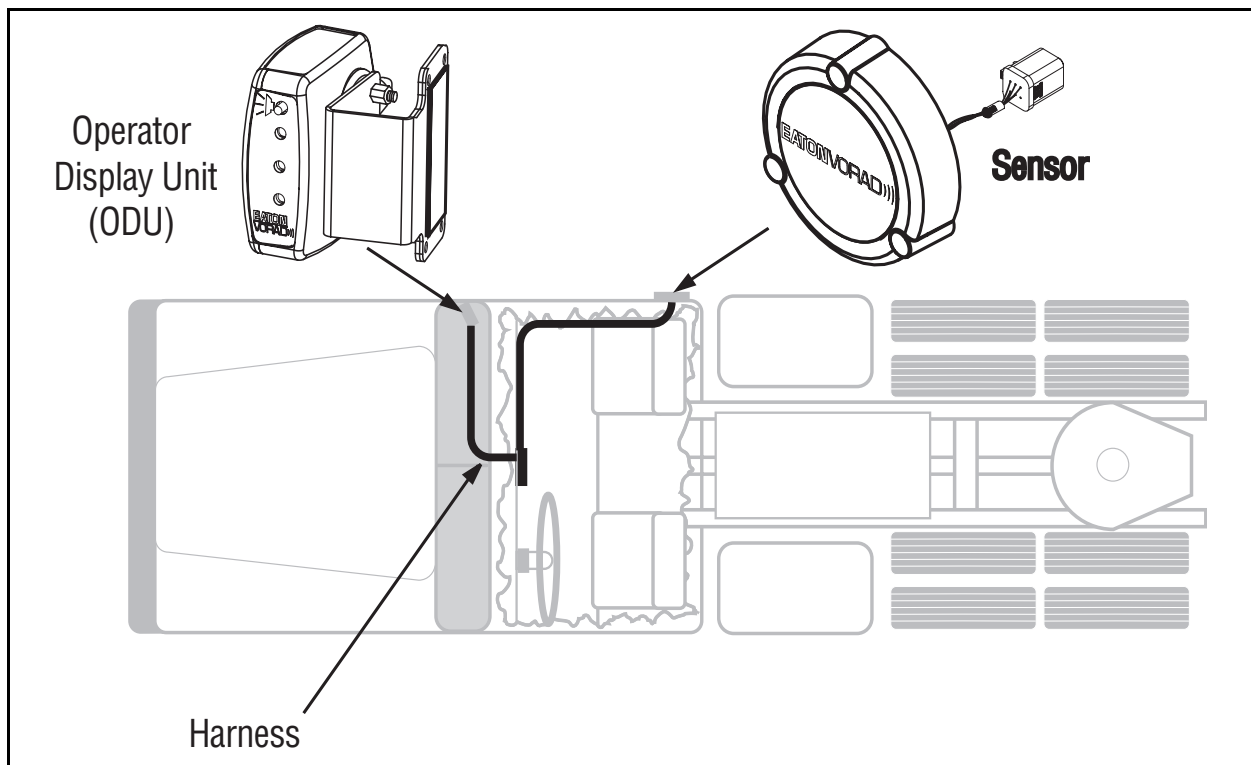
If self-check fails, the product cannot perform any operations.

Required Tools

- Digital Volt/Ohm Meter

Possible Causes

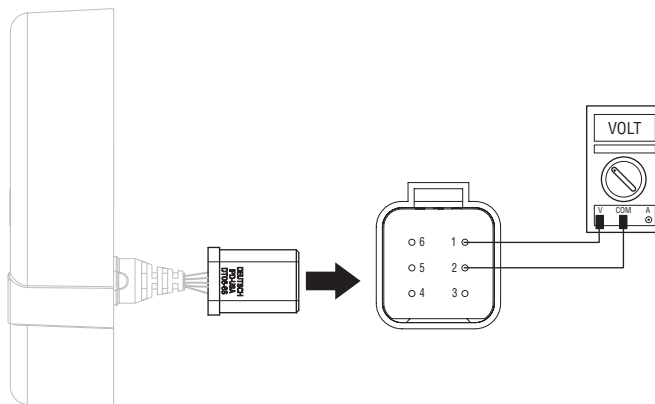
- Sensor
- Operator Display Unit
- Vehicle Harness



Power-Up Sequence Test

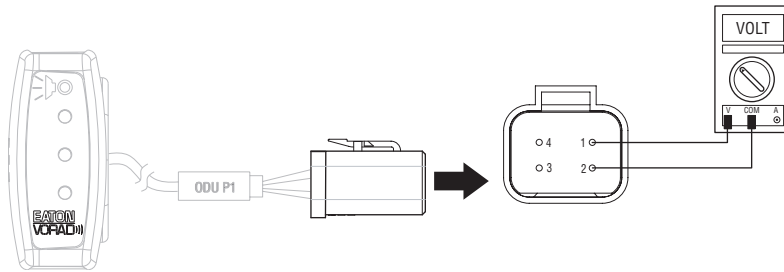
Step A	Procedure	Condition	Action
	1. Before performing this test, the Electrical Pretest must pass.		
	2. Clear area around sensor of objects.		
	3. Key on.		
	4. Observe the Operator Display Unit. →	If both LED lights turn on for 1/2 second, followed by red LED for 5 seconds, followed by continuous yellow light →	Test complete.
		If lights fail to turn on →	Go to Step B .
		If lights turn on and stay on →	Go to Step D .

Step B	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect sensor harness J2.		
	3. Key on.		
	4. Measure voltage between sensor harness J2 pins 1 and 2. →	If voltage is between 10 and 14 volts →	Go to Step C .
		If voltage is outside of range →	Repair harness. Go to Step V .



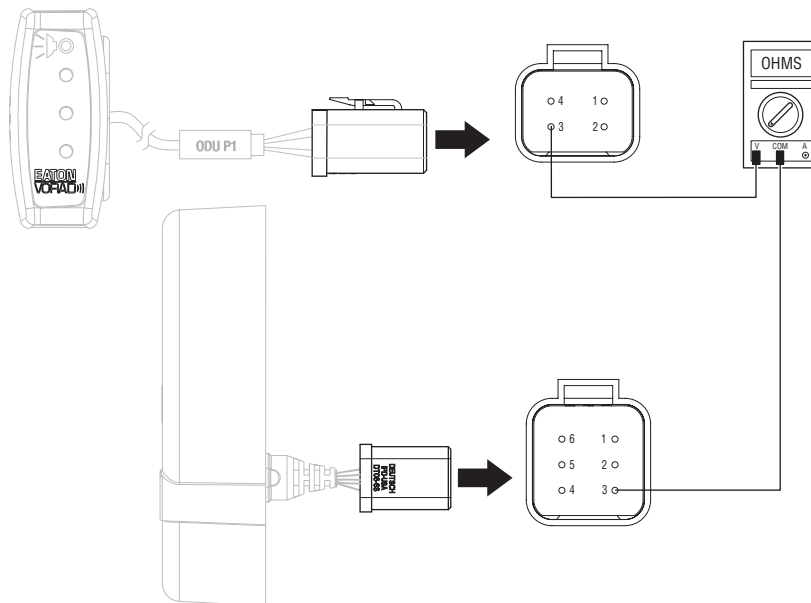
Power-Up Sequence Test, continued

Step C	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect Operator Display Unit from Harness J1.		
	3. Key on.		
	4. Measure voltage between sensor harness J2 pins 1 and 2.	→ If voltage is between 10 and 14 volts →	Replace ODU. Go to Step V .
		→ If voltage is outside of range →	Replace sensor. Go to Step V .



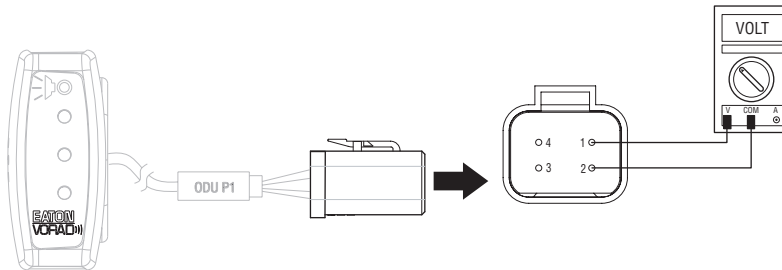
Power-Up Sequence Test, continued

Step D	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect sensor harness J2.		
	3. Disconnect Operator Display Unit from Harness J1.		
	4. Measure resistance between J1 pin 3 and J2 pin 3.	If resistance is between 0 and 0.3 ohms → If resistance is outside of range →	Replace ODU. Go to Step E . Replace sensor. Go to Step V .



Power-Up Sequence Test, continued

Step E	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect Operator Display Unit from Harness J1.		
	3. Key on.		
	4. Measure voltage between sensor harness J2 pins 1 and 2.	→ If voltage is between 10 and 14 volts →	Replace ODU. Go to Step V .
		→ If voltage is outside of range →	Replace Sensor. Go to Step V .



Step V	Procedure	Condition	Action
	1. Key off.		
	2. Reconnect all connectors.		
	3. Key on.		
	4. Drive vehicle to determine if problem has been corrected.	→ If problem corrected →	Test complete.
		→ If problem not corrected →	Return to Step A to find error in testing.

Power-Up Sequence Test, continued

Operator Display Unit Audible Indicator (Buzzer) Not Functioning

Overview

This symptom driven test is performed when the system fails to detect objects properly.

Detection

The symptom is observed by the driver when objects closer than 10 feet are detected, when the turn signal is activated and no audible sound is heard.

Fallback

There is no fallback mode for this symptom. The system will not operate properly.

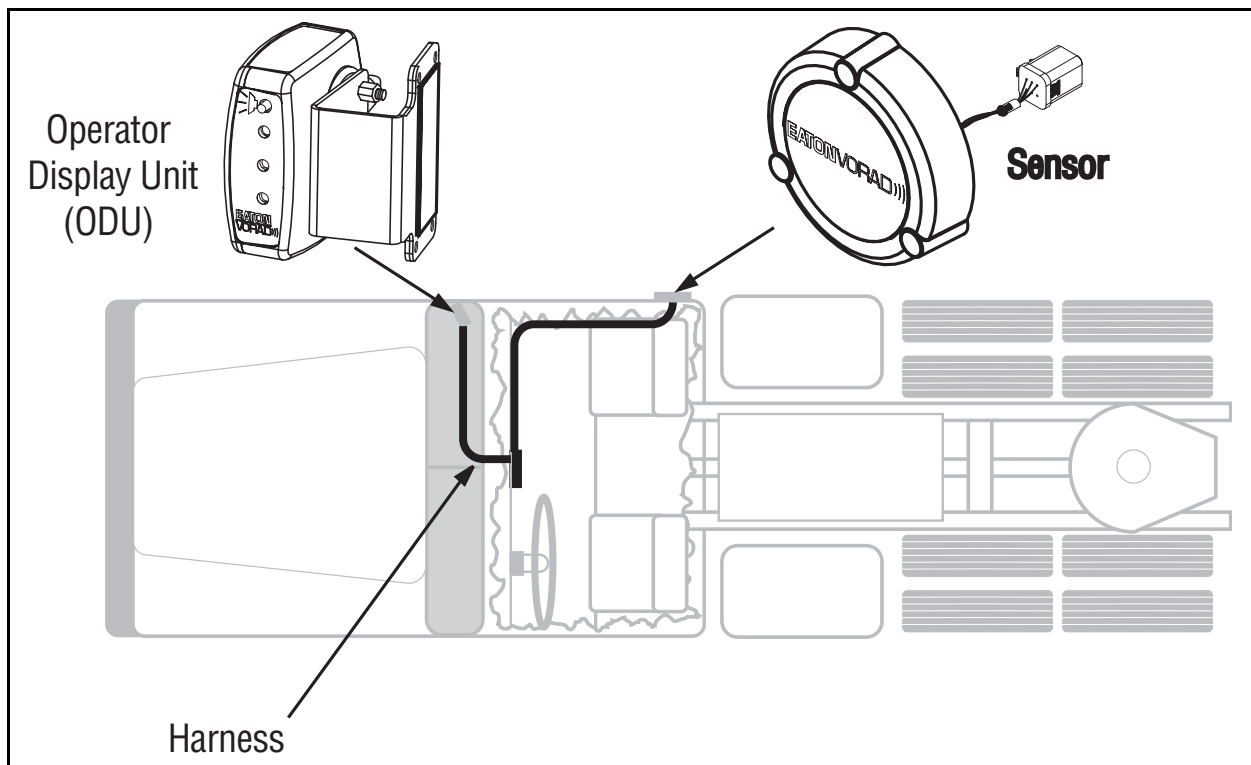
Required Tools

- Digital Volt/Ohm Meter

Possible Causes

This fault can be caused by any of the following:

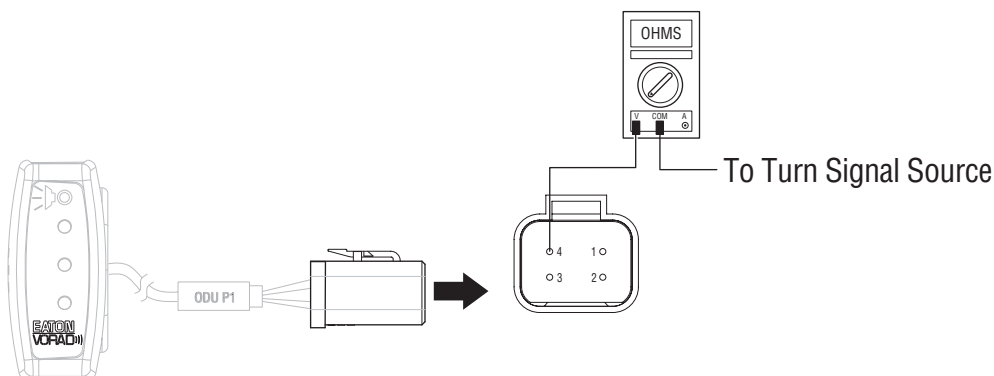
- Operator Display Unit
- Vehicle Harness



Operator Display Unit Audible Indicator (Buzzer) Not Functioning

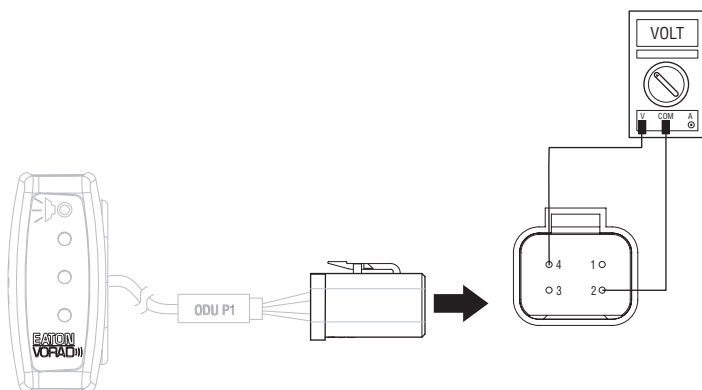
Step A	Procedure	Condition	Action
	1. Key on.		
	2. Activate turn signal.		
	3. Place a target between 3 and 10 feet directly in front of the sensor.	→ If the Operator Display Unit has red LED on and buzzer sounds →	Test complete.
	Note: If both LEDs are illuminated go to the appropriate isolation procedure.	→ If the Operator Display Unit has red LED on only (no sound) →	Go to Step B .

Step B	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect Operator Display Unit from Harness J1.		
	3. Measure resistance between sensor harness J1 pin 4 and turn signal source.	→ If resistance is between 0 and 0.3 ohms →	Go to Step C .
		→ If resistance is outside of range →	Repair wiring harness. Go to Step V .



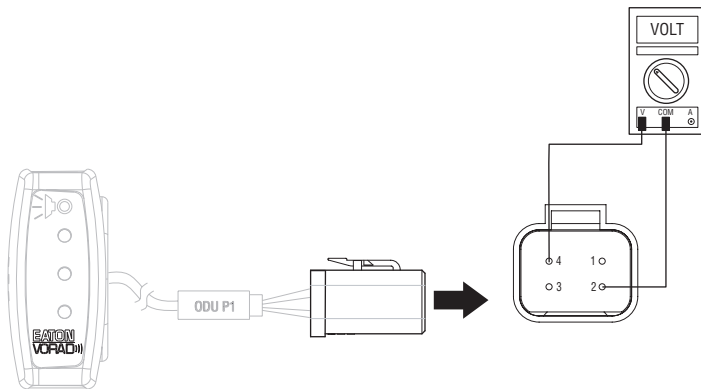
Operator Display Unit Audible Indicator (Buzzer) Not Functioning, continued

Step C	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect Operator Display Unit from Harness J1.		
	3. Measure resistance between display harness J1 pins 2 and 4.	If resistance is between 0 and .5 ohms	Go to Step D .
		If resistance is outside of range	Repair wiring harness. Go to Step V .



Operator Display Unit Audible Indicator (Buzzer) Not Functioning, continued

Step D	Procedure	Condition	Action
	1. Key off.		
	2. Disconnect Operator Display Unit from Harness J1.		
	3. Key on.		
	4. Activate turn signal		
	5. Measure voltage between display harness J1 pins 2 and 4.	If voltage is between 10 and 14 volts → If voltage is outside of range →	Replace display. Go to Step V . Repair wiring harness. Go to Step V .



Step V	Procedure	Condition	Action
	1. Key off.		
	2. Reconnect all connectors.		
	3. Key on.		
	4. Drive vehicle to determine if problem has been corrected.	If problem corrected → If problem not corrected →	Test complete. Return to Step A to find error in testing.

Side Sensor Not Detecting Targets

Overview

This symptom driven test is performed when the system fails to detect objects properly.

Detection

The symptom is observed by the driver when objects at 3 to 10 feet are not detected. The yellow light also continuously illuminates when the Sensor has failed.

Fallback

There is no fallback mode for this symptom. The Sensor will not operate properly.

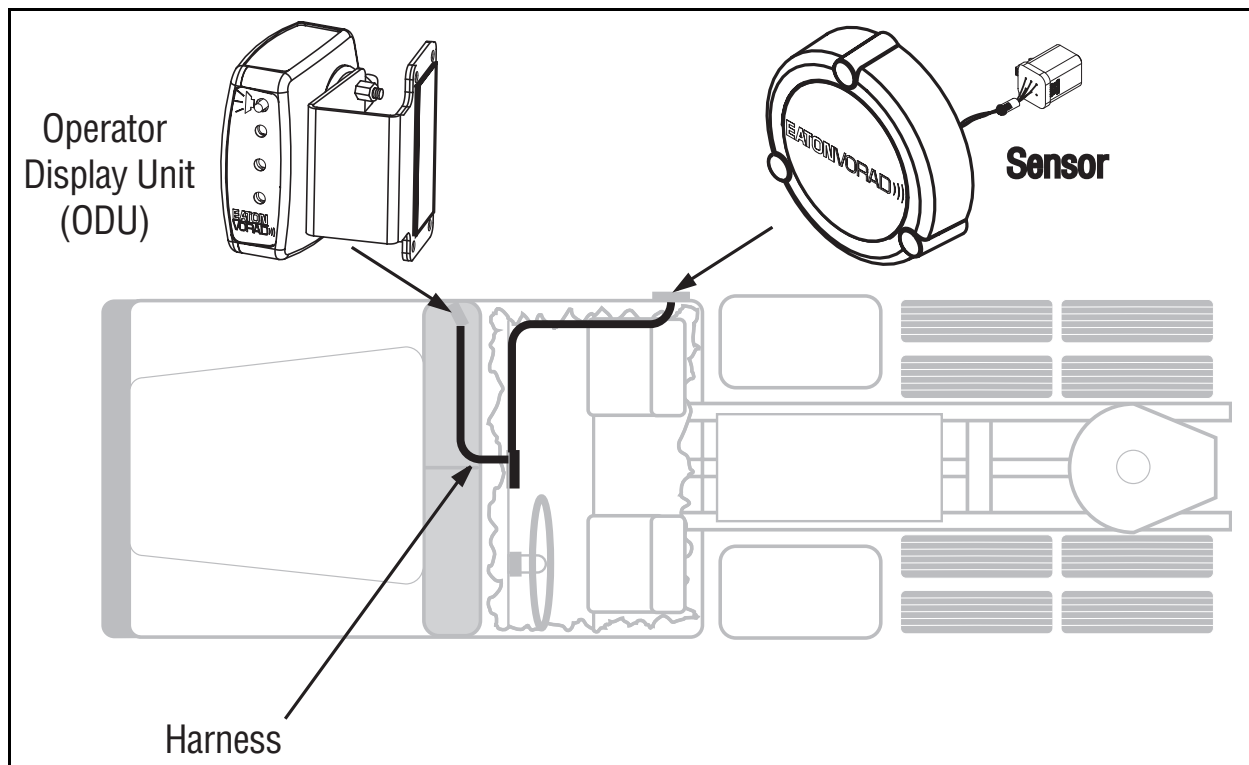
Required Tools

- None

Possible Causes

This fault can be caused by any of the following:

- Sensor
- Operator Display Unit



Side Sensor Not Detecting Targets

Step A	Procedure	Condition	Action
	1. Clear area around sensor of objects.		
	2. Key on.		
	3. Allow Operator Display Unit to go through self-test and shows no targets (yellow LED light should be on).	<p>→ If both LED lights turn on for 1/2 second, followed by red LED for 5 seconds, followed by continuous yellow light →</p> <p>If only yellow LED light turns on for 1/2 second, followed by continuous yellow light →</p> <p>If both LED lights turn on for 1/2 second, followed by continuous yellow and red lights →</p>	<p>Go to Step B.</p> <p>Replace Operator Display Unit.</p> <p>Go to the "Power-Up Sequence Test" on page 2- 5.</p>

Step B	Procedure	Condition	Action
	1. Key on.		
	2. Place a target 3 to 10 feet directly in front of the Sensor.	<p>→ If the Operator Display Unit indicates that a target is detected (red light on) →</p> <p>If the Operator Display Unit does not indicate a target is present (yellow light on) →</p>	<p>Go to Step V.</p> <p>Replace sensor.</p>

Step V	Procedure	Condition	Action
	1. Key off.		
	2. Reconnect all connectors.		
	3. Drive vehicle to determine if problem has been corrected.	<p>→ If complaint has been repaired →</p> <p>If complaint has not been repaired →</p>	<p>Test complete.</p> <p>Return to Step A to find error in testing.</p>

Side Sensor Continuously Detecting Targets

Overview

This symptom driven test is performed when the system continuously detects objects.

Detection

The symptom is observed by the driver when sensor continuously detects targets.

Fallback

There is no fallback mode for this symptom. The Sensor will not operate properly.

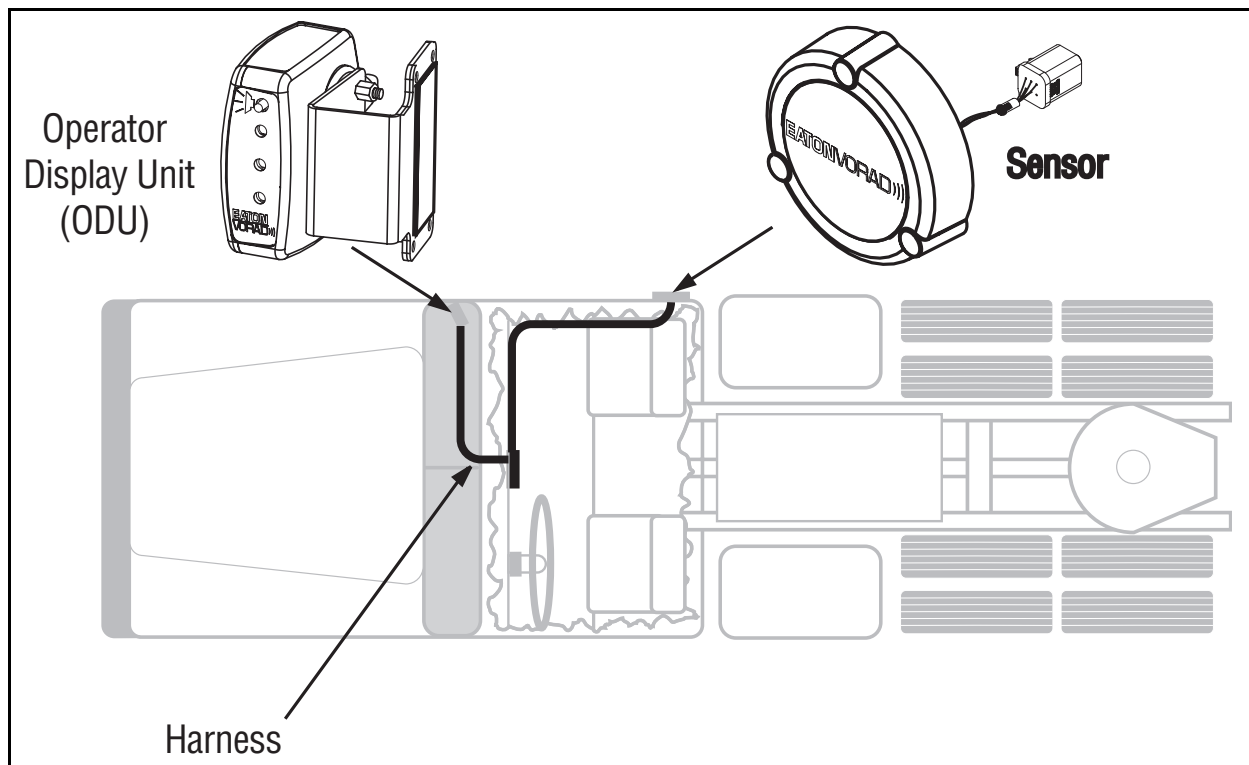
Required Tools

- None

Possible Causes

This fault can be caused by any of the following:

- Sensor
- Operator Display Unit



Side Sensor Continuously Detecting Targets

Step A	Procedure	Condition	Action
	1. Clear area around sensor of objects.		
	2. Key on.		
	3. Allow Operator Display Unit to go through self-test and shows no targets (yellow LED light should be on).	→ If both LED lights turn on for 1/2 second, followed by red LED for 5 seconds, followed by continuous yellow light →	Go to Step V .
		→ If both LED lights turn on for 1/2 second, followed by continuous red light →	Go to Step B .
		→ If only red LED lights →	Replace Operator Display Unit.

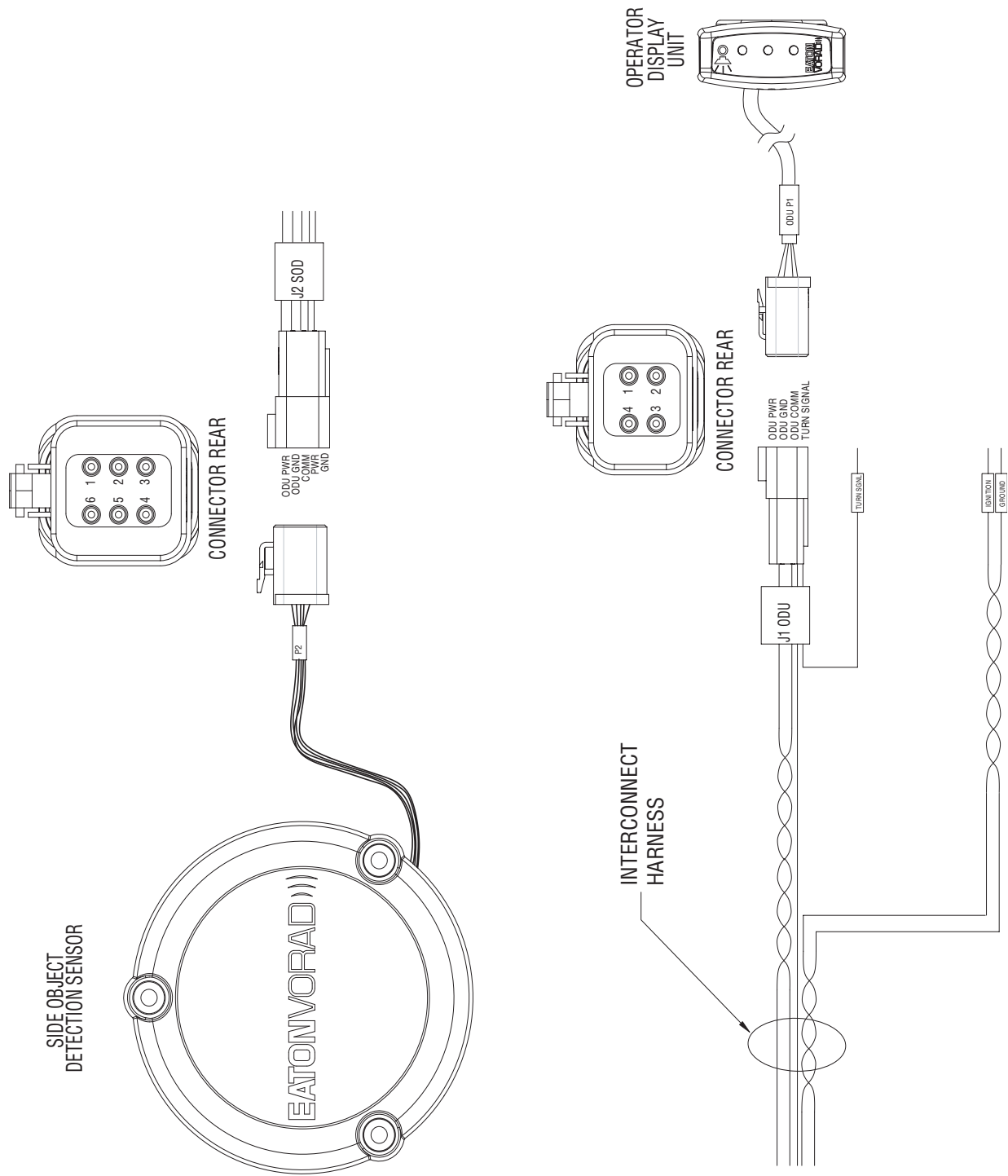
Step B	Procedure	Condition	Action
	1. Key on.		
	2. Remove Sensor from mounting position.		
	3. Move Sensor out away from the vehicle and place in an open area.		
	4. Key on.		
	5. Allow Operator Display Unit to go through self-test and shows no targets (yellow LED light should be on).	→ If both LED lights turn on for 1/2 second, followed by red LED for 5 seconds, followed by continuous yellow light →	Reposition sensor on vehicle to allow clear detection zone. Go to Step V .
		→ If both LED lights turn on for 1/2 second, followed by continuous red light →	Replace sensor. Go to Step V .

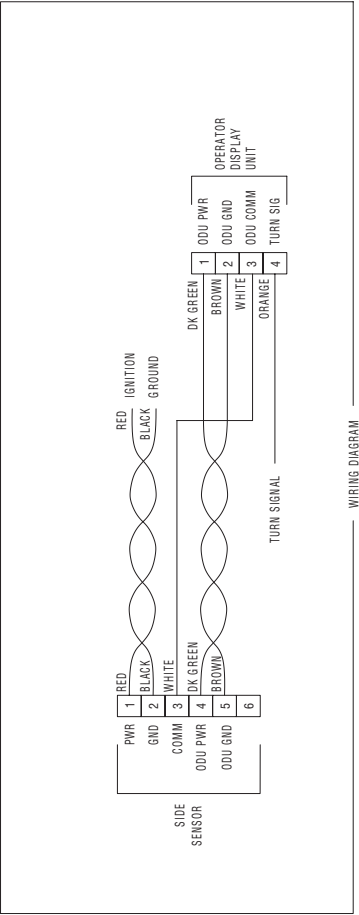
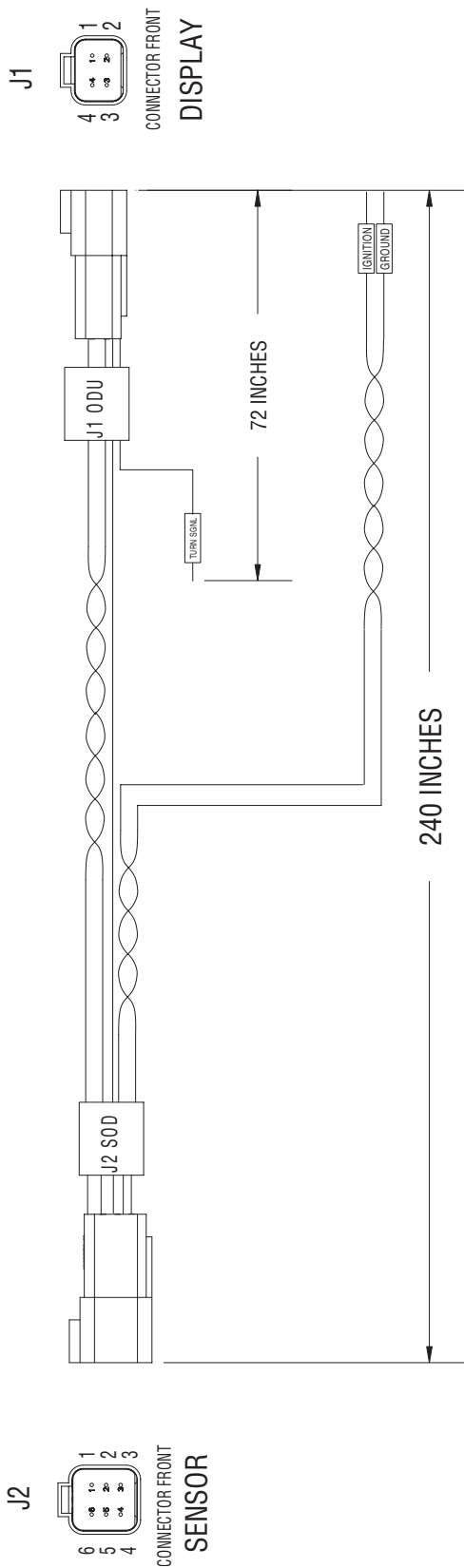
Side Sensor Continuously Detecting Targets, continued

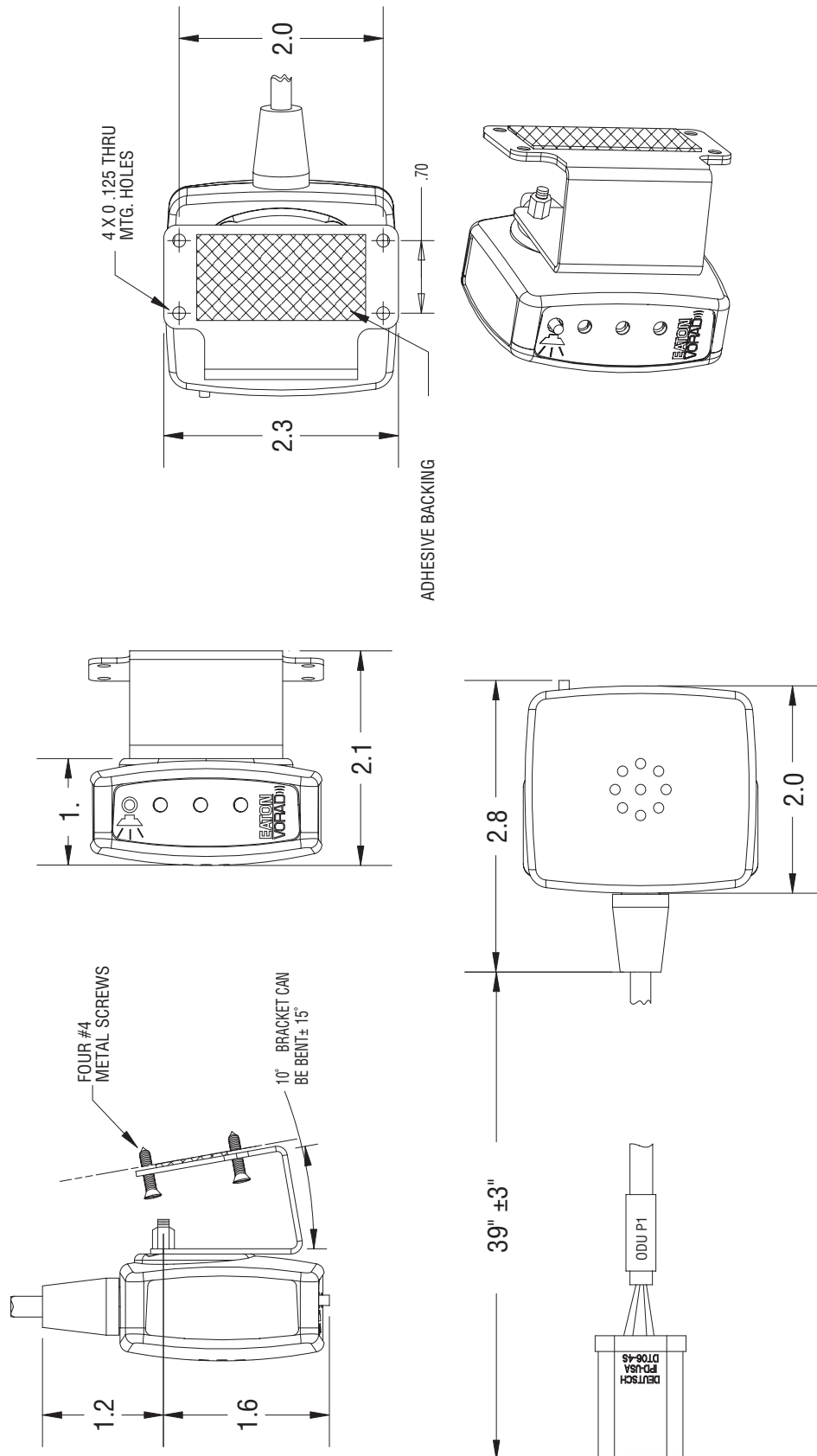
Step V	Procedure	Condition	Action
	1. Key off.		
	2. Reconnect all connectors.		
	3. Drive vehicle to determine if problem has been corrected.	→ If complaint has been repaired →	Test complete.
		If complaint has not been repaired →	Return to Step A to find error in testing.

Side Sensor Continuously Detecting Targets, continued

Wiring Diagrams

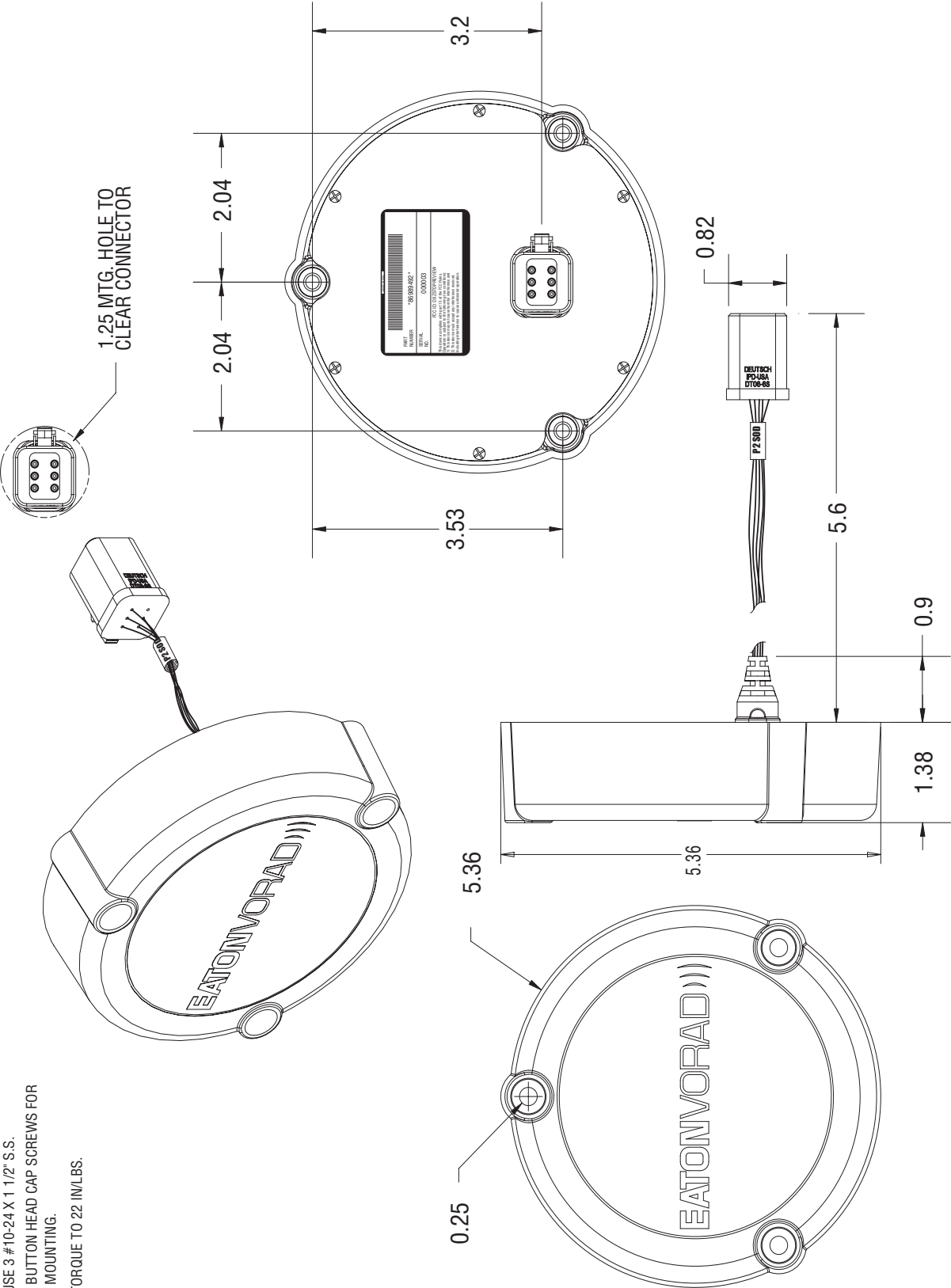






NOTES:

- 1) USE 3 #10-24 X 1 1/2" S.S. BUTTON HEAD CAP SCREWS FOR MOUNTING.
- 2) TORQUE TO 22 IN./LBS.



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