

SIDE ROLL SENSOR TROUBLESHOOTING GUIDE

WARNING

- **Service the roll sensor(s) only if you are an authorized technician.**
- **The roll sensor triggers airbags and seat restraints. Accidental deployment could cause serious injury and property damage.**
- **Never remove the roll sensor with cables connected. Removing the roll sensor may deploy the airbags and seat restraints.**
- **Never connect harness to an unmounted side roll sensor.**
 - **Devices could be activated! The sensor is riveted to the roof and should NOT be removed except for replacement.**
- **Cylinders contain explosives and pressurized gas that can be dangerous if punctured, damaged, cut or drilled into.**
- **The side roll sensor must be disconnected when welding on the vehicle.**
- **MAKE sure battery switch is OFF before connecting or disconnecting side roll sensor.**

TO PERFORM DIAGNOSTIC TROUBLESHOOTING, the following additional items may be required:

1. Either of the following diagnostic tools. The troubleshooting procedure will vary depending on the diagnostic tool used.
 - a. SAE J1587 heavy-duty truck cartridge diagnostics with Pro Link reader or lap top. Other cartridges or software that are capable of picking up automatic MIDs can also be used. (DDEC, WTEC, Cummins and other ECU specific cartridges will NOT work.)
 - b. RollTek Diagnostic software and cable for a laptop computer.
2. Digital Voltmeter (DVM)
3. Roll System Wiring Diagram
4. 66-3000-**** Roll sensor seating Layout SP diagram that is completed for the job.
5. Vehicle Operations Manual – Side roll sensor section

SIDE ROLL PROTECTION FAULT LIGHT FUNCTIONALITY:

The indicator lamp normally remains on for approximately 5 seconds after the vehicle ignition power is applied. During these 5 seconds, internal tests verify system functionality.

If the cab is raised, the vehicle is moving, and/or experiences heavy vibration during the 10-second initialization period, internal sensor tests may fault. The fault light will activate, and the system will remain inactive. The power must then be cycled when the truck is in a stationary level position for the fault to clear.

If side roll sensor is unplugged, the connector shorts “Warning Lamp GND” to “Warning Lamp Out”, thus activating the “Side Roll Protection” warning indicator.

The vehicle can be operated while the warning lamp is on.

The roll system may or may not be operational, but this will not affect the vehicle operations.

SIDE ROLL SENSOR FUNCTIONALITY:

Sensor diagnostics continuously monitor internal functions such as the power supply, accelerometer, angular rate sensor, microprocessor, and memory operation. The sensor also monitors external connections to power and the active restraints. Fault conditions are indicated via the Roll System Fault warning lamp and the SAE J1708 diagnostic bus.

Normal operating voltage: 9-16 VDC ignition power. (If available, wired to auxiliary battery)

Operating Current: 200Ma at 14 VDC

Temperature Range: -40 to +85C

The side roll sensor has a minimum power reserve of 1 second in case of loss of power during a side roll.

The electrical connections to the side roll sensor are made with a special AMP connector.

- The connector is designed for use with pyrotechnic squibs in the activation of vehicle air bag and similar occupant protection devices.
- The connector pins to these squibs short together when the connector becomes disengaged. This design is to reduce the possibility of accidentally deploying devices during installation.
- The connector has a secondary red locking tab that must be pushed forward to lock or pulled back to unlock the connector. This tab must have mild pressure applied to remove the connector from the module.
- When connecting, gently tug on connector when seated in place to verify locking mechanism has been latched, and apply secondary lock.

The indicator light should remain active if the side roll sensor is disconnected and the battery switch is ON.

Always disconnect power before connecting or disconnecting harness to roll sensor.

LARGE SAFETY SYSTEM APPLICATIONS:

If Air Curtains or more than eight safety system devices (6 seating positions) are required in an application, an extra “Slave” side roll sensor may be linked to the “Master” side roll sensor. The “master” sensor then signals the “slave” sensor when a roll event occurs. The sensor communications are thru the harness via Type II I/O (+/-) communications.

MID 254 identifies master sensor. MID 232 identifies slave sensor. The 6 pin diagnostic port for these sensors is under the dash, labeled “Side Roll Diagnostics”.

FRONTAL AIRBAG SYSTEM APPLICATIONS:

If the system includes frontal airbag (4Front) protection, a frontal sensor is mounted under the dash. This frontal sensor is linked to the “master” and “slave” roll sensors (if provided). The frontal sensor then signals the “master” and “slave” sensors when a frontal event occurs. The sensor communications are thru the harness via Type I I/O (+/-) communications.

MID 232 identifies frontal sensor. The 9 pin diagnostic port for this sensor is under the dash, labeled “Trans/Frontal Diagnostics”.

SQUIB DEVICES:

Outputs to the squib devices are closed loop. The power and ground both must be given to the pyrotechnic device to activate it.

If the connectors to the pyrotechnic devices are opened during testing, Void stickers must be replaced. These are added as tamperproof evidence to verify the connection.

If a seating position is not used, a terminating resistor is installed at the connector end of the harness in place of that seating position. The resistor used is 2.2ohm, 5%, 1/4watt

IF THE INDICATOR LAMP REMAINS ILLUMINATED:

If the Side Roll Protection fault light remains lit, or does not light during vehicle prove out, the vehicle should be brought to a Pierce Manufacturing authorized service facility. In certain cases, turning OFF the ignition and vehicle power and then turning them back ON may reset the fault light. The roll sensor(s) record all fault codes, which may be read with a diagnostic reader at a Pierce Manufacturing authorized service facility.

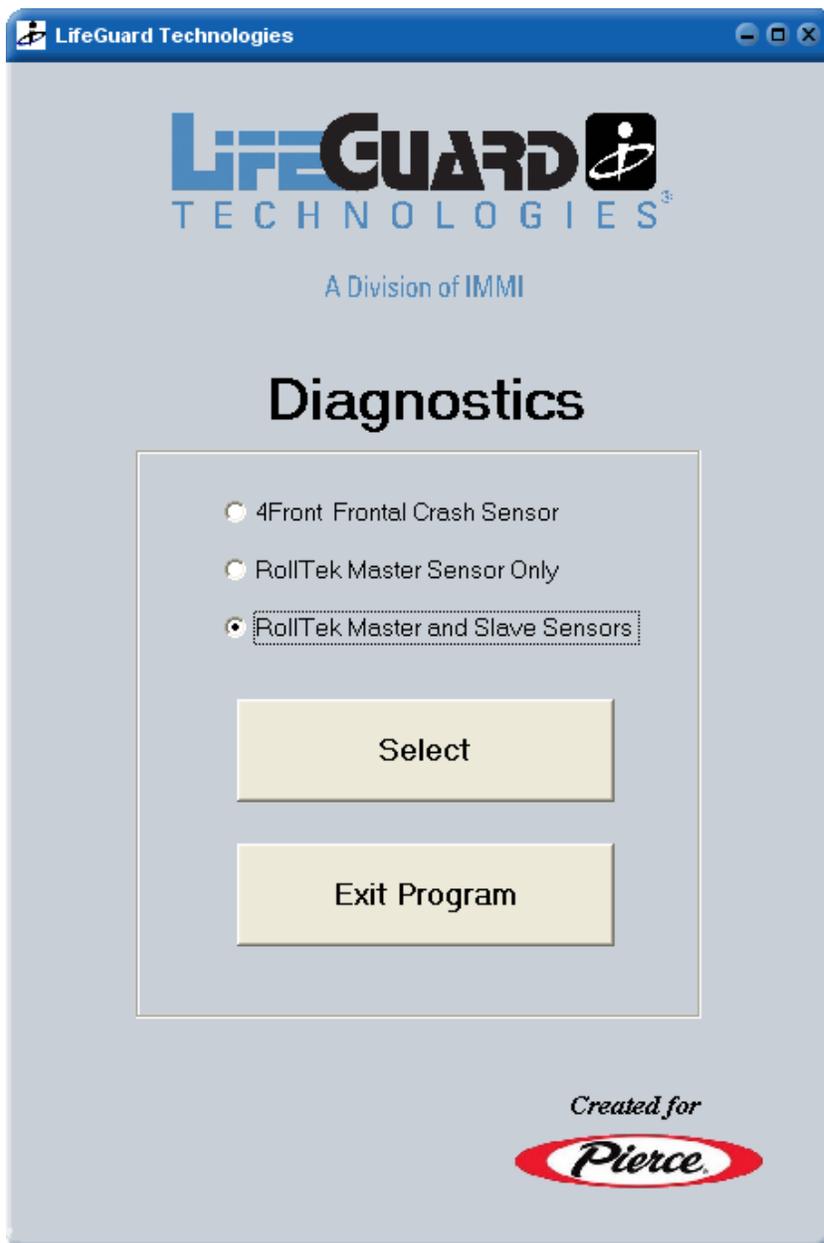
TROUBLESHOOTING PROCEDURE WITH ROLLTEK DIAG:

If a fault occurs, system diagnostics must be performed to determine the source of the fault. Diagnostics will be performed with a laptop computer using RollTek Diagnostic software and supplied cables. For troubleshooting using Pro-Link reader, see procedure at the end of this document.

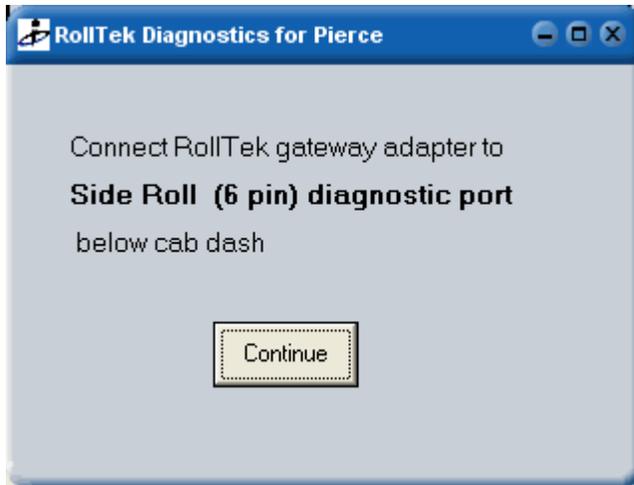
Park the vehicle in a level, stationary position.

Turn ignition switch off.

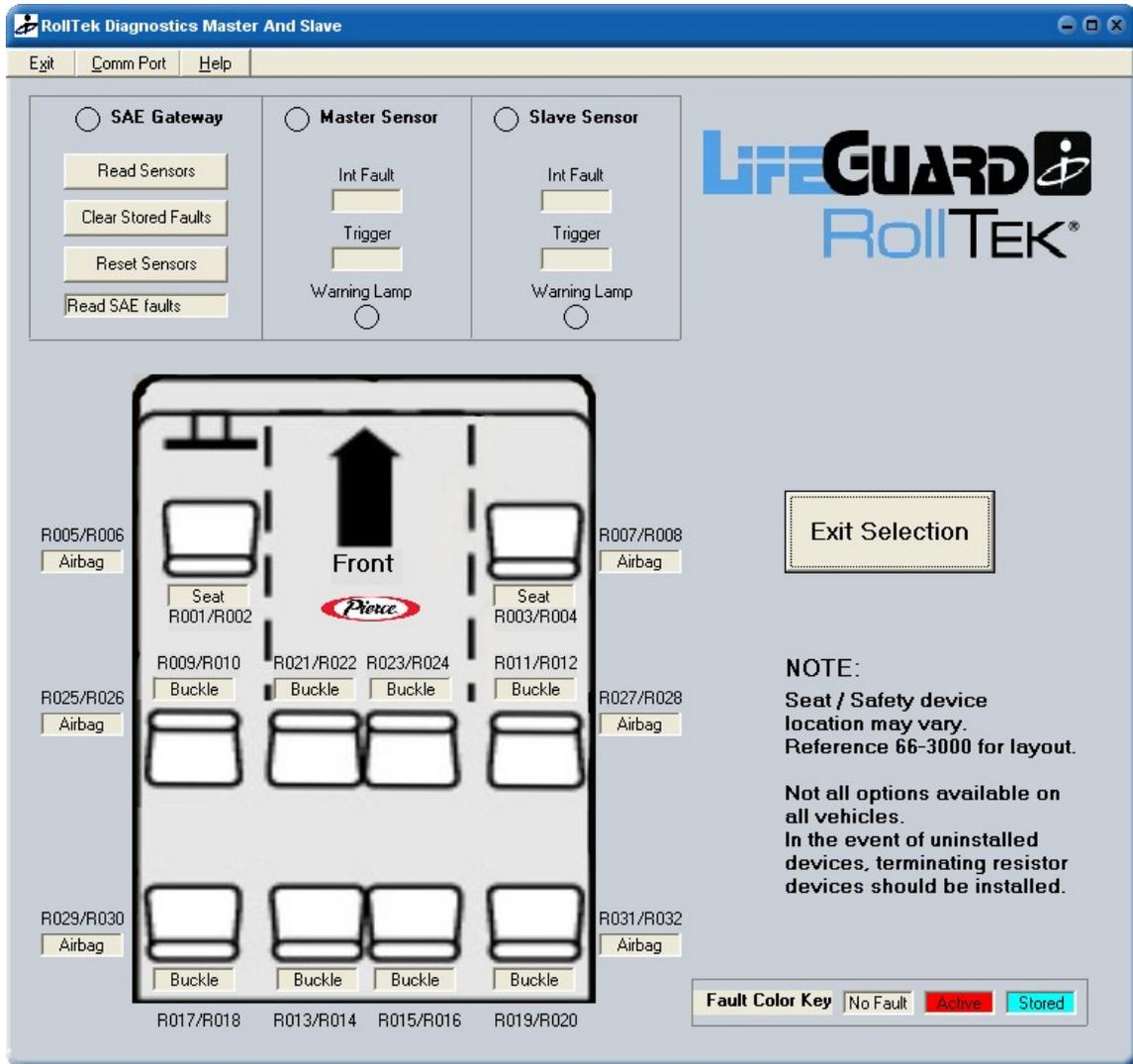
To start testing a RollTek system in a vehicle, install the RollTek Diag software on a laptop or other personal computer that can be located near the vehicle. When installed and started, the startup screen should appear:



Choose the RollTek system that best matches the vehicle you are troubleshooting, and press “Select”. You should then see this screen:



The operating screen will then appear:



Apply power with the vehicle ignition switch. The red light on the Gateway will illuminate and RollTek system will be energized.

Use the Comm Port pull down menu to chose the correct port. If the program has established communications with the SAE Gateway, the status window will read "Ready". Click on "Read Sensors" to check for faults. As the Master and Slave Sensors and SAE Gateway respond, the circle indicators will blink green. If these indicators do not blink, the component is not communicating. Check the wiring and power connections.

If the status window reads "Check connections" or "Comm timeout", there may be a problem with the wiring setup. Check that the cables are connected, the correct communications port is selected, and power is applied to the SAE Gateway and the RollTek system. Once the RollTek Diag program has connected to the RollTek system, it is ready to check sensor faults.

IGNITER CIRCUIT FAULTS

RollTek Diag displays sensor faults in a graphical format. Click “Read Sensors” to check for faults. Currently active faults light up red, while stored faults are blue. The master sensor below has an stored short circuit fault on the driver S4S and a active open circuit on the first officer S4S. The master sensor is also illuminating the warning lamp. Refer to the vehicle’s RollTek wiring diagram to determine the wiring details. Stored faults may be due to an intermittent wiring issue, so the wiring should be checked before putting the vehicle into service.

The screenshot shows the RollTek Diagnostics Master And Slave software interface. The window title is "RollTek Diagnostics Master And Slave". The menu bar includes "Exit", "Comm Port", and "Help".

On the left, there are three columns of controls:

- SAE Gateway:** Includes buttons for "Read Sensors", "Clear Stored Faults", "Reset Sensors", and a "Ready" status indicator.
- Master Sensor:** Includes "Int Fault" (No Fault), "Trigger", and "Warning Lamp" (Active, indicated by a red light).
- Slave Sensor:** Includes "Int Fault" (No Fault), "Trigger", and "Warning Lamp" (No Fault, indicated by a white light).

The "LIFE GUARD RollTEK" logo is displayed on the right side of the interface.

The central part of the interface shows a vehicle layout diagram with the following components and fault status:

- Front:** Indicated by a large black arrow pointing up.
- R005/R006:** Airbag (No Fault)
- R007/R008:** Open (Active, indicated by a red box)
- R001/R002:** Short (Stored, indicated by a blue box)
- R003/R004:** Seat (No Fault)
- R009/R010:** Buckle (No Fault)
- R021/R022:** Buckle (No Fault)
- R023/R024:** Buckle (No Fault)
- R011/R012:** Buckle (No Fault)
- R025/R026:** Airbag (No Fault)
- R027/R028:** Airbag (No Fault)
- R029/R030:** Airbag (No Fault)
- R031/R032:** Airbag (No Fault)
- R017/R018:** Buckle (No Fault)
- R013/R014:** Buckle (No Fault)
- R015/R016:** Buckle (No Fault)
- R019/R020:** Buckle (No Fault)

An "Exit Selection" button is located on the right side of the diagram.

NOTE:
Seat / Safety device location may vary.
Reference 66-3000 for layout.

Not all options available on all vehicles.
In the event of uninstalled devices, terminating resistor devices should be installed.

Fault Color Key: No Fault (white), Active (red), Stored (blue)

WARNING

- **Before correcting any faults, deactivate the side roll sensor by turning off the ignition and battery switch. Do NOT perform service to a live system. Accidental deployment could cause serious injury and property damage.**

Identify the source of the open or short circuit. After the wiring is repaired, the fault indicator will change from red to blue. Click “Clear Stored Faults”. Warning light will not deactivate until active and inactive codes are cleared. Verify fault light operation.

Note: The connectors going to the squib devices and side roll sensor are shorting when disconnected. If a terminating resistor is used in place of a seating position, the resistor used is 2.2ohm, 5%, 1/4watt

ADDITIONAL FAULT CODE MESSAGES

Internal faults

This fault could indicate a faulty component in the sensor. An internal fault can also be created when the cab is tilted for servicing, or if there are excessive vibrations at the sensor location. If the sensors are mounted firmly and the internal fault indicator remains on after cycling the power, continue below.

A slave sensor can generate this fault code if the communication is lost between the Master and Slave. Check Type II I/O (+/-) wiring circuits “R054” and “R055”, between the modules. Also check the connections to the Master and Slave. Then try to clear the fault.

If the system includes 4Front frontal protection, the sensor can generate this fault code if the communication is lost between the frontal sensor and the roll sensors. Check Type I I/O (+/-) wiring circuits between the modules. Also check the connections to the frontal sensor.

If the fault will not clear, the module must be replaced and returned to the manufacturer. UNPLUG side roll sensor before attempting to remove from vehicle. Activated side roll sensor could deploy safety devices.

Trigger

This indicates that a trigger is stored in program memory. The side roll sensor will transmit the status message following a roll or frontal crash trigger every 15 seconds. Contact IMMI for assistance. Trigger events cannot be cleared with standard diagnostic tools. IMMI has proprietary diagnostic software for roll event data extraction.

Additional information is recorded in the sensor. IMMI has proprietary diagnostic software for roll event data extraction. Please contact IMMI for assistance to reconstruct roll events.

The side roll sensor is designed to activate once. If the system is activated or damaged, trained authorized personnel must replace the unit.

TROUBLESHOOTING PROCEDURE WITH PRO-LINK:

If a fault occurs, system diagnostics must be performed to determine the source of the fault. Diagnostics will be performed with an SAE J1587 module, such as PRO-LINK.

1. Park the vehicle in a level, stationary position.
2. Turn ignition switch off.
3. Connect diagnostic reader with heavy-duty cartridge to side roll sensor diagnostic port below cab dash. Turn ignition switch “on.” The diagnostic module should power up, and the “Roll Sensor Fault” dash light should illuminate brighter. The light will remain on if a fault is present, the side roll sensor is disconnected, or power to the side roll sensor power is lost. The light will deactivate if no faults exist.
4. Set the diagnostic module to automatically scan for all Message Identification Character (MID)’s. It should find MID 254 (Master) and MID 232 if a slave controller is used. Check both for active and inactive faults in the Rollover Protection system. Check, Subsystem Identification (SID), Parameter Identification Character (PID), and/or Failure Mode Identifier (FMI) faults with the tables below.
5. Before correcting any faults, deactivate the side roll sensor by turning off the ignition and battery switch. Do NOT perform service to a live system!
6. After troubleshooting is complete, clear all stored faults and cycle ignition power. Warning light will not deactivate until active and inactive codes are cleared.
7. If the lamp continues to remain illuminated, contact an authorized service facility to further diagnose and repair the rollover protection system.

Diagnostic Codes for Igniter Circuits (Master, MID 254)

SID	FMI	Description
1	5	Device 1, Driver Seat Igniter Open Circuit
1	6	Device 1, Driver Seat Igniter Short Circuit
2	5	Device 2, Pass Seat Igniter Open Circuit
2	6	Device 2, Pass Seat Igniter Short Circuit
3	5	Device 3, Driver Air Bag Open Circuit
3	6	Device 3, Driver Air Bag Short Circuit
4	5	Device 4, Pass Air Bag Open Circuit
4	6	Device 4, Pass Air Bag Short Circuit
8	5	Device 5, D/S Crew cab Open Circuit

SID	FMI	Description
8	6	Device 5, D/S Crew cab Short Circuit
9	5	Device 6, P/S Crew cab Open Circuit
9	6	Device 6, P/S Crew cab Short Circuit
11	5	Device 7, D/S Crew cab Open Circuit
11	6	Device 7, D/S Crew cab Short Circuit
12	5	Device 8, P/S Crew cab Open Circuit
12	6	Device 8, P/S Crew cab Short Circuit

Identify the source of the open or short circuit, repair, clear codes. Verify fault light operation.

The connectors going to the squib devices and side roll sensor are shorting when disconnected. If a terminating resistor is used in place of a seating position, the resistor used is 2.2ohm, 5%, 1/4watt

Diagnostic Codes for Igniter Circuits (Slave, MID 232)

SID	FMI	Description
1	5	Device 9, D/S Forward Facing Outboard Igniter Open Circuit
1	6	Device 9, D/S Forward Facing Outboard Igniter Short Circuit
2	5	Device 10, P/S Forward Facing Outboard Igniter Open Circuit
2	6	Device 10, P/S Forward Facing Outboard Igniter Short Circuit
3	5	Device 11, D/S Rear Facing Inboard Igniter Open Circuit
3	6	Device 11, D/S Rear Facing Inboard Igniter Short Circuit
4	5	Device 12, P/S Rear Facing Inboard Igniter Open Circuit
4	6	Device 12, P/S Rear Facing Inboard Igniter Short Circuit
8	5	Device 13, D/S Rear Facing Outboard Head Curtain Open Circuit
8	6	Device 13, D/S Rear Facing Outboard Head Curtain Short Circuit
9	5	Device 14, P/S Rear Facing Outboard Head Curtain Open Circuit
9	6	Device 14, P/S Rear Facing Outboard Head Curtain Short Circuit

SID	FMI	Description
11	5	Device 15, D/S Forward Facing Outboard Head Curtain Open Circuit
11	6	Device 15, D/S Forward Facing Outboard Head Curtain Short Circuit
12	5	Device 16, P/S Forward Facing Outboard Head Curtain Open Circuit
12	6	Device 16, P/S Forward Facing Outboard Head Curtain Short Circuit

ADDITIONAL FAULT CODE MESSAGES

Internal faults

MID	SID	Description	FMI	Description
254 or 232	254	Controller #1	12	Bad Device or Component

This fault could indicate a faulty component in the sensor. A slave sensor can generate this fault code if the communication is lost between the Master and Slave. Check Type II I/O (+/-) wiring circuits “R054” and “R055”, between the modules. Also check the connections to the Master and Slave. Then try to clear the fault. If the fault will not clear, trained authorized personnel must replace the module, then return it to the manufacturer. UNPLUG side roll sensor before attempting to remove from vehicle. Activated side roll sensor could deploy safety devices.

Trigger Event Stored

MID	SID	Description	FMI	Description
254 or 232	240	Program Memory	14	Special Instructions

This indicates that a trigger is stored in program memory. The side roll sensor will transmit the status message following a roll or frontal crash trigger every 15 seconds. If the diagnostic module is capable, further trigger status information may be read. Contact IMMI for assistance. Trigger events cannot be cleared with standard diagnostic tools. IMMI has proprietary diagnostic software for roll event data extraction. The side roll sensor is designed to activate once. If the system is activated or damaged, trained authorized personnel must replace the unit.

Additional information is recorded in the sensor. IMMI has proprietary diagnostic software for roll event data extraction. Please contact IMMI for assistance to reconstruct roll events.