

Omnitracs SR4 Freightliner Columbia Installation Guide

This VSA covers models manufactured between 2001-2010



Manufactured by Daimler Trucks of North America

Available as a Glider Kit from 2011-present

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Rev 8, May 18, 2021



Freightliner Columbia




Cable Guide 2001-2010



Columbia
CL 120
(Split Windshield)



Classic S/T (Split Windshield)

Year Range	SR4 Harness Description	SR4 SKU	Cable Type
2001-2003	J-1708, 6 Pin	104-0009-0011-01	 J-1708, 6-pin, (White) Flange
2004-2009	J-1939 & J1708 9 Pin Type 1, Threaded black	104-0009-0019-00	 J-1939, 9-pin Type 1, (Black) Threaded
2010-2010	J-1939, 2 Pin Type B, (Deutsch black inside)	104-0009-0008-00	 J-1939, 2-pin Type B, Deutsch (Black Inside)

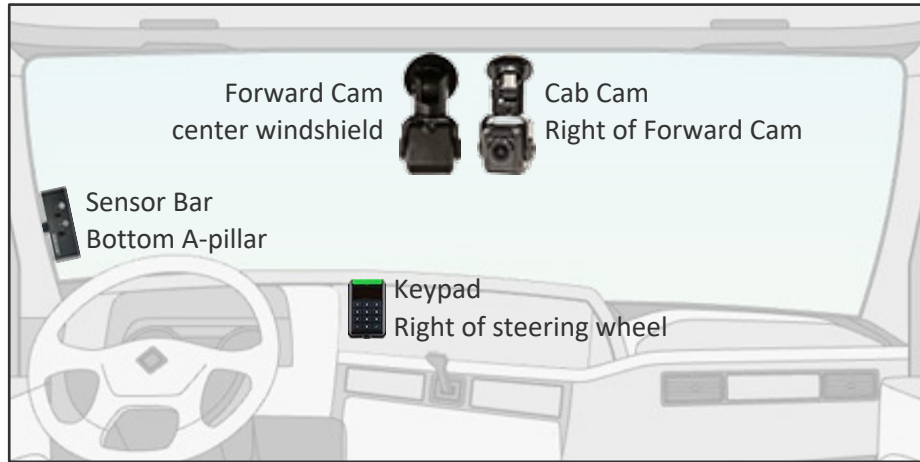
Verify if the Freightliners VIN# has an "X" in the 4th character . If so, this will be a Glider kit with older rebuilt engine and exhaust systems installed. These vehicles do not follow standard wiring configuration and will be a custom application. DO NOT connect ECU connections on these vehicles as this could result in unknown issues with the vehicle. These vehicle are required to have power connections (hard-wired) with NO ECU CONNECTION.

Freightliner Columbia

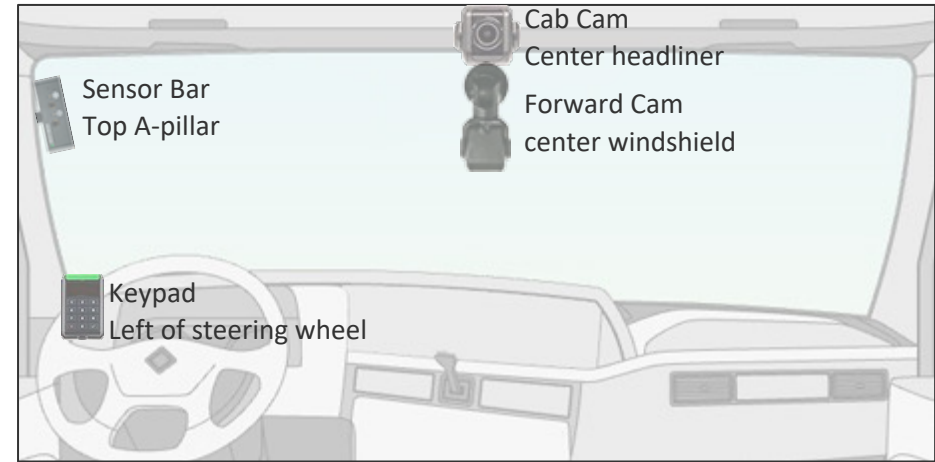
Approved camera mounting (flat/split windshield), sensor bar, and keypad locations

Note: Any combination of these mounting locations are approved

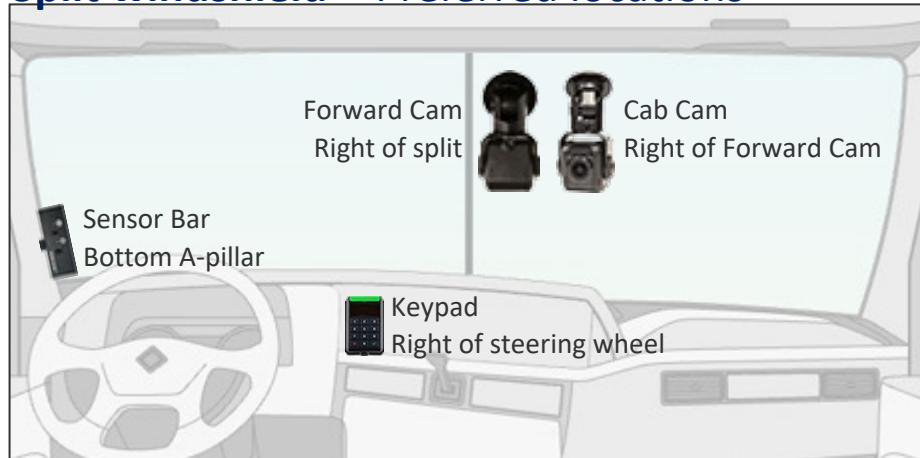
Flat windshield - Preferred locations



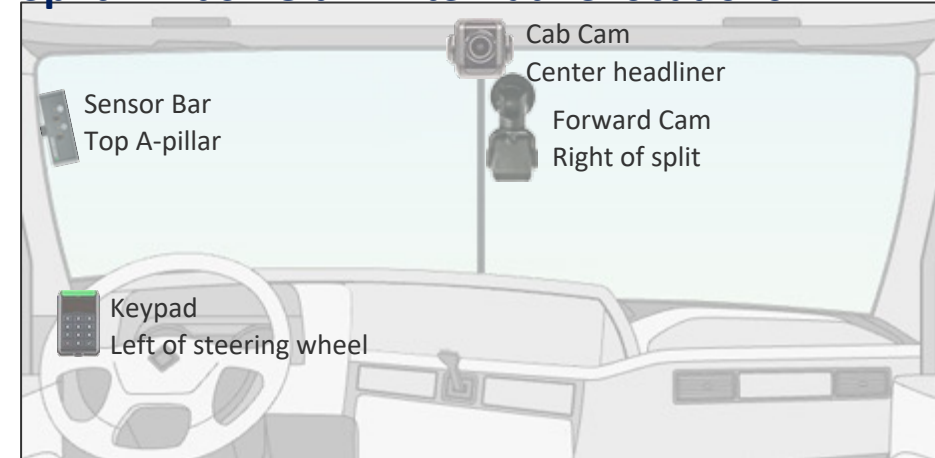
Flat windshield - Alternative locations



Split windshield - Preferred locations



Split windshield - Alternative locations

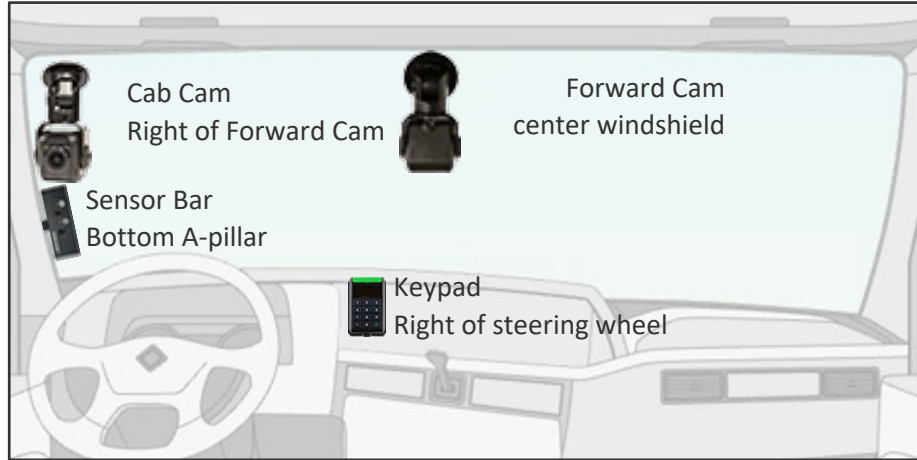


Freightliner Columbia

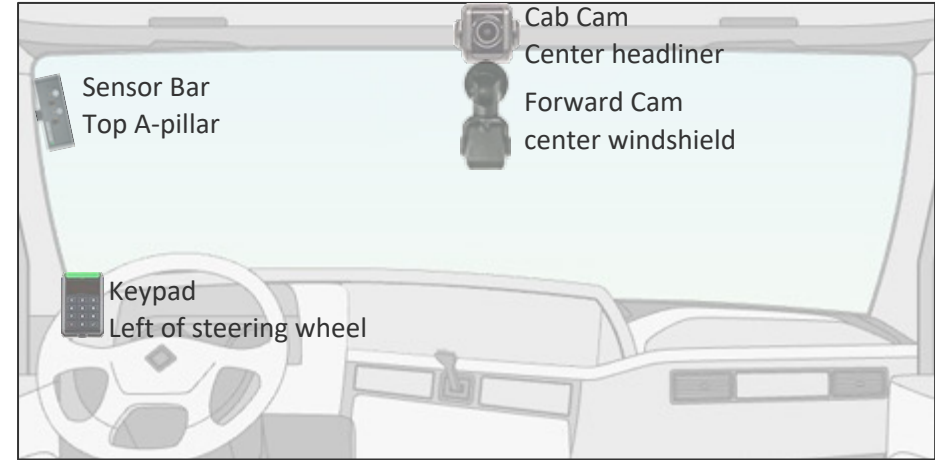
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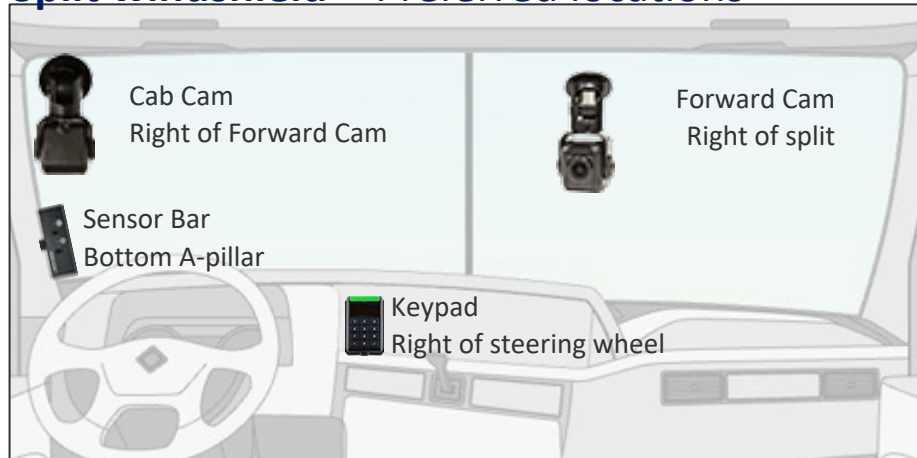
Flat windshield - Preferred locations



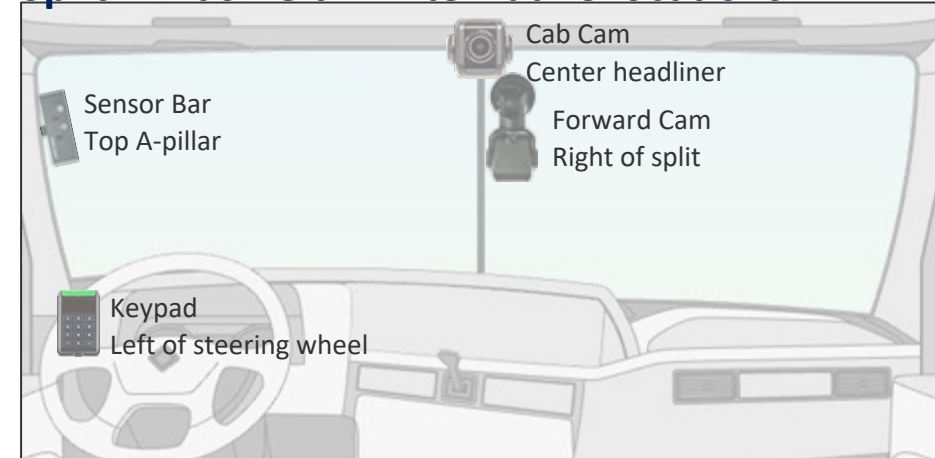
Flat windshield - Alternative locations



Split windshield - Preferred locations



Split windshield - Alternative locations



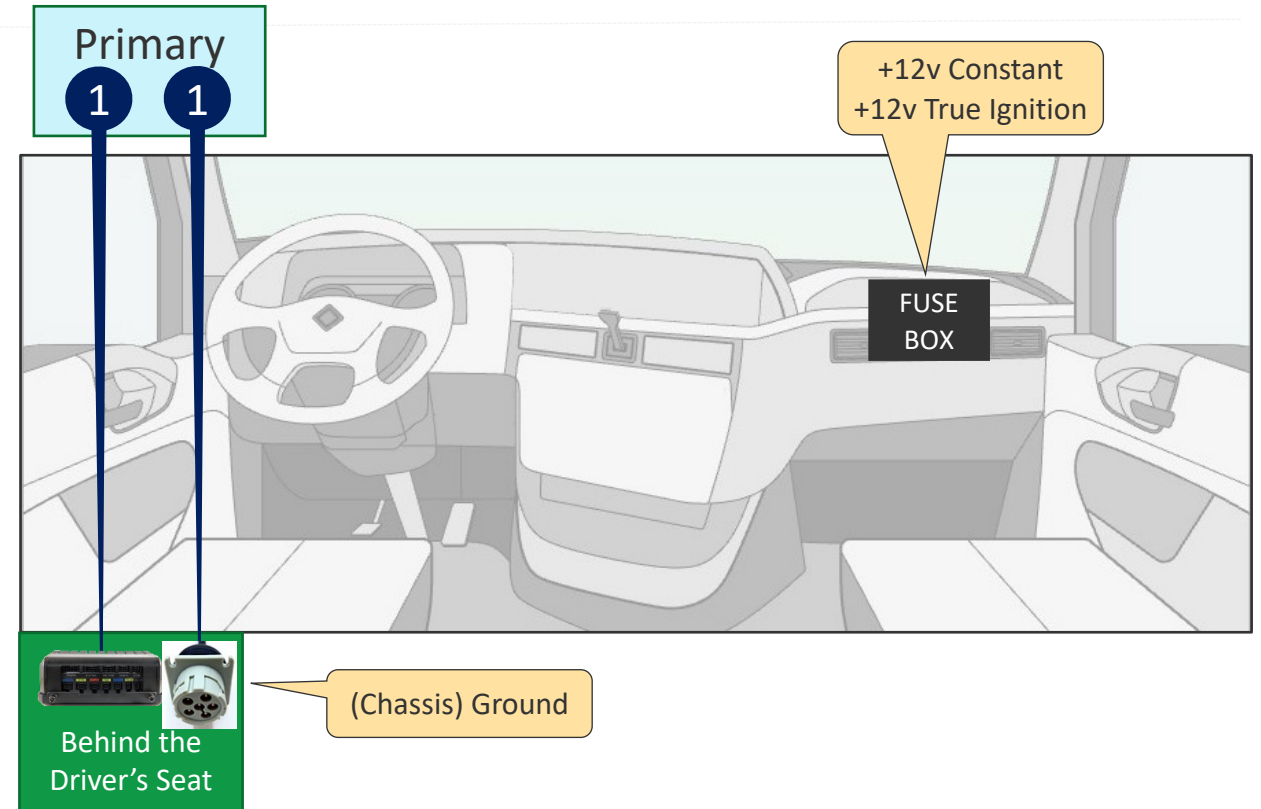
[RETURN HOME](#)

2001-2003 DLC and wiring instructions

Freightliner Columbia

2001-2003 Approved controller, ECU, and wiring locations

1	
Component	Primary location
Component	Primary location
Controller	Driver-side Behind the instrument panel
ECU Port	1997-2003 Driver-side 6-pin, Type 1, Flange (104-0009-0011-01)
Wiring Constant Power & True Ignition	Passenger-side Fuse Box



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Freightliner Columbia

2001-2003 6-PIN Flange Data Link Connector (DLC)

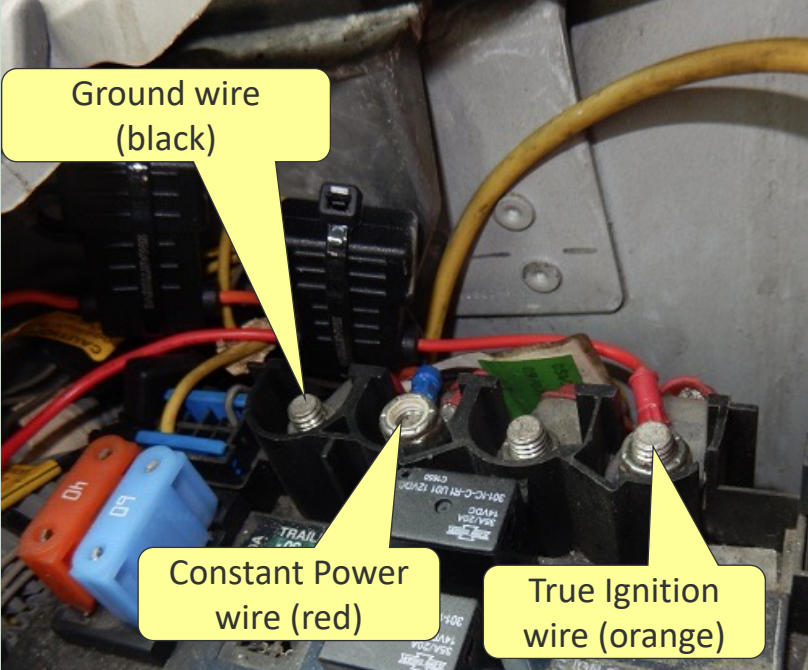
Component		Notes
6-Pin Flange J-1708 (White)		N/A

Description		
SR4 Part#	104-0009-0011-01	J-1708, 6 Pin, Flange white
Connector Color	White	(<u>White</u>) color indicates J1708, 9600bit/s network speed
Network	J1708	Vehicle Bus Communication Network - (Passive)
Baud Rate	9600bit/s	<ul style="list-style-type: none">• Supports (9600b) low speed protocol• Legacy Protocol for 3rd Party Devices
Connection Type	6-Pin, Flange	Square mounting tab located near the connectors base with slots for mounting screws.



Freightliner Columbia

2001-2003 Constant power, true ignition, and ground wiring connections

Fuse box Location	Wiring Locations
<p data-bbox="496 325 899 359">Passenger-side Dashboard</p> 	<p data-bbox="1302 325 1498 359">True Ignition</p> <p data-bbox="1302 368 2390 448">Located inside the passenger-side dashboard. Stud on side of fuse panel marked "IGN" using a large ring terminal</p> <p data-bbox="1302 502 1549 536">Constant Power</p> <p data-bbox="1302 545 2390 625">Located inside the passenger-side dashboard. Stud on side of fuse panel marked "BAT" using a large ring terminal</p> <p data-bbox="1302 679 1421 714">Ground</p> <p data-bbox="1302 722 2390 802">Located inside the passenger-side dashboard. Stud on side of fuse panel marked "GND" using a large ring terminal</p>

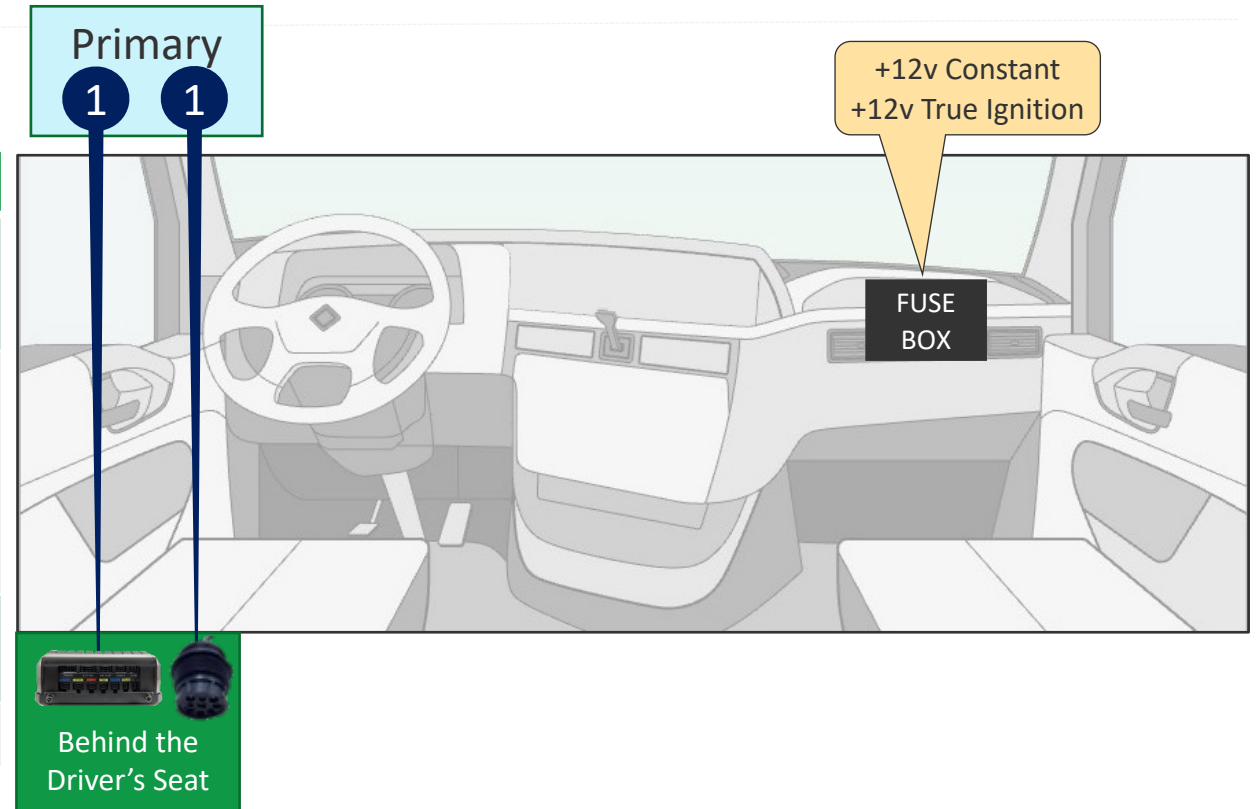
[RETURN HOME](#)

2004-2009 DLC and wiring instructions

Freightliner Columbia

2004-2009 Approved controller, ECU, and wiring locations

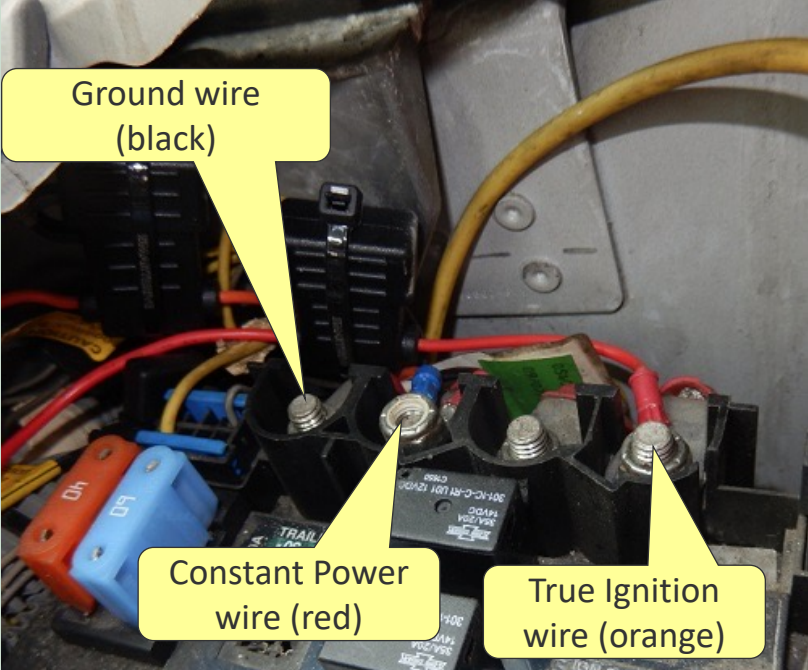
Component	Primary location
Controller	<p>Driver-side Behind the driver's seat Behind the instrument panel</p>
ECU Port	<p>Driver-side Behind the driver's seat J-1939 & J1708 9 Pin Type 1, Threaded black</p>
Wiring Constant & True Ignition	<p>Passenger-side Fuse Box</p>



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Freightliner Columbia

2004-2009 Constant power, true ignition, and ground wiring connections

Fuse box Location	Wiring Locations
<p data-bbox="496 325 899 358">Passenger-side Dashboard</p> 	<p data-bbox="1302 325 1498 358">True Ignition</p> <p data-bbox="1302 368 2390 448">Located inside the passenger-side dashboard. Stud on side of fuse panel marked "IGN" using a large ring terminal</p> <p data-bbox="1302 501 1549 534">Constant Power</p> <p data-bbox="1302 544 2390 624">Located inside the passenger-side dashboard. Stud on side of fuse panel marked "BAT" using a large ring terminal</p> <p data-bbox="1302 676 1421 709">Ground</p> <p data-bbox="1302 719 2390 799">Located inside the passenger-side dashboard. Stud on side of fuse panel marked "GND" using a large ring terminal</p>

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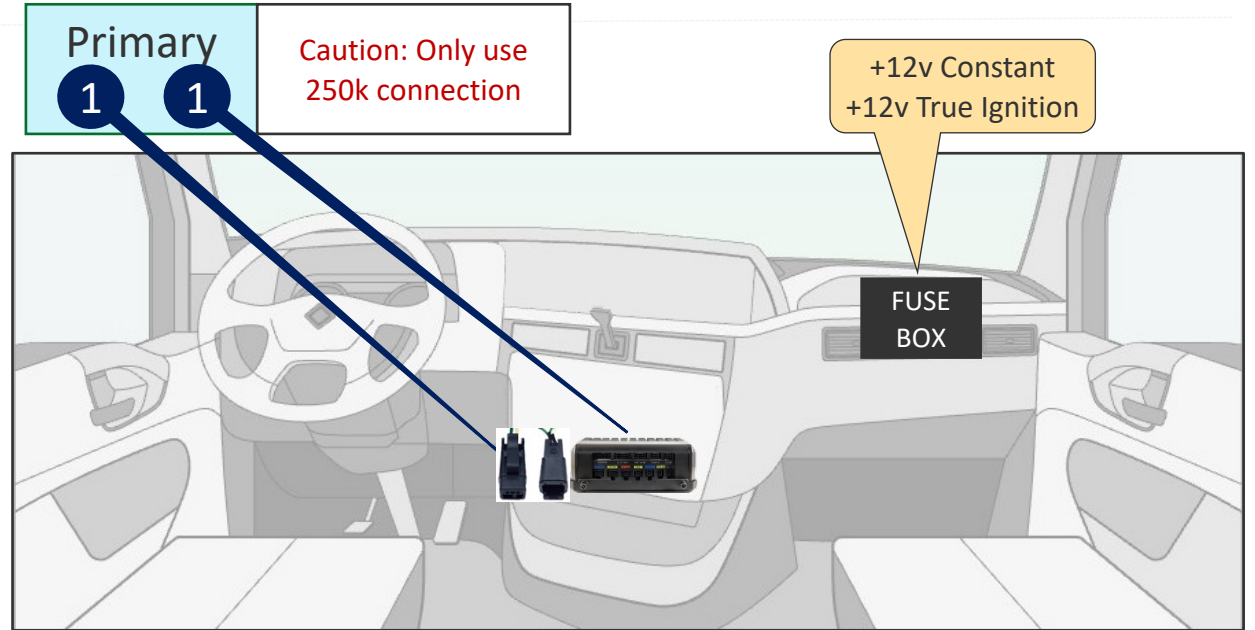
2010 DLC and wiring instructions

Freightliner Columbia

2010 Approved controller, ECU, and wiring locations

1

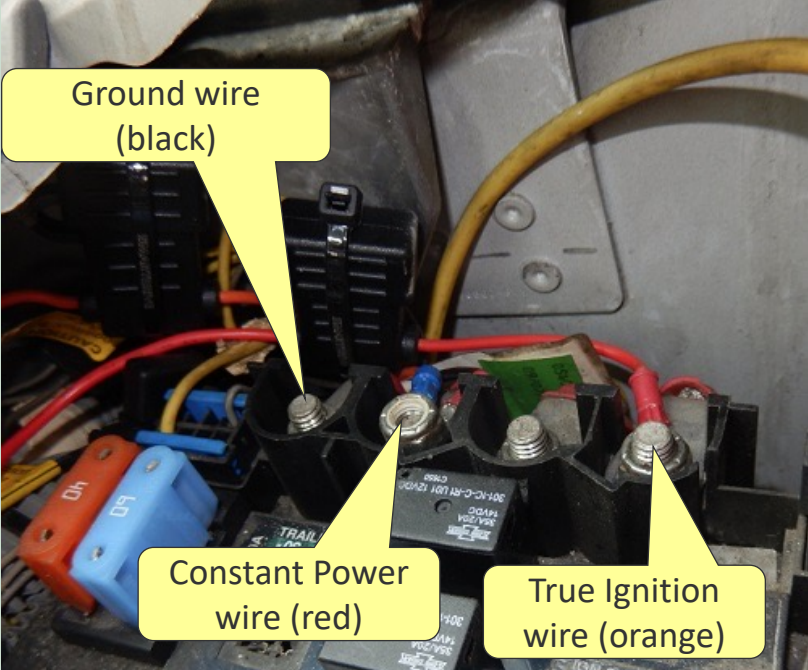
Component	Primary location
Controller	Center dash
ECU Port	Center dash J-1939, 2 Pin Type B Deutsch black inside (104-0009-0008-00)
Wiring Constant & True Ignition	Passenger-side Fuse Box



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Freightliner Columbia

2004-2009 Constant power, true ignition, and ground wiring connections

Fuse box Location	Wiring Locations
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360 Camera Side-mirror Installation

Freightliner Columbia

Approved 360 Camera VSA

The following 360 Convoy VSAs describe the installation process.

- SR4-360 VSA_Side Mirror
- SR4-360 VSA_Rear view
- SR4-360 VSA_Entry Exit Door
- SR4-360 VSA_Inside Interior
- SR4-360 VSA_Monitor M7104
- SR4-360 VSA_5 Camera

Please contact your Project Manager for a copy of these documents.

SmartDrive™ SR4 360 VSA

360 Convoy Mirror-Mount Side Camera

Installation Quality Standards



C1600SD-LR (bottom of mirror)

Driver side, left Passenger side, right

C1600SD-R (top of mirror)

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SMARTDRIVE
Rev 1, March 29, 2019

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ADAS Camera and Driver Feedback Device

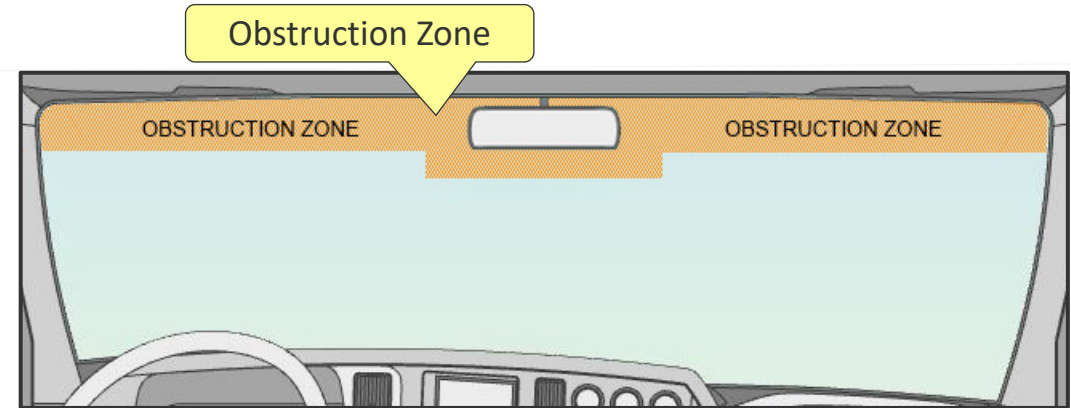
Freightliner Columbia

Best Practice: Camera Mounting Considerations

During an install, you may find obstructions such as sun visors and third party devices that make it impossible to mount in a SmartDrive approved location. The following describes our recommended adjustments in these situations.

Sun Visors are set in the down position and fully extended during the install process to verify the Cab-facing camera has a clear view of the drivers face, hands on the steering wheel, shoulder, and seat or lap belt. When blocked by visor, mount the Cab-facing camera using the secondary location where the desired view is attainable.

When third party devices are located at the top center of the windshield, mount the forward-facing camera on the right side of the device.



Freightliner Columbia

Approved ADAS Forward-facing Camera location

Mounting Location

Mount the ADAS shroud 1" from the top and center of the windshield

The camera cannot interfere with a driver's line of sight of the road, traffic signals, or road signs.

Details

1. Before removing the adhesive backing, check to make sure the camera fits properly
2. Using an alcohol pad clean the windshield and wipe dry with a lint-free clean cloth
3. **Critical: Use a pocket level to ensure that the bottom of the camera is mounted level looking from left to right.**
4. Press firmly on camera bracket for 10 seconds to ensure adhesion
5. Run camera cable under the headliner towards the driver side
6. Remove the A-pillar cover and run the camera cable down to the controller. Ensure the cable doesn't get pinched.

This camera requires calibration.
Details are available in the
ADAS installation and Calibration guide



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Driver Feedback Device location

Mounting Location

**Mounted on the right hand side of the steering wheel
to the top of the dash.**

Run the cable to the controller.

**Plug the driver feedback cable into the port DRIVER FB
Secure the device by cleaning the area with alcohol pad
and secure with adhesive**

Details

1. The sensor bar must be visible to the driver.
2. Clean the windshield with an alcohol pad and wipe dry with clean cloth. Do not use shop rags which have grease even when clean.
3. Press firmly on the baseplate for 10 seconds to ensure it adheres properly to the dash
4. Secure with 2 self-tapping screws
5. Run wires to the controller



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Best Practices: Cameras, Sensor Bar, & Keypad

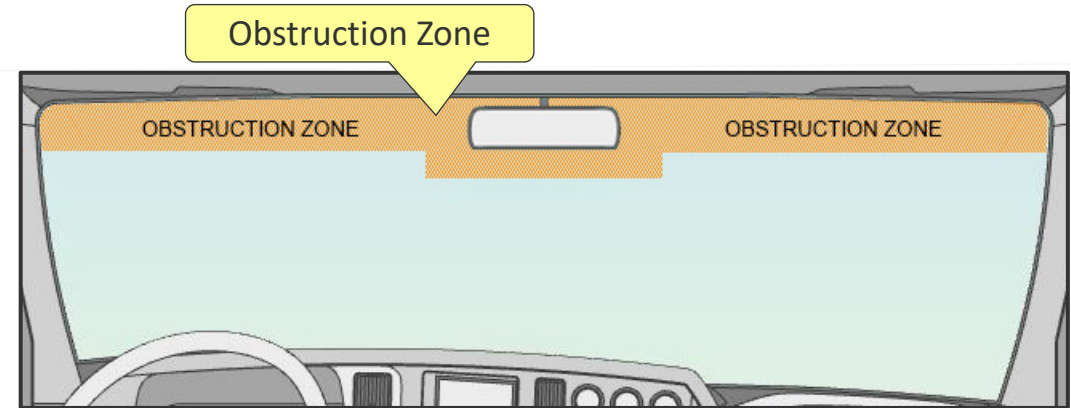
Freightliner Columbia

Best Practice: Camera Mounting Considerations

During an install, you may find obstructions such as sun visors and third party devices that make it impossible to mount in a SmartDrive approved location. The following describes our recommended adjustments in these situations.

Sun Visors are set in the down position and fully extended during the install process to verify the Cab-facing camera has a clear view of the drivers face, hands on the steering wheel, shoulder, and seat or lap belt. When blocked by visor, mount the Cab-facing camera using the secondary location where the desired view is attainable.

When third party devices are located at the top center of the windshield, mount the forward-facing camera on the right side of the device.



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Best Practice: Forward and Cab-facing Camera Installation Instructions

Forward-facing Camera Installation Instructions



**Mount the camera within 6" from the top of the windshield.
Camera cannot interfere with a driver's line of sight
to the road, traffic signals, or road signs**

Details

1. Before removing the adhesive backing, check to make sure the camera fits properly. **Use a pocket level to ensure the bottom of the camera is mounted level looking from left to right.**
2. Using an alcohol pad clean the windshield and wipe dry with a lint-free clean cloth. Do not use shop rags which contain grease even when clean.
3. Press firmly on camera bracket for 10 seconds to ensure adhesion
4. Use ¼ loom to protect the cable and to keep it from coming loose from the headliner
5. Run the camera cable down to the controller.
6. Cables must not block air bag functionality

Cab-facing Camera Installation Instructions



Camera lens must have a complete view of the driver when the visors are in the down and fully extended position. Use a headliner location when the fully extended visor covers the camera lens.

Details

1. Mount the Cab-facing camera on a flat hard surface Using an alcohol pad clean the windshield and wipe dry with a clean cloth. Do not use shop rags which contain grease even when clean.
2. **Mount the camera where the sun visor does not block the lens** (windshield or headliner)
 - Headliner: Secure with 2-3 self-tapping screws
3. Press firmly on camera bracket for 10 seconds to ensure adhesion
4. Use ¼ loom to protect the cable and to keep it from coming loose from the headliner
5. Run the camera cable to the controller
6. Cables must not block air bag functionality
7. Ensure the cable doesn't get pinched

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Best Practice: Cab-facing Camera Installation Instructions regarding Infrared Light

Cab-facing Camera Headliner Mount

The cab-facing camera has two infrared (IR) sensors that improve image quality when the cab is dark. IR flare occurs when the camera bracket partially blocks the cab-facing camera creating a bright flare in the image. (See image 1)

Proper Headliner Mounting Options

The camera face must extend beyond the bracket to prevent obstruction

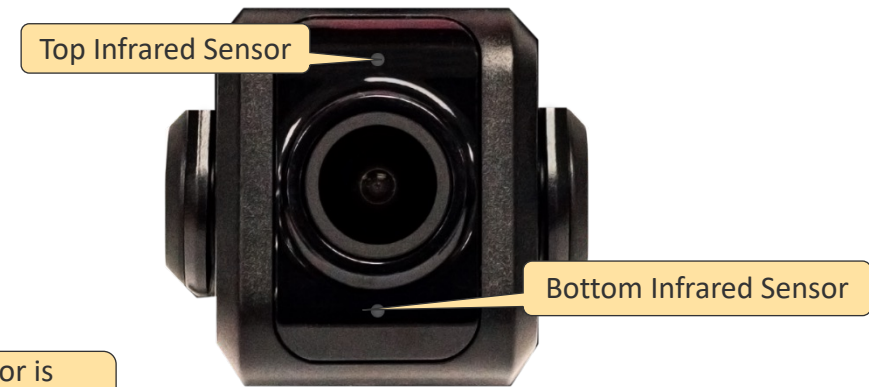
Vertical Mount

Mount the camera vertically to the headliner and position the bracket to hang toward the road. Rotate the camera level with the road and tilted down slightly toward the driver. There should be a visual air gap between the camera and bracket (see all the way through). (See image 2)

Horizontal Mount

Mount the camera horizontally to the headliner and tilt the bracket forward parallel with the headliner. Rotate the camera level with the road and tilt it down toward the driver. There should be a visual air gap between the camera and bracket (see all the way through). (See image 3)

Make sure the cab-facing camera bracket, or vehicle's headliner, DOES NOT BLOCK the cameras Infrared (IR) sensors



Infrared Sensor is obstructed by the bracket



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Best Practice: Forward-facing Camera – Field of View Adjustment

Use the proprietary M4 security wrench

1. Loosen the camera bracket screws located on the Forward-facing camera mounting bracket shaft
2. Adjust the camera angle by rotating and/or tilting the camera slightly down to capture the view of the horizon to see an unobstructed view of the road and traffic signals/signs in front of the vehicle
 - **Note:** It is not required to remove the camera from the mounting bracket to complete this adjustment
3. Tighten camera bracket screws when the proper camera angle placement is achieved

Note: These are stock images which are not specific to this vehicle.



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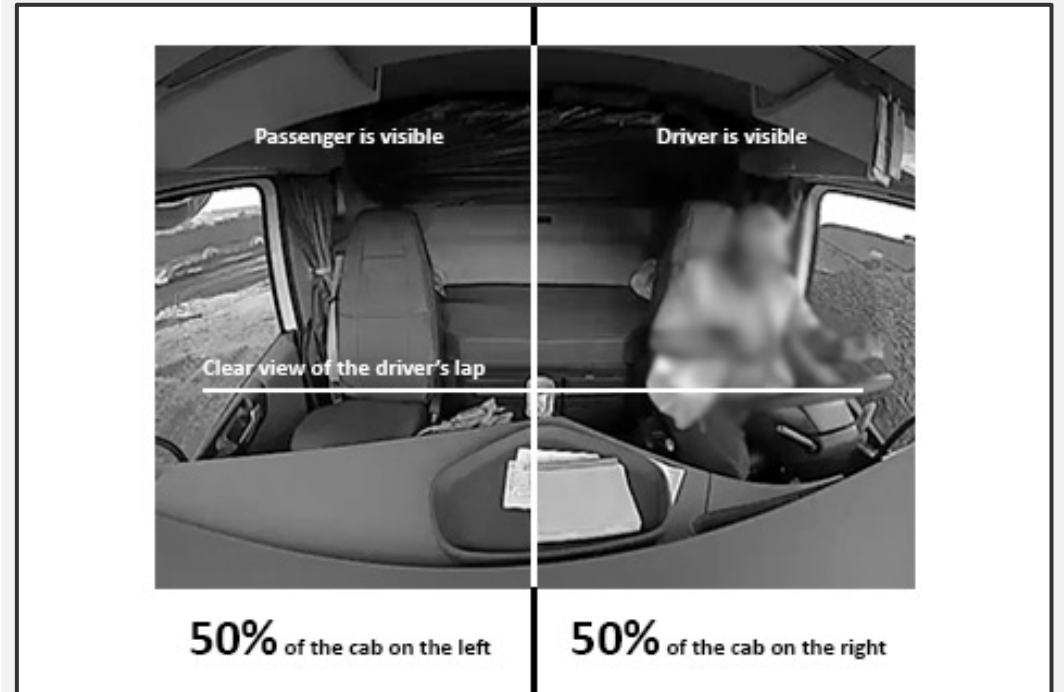
Best Practice: Acceptable Camera Views

Forward-facing camera view



The field of view shows a small portion of the hood while maintaining view of horizon to see road and traffic signals/signs.

Cab-facing camera view



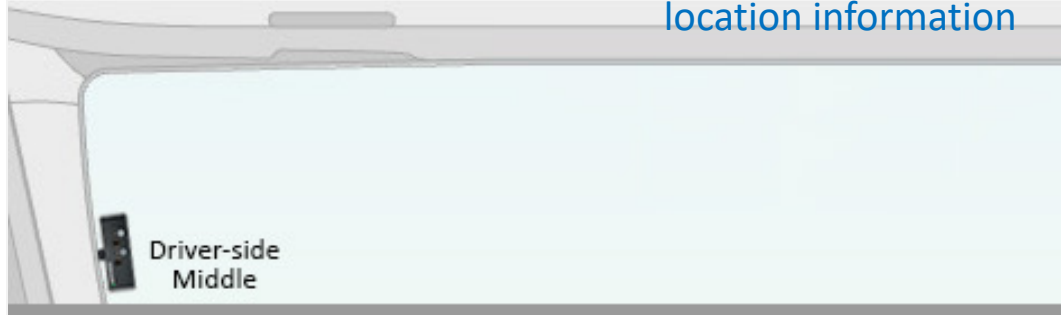
The camera placement is ideal if the field of view provides an unobstructed view of the driver's head / eyes, lap, hands, seatbelt, and an adequate view of the steering wheel (i.e., a visual approximation of at least 75% of the wheel visible within the frame).

Freightliner Columbia

Best Practice: Sensor Bar and Keypad Installation Details

Sensor Bar Installation Details

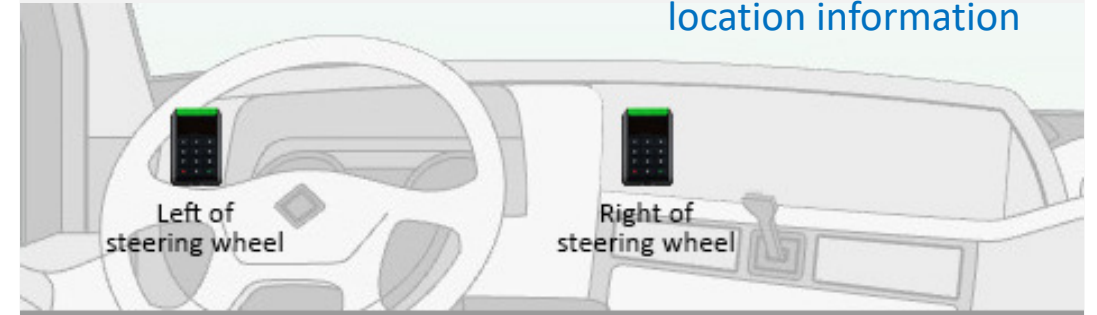
See Sensor Bar slide for location information



1. The sensor bar must be visible to the driver. Do not mount where a visor in the down position or fully extended can block the drivers view of the sensor bar.
2. Clean the windshield with an alcohol pad and wipe dry with clean cloth. Do not use shop rags which have grease even when clean.
3. Remove the baseplate from the sensor bar.
 - DO NOT lose the screws
4. Press firmly on the baseplate for 10 seconds to ensure it adheres properly to the windshield
5. Install the sensor bar and secure screws until tight
6. Run sensor bar wires to the controller
7. Ensure the cable does not prevent the functionality of an airbag

Keypad Installation Details

See Keypad slide for location information



1. Mount keypad bracket and secure the bracket with 2 self-tapping screws
2. Run the length of the keypad cable behind the dashboard to the controller location.
3. If needed, drill a 3/4 inch hole in the dash and insert a 3/4 inch snap bushing into the hole to protect the cable from sharp surfaces
4. Inspect the backside of the box & verify that the screws don't protrude and cause damage
5. Insert keypad into mount

Freightliner Columbia

Best Practice: Cable Routing

Service Loops

Before connection cables to the controller, coil excess wiring in an 8" loop and secure with zip ties

Zip Ties

Use zip ties as needed to secure wiring

Controller SMB Connectors

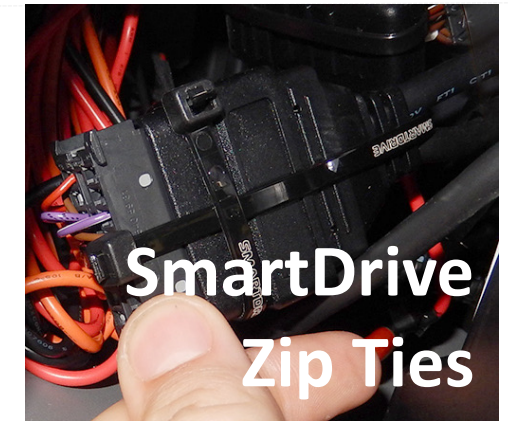
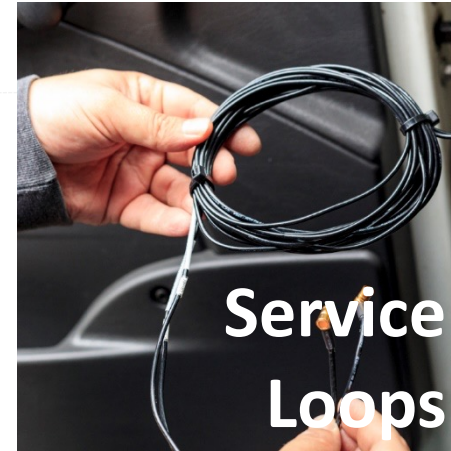
Press down on each SMB Coaxial connector to ensure a good connection

Molex Connectors

Push and lightly pull each Molex connector to ensure that the snap-in clip is secure

OBDII Connectors

Use SmartDrive banded zip ties around the connectors to prevent them from coming loose and to identify tampering



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Controller: Wiring and Component Connections

Freightliner Columbia

Approved and Non-Approved Electrical Connection Methods

Approved Electrical Connections

Approved connections methods are with **(Permanent Connections)** – Heat Shrinkable and Water Resistant connectors.

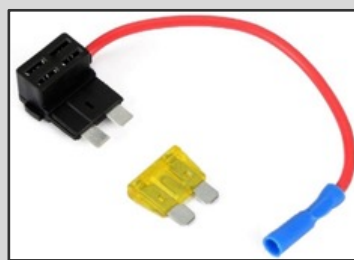
Ring Terminals ✓



Spade Terminals ✓



Add-a-Fuse ✓



Butt Connectors ✓

16-14 Awg.		
12-10 Awg.		
8 Awg.		

Non-Approved Electrical Connections

Scotchloks or T-Taps are NOT allowed. These connections are prone to corrosion, loosening, are easily tampered. They can result in less than desirable performance issues.

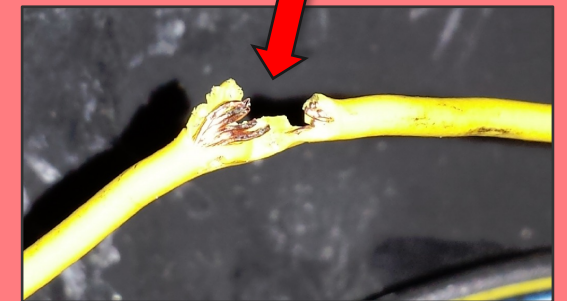
Scotchlok (Wire Nuts) ✗



Scotchlok (T-Tap) ✗



Inline Wire Tap ✗



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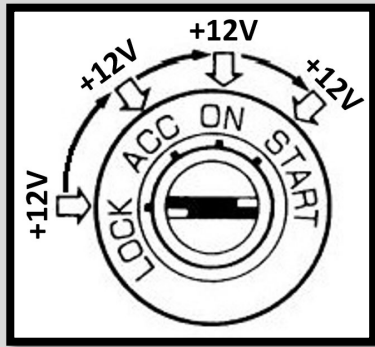
Verifying Wiring Connecting

+12v (Uninterrupted) Constant Power

(Red Wire)

How to locate Constant Uninterrupted Power with a Digital Multi-meter:

1. Test for constant 12 volts (in all key positions)
2. With the ignition ON, vehicle running, Ignition OFF, and while cranking.
3. Verify constant battery voltage remains constant and does not drop below 10vDC

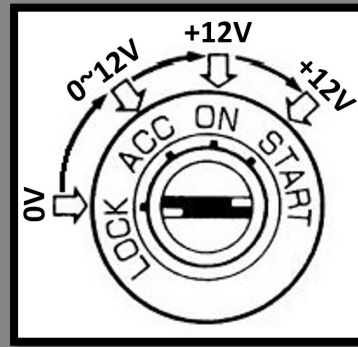


+12v True-Ignition

(Orange Wire)

How to locate True Ignition with a Digital Multi-meter:

1. With the vehicle off your meter will show "0" volts.
2. With the key in the Run position your meter will show approx. 11 ~ 14 volts.
3. While the vehicle starter is cranking, your meter will show approx. 10 ~11 volts.
4. With the engine running your meter will show approx. 12 ~ 14 volts.

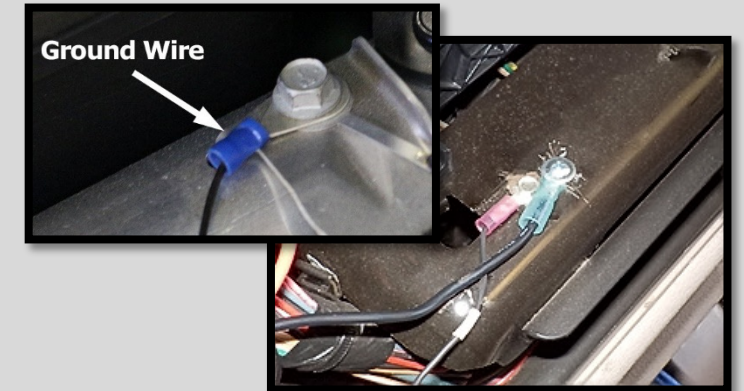


(Chassis) Ground

(Black Wire)

Verifying Chassis Ground

Connect a #10 ring terminal to the black ground wire. When making a connection in the engine compartment, use a #10 water resistant, heat shrinkable ring terminal. Scrape surface near the vehicles fuse box and use ¼ inch self-tapping screw to connect the ground wire



Freightliner Columbia

Master Power Cutoff (MPC) and Low Voltage Disconnect (LVD)



Negative Ground Master Power Cut-off Switch (-MPC)

NEVER connect to:

(-) Negative Ground (MPC)!

Positive Master Power Cut-off Switch (+MPC) and LVD

ONLY connect to:

- Positive Post of Vehicle Battery.
- Hot/Battery side of (+MPC) Switch.
- Hot/Battery side of (LVD).



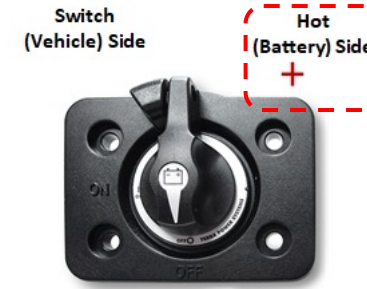
Vehicle Battery



Connect the SmartRecorders **Red** Constant Power wire to the **Positive Post** of the Vehicles Battery.

(+MPC)

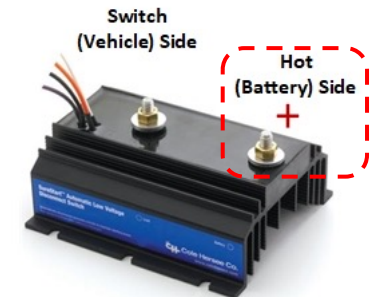
Positive Master Power
Cut-off Switch



Connect the SmartRecorders **Red** Constant Power wire to the **Hot/Battery** side of the Master Power Cut-off switch.

(LVD)

Low Voltage Disconnect



Connect the SmartRecorders **Red** Constant Power wire to the **Hot/Battery** side the Low Voltage Disconnect.

The SmartDrive SR4 system is designed to function only with a Positive MPC/LVD, not a Negative Ground MPC/LVD.

Freightliner Columbia

Controller Connection Ports: DLC/Power, Analog Power, Keypad, Sensor Bar, GPS, Wabco Camera, GPS, Remote Push Button

Expansion Port

Plug the expansion cable to the EXPANSION port

ECU/Controller connection and Power

Plug the main power and ECU connector to the ECU/PWR port

Analog Power

Plug the Analog Camera Power connector to the Analog PWR port

Driver Feedback

Plug the driver feedback cable into the port DRIVER FB

The Keypad

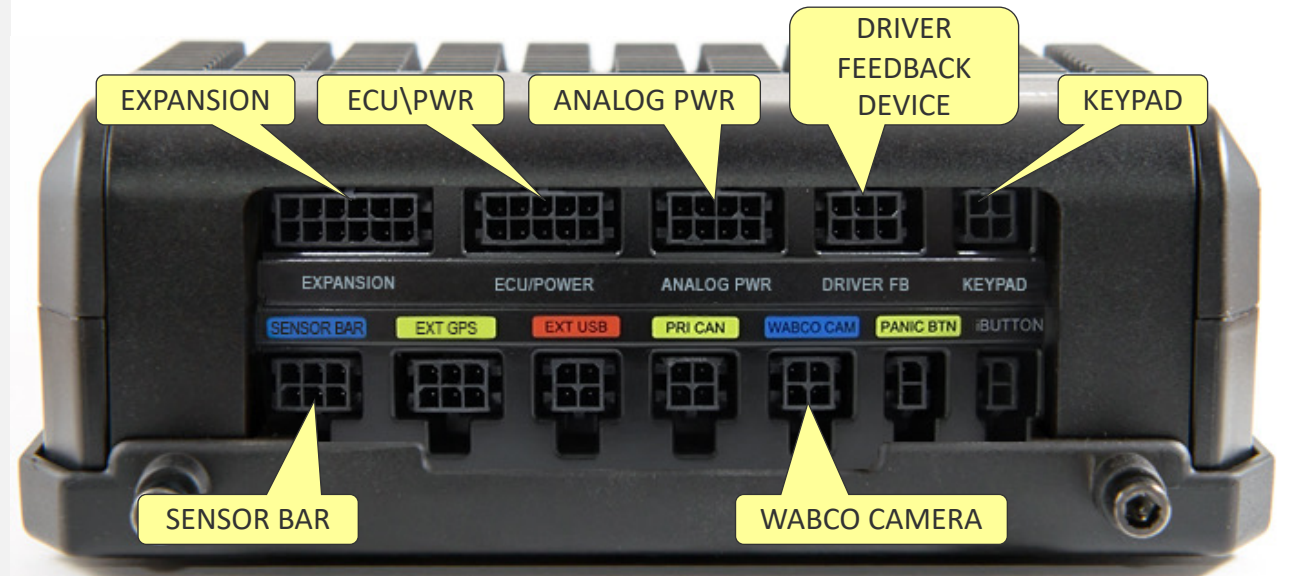
Connect the Keypad connector to the KEYPAD port

The Sensor Bar

Connect the Sensor Bar connector to the blue SENSOR BAR port

Wabco Camera

Plug the Wabco camera connector to the WABCO CAM port



Freightliner Columbia

Controller Connections: Forward and Cab-facing cameras and Sensor Bar (Cellular and WIFI)

Connection instructions

1. Forward-facing Camera (FWDCAM-1 port)
2. Cab-facing Camera (DCAM-2 port)
3. Reserved (DCAM-3 port)
4. Other Digital Camera (DCAM-4 port) (not available)
5. Cellular Antenna (CELL ANT port)
6. WIFI Antenna (WIFI ANT port)

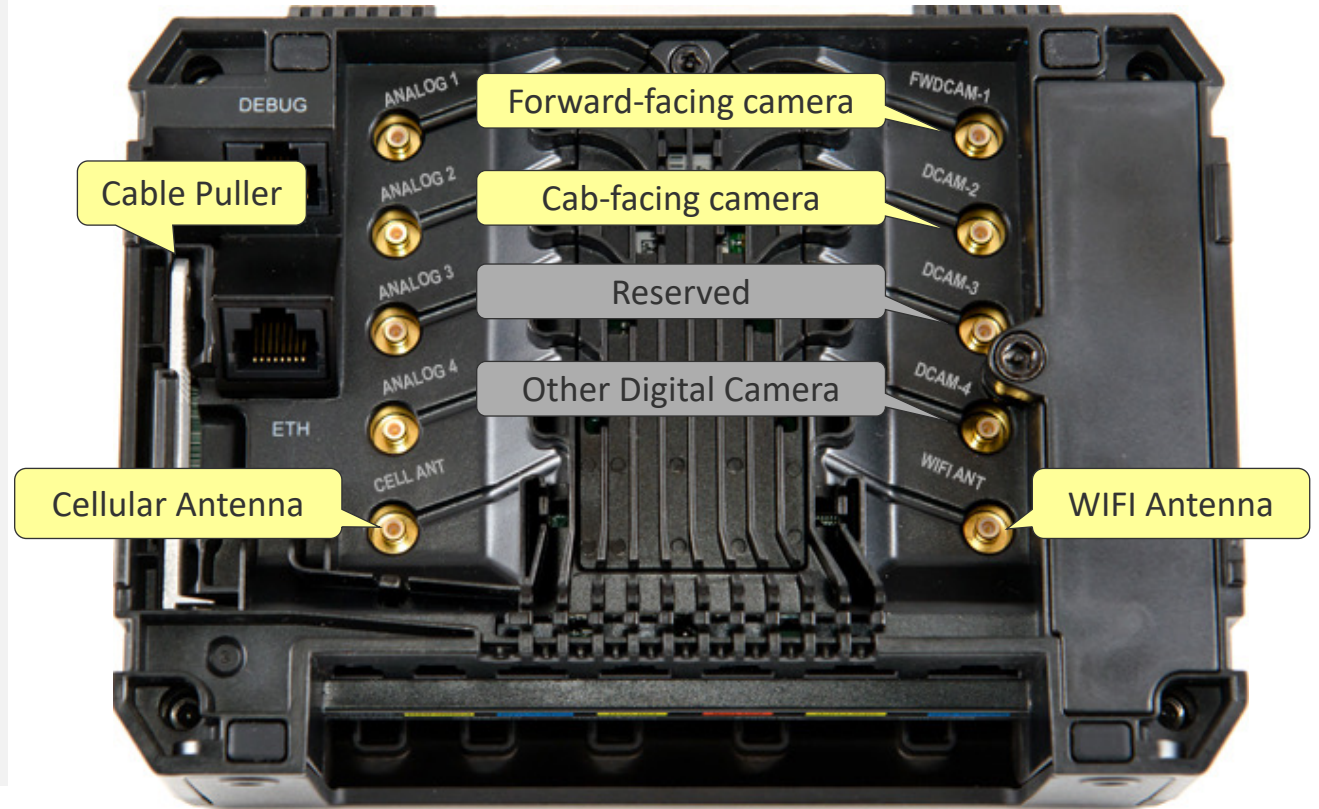
Details

Connect all cables to their ports and route through the strain relief channel. Use mounting tray for securing the Controller

Please take extra care when routing and tying up the camera cables as kinks or tight cable ties may create video failure

Depress the SMB coaxial connector until it clicks (locks) in place then route the cable in the strain relief channel

Should you need to remove a cable, use the cable puller



Freightliner Columbia

Controller Connections: Analog cameras

Connection instructions

- Analog 1: 360 camera mounted on the passenger-side
- Analog 2: 360 camera mounted on the driver-side
- Analog 3: Any other analog camera (backup, rear view, etc.)
- Analog 4: Not available

Details

Connect all cables to their ports and route through the strain relief channel. Use mounting tray for securing the Controller

Please take extra care when routing and tying up the camera cables as kinks or tight cable ties may create video failure

Depress the SMB coaxial connector until it clicks (locks) in place then route the cable in the strain relief channel




Should you need to remove a cable, use the cable removal tool



Freightliner Columbia

System Verification

Once the Controller is powered up, use the 3 LEDs on the top of the Controller to verify proper operation

- ✓ **Power LED** 
 - ✓ Solid **red** when control is receiving external power
 - ✓ OFF when not powered
- ✓ **Ignition LED** 
 - ✓ Solid **orange** when ignition is on
 - ✓ OFF when ignition is off
- ✓ **System LED** 
 - ✓ OFF when the controller is shut down
 - ✓ ON green, awake and running with constant power
 - ✓ BLINKING green, awake and running **ONLY** on the controllers internal battery. Action: Rewire to obtain constant power.



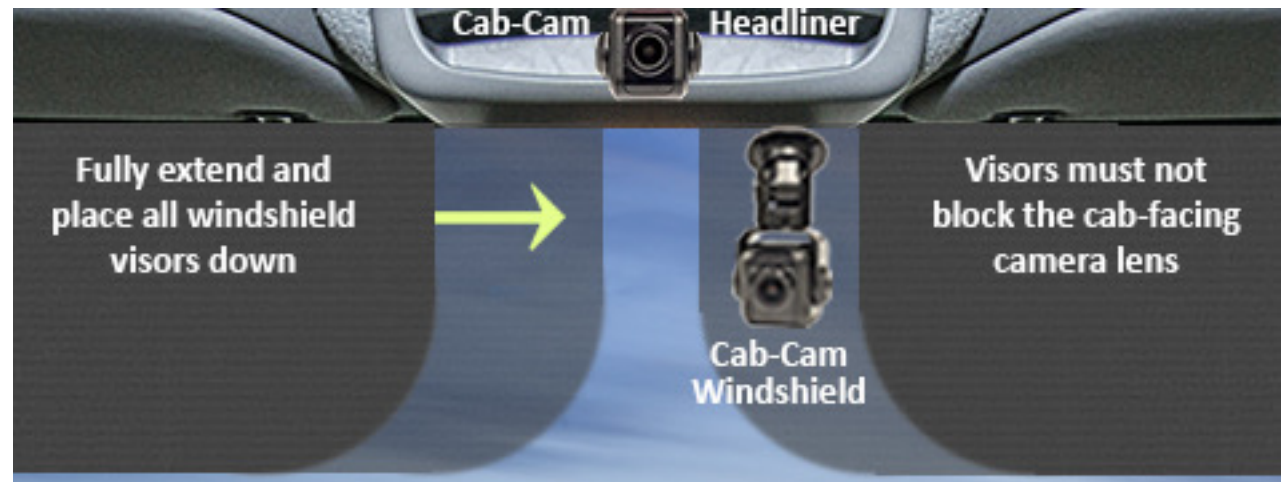
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Diagnostic Mode and Self QA

Freightliner Columbia

Preparing Diagnostic Mode and checking cellular connectivity

1. **Move the vehicle outside** to obtain cellular connectivity
2. **Start/Crank the vehicle and let it run for 30-60 seconds** before triggering an event to ensure ECU data is being gathered.
3. **Turn the windshield wipers on** to ensure the Road-Facing camera is in the windshield wiper path.
4. **Fully extend and place all windshield visors down** to ensure the Cab-Facing camera has a clear view of the driver (no obstructions).
5. **Verify the system has a cellular connection** by observing a solid blue gear LED on the Sensor Bar.



Freightliner Columbia

Run Diagnostic Mode using the Keypad or Driver Feedback Device

Press the green button on the keypad or driver feedback device 5 times in 10 seconds to initiate Diagnostic Mode

When diagnostic mode is complete, it will display all Zeros (000000).

Press the green button one time to create a manual event.

Note: The SR4 Controller will reboot after the test is complete.



When the test identifies a SR4 system fault, a code will display on the keypad or the driver feedback device. Fault codes are cumulative

Example:

Sensor Bar not found (020,000)

Ignition Off (010,000)

The error codes are added together. 030,000 will display.

When the keypad displays a fault code, use the [SR4 Installation Checklist and Diagnostic Mode/Fault Code Guide](#) to assist you in resolving the problem. This document is available from your SmartDrive Project Manager or online in the Response Center help page.

If you can't resolve a fault code, contact **Technical Support**.
Toll free number **(866) 933-9930 Option 1**



SMARTDRIVE

What is Diagnostic Mode?

Diagnostic Mode is an environment that runs a set of tests on the SmartRecorder™ 4 (SR4) in order to identify any faults that may be occurring. Diagnostic Mode utilizes the SR4 Keypad and Driver Feedback Device to display fault codes.

Run Diagnostic Mode after every installation or repair

Diagnostic Mode codes will display any appropriate fault codes on the keypad and the driver feedback device.

Fault codes appearing on the keypad are cumulative

Example: Sensor Bar not found (020000) + No GPS Signal (000100) = 020100

How to Exit Diagnostic Mode?

To exit Diagnostic Mode, turn the Ignition OFF and wait 15 seconds.

Diagnostics Mode Fault Codes

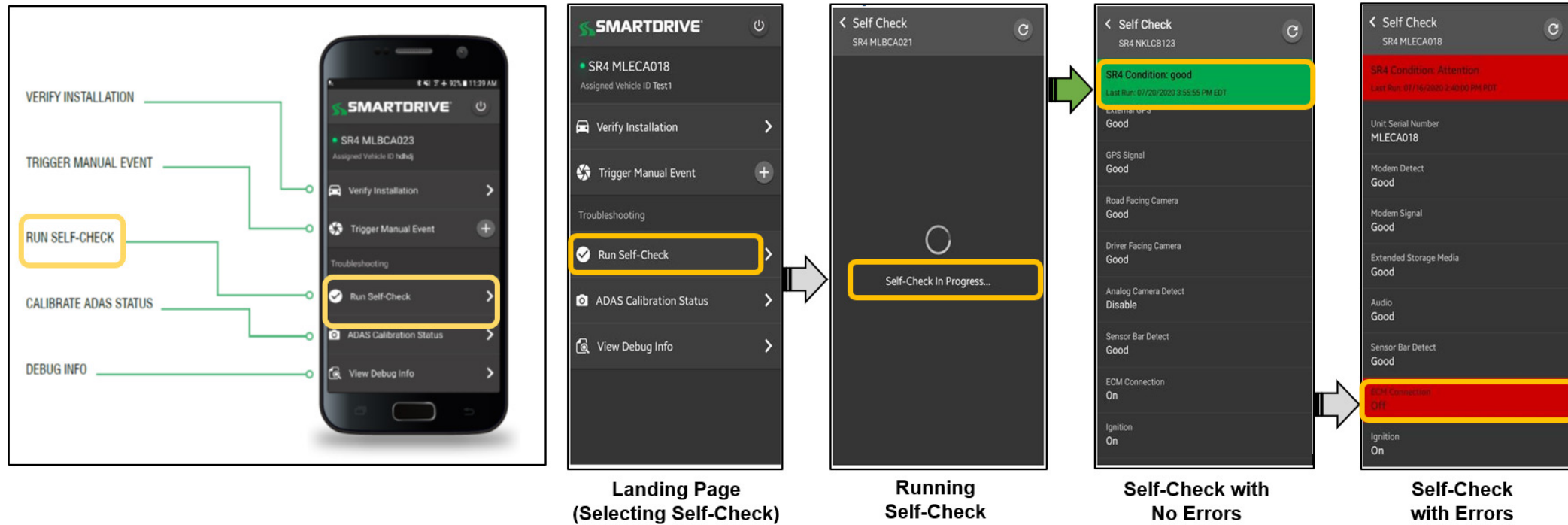
Keypad Code	Code Description	Action
000000	Diagnostic Mode has completed with no faults	None – Passed
000001	Analog camera enabled and not detected	Often referred to as "360 cameras", ensure you would expect analog Cameras to provide feed during the diagnostics test. Refer to your Vehicle Spec for connectivity or contact technical support for further assistance
000002	Analog Camera Capture Circuit	Contact technical support for assistance with this code
000004	Audio Fault	Contact technical support for assistance with this code
000010	Wi-Fi Wireless signal found but unable to connect to SmartDrive	Verify the Vehicle is in WIFI coverage area; check your facility Wi-Fi setup. If correct, contact technical support
000020	Wi-Fi Modem Fault	Perform a soft reboot (10 key presses in 10 seconds) Wait 5 minutes for system to reboot, re-run diagnostic test again. If the fault does not clear, contact technical support

Freightliner Columbia

Run Self-check (Diagnostic Mode) using the SmartDrive Technician App

Perform self-service installation QA via a mobile device

- The Android App is available in the Google Play Store.
- Run Self-Check.
- When the SR4 Condition is green, you are done.
- When the SR4 Condition is red, the problem area is shown in red. Resolve that problem area and run Self-Check again.



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Approved Exceptions

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Vehicle Specification Assessment (VSA) & Exception Management

VSA - MASTER INSTALL SPECIFICATION

The VSA is the approved hardware installation and wiring spec for this vehicle make-model and year ranges

Specific details are defined within – **check the model year you are installing on** as it specifies:

- ✓ Appropriate SmartDrive wiring harness to use
- ✓ Location and instructions for the approved Data Link Connector (DLC)
- ✓ Approved locations and install details for cameras, controller, keypad, and sensor bar
- ✓ The source and approved method to obtain uninterrupted constant power, true ignition, and chassis ground
- ✓ How to connect cables to the controller
- ✓ How to test, troubleshoot, and diagnose
- ✓ How to call into Technical Support for final QA validation

CAUTION:

EXCEPTION MANAGEMENT

- Contact** your SmartDrive Project and Account Manager if anything within this document cannot be followed
- Toll free number **(866) 933-9930 Option 1** or their direct phone number
- All exceptions** must be documented and approved by SmartDrive and Customer before proceeding with installations

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Document all Approved Exceptions

N/A

Approved by