NFPA506-B NFPA Seat Belt Monitor
2011-2015 Ford F650-750 6.7L Cummins
Regular Cab

Introduction

The NFPA506-B system provides both seat occupant sensing and belt buckle sensing along with replacement red seat belts for the driver and passenger seat positions. This allows compliance with NFPA1901 requirements. In addition, the NFPA506-B system provides a J1939 data stream which includes seat/buckle sensor and optical warning information for use with an optional Vehicle Data Recorder (VDR).

NFPA506 Module

A dash mounted LED panel indicates which seats have an occupant, and whether or not the seat belt is properly buckled. For the F650/750 Regular cab, only the first two positions are active.

LED Dash Panel

A seat "violation" occurs whenever the vehicle is driven when an occupant does not have his seat belt buckled. A violation is visually indicated by a Red LED on the dash panel, and audibly indicated by a beeper. The audible alarm sounds only when the Park Brake is released **and** the vehicle is shifted out of Park with any seat violation. Audible violation alarms can be silenced by pushing the yellow silence button on the dash display.

The system will detect when a seat belt is buckled before an occupant is seated, and this will indicate a seat violation.

VDR Interface

Seat occupant status, belt buckle status, and an optional optical warning system status (roof mounted emergency flashing lights) are provided on the J1939 data stream for an optional Vehicle Data Recorder.
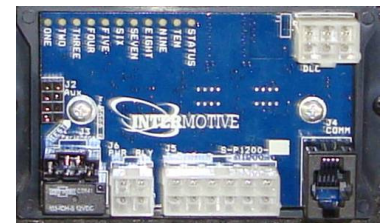
Installation Instructions

Disconnect vehicle battery before proceeding with the installation.

WARNING
Disconnect the battery to prevent setting a check engine light.

It is the installer's responsibility to route and secure all wiring harnesses where they cannot be damaged by sharp objects, mechanical moving parts and high heat sources. Failure to do so could result in damage to the system or vehicle and create possible safety concerns for the operator and passengers.
It is important to avoid placing the module where it could encounter strong magnetic fields from high current cabling connected to motors, solenoids, etc. Also avoid radio frequency energy from antenna's or inverters next to the module. Finally, avoid high voltage spikes in vehicle wiring by always using diode clamped relays when installing upfitter circuits.

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J1939 Data Link Harness

1. Locate the vehicle's J1939 Connector. It should be mounted in the area of the lower left dash panel.

2. Remove the J1939 Connector from the mounting bracket.

3. Connect the NFPA506 Data Link harness J1939 female connector to the vehicle's J1939 connector.

4. Mount the NFPA506 Data Link harness J1939 male connector to the vehicle's J1939 connector mounting bracket.

5. Secure the NFPA506 Data Link harness so that it does not hang below the lower dash panel.

Do NOT plug it into the NFPA506 module at this time.

Vehicle

NFPA506 Module

VDR

Data Link Harness Connections

NFPA506 J1939 VDR Data Output

The NFPA506-B Data Link Harness has a 4-Pin White connector that provides J1939 data for connecting to a VDR. The pin out is as follows:

Pin #1 Brown Wire - J1939 CAN High   Pin #2 Red Wire - Battery Voltage
Pin #3 Blue Wire - J1939 CAN Low   Pin #4 Black Wire - Ground
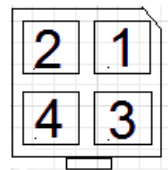
Optional Optical Warning Input

The 12 Pin connector Pin #3 Gray wire can be wired to a 12 volt emergency vehicle warning light signal. The NFPA506 inserts the status of this signal into the J1939 data stream for access by a VDR. This is the preferred method of connecting this signal when using the Fire Research Corp (FRC) VDR. Some VDR's (including FRC) also have a discrete wire input for the optical warning signal. Either method of connection is acceptable.   If no VDR is being used, this wire does not need to be connected.

Vehicle Data Recorder Installation

Install the Vehicle Data Recorder per manufacturer's instructions, connecting the Vehicle Data Recorder harness (J1939 signals and power) to the 4 pin Data Link Harness connector (see picture above).

Replacing the seatbelts

The NFPA506 kit includes replacement red seatbelts which are compatible with the stock OEM seats. These may not be appropriate for use with other seats, such as air ride seats. The following instructions are a guide to replacing the OEM seatbelts with the red ones in this kit. Per Ford Motor Co., front seat mounting bolts must be replaced when removed (not included in kit). Re-torque all mounting bolts to factory specifications.

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Seat/Seat Belt /Buckle Torque Table (Ford specs)

	Driver	Front Passenger
Seat Track to Floor (Bolt or Nut)	55Nm (41ft-lbs)	55Nm (41ft-lbs)
Buckle Assembly	N/A	35Nm (26ft-lbs)
Belt Assembly (all three bolts same)	40Nm (30ft-lbs)	40Nm (30ft-lbs)

Replacing the seatbelts

1. Remove the driver and passenger seats.

2. Remove the front left scuff plate. (Figure 1, detail 2 and 4)

3. Remove the left B-pillar trim panel covering the front left seatbelt retractor. (Figure 1, detail 9)

4. Remove the driver's safety belt retractor and pretension bolt. (Figure 1, detail 12)

5. Remove the upper D-ring bolt. (Figure 1, detail 7)

6. Remove the safety belt anchor bolt that secures the driver's (left) seatbelt and remove belt. (Figure 1, detail 13)

7. Replace it with the NFPA red left seatbelt. Torque these bolts to 40Nm (**30ft-lbs**).

8. Reinstall the left B-pillar trim panels.

9. Remove the passenger's safety belt retractor and pretension bolt. (Figure 1, detail 12)

10. Remove the right B-pillar trim panel covering the front right seatbelt retractor. (Figure 1, detail 9)

11. Remove the upper D-ring bolt. (Figure 1, detail 7)

12. Remove the safety belt anchor bolt that secures the passenger's (right) seatbelt. (Figure 1, detail 13)

13. Replace OEM belt with the NFPA red passenger seatbelt. Torque these bolts to 40Nm (**30ft-lbs**).

14. Leave the front driver's (left) buckle in place, but remove the front passenger's (right) buckle.

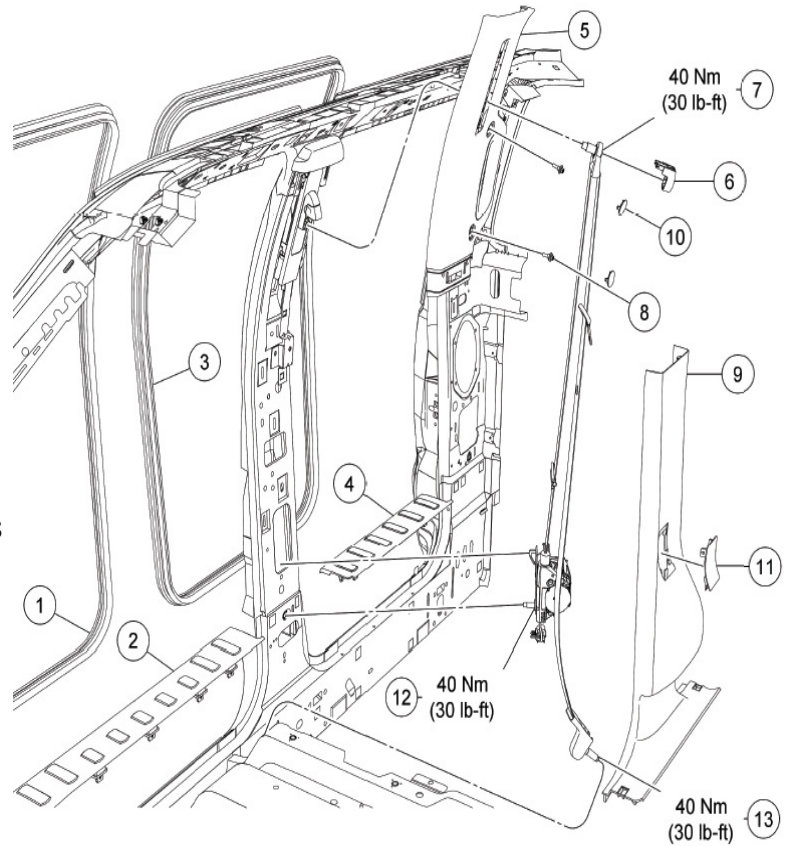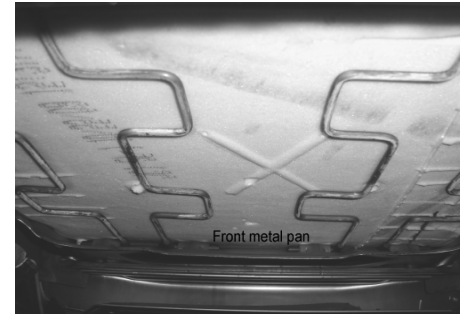15. Replace it with the NFPA red sensor buckle. Torque this bolt to 35Nm (**26ft-lbs**).

Figure #1

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Installing Seat Sensors

- **Caution—some seats may have integral Supplemental Restraint System airbags incorporated into the seat. Great care must be taken to not activate the air bag. Do not probe any under seat wiring with an energized test probe. Air bag connectors are usually yellow. Always be very careful dealing with these harnesses. Great bodily harm and expense can result from an inadvertent air bag deployment.**

Front metal pan

- The driver and passenger seats must be removed and inverted in order to install the seat sensors.

- These vehicles can have various optional seats installed. The idea is to install the sensors underneath the seat foam, but on top of whatever support the seat provides. Many seats will have serpentine springs supporting the foam. Frequently these springs can be removed with pliers to allow installing the sensor. Figure 2 shows the seat sensor installed between the springs and the foam. Not easily visible in the picture is the plastic spring guard which is positioned between the black sensor bag and the spring. This is necessary to protect the sensor from long term wear of the spring rubbing on the sensor.

Figure 2

- In some applications, the black sensor bag may be squeezed too tightly when no one is sitting in the seat. This can cause the system to falsely sense an occupant. In this case it can be helpful to add additional spacers of foam or other materials around the outside of the sensor that will absorb some of the compression force. This can be a trial and error process. The finished result must only sense an occupant if 10-50+ lbs of force are applied to the top seat surface.

- Placing the sensor so the long side of the bag is aligned left to right seems to work best.

- Placing the sensor either too far forward or back will make it difficult to correctly sense an occupant. Try to locate the sensor where the maximum occupant weight will be applied. This is usually a little to the rear of the midpoint location of the seat.

- Sensor wires should exit toward the rear of the seat.

- Double back sticky tape is provided that should be installed between the sensor bag and the plastic spring guard. This will prevent the sensor from moving around over time.

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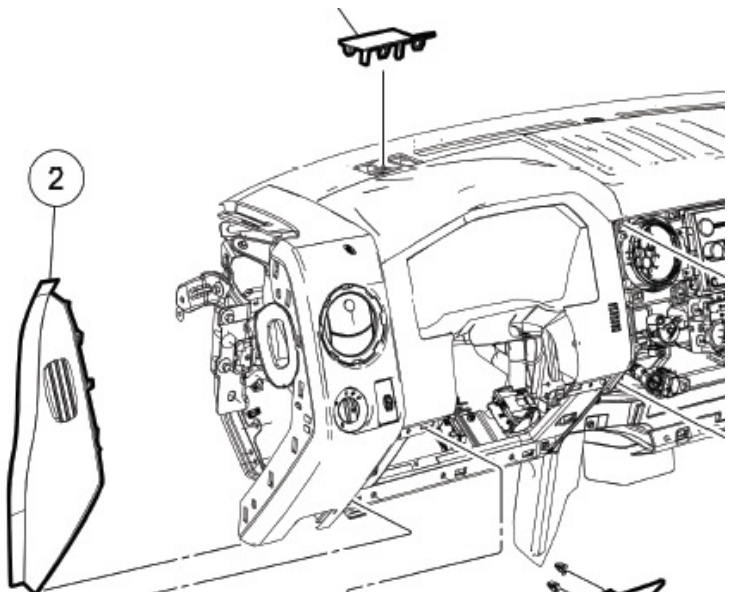
Seat Wiring Harness Installation

1. Remove the front left kick panel below the left A-pillar.

2. Open the left side plastic cable enclosure that re-sides under the scuff panel.

3. Identify the end of the harness which connects to the seat sensors and belt buckles. From the drivers side of the vehicle, feed this end of the harness under the carpet just behind the seats toward the passenger side of the vehicle.

4. Feed the drivers seat connector pair out of the carpet opening for the left floorboard vent under the driver seat.

5. Feed the passenger seat connector pair out of the carpet opening under the passenger seat.

Figure #3

6. Place the seats in position being careful not to damage the exposed harness connectors. It's recommended to start the front seat bolts to hold the seats in position.

7. Connect the respective sensor connectors to the harness: Unplug the OEM drivers buckle harness, and insert the NFPA T- harness. The passenger buckle from the NFPA kit plugs right into the NFPA harness (no T).

8. From the drivers side, start laying the sensor harness forward in the plastic cable enclosure to the A-pillar (refer to figure 1, page 3).

9. Feed the sensor harness upward, either along the A-pillar or in the area of the left kick panel to where the NFPA506 module will be mounted. (Figure 3, detail 2).

10. Adjust the harness as necessary leaving some "take out" available at the module.

11. Plug the seat harness into the NFPA506 module's 12 pin connector.

12. Do not replace any panels until initial testing is completed.

Warning Beeper Installation

1. Choose an appropriate location, usually under the dash, to mount the warning beeper. If a hole needs to be drilled, the hole size is 1-1/8 inch.

2. Attach the 4 Pin Warning Beeper harness to the NFPA502-B Module's 4-Pin White connector.

3. Attach the 12-Pin connector Pin #12 Orange wire to the Positive side (red painted terminal) of the Warning Beeper.

4. Secure the Warning Beeper under the dash.

The bezel on the beeper cab be rotated for volume control

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LED Display Panel Installation

Note: It is recommended to mount the LED Panel after all upfitting is complete (radios, computer, electronics etc.).

The NFPA system requires **either** the Intermotive LED panel (shown) or the FRC panel (VDR) to be installed. The FRC panel is included in FRC kit if specifically ordered, and should be installed in lieu of the Intermotive LED panel.

To install the Intermotive LED panel, locate a suitable position on the dashboard within view of both the driver and passenger (fire captain) for mounting the LED Display Panel. The passenger (captain) <u>must</u> be able to see the LED panel should a laptop or other additional equipment be placed on or at the center console. The length of the display harness is 40". This is the maximum distance the display can be mounted from the NFPA502 module.

1. Drill a 5/8" hole in the dashboard where the center of the display will be located, being careful not to damage anything behind the dashboard.

2. Attach the 4 Pin LED display harness to the NFPA502 Module's 4-Pin Black connector.

3. Run the free end of the display harness behind the dash and out through the 5/8" hole.

4. Attach the end of the display harness to the LED Display Panel.

5. Ensure panel is level, and secure using the supplied screws.

Reconnect vehicle battery

Initial Installation Power-Up

Note: Do not mount module until post installation is complete.

- Seat belts are NOT buckled.
- With the key ON and engine OFF, plug in the 6-pin Data Link harness connector into the white 6-pin connector on the NFPA502 module. This will "Hard Boot" the module and cause it to go into a special "Installation Routine" that will assure the module is configured properly for the vehicle:
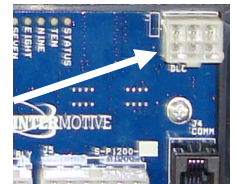
CAN detect

The module auto-detects the vehicle CAN communication bus to verify it can read vehicle data. If the module fails to detect the CAN bus, **module** LED6 will turn ON and LEDs 1-4 will scroll. In addition, the far right 2 sets of LEDs (top & bottom row) on the NFPA502-B dash display will "rotate". The module will not function if this happens.

The most likely problem in this case is something wrong with either the vehicle OBDII connection or in the harness connecting to the module. It's unlikely the vehicle itself has a problem.

At a later date, an Installation Routine can be forced to re-run, by cycling the data link connector while grounding the silver test pad label "TEST" on the module. This will re-run the active seat detection routine.

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# Initial Installation Power-Up (continued)

Seat Selection

The module is designed to handle a variable number of seat positions. During this installation routine, it will establish which seat positions are active in the vehicle. It does this by reading seat belt sensors. The driver's seat is always active by default, but the other positions can be active or inactive. If inactive, the module will not display LED panel status nor report status to the VDR. In order for a specific position to be sensed and deemed "active", it needs a proper harness connection to the module, and additionally the seat belt must be unbuckled (this is true with the passenger buckle provided in this NFPA kit).

Once the seat selection is complete, the module will "flash out" the seat configuration using module LEDs 1-5. The LEDs will blink several times indicating (by being ON) which positions are active. Only LED positions 1 and 2 should flash.

Yellow Status LED

LED1—Driver   LED2— passenger
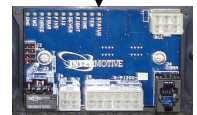
The seat selection routine runs automatically the first time (from the factory) power is applied to the module. If seat selection is required at a later time, a "special hard boot" needs to be run. To do this, make and hold a ground connection to the module silver test pad label "TEST" while plugging it in. The module will "see" this and run the seat selection routine.

If seat selection fails, module LED7 will turn ON and LEDs 1-4 will scroll. If this is indicated, the problem is most likely the module itself. Contact Intermotive Technical Support 530-823-1048.

VIN Capture

The first time (from the factory) the module is plugged in, it will try to read the vehicle VIN. It needs this to assure that vehicle data will be correctly received and interpreted. If it cannot acquire the VIN or if the acquired VIN is invalid, the module yellow Status LED will flash, and the Intermotive dash panel LEDs will "dance". If VIN acquisition was successful, the module stores and uses it for future reference. If VIN cannot be acquired, the module will not function. Contact Intermotive Technical Support at 530-823-1048.

Post Installation Test

With vehicle in Park, Parking Brake applied, and Key OFF (<u>module asleep</u>):

1. Turn Key ON. Verify all Display Panel LEDs prove out (come on, then follow seat status).
2. Sit in <u>each</u> seat location, and verify respective red LED illuminates on the panel.
3. While sitting in the seat, buckle seatbelt, and verify red LED goes out and the green LED illuminates.

While sitting in a seat (seat belt unbuckled, vehicle in Park, and Park Brake applied):

1. Move transmission selector out of Park position **and** disengage the Park Brake. Verify audible beeper activates.
2. Press Silence button (on Display Panel), and verify beeper stops. Shift back into Park position.
3. Leave the seat for 3 seconds, then sit back down again. This resets the alarm function.

If the system passes all tests, torque seats in position, restore all panels, etc. If the NFPA502-B fails any step in the Post Installation Test, review the installation instructions and check all connections. If necessary, call InterMotive Technical Support at 530-823-1048

NFPA502 Module Mounting

Ensure all harnesses are properly connected and routed, and are not hanging below the dash area. Mount the NFPA502-B module and secure using supplied screws or double sided tape.

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Leave in Vehicle
Operating Instructions NFPA506-B Seat Belt Monitor
2011-2015 Ford F650/750 Regular Cab 6.7L Cummins

This system meets the NFPA1901 requirements for a seat belt monitoring system. It indicates if someone is sitting in a seat, and if they have their seat belt buckled. It sounds a beeper if the vehicle is driven when a seat belt is not buckled. The volume of the beeper may be adjusted by rotating the bezel on the beeper.

The system also provides this seat information to an optional Vehicle Data Recorder. The system will have a status display panel—either the one shown here, or one provided by the VDR manufacturer. There should be separate instructions for that status display, if so equipped.

To test the system, turn the vehicles key on.

All of the Display Panel LEDs will light up briefly.

Sitting in each seat location will illuminate the respective **Red** LED on the panel. Only the first two positions are active for the Regular Cab truck.

When sitting in an unbelted seat, moving the transmission selector out of the Park position and releasing the Park Brake will sound the beeper.

Pressing the Silence button anytime the beeper is sounding will stop the beeper for that seat.

Inserting the seatbelt into the buckle while sitting in each seat will illuminate the respective **Green** LED and the extinguish the **Red** LED.

Inserting the seatbelt into the buckle without sitting in the seat will flash the respective **Red** LED, indicating an improper condition.

If the NFPA506-B fails any step in the Operating Instructions, review the installation instructions and check all connections. If necessary, call InterMotive Technical Support at (530) 823-1048.
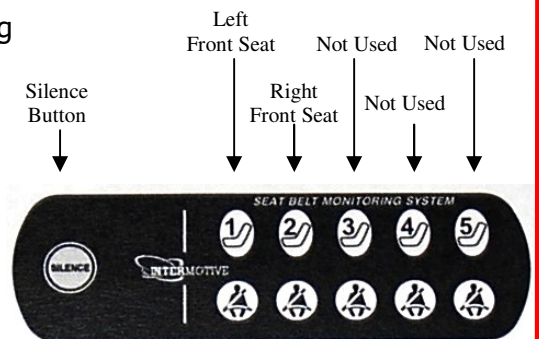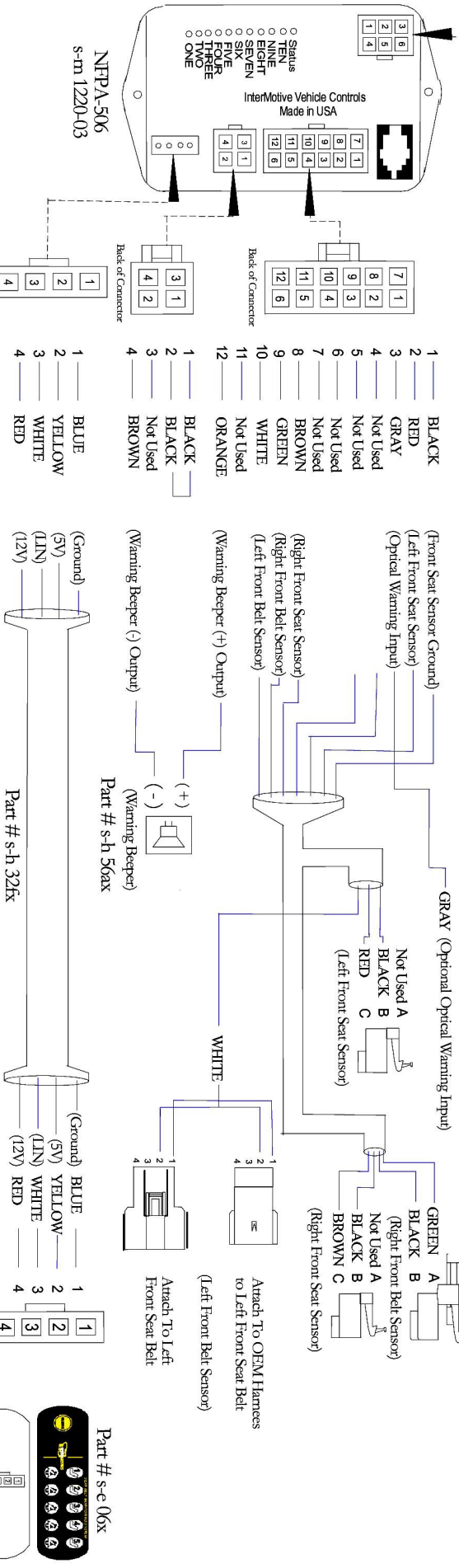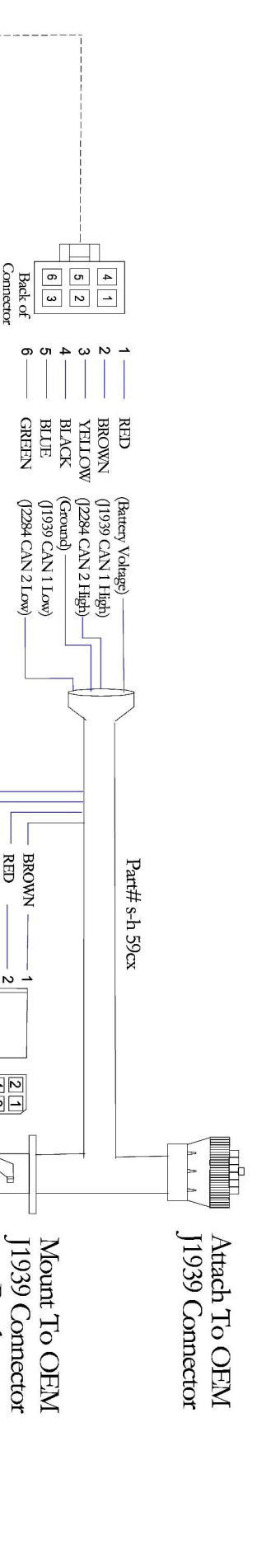
Submit product registration at www.intermotive.net

If the NFPA506 fails any step in the System Operation Test, review the installation instructions and check all connections.

If necessary, call InterMotive Technical Support at (530) 823-1048.

NFPA-506
s-m 1220-03

InterMotive Vehicle Controls
Made in USA

Status
TEN
NINE
EIGHT
SEVEN
SIX
FIVE
FOUR
THREE
TWO
ONE

Back of Connector

1	RED (Battery Voltage)
2	BROWN (J1939 CAN 1 High)
3	YELLOW (J2284 CAN 2 High)
4	BLACK (Ground)
5	BLUE (J1939 CAN 1 Low)
6	GREEN (J2284 CAN 2 Low)

Part# s-h 59cx

Attach To OEM
J1939 Connector

Mount To OEM
J1939 Connector
Bracket

4 Way FRC
J1939 CAN
Connection

BROWN — 1
RED — 2
BLUE — 3
BLACK — 4

Back of Connector

1	BLACK (Front Seat Sensor Ground)
2	RED (Left Front Seat Sensor)
3	GRAY (Optical Warning Input)
4	Not Used
5	Not Used
6	Not Used
7	Not Used
8	BROWN (Right Front Seat Sensor)
9	GREEN (Right Front Belt Sensor)
10	WHITE (Left Front Belt Sensor)
11	Not Used
12	ORANGE (Warning Beeper (-) Output)

Part # s-sb-h04bx

GRAY (Optional Optical Warning Input)

Not Used A
BLACK B
RED C
(Left Front Seat Sensor)

Attach To Left
Front Seat Belt
(Left Front Belt Sensor)

GREEN A
BLACK B
Not Used C
(Right Front Belt Sensor)

Attach To OEM Harness
to Left Front Seat Belt

BROWN C
BLACK B
Not Used A
(Right Front Seat Sensor)

Back of Connector

1	BLACK (Warning Beeper (+) Output)
2	BLACK
3	Not Used
4	BROWN

Warning Beeper
Part # s-h 56ax

(+)
(-)
(Warning Beeper)

Back of Connector

1	GRAY
2	RED
3	GRAY
4	Not Used

1	BLUE (Ground)
2	YELLOW (5V)
3	WHITE (LIN)
4	RED (12V)

Part # s-h 32kx

WHITE

BLUE (Ground)
YELLOW (5V)
WHITE (LIN)
RED (12V)

Back of Connector

Part # s-e 06x

Back of LED Display