



A Safe Fleet Brand



SEAT MONITOR AND DATA ACQUISITION SYSTEM HARDWARE MANUAL

The SBA document set includes the following:

SBA1GD General Description

SBA1HM Hardware Manual

SBA1UG User Guide

SBA2DC Data Collector Manual

SBA2EM OEM Guide

SBA100



SBA200



SBA300



SBA400



Lateral G Sensor

Vehicle Data
Recorders

6-Seat USB

Data
CollectorWireless
Interface

12-Seat Wireless

Proprietary
Software

12-Seat USB

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Glossary of Terms

Pairing

Note: A VDR shall not be paired until the vehicle is delivered and the pairing process is carried out using the end users copy of HAWK software.

This process establishes a permanent association between the copy of HAWK software that is loaded on the end users computer and the vehicle VDR. Stored data from the VDR can only be uploaded and saved to this copy of HAWK software.

Paired Vehicle VDR

The VDR is secured so that the program and stored data is only accessible by personnel authorized by the end user. A paired VDR has the vehicle name, vehicle identification number, and the end users password embedded into its memory.

Unpaired Vehicle VDR

A new VDR that has not been associated with a copy of HAWK software. An unpaired VDR can be accessed using HAWK OEM software to upload programming.

INTRODUCTION

This Hardware Manual includes the information needed to install the Seat Monitor and Data Acquisition System vehicle mounted hardware. It includes hardware specifications, mounting instructions, power-up information, and wiring diagrams.

Refer to the General Description (SBA1GD) for overall system information; the Hardware Manual (SBA1HM) for hardware specifications, mounting instructions, and wiring; the User Guide (SBA1UG) for HAWK software installation, set-up, and how to instructions for the data management software; the Data Collector Manual (SBA2DC) for instructions on using the FRC portable data collector; the OEM Guide (SBA2EM) for information needed by body builders, dealers, and service personnel to use the body builder/service programs in HAWK.

Overview

The Seat Monitor and Data Acquisition System is available with four different Seat Monitor Display modules. The simplest model has six seat belt icons and a silence button for the audible alarm. More complex models will include a message display, push buttons for navigating through programs, vehicle system warning indicators, and the lateral acceleration indicator.

The Vehicle Data Recorder (VDR) houses the on-board computer and software, the hardware for all system interconnections, and the wireless or USB interface. It is capable of processing input data from the vehicle J1939 CAN Bus, the data link, or separate hard-wired inputs. The VDR communicates via the proprietary FRC datalink with the system modules.

The Seat Monitor and Data Acquisition System consist of the following components:

- Seat Monitor Display Module

- Vehicle Data Recorder (VDR)

- Lateral G Sensor Module (SBA100 Models Only)

- Datalink Terminating Resistor

- Cables

- Wireless Interface Module

- Data Collector

- HAWK Data Management Software

The Data Collector, the Wireless Interface Module, and the HAWK Software are not mounted on the vehicle. All communications between the wireless VDR and the Data Collector or a computer are accomplished via wireless technology. All communications between a VDR with the USB interface and a computer are accomplished via a USB cable.

Features

The Seat Monitor and Data Acquisition System has been designed with the following unique features:

- Exceeds NFPA 1901 Standard for Automotive Fire Apparatus 2009 Edition, paragraph 4.11 requirements for a Vehicle Data Recorder.

 - 48 Hours of Stored Second-by-Second Data

 - 100 Engine Hours of Stored Minute-by-Minute Summary Data

 - All Data is Date and Time Stamped

- All Stored and Collected Data is Password Protected

- HAWK Data Management Software Package

- J1939 CAN Bus Interface

- Discrete Inputs (When Data is not Available on J1939 CAN Bus)

- Wireless Interface for Uploading Data from 12-Seat VDR

- Data Collector Remotely Uploads and Stores Data from 12 VDRs

- USB Port for Uploading Data from 6-Seat VDR

- Exceeds NFPA 1901 Standard for Automotive Fire Apparatus 2009 Edition, paragraph 14.1.3.10 requirements for a Seat Belt Warning system.

 - Monitors up to 13 Seating Positions

 - Provides a Visual Display Showing the Condition at Each Position

 - Validates Sit and Buckle Sequence

 - Audio and Visual Alarm Outputs

- Highly Visible LED Display

- Programmable Seat Configuration

- Lateral G Indicator

Specifications

Power is connected to the Vehicle Data Recorder (VDR) and then supplied to the system modules via the 5-Pin Seat Monitor cable or FRC harness connectors.

System Power

The VDR Supply Power input (POWER/DATABUS connector pins 1 and 2) is directly connected to battery power. (A 10 AMP fuse between pin 1 and the battery is recommended.) When there is no activity on the VDR and the vehicle ignition is off the system goes into the sleep mode.

Power to each module in the Seat Monitor and Vehicle Data Acquisition System is provided through the VDR via the 5-Pin cable(s) or wiring. Power requirements for these modules are shown in Table HM-1 System Power. The total system supply current required (pins 1 and 2 of the VDR POWER DATA/BUS connector) is the sum of the requirements of all the modules installed.

Seat Monitor Display Module

Supply Voltage: 9 - 30 VDC (Over 5-Pin Cable or VDR Harness)

Dimensions:

SBA100	4" W	4 1/2" H	1 7/16" D
SBA200	4" W	4 1/2" H	1 7/16" D
SBA300	5 1/8" W	2 7/8" H	1 5/16" D
SBA400	5 1/8" W	2 7/8" H	1 5/16" D

*Dimensions do not include the mounting bracket.

Vehicle Data Recorder

The wireless device complies with the Code of Federal Regulations, Title 47, Part 15, FCC Rules and Regulations.

Supply Voltage: 9 - 30 VDC

Supply Current: Refer to Table HM-1 System Power

12-Seat Dimensions: 9 7/8" by 3 3/4" by 2 1/2" *

* This is 5 5/8" with antenna extended.

6-Seat Dimensions: 5 7/8" by 3 3/4" by 1 7/8"

Lateral G Sensor Module Option

Supply Voltage: 9 - 30 VDC (From VDR Over 5-Pin Cable)

Supply Current: Refer to Table HM-1 System Power

Dimensions: 5" by 2" by 1 3/4"

Data Collector

Supply Power:

Portable Operation 9 VDC Lithium Battery

USB Port Connected USB Cable

Dimensions: 4 1/2" by 7 3/4" by 1 1/4"

Wireless Interface

This device complies with the Code of Federal Regulations, Title 47, Part 15, FCC Rules and Regulations.

Supply Power: USB Cable (Connected to Computer)

Dimensions: 2 5/8" by 2 5/8" by 1 1/8" *

* This is 4" with the antenna raised.

Watch Dog PRO

Supply Voltage: 9 - 30 VDC

Inputs: 8 or 18, Active Low

Dimensions: 5 7/8" by 3 3/4" by 1 7/8"

Note: Other products may have inputs into the FRC VDR. Refer to the specific product manual for installation information.

Table HM-1. System Power

Module	Supply Current (in Amps)	
	12 VDC	24 VDC
SBA100 Display	1.0	0.5
SBA200 Display	1.0	0.5
SBA300 Display	0.7	0.35
SBA400 Display	0.7	0.35
12-Seat VDR Module	0.2	0.1
6-Seat VDR Module	0.2	0.1
Lateral G Sensor Module	0.2	0.1
WatchDog PRO	0.08	0.04

SYSTEM DESCRIPTION

Refer to the General Description (SBA1GD) for more detailed system information or the User Guide (SBA1UG) for HAWK Software details.

Components

The Seat Monitor and Data Acquisition System consist of the following components:

- Seat Monitor Display Module

- Vehicle Data Recorder

- Data Collector (Wireless VDR Only)

- Wireless Interface Module (Wireless VDR Only)

- Hawk Data Management Software Package

- Lateral G Sensor Module (SBA100 Models Only)

- WatchDog PRO Module (Optional)

- Datalink Terminating Resistor

- Cables

Note: Other components may have inputs into the FRC VDR. Refer to the specific product manual for information.

Seat Monitor Display Module

This module is mounted in the cab. It provides a visual display for the driver or officer showing the condition of each seating position along with parking brake engaged and door open warning icons. The data that the VDR is recording can be viewed live on display models that include a message display.

Vehicle Data Recorder (VDR)

The VDR monitors vehicle data via the J1939 CAN Bus and wired inputs. The data is collected, stored, and available to be uploaded to a computer running HAWK data management software. The VDR communicates with HAWK software via a Wireless Interface, wireless Data Collector or some models use a connected USB cable.

Data Collector, Wireless Interface Module, and Hawk Data Management Software Package

These components are not mounted on the vehicle. Reference in this publication to these three components are informative and given to aid in the overall understanding of the complete system.

Lateral G Sensor Module (SBA100 Models Only)

Provides the input for the LATERAL G INDICATOR on the SBA100 display module. The lateral G indicator provides a visual cue to the driver and officer of the side forces on the vehicle as it is cornering or being operated on a slope.

WatchDog PRO Module

The WatchDog PRO installs as an integral part of the Seat Monitor and Data Acquisition System to provide an output if the vehicle is moved when a hazardous condition exists. It monitors the condition of any device permanently attached to the apparatus that may be open, extended, or deployed in a manner that is likely to cause damage to the apparatus or device if the apparatus is moved.

U-Bracket Mount

Surface Mount

SBA100

SBA200

SBA300

When multiple display modules are used, the terminating resistor at the module with the tee fitting needs to be unterminated.

Alarm
Outputs

Supply
Power

Ignition
Switch

Alarm Outputs

FRC
Datalink

5-Pin Seat Monitor Cable

Monitors up
to 12 Seat
Belt and Seat
Switch Inputs

To Seat Belt and Seat Switches

Wireless Interface

12-Seat VDR Module

USB Interface

5-Pin FRC Datalink Cable

Lateral G Sensor Module

SBA100 Only

Wiring is the same for both 12-Seat VDRs.

Refer to Wiring Section for detailed information on pinouts, cables, and connectors.

10

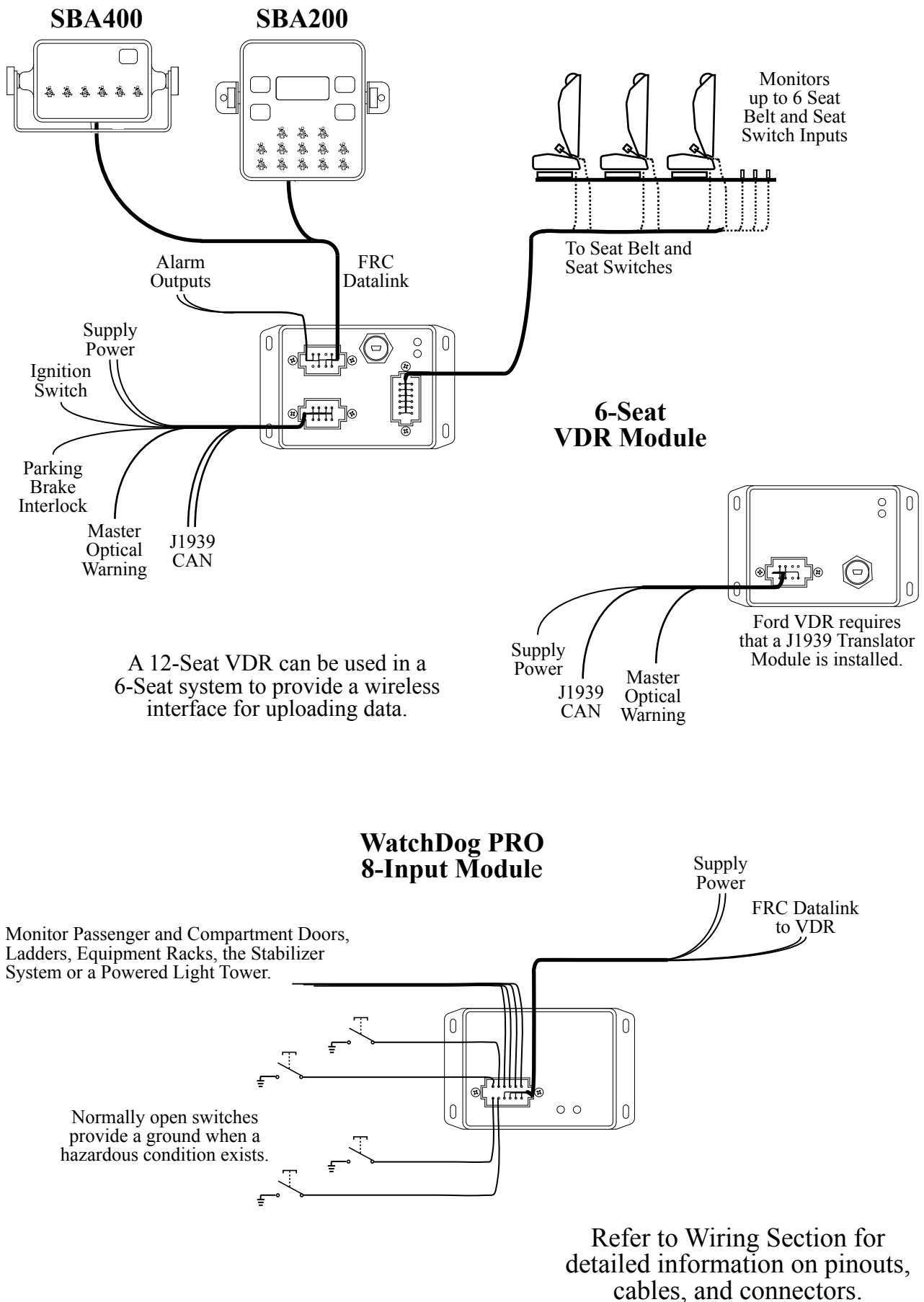


Figure HM-2. General Layout, 6-Seat System and WatchDog PRO

Display Module Controls and Indicators

There is a test mode built into the display modules. When initiated it allows all the pushbuttons and LEDs to be tested. Refer to the Operation Section, Display Module Test Mode.

Light Sensor

A built in sensor adjust the brightness of the LED displays for day or night operation.

Pushbuttons

There are four pushbuttons on the SBA100 and SBA200 display modules. They are used with the message display to scroll up, down, left, or right. The down button doubles as the SILENCE button. The SBA300 and SBA400 have a single SILENCE button. The SILENCE button is used to suppress the audio alarm and when programming the display.

Message Display (SBA100 and SBA200 Only)

The data that the VDR is recording can be viewed live on the message display. Press the left and right pushbuttons to scroll, the bottom of the message display shows the type of data and the top shows the exact condition or a numerical value. When a WatchDog PRO is installed the message display shows the name and location of an open compartment or equipment that is not stowed. The message display is also used when performing a self-test.

Seat Belt Icons

There are thirteen seat belt icons, six on the SBA400. Inputs for the icons are from the seat sensors via the VDR input connections. The indicators are programmed to match the vehicle seat configuration. Each indicator provides the following display:

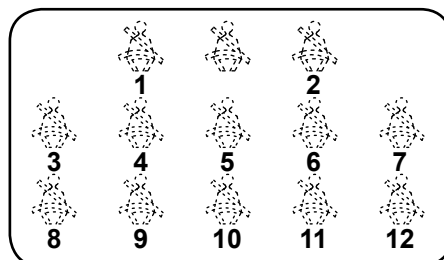
OFF - Seat Unoccupied

GREEN - Correct Sit-Buckle Sequence

AMBER - Seat Occupied, Seat belt Open, Parking Brake On (in a moving vehicle this color may come on during a bounce state indicating a loose seat belt)

RED - Seat Occupied, Seat belt Open, Parking Brake Off, or Incorrect Sit-Buckle Sequence.

Seat Monitor Display
Default Indicator Pattern



LATERAL G INDICATOR LEDs (SBA100 Only)

The five LED indicators display the side-to-side force on the vehicle. Input for these LEDs are from an accelerometer mounted in the Lateral G Sensor Module.

The side force that is indicated by the LEDs is programmable. Factory default setting for the LEDs are: GREEN less than 0.2 g; AMBER 0.2 to 0.25 g; RED greater than 0.25 g. (1 g = 9.806 m/s²)

Parking Brake Indicator (SBA100, SBA200 and SBA400 Only)

Input to the VDR for this indicator is from the parking brake interlock. A wire is connected to the VDR at the POWER/DATABUS connector Pin 4.

OFF - Parking Brake Off

GREEN - Parking Brake On, No Cautions

Open Door Indicator (SBA100, SBA200, and SBA400 Only)

Input to the VDR for this indicator is from the WatchDog PRO compartment door and equipment monitor module. The FRC datalink is used to transmit data. The red door-open icon lights when a hazardous condition exists. The seat monitor message display (SBA100 and SBA200) is programmed to show the name and location for each input that is causing an alarm.

Caution Indicator (SBA100 and SBA200 Only)

TBD

POWER LED (SBA300 and SBA400 Only)

This LED is on when power is supplied to the display from the VDR and the system is in the active mode.

CAN BUS LED (SBA300 and SBA400 Only)

This LED is on when data is being transferred between the VDR and display on the FRC datalink.

Vehicle Data Recorder

Access to VDR stored data and programming is password protected. All communications with the VDR are accomplished using HAWK software. HAWK software is loaded on a laptop or personal computer and provides the interface to change programming in the VDR, update VDR programs, or access data stored in the VDR.

The connection between the VDR and HAWK is made one of two ways:

1. Wireless technology with the data collector or the wireless interface module
2. A cable connected to the VDR USB connector.

Default Profile

The default VDR profile is programmed at the factory. Seat and belt inputs (connectors J1 and J2) and the seat configuration for display on the seat monitor display are set (Refer to Wiring Section). The VDR profile can be changed using the OEM HAWK program.

OEM (or Dealer) Using HAWK Software

An OEM (or dealer) gains access to the VDR using the OEM user name and password. If needed it is used at the time of installation to update firmware, change factory default configurations, or for testing/maintenance. This password does not provide access to user information or saved data. Refer to the OEM Guide (SBA2EM) for complete information.

Wireless VDR

To establish communications between the data collector or the wireless interface and the VDR, access to the inside of the vehicle at the seat monitor display is required. The **SILENCE** button on the display must be pressed for HAWK software to connect to the VDR. The VDR in the vehicle where the **SILENCE** button is pressed is the only one that communicates with HAWK software.

When HAWK connects to the VDR, it validates that the wireless communication is working.

USB Connector

Some VDR models have a USB port that allows for a direct connection to a laptop or a personal computer running HAWK software. (All stored data and programming is password protected.)

LEDs

The VDR has two status LED indicators. Operation of the VDR is automatic.

STATUS POWER LED

This LED is on when the VDR has activity on any VDR input. When the VDR is in sleep mode (inactive) this LED will blink. The VDR is connected to the battery and always has power.

STATUS CAN BUS LED

This LED is on when ECM data is active on the vehicle CAN bus.

External Alarms

There are two (2) alarm outputs from the VDR SIGNAL I/O connector (refer to Wire Section).

Alarm 1 Visual

The alarm is activated when there is a seat violation (seat occupied, seat belt open or improper sit-buckle sequence). This pin provides a ground when there is an alarm condition (300mA maximum).

Alarm 2 Audible

This alarm is activated when there is a seat violation and the VDR detects a vehicle speed greater than 5 mph. Pressing the **SILENCE** button on the display module cancels the audible alarm (it does not cancel the visual alarm or any alarm on the display module). This pin provides a ground when there is an alarm condition (300mA maximum).

Wireless Communications

The HAWK data management software needs to be installed on the computer to store, sort, and display the VDR data.

There are two ways to collect data from the wireless VDR. Use the data collector or the FRC wireless interface module plugged into a computer USB port. When data is collected from the VDR using the data collector, it needs to be transferred to the computer. The data collector is plugged directly into the computer using a USB cable.

Data Collector

The data collector is a wireless device that interfaces with FRC VDRs. Before it is used the data collector must be synchronized to the owners copy of HAWK. This downloads the owners VDR password, the users login list with passwords, and specific vehicle information into the data collector.

To gain access to the data collector menus, to pair the VDR or download data stored in the VDR or update VDR firmware a user must be logged in on the data collector.

Wireless Interface Module

Installation for the wireless interface module consists of connecting a standard USB mini-B to Type A cable between the module and a USB port on the laptop or personal computer with the HAWK software program installed. The first time that the module is connected, the device driver that is supplied with the HAWK software package needs to be installed.

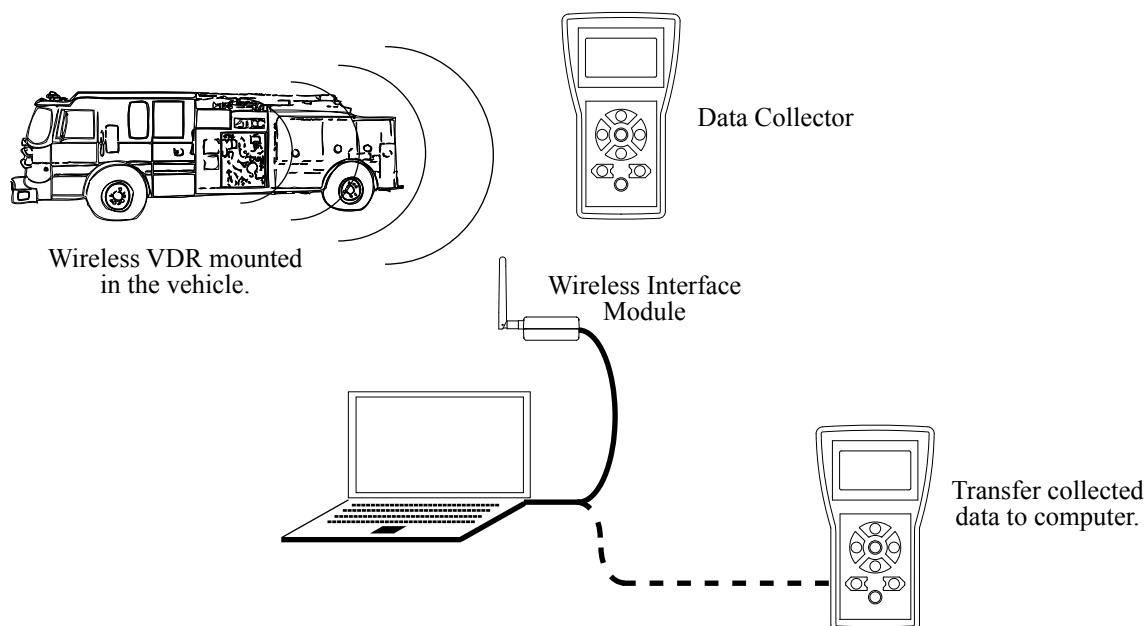


Figure HM-3. Wireless Communications

WatchDog PRO Module

The WatchDog PRO is a compartment door and equipment monitoring device. The module becomes an integral part of the FRC Seat Monitor and Data Acquisition System when it is connected to the VDR via the FRC datalink.

The VDR monitors and records the status of all inputs connected to the module.

The VDR provides an audible alarm output if the vehicle is moved when a hazardous condition exists.

The seat monitor message display shows the name and location for each input that is causing an alarm.

The seat monitor red door-open icon lights when a hazardous condition exists.

HAWK software templates allow the names of inputs and locations to be created or changed.

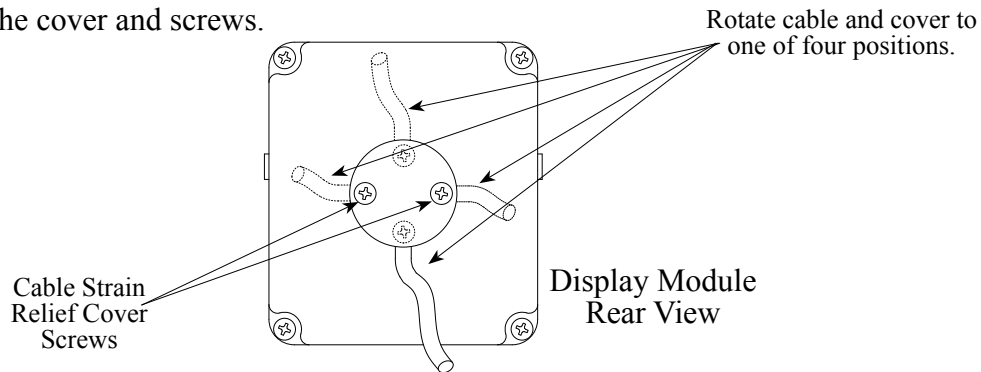
HAWK reports show past hazardous conditions by name and location with a date and time stamp.

INSTALLATION

Install Seat Monitor Display Module

Note: The direction the cable exits the rear of some display modules is adjustable.

1. If required adjust the cable position:
 - a. Remove the cable strain relief cover screws.
 - b. Rotate the cable and strain relief.
 - c. Reinstall the cover and screws.



2. Measure and mark mounting location for display module mounting screw holes. Make sure there is clearance for the module and cables before drilling holes. Refer to the following Figures for layout and dimensions.
3. Drill two holes for mounting screws (10-32 mounting hardware is recommended).
4. Place display module in position and secure with two screws.
5. Connect the display module cable to the VDR. (Refer to Wiring Section.)

Note: The bushing for the adjustment knob is installed between the bracket and the module. Use the knobs to adjust the display viewing angle.

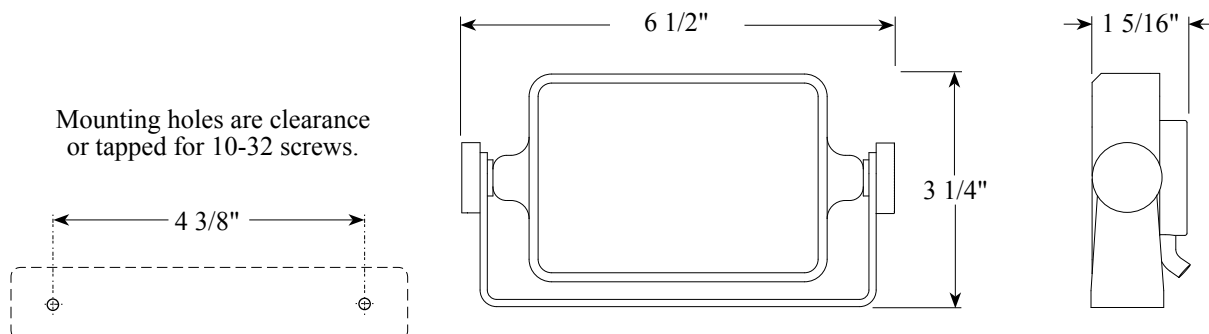


Figure HM-4. SBA300/400 Display Module U-Bracket Mount

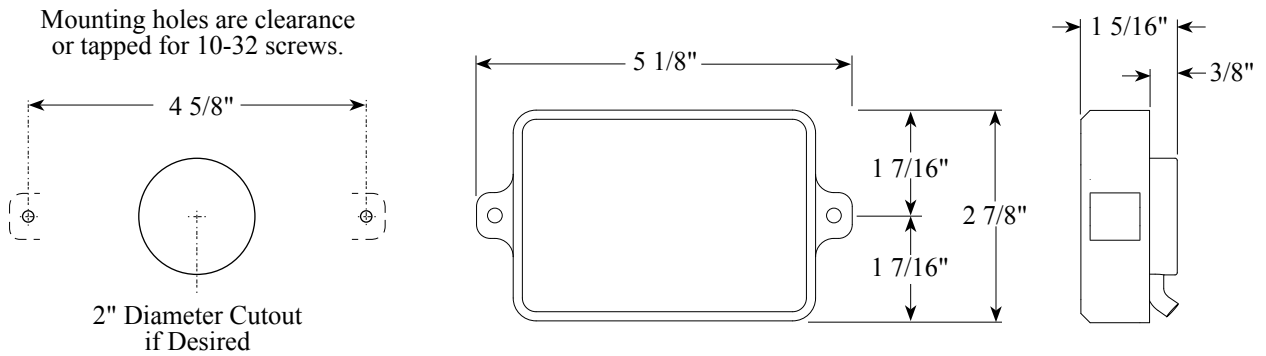


Figure HM-5. SBA300/400 Display Module Surface Mount

Note: The bushing for the adjustment knob is installed between the bracket and the module. Use the knobs to adjust the display viewing angle.

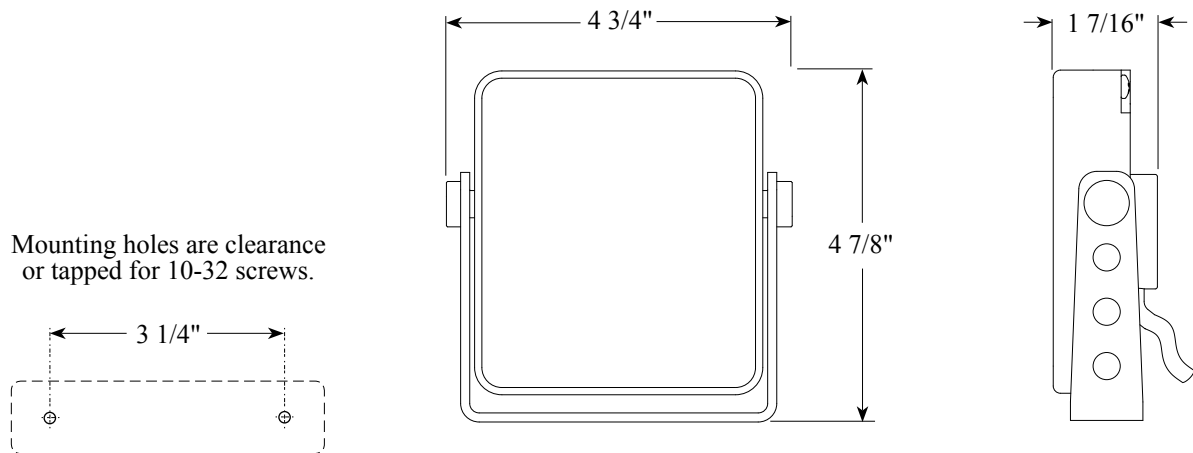


Figure HM-6. SBA100/200 Display Module U-Bracket Mount

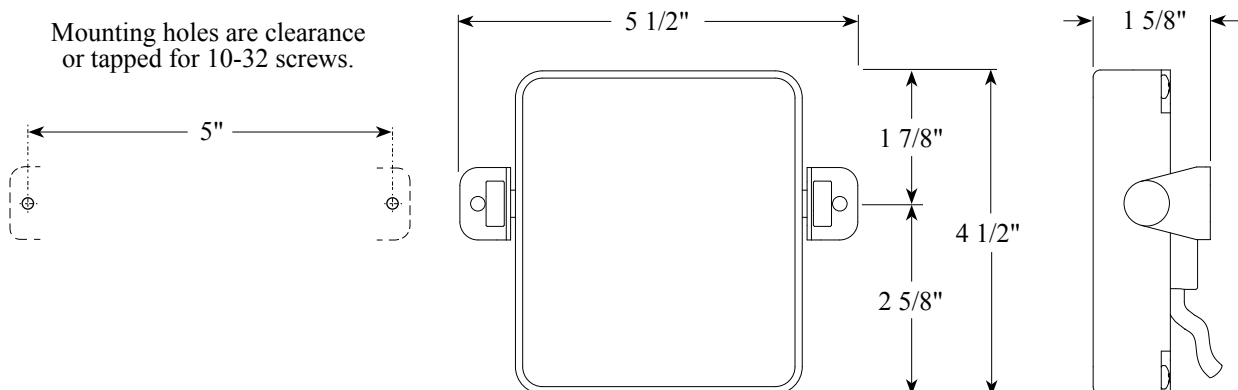


Figure HM-7. SBA100/200 Display Module Surface Mount

Install 12-Seat Vehicle Data Recorder

Wireless Interface

As with all wireless radio systems, performance and quality of transmission depends greatly on the installation of the equipment. For best performance note the following tips for mounting the VDR:

To get the maximum transmit distance for the signal, locate the VDR in the cab area as high up as possible

All metal will affect the transmitted signal, it is recommended that the VDR not be mounted inside of a closed metal compartment

The antenna must be located at least 8 inches from occupants

Install the VDR connectors up (toward the top of the vehicle) when it is mounted horizontally

Install the VDR connectors forward (toward the front of the vehicle) when it is mounted vertically

Position the antenna in a vertical position when possible, otherwise it should be folded down horizontally with the tip pointed toward the driver's side of the vehicle

Ensure that the antenna does not touch any objects, particularly metal objects or wires, as this will seriously degrade the transmitted signal strength.

USB Interface

Ensure there is room to access the USB port before installing.

Installation

1. Measure and mark mounting location for vehicle data recorder mounting screw holes. Make sure there is clearance for the VDR, antenna, and cables before drilling holes. Refer to Figure HM-8 for layout and dimensions.
2. Drill two holes for mounting screws (1/4 inch mounting hardware is recommended).
3. Place VDR in position and secure with two screws.
4. Connect cables and terminating resistor when required to the VDR. (Refer to Wiring Section.)

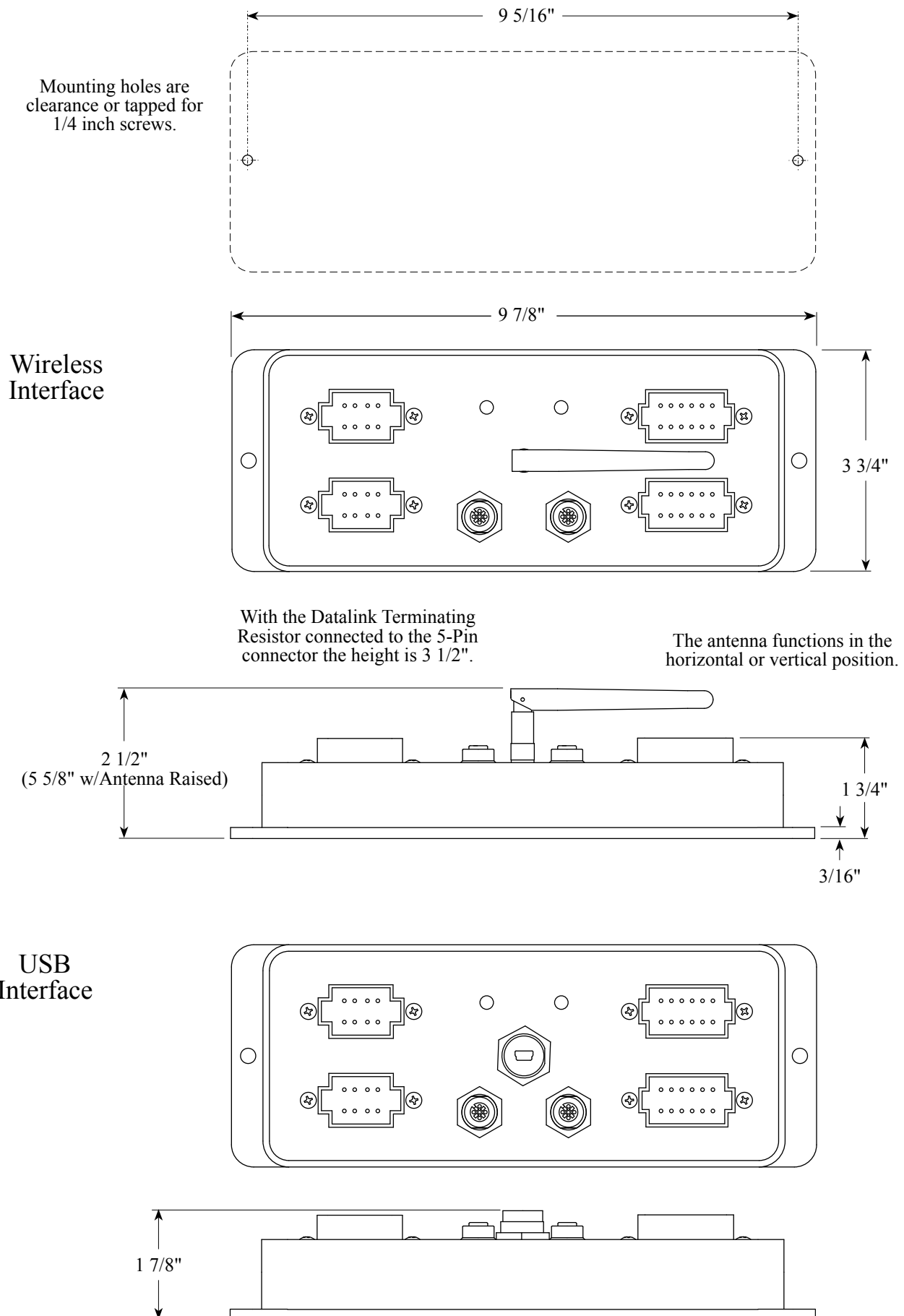


Figure HM-8. 12-Seat VDR Mounting Dimensions

Install 6-Seat Vehicle Data Recorder

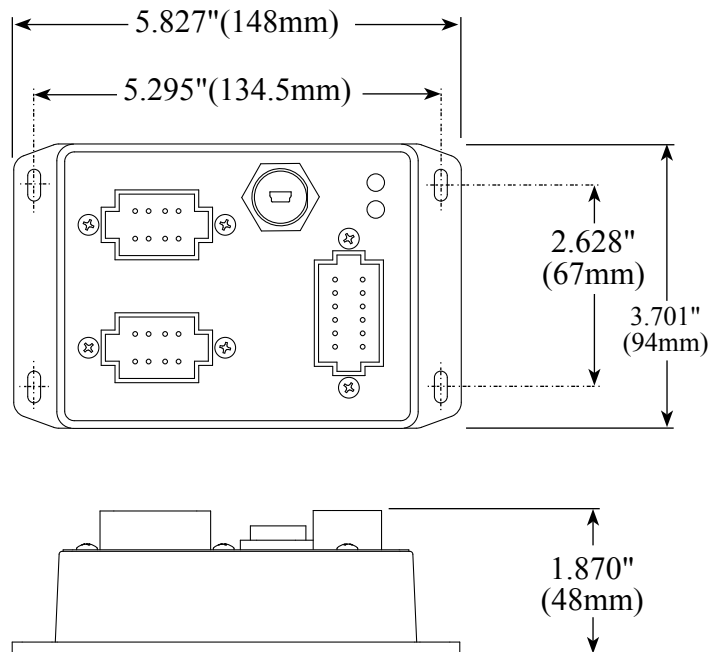
There are two 6-Seat VDRs: both VDRs have a USB connector; one has three connectors for standard J1939 CAN Bus, FRC Datalink, and wired connections; one has an 8-pin connector and is used with the J1939 Translator Module installed on Ford F-Series Trucks.

Note: The WatchDog PRO uses the same box.

1. Measure and mark mounting location for vehicle data recorder mounting screw holes. Make sure there is clearance for the VDR and cables before drilling holes. Refer to the Figure HM-9 for layout and dimensions.
2. Drill four holes, clearance or tapped, for #8 mounting screws.
3. Place VDR in position and secure with four screws.
4. Connect the cable(s) to the VDR. (Refer to Wiring Section.)

Mounting holes are clearance or tapped for #8 screws.

6-Seat Module



Boxes are the same size.

Ford Module

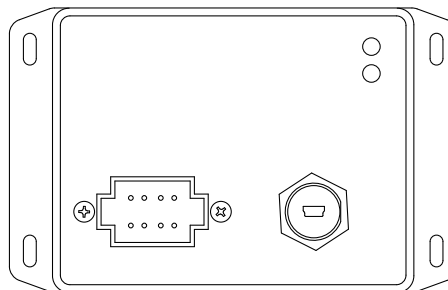


Figure HM-9. 6-Seat VDR Mounting Dimensions

Install Lateral G Sensor Module

Note: PORT 1 of the lateral G sensor module must face the front of the vehicle.

1. Measure and mark mounting location for lateral G sensor module mounting screw holes. Make sure there is clearance for the module and cables before drilling holes. Refer to Figure HM-10 for layout and dimensions.
2. Drill four holes for mounting screws (#6 mounting hardware is recommended).
3. Place the module in position and secure with four screws.
4. Connect cables (and terminating resistor when required) to the module. (Refer to Wiring Section.)

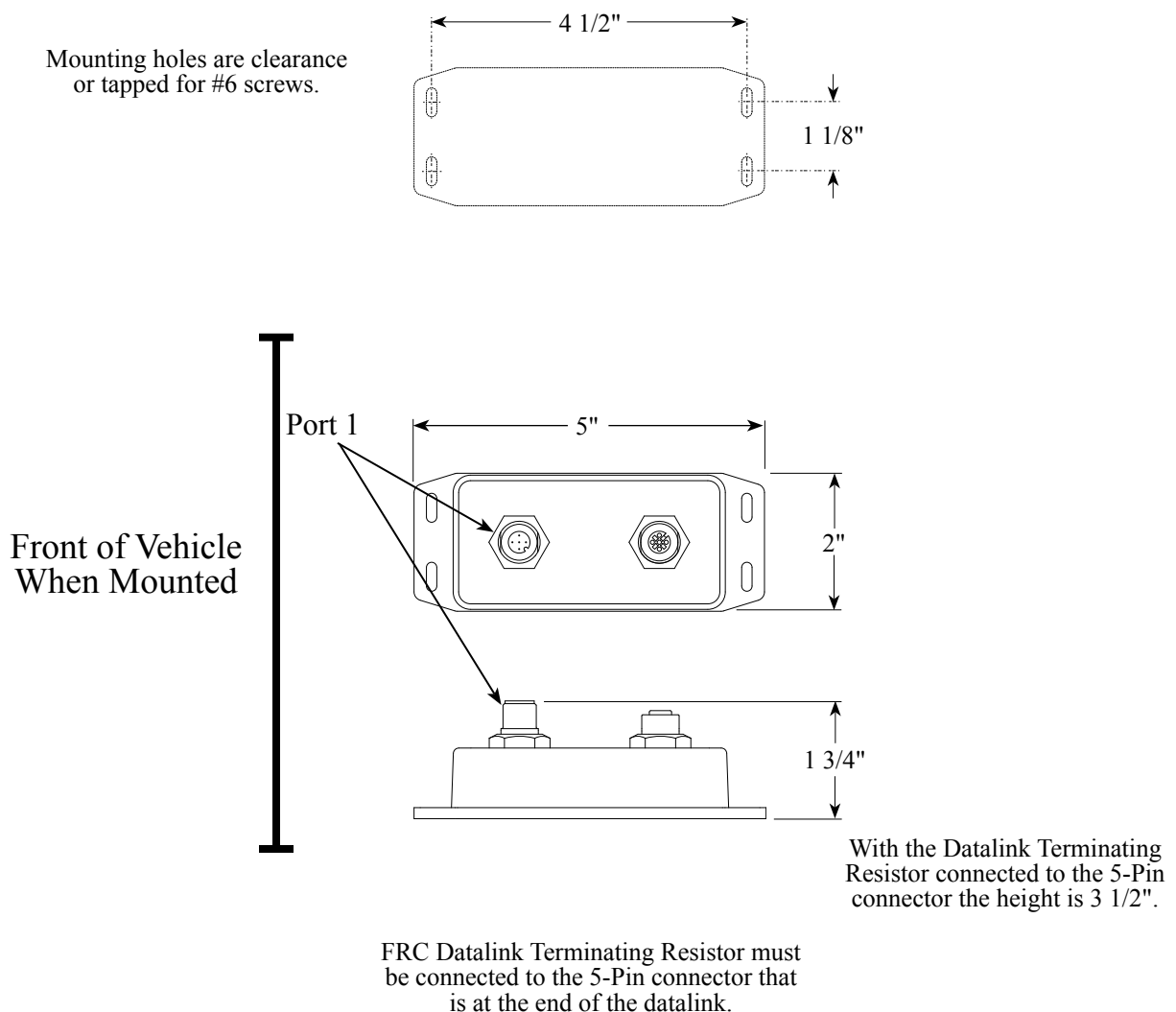


Figure HM-10. Lateral G Sensor Module Mounting Dimensions

Data Collector

Installation for this device consists of plugging a cable into the USB port on a laptop or personal computer that has the HAWK software program installed.

For information on loading and using the HAWK software program refer to the Seat Monitor and Data Acquisition System User Guide (SBA1UG).

Note: Do not connect the data collector to the computer until the HAWK software has been installed.

1. Connect the USB cable to the data collector module.
2. Connect the cable to a USB port on a laptop or personal computer. (Refer to Wiring Section.)

Battery Replacement

The data collector uses a 9 volt lithium battery. (A 9 volt alkaline battery may be substituted, it will have 1/3 the service life.)

1. Slide off the battery cover on the back of the module.
2. Remove the battery by lifting from the terminals end.
3. Install a fresh 9 volt battery, pay attention to the correct polarity.
4. Replace the cover.

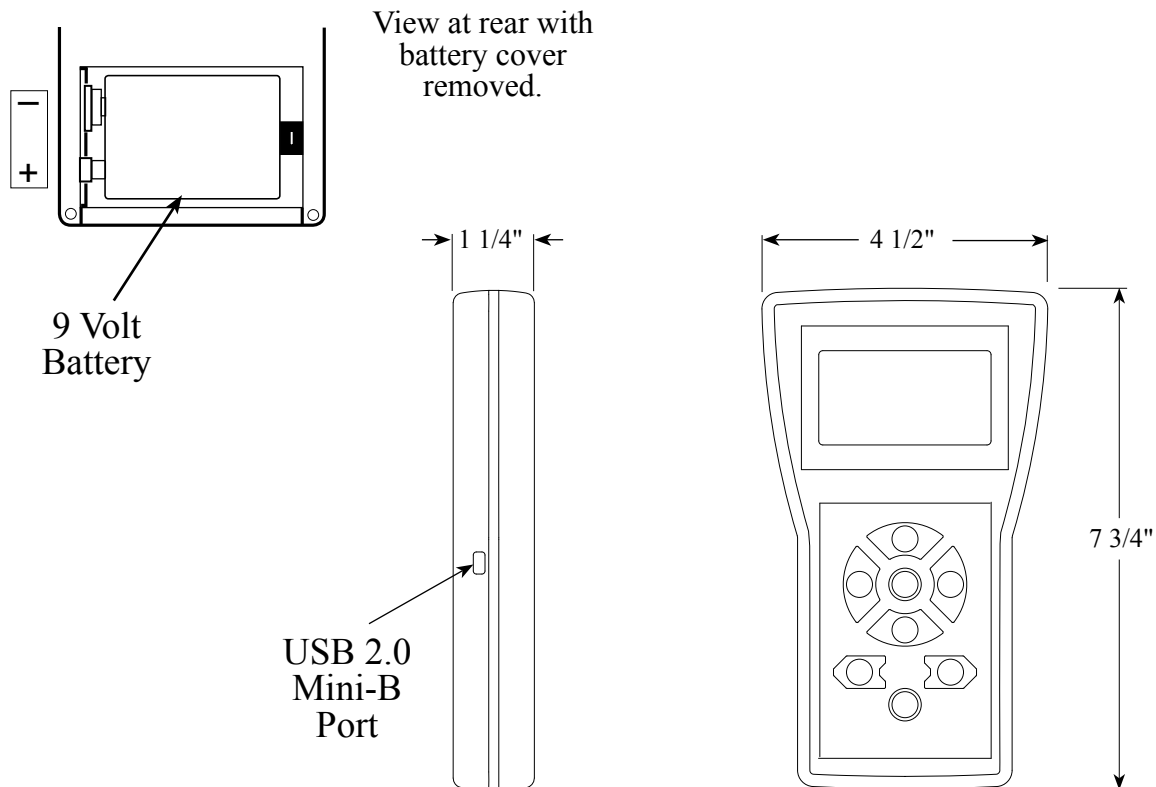


Figure HM-11. Data Collector Dimensions

Wireless Interface

Installation for this device consists of plugging a cable into the USB port on a laptop or personal computer that has the HAWK software program installed.

For information on loading and using the HAWK software program refer to the Seat Monitor and Data Acquisition System User Guide (SBA1UG).

Note: Do not connect the wireless to the computer until the HAWK software has been installed.

1. Connect the USB cable to the wireless module.
2. Connect the cable to a USB port on a laptop or personal computer. (Refer to Wiring Section.)

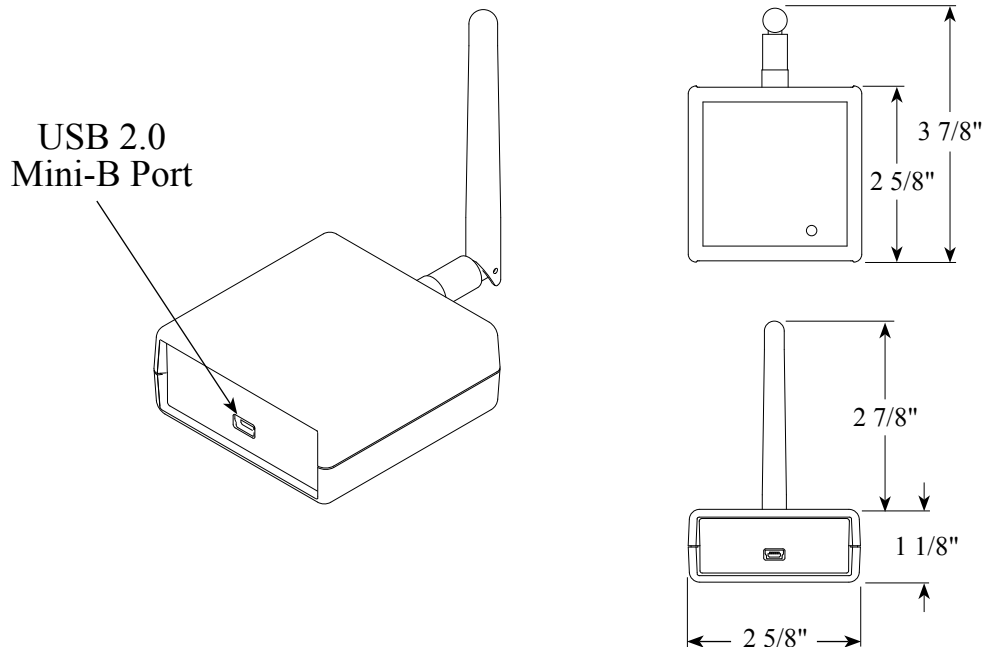


Figure HM-12. Computer Wireless Interface Dimensions

SYSTEM POWER

The VDR Supply Power input (POWER/DATABUS connector pins 1 and 2) is directly connected to battery power. (A 10 AMP fuse between pin 1 and the battery is recommended.) Power is supplied from the VDR when it is in the active mode to the system modules via the 5-Pin Seat Monitor or FRC harness connectors. The total system power is the sum of all the module needs. Refer to Table HM-1. System Power for module power requirements.

When power is first applied to the VDR it may take the power initialization sequence up to 3 minutes for the system to become active.

There are 2 status LEDs on the VDR, STATUS POWER and STATUS CAN BUS. When the VDR is active, the STATUS POWER green LED is on. If the ECM is operating with the J1939 data bus active, the STATUS CAN BUS green LED is on.

Since the VDR is directly connected to the battery, it always has power and is constantly recording data. When the parking brake is set it is important that the Parking Brake Interlock input (POWER/DATABUS connector pin 4) be tied to a hard ground through the parking brake switch. If this input is allowed to float when the battery switch is off, it can cause false parking brake violations in the summary report. (Refer to Wiring Section.)

The VDR has two modes—sleep and active.

Sleep Mode

When the vehicle ignition is off and there is no activity on VDR inputs, the system is in the sleep mode. No power is supplied to the system modules. The STATUS POWER LED will blink at a low intensity 5 times and then once at full intensity.

The VDR goes into sleep mode 60 seconds after the ignition key is switched off if there is no activity on the VDR inputs.

Active Mode

When there is activity on a VDR input (seat, belt, parking brake, ignition, etc.), a button pressed on the Seat Monitor display, or a wireless transmission is detected, the VDR goes active. When the VDR is active, the STATUS POWER green LED is on, power is supplied to the system modules.

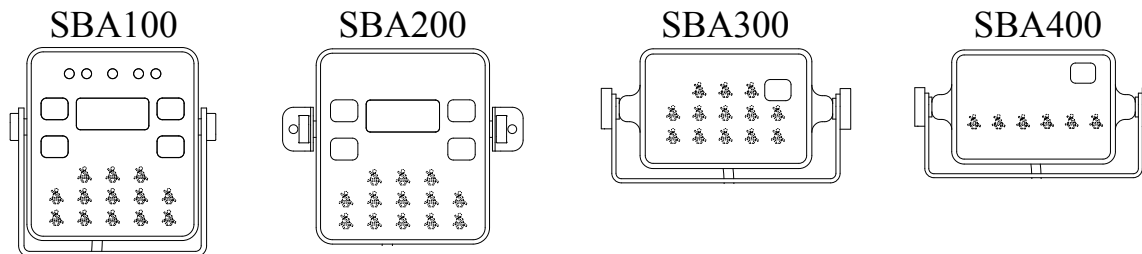
If the ECM is operating with the J1939 data bus active, the STATUS CAN BUS green LED is on.

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SEAT MONITOR DISPLAY OPERATION

Basic hardware operation is presented in this section to assist in the installation process. For detailed description on HAWK software installation, programming, and how to instructions refer to the User Guide (SBA1UG).

There are four different Seat Monitor Display modules. The simplest models have seat belt icons and a silence button for the audible alarm. More complex models include a message display, push buttons for navigating through programs, vehicle system warning indicators, and the lateral acceleration indicator.



Message Display (SBA100, SBA200)

The data that the VDR is recording can be viewed live on the message display. The top line of the message display shows the name of each data field and the bottom line shows the current value. Press the left and right pushbuttons to scroll through the data fields. Refer to Table HM-2 Display Module Message Display for descriptions.

When a data field is selected by scrolling that can be changed, the up and down pushbuttons are used. Refer to Setting the Time.

Table HM-2. Display Module Message Display

Message Display	Description
THROTTLE	Engine throttle position in percent.
TACH	Engine RPM.
SPEED	Vehicle speed. Can be set to read MPH or KPH.
ACCEL DECEL	The acceleration is shown as a positive or negative and is set to MPH/s (miles per hour per second) or KPH/s (kilometers per hour per second) depending on the setting for speed.
SEAT BELT	Reflects the condition as shown by the seat belt icons.
IGNITION	Vehicle ignition state.
PBRAKE	Parking brake state.
ABS	Anti-locking brake system status.
LIGHTBAR	Master optical warning switch status.
Date and Time	The display needs to be set to show local time.

Set the Time (SBA100, SBA200)

The clock for the VDR is synchronized to the Coordinated Universal Time (UTC) at the factory. The seat monitor display module does need to be set to show the local time in the message display.

Note: The data recorded by the VDR and uploaded to the data management system is date and time stamped using UTC. The HAWK software converts it to local time for use in the data management system. The time set on the display does not effect the time stamp on uploaded data.

1. Press the left and right pushbuttons and scroll to show the **Date and Time**.
2. Press the down (SILENCE) button.
3. Press the left and right pushbutton to select 12 or 24 hours time format.
4. Press the down (SILENCE) button.

Result: UTC and + or – offset amount will show in the lower window.

5. Press the left and right pushbutton to adjust the offset. The time shown in the upper window changes as the offset is adjusted. Set the upper window to show the correct local time.
6. Press the up button twice to return to normal display.

Set the Lateral G Indicator (SBA100)

The five LED indicators display the side-to-side force on the vehicle. Input for these LEDs are from an accelerometer mounted in the Lateral G Sensor Module. The amount of lateral force that each LED indicates is set using the pushbuttons on the display.

Factory default setting for the LEDs are: green less than 0.2 g; amber 0.2 to 0.25 g; red greater than 0.25 g. (1 g = 9.806 m/s²)

Change the Amber LED Setting

1. Press and hold the down (SILENCE) button and left scroll button at the same time for three (3) seconds.
Results: The display shows LAT G and the setting for the amber LED to come on.
2. Press the left or right scroll buttons to change the setting.
3. Press the up button to save the setting and return to normal display.

Change the Red LED Setting

1. Press and hold the down (SILENCE) button and right scroll button at the same time for three (3) seconds.
Results: The display shows LAT G and the setting for the red LED to come on.
2. Press the left or right scroll buttons to change the setting.
3. Press the up button to save the setting and return to normal display.

Self-Test Mode

There is a self-test mode built into the display modules. When initiated it allows all the LEDs and pushbuttons to be tested. The function to change the terminating resistor status is included in the self-test mode. When multiple display modules are used, the terminating resistor at the module with the tee fitting (first in line) needs to be unterminated.

SBA100, SBA200

Note: The seat belt icons may form a green or red C pattern indicating that the VDR is looking to establish a wireless connection. This is not the self-test.

Press and hold the down (SILENCE) button until DIAG MENU is shown in the message display (approx. 45 seconds). Release the SILENCE button and TEST DISPLAY is shown. The display module is now in the test mode. Press the right button to scroll through the tests as shown in Table HM-3 Display Module Self-Test Mode.

Table HM-3. SBA100, SBA200 Self-Test Mode

Message Display	Action
TEST DISPLAY	Press the down (SILENCE) button, the message display runs a test sequence.
TEST LEDS	Press the down (SILENCE) button, the seat belt icons run a test sequence.
TEST BUTTONS	Press each button, the message display responds. Press and hold the down (SILENCE) button to exit.
DEVICE DATA	The message display shows the following information: serial number, software version, hardware version, manufacture date, and unit IDs.
CAN BUS MENU	Set CAN bus terminating resistor ON or OFF
DEMO PROG	TBD
TEST EXIT	Press the SILENCE button to exit the self-test mode.

SBA300, SBA400

Note: The seat belt icons may flash green or red indicating that the VDR is looking to establish a wireless connection. This is not the self-test.

Press and hold the SILENCE button until the seat belt icons start the test sequence by blinking on one at a time (approx. 45 seconds).

Release the SILENCE button. The display module is now in the self-test mode and runs the test sequence. At the end of the sequence the seat belt icons are green or red. The green (T) indicates that the datalink terminating resistor is on, the red (U) indicates that the datalink terminating resistor is off. To change the terminating resistor status, press the SILENCE button. The self-test mode is canceled when complete.

Operational Check

The following tests should be performed after installation and can be used as a troubleshooting aide.

The display module has self-test that can be run to check the LED and button operation and show information such as software version, hardware version, and manufacture date. It also includes the function to change the terminating resistor status. Refer to Self-Test Mode.

When the system is in the sleep mode, press any button to activate it.

Parking Brake Indicator

The P icon is green to indicate the parking brake is set. (SBA300 does not have vehicle system warning indicators.)

Hazardous Condition Indicator

The door open icon is red to indicate a hazardous condition exists. This indicator is active with a compartment door and equipment monitor (WatchDog PRO) module installed. The system can be programmed to use the message display to show the name and location for each input that is causing an alarm.

Check the Seat/Belt Switch Input

This is a simple test to make sure that the VDR is receiving the switch signals from the seat and the belts. It verifies that they are wired correctly and checks the VDR profile. This test also checks the data link between the VDR and the display module.

Perform the following for each seat. Ensure that each seat triggers the desired seat belt icon position on the display module. Have the parking brake set and the ignition off.

1. Activate the seat switch by sitting in the seat.

Result: The seat belt icon for that seat lights amber.

2. Fasten the seat belt.

Result: The seat belt icon turns green.

3. Repeat at each seat.

WIRING

The following figures include the cables, component connector pin outs, and wiring information for the Seat Monitor and Data Acquisition System.

Cables

The 5-Pin cable is used to make the connections from the wireless VDR to the seat monitor display and lateral acceleration module. All 5-Pin connectors use the provided pre-assembled cables only.



Typical cable from the rear of a Seat Monitor display.

The direction the cable exits the rear of the display module is adjustable. Refer to Installation.

5-Pin Cable to VDR SEAT MONITOR connector.



5-Pin Cable

Note: When multiple display modules are used, the terminating resistor at the module with the tee fitting needs to be unterminated.

The SBA400 6-Seat Monitor display has a 4-pin Deutsch connector.



Figure W-1. Cables (Sheet 1 of 2)

Datalink Terminating Resistor

The FRC terminating resistor must be used to terminate the datalink for all system configurations.



Datalink Terminating Resistor

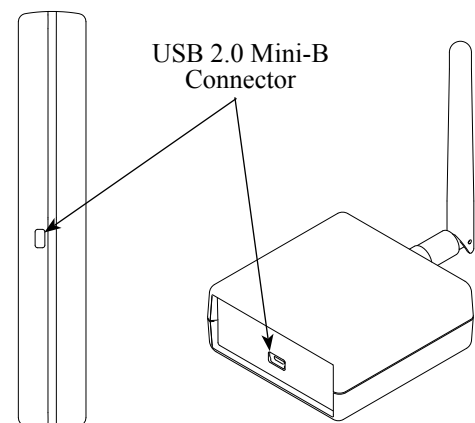


For a basic system with no optional modules installed, the terminating resistor is installed on the VDR FRC DATALINK connector.



If optional modules are installed the terminating resistor is installed on the 5-Pin connector that is at the end of the datalink chain.

USB Connections



A standard USB cable connects the data collector, the wireless interface, or a VDR to the computer.

VDR w/USB Port

The 6 and 12 seat VDRs are available with USB connector for transferring data between the VDR and HAWK software.

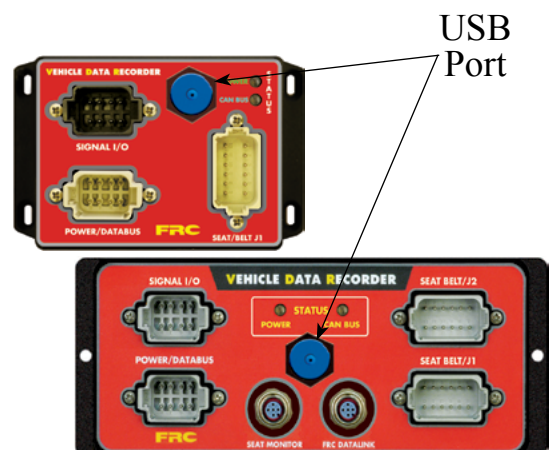
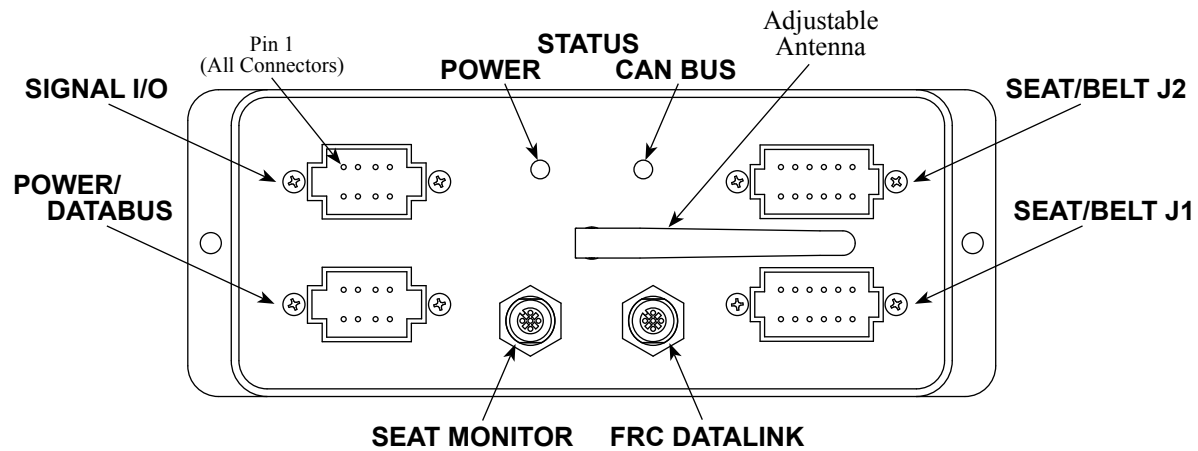


Figure W-1. Cables (Sheet 2 of 2)

12-Seat Vehicle Data Recorder Connectors

The 12-Seat Wireless and 12-Seat USB VDRs have the same connectors and system wiring.

12-Seat Wireless



The 5-Pin connectors use provided pre-assembled cables only.

FRC Datalink Terminating Resistor must be plugged into the 5-Pin FRC DATALINK connector when there are no optional modules connected.

12-Seat USB

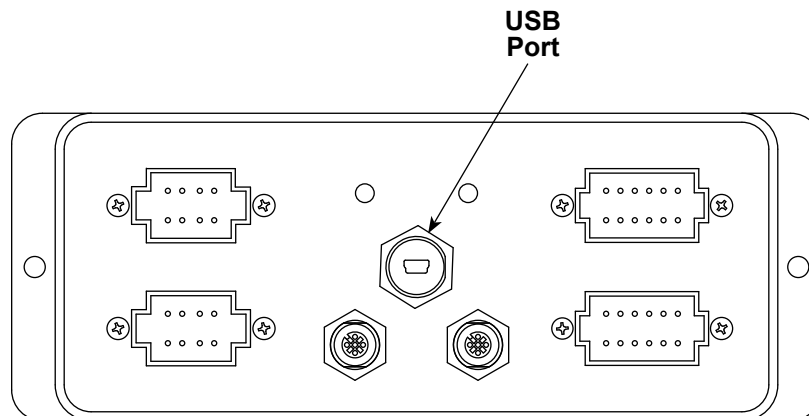


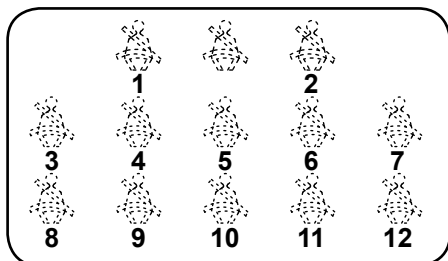
Figure W-2. 12-Seat VDR Connectors (Sheet 1 of 2)

SIGNAL I/O		8-Pin Harness Connector Black Deutsch Plug #DT06-8SB with W8S Wedge Pins Deutsch Socket #0462-20116141	SEAT/BELT J2	
8-Pin Connector/Cable			12-Pin Connector/Cable	
<u>Pin</u>	<u>Description</u>		<u>Pin</u>	<u>Description</u>
1	Alarm 1 Visual		1	* Seat 7
2	Alarm 2 Audible		2	* Seat 8
3	Reserved		3	* Seat 9
4	FRC Datalink (–)	12-Pin Harness Connector Black Deutsch Plug #DT06-12SB with W12S Wedge Pins Deutsch Socket #0462-20116141	4	* Seat 10
5	FRC Datalink (+)		5	* Seat 11
6	Supply Power (Battery +)		6	* Seat 12
7	Supply Power (Battery –)		7	* Belt 12
8	Reserved		8	* Belt 11
			9	* Belt 10
			10	* Belt 9
			11	* Belt 8
			12	* Belt 7

* These are factory default settings and are subject to change with VDR profile programming in HAWK software.

POWER/DATABUS		8-Pin Harness Connector Gray Deutsch Plug #DT06-8S with W8S Wedge Pins Deutsch Socket #0462-20116141	SEAT/BELT J1	
8-Pin Connector/Cable			12-Pin Connector/Cable	
Pin	Description		Pin	Description
1	Supply Power (Battery +)		1	* Seat 1
2	Supply Power (Battery -)		2	* Seat 2
3	Ignition + VDC		3	* Seat 3
4	Parking Brake Interlock		4	* Seat 4
5	Master Optical Warning		5	* Seat 5
6	Alarm 2 AUX		6	* Seat 6
7	J1939 CAN (-)		7	* Belt 6
8	J1939 CAN (+)		8	* Belt 5
			9	* Belt 4
			10	* Belt 3
			11	* Belt 2
			12	* Belt 1

12-Seat Monitor Display
Default Indicator Pattern
for Seat/Belt Number

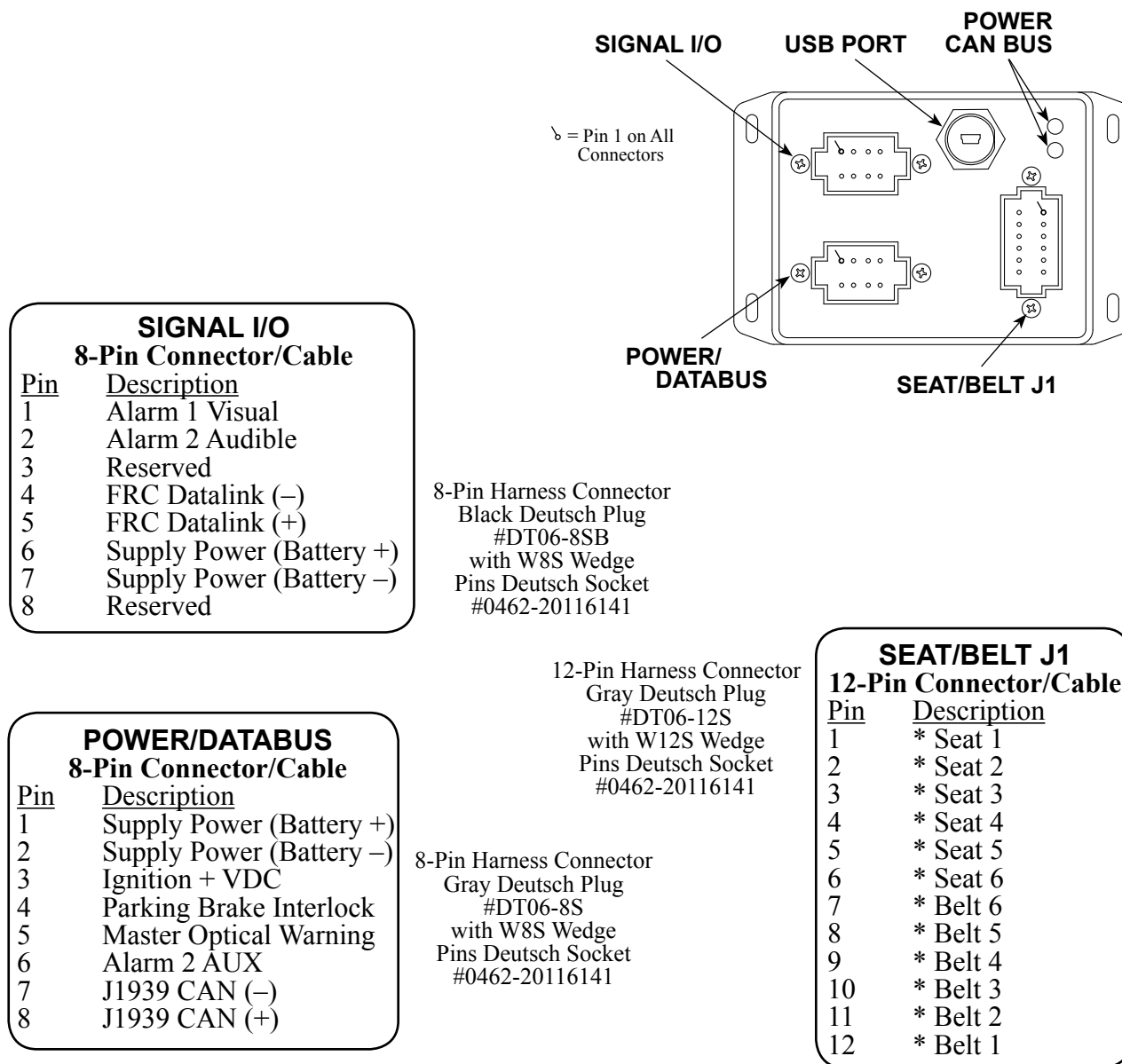


The inputs at J1 and J2 for the seat and belt switches are programmable using HAWK software. Seat default is for a Normally Open Contact. Belt default is for a Normally Closed Contact.

Figure W-2. 12-Seat VDR Connectors (Sheet 2 of 2)

6-Seat Vehicle Data Recorder Connectors

The 6-Seat USB VDR has the same connectors and system wiring as the 12-Seat VDRs.



* These are factory default settings and are subject to change with VDR profile programming in HAWK software.

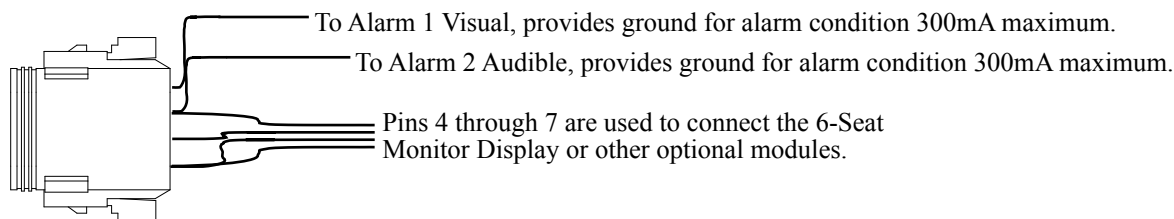
The inputs at J1 and J2 for the seat and belt switches are programmable using HAWK software. Seat default is for a Normally Open Contact. Belt default is for a Normally Closed Contact.

Figure W-3. 6-Seat VDR Connectors

Vehicle Data Recorder Harness Connections

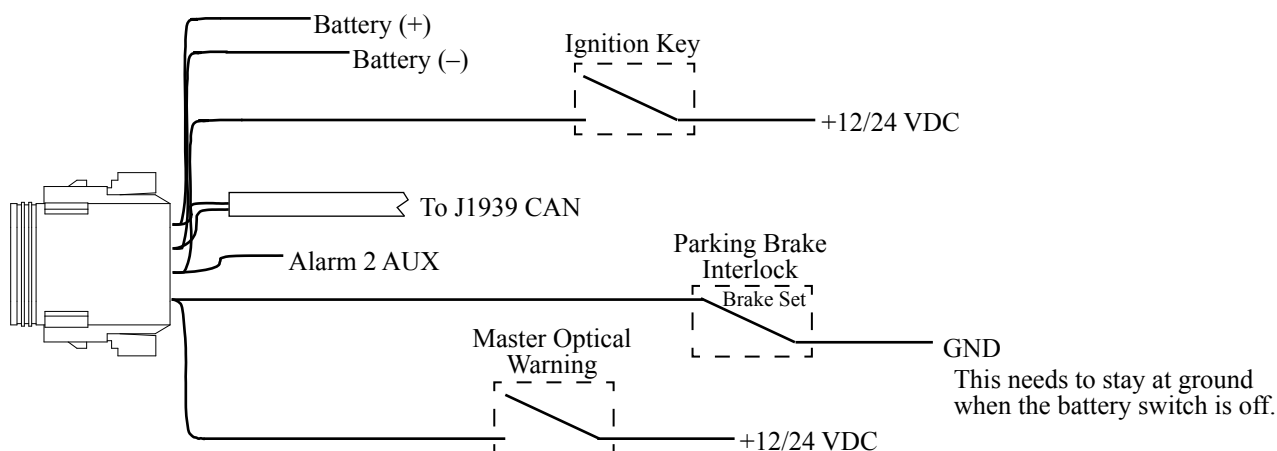
It is recommended to use 16 AWG wire for the Battery (+) and Battery (-) connections, for all other wires 16 or 18 AWG wire is used.

SIGNAL I/O

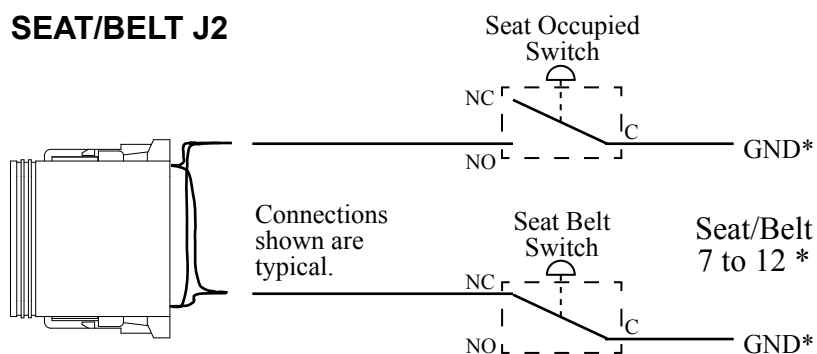


POWER/DATABUS

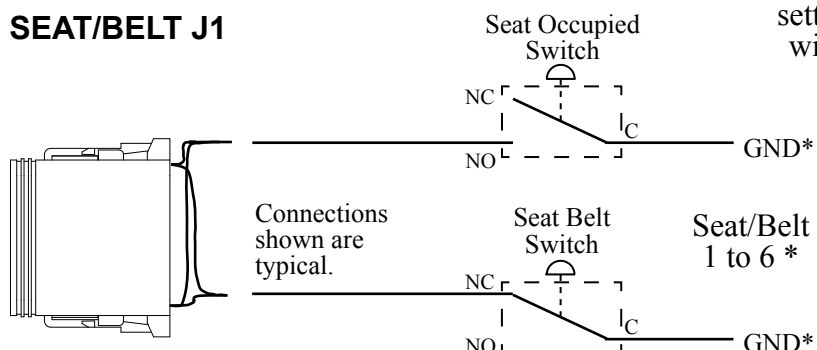
HAWK program menus allow various input conditions to be set for the POWER/DATABUS connector pins on the VDR. Selections are available for the input provided to be BATT (+ VDC) or GND (ground) and to include an internal pull-up or pull-down resistor when required to prevent a floating input.



SEAT/BELT J2



SEAT/BELT J1



* These are factory default settings and are subject to change with VDR profile programming in HAWK software.

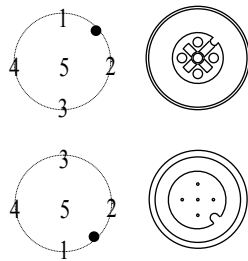
Figure W-4. VDR Harness Connections

Seat Monitor Display Harness Connections

The displays are connected using the 5-Pin cable or a 4-Pin Deutsch connector.

SEAT MONITOR or FRC DATALINK 5-Pin Connector/Cable		
Pin	Wire Color	Description
1	Yellow	Shield
2	Red	Supply Power (+)
3	Black	Supply Power (-)
4	White	FRC Datalink (+)
5	Blue	FRC Datalink (-)

5-Pin Connector
Pin Locations



SBA400 MONITOR 4-Pin Connector/Cable	
Pin	Description
1	Supply Power (+)
2	Supply Power (-)
3	FRC Datalink (+)
4	FRC Datalink (-)

Use a twisted pair for the
FRC Datalink wires.

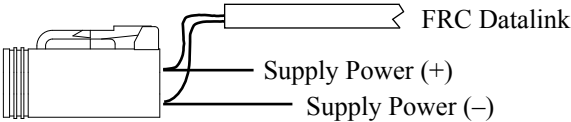
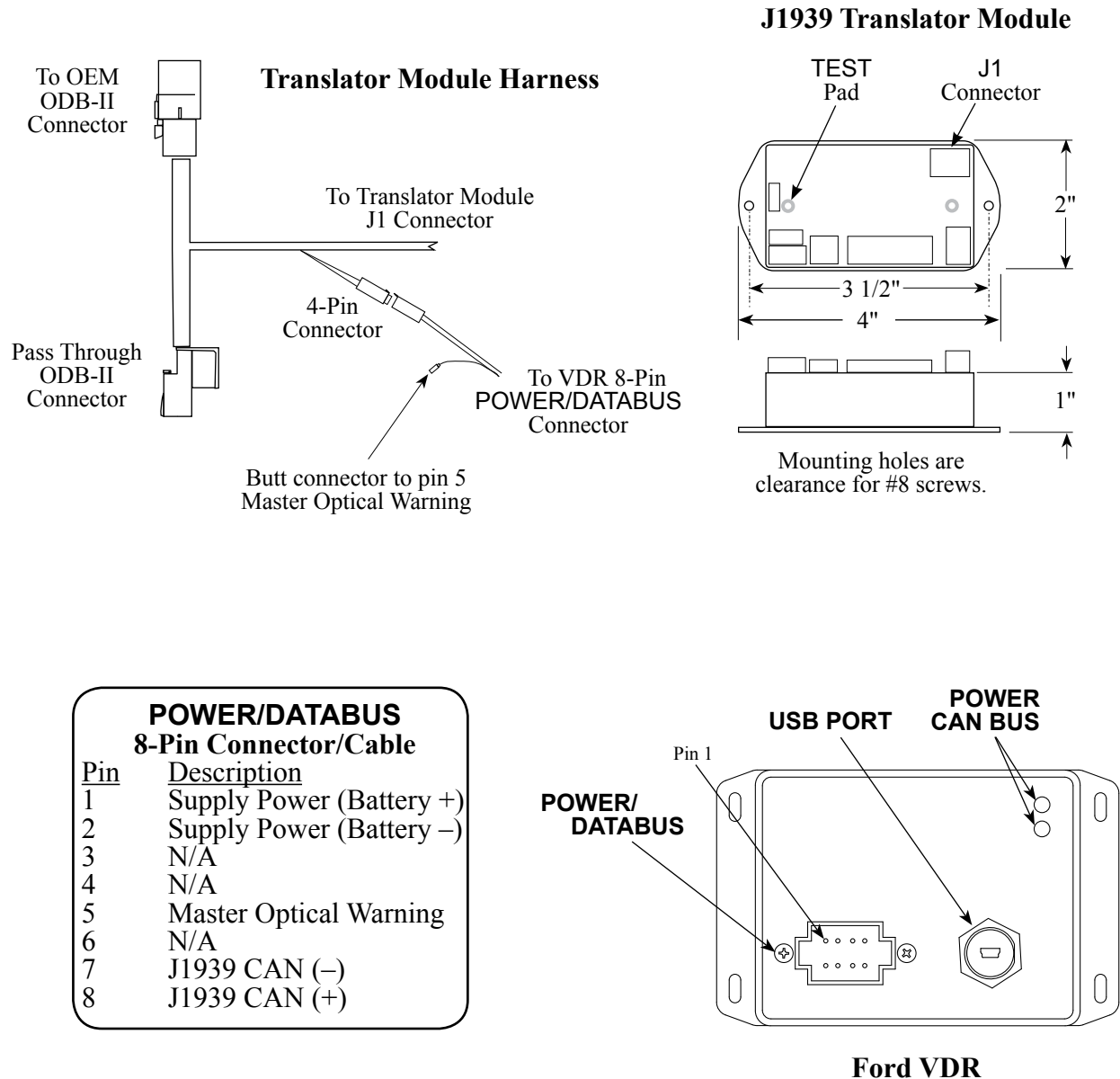


Figure W-5. Seat Monitor Display Harness Connections

Ford Vehicle Data Recorder and Harness Connections

The J1939 Translator Module with the ODB-II Interconnecting Harness must be installed for Ford models F-250/350/450/550 with the 6.7L Diesel Engine. The module interprets the Ford engine information and provides a J1939 CAN bus connection to the VDR.

Note: To install the J1939 Translator Module with ODB-II harness, read and follow the installation instructions provided with the Translator Module kit.



Note: When a FRC Seat Monitor display is installed with a 12 or a 6-Seat VDR, it requires wiring to the VDR 8-Pin SIGNAL I/O or the 5-Pin FRC Datalink connector.

Figure W-6. Ford VDR and Harness Connections

Lateral G Sensor Module Harness Connections

The connections between optional modules are made using pre-assembled 5-Pin cables or a two-wire FRC datalink. A terminating resistor must be at the end of the datalink.

Lateral G Sensor Module SBA100 models only.

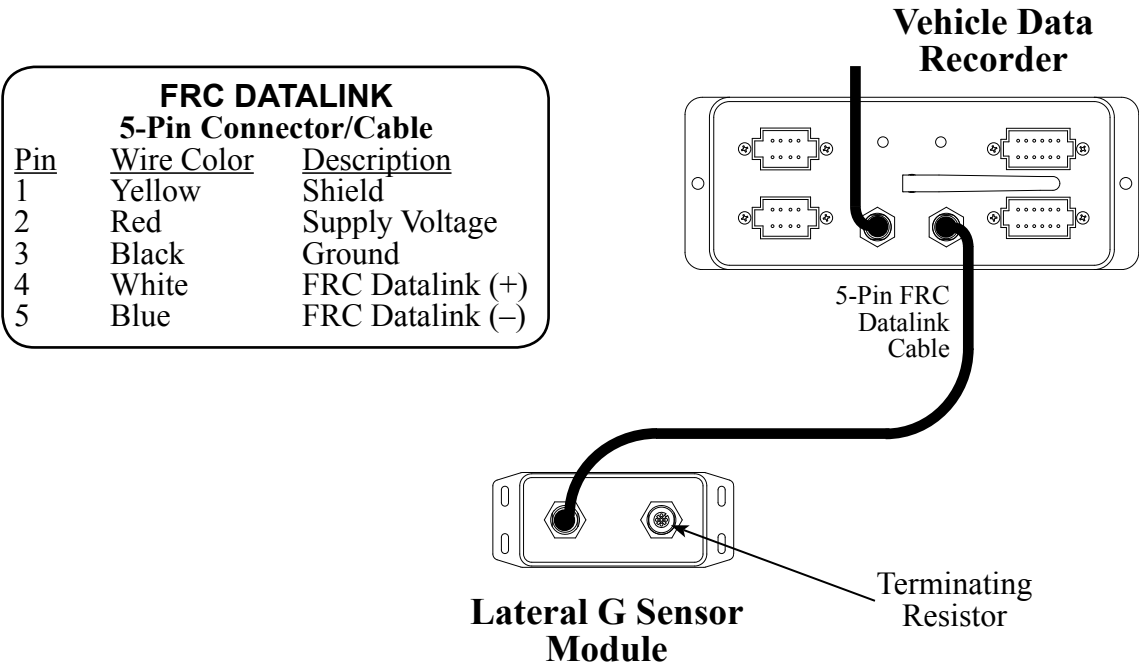
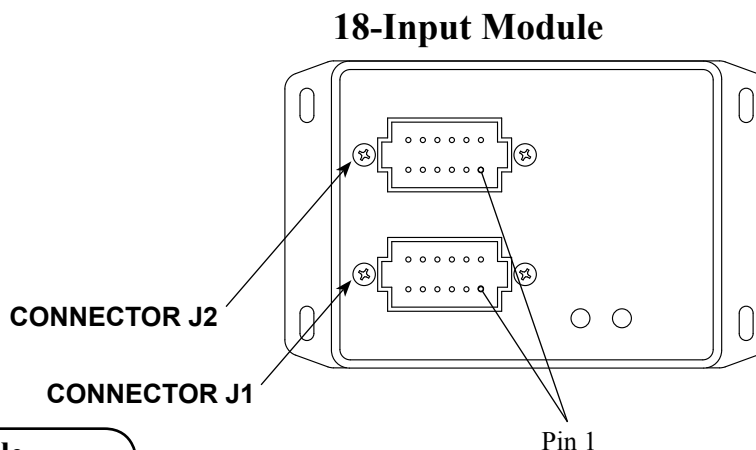


Figure W-7. Lateral G Sensor Module Connections

WatchDog PRO Modules

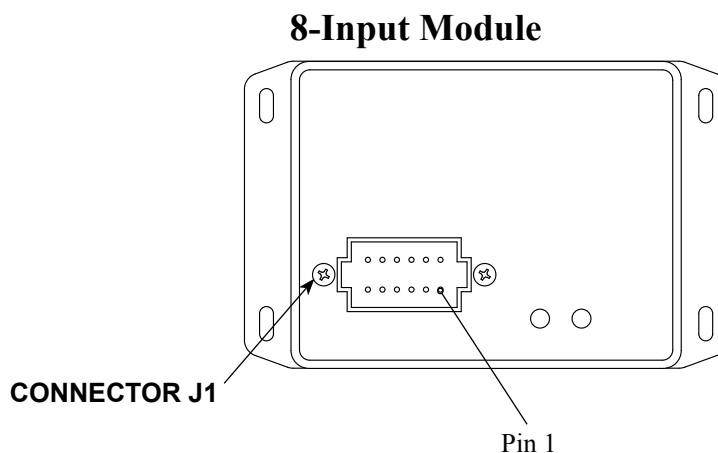
Compartment Door and Equipment Monitor

18-Input Module CONNECTOR J2	
12-Pin Connector/Cable	
Pin	Description
1	Input (Active Low)
2	Input (Active Low)
3	Input (Active Low)
4	Input (Active Low)
5	Input (Active Low)
6	Input (Active Low)
7	Input (Active Low)
8	Input (Active Low)
9	Input (Active Low)
10	Input (Active Low)
11	Input (Active Low)
12	Input (Active Low)



18-Input Module CONNECTOR J1	
12-Pin Connector/Cable	
Pin	Description
1	Supply Power (Battery +)
2	Supply Power (Battery -)
3	FRC Datalink (-)
4	FRC Datalink (+)
5	FRC Datalink (-)
6	FRC Datalink (+)
7	Input (Active Low)
8	Input (Active Low)
9	Input (Active Low)
10	Input (Active Low)
11	Input (Active Low)
12	Input (Active Low)

Connect the supply power and FRC Datalink wires to the VDR 8-Pin SIGNAL I/O connector. (Power connection can be made here also.)



Note: When multiple modules are connected to a VDR datalink, they must be set for different addresses. If modules are connected to the datalink with the same address, a red LED lights on each module. Refer to WatchDog Manual for settings.

8-Input Module CONNECTOR J1	
12-Pin Connector/Cable	
Pin	Description
1	Supply Power (Battery +)
2	Supply Power (Battery -)
3	FRC Datalink (-)
4	FRC Datalink (+)
5	Input (Active Low)
6	Input (Active Low)
7	Input (Active Low)
8	Input (Active Low)
9	Input (Active Low)
10	Input (Active Low)
11	Input (Active Low)
12	Input (Active Low)

Figure W-8. WatchDog PRO Module Connections

NOTES

NOTES



PERSONAL RESPONSIBILITY CODE

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.
2. It is your responsibility to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called upon to use.
3. It is your responsibility to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.
4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns or other severe injury.



Fire and Emergency Manufacturers and Services Association, Inc.
P.O. Box 147, Lynnfield, MA 01940 www.FEMSA.org

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