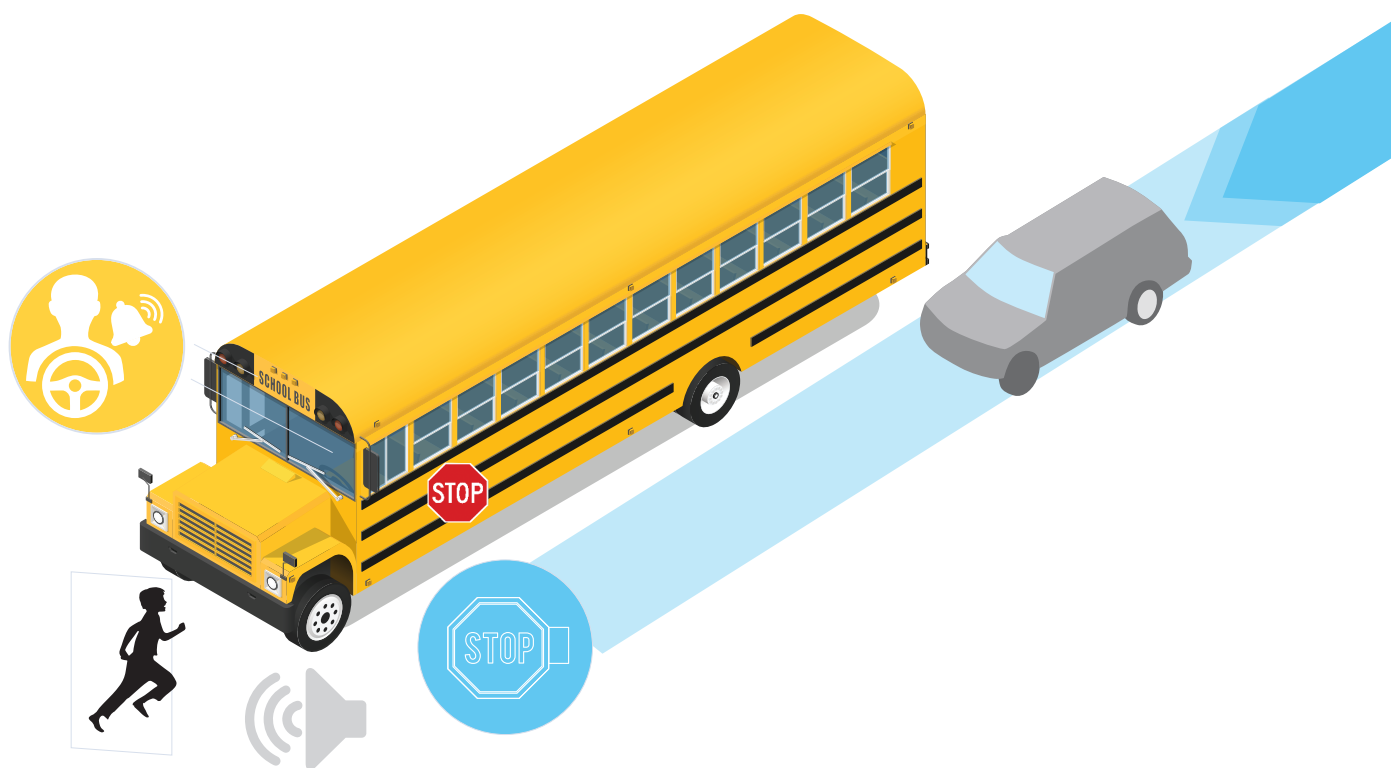


PSA

Predictive Stop Arm™



Installation Guide

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Introduction

About this guide

This guide covers installation procedures for the Predictive Stop Arm™ (PSA) system. PSA installation is for certified personnel only. For more information, contact Technical Support (see the back of this guide for details).

Initial Configuration



After installing components, you must set up the system to operate correctly.

For more information, see the *PSA User Guide* (part #700-1176).

About PSA

PSA is a radar-based safety system designed for school buses. Its primary function is to alert the driver and students leaving the bus about the danger from oncoming traffic, to prevent a potential accident before it happens.

How does it work?

The PSA system uses 2 radar modules (one forward and one rear-facing) to monitor the distance and speed of approaching traffic and detect vehicles that are unlikely to stop when the school bus stop arm is deployed. A display unit delivers appropriate visual alerts to the driver, and two exterior horn speakers play sounds to alert pupils of potential danger.

What does the PSA system include?

The PSA system has the following primary components:

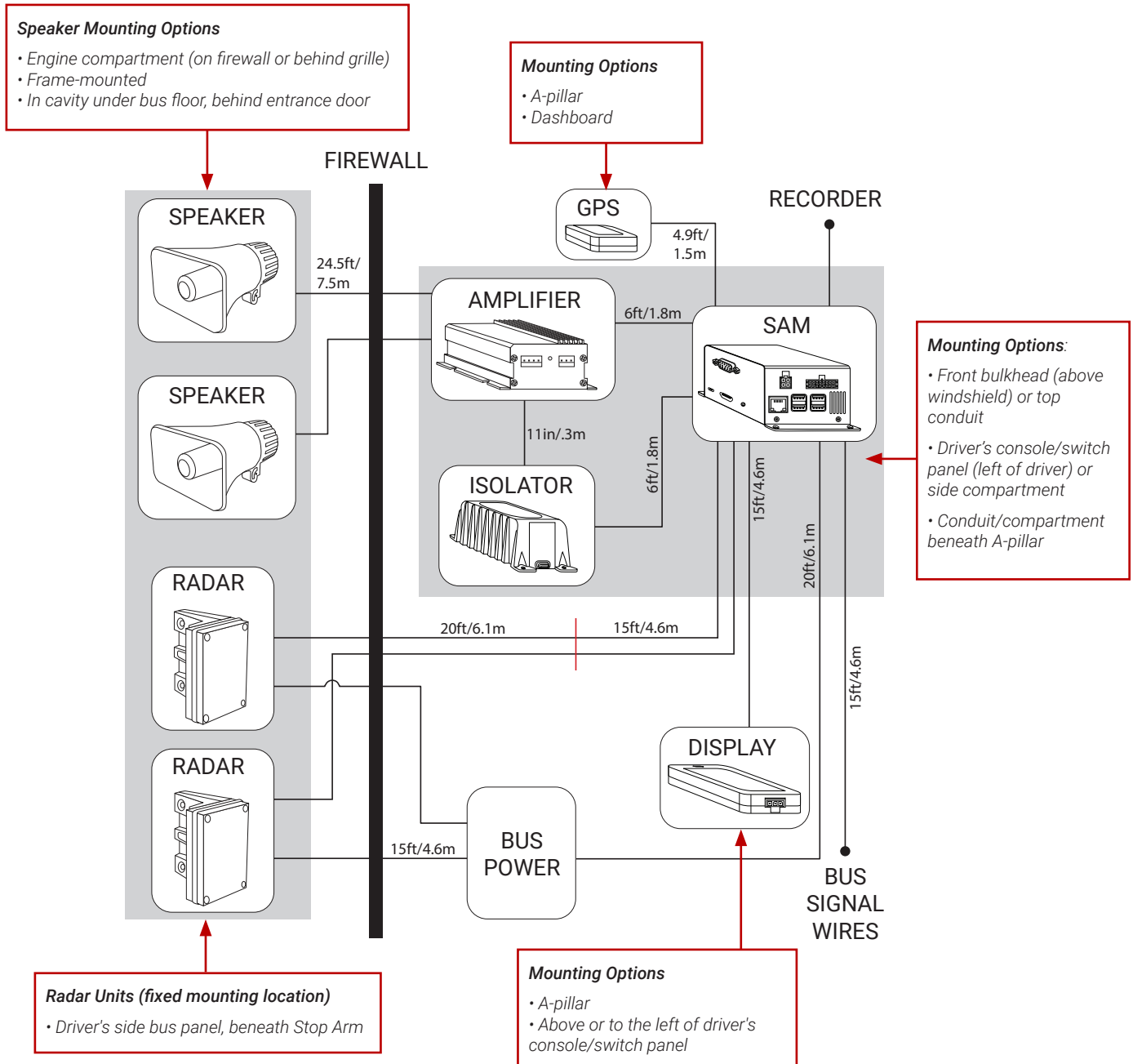
- Safety Alert Module (SAM) providing system logic and configuration capabilities
- Radar system monitoring the area around the vehicle
- Display unit for visual notification to the driver
- Amplified speakers for audible alerts

System Components

The PSA installation kit ships with the following components:

<p>1x SAM Controller (032-1034); ships w/ 4x #10 x 3/4" self-drilling screws (600-0038)</p> 	<p>1x SAM Power Harness Kit - 20ft/6.1m; ships w/10A and 1A fuses/holders</p> 	<p>1x SAM I/O harness (060-1117) 15 ft/4.6m</p> 
<p>1x FORWARD Radar (080-1063) and 1x REAR Radar (080-1073); each radar ships w/3 x #10 x 1.25" Phillips screws (600-0098), and drilling template (700-1155)</p> 	<p>2x Radar I/O Harness (060-1128) 20 ft/6.1m (5-wire I/O and DB9 legs), 15 ft/4.6m (2-wire power leg)</p> 	<p>1x SAM Display (080-1076); ships w/velcro mounting strip</p> 
<p>2x Exterior Speakers (085-1087); ships w/bracket, drilling template (700-1145) and 4x #10 x 3/4" self-drilling screws (600-0038)</p> 	<p>1x Audio Amplifier (085-1089) ships w/4 x machine screws and lockwashers</p> 	<p>1x Ground Loop Isolator (085-1093) ships w/4x #8 x 3/4" Phillips screws (600-0045)</p> 
<p>1x Amplifier Power Splitter (060-1166) 6ft/1.8m, & Harness (included with amplifier)</p> 	<p>1x Speaker Harness (ships w/amplifier, plus 24.5ft/7.5m extension 060-1155)</p> <p>1x Audio Connector (085-1096) 6ft/1.8m, SAM AV to Ground Loop Isolator</p> 	<p>1x GPS Receiver (080-1082) magnetic mount</p> 

System Diagram



Preparing for Installation

PSA components mount in various locations inside and outside the bus (consult the "System Diagram" on page 6). Use the following information to help avoid mounting problems and harness-routing obstacles.

Vehicle-specific Planning

Important aspects of a PSA installation depend on implementation details, including:

- School bus body and cab interior configuration
- Vehicle mechanical/electrical design
- Pre-existing equipment

Before proceeding, carefully consider the following guidelines and recommendations, and discuss component mounting locations with the customer.

System Mounting

- Allow physical space around components and account for bulky I/O harnesses, wiring, fuse holders, and connectors
- Do not block operator sight lines (windows/mirrors)

Specific component requirements are covered in the mounting procedures (see "Installing Components" on page 9).

Component Mounting

Select the SAM controller location first.

Important cabling decisions and component locations depend on where the SAM controller is mounted. Determine the SAM location before planning for other components.

Place the SAM Controller, Amplifier, and Ground Loop Isolator in proximity.

The amplifier must be mounted within 10 inches of the isolator unless a cable extension is used on the isolator pigtail (for details, see "Audio Harnesses" on page 17).

Radars modules mount on the driver's side exterior bus panel (under the stop arm).

Harness Routing

After determining component locations, plan harness and cable routes (see the "System Diagram" on page 6 and the "Wiring Diagram" on page 13):

- Consider routing distances and logistics, including barriers/bottlenecks.
- Plan for efficient access to battery source/ignition, power relays, and interface panels; choose power/ground connections and fuse placement to limit the number and bulkiness of runs, particularly where space is limited.
- Manage harnesses and channel wiring to keep runs tidy and avoid cable damage.

Radar I/O

An I/O harness (060-1128) runs from each radar module on the side of the bus, and splits into 3 legs:

- The power leg (2 wires) is 15ft./4.6m.
- The other 2 legs run inside the bus (generally through the firewall) to the SAM. The SAM I/O leg (5 wires) is 15ft./4.6m. The serial leg is 20ft./6.1m with two DB9 connectors.

The serial leg is only used temporarily for configuration and logging, and is not required for normal system operation. For more information, see "Radar I/O Harnesses" on page 18.

Wire looms

After determining harness runs and cable lengths, find a suitable area outside the bus to lay out wiring and create looms:

- Label wires/connectors
- Use appropriate conduit and/or bind with tape or zip ties

Radar I/O Harness Labels



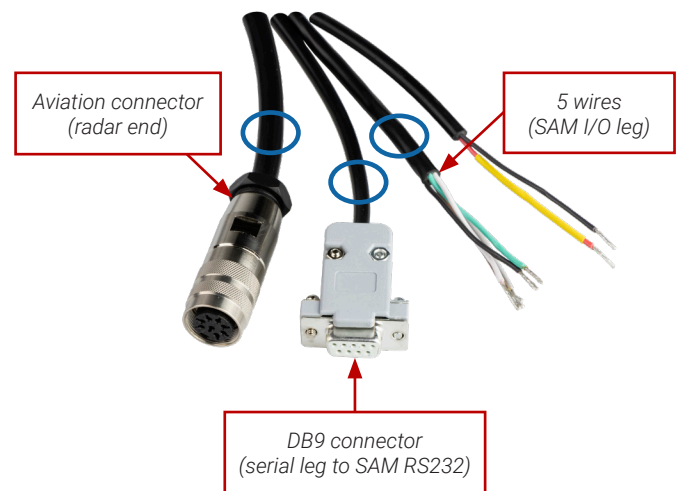
Before proceeding, lay out the 2 radar I/O harnesses separately. On one harness, attach 3 supplied "FORWARD" labels, to the legs:

- Aviation connector
- DB9 connector
- 5-wire I/O leg

The 2-wire power connection does not require labeling.

Use 3 supplied "REAR" labels to repeat the process for the other harness. You'll need the labels to help identify proper connections during system installation and configuration procedures.

Attach "FORWARD"/"REAR" Labels:



Operator Safety Warning Sticker

The PSA system ships with an adhesive label displaying important operator safety warnings.

Post the sticker in proximity to the vehicle operator – for example on the driver's side console or front bulkhead/cabinet.

⚠ WARNING:

SEVERE INJURY OR DEATH can result if you fail to comply with the following:

- **ALWAYS** ensure Predictive Stop Arm system (PSA) is functioning properly before operating the bus (see the 3-Step Operator Checklist for test procedure).
- **ALWAYS** pay attention to PSA audio and visual alarms and take appropriate action.
- **ALWAYS** keep a proper lookout for pedestrians and other objects.
- **ALWAYS** follow all laws, regulations and rules for proper bus operation.
- **ALWAYS** keep all PSA equipment clean and free of debris and ensure that your view of the PSA Display Module is unobstructed.

Installing Components

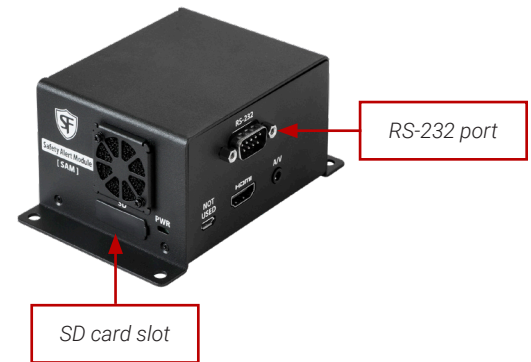
Mounting the SAM Controller

1. Select a location according to the requirements in "System Mounting" on page 7. In addition:

Access to the RS-232 Serial Port

Each radar I/O harness serial (DB9) leg must be temporarily connected to the SAM RS-232 port for PSA configuration and logging (see "Radar I/O Harnesses" on page 18).

- Allow sufficient access to ports for harness and cable connections (see the "Wiring Diagram" on page 13).
 - Vertical, horizontal, and hang-mounting are all acceptable.
 - Do not orient the unit with the SD card slot facing downward.
 - Do not expose the SAM to moisture.
 - Do not mount the SAM in a closed-in area or restrict ventilation in any way. The SAM requires air circulation to maintain optimum operating temperature and provide best performance.
2. Secure the SAM Controller to the mounting surface with the 4 supplied self-drilling screws.



Mounting the GPS Receiver

- The back of the GPS has 2 magnetic strips. Attach the unit to a ferrous metal surface.
- Select a location allowing the cable (4.9ft/1.5m) to reach a USB port on the SAM controller.

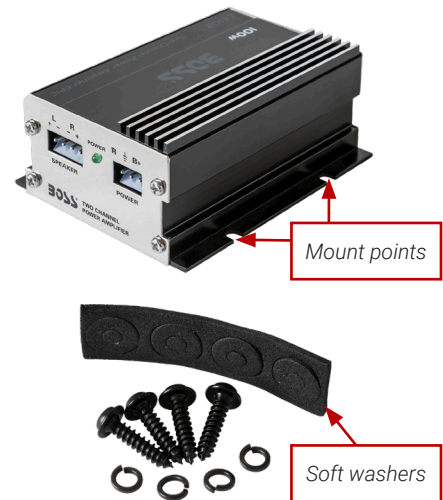
Satellite Reception

For best results, place the GPS close to the windshield edge and ensure the top side faces up, toward the sky.



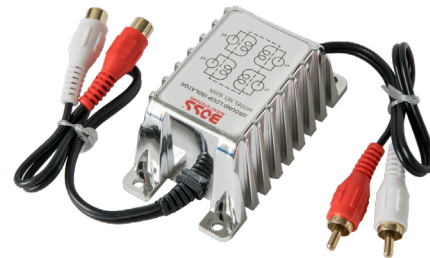
Mounting the Audio Amplifier

1. Select a location according to the requirements in "System Mounting" on page 7. In addition:
 - Do not expose the amplifier to moisture
 - Install the amplifier away from any sort of heat outlet, heater, or AC blower
2. Remove the 4 soft washers from the supplied strip and apply the sticky side of each washer to the underside of the amplifier at the 4 mount points.
3. Secure the amplifier to the mounting surface with the 4 supplied screws/lockwashers.



Mounting the Ground Loop Isolator

1. Select a location according to the requirements in "System Mounting" on page 7. In addition:
 - Do not expose the isolator to moisture
 - Install the isolator away from electrical circuits
2. Secure the isolator to the mounting surface with the 4 supplied #8 x 3/4" screws.



Mounting the SAM Display

1. Select a location according to the requirements in "System Mounting" on page 7. In addition:

⚠ WARNING

DO NOT BLOCK OPERATOR SIGHT LINES.

- Choose a prominent location within the operator's peripheral vision, preferably at eye-level: we recommend the A-pillar (lined-up with the bottom half of the side mirror) or just above the driver's console.
 - Mount on a flat surface
2. Remove backing from the 2-sided tape on the rear of the display.
 3. With the car image facing you, and the Safe Fleet logo toward the ground, press the display against the mounting surface until it sticks.



Mounting Speaker Horns

1. Select locations according to the requirements in "System Mounting" on page 7. Place speakers so sound projects out, toward students exiting the bus. For example:
 - in the engine compartment - on the radiator frame, or just inside the grille (mount as close as possible to openings)
 - in a cavity under the bus floor (e.g. behind the entrance door)
 - on the firewall, or frame-mounted (downward-facing)

Avoid Exterior Mounting Locations



To help prevent damage to speakers, we recommend against mounting horns on exterior bus panels.

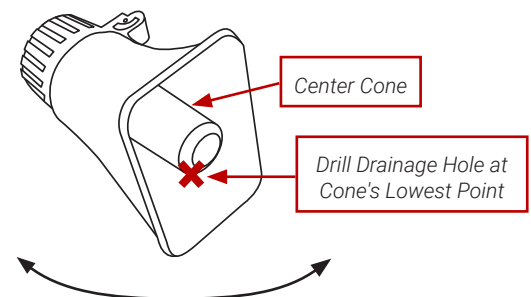
2. Use the supplied drilling template (700-1145) to mark the 4 screw holes on the mounting surface.
3. Drill the screw holes, then mount the bracket to the surface using the 4 supplied #10 x 3/4" screws.
4. Place the speaker in the bracket so the holes line up, and insert the 2 bracket screws. Use the supplied washers, and thread the nuts onto the screws.
5. If required, pivot the speaker horn toward an opening, then tighten the speaker bracket assembly.

NOTE: Water Drainage



If the speaker is mounted low on the vehicle with the center cone facing down, drill a hole to allow any accumulated water to drain:

- Drill a 1/8" hole at the lowest point in the center cone.
- The drainage hole is not required if the cone points upward or sideways.



Mounting Radar Modules

- Radar modules are labeled **FORWARD** and **REAR**, and mount on the exterior bus panel beneath the stop arm:
 - Select a flat location to minimize potential moisture leakage into the vehicle.
 - Attach a supplied forward/rear label near the connector on each radar pigtail.
- Using the supplied drilling template:
 - Drill the 2 cable holes ($1 \frac{5}{16}$ "") for the both modules
 - Drill the 3 pilot holes ($\frac{5}{32}$ "") for the forward and rear module mounting screws.

Radar Drilling Template

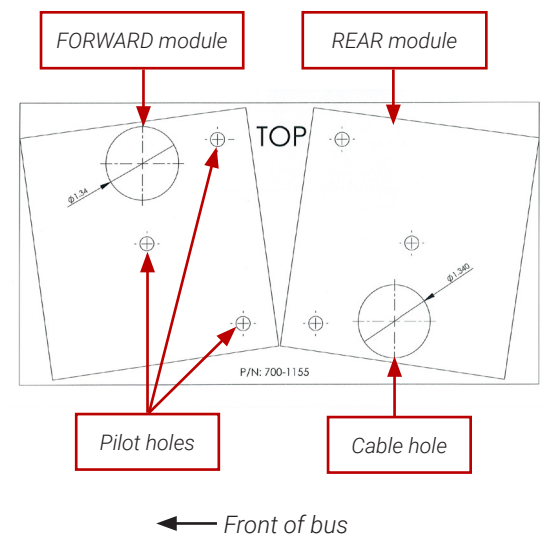
The template image shown on the right is not to scale. The actual template is included with the installation kit.

Radar I/O Harness Routing

Before connecting radar pigtails to I/O harnesses and mounting the modules, ensure you know how cables will route from inside the bus and out to the radar modules.

For more information see "Harness Routing" on page 7.

- Run the 8-pin aviation connectors from radar module pigtails through the panel cable holes, and thread into the forward and rear radar I/O harnesses.
- Use the 3 supplied #10 x $1 \frac{1}{4}$ " Phillips screws to secure each radar module to the panel.
 - Ensure the rubber backing of the radar module is flat against the panel surface, with the round rubber grommet inside the cable hole.
 - We recommend caulking around the edges of the radar module base.



Wiring Diagram Cable Legend

- 1 Radar I/O harness (060-1128)
- 2 SAM I/O harness (060-1117)
- 3 Power splitter harness (060-1166)
- 4 SAM power harness (PH2X2MFJR)
- 5 SAM audio connector (085-1096)
- 6 Speaker cable extension (060-1155)

Installing Harnesses

SAM I/O Harness

The SAM I/O harness supports the following connections:

Inputs

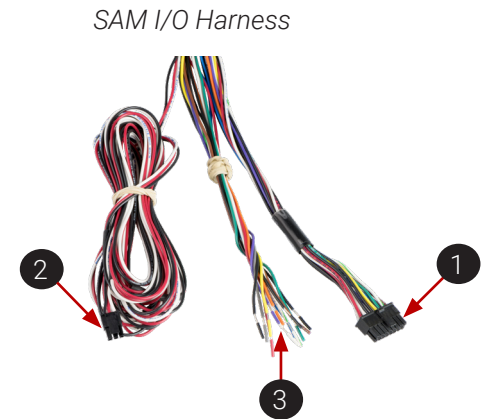
- Bus signals (flashers/stop arm, door open)
- Radar (alerts and warnings)

Outputs

- Radar enable
- SAM display

Installation Procedure

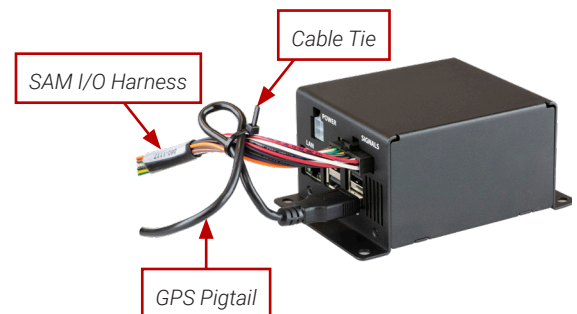
1. Connect the 2x8 Microfit to the SAM **SIGNALS** port.
2. Connect the 1x3 Microfit to the SAM display.
3. Connect fly wires as detailed in the wiring diagram (see page 13):
 - Bus signals
 - Front and rear radar I/O harnesses



GPS

Connect the GPS receiver's pigtail to a USB port on the SAM controller. We recommend securing the USB cable to the SAM I/O harness:

1. Ensure the SAM I/O harness' 2x8 Microfit is plugged in to the SAM SIGNALS port.
2. Create a small loop a few inches from the USB connector at the end of the GPS pigtail.
 - Use a cable tie to fasten the loop to the SAM I/O harness wire bundle. Leave enough slack so the USB connector so can plug in and out of a USB port on the SAM controller.
3. Connect the USB cable to a port on the SAM controller.



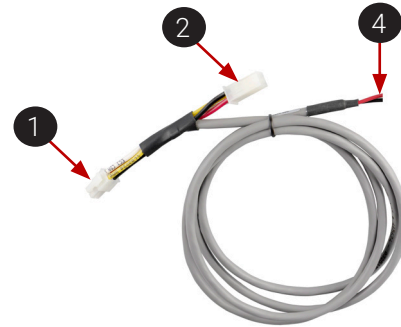
SAM Power and Splitter Harnesses

A splitter cable takes power from the SAM power harness to supply both the SAM controller and the amplifier.

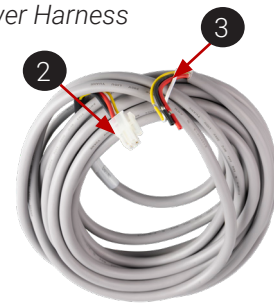
Installation Procedure

1. Connect the 2x2 male Microfit on the power splitter harness (060-1166) to the SAM POWER port.
2. Connect the 2x2 female Microfit on the splitter to the SAM power harness (PH2X2MFJR).
3. Connect the SAM power harness fly wires and fuses:
 - Connect the red fly wire to the supplied 10A fuse/holder, and wire the other side of the fuse holder to battery positive.
 - Connect the yellow fly wire on the SAM power harness to the supplied 1A fuse/holder, and wire the other side of the fuse holder to vehicle ignition.
 - Connect the black fly wire on the SAM power harness to battery negative.
4. Splice the red, black, and yellow fly wires from the power splitter harness to the amplifier power harness. For details, see "Audio Harnesses" on page 17.

Power Splitter



SAM Power Harness



Audio Harnesses

The audio connector runs from the SAM controller to the ground loop isolator, which plugs into the amplifier. The amplifier comes with a 1x3 power harness (including 5A inline fuse) and a 1x4 speaker harness.

Installation Procedure

1. Plug the male 1/8" (3.5mm) stereo jack on the audio connector (085-1096) into the SAM controller's **A/V** port.
2. Plug the audio connector's 2 male RCA jacks into the isolator pigtail's female RCA jacks (red to red, and black to white).
3. Connect the isolator pigtail's 2 male RCA jacks to the amplifier's RCA female LOW INPUT jacks (red to **R**, and white to **L**).
4. Wire the amplifier leg of the power splitter harness (060-1166 - see page 16) to the amplifier power harness:
 - a. Splice the red fly wire (**POWER**) from the amplifier power harness' inline 5A fuse to the red fly wire on the splitter harness.
 - b. Splice the black fly wire (**GROUND**) from the amplifier power harness to the black fly wire on the splitter harness.
 - c. Connect the orange (**REMOTE**) fly wire from the amplifier power harness to the yellow fly wire on the splitter harness. For more information, see the "Wiring Diagram" on page 13.
 - d. Plug the amplifier power harness' 1x3 connector into the amplifier **POWER** port.
5. Wire the speaker harness:
 - a. Splice the 2 green wires (right speaker) from the harness to an extension cable (060-1155). The harness striped green connects to the extension black; the harness green connects to the extension red.
 - b. Splice the 2 black wires (left speaker) from the harness to an extension cable (060-1155). The harness striped black connects to the extension black; the harness black connects to the extension red.
 - c. Plug the speaker harness' 1x4 connector into the amplifier **SPEAKER** port.
 - d. Connect the black and red wires from the right speaker's extension cable to the black and red fly wires from the right speaker horn.
 - e. Connect the black and red wires from the left speaker's extension cable to the black and red fly wires from the left speaker horn.

Audio Connector



Amplifier Power Harness



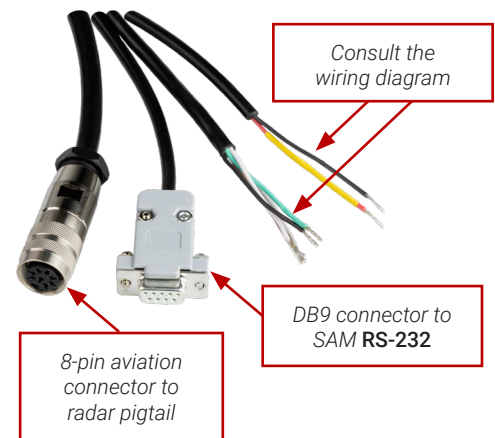
Speaker Harness



Radar I/O Harnesses

8-pin aviation connectors attach to forward and rear radar module pigtails through the bus side panel. From each radar module, three harness legs run into the bus:

- Serial leg (DB9 connector) to the SAM controller **RS-232** port
- Power leg (2-wire) to battery positive (via 5A fuse) and battery negative
- SAM I/O leg (5-wire) - for details, consult the wiring diagram



Harness Labels

Use the supplied labels to identify forward/rear harnesses and the serial and I/O legs. For details, see "Wire looms" on page 8.

Installation procedure

1. Ensure forward and rear I/O harnesses are connected to radar module pigtails (8-pin aviation connectors) and routed appropriately into the bus. For more information, see "Mounting Radar Modules" on page 12.
2. Connect the red wires from the 2 radar harness power legs to the 5A fuse holder (470-0012G)/5A fuse (420-0007G).
3. Wire the other side of the 5A fuse holder to battery positive.
4. Connect the black wires from the 2 radar harness power legs to battery negative.
5. Connect the fly wires on each radar harness SAM I/O leg as detailed in the wiring diagram on page 13.
6. Plug one of the DB9 connectors into the SAM controller's **RS-232** port. Coil and stow the other serial cable leg/DB9 connector in an appropriate location near the SAM so it's available to connect to the RS-232 port when required.

Temporary DB9 Connections to SAM

Forward and rear radar I/O harness serial legs must be temporarily connected to the SAM RS-232 port (one at a time) during PSA configuration and logging. These connections are not required for normal system operation. For more information see the *PSA User Guide* (700-1176).

Soft-mounting Serial/DB9 Harness Legs

If the SAM controller is mounted above the windshield, we recommend against permanently installing the serial/DB9 cable runs all the way up to the bulkhead. Instead, run the serial cable legs into the bus beside the driver, and find a convenient location (such as the switch panel or side compartment) to coil and stow the excess length. Temporarily connect the serial/DB9 cables to the SAM RS-232 port for configuration and logging, then stow away when not in use.

Support Information

Contact customer service

- Technical Support: 1.844.899.7366
- General Enquiries: 1.877.630.7366
- Email: service@seon.com

If your PSA system is to be returned, please contact Technical Support, and provide the model and/or serial number of your unit. Ask for a Return Merchandise Authorization (RMA) number. An RMA number allows the Service Technicians to better track your product when it comes in for service. Please show the RMA number on the outside of the package. ANY RETURNED PRODUCT WITHOUT AN RMA NUMBER MAY BE REFUSED.

Product information

For product information and related documentation, please visit the Safe Fleet Community:

- <https://community.seon.com/>

Please contact Technical Support if you do not have credentials to log in.

Warranty

Complete warranty details are available at:

<https://www.seon.com/documents/Seon-Warranty.pdf>