

Model SS201 Series Electronic Siren/Light Control System with SIGNALMASTER[®] Directional Light

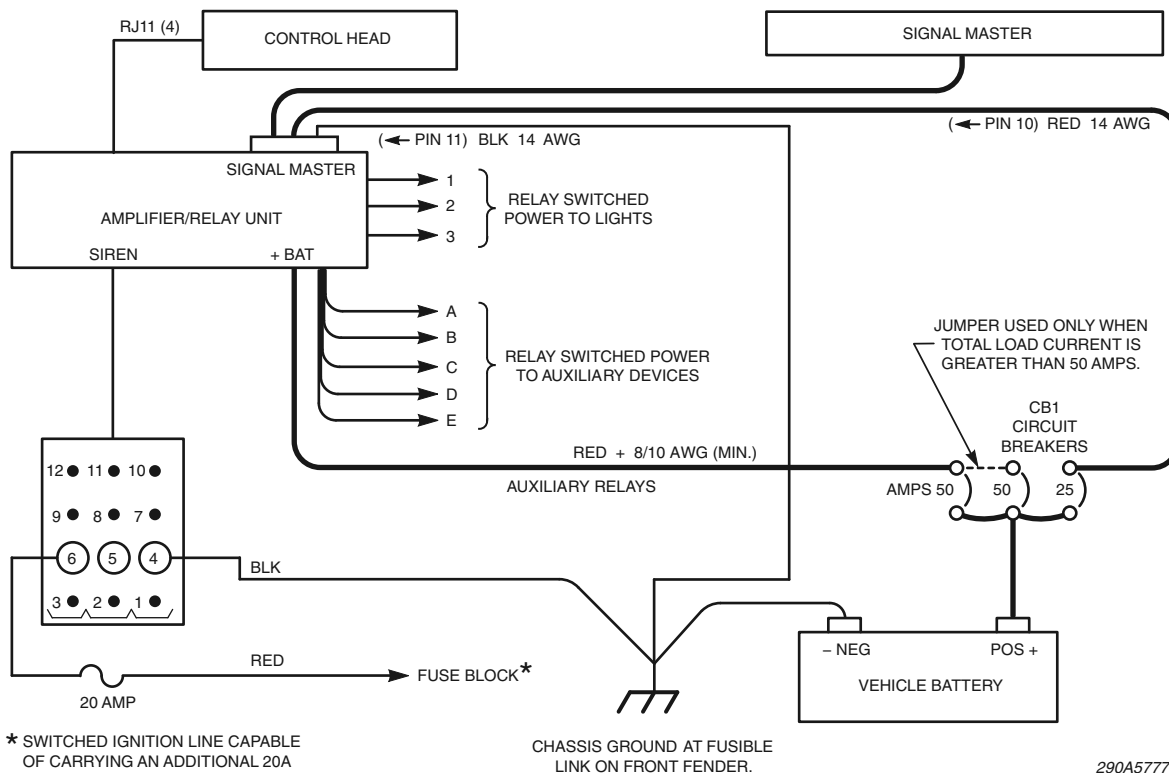


Installation and Service Manual

Important Wiring Information

⚠ WARNING

The Federal Signal SMARTSIREN® Model SS201 is an advanced microprocessor-based siren system. Unlike conventional siren systems, the Model SS201 WILL malfunction or operate incorrectly if you fail to follow proper installation procedures. Refer to the wiring diagram below and pay special attention to the Wiring Checklist. For complete wiring instructions, see Chapter 3 on page 10 and Chapter 4 on page 14.



Block Wiring Diagram

Wiring Checklist

1. Is the red wire from the twelve-pin SIREN connector (pin 6) connected to a point on the fuse block that is powered in the RUN and START positions? Use an in-line 20 A fuse.	YES <input type="checkbox"/>
2. Is the black wire from the twelve-pin connector (pin 4) connected to the fusible link at the front fender between the negative (- NEG) battery terminal and chassis ground? This is the ONLY chassis ground allowed for this wire.	YES <input type="checkbox"/>
3. AUXILIARY RELAY/SIREN POWER: Is an 8 AWG or 10 AWG wire connected to the load side of the 50/100 A circuit breakers? Route the wire through the hole labeled +BAT on the amplifier/relay unit and attach it to the lug on the circuit board. Use a 10 AWG wire with the 50 A circuit breaker. Use an 8 AWG wire with the 100 A circuit breaker.	YES <input type="checkbox"/>
4. SIGNALMASTER POWER: Is the 14 AWG wire (pin 10 of the eleven-pin connector) connected to the load side of the 25 A circuit breaker?	YES <input type="checkbox"/>

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Chapter 1 An Overview of the Model SS201 Series

Topics:

- Product Overview
 - System Specifications
 - Siren Specifications
 - SIGNALMASTER Specifications
 - Relay Specifications
-

Product Overview

The Federal Signal Model SS201 is a full-featured electronic siren and light control system. The system has a high degree of reliability and a compact size through the use of a CMOS microprocessor and other integrated circuits. State-of-the-art microprocessor technology produces a system with a small, compact control head and an amplifier/SIGNALMASTER™ control/relay unit that can be remotely mounted. The six-button control head with a three-position slide switch operates all lighting and siren functions.

Siren Tones, Air Horn, and Public Address

The SS201 is designed to operate with one or two 11-ohm-impedance speakers. The single speaker or pair can be either low power (58 W) or high power (100 W). Two speakers must be connected in parallel and in phase. The SS201 produces wail and yelp siren tones as well as an air horn sound. The horn ring control of siren tones is transferred only in slide-switch positions 2 and 3 of the control head, which are non-programmable.

Public address (PA) is available with a Federal Signal Model MNCT-SB microphone or with a common microphone. Push-button 5 on the control head can be used as a common microphone relay to power an installer-supplied audio-switching device. Radio rebroadcast is not available. Eight relay outputs are available for control of lightbars, other auxiliary lights, and accessories. In addition, a SIGNALMASTER controller is integrated into the system.

SIGNALMASTER Control

The SS201 controls the SIGNALMASTER with push-button 3 in the top right position on the control head. The SIGNALMASTER generates the directional signals Left, Right, and Center Out, and Warn 4. For the warning patterns, see *Tables 6.3 and 6.4* on page 25.

The SS201 is not programmable. For programmable features we recommend Models SS2000SS and SS2000SM.

Installation and Connections

The SS201 may be installed in the trunk, under the seat, or under the dash of any vehicle with a 12-volt, NEGATIVE-ground electrical system. Installation and service is simplified through plug-in cables and printed circuit boards. The siren circuits are protected by an in-line fuse that is replaceable without tools. Relay outputs are protected by individual fuses. The control head and the SS201 are connected through a telephone-type, four-conductor cable with standard modular phone connectors at both ends for simple installation.

System Specifications

Input Voltage	11 Vdc to 15 Vdc
Polarity	Negative ground only
Operating Temperature Range	-30 °C to +80 °C
Standby Current	Less than 0.5 A
Dimensions:	
Amplifier/SIGNALMASTER Control/Relay Unit	
Height	3.13 in (7.95 cm)
Width	6.38 in (16.19 cm)
Length	6.25 in (15.87 cm)
Net Weight	3.75 lb (1.70 kg)
Control Head	
Height	3.13 in (7.95 cm)
Width	1.25 in (3.18 cm)
Length	2.94 in (7.48 cm)
Net Weight	9.63 oz (0.273 kg)
Shipping Weight	6.8 lb (3.08 kg)

Siren Specifications

Operating Current (no lamps on)	9 A (nominal) (13.6 V battery, 11-ohm load at high power)
Frequency Range	725 to 1600 Hz
Nominal Cycle Rate	Wail: 12 cycles per minute Yelp: 180 cycles per minute
Nominal Voltage Output	64 V peak-to-peak (siren tones)
Audio Response	300 Hz to 3000 Hz \pm 3 dB
Audio Power	45 W in PA Mode (typical with 1.4 V peak-to-peak input)
Harmonic Distortion	Less than 10 percent from 5 to 45 W
Input Impedance (PA)	4000 ohms (nominal)
Siren Tone Compliances	SAE J1849 JUL89

SIGNALMASTER Specifications

Fuse	25 A (halogen) 7.5 A (LED and CUDA TRIOPTIC™ 6- and 8-module)
Output Drive Capability (Total)	Eight lamps at 27 W each
Normal Flash Rate	
Directional	Approximately 35 patterns per minute
Warn	Approximately 60 patterns per minute

Relay Specifications

Relay	Fuse Capability
K1	20 A
K2	20 A
K3	Two 20 A fuses for a total of 40 A
KA, KB, KC, KD, KE	10 A each

Chapter 2 Mounting the SS201 System

Topics:

- Safety Messages to Installers of Federal Signal Electronic Sirens
 - Unpacking the SS201 System
 - Selecting the Location of the Amplifier/Relay Unit
 - Installing the SIGNALMASTER Light Assembly
 - Installing the Mounting Bracket for the Amplifier/Relay Unit
 - Mounting the Control Head
-

Safety Messages to Installers of Federal Signal Electronic Sirens

WARNING

People's lives depend on your proper installation and servicing of Federal Signal products. It is important to read and follow all instructions shipped with this product. In addition, listed below are some other important safety instructions and precautions you should follow:

Before Installation

Qualifications

- To properly install an electronic siren you must have a good understanding of automotive electrical procedures and systems, along with proficiency in the installation and service of safety warning equipment. Always refer to the vehicle's service manuals when performing equipment installations on a vehicle.

Sound Hazards

- Your hearing and the hearing of others, in or close to your emergency vehicle, could be damaged by loud sounds. This can occur from short exposures to very loud sounds, or from longer exposures to moderately loud sounds. For hearing conservation guidance, refer to federal, state, or local recommendations. OSHA Standard 1910.95 offers guidance on "Permissible Noise Exposure."
- All effective sirens and horns produce loud sounds (120 dB) that may cause permanent hearing loss. Always minimize your exposure to siren sound and wear hearing protection. Do not sound the siren indoors or in enclosed areas where you and others will be exposed to the sound.
- Federal Signal siren amplifiers and speakers are designed to work together as a system. Combining a siren and speaker from different manufacturers may reduce the warning effectiveness of the siren system and may damage the components. You should verify or test your combination to make sure the system works together properly and meets federal, state and local standards or guidelines.

During Installation

- Do NOT get metal shavings inside the product. Metal shavings in the product can cause the system to fail. If drilling must be done near the unit, place an ESD approved cover over the unit to prevent metal shavings from entering the unit. Inspect the unit after mounting to be sure there are no shavings present in or near the unit.

- Do NOT connect this system to the vehicle battery until ALL other electrical connections are made, mounting of all components is complete, and you have verified that no shorts exist. If wiring is shorted to vehicle frame, high current conductors can cause hazardous sparks resulting in electrical fires or flying molten metal.
- Be sure the siren amplifier and speaker(s) in your installation have compatible wattage ratings.
- In order for the electronic siren to function properly, the ground connection must be made to the NEGATIVE battery terminal.
- Sound output will be severely reduced if any objects are in front of the speaker. If maximum sound output is required for your application, you should ensure that the front of the speaker is clear of any obstructions.
- Install the speaker(s) as far forward on the vehicle as possible, in a location which provides maximum signaling effectiveness and minimizes the sound reaching the vehicle's occupants. Refer to the National Institute of Justice guide 500-00 for further information.
- Mounting the speakers behind the grille will reduce the sound output and warning effectiveness of the siren system. Before mounting speakers behind the grille, make sure the vehicle operators are trained and understand that this type of installation is less effective for warning others.
- Sound propagation and warning effectiveness will be severely reduced if the speaker is not facing forward. Carefully follow the installation instructions and always install the speaker with the projector facing forward.
- Do NOT install the speaker(s) or route the speaker wires where they may interfere with the operation of air bag sensors.
- Installation of two speakers requires wiring speakers in phase.
- Never attempt to install aftermarket equipment, which connects to the vehicle wiring, without reviewing a vehicle wiring diagram available from the vehicle manufacturer. Insure that your installation will not affect vehicle operation and safety functions or circuits. Always check vehicle for proper operation after installation.
- Do NOT install equipment or route wiring or cord in the deployment path of an air bag.
- Locate the control head so the vehicle, controls, and microphone can be operated safely.
- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged.

After Installation

- After installation, test the siren system and light system to ensure that it is operating properly.
- Test all vehicle functions, including horn operation, vehicle safety functions and vehicle light systems, to ensure proper operation. Ensure that installation has not affected vehicle operation or changed any vehicle safety function or circuit.
- After testing is complete, provide a copy of these instructions to the instructional staff and all operating personnel.
- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the product.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

RETAIN AND REFER TO THIS MESSAGE

Unpacking the SS201 System

After unpacking the SS201 System, examine it for damage that may have occurred in transit. If the product has been damaged, file a claim immediately with the carrier stating the extent of damage. Carefully check all envelopes, shipping labels, and tags before removing or destroying them. Ensure that the parts listed in *Table 2.1* are contained in the packing carton.

Table 2.1 Kit contents list

Qty.	Description	Part Number
1	Plug, Right Angle, 7-Position	140338-07
1	Plug, Right Angle, 11-Position	140338-11
1	Cable Assy., Telephone, 25 ft	146863
1	Fuse, 7.5 A, 32 V, Autofuse	148A142-04
1	Fuse, 25 A, 32 V, Autofuse	148A142-07
1	Circuit Breaker, 25 A	152118-25
2	Label, Warning, Siren	1612339
1	Power Cable, Assy., SmartSiren	17684-06
1	Terminal, Fuse Adapter	224256
1	Terminal, Mini ATF Adapter	224260
1	Term, QD, 250 RCPT, 22-18	224A216-01
1	Jumper, Two-Position	233A198
1	Instructions, SmartSiren Wiring	2561644
1	Card, Safety Messages	256B691
2	Screw, Machine, Hex Head, Black, 1/4-20	7000A323-07
2	Screw, Cap, Hex Head, 1/4-20	7002A000-12
2	Screw, Thread-Forming, Type B, #10	7011A047-08
2	Screw, Thread-Forming, Pan Head, #14	7011A114-12
4	Screw, Hi-Lo Pan Head, #6-19	7017A035-06
2	Screw, Machine, Cap Head, 10-32	7000A070-07
2	Nut, Machine, Hex, Double Chamfered 1/4-20	7059A018
4	Lockwasher, Split, #6	7074A001
4	Lockwasher, Split, 1/4	7074A015
2	Lockwasher, Ext Tooth, #10	707A031
1	Link, Bus	8474A139
1	Circuit Breaker, 12 V, 50 A	8474176
1	Bracket, Mounting, Siren	85361059
2	Bracket Assy., 6-Button Control Head	8623120
1	Insert, Legends, 6-Button Control Head	8572294-04

Selecting the Location of the Amplifier/Relay Unit

⚠ WARNING

AIRBAG DEPLOYMENT

Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury to you or others.

NOTICE

UNIT IS NOT WATERPROOF

The SS201 amplifier/relay unit housing is **NOT** waterproof. It must be mounted in a location that is sheltered from falling rain, snow, standing water, etc.

NOTICE

UNIT REQUIRES VENTILATION

The SS201 amplifier/relay unit needs to radiate heat. Do not install it in an area where it cannot dissipate heat into the air. Do not mount the unit near a heater duct or under the hood.

When selecting a mounting location for the Model SS201 Amplifier/SIGNALMASTER Control/Relay Unit (amplifier/relay unit) and the control head, keep in mind any limitations due to cable length. Before performing any installation, see the block wiring diagram on the inside front cover and plan all wiring and cable routings.

Suggested mounting locations for the amplifier/relay unit are under the dash, under the front seat, or in the trunk under the rear deck near the rear-seat speakers. To maintain the reliability of the amplifier/relay unit, which is cooled by natural air flow, ensure that there is enough room for the flow of air.

Installing the SIGNALMASTER Light Assembly

Install the SIGNALMASTER light assembly according to the instructions included with it. Route the cable near the planned location of the amplifier/relay unit.

Installing the Mounting Bracket for the Amplifier/Relay Unit

This section has instructions for installing the mounting bracket for the amplifier/relay unit in preparation for mounting the unit after all electrical connections are completed. The bracket enables the unit to be easily removed for wiring and servicing.

NOTICE

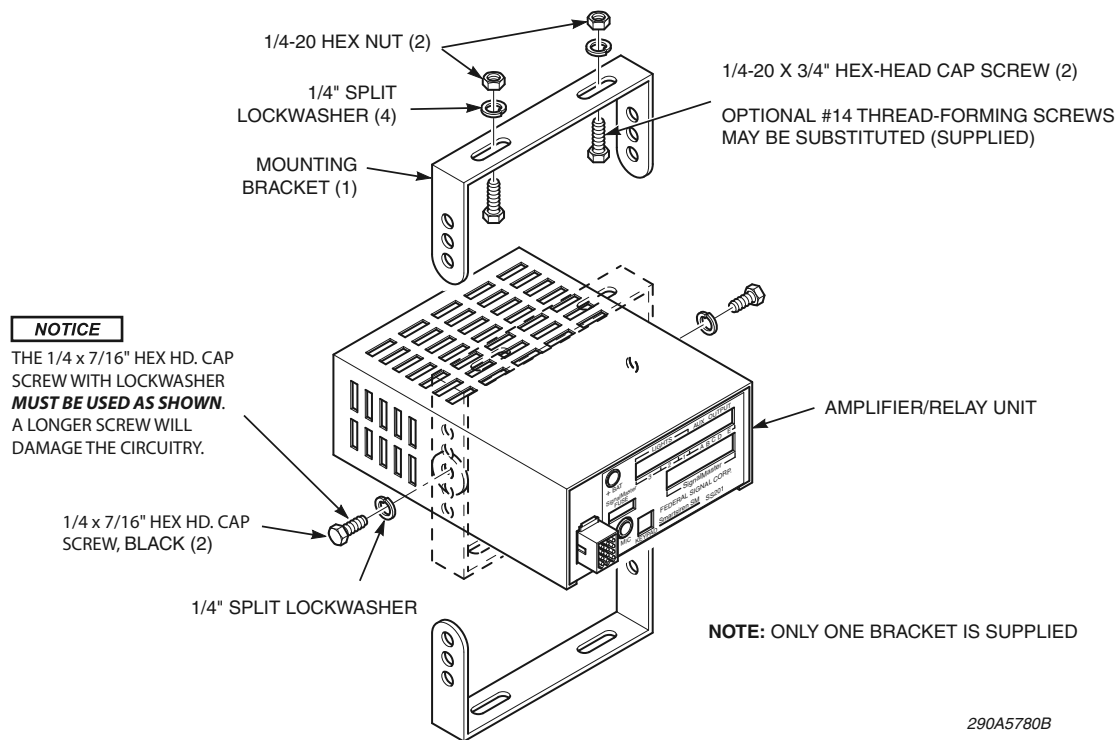
DRILLING PRECAUTIONS

Before drilling holes, check that the area you are drilling into to be sure that you do not damage vehicle components. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

1. Use the mounting bracket as a template to scribe two drill-position marks at the selected mounting location.
2. Drill two mounting holes at the drill-position marks.
3. Secure the mounting bracket to the mounting surface with the 1/4-20 x 3/4 hex head screws, 1/4 split lockwashers, and 1/4-20 hex nuts as shown in *Figure 2.1* on page 8.

NOTE: The #14 thread-forming screws may be used instead of the 1/4-20 x 3/4 hex head screws.

Figure 2.1 Positions for the mounting bracket for the amplifier/relay unit



Mounting the Control Head

⚠ WARNING

DO NOT MOUNT UNIT ON PADDED SURFACE

Unreliable switch activation and loss of “tactile feedback” will result if the method of mounting the control head allows movement. Do not mount the control head on padded surfaces.

Failure to heed this warning could result in driver distraction or driver error while operating the vehicle.

⚠ WARNING

LOCATING OPERATOR CONTROLS

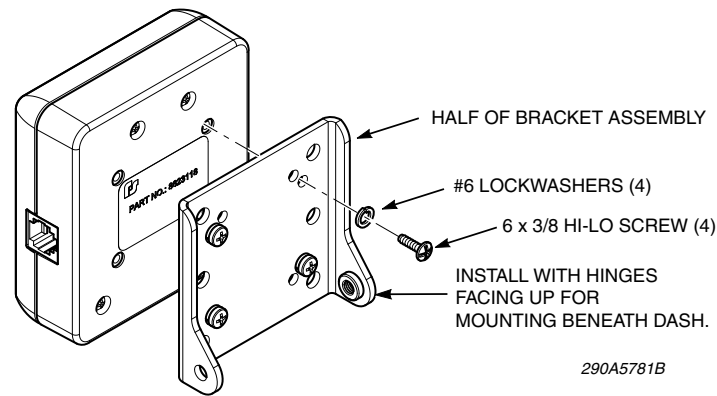
Choose a location for the control head that allows the vehicle, controls, and microphone to be operated safely under all driving conditions.

Failure to heed this warning could result in driver distraction or driver error while operating the vehicle.

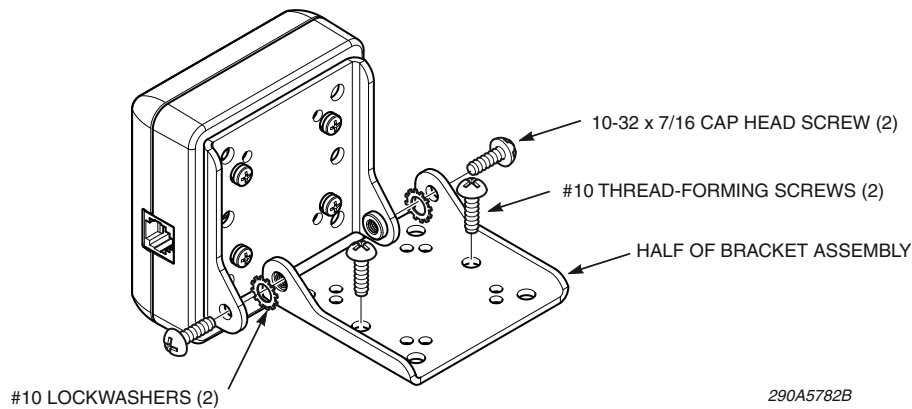
The hinged mounting bracket enables you to mount the control head in a variety of positions. If you position the bracket above the control head, for example, you can mount it on the underside of the dash. If you position the bracket below the control head, you can mount it on any horizontal surface. After mounting the control head, you can adjust its angle forward and backward.

To mount the control head with the bracket:

1. Attach one bracket to the control head with the #6 Hi-Lo™ screws and #6 lockwashers (Figure 2.2 on page 9).

Figure 2.2 Installing the bracket for mounting above a surface

2. Attach the other half of the mounting bracket to the hinge with the 10-32 x 7/16 cap head screws and #10 lockwashers.

Figure 2.3 Mounting the control head**NOTICE****DRILLING PRECAUTIONS**

Before drilling holes, check that the area you are drilling into to be sure that you do not damage vehicle components. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

3. Use the mounting bracket as a template and scribe two drill positioning marks at the selected mounting location.
4. Drill two mounting holes at the position marks.
5. Secure the mounting bracket to the surface with the #10 thread-forming screws.
6. To adjust the angle of the control head, loosen the hinge screws, tilt the control head forward or backward, then securely tighten the screws.

Chapter 3 Connecting the Power Cable

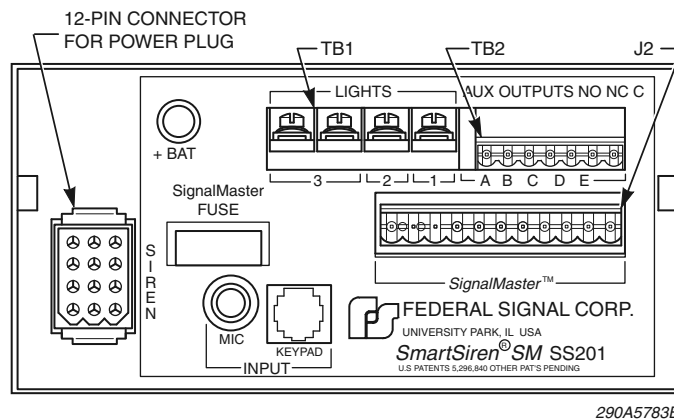
Topics:

- Connecting One or Two Speakers
- Transferring Horn Ring Control of Siren Tones
- Connecting the Park Siren Deactivator
- Connecting to the Power Source

This chapter describes how to connect the leads from the SS201 power cable. Additional wire (the same gauge or heavier) may be spliced to the leads if needed. See *Figure 3.2* on page 11 for the functions and colors of the power cable leads. The power cable has a twelve-pin plug that mates with the connector on the faceplate of the amplifier/relay unit (*Figure 3.1*). The cable is supplied with a 20 A in-line fuse.

NOTE: Fold and insulate these unused power cable leads: the purple wire from pin 8 and the brown radio wires from pins 9 and 12.

Figure 3.1 Faceplate on the back of SS201 amplifier/relay unit



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Connecting One or Two Speakers

The SS201 is designed to operate with one or two 11-ohm-impedance speakers. The single speaker or pair can be either low power (58 W) or high power (100 W).

Connecting One 100 W Speaker

1. Use 18 AWG wire to connect one speaker lead to the blue lead from the power cable.
2. Use 18 AWG wire to connect the other speaker lead to the single brown lead from the power cable. **Do not connect to the brown zip cord.**

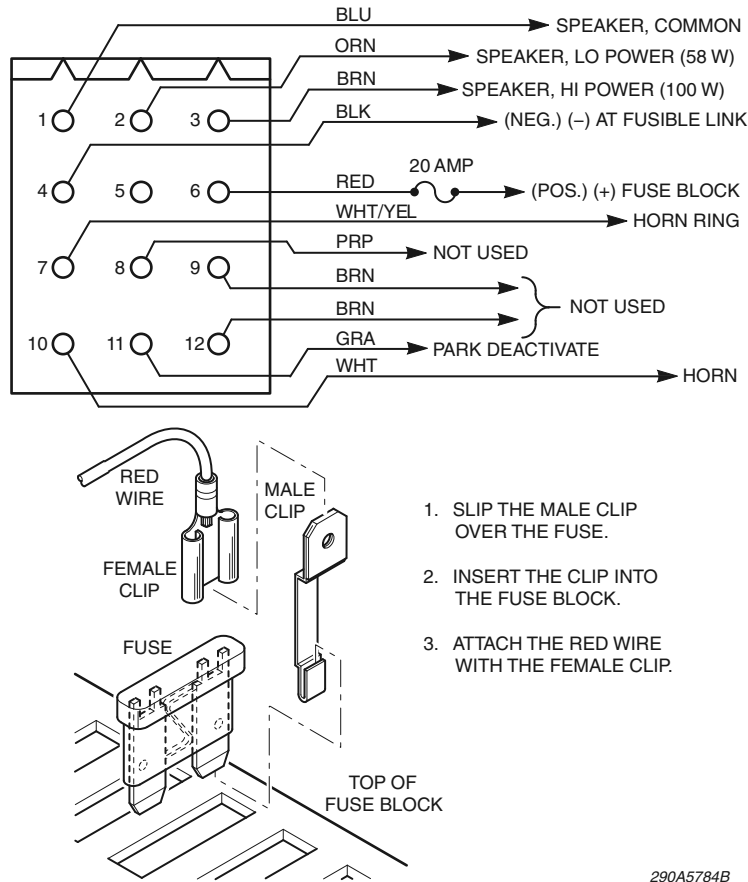
Connecting One 58 W Speaker

1. Use 18 AWG wire to connect one speaker lead to the blue lead from the power cable.
2. Use 18 AWG wire to connect the other speaker lead to the orange lead from the power cable.

Connecting Two 58 W or 100 W Speakers

Two speakers must be connected in parallel and in phase to the blue wire and single brown wire from the power cable.

Figure 3.2 Power cable and fuse clip adapter in the amplifier/relay unit



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Transferring Horn Ring Control of Siren Tones

The horn ring is transferred in slide-switch position 2 (peak and hold tone) and position 3 (cycles between wail and yelp tones). The slide switch positions are not programmable. For this procedure obtain a SPST relay of enough contact-current capacity to activate the vehicle horn. To use the horn ring control of siren tones, such as Tap II (push on/push off) and other siren features:

1. Cut the wire that connects the vehicle's horn ring switch to the horn or horn relay (*Figure 3.3* on page 12).
2. Splice the white/yellow wire from the power cable to the horn ring side of the wire that you cut in step 1. Insulate the splice with a wire nut.

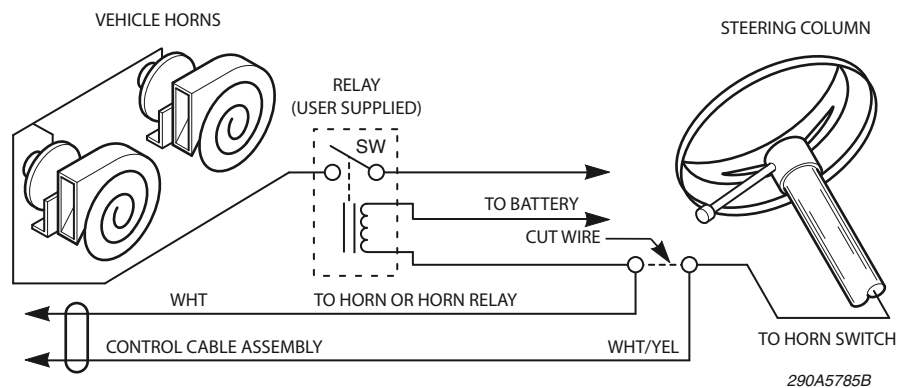
NOTICE

DETERMINE CURRENT FOR HORN

The horn ring transfer circuit of the siren can switch a maximum of 2 A. Some vehicles do not have a horn relay and consequently will draw more than 2 A when the vehicle horn is activated. Consult your vehicle service manual or a qualified mechanic to determine the current required to activate the horn. If it is less than 2 A, perform step 3. If it is greater than 2 A, perform steps 4 through 10.

3. Splice the white wire from the power cable to the horn side of the cut wire. Insulate the splice with a wire nut.
4. Obtain a SPST relay of enough contact-current capacity to activate the vehicle horn.
5. Mount the relay in a suitable location.
6. Connect the horn side of the wire cut in step 1 to the relay-contact terminal.
7. Determine the “sense” of the vehicle’s horn ring activation circuit: Does the horn circuit require a switched positive voltage or switched ground for activation?
8. Connect the switched relay-contact terminal to the positive or negative potential you determined in step 7.
9. Connect the white wire from the power cable to one end of the relay coil.
10. Connect the other end of the relay coil to the opposite potential of that connected to the switched relay contact terminal in step 8.

Figure 3.3 Horn ring connections



Connecting the Park Siren Deactivator

IMPORTANT: It is the installer’s responsibility to determine an appropriate location in the vehicle circuitry to connect the gray PARK DEACTIVATE wire (*Figure 3.2* on page 11).

This feature uses the PARK DEACTIVATE wire to automatically deactivate siren tones when the vehicle is shifted into PARK. To use this feature, connect the power cable’s gray wire to a vehicle circuit that is grounded when the vehicle is shifted into PARK.

Connecting to the Power Source

The SS201 must operate from a 12-volt NEGATIVE-ground vehicle electrical system. Therefore, before making any electrical connections, verify the polarity of the vehicle’s electrical system ground.

NOTICE

ROUTE WIRES PROPERLY

If you do not route wiring properly, transient noise pulses caused by the automotive power system or surge currents due to switching inductive or incandescent lamp loads may cause malfunctions in the SS201.

The red (positive) power cable lead from the amplifier/relay unit should be as short and direct as possible to the fuse block or installer-supplied switch. The switch must have a current capacity of at least 20 A. **Do not splice the red lead to the power leads for accessories.**

The black (negative) power-cable lead from the amplifier/relay unit should be as short and direct to the fusible link on the front fender as possible. **Do not splice to accessory negative (black) leads.**

IMPORTANT: The SS201 does not have an on-off switch. If power for the SS201 is obtained directly from the vehicle battery, the system continuously draws approximately 0.5 A and will eventually discharge the vehicle's battery. It is RECOMMENDED that power for the amplifier/relay unit be obtained from a vehicle circuit that is powered in the RUN and START positions. Power can also be obtained from an installer-supplied switch with a current capacity of at least 20 A.

NOTICE

DRILLING PRECAUTIONS

Before drilling holes, check that the area you are drilling into to be sure that you do not damage vehicle components. All drilled holes should be deburred and all sharp edges should be smoothed. All wire routings going through drilled holes should be protected by a grommet or convolute/split loom tubing.

Power for the amplifier/relay unit can be obtained from the vehicle's fuse block or a 20 A fused, switched circuit. When obtaining power from the vehicle's fuse block, refer to the vehicle's wiring manual to ensure the unit will be powered in the RUN and START positions.

1. After planning where to route the cables, drill a routing hole for cables and leads.
2. Smooth, deburr, and insert a grommet in the hole.
3. Route the red (+) power-cable lead to the fuse block or installer-supplied switch. When you route the red (+) lead to the fuse block, install the supplied fuse clip adapter as described in the next three steps and in *Figure 3.2* on page 11.
 - a. Slip the fuse-clip adapter over the fuse.
 - b. Insert the adapter clip/fuse into the applicable fuse block location (refer to the vehicle's wiring manual) with the adapter-clip end toward the top of the fuse block. Make sure that the selected fuse block location is capable of supplying an additional 20 A.
 - c. Attach the power cable's red wire on the fuse clip.
4. To protect the wires, use the in-line fuse-holder and 20 A fuse. The fuse-holder and fuse should be installed in the red (+) lead as close as practical to the power source.

NOTICE

WIRING PRECAUTION

To avoid damage to the equipment, do not make any connections to the battery until all other wiring is completed.

5. Route the black (–) power-cable lead through the drilled hole into the engine compartment and through existing clamps and holders toward the fusible link on the front fender. **Do not make any connections to the battery until all other wiring is completed.**

Chapter 4 Connecting the Control Head and Accessories

Topics:

- Connecting the Lightbar and Auxiliary Lights
- Connecting the SIGNALMASTER Lights
- Connecting the Control Head
- Connecting a Microphone
- Connecting a Common Microphone

Connecting the Lightbar and Auxiliary Lights

The SS201 has two terminal strips (TB1 and TB2) for the control of lightbars, auxiliary lights, and accessories (*Figure 3.1* on page 10). A total of eight fused relay-controlled outputs are available. Each output switches a nominal +12 volts to the controlled device. **Do not use the black wire in the power cable for grounding the switched device(s). Ground the switched devices separately.** For additional precautions and details, refer to the installation instructions provided with the lightbar or auxiliary light.

Fuse current ratings and suggested uses for each output are shown in *Table 4.1*.

Table 4.1: Output ratings

Output Terminal	Fuse	Rating	Relay	Suggested Applications
LIGHTS 1	F1	20 A	K1	Rear flashing lights
LIGHTS 2	F2	20 A	K2	Front flashing or secondary warning lights
LIGHTS 3	F3A and F3B	Two 20 A = 40 A total	K3	Rotating or primary lights
A–E	FA, FB, FC, FD, FE	10 A each	KA, KB, KC, KD, KE	Auxiliary lights (takedown, alley, etc.)

NOTE: Output E provides both normally open/normally closed (NO/NC) and common contacts. By removing the fuse labeled FE, output E can be isolated from the +12 V battery supply for switching other POSITIVE voltages.

After assigning devices to the relays, record them on the chart on page 37.

To complete the wiring to the lightbar or accessories:

1. Remove the cover from the SS201 by loosening the two 8-32 hex washer-head screws on the bottom of the unit. Slide the cover to expose the relay board and terminal strips.

NOTICE

REVERSE POLARITY

Reverse polarity may damage the relay board. To avoid damage to the board, ensure that the polarity is correct.

2. Use a flat-head screwdriver to loosen the lug on the relay board, which is the top board (*Figure 4.1*).
3. Strip 1/4 inch of insulation from a red wire that is a minimum 10 AWG. Use an 8 AWG red wire if the total load currents of the lightbar and auxiliary lights exceed 50 A.
4. Route the wire through the hole in the SS201 faceplate labeled +BAT and insert it the under the screw in the lug. Tighten the screw.

NOTICE

CONNECTION PRECAUTION

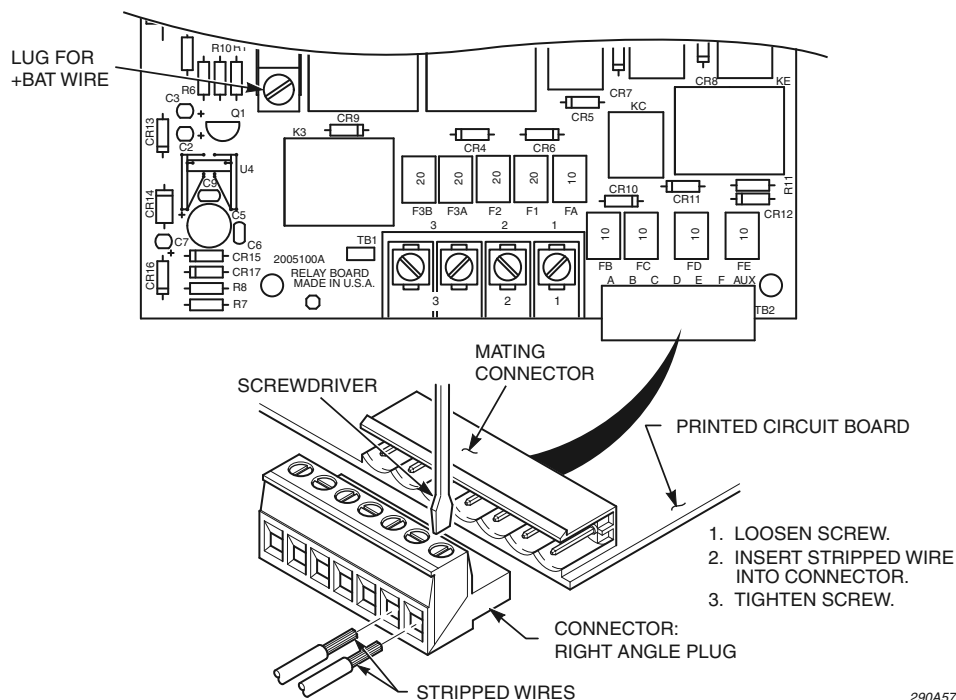
It is important to make a good connection at the lug terminal because the red wire provides the power source for all switched lighting functions.

NOTICE

WIRING PRECAUTION

To avoid damage to the equipment, do not make any connections to the battery until all other wiring is completed.

Figure 4.1 Right-angle plug on TB2 on relay board



- Route the red 8 AWG or 10 AWG wire from the lug on the relay board through the drilled hole into the engine compartment and through existing clamps and holders toward the battery. **Do not make any connections to the battery until all wiring is completed.**

⚠ WARNING

DO NOT EXCEED CURRENT RATING OF CB1

When making the following connections, never exceed the current rating of the circuit breakers (CB1) near the battery (*Figure 4.2*).

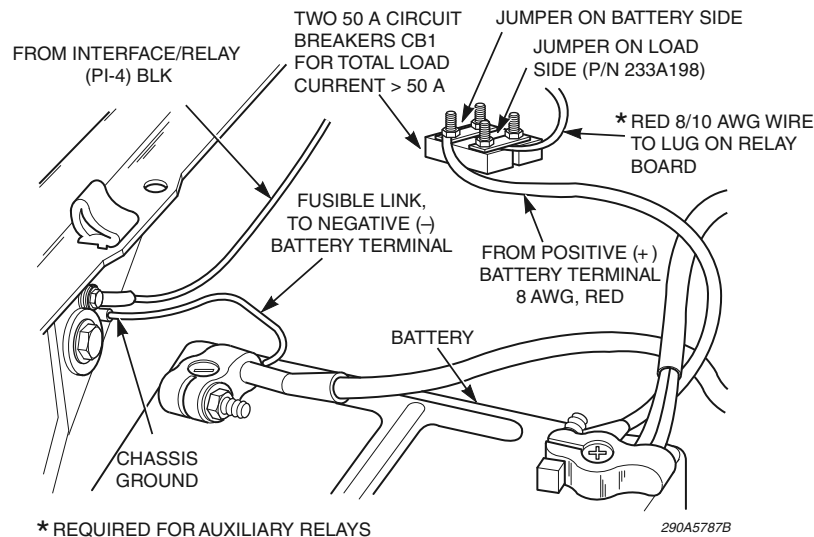
Failure to heed this notice will result in a shutdown of the vehicle warning system that could lead to serious injury to death to the driver or others.

- If the total load current is less than 50 A, protect the 10 AWG wire from the lug on the relay board with with a 50 A circuit breaker.

If the total load current is greater than 50 A, protect the 8 AWG wire from the lug on the circuit board with two circuit breakers (CB1) rated at 50 A each.

The single breaker or the pair, Federal Signal P/N 8474A176 or equivalent, should be connected as close as practical to the positive (+) battery terminal. To use the Federal Signal 50 A circuit breakers as a 100 A circuit breaker, add the supplied jumper between the two circuit breakers on the load side. **Do not remove the jumper on the battery side of the circuit breakers (*Figure 4.2*).**

Figure 4.2 Battery connections



NOTICE

DO NOT EXCEED FUSE CURRENT RATINGS

Never exceed the current ratings of the fuses. The installation of higher current fuses WILL damage the unit and void the warranty.

- Connect the wires from the lightbar or accessories to the terminals at TB1 or TB2 as applicable (*Figure 3.1* on page 10). All wire connections for TB2 are made with the right angle plug (*Figure 4.1* on page 15). For relay designations, see the faceplate on the SS201. Refer to the instructions packed with the lightbar or accessory for proper wire gauge, current requirements, and any additional instructions. **Do not exceed fuse ratings shown in *Table 4.1* on page 14.**

NOTE: Although TB1-3 (output 3) is rated at 40 A, the circuit is protected by two 20 A fuses that are connected in parallel. TB1-3 has two terminals in parallel to obtain the 40 A rating.

- When the current requirement for LIGHTS 3 exceeds 30 A, split the load between the two terminals of TB1-3 or connect the two terminals together with the supplied jumper (P/N 233A198).

⚠ WARNING

SHOCK HAZARD

Personal injury, vehicle component damage, and/or damage to the amplifier/relay unit will occur if the LIGHTS 3 terminal (TB1-3) is shorted to the chassis. Before replacing the chassis cover, ensure that the jumper (if installed) between the two terminals of TB1-3 will not short to the chassis.

NOTICE

CORRECTLY POSITION VENT SLOTS

Excess heat can damage the amplifier/relay unit. When sliding the cover on the chassis, ensure that the cover's vent slots are positioned over the transformer.

- Slide the cover onto the chassis and secure it with the two 8/32 hex washer-head screws.

Connecting the SIGNALMASTER Lights

⚠ WARNING

FIRE HAZARD

Do not connect more than one 6- or 8-module halogen SIGNALMASTER light assembly to a SIGNALMASTER controller or the SIGNALMASTER outputs of a SMARTSIREN®. Electrical fire or damage to the controller or siren will result.

The amplifier/relay unit is not supplied with a fuse installed for the SIGNALMASTER. The kit contains a 25 A and a 7.5 A fuse. Follow the appropriate installation instructions depending on whether the SIGNALMASTER halogen or LED.

Halogen SIGNALMASTER

- Route the SIGNALMASTER cable toward the amplifier/relay unit. Use caution to avoid scraping the wires on any sharp edges.
- Cut the cable to the required length.

NOTICE

WIRING PRECAUTION

To avoid damage to the equipment, do not make any connections to the battery until all other wiring is completed.

- Route installer-supplied red and black 14 AWG wires through the vehicle's firewall and toward the battery. Connect the red wire to one end of the supplied 25 A circuit breaker (P/N 152118-25). **Do not connect the other end of the circuit breaker to the positive (+) terminal until ALL wiring is completed.**
- Strip 1/4 inch of insulation from each wire at the eleven-position connector for insertion into the terminals on the eleven-pin connector. Insert the eight 22 AWG wires, the 16 AWG red wire, and the 14 AWG red and black wires into the connector as shown in *Figures 4.3* and *4.4* on page 18. Tighten the screw at each connector to secure the wires.

5. Insert the supplied 25 A fuse for the halogen SIGNALMASTER in the fuse holder in the back of the amplifier/relay unit.

Figure 4.3 SIGNALMASTER connections

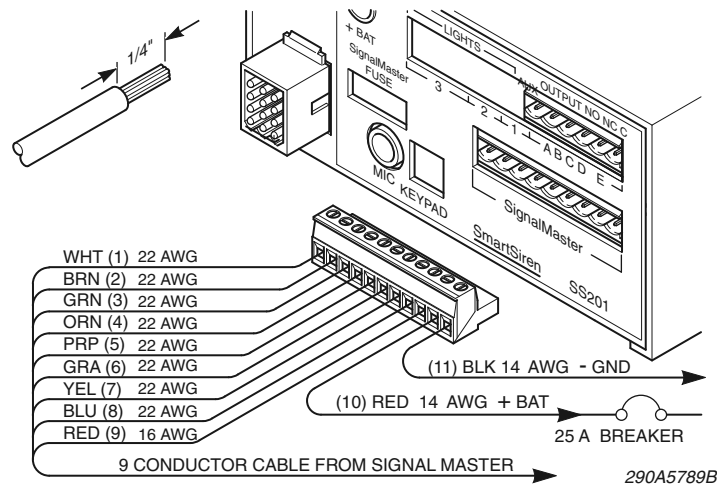
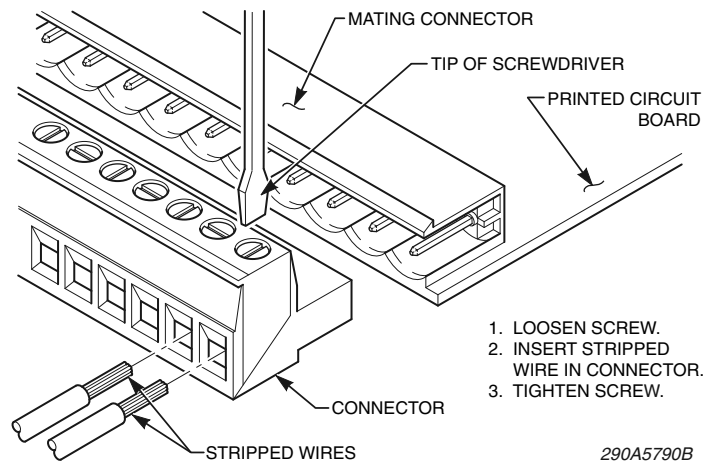


Figure 4.4 SIGNALMASTER eleven-pin connector



LED or CUDA TriOPTIC™ SIGNALMASTER

1. Unless previously routed, route the SignalMaster cable toward the amplifier/relay unit. Use caution to avoid scraping the wires on any sharp edges.
2. Cut the cable to the appropriate length as required.
3. Route installer-supplied black 14 AWG wire through the vehicle's firewall and toward the battery.
4. Route the installer-supplied red 14 AWG wire toward the ignition terminal. Connect the red wire to one end of the supplied 25 A circuit breaker (P/N 152118-25). **Do not connect the other end of the circuit breaker to the ignition terminal until ALL wiring is completed.**
5. Strip 1/4 inch of insulation off each wire for insertion into the eleven-pin connector.
6. Insert the eight 22 AWG wires, the 16 AWG red wire, and the 14 AWG red and black wires into the connector as shown in *Figures 4.3* and *4.4*. To secure the wires, tighten the screw at each connector.

7. Insert the supplied 7.5 A fuse for the LED or CUDA TRIOPTIC SIGNALMASTER (6- or 8-module models) in the fuse holder in the back of the amplifier/relay unit.

Connecting the Control Head

The SS201 control head and amplifier/relay unit are connected by a 20-foot, telephone-type cable, which comes in the kit. The cable has modular connectors.

NOTICE

WIRE CONTROL HEAD PROPERLY

The control head will not operate if the telephone-type cable is improperly wired. If it is necessary to shorten the four-conductor, telephone-type cable, ensure that the connections made to the modular connector are exactly the same as the original cable connections.

To connect the control head:

1. Route the 20-foot cable between the SS201 control head and the amplifier/relay unit. Secure the cable with installer-supplied clamps and hold-downs as needed.
2. Insert the modular connector in the KEYPAD receptacle on the faceplate of the amplifier/relay unit. To provide strain relief, secure it with installer-supplied clamps or wire ties
3. Insert the other modular connector in the receptacle on the control head. To provide strain relief, secure it with installer-supplied clamps or wire ties.

Connecting a Microphone

The SS201 is not supplied with a microphone. A Federal Signal Model MNCT-SB microphone can be plugged into the microphone jack (MIC) on the faceplate of the amplifier/relay unit.

If the amplifier/relay unit is remotely mounted, the Model RMK microphone extension kit is available from Federal Signal. Model RMK-V has volume control. Both models include a 20-foot extension cable with phone plug, jack, and dashboard mounting bracket.

Carefully route the extension cable from the microphone and the cable for the control head through the vehicle. Secure the cables with installer-supplied clamps and ties.

Connecting a Common Microphone

If the PA and RADIO transmitter are to share a common microphone, the audio switching must be performed by an installer-supplied switching device that is activated by +12 Vdc and rated at 1 A or less. For the common microphone, you can use relay KD to provide +12 Vdc to the switching device. Because the SS201 cannot be reprogrammed, push-button 5, which turns on and off relay KD, is used to control the common microphone. Push-button 5 is the middle of the bottom row on the control head (*Figure 6.1* on page 24).

To connect a common microphone, refer to the instructions provided with the audio-switching device. Connect the audio-switching device to the relay KD output.

Chapter 5 Final Installation and Inspection

Topics:

- Mounting and Testing the Amplifier/Relay Unit
 - Applying the Replaceable Keypad Labels
 - Testing the Installation
 - Distributing the Safety Message Card
 - Applying the Siren Safety Labels in the Vehicle
-

Mounting and Testing the Amplifier/Relay Unit

1. Secure the amplifier/relay unit to the mounting bracket with the BLACK 1/4-20 x 1/2 hex head screws and 1/4 split lockwashers (*Figure 2.1* on page 8). Ensure all fasteners are properly tightened.
2. Before connecting to the power source, visually check all connections and wiring.
3. Ensure that there are no loose wire strands or other bare wires that may cause a short circuit. Also, all wires must be protected from any sharp edges which could eventually cut through the insulation.
4. Use an ohmmeter to verify that a short circuit does NOT exist between the positive (+) and negative (-) power cable leads. Also, there must be NO short circuits between the positive (+) wires and the vehicle chassis.
5. Connect all black ground (-) wires from the SS201 to the fusible link on the front fender.
6. Ensure that all mechanical and electrical connections are secure.

⚠ WARNING

FIRE HAZARD

Do NOT connect this system to the vehicle battery until ALL other electrical connections are made and mounting of all components is complete. Failure to observe this WARNING may result in fire, burns, and blindness.

⚠ WARNING

FIRE HAZARD

If wires are shorted to the vehicle frame or each other, high-current conductors can cause hazardous sparks resulting in electrical fires and molten metal. Verify that no short circuits exist before connecting to the positive (+) battery terminal. Failure to observe this WARNING will result in fire, burns, and blindness

⚠ WARNING

BATTERY EXPLOSION

To avoid a battery explosion, always disconnect the negative battery cable first and reconnect it last. Avoid causing a spark when connecting near or to the battery. The gases produced by a battery can cause a battery explosion that could result in vehicle damage and serious injury.

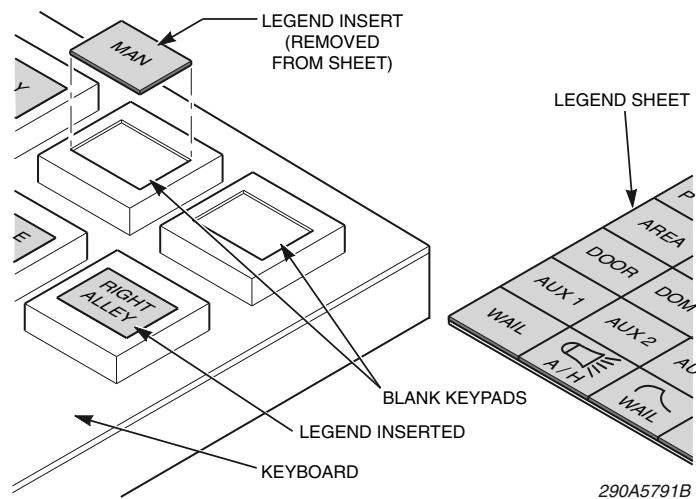
7. Connect the 8 or 10 AWG (minimum) red (+) wire from the +BAT lug on the relay board to the positive (+) terminal of 50 A circuit breaker at the vehicle battery.
8. Connect a 14 AWG red wire from the unused end of the 25 A circuit breaker at the SIGNALMASTER connector to the positive (+) terminal of the power source. Secure mechanical and electrical connections are required.
9. Complete the Wiring Checklist on the inside front cover of this manual.

Applying the Replaceable Keypad Labels

Replaceable keypad function labels identify the switches on the control head. A sheet of applicable function legends is supplied. See *Tables 6.1* and *6.2* on page 25 for a description of the keypad functions.

To apply the labels, select the appropriate labels from the supplied sheet of function legends. Peel the labels from the sheet and apply them to the keypad in the areas shown in (*Figure 5.1*). Verify that the label is properly tucked under the retaining ridge on the push-button.

Figure 5.1 Installing the keypad function labels



Testing the Installation

WARNING

SOUND HAZARD—All effective sirens and horns produce loud sounds (120 dB) that may cause permanent hearing loss. Always minimize your exposure to the sound of the siren and horn and wear hearing protection. Do not sound the siren or horn indoors or in enclosed areas where you and others will be exposed to the sound.

WARNING

LIGHT HAZARD—To be an effective warning device, an emergency warning system produces bright light that can be hazardous to your eyesight when viewed at a close range. Do not stare directly into the lights at a close range or permanent damage to your eyesight may occur.

After testing the installation, test the emergency warning system to ensure that it is operating properly. Also test all vehicle functions, including horn operation, vehicle safety functions, and vehicle lighting systems to ensure proper operation. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety functions or circuits.

Do not test the sound and light system of the vehicle while driving. Operating the vehicle warning systems may pose a hazard to the operator and other drivers if the systems do not function as expected. Test the vehicle only in a controlled environment. After testing is complete, provide a copy of these instructions to the instructional staff and all operating personnel.

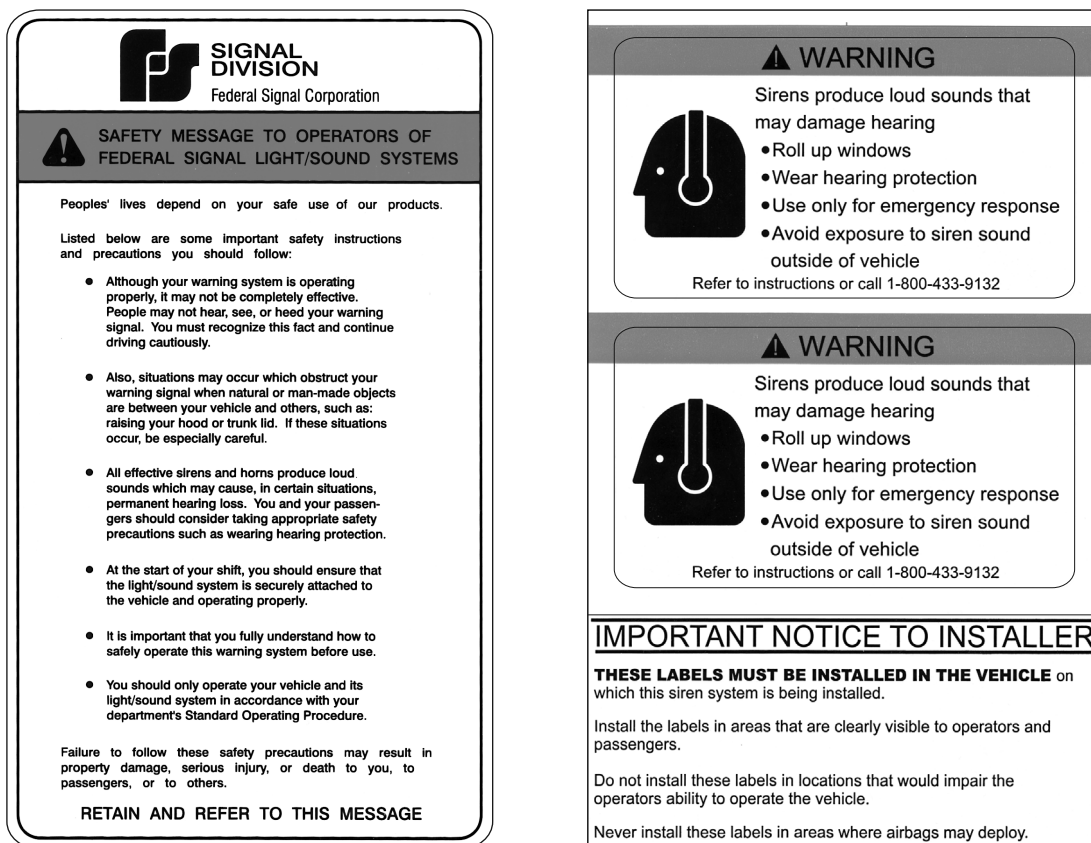
Distributing the Safety Message Card

Give the operator of the SS201 Siren System the card entitled “Safety Message to Operators of Federal Signal Light/Sound Systems” (part no. 256B691) (Figure 5.2). The operator must read and understand the safety instructions and keep the card in the vehicle for reference.

Applying the Siren Safety Labels in the Vehicle

The SS201 Siren System kit includes a sheet of two labels with siren safety messages (part no. 1612339) (Figure 5.2). These labels must be installed in the vehicle in which the system is installed. Place these labels in areas that are clearly visible to operators and passengers. Do not adhere the labels to locations that would impair the driver’s ability to operate the vehicle. Never install the labels in areas where air bags may deploy.

Figure 5.2 Safety message card (left) and siren safety labels (right)



Chapter 6 Operating the SS201

Topics:

- Safety Messages to Operators of Federal Signal Electronic Sirens and Sound/Light Systems
 - Using the Control Head
-

Safety Messages to Operators of Federal Signal Electronic Sirens and Sound/Light Systems

WARNING

The lives of people depend on your safe operation of Federal products. It is important to read and follow all instructions shipped with the products. In addition, listed below are some other important safety instructions and precautions you should follow:

Qualifications

- To properly use an electronic siren and speaker(s) you must have a good understanding of general vehicle operation, a high proficiency in the use of safety warning equipment, and thorough knowledge of state and federal UNIFORM TRAFFIC CODES.

Sound Hazards

- Your hearing and the hearing of others, in or close to your emergency vehicle, could be damaged by loud sounds. This can occur from short exposures to very loud sounds, or from longer exposures to moderately loud sounds. For hearing conservation guidance, refer to federal, state, or local recommendations. OSHA Standard 1910.95 offers guidance on “Permissible Noise Exposure.”
- All effective sirens and horns produce loud sounds (120 dB) that may cause permanent hearing loss. Always minimize your exposure to siren sound, roll up your windows and wear hearing protection. Do not sound the siren indoors or in enclosed areas where you and others will be exposed to the sound. Only use the siren for emergency response situations.

Sound Limitations

- Before using the vehicle, check to see if the siren speakers are concealed from view. If the siren speaker is not in clear view on the front of the vehicle, use extra caution when operating the vehicle. A concealed siren speaker installation is less effective at warning others.
- Maximum sound output will be severely reduced if any objects are in front of the speaker. If your installation has obstructions in front of the speaker, drive even more cautiously.
- Frequently inspect the speaker to ensure that it is clear of any obstruction, such as mud or snow, which will reduce maximum sound output.

Signaling Limitations

- Be aware that the use of your visual and audible signaling devices does not give you the right to force your way through traffic. Your emergency lights, siren, and actions are REQUESTING the right-of-way.
- Although your warning system is operating properly, it may not alert everyone. People may not hear, see, or heed your warning signal. You must recognize this fact and continue driving cautiously.

- Situations may occur which obstruct your warning signal when natural or man-made objects are between your vehicle and others. This can also occur when you raise your hood or trunk lid. If these situations occur, be especially careful.

Driving Limitations

- At the start of your shift, you should ensure that the light/sound system is securely attached to the vehicle and operating properly.
- If the unique combination of emergency vehicle equipment installed in your vehicle has resulted in the siren controls being installed in a position that does not allow you to operate them by touch only, OPERATE CONTROLS ONLY WHILE YOUR VEHICLE IS STOPPED.
- If driving conditions require your full attention, you should avoid operating the siren controls while the vehicle is in motion.

Continuing Education

- File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to new recruits and trainees.

Failure to follow these safety precautions may result in property damage, serious injury, or death to you, to passengers, or to others.

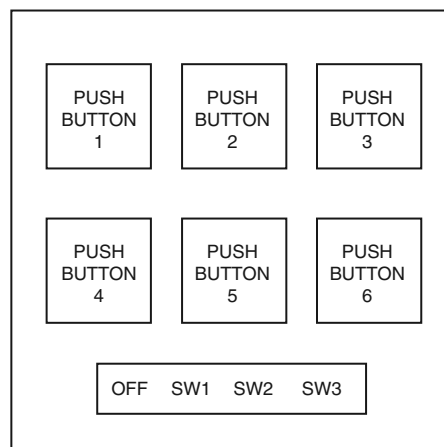
Using the Control Head

The SS201 control head is designed to help the operator select functions. Each control head switch is recessed and guides the operator's finger to the switch's center. When the operator presses a button, the selection is confirmed by tactile feedback: a click is felt, a beep sounds, and the button lights up.

For the functions of the slide switch and push-buttons, see *Tables 6.1* and *6.2* on page 25.

NOTE: The slide switch is independent of the push-button controls

Figure 6.1 Control head keypad



290A5793B

Table 6.1 Slide switch functions

Slide-Switch Position	Function
OFF	K1/K2/K3 off, no siren tone.
1	K1 on, K2/K3 off, Warn 1 pattern.
2	K11/K2 on, K3 off, no siren tone. Horn ring activates: peak and hold, Warn 2 pattern.
3	K1/K2/K3 on, siren tone on. Horn ring activates: cycles between wail to yelp, Warn 3 pattern.

Table 6.2 Push-button functions

Push-Button	Function
1	Cycles between wail and yelp sirens tones in slide switch position 3
2	Activates/deactivates air-horn siren tone
3	Activates the SIGNALMASTER and changes with each press of the button from directional signals Left, Right, Center Out, Warn 4 pattern, and Off
4	Changes with each press of the button from relays KA, KB, and KC
5	On/off control of relay KD
6	Momentary on/off control of relay KE

Table 6.3 SS201-6 warning patterns

Pattern	Number of Flashing Modules
Warn 1	1 and 1 alternate
Warn 2	2 and 2 alternate
Warn 3	3 and 3 alternate
Warn 4	2 center modules alternate with 2 outer modules

Table 6.4 SS201-8 warning patterns

Pattern	Number of Flashing Modules
Warn 1	1 and 1 alternate
Warn 2	2 and 2 alternate
Warn 3	3 and 3 alternate
Warn 4	4 center modules alternate with 2 outer modules

Chapter 7 Servicing the SS201

Topics:

- Safety Messages to Personnel Servicing Federal Signal Electronic Sirens
 - Disassembling and Servicing the Amplifier/Relay Unit
 - Reassembling the Amplifier/Relay Unit
 - Testing the SS201
 - Getting Replacement Parts
 - Getting Technical Support
 - Returning a Product to Federal Signal
 - Chart for Relay and Device Assignments
-

Safety Messages to Personnel Servicing Federal Signal Electronic Sirens

▲ WARNING

The lives of people depend on your proper servicing of Federal Signal products. It is important to read and follow all instructions shipped with the products. In addition, listed below are some other safety instructions and precautions you should follow:

- Read and understand all instructions in this manual before servicing the electronic siren or speaker.
- To properly service an electronic siren or speaker, you must have a good understanding of automotive electrical procedures and systems, along with proficiency in the installation and service of safety warning equipment. Always refer to the vehicle's service manuals when performing service on a vehicle.
- Electronic circuit and speaker repairs must be performed by a qualified and competent electronic technician.
- Your hearing and the hearing of others, in or close to your emergency vehicle, could be damaged by loud sounds. This can occur from short exposures to very loud sounds or from longer exposures to moderately loud sounds. For hearing conservation guidance, refer to federal, state, or local recommendations. OSHA Standard 1910.95 offers guidance on "Permissible Noise Exposure."
- All effective sirens and horns produce loud sounds (120 dB) that may cause permanent hearing loss. Always minimize your exposure to siren sound and wear hearing protection. Do not sound the siren indoors or in enclosed areas where you and others will be exposed to the sound.
- Do NOT connect this system to the positive terminal of the battery until servicing is complete, and you have verified that there are no short circuits to ground.
- In order for the electronic siren to function properly, the ground connection must be made to the NEGATIVE battery terminal.
- After repair, test the electronic siren and speaker system to ensure that it is operating properly.

- Federal Signal siren amplifiers and speakers are designed to work together as a system. Combining a siren and speaker from different manufacturers may reduce the warning effectiveness of the siren system and may damage the components. You should verify or test your combination to make sure the system works together properly and meets both federal, state and local standards or guidelines.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

Disassembling and Servicing the Amplifier/Relay Unit

The control boards in the amplifier/relay unit can be removed for replacement or service. For replacement boards, see *Table 7.3* on page 32. When replacing small components, use care when soldering. Heat easily damages transistors, capacitors, and circuit boards. It is therefore advisable to use long-nose pliers or a similar heat sink on the lead you are soldering.

The SS201 consists of three circuit boards stacked on top of each other. The top board is the relay board, the center board is the SIGNALMASTER controller board, and the bottom board is the amplifier board. To remove a lower board, you must remove the board or boards above it.

NOTICE

DISCONNECT RED WIRES TO SS201 BEFORE SERVICING

To avoid damage to the amplifier/relay unit, disconnect both red wires to the SS201 at the battery before servicing.

NOTICE

To prevent ESD (electrostatic discharge) damage to the circuitry, wear an anti-static wrist strap that is properly grounded.

Removing the Amplifier/Relay Unit from the Vehicle for Service

1. Unplug from the amplifier/relay unit the keypad, eleven-pin SIREN connector, and microphone.
2. To remove the amplifier/relay unit from the mounting bracket, remove the 1/4-20 x 3/4 hex head screws, 1/4 split lockwashers, and 1/4-20 hex nuts as shown in *Figure 2.1* on page 8.
3. Loosen the two 8-32 hex washer-head screws from the bottom of the chassis and slide the case off the unit.
4. Use a flat-head screwdriver to loosen the screws at terminal strips TB1 (LIGHTS) and the SIGNALMASTER.
5. Unplug the TB2 and SIGNALMASTER right-angle connectors.
6. Use a flat-head screw driver to loosen the screw securing the red +BAT wire from the lug on the board and remove the wire.

Removing the Relay Board

See *Figure 7.1* on page 34.

1. Disconnect these wires to the relay board:
 - a. Disconnect the red wire on the relay board at H1, the black ground wire at H2, and the red wire from the transformer at H3.
 - b. Use long-nose pliers to grasp the ribbon cable (JU1) directly above its black connector (P1) on the board below. Pull the cable straight out of the connector to avoid bending the pins.

2. Remove and retain these fasteners that secure the relay board to the chassis:
 - a. Use a Phillips screwdriver to remove the two 8-32 pan-head screws securing the board to the metal standoffs.
 - b. Use long-nose pliers to grasp the locking tab on one of the plastic standoffs at a point slightly above the board. Press the locking tab while gently pushing the board from underneath the tab until the corner of the board is free. Repeat this step with the other plastic standoff.
3. Remove the relay board from the chassis.

Removing the SMC (SIGNALMASTER Controller) Board

See *Figure 7.2* on page 35.

1. Remove the relay board as described in the previous section.
2. Remove and retain the SIGNALMASTER fuse.
3. Use pliers to grasp the ribbon cable (J1) directly above its black connector (J1) on the amplifier board below. Pull the cable straight out of the connector to avoid bending the pins.
4. Remove the two plastic standoffs with the 5/6-inch nut driver and retain them.
5. Remove the two metal standoffs with the 1/4-inch nut driver and retain them.
6. Remove the SMC board from the chassis.

Removing the Amplifier Board

See *Figure 7.3* on page 36.

1. Remove the SMC board as described in the previous section.
2. Unplug these wires to the amplifier board:
 - a. Disconnect the red wires from J10, J6, and J5. Be sure to retain the short red wire from J5 for reassembly.
 - b. Disconnect the blue wire from J8 and the black wire from J9.
 - c. Unplug the 8-pin SIREN connector from J7.
3. Remove the insulator on the J3 MIC jack for the SIGNALMASTER fuse. Be sure to retain it for reassembly.
4. To free the board from the chassis:
 - a. Remove the metal standoffs using a 1/4-inch nut driver and retain them.
 - b. Remove the plastic standoffs using a 1/4-inch nut driver and retain them.
 - c. Remove and retain the 6/32 screws and #6 split lockwashers securing the board to the two output transistors (Q3 and Q4).
5. Remove the amplifier board from the chassis.

Replacing the Fuse for the Control Head and Cable

A soldered sub-miniature fuse (F1) on the amplifier board provides short-circuit protection for the control head and cable. F1 is located next to the MIC jack J3 on the amplifier board (*Figure 7.3* on page 36). The failure of F1, although unlikely, causes the SS201 to be completely inoperative. If you suspect that the fuse has failed:

1. Remove the amplifier board as described in the previous section.
2. Check the fuse for continuity with an ohmmeter.
3. Replace the failed fuse with the same type and amperage listed in *Table 7.1* on page 32.

NOTE: Failure of the control head fuse is usually the result of a shorted control head cable or damage to the the control head cable during installation. Ensure that the cause of the failure of F1 is located and repaired before reapplying power to the control head.

Replacing the Output Transistors

The failure of one or both of the output transistors Q3 and Q4 on the amplifier board is usually the result of a short-circuited voice coil on the speaker. Rebroadcast of unquelled radio or music for long periods will also have a detrimental effect on the output transistors, and is therefore not recommended. If only one device proves to be defective, we recommend that both output transistors be replaced. The replacement of both output transformers will ensure long periods of service between failures.

When installing a new output transistor, ensure that the Sil-Pad[®] insulator is installed between the heat-sink and transistor (*Figure 7.3* on page 36).

Reassembling the Amplifier/Relay Unit

NOTICE

To prevent ESD (electrostatic discharge) damage to the control boards, wear anti-static wrist strap that is properly grounded.

To reinstall the circuit boards, begin with the lowest board removed from the stack. Make sure all connectors are properly seated.

Reinstalling the Amplifier Board

See *Figure 7.3* on page 36.

1. Secure the amplifier board to the chassis:

NOTICE

DO NOT OVERTIGHTEN FASTENERS

To avoid damage to the circuit board, do not overtighten the fasteners.

- a. To prevent the SIREN and ground wires from being caught between the chassis and the case, route the wires so that they exit next to J11 and the transformer,
- b. Place the amplifier board on the four standoffs. Center the holes in the board over the holes in the standoffs and output transistors.
- c. Insert and tighten the metal standoffs using the 1/4-inch nut driver.
- d. Insert and tighten the plastic standoffs using the 1/4-inch nut driver.

- e. Insert a 6/32 screw with a #6 split lockwasher into each of the two output transistors (Q3 and Q4). Tighten the screws.
 - f. Place the insulator on the J3 MIC jack with the insulator's hole around the metal standoff.
2. Plug in these internal wires:
 - a. Plug the 8-pin SIREN connector into J7.
 - b. Plug the red SIREN wire into J6.
 - c. Plug the short red wire into J5.
 - d. Plug the brown wire from the transformer into J10.
 - e. Plug one of the short black ground wires into J11.
 - f. Plug the blue wire from the transformer into J8.
 - g. Plug the long black ground wire into J9.

Reinstalling the SMC (SIGNALMASTER Controller) Board

See *Figure 7.2* on page 35.

1. Grasp the ribbon cable (J1) directly above the pins. Insert the pins straight into J1 on the amplifier board below. Make sure the pins are correctly seated.
2. Place the SMC board on the standoffs. Center the holes in the board over the holes in the standoffs and output transistors. Make sure the wires from the SIREN connector are clear of the board.

NOTICE

DO NOT OVERTIGHTEN FASTENERS

To avoid damage to the circuit board, do not overtighten the fasteners.

3. Insert and tighten the two metal standoffs using the 1/4-inch nut driver.
4. Insert and tighten the two plastic standoffs using the 5/6-inch nut driver.
5. Insert the 25 A or 7.5 A SIGNALMASTER fuse into the F1 connector.

Reinstalling the Relay Board and Vehicle Connections

See *Figure 7.1* on page 34.

1. Grasp the ribbon cable (JU1) directly above the pins. Insert the pins straight into JU1 on the SMC board. Make sure the pins are correctly seated.
2. Insert the auxiliary output connector into its cutout in the chassis.
3. Place the board on the standoffs.
4. Secure the relay board to the chassis:

NOTICE

DO NOT OVERTIGHTEN FASTENERS

To avoid damage to the circuit board, do not overtighten the fasteners.

- a. Press gently on the edges of the board near the standoffs to lock the plastic tabs on the board.
- b. Reinsert and tighten the two 8/32 screws securing the board to the metal standoffs.
5. Reconnect the red wire from the amplifier board (J5) at H1, the black ground wire at H2, and the red wire from the transformer at H3.
6. Reconnect these wires to the relay board from the vehicle:
 - a. Reconnect the red +BAT wire at the lug.

⚠ WARNING

SHOCK HAZARD

Personal injury, vehicle component damage, and/or damage to the amplifier/relay unit will occur if the LIGHTS 3 terminal (TB1-3) is shorted to the chassis. Before replacing the chassis cover, ensure that the jumper (if installed) between the two terminals of TB1-3 will not short to the chassis.

- b. Plug the right-angle connector into the connector at TB2.
- c. Reconnect the wires at the terminal strips TB1 (LIGHTS), TB2 (AUX OUTPUTS), and SIGNALMASTER.

NOTICE

CORRECTLY POSITION VENT SLOTS

Excess heat can damage the unit. When reassembling, ensure that the cover's vent slots are positioned over the transformer.

7. Slide the cover onto the chassis and secure it with the two hex-head screws.
8. Reinstall the amplifier/relay unit in its mounting bracket in the vehicle.

Testing the SS201

⚠ WARNING

SOUND HAZARD

All effective sirens and horns produce loud sounds (120 dB) that may cause permanent hearing loss. Always minimize your exposure to siren sound and wear hearing protection. Do not sound the siren indoors or in enclosed areas where you and others will be exposed to the sound.

NOTICE

TEST SPEAKER BEFORE INSTALLING SS201

Make certain that the speaker is not defective before installing the repaired SS201.

After servicing is completed, perform a test of all functions to ensure the siren is operating properly.

Getting Replacement Parts

To order replacement parts, call our Mobile System Customer Support at 1-800-264-3578, 7 AM to 5 PM, Monday through Friday (CT) or contact your nearest distributor.

Table 7.1 Fuses

Designation	Description	Part Number
	Fuse, 2 A, Pico Fuse	148151-08
FA, FB, FC, FD, FE	Fuse, 10 A, Automotive Blade	148A142-05
F1, F2, F3A, F3B	Fuse, 20 A, Automotive Blade	148A142
	Fuse, 25 A, Automotive Blade	148A142-07
	Fuse, 20 A, In-Line	148A127
	Fuse, 7.5 A, Automotive Blade	148A142-04

Table 7.2 Assemblies

Description	Part Number
Control Head Assy.	8623118-02
Amplifier Assy., SS201-6	85361191
Amplifier Assy., SS201-8	85361191-01
SignalMaster PCB Assy.	2001181
Amplifier PCB Assy.	2005351-12
Relay PCB Assy.	2005100

Table 7.3 SS201 components

Designation	Description	Part Number
T2	Transformer, Output	120C165-03
Q3, Q4	Transistor, Output	125467
	Legend Sticker Card	8572294-04
	RJ-11 Data Cable	146863
	Power Harness (12-Conductor)	175684-06
CB1	Circuit Breaker (2–50 Amperes)	8474176
	Circuit Breaker, 25 A	152118-25
	Mounting Bracket, Amplifier	85361059
	Mounting Bracket, Control Head	8623120
	Installation Accessory Kit	85361194-01
	Microphone	MNCT-SB
	Remote Microphone Cable	RMK
	Remote Microphone Cable with Volume Control	RMK-V
	Plug, SIGNALMASTER	140338-11
	Two Position Jumper	233A198
	Right Angle Plug, Relay	140338-07

Getting Technical Support

For technical support, please contact the Federal Signal Service Department at:

Service Department
Federal Signal Corporation
Phone: 1-800-433-9132
Fax: 1-800-343-9706
Email: empsserviceinfo@fedsig.com

Returning a Product to Federal Signal

Before returning a product to Federal Signal, call 800-264-3578, 800-433-9132, or 800-824-0254 to obtain a Returned Merchandise Authorization number (RMA number). To expedite the process please be prepared with the following information:

- Your Federal Signal customer or account number.
- The purchase order number under which the items were purchased.
- The shipping method.
- The model or part number of the product being returned.
- The quantity of products being returned.
- Drop ship information as needed.
- Any estimate required.

When you receive your RMA Number:

- Write the RMA number on the outside of the box of returned items.
- Reference the RMA number on your paperwork inside of the box.
- Write the RMA number down, so that you can easily check on status of the returned equipment.

Send all material with the issued RMA number to:

Federal Signal Corporation
Public Safety Systems
2645 Federal Signal Drive
University Park, IL 60484-3167
Attn: Service Department
RMA: # _____
Federal Signal Corporation
800-433-9132 (phone)
800-343-9706(fax)
www.fedsig.com

Figure 7.1 Relay board (top board)

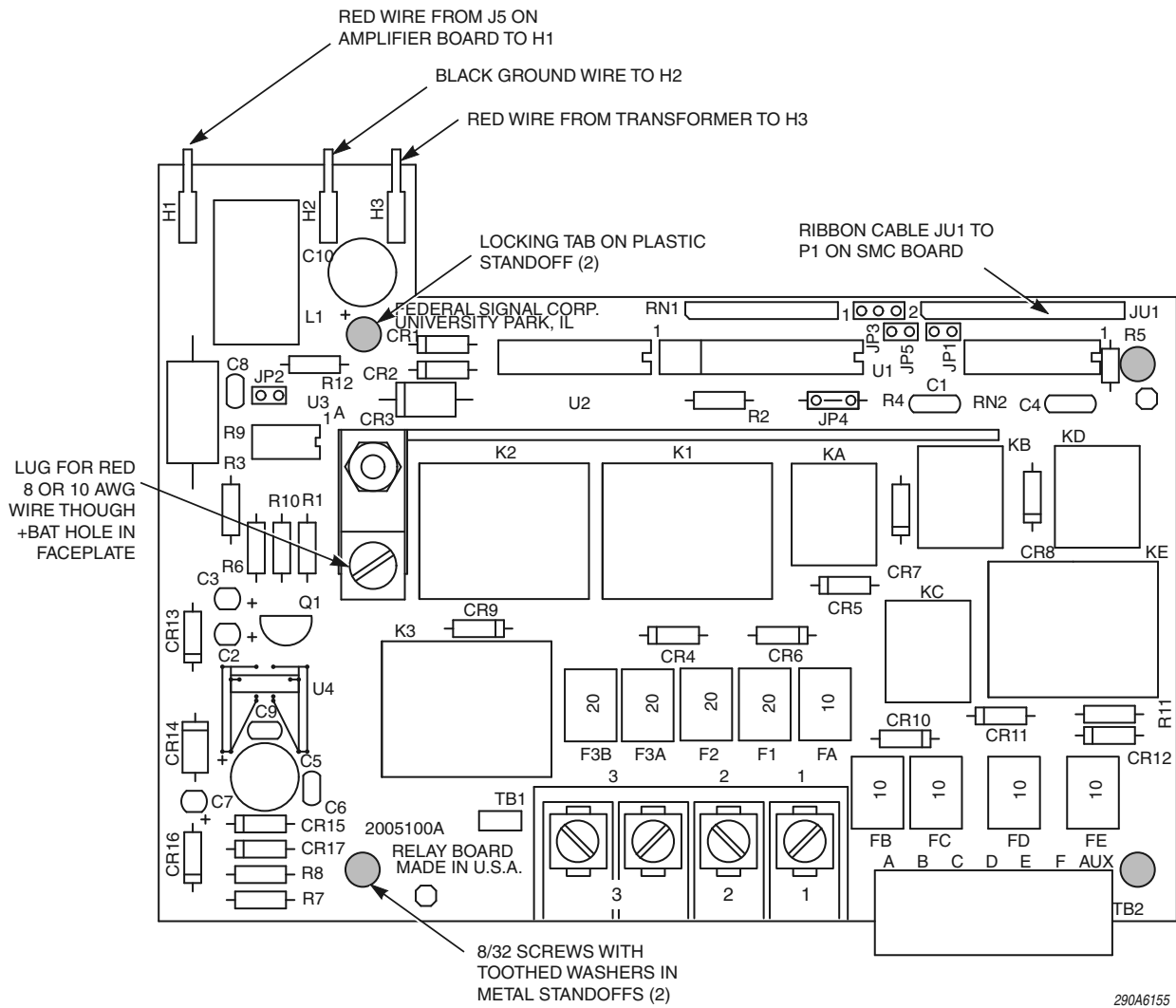


Figure 7.2 SMC board (middle board)

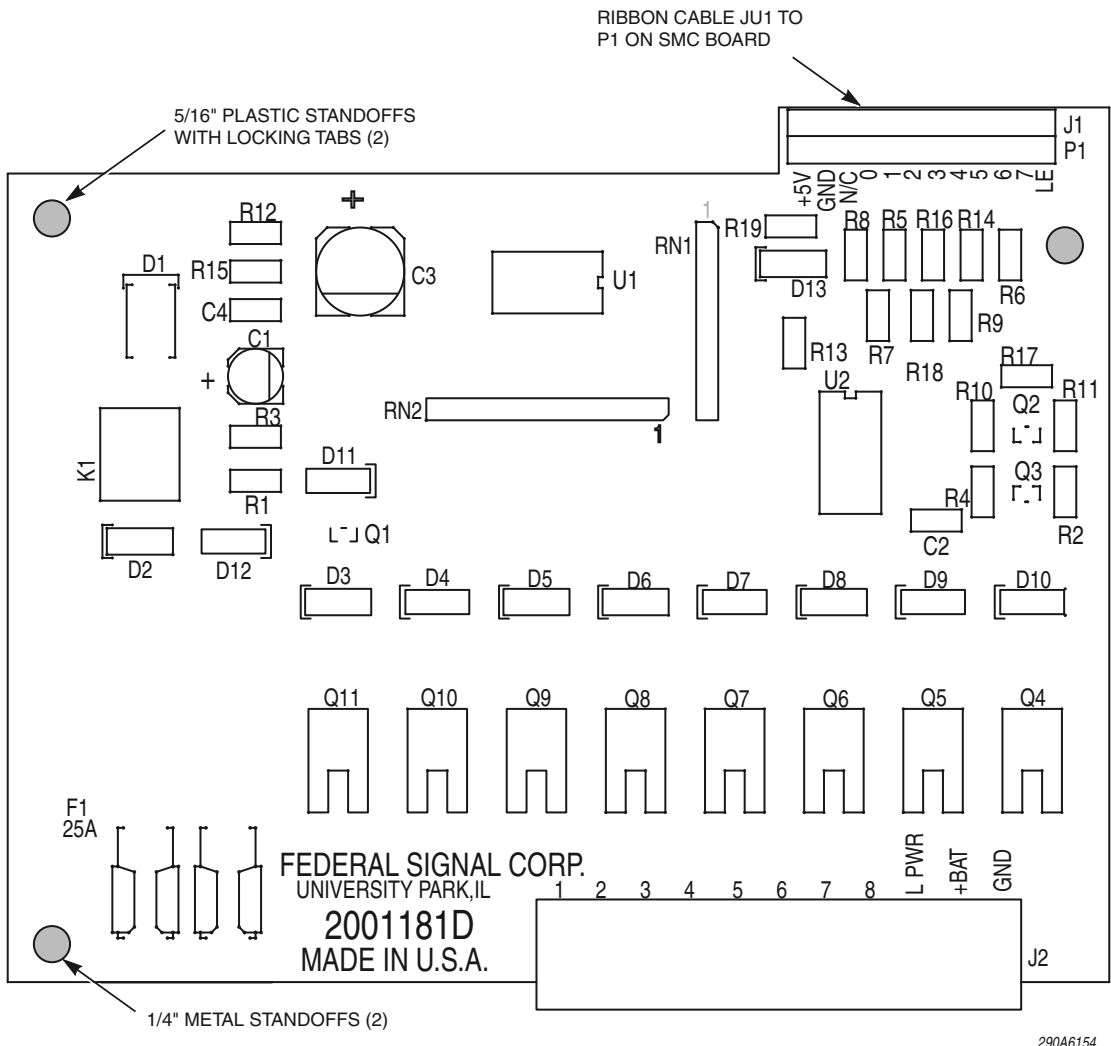


Figure 7.3 Amplifier board (bottom board)

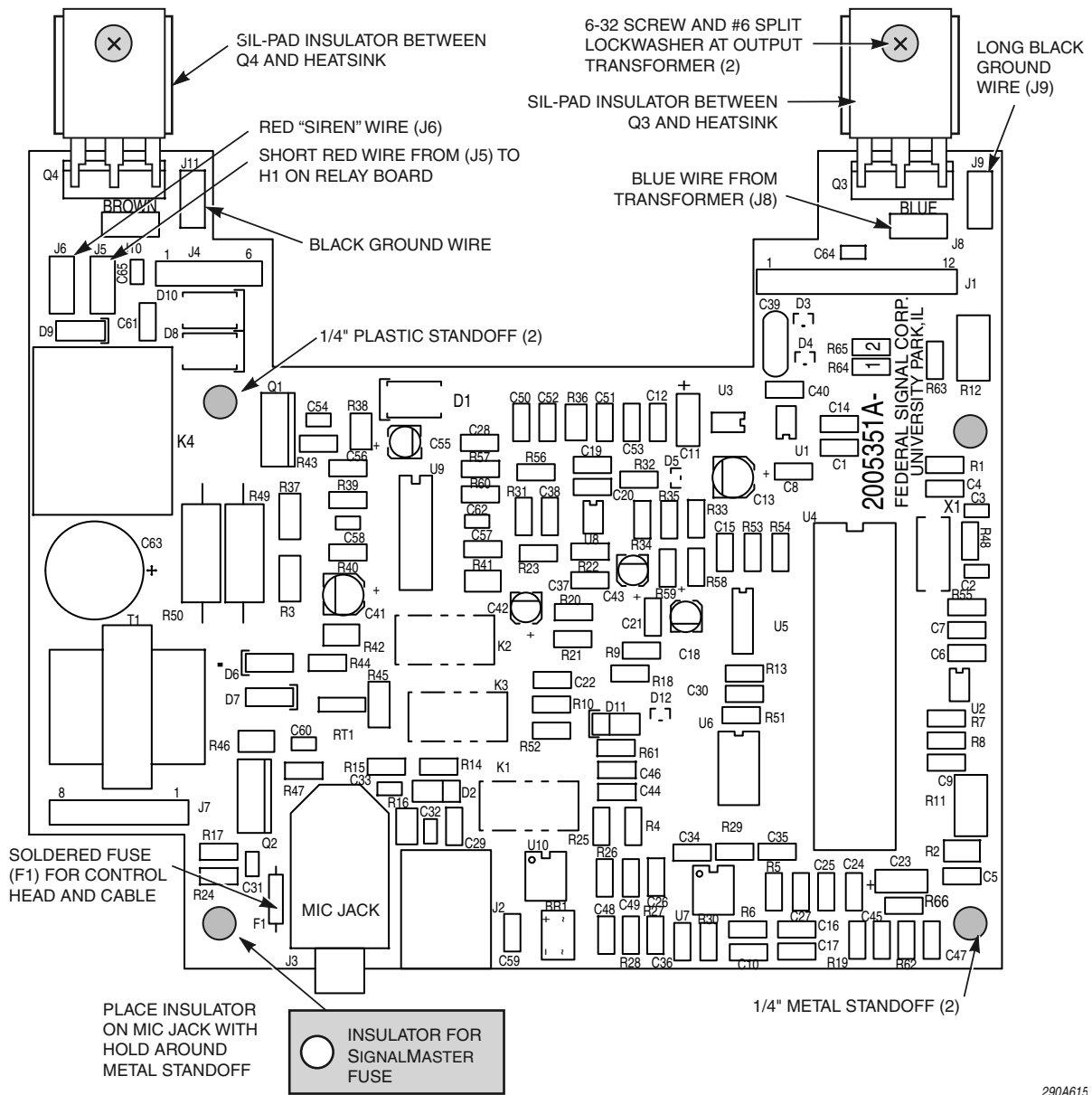


Chart for Relay and Device Assignments

Use this chart to record the devices assigned to each relay.

Relay K1 (20 A max.)
Relay K2 (20 A max.)
Relay K3 (Two 20 A = 40 A max.)
Relay KA (10 A max.)
Relay KB (10 A max.)
Relay KC (10 A max.)
Relay KD (10 A max.)
Relay KE (10 A max.)

	YES	NO
Is Horn Ring Transfer used?	<input type="checkbox"/>	<input type="checkbox"/>
	YES	NO
Is the Park Siren Deactivator Used?	<input type="checkbox"/>	<input type="checkbox"/>

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